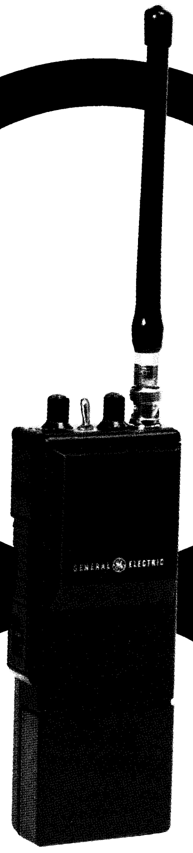
MOBILE RADIO

MPI PERSONAL RADIO

MAINTENANCE MANUAL LBI-31497B

(SUPERSEDES LBI-31311)



136-174 MHz
PERSONAL RADIO
2/4 WATTS

GENERAL ELECTRIC

TABLE OF CONTENTS

COMBINATION NOMENCLATURE

Digits 1 & 2	Digit 3	Digit 4	Digit 5	Digit 6	Digit 7	Digit 8	Digit 9	Digit 10
Product Code	Package	TX Frequency Range	RX Frequency Range	Channel Spacing	RF Power Output	Max. Channel Capacity	Control	Power Source
P5 MPI	**C** Local/ Remote	**H** 136-150 MHz	**H** 136-150 MHz	**6** 30 kHz	**5** 1.7-3.8 Watts	**B** 2 Tx-2 Rx	**E** Standard	**N** NiCd 450 mAh
		J 150-174 MHz	**J** 150-174 MHz		**6** 3.9-6.4 Watts	**C** 2 Tx-1 Rx		
						D 1 Tx-2 Rx		

RC5122

STRUCTURED OPTIONS

A Option TX Xtals	**B** Option RX Xtals	**C** Option	**D** Option	**E** Option	**F** Option	**H** Option	**K** Alt IF
A 1 Xtal	**A** 1 Xtal	**O** None	**O** None	**O** None	**O** None	**O** None	**O** None
B 2 Xtals	**B** 2 Xtals	**2** 1 Tone Enc CG	**L** T-99 Ind.	**I** DTMF	**4** Int. Safe	**A** CGE UHF	**3** Alt IF
O No Xtals	**O** No Xtals	**U** 1 Tone/Enc DCG	**M** T-99 Ind.-Group			**B** CGE HB	
		4 1 Code Enc. DCG.	**N** T-99 Ind. CG Enc				
		D 1 Code Enc/ Dcc DCG					
		R 1 Tone CG Enc w/Switch					
		S 1 Tone DCG Enc w/Switch					

RC4345A Sheet 2

VHF MPI
TYPICAL SPECIFICATIONS*
SYSTEM

FCC IDENTIFICATION NUMBER	
2-WATT	AXA9MZTR122A
4-WATT	AXA9MZTR120A
FREQUENCY RANGE	136-174 MHz
BATTERY DRAIN	
Receiver	
Standby	17 milliamperes
Rated Audio	150 milliamperes
Transmitter	
2 Watts	750 milliamperes @ 7.5 Volts
4 Watts	1100 milliamperes @ 10 Volts
TEMPERATURE RANGE	-30°C (-22°F) to +60°C (140°F)
DIMENSIONS (EIA) LESS ACCESSORIES (H X W X D)	7.11 (7.81 on 4 Watts) x 2.59 x 1.46 inches (180.5 x 65.7 x 37.1 millimeters)
WEIGHT, WITH ANTENNA	
2 Watts	455 grams (16 ounces)
4 Watts	492 grams (17.3 ounces)

BATTERY LIFE	2 Watts	4 Watts
At 5% - 5% - 90% Duty Cycle	8 hours	6 hours
At 2% - 8% - 90% Duty Cycle	12 hours	9 hours

TRANSMITTER

POWER OUTPUT	2 Watts	4 Watts
FREQUENCY STABILITY	±0.0005	±0.0005%
CONDUCTED SPURIOUS AND HARMONIC EMISSION	-26 dBm	
RATED SYSTEM DEVIATION	±5 kHz	
FM HUM & NOISE	Greater than 50 dB	
AUDIO FREQUENCY CHARACTERISTICS	Frequency Response per EIA RS 316-B. Post limiter filter per FCC and EIA.	
DISTORTION	Less than 5% (300 to 3000 Hz)	
DEVIATION SYMMETRY	0.5 kHz maximum	
MAXIMUM FREQUENCY SPREAD	4 MHz (Full Performance) 5 MHz (1 dB Degradation) 6 MHz (3 dB Degradation)	
RF OUTPUT IMPEDANCE	50 ohms	

RECEIVER

AUDIO OUTPUT (into 8.0 ohm load)	500 milliwatts (less than 5% distortion)
SENSITIVITY	
12 dB SINAD	0.25 uV
20 dB Quieting	0.35 uV
FREQUENCY STABILITY	0.0010%
SELECTIVITY	
EIA Two-Signal Method	-80 dB @ ±30 kHz
SPURIOUS RESPONSE	-70 dB
INTERMODULATION	-70 dB
MODULATION ACCEPTANCE	±7.5 kHz
SQUELCH SENSITIVITY	<6 dB SINAD
FREQUENCY RESPONSE	EIA RS 316-B

	NO DEGRADATION	3 dB DEGRADATION	6 dB DEGRADATION
MAXIMUM FREQUENCY SPREAD	2 MHz	3 MHz	4 MHz
RF INPUT IMPEDANCE	50 ohms		

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

DESCRIPTION

General Electric MPI Personal radios are extremely compact, high performance two-way FM radios designed for operation in the 136-174 MHz range. The lightweight radio utilizes both discrete components and Integrated Circuit modules (IC's).

All operating controls except the Push-To-Talk (PTT) switch and frequency select switch are conveniently located on the top of the radio. The frequency select and PTT switches are located on the side of the radio. An earphone jack, located above the PTT switch, is used with an earphone to provide message privacy, or to permit the operator to receive messages in noisy locations.

An external microphone jack is located next to the earphone jack. This permits the transmitter to be keyed and messages transmitted using the external speaker/ microphone.

Power for the radio is supplied by a removable rechargeable nickel-cadmium battery pack that fits in the bottom front section of the case. The battery pack can be recharged either in or out of the radio.

Test Adaptor 4EX12A12 is available to provide audio connections for servicing the transmitter and receiver.

OPERATION

If the radio is equipped with an option switch, disable the option before adjusting the radio by placing the switch in the OFF or MONITOR position. After adjusting the radio, place the option switch back in the CG OR T99 position (See Figure 1).

ADJUSTING THE RADIO

To Receive a Message:

1. Turn the OFF-VOLUME control clockwise to about mid-range.
2. Disable any option by placing the option control toggle switch (if present) in the OFF or MONITOR POSITION.
3. Turn the SQUELCH (SQ) control fully clockwise. A hissing sound will be heard from the speaker.
4. Adjust the VOLUME control until the hissing sound is easily heard but not annoyingly loud.
5. Turn the SQUELCH control slowly counterclockwise until the hissing noise stops. This adjustment is very important as it eliminates annoying noise when no one is calling you. It also determines how sensitive your radio will be to incoming calls.
6. In two-frequency units, select the proper frequency. You are now ready to receive messages from other radios in your system.

To Send a Message:

1. Turn on the radio as directed in the "To Receive a Message" section.
2. In two-frequency units, select the proper frequency. Then listen to make sure that no one is using the channel.

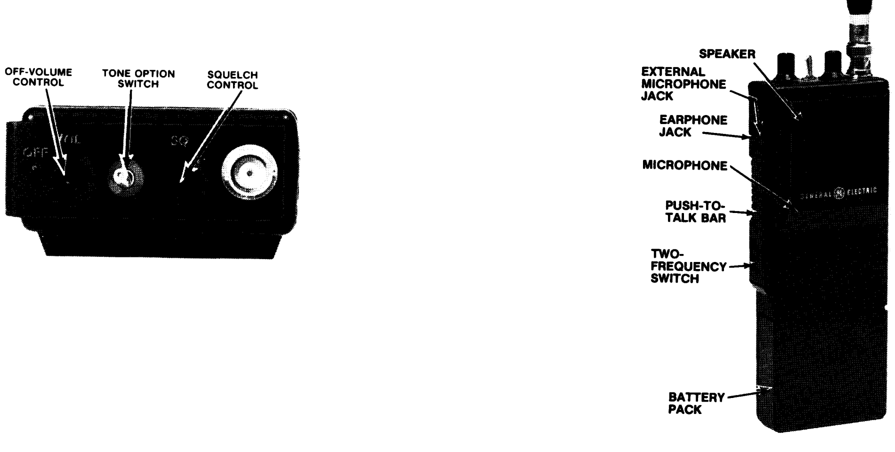


Figure 1 - Operating Controls

3. Hold the radio so that the antenna is vertical. Press the Push-To-Talk (PTT) bar and speak directly into the microphone in a clear and distinctive voice. The microphone is located in the lower left corner of the speaker grille. Always release the PTT bar as soon as you stop talking. You cannot receive messages while the PTT bar is pressed.

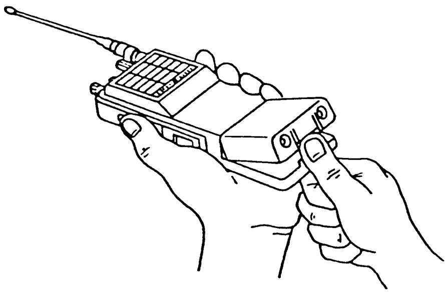
CHARGERS

Three battery chargers are available for recharging the Nickel-Cadmium battery pack. For specific instructions, refer to the applicable operating instruction or maintenance manual.

BATTERY PACK REPLACEMENT

To remove the battery pack from the radio:

1. Turn the radio OFF.
2. Place thumb on bottom of battery pack and press battery pack toward the top of radio as shown.
3. Then push bottom of battery pack away from the radio.



WARNING

Do not dispose of battery packs or batteries by burning. To do so may cause an explosion.

CAUTION

OSCILLATOR CRYSTAL REPLACEMENT

Crystals Y1, Y2, Y4, and Y5 are plug-in types for ease of replacement. Note that one lead is grounded to the crystal can. This lead must be plugged into the socket which is connected to the ground plane of the Transmit Receive Board.

CIRCUIT ANALYSIS

TRANSMITTER

The Transmitter is a crystal-controlled, frequency modulated transmitter for one- or two-frequency operation in the 136-174 MHz band. The transmitter utilizes discrete components to provide a minimum RF power output of two watts. The transmitter consists of the following assemblies.

- Audio Board - with the microphone amplifier/limiter, post-limiter filter and oscillator compensator circuits.
- Transmit/Receive (TR) Board - with the oscillators, multiplier stages, amplifier, driver and PA stages, TR switch, and low-pass filter.

All supply voltages for the transmitter are provided by the battery and the Regulator. The different transmitter voltages required are shown in the following chart:

Voltage	Used For
Continuous 10/7.5 Volts	Post-limiter filter, driver and PA circuits
Switched TX 10/7.5 Volts	Multipliers and 1st amplifier
Switched TX 5.4 Volts	Mic amp/limiter, microphone, driver base bias and oscillators
Regulated 5.4 Volts	Compensator and modulator circuits

References to symbol numbers mentioned in the following text are found on the Schematic Diagrams, Outline Diagrams and Parts List. A block diagram of the complete transmitter and receiver is shown in Figure 2.

AUDIO CIRCUITS

Audio from the microphone is applied to a 6 dB pre-emphasis network (R16, D1, C15, C17 and C18) and then to amplifier-limiters Q3 and Q4. The output of Q4 is applied to the post-limiter filter consisting of Q6, Q7, Q8 and associated circuitry.

The output of the post-limiter filter is coupled through C30 and the modulation circuitry to transmitter oscillator Q13.

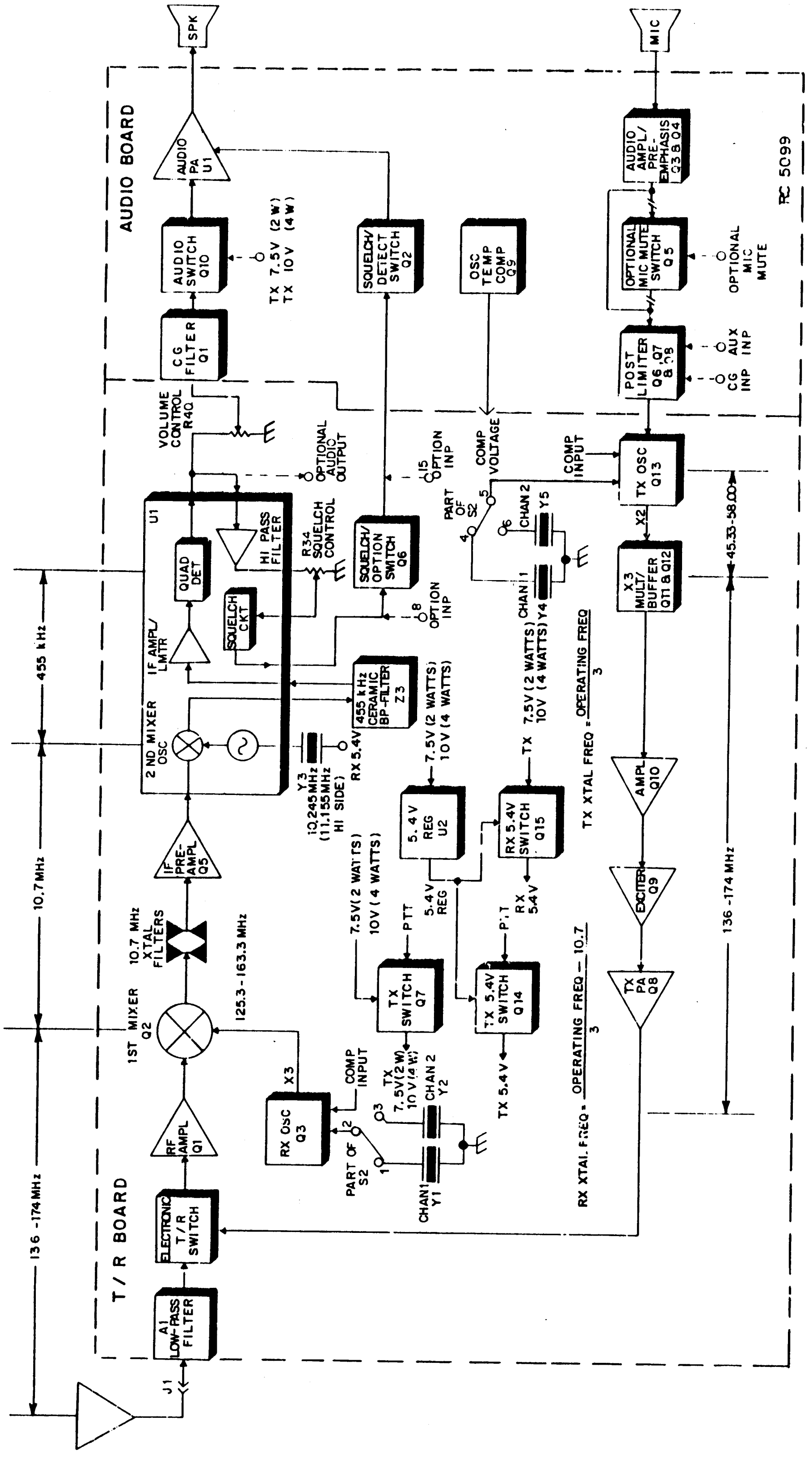


Figure 2 - Block Diagram

A compensator circuit (Q9 and R36 through R40 on the audio board) provides frequency compensation at low temperatures for the transmitter and receiver oscillators.

T/R BOARD

OSCILLATOR & MULTIPLIER-BUFFER

The temperature compensating DC voltage and TX audio is applied to FM modulators D6 and D7 through MOD ADJ controls R69 and R70. The modulator varactor varies the transmit frequency at the audio rate applied from the audio board.

Q13, Y4, Y5 and associated circuitry comprise a Colpitts oscillator. The transmit oscillator is adjusted to the assigned operating frequency by L36 and L37. Channel 1 or Channel 2 is selected by S2. The oscillator output is matched to the input of the buffer-multiplier stage by L33 and applied to the base of buffer/multiplier Q12/Q11.

The output of multiplier Q11 is tuned to three times the crystal frequency by L30 and L31.

Drive to the multiplier/buffer stages can be monitored at J10 (TP4).

AMPLIFIERS AND PA

Following Q11 is Class B amplifier Q10. Emitter voltage can be monitored at J9 (TP5). The output of Q10 is tuned by C63 and C92 to provide maximum drive to Q9. The output of driver Q9 is applied to the base of PA transistor Q8. C59 is tuned to provide impedance matching to the PA stage.

A collector feed network consisting of L18, L19, L24, L25, C51, C54, C58, C61, C62, R46, R47, and R48 acts as a stablizing and decoupling network for Q9 and Q8.

Power adjust control C53 is used to set the output power to two watts. The PA output is applied to the antenna switch.

ANTENNA SWITCH

The solid state antenna switch consists of A1, C1, C2, L1 and D1 on the TR board. The circuit acts as a 1/4-wave line simulator.

Keying the transmitter applies approximately 1.6 volts to the anode of A1-D1, forward biasing the diode. When A1-D1 is forward biased, the 1/4-wave line appears as an open circuit to the RF output of the transmitter. This allows the transmitter output to be coupled through the low-pass filter to the antenna. L17, C91 and R74 provide bias and decoupling for the antenna switch.

The antenna switch acts as a 50-ohm line in the receiver mode (A1-D1 not forward biased).

RECEIVER

The receiver is a dual conversion, superheterodyne FM receiver designed for one or two-frequency operation in the 136-174 MHz frequency range. A regulated 5.4 volts is used for all receiver stages except for the audio PA IC, receiver RF amplifier, and mixer which operate from the 7.5 volt battery.

The receiver has intermediate frequencies of 10.7 MHz and 455 kHz. Adjacent channel selectivity is obtained by using three band-pass filters: two 10.7 MHz two-pole crystal filters and a 455 kHz ceramic filter.

All of the receiver circuitry except the audio PA and oscillator compensator is mounted on the transmitter/receiver (TR) 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 Circuitry
- Squelch Circuitry

RECEIVER FRONT END

An RF signal from the antenna is coupled through the low-pass filter, antenna switch, and image filter to the emitter of RF amplifier Q1. The image filter consists of C3, C4, C5 and L2.

The output of Q1 is coupled through two tuned circuits that provide most of the front end selectivity. The tuned circuits are L3, C8, C9, C10, C17, L4 and L5.

OSCILLATOR AND MULTIPLIER

Q3, Y1, Y2, D2, D9 and associated circuitry make up a Colpitts oscillator. The frequency is controlled by a third mode crystal operated at one third of the required injection frequency. Voltage-variable capacitor D2, L34 and Y1 are connected in series to provide compensation capability.

The compensation voltage used to control the transmitter oscillators is applied to D2 to maintain stability. L34 is adjustable to set the oscillator frequency. R75 is in parallel with Y1 to insure operation on the third overtone of the crystal.

The oscillator output is tuned to the third harmonic of the oscillator frequency by C25. C29 and C86 are tuned to reduce unwanted harmonics. The output frequency of the oscillator is the operating frequncy minus 10.7 MHz. This frequency is then applied to the first mixer, (Q2).

The DC level of the oscillator can be monitored at J6 (TP1). The meter reading at this point is typically 5.2 volts.

1ST MIXER AND IF FILTER

The 1st mixer uses an FET (Q2) as the active device. The FET mixer provides a high input impedance, high power gain and an output relatively free of intermodulation products.

In the mixer, RF from the front end filter is applied to the gate Q2. Injection voltage from the oscillator is applied to the source of the mixer. The 10.7 MHz mixer 1st IF output signal is coupled from the drain of Q2 to crystal filters Z1 and Z2.

The highly-selective crystal filter provides the first portion of the receiver IF selectivity. The output of the filter is coupled through R9 to the 1st IF amplifier.

Supply voltage for the 1st mixer can be metered at J5 (TP3). The meter reading is typically 7.4 volts.

1ST AND 2ND IF AND DETECTOR STAGES

The 10.7 MHz IF output of the crystal filters is applied to the base of IF amplifier Q5. The amplifier provides approximately 12 dB of IF gain. The output of Q5 is coupled through C18 to the input of the 2nd Mixer IC.

U1A and associated circuitry consists of the 2nd oscillator and mixer. The crystal for the oscillator is Y3. The oscillator operates at 10.245 MHz for low side injection of the 2nd IF (standard), or 11.155 MHz for high side injection for those radios determined to be operating on a tweet frequency. This frequency is mixed with the 10.7 MHz input to provide the 455 kHz 2nd IF frequency.

The output of U1A is coupled through ceramic filter Z3 which provides the 455 kHz selectivity. The filter output is applied to U1B.

U1B and associated circuitry consists of an IF amplifier, 455 kHz limiter and a quadrature type FM detector. L16 is the quadrature detector coil. Volume control R40 is used to set the audio output level to the audio amplifier. R39 and C45 act as a low pass filter to remove 455 kHz from the audio.

AUDIO AND SQUELCH CIRCUITS

Audio

Audio from the VOLUME arm is coupled through a twin-T Channel Guard notch filter that consists of Q1 and associated circuitry. The filter attenuates any audio frequency below 211 Hz.

The audio output from the filter is coupled through receiver muting switch Q10 to audio amplifier U1. Q10 is turned on in the receive mode to pass the audio. The 500 milliwatt audio output of U1 is coupled through C10 to the speaker and earphone jack.

A 6 dB/octave de-emphasis is provided by C12, C6 and R10 in the audio feedback path. R7 and C5 provide additional de-emphasis at higher frequencies.

Squelch

The squelch circuit operates on the noise components contained in the FM detector output. The output of U1B is applied to a high-pass filter consisting of U1C, and associated circuitry. The output of U1C is noise in a band around 8 kHz.

With no RF signal present, the noise is rectified by D4 and a negative voltage is applied to the input of U1D, keeping it turned off and the receiver muted.

Pressing the PTT switch also forward biases clamping diode D5, keeping U1D input bias at the correct standby voltage in the transmit mode.

When an RF signal is received (receiver unsquelches), no noise is rectified by D4 and the input voltage at pin 12 of U1D rises to approximately +1 volt. This positive voltage turns on U1D, causing the output at U1D-14 to go positive, turning on buffer Q6. When turned on, the collector voltage of Q6 goes low, turning on PNP audio board squelch switch Q2. Turning on Q2 applies 7.5 volts to audio amplifier U1. This turns on U1 so that audio is heard at the speaker.

VOLTAGE REGULATOR AND TR SWITCHES

Turning on-off switch to the "on" position applies 7.5 volts to hybrid voltage regulator hybrid, U2. The hybrid provides a continuous, regulated output of 5.40 volts at U2-2.

TRANSMITTER SWITCHES

Pressing the PTT switch turns on Q7 and Q14. When Q7 is turned on, 7.5 volts from the battery is applied to the transmitter multipliers and 1st amplifier stages. The 7.5 volts is also applied to the gate of receiver muting FET Q10. The positive voltage on the gate turns Q10 off and mutes the receiver in the transmit mode. The switched 7.5 volts is also applied to the base of RX 5.4 volt switch Q15, turning the switch off in the transmit mode.

Turning on Q14 applies 5.4 volts to the transmitter oscillator, multiplier, buffer, and TX driver base bias circuits.

RECEIVER SWITCH

Releasing the PTT switch turns off the transmitter switches and turns on receiver switch Q15. This applies 5.4 volts to the receiver oscillators, IF amplifier, audio and squelch stages.

DISASSEMBLY

To remove the front cover for servicing, first remove the battery. Then remove the two screws at A and lift off the front cover (See Figure 3).

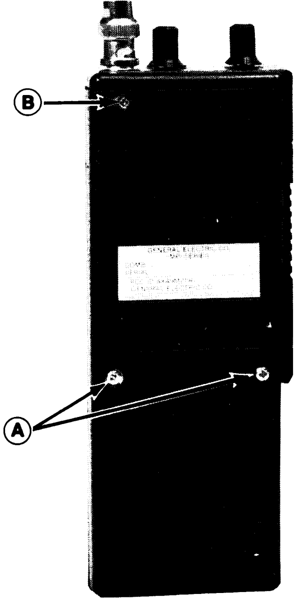


Figure 3 - Disassembly

To gain access to the back of the TR board, remove the two screws at A and the screw at B and remove the front and back covers.

CAUTION

Due to the excellent "drive" capability of the miniature TORX®-head screws, it is relatively easy to overtorque and damage the screws. The torque required for the screws is as follows:

1. **4 inch-pounds for the three M2.5 screws in the back cover.**
2. **2 1/4 inch-pounds for the three M2 screws holding the accessory area cover plate (under the battery).**

DO NOT OVERTORQUE!

If the radio is equipped with an option board, in addition to the above steps, the three screws holding the option cover must be removed.

NOTE

The option board must be slightly raised to clear the option cover mounting boss before removing the back cover.

CAUTION

Do <u>not</u> bend the thin option board material any more than necessary.

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

GENERAL ELECTRIC*
U.S.A.

REPLACING CHIP COMPONENTS

Replacement of chip capacitors should always be done with a temperature-controlled soldering iron, using a controlled temperature of 700°F (371°C). However, do NOT touch black metal flim of the resistors or the ceramic body of capacitors with the soldering iron.

NOTE

The metalized end terminations of the parts may be touched with the soldering iron without causing damage.

REMOVING CHIP COMPONENTS

1. Grip the component with tweezers or needle nose pliers.
2. Alternately heat each end of the chip in rapid succession until solder flows, and then remove and discard the chip.
3. Remove excess solder with a vacuum solder extractor or Solder-wick®.
4. Carefully remove the epoxy adhesive and excess flux to prevent damage to the printed board.

REPLACING CHIP COMPONENTS

1. Using as little solder as possible, "tin" one end of the component and one of the pads on the printed wiring board.
2. Place the "tinned" end of the component on the "tinned" pad on the board and simultaneously touch the component and the pad with a well "tinned" soldering iron while pressing the component down on the board.
3. Place the "tinned" soldering iron on the other end of the component and the pad simultaneously. Apply solder to the top of the end of the component until the solder starts to flow. Use as little solder as possible while getting a good joint.
4. After the component has cooled, remove all flux from the component and printed wiring board area with alcohol.

HOLE CHART

HOLE	DESCRIPTION
1	PTT SWITCH GND
2	OPT. GND
3	OPT. SW. GND
4	OPT. 10V[+7.5V]*
5	PTT FROM OPT.
6	OPT. +5.4V REG.
7	DISCRIMINATOR OUTPUT
8	OPT. MUTE
9	PTT OUTPUT TO OPTIONS
10	PTT SWITCH (HOT)
11	CG TONE INPUT TO XMTR
12	FROM OPT. TO OPT. SW. CONN.
13	FROM OPT. SW. TO OPT. CONN.
14	PTT OUTPUT FROM OPTIONS
15	SQUELCH FROM OPTIONS
16	TX 10V[+7.5V]*
0	
18	JUMPER WIRE
19	
20	GND. FOR RF CHOKE
21	OPTION SW GND FOR MIN LO VOL OPTION

TEST POINT CHART

TP	FUNCTION	TYPICAL V
1	RX Injection Tuning	5.2
2	(Not Used)	---
3	RX Injection Tuning	9.9[7.4]*
4	TX Drive Tuning	0.4
5	TX Drive Tuning	0.8
6	TX Drive Tuning	0.3

* [ ] = Voltages in brackets are for 2-Watt Transmitters

SERVICE TOOLS

4EX12A12 - Personal Radio Test Set (Does not include any inter connect cables)

Option 2847 - Internal J4 Interconnect Cable (May be used with any MPI radio)

Option 4990 - External Audio Jacks Interconnect Cable (Only used on units with remote mic capability)

Option 4120 - (Replaced TS 10 Service Tool Kit)
- ST 2513 - Coil and Trim Pot Alignment Tool
- ST 2521 - Oscillator Coil Alignment Tool
- ST 2519 - Johanson Capacitor Alignment Tool (0.029" tip)
- ST 2520 - Johanson Capacitor Alignment Tool (0.025" tip)
- 19A702672P1 - Battery Test Lead (Black)
- 19A702672P2 - Battery Test Lead (Red)
- 19B800747P3 - Audio Board Jumper Cable. Tin Contacts. (2 Required)
- 19B801406P57 - Audio Board Jumper Cable. Gold Contacts. (2 Cables Required)
- 19A144745G1 - Receiver Audio Test Cable
- 19B800968G1 - RF Probe Assembly

Option 4121 - 7.5 Volt Dummy Battery Pack (19D900773G1)

Option 4122 - 10 Volt Dummy Battery Pack (19D900773G2)

Mechanical Tools:
- ST 2307 - Spanner wrench for audio jacks
- ST 2311 - Spanner wrench for volume & squelch controls
- ST 0720 - Hex driver & assortment of 9 TORX bits

SYMPTOM	PROCEDURE
Poor or No Sensitivity	Verify that proper injection power is present and at the correct frequency, (f_c -10.7). This can be done by 50 ohm probe across L40. The power seen should be approximately 0 dBm. If OK, then use the 50 ohm probe with a signal generator to inject signal into various portions of the radio to isolate the bad section. Set the generator with standard modulation to the level and frequency indicated on the large service schematic and probe those points starting with the IC (U1) and moving forward to the antenna jack. In some cases parts must be adjusted for best sensitivity while probing. This is indicated on the schematic. Once the faulty stage is isolated, measure bias voltages.
No or Low Injection Power	Verify that tuning procedure has been done or tried. The oscillator string can be trouble shot by using a 50 ohm probe connected to a power meter capable of measuring power as low as -20 dBm. Probe the available power points to ground indicated on the large service schematic. The power seen should be approximately that shown on the schematic. Any adjustment needed during probing is indicated on the schematic. Start probing with the oscillator and proceed towards the mixer. Bias voltages are also shown on the schematic for both a running and non-running oscillator. To kill a running oscillator, place a .01 uF ceramic capacitor with short leads from the base to collector of the oscillator transistor Q3.
Receive Frequency Won't Adjust Properly	Check compensator voltage at P3-2 and at varicap (D2 or D9). Check anode voltage of varicap.
No Transmit 5.4V	Check the switching transistor Q14.
Radio Won't Go Into Transmit Mode	Verify that Hole 9 is going to ground when the PTT switch is pushed. If Channel Guard is present, first short Hole 9 and then Hole 5 to ground. Both operations should cause the radio to go into transmit mode unless a problem exists with the Channel Guard circuitry.
Low or No Transmit Power	Check battery voltage when in transmit. Low or uncharged battery or shorted cell will be <7 volts If the total transmit current is >500 mA, check the low pass filter and T/R switch. 1.6 VDC at C91 indicates that the radio is in the transmit mode. If the total transmit current is <100 mA, measure the base bias of Q13. Check for proper test point readings at TP4, TP5, TP6.
High TP6	0.2 - 0.4 VDC indicates proper drive into Q11. 0.6 VDC indicates no drive. Check the bias voltages.
Low TP5	0.7 - 0.9 VDC indicates proper drive into Q12. 0.5 VDC indicates no drive. Check the bias voltages.
High TP4	0.3 - 0.5 VDC indicates proper drive from the oscillator. With no oscillator activity TP4 will be 0.7 VDC.
Transmit Frequency Will Not Adjust Properly	Check the compensator voltage at P3-2. Check the anode voltage of the varicaps (D6 or D7).
No Transmitter Deviation	Disconnect the front cover and connect the test box. Apply 600 mV to TX audio. Check the DC and Audio Voltages on the Audio Board as indicated on the service schematic during transmit. If values are as indicated, substitute another front cover to test the microphone.
No 10V[7.5V] Supply	Check power connections and continuity of supply leads, and check fuse. If fuse is blown, check radio for shorts.
Low 10V[7.5V] Supply	Check for low or uncharged battery possibly with bad cell.
No 5.4V Regulated Supply	Check the 10V[7.5V] supply at pin 3 of regulator Q2. If a large standby current (i.e., >100 mA) is seen, check for a short to ground on the 5.4V output line.
No Rx	Check the 5.4V regulated supply. Then check 5.4V switching transistor Q15.
No Audio Output	Check audio board squelching transistor, Q2. If the audio amplifier U1 is properly biased on, inject a 50 mV RMS, 1 kHz signal into the preceeding stages until the faulty stage is isolated as follows. This signal must be capacitively coupled from the audio generator using a 1 uF electrolytic capacitor to avoid shifting bias voltages. Sequentially inject signal into the following points on the audio board: Pin 3 of U1, emitter of Q1, base of Q1, and P2-5 (volume control dependent). If the problem is not found on the audio board, check for recovered audio on the main board with an oscilloscope. Recovered audio should be seen at Pin 9 of U1, at Hole 7, and at Pin 3 of R40 (as well as the wiper depending upon position).
Low Audio	Measure supply voltage at Pin 6 of audio board IC (U1) and gate voltage of Q10. Verify that at least 150 mV (424 peak-to-peak) is present at Hole 7 when a strong RF signal is applied to the radio with standard test modulation. Check quad coil (L16) setting.
Distorted Audio Output	Apply a strong RF signal with standard test modulation and measure audio distortion into an 8 ohm dummy load (e.g., test adaptor box). Distortion should be less than 5% at 2 volts output at 1 kHz. If there is low electrical distortion and acoustical distortion is still present, listen with test box or swap front covers with another radio to test speaker.
No or Incorrect Detector Output	Verify bias to Pins 4 and 8 of the main board IC, U1. Using a 50 ohm probe, inject a strong 10.7 MHz modulated signal into Pin 16 of U1. Recovered audio should be seen at Pin 9 and the level should vary with the setting of quad coil, L16. If none is seen, check the second oscillator for activity. At least 80 mV of RF should be seen on Pin 1 to ground.
No 2nd Oscillator Activity	Substitute a known good crystal for Y3. Check voltages on U1 pins 1 and 2.
Radio Permanently Squelched	Verify that main board IC, U1, is properly biased at Pins 4 and 8 and that quad coil L16 is correctly adjusted. The voltage at the Schmidt trigger input (U1 Pin 12) should rise and fall with the setting of R34. The output at pin 14 should switch bias on and off to the base of Q6 as the input threshold is crossed. The collector of Q6 should saturate and unsquelch the radio once the input (Pin 12) is above the threshold, approx. 0.8V.
Radio Won't Squelch	Verify that main board IC, U1, is properly biased at Pins 4 and 8 and that quad coil L16 is correctly adjusted. An oscilloscope should see high frequency (approx. 8 kHz) noise at the noise filter output, U1 pin 11. This noise should be seen at the wiper of R34 (dependent upon position) and should be negatively rectified by D4. The remainder of the squelch circuit is described under the "Radio Permanently Squelched" section.

TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

1. Power Supply (minimum range of 6 volts to 10 volts, 3 Ampere)
2. 50-ohm Wattmeter capable of 7 watts with 50-ohm load
3. Audio Oscillator
4. Deviation Monitor
5. Frequency Counter
6. Voltmeter
7. Ammeter (3 ampere)
8. MPI Tune-up Kit Option 4120 (contains coil tuning tools, capacitor tuning tools, dummy battery, audio board jumper cables, and a 50 ohm probe).
9. Test adaptor 4EX12A12 and MPI cable 19B234242G1 for internal J4 connection (Option 2847), or Option 4990 for local remote connection.

PRELIMINARY STEPS AND ADJUSTMENTS

1. In addition to the antenna mounting bracket screw, the radio must be held tight against the back cover at the lower right corner near the negative battery terminal or TP8 (e.g. use a 4-40 screw and nut).
2. Remove the front cover and unplug the audio board from the main board. Then connect the audio board to the main board with the jumper cables.
3. Insert the dummy battery into the battery pack area and apply 7.5 Volts for 2 Watt radios or 10.0 Volts for 4 Watt radios to the RED terminal (BLACK terminal is ground) on dummy battery pack.

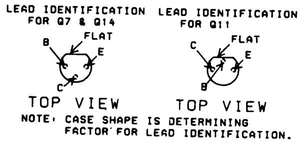
CAUTION

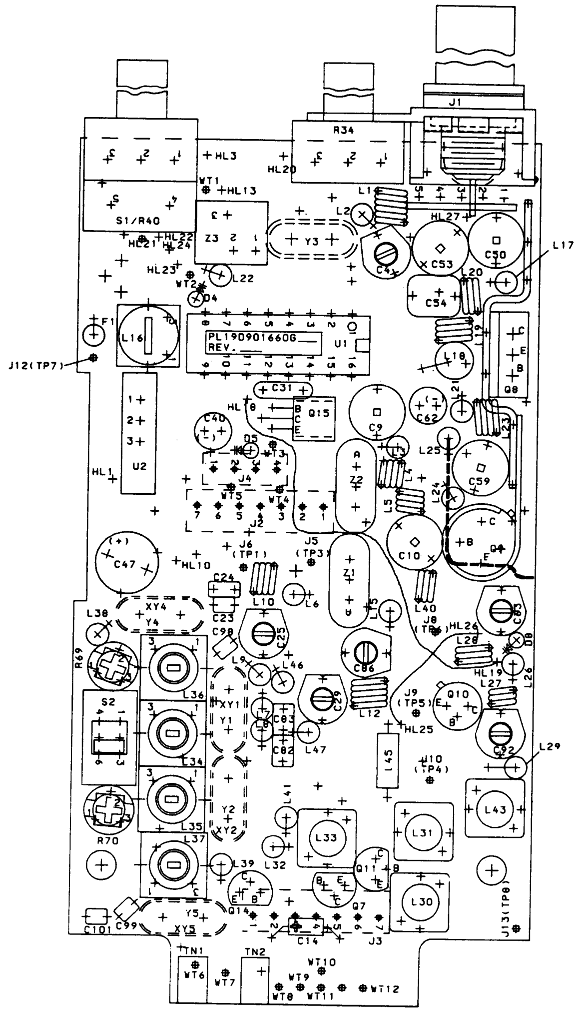
Reversing the supply voltage or applying an overvoltage may damage the radio.

4. Pre-set the tuning slugs in L36 (and L37 in two-frequency radios) to the center of their tuning range. Then set the tuning slugs of L31, L33 and L43 flush with the top of the coil form. Adjust L30 to the center of its tuning range. Adjust C63 for minimum and C92 for maximum capacitance (arrow pointing toward each other).
5. All adjustments are made with the transmitter keyed and Channel Guard enabled, if present.

NOTE

In two-frequency radios, switch to the higher frequency.





(19D901662, Sh. 1, Rev. 4)

ALIGNMENT PROCEDURE

STEP	METERING POINT	TUNING CONTROL	PROCEDURE
1.	TP4	L36 (or) L37 and L33	Adjust the frequency adjust coil of the higher frequency (L36 or L37) and L33 in that order for a dip in meter reading.
2.	TP5	L30, L31 and L43	Adjust L31, L43 and L30 in that order for a peak in meter reading. Repeat the adjustments.
3.	TP6	C92 and C63	Adjust C92 and C63 in that order for a dip in meter reading. Repeat the adjustment.
4.	Wattmeter	C59, C50 and C53	Adjust C59, C50 and C53 in that order for maximum power output. Repeat the adjustment.
5.	Ammeter	C50	Adjust C50 for a current drain of 750 milliamperes for a low power radio or 1.1 amp for a high power radio.
6.	Wattmeter	C53	Adjust C53 in the direction that causes both the power and current to decrease. Then adjust C53 for an output of 2.0 Watts for a low power radio or 4.0 Watts for a high power radio. NOTE The transmitter provides optimal radiation efficiency (antenna matching) when the transmitter is adjusted per the specifications. Tuning for higher power will degrade both radiated power and battery life.
7.	Wattmeter	C59	Reduce the supply voltage to 6.0 volts for low power radio or 8.0 volts for high power radio. Then re-adjust C59 for maximum power output. The output should be more than one watt for the low power radio or two watts for the high power radio.
8.			Increase the supply voltage to 7.5 volts for a low power radio or 10 volts for a high power radio. Then repeat Step 6. Do not re-adjust C50, and do not retune any of the previous stages.
9.	TP4	L36 or L37	On two-frequency radios, switch to the lower frequency channel and adjust L36 or L37 for minimum meter reading. Then measure the power output. Power output must be greater than or equal to 2.0 watts for the low power radio or 4.0 watts for the high power radio.
			FREQUENCY ADJUSTMENT
10.	Frequency Counter	L36 and L37	Plug the audio board onto the main board. In single frequency radios, adjust L36 for the proper frequency. In two-frequency radios, switch to Channel 1 and adjust L36 for the proper frequency. Then switch to Channel 2 and adjust L37 for the proper frequency.
			MODULATION ADJUSTMENT
11.	Deviation Monitor	R69 and R70	Connect the test adaptor with cable to J4 and switch to channel 1. Apply 600 millivolts at 1 kHz to the transmit audio terminals of the test adaptor and adjust R69 for highest peak deviation of 4.5 kHz ±100 Hz with Channel Guard enabled, if present. In two-frequency radios, switch to channel 2 and adjust R70 for 4.5 kHz peak deviation with Channel Guard enabled, if present.

ALIGNMENT PROCEDURE

TRANSMITTER

RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. 7.5-Volt or 10-Volt power supply as required.
2. Floating terminal (non-grounded) multimeter with at least 3 1/2 digits and a 200 millivolt DC lowest range.
3. RF generator.
4. Distortion analyzer.
5. MPI tune-up kit Option 4120 containing coil tuning tools, trimmer capacitor tuning tools, dummy battery, audio board jumper cables and a 50 ohm probe.
6. Test Adaptor 4EX12A12 and MPI Interconnect Cable (OPTION 2849 for J4 interconnect, or Option 4990 for local/remote interconnect).

PRELIMINARY CHECKS AND ADJUSTMENTS

1. In addition to the antenna mounting bracket screw, the radio must be held tight against the back cover at the top and lower right corner near the negative battery terminal or TP8 (e.g. use a 4-40 screw and nut).
2. Remove the front cover and unplug the Audio board from the main board. Then connect the audio board to the main board with the jumper cables.
3. Insert the dummy battery into the battery pack area and apply 7.5 Volts for a 2 Watt radio or 10.0 Volts for a 4 Watt radio, to the RED terminal (BLACK terminal is ground) on dummy battery.

CAUTION

Reversing the supply voltage or applying an over-voltage may damage the radio.

4. Pre-set the tuning slugs in L34, and L35 to the middle of their tuning range. Next, set the arrow on the rotor of C4, C25, C29 and C86 so that it points towards the rounded end of the capacitor.
5. Disable Channel Guard, if present.

NOTE

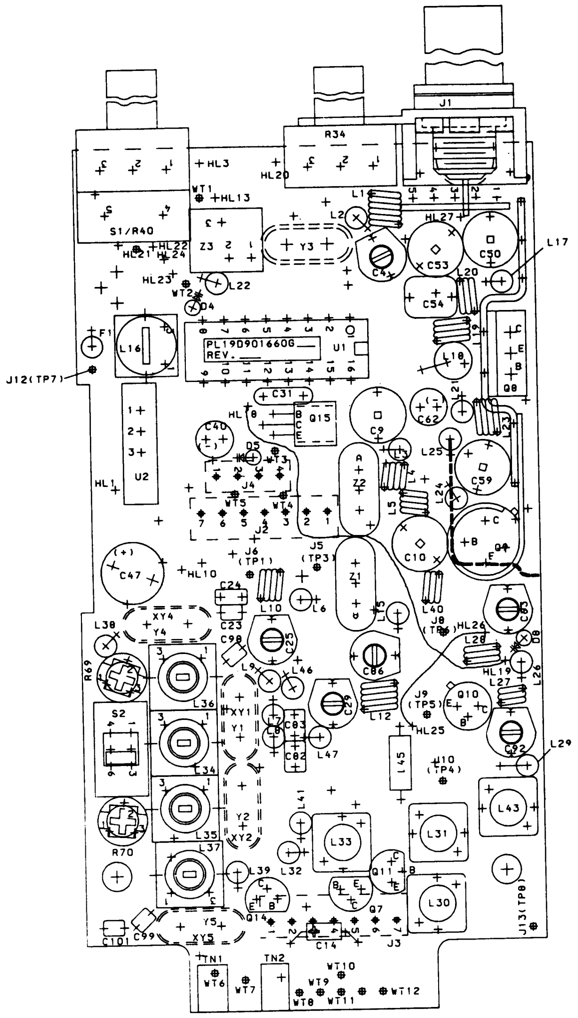
In two-frequency radios, all adjustments are made on the lowest frequency except as directed.

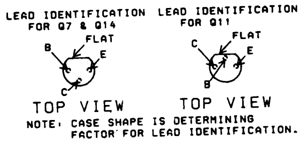
ALIGNMENT PROCEDURE

STEP	METERING POINT	TUNING CONTROL	PROCEDURE
			DETECTOR AND INJECTION ADJUSTMENT
1.	U1B-9 (on T/R board)	L16	Set the maximum audio level with the Volume Control to about 1 Volt RMS to prevent limiting. Using the 50-ohm probe, apply a strong modulated 10.7 MHz signal (>-50 dBm) to U1A-16 and adjust L16 for maximum audio output. **NOTE** If a 10.7 MHz generator is not available, set L16 for maximum noise output.
2.	Distortion Analyzer	L34 or L35, C25, C29, C86 C4, C9 and C10	In two-frequency radios, set the signal generator on the lower frequency with no modulation. Set the output level at approximately +10 dBm. Then adjust lower frequency control L34 (or L35) along with C25, C29, C86, C4, C9 and C10 in that order for best quieting. Use a ceramic-tipped tuning tool for tuning C4 and C9 to prevent tuning errors.
3.	U1B-9 (on T/R board)	L34 or L35	Modulate the RF generator with a 1 kHz signal at 5 kHz deviation. Adjust the frequency adjust coil (L34 or L35) on the lower frequency for best SINAD.

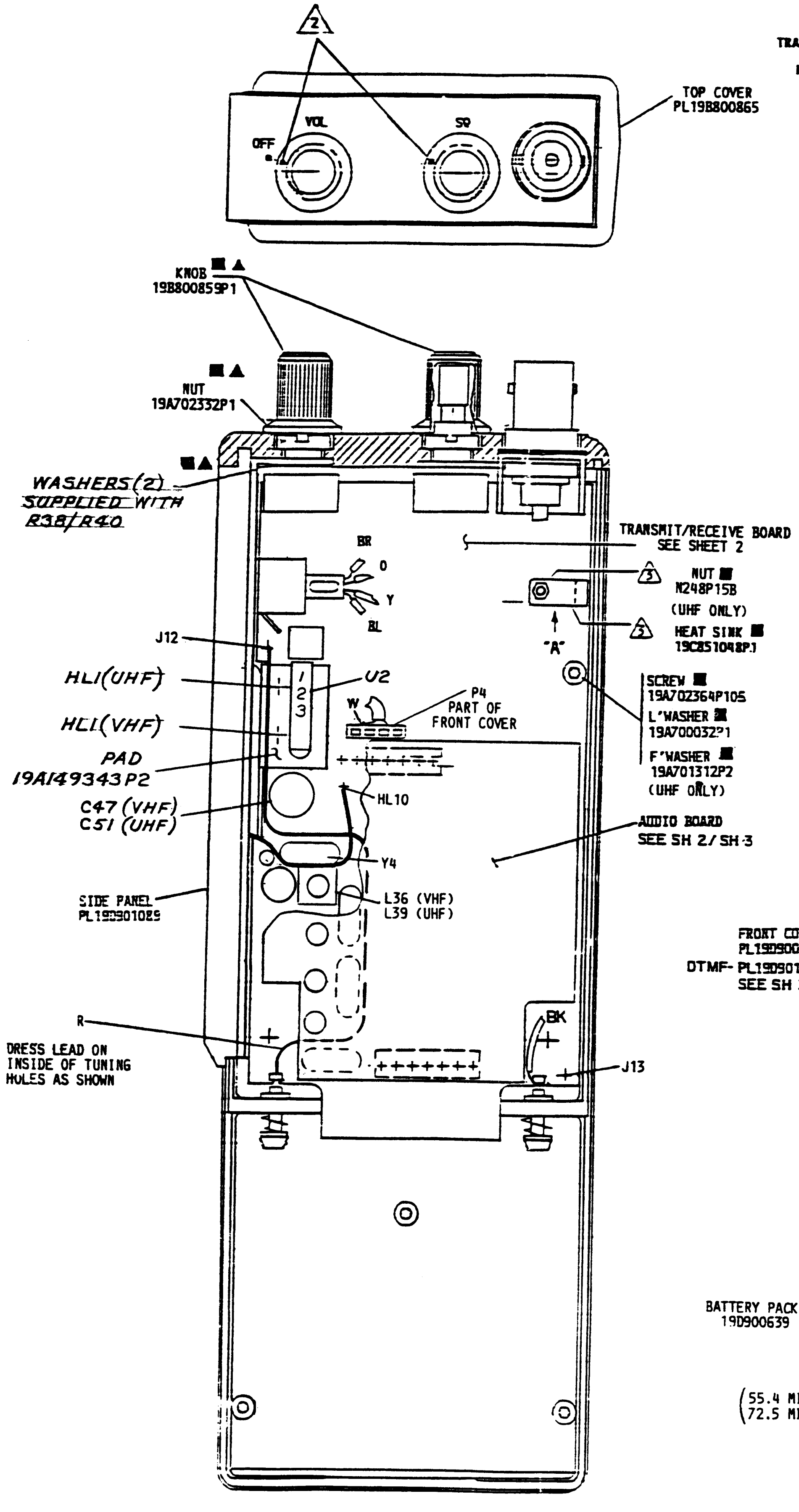
ALIGNMENT PROCEDURE (CONT.)

STEP	METERING POINT	TUNING CONTROL	PROCEDURE
			FREQUENCY AND FRONT END ADJUSTMENT
4.	U1B-9 (on T/R board)	L34 or L35	In two-frequency radios, move the frequency select switch S2 to the higher channel. Set the signal generator on the higher frequency with modulation. Then adjust the frequency adjust coil of the higher frequency channel (L34 or L35) for best SINAD.
5.	Distortion Analyzer	C4	Set Frequency Selector Switch (S2) to the higher frequency channel. Set the signal generator to the image frequency (21.4 MHz below the carrier frequency) and increase the RF level to approximately -50 dBm. Then adjust C4 for the worst quieting. **NOTE** Some retuning may be required on two-frequency units to balance the performance between the two frequencies. Switch between channel 1 and channel 2 and adjust C25, C29, C86, C10 & C9 for best sensitivity compromise between the two frequencies.

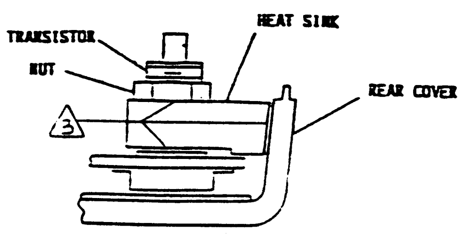




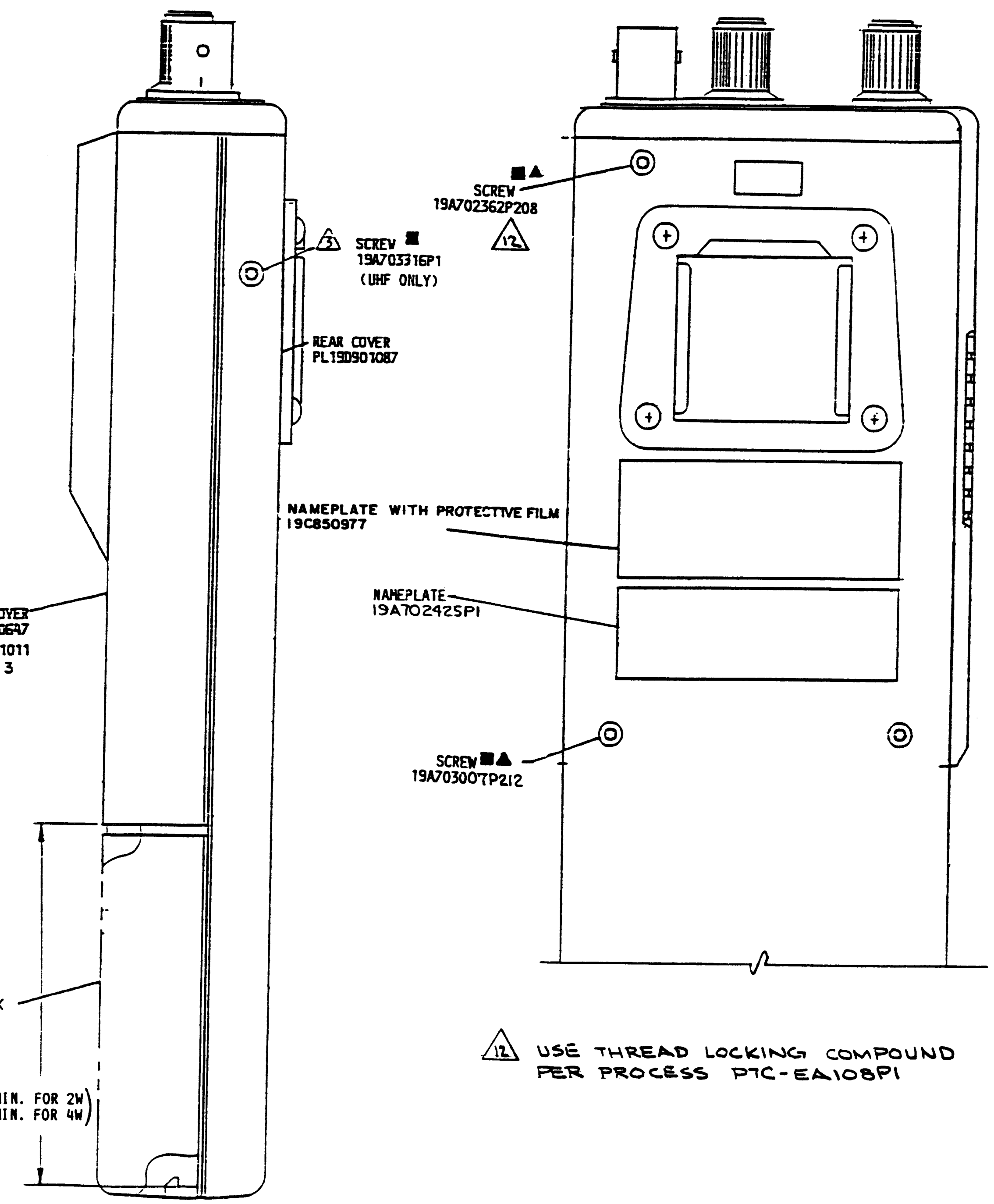
(19D901662, Sh. 1, Rev. 4)



FRONT VIEW WITH COVER REMOVED



VIEW AT "A"
(UHF ONLY)



CONNECTION CHART	
FROM	TO
SIDE PANEL-BK	TRANSMIT/RECEIVE BD-HL1 △10
SIDE PANEL-V	TRANSMIT/RECEIVE BD-HL10 △10
REAR COVER-R	TRANSMIT/RECEIVE BD-J12
REAR COVER-BK	TRANSMIT/RECEIVE BD-J13
SIDE PANEL-BR	TRANSMIT/RECEIVE BD-HL24 UHF/HL21 VHF
SIDE PANEL-O	TRANSMIT/RECEIVE BD-HL25 UHF/HL22 VHF
SIDE PANEL-Y	TRANSMIT/RECEIVE BD-HL26 UHF/HL24 VHF
SIDE PANEL-BL	TRANSMIT/RECEIVE BD-HL27 UHF/HL23 VHF

① VHF
SEE NOTES △4 △5 △8

② UHF
SEE NOTE △8

③ VHF - TWO FREQ TX & SINGLE FREQ RX
SEE NOTES △4 △6

④ UHF - TWO FREQ TX & SINGLE FREQ RX
SEE NOTE △6

⑤ DTMF
SEE SH. #3

⑥ VHF - SINGLE FREQ TX & TWO FREQ RX
SEE NOTES △4 △7

⑦ UHF - SINGLE FREQ TX & TWO FREQ RX
SEE NOTE △7

NOTES:

1. ITEMS MARKED ■ ARE PART OF HARDWARE KIT PL19A702379G2 (UHF).
ITEMS MARKED ▲ ARE PART OF HARDWARE KIT PL19A702379G3 (VHF).

△2. ROTATE OFF/ON-VOL POT TO EXTREME COUNTER CLOCKWISE (OFF) POSITION. ASSEMBLE KNOB WITH INDICATOR MARK ALIGNED WITH MARK ON TOP COVER. ROTATE SQUELCH POT TO EXTREME COUNTER CLOCKWISE POSITION. ASSEMBLE KNOB WITH INDICATOR MARK IN APPROXIMATELY SAME POSITION AS THE OFF/ON-VOL KNOB.

△3. APPLY SILICON GREASE (19A701337P1■) PER 19A701431 BETWEEN MATING SURFACES OF HEAT SINK, NUT, TRANSISTOR AND REAR COVER. SCREW MUST BE TIGHTENED BEFORE NUT. NUT TIGHTENING TORQUE TO BE .3 N-M

△4. A. CUT RUN ON SOLDER SIDE OF TX/RX BOARD 19D901660G1 WHEN LOWEST TX FREQ. SPECIFIED IS BELOW 142 MHz OR ON TX/RX BOARD 19D901660G2 WHEN LOWEST TX FREQ. SPECIFIED IS BELOW 162 MHz AS SHOWN IN DETAIL "G" (SH. #2).
B. CUT RUN ON SOLDER SIDE OF TX/RX BOARD 19D901660G2 WHEN HIGHEST RX FREQ. SPECIFIED IS BELOW 162 MHz AS SHOWN IN DETAIL "G" (SH. #2)

△5. A. WHEN NO TX CRYSTALS ARE SPECIFIED ON PRODUCTION TAG DO NOT CUT RUN SHOWN IN DETAIL "G" (SH. #2) PER NOTE 4.A.
B. WHEN NO RX CRYSTALS ARE SPECIFIED ON PRODUCTION TAG DO NOT CUT RUN SHOWN IN DETAIL "G" (SH. #2) PER NOTE 4.B.

△6. CUT RUN ON SOLDER SIDE OF TX/RX BOARD AND ADD JUMPERS AS SHOWN IN DETAIL "D" (SH. #2).

△7. CUT RUN ON SOLDER SIDE OF TX/RX BOARD AND ADD JUMPERS AS SHOWN IN DETAIL "E" (SH. #2).

△8. *SWITCH STOP IS TO BE INSTALLED UNLESS 8TH DIGIT OF COMBINATION NUMBER IS 'C', 'D' OR CRYSTALS ARE INSTALLED IN CHANNEL 2 TX AND/OR RX.*

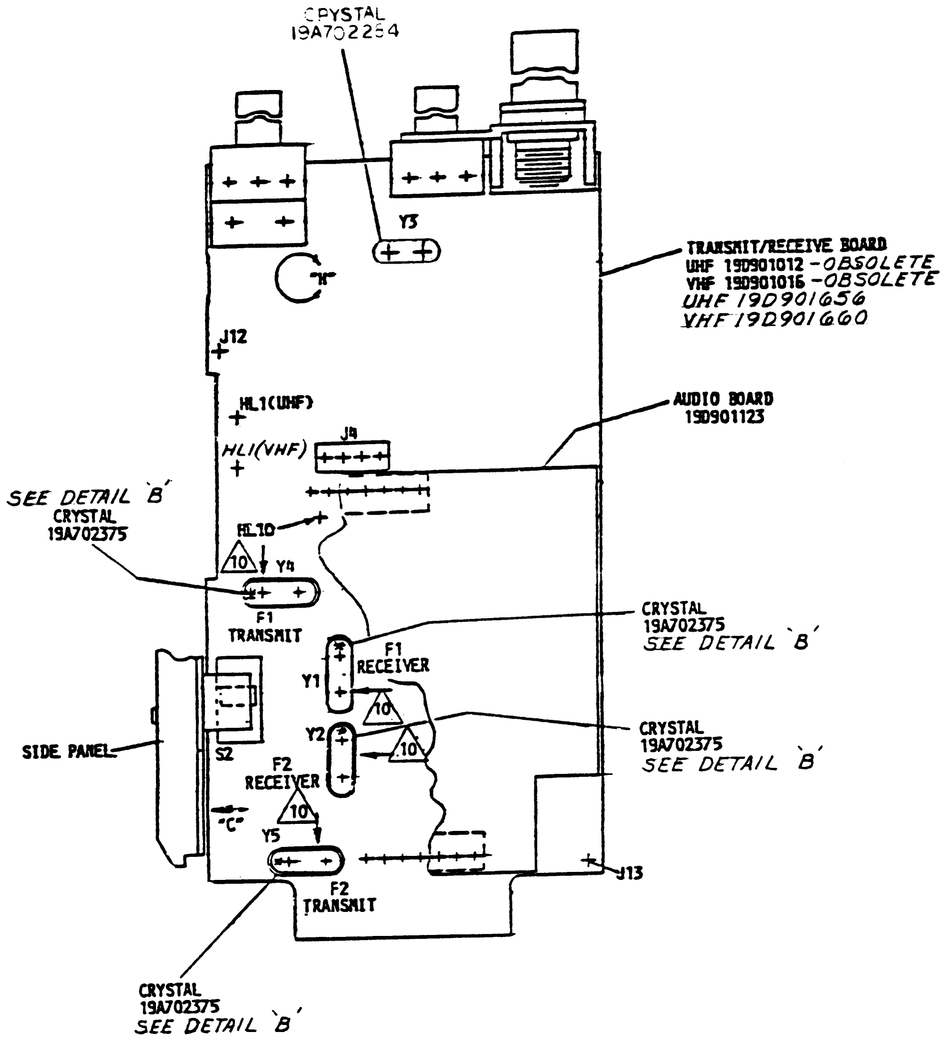
9. SOLDER ALL ELECTRICAL CONNECTIONS.

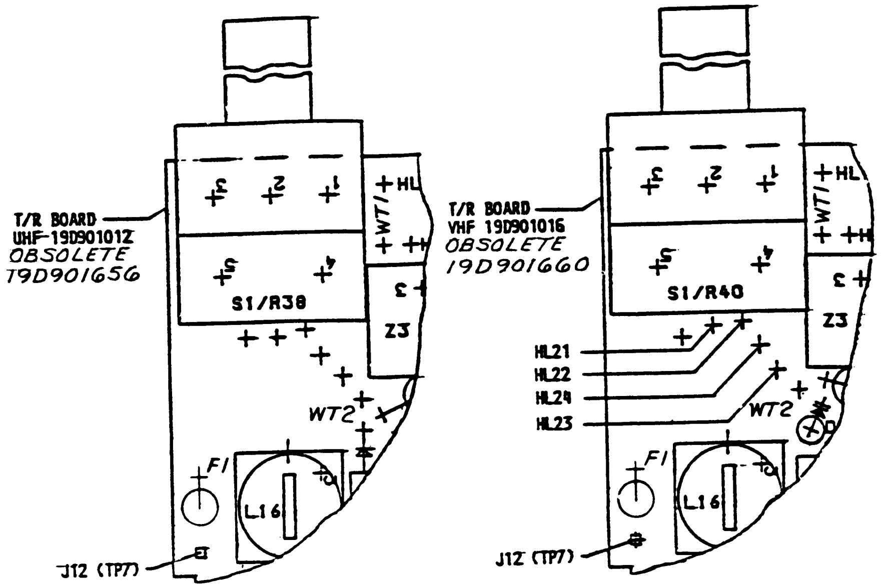
△10. ORIENT Y1, Y2, Y4 AND Y5 SO THAT DWG. NO. & FREQ. MARKING IS AT SIDE INDICATED. GROUND LEAD MUST BE IN POSITION AS INDICATED BY * (SH. #2)

△12. USE THREAD LOCKING COMPOUND PER PROCESS PTC-EA108P1

(19D901090, Sh. 1, Rev. 12)

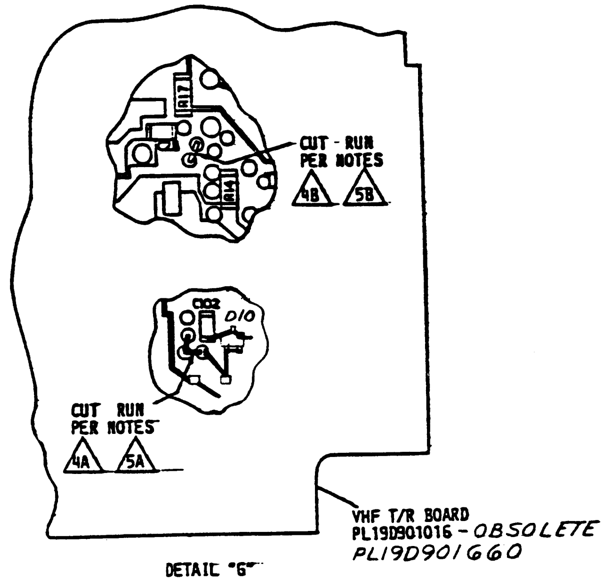
MECHANICAL LAYOUT



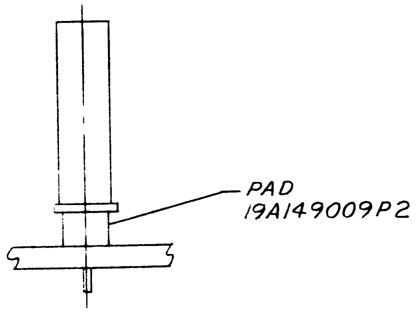


CONNECTIONS FROM SIDE PANEL JACKS TO T/R BOARDS

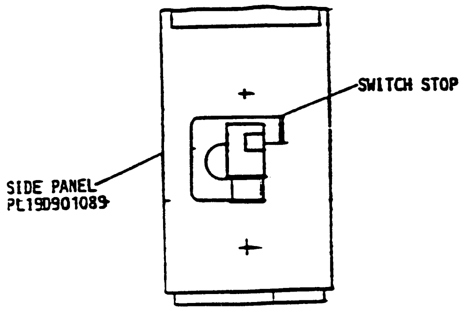
DETAIL "H"



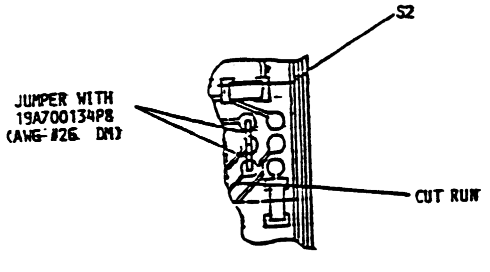
DETAIL "G"
SOLDER SIDE VIEW
(ENLARGED)



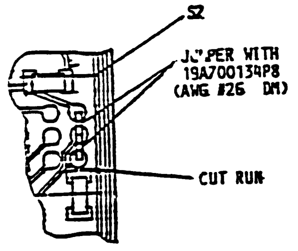
DETAIL 'B'
ENLARGED



VIEW AT "C"



PART 3 & 4 ONLY
DETAIL "D" 6
SOLDER SIDE VIEW
(ENLARGED)



PART 6 & 7 ONLY
DETAIL "E" 7
SOLDER SIDE VIEW
(ENLARGED)

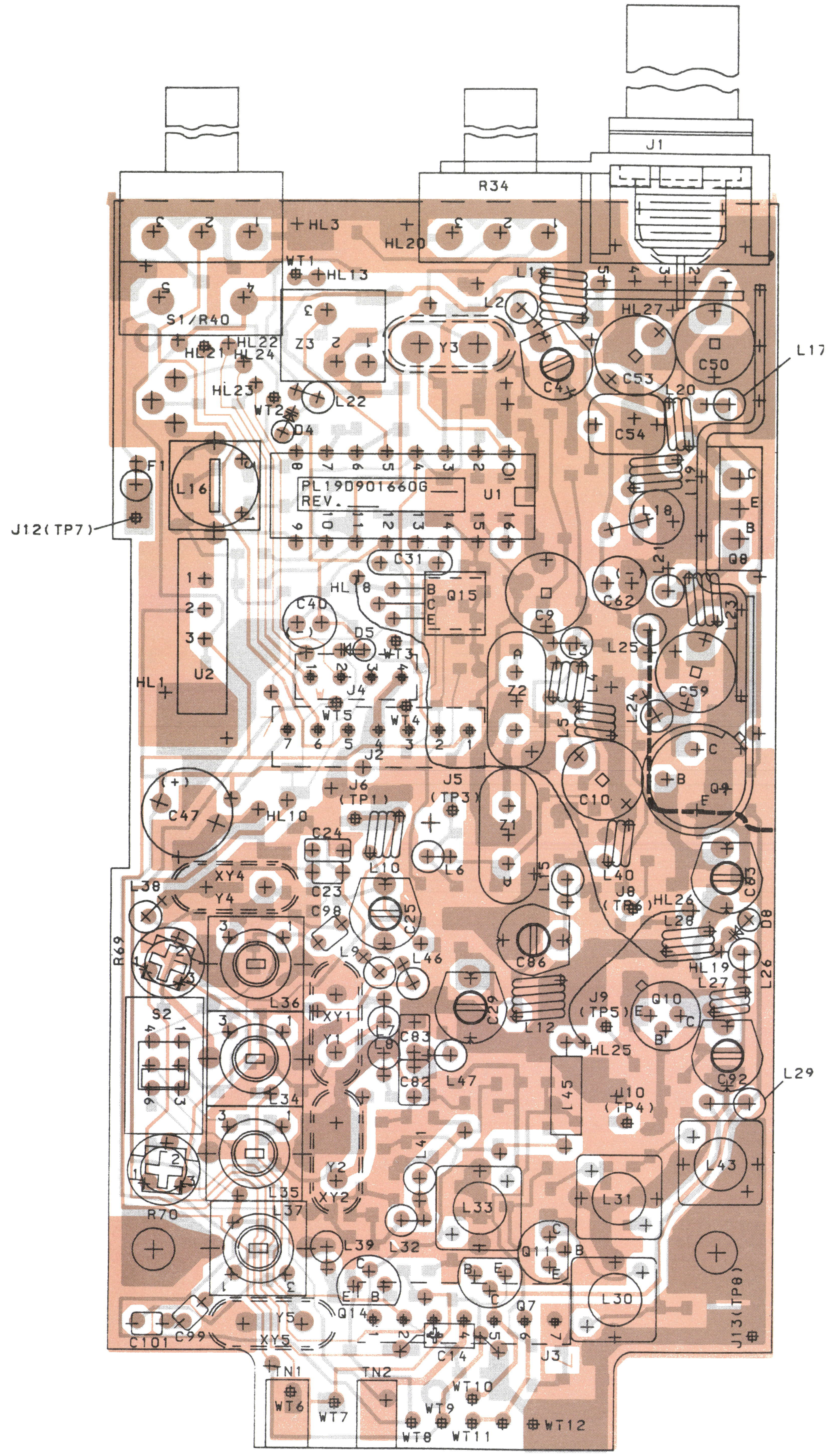
MECHANICAL LAYOUT

(19D901090, Sh. 2, Rev. 7)

CAUTION

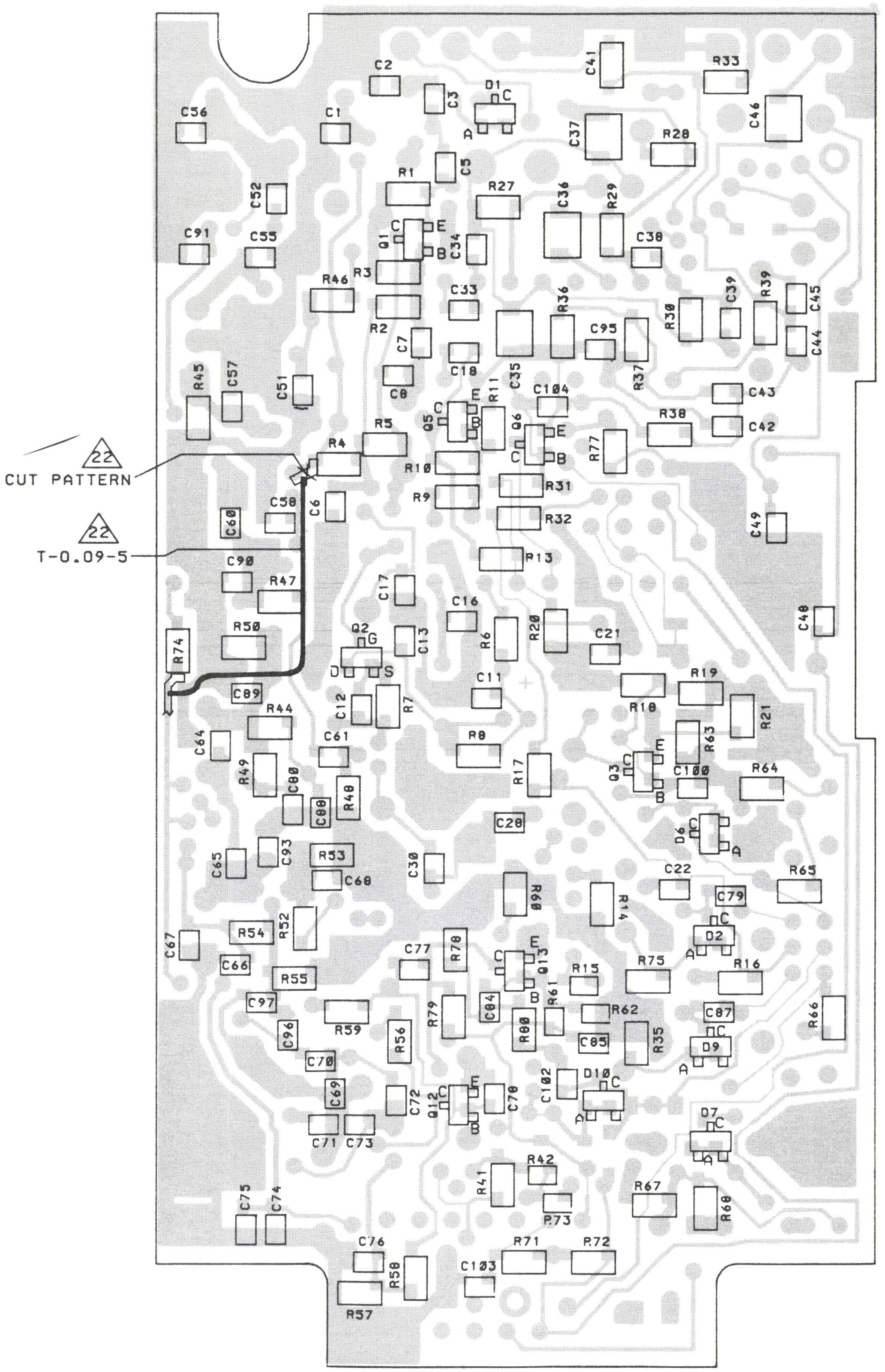
OBSERVE PRECAUTIONS FOR HANDLING

ELECTROSTATIC SENSITIVE DEVICES



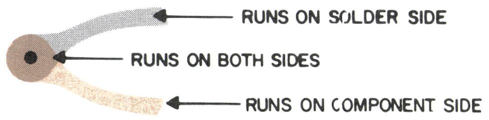
FRONT VIEW

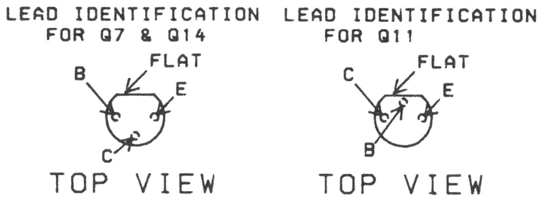
(19D901662, Sh. 1, Rev. 4)
(19A704672, Sh. 1, Rev. 1)
(19A704672, Sh. 2, Rev. 1)



REAR VIEW

(19D901660, Sh. 1, Rev. 7)
(19A704672, Sh. 2, Rev. 1)

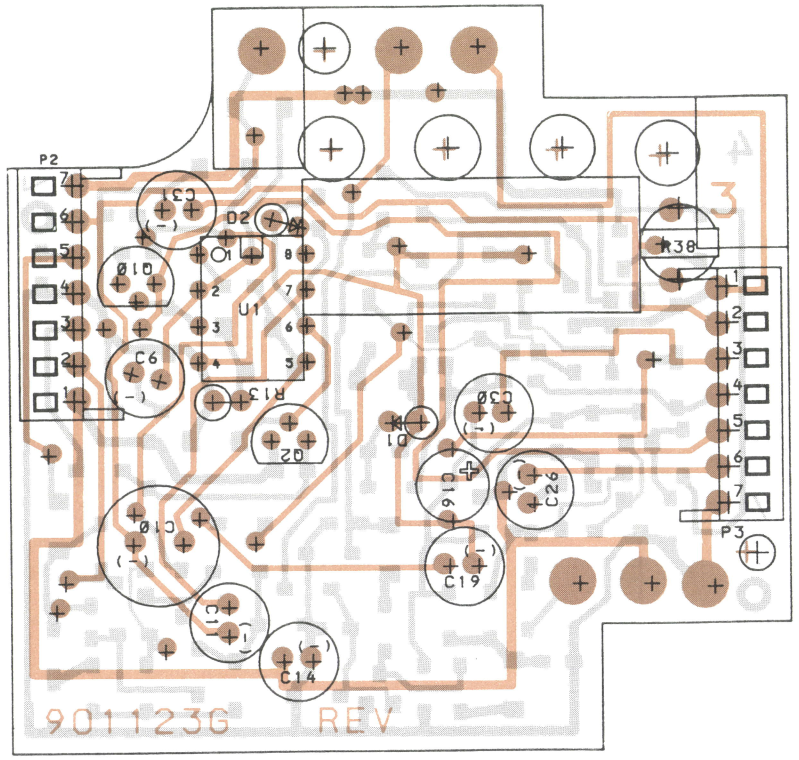




NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

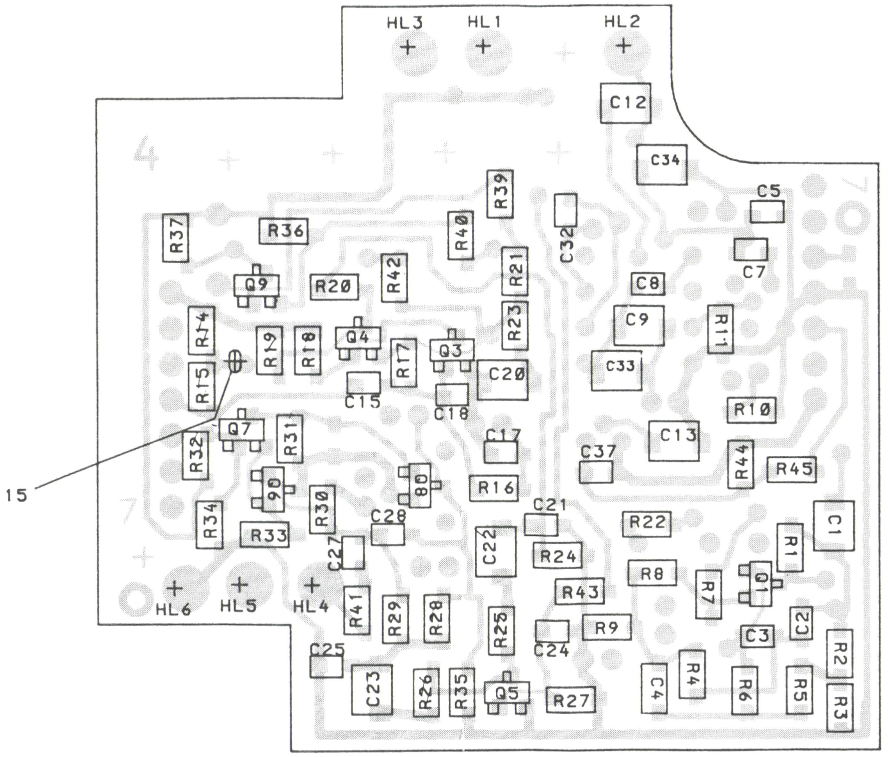
OUTLINE DIAGRAM

TRANSMITTER/RECEIVER BOARD



FRONT SIDE

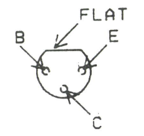
(19D901124, Sh. 1, Rev. 5)
(19A703568, Sh. 1, Rev. 3)
(19A703568, Sh. 2, Rev. 4)



BACK SIDE

(19D901123, Sh. 1, Rev. 7)
(19A703568, Sh. 2, Rev. 4)

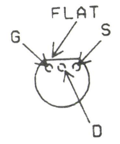
LEAD IDENTIFICATION
FOR Q2



IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

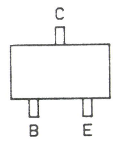
LEAD IDENTIFICATION
FOR Q10



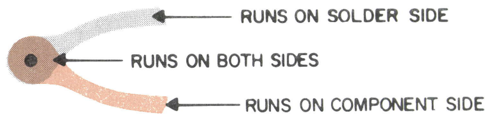
IN-LINE
TOP VIEW

NOTE: CASE SHAPE IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION
FOR Q1, Q3 THRU Q9



TOP VIEW



OUTLINE DIAGRAM

AUDIO BOARD

FREQUENCY SENSITIVE COMPONENTS
(DESIGNATED BY * ON SCHEMATIC)

REF NO.	G1 & G7 136-151	G2 & G8 150-174
C17*	10P	8.2P
C24	130P	100P
C29	5-30P	4-20P
C52*	68P	33P
C64*	33P	NONE
C69*	12P	10P
C70*	3.3P	1.8P
C71*	18P	15P
C78*	47P	39P
C79*	3.9P	NONE
C84*	68P	150P
C86	4-20P	3-11P
C87*	3.9P	NONE
C93*	33P	15P
L7	1.2u	1.0u
L8	1.2u	1.0u
L9	680n	560n
L32	470n	NONE
L38	1.0u	680n
L39	1.0u	680n
L41	1.5u	1.0u
L46	NONE	180n
R71*	64.9K	47K
R72*	56K	68K

DESCRIPTION	MODEL NO.	REV LTR
VHF 2W/4W MAIN BOARD 136-151 MHZ	PL19D901660G1	C
VHF 2W/4W MAIN BOARD 150-174 MHZ	PL19D901660G2	B
VHF 2W/4W MAIN BOARD 136-151 MHZ	PL19D901660G7	D
VHF 2W/4W MAIN BOARD 150-174 MHZ	PL19D901660G8	C
AUDIO BOARD (STANDARD)	PL19D901123G1	E
AUDIO BOARD (W/OPTION PARTS)	PL19D901123G2	E
AUDIO BOARD (STANDARD)	PL19D901123G7	
AUDIO BOARD (W/OPTION PARTS)	PL19D901123G8	
AUDIO BOARD (STANDARD) (GOLD)	PL19D901123G7	A
AUDIO BOARD (W/OPTION PARTS) (GOLD)	PL19D901123G8	A
BATTERY 10V	PL19D900639G3	
BATTERY 7.5V	PL19D900639G2	
REAR COVER (4 WATT)	PL19D901087G1	
REAR COVER (2 WATT)	PL19D901087G3	
SIDE PANEL	PL19D901089G1	
FRONT COVER (STANDARD)	PL19D900647G1	
FRONT COVER (LICENSEE)	PL19D900647G2	
FRONT COVER (DTMF/STD)	PL19D901011G1	
FRONT COVER (DTMF/LICENSEE)	PL19D901011G2	
FRONT COVER (STD.W/O METAL)	PL19D900647G4	

VOLTAGE READINGS:

VOLTAGE READINGS ARE TYPICAL VALUES MEASURED WITH A HIGH IMPEDANCE (eg:10MΩ) MULTI-METER FROM THE INDICATED POINT TO GROUND. CONDITIONS FOR READINGS ARE INDICATED BY THE FOLLOWING KEY:

R	INDICATES VOLTAGES ARE TO BE MEASURED DURING RECEIVE MODE
T	INDICATES MEASUREMENT DURING TRANSMIT
C	INDICATES CONTINUOUS VOLTAGE ALWAYS PRESENT WHEN RADIO IS ON

VOLTAGE READINGS SHOWN ARE FOR 4W MPI UNITS UNLESS ENCLOSED IN BRACKETS WHICH INDICATE VOLTAGES MEASURED ON 2 WATT MPI UNITS (FOR EXAMPLE [+7.5V])

NOTES

△1 PART OF PWB.

3. * IDENTIFIES "CHIP" COMPONENTS (EXAMPLE C57*) WHICH ARE LOCATED ON SOLDER SIDE OF PWB.

4. * PART VALUE SHOWN IS USED ON GROUP 2 & GROUP 8 UNITS. FOR GROUP 1 & GROUP 7 VALUES SEE COMPONENT IDENTIFICATION CHART OR PARTS LIST.

5. ALL CHIP RESISTORS ARE 1/8 WATT.
ALL OTHER RESISTORS ARE 1/8 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,u OR n.

△6 CUT THIS RUN FOR CG/CCT OPTION.

△7 CUT THIS RUN IN GROUP 1 & GROUP 7 IF THE HIGHEST TRANSMIT FREQUENCY IS BELOW 142 MHZ.
CUT THIS RUN IN GROUP 2 & GROUP 8 IF THE HIGHEST TRANSMIT FREQUENCY IS BELOW 162 MHZ.

△9 CUT THIS RUN IN GROUP 2 & GROUP 8 IF THE HIGHEST RECEIVE FREQUENCY IS BELOW 162 MHZ. DO NOT CUT THIS RUN IN GROUP 1 & GROUP 7.

△10 PART OF MODIFICATION KIT USED FOR CANADIAN GE OPTION (200 SERIES).

△11 CUT THIS RUN AND ADD WIRE IN GROUPS 1 & 7 ONLY.

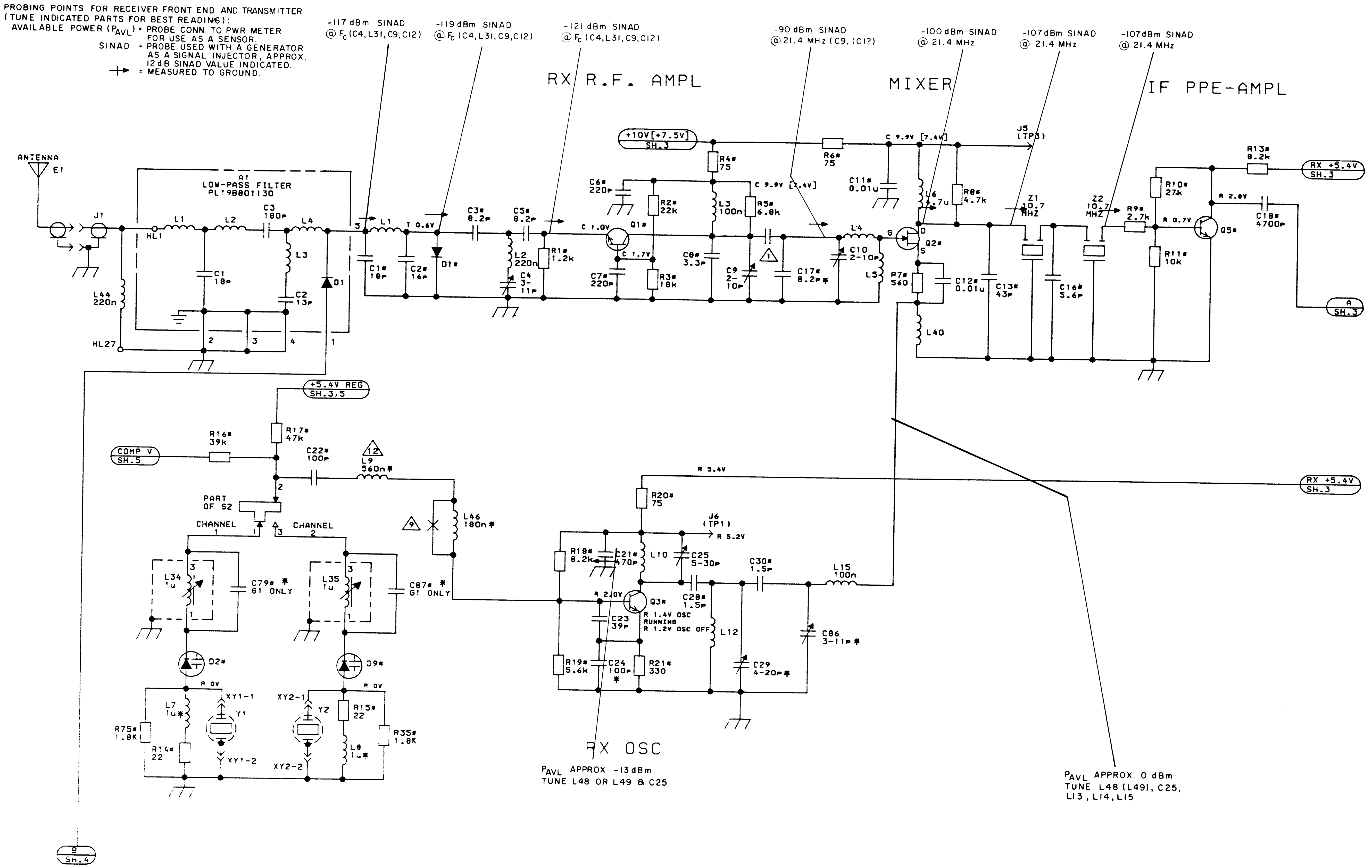
△12 THIS MODIFICATION PROCEDURE IS ONLY FOR GROUP 7 (REV.C) OR GROUP 8 (REV.B) THESE BOARDS WERE BUILT WITH OSCILLATOR COIL 19B801465P1 (L34 THRU L37). IF CHANNEL FREQUENCY CANNOT BE SET AT HIGH END OF A SUB-BAND (SEE NOTES 7 AND 9), PERFORM FOLLOWING MODIFICATIONS.
A. FOR RECEIVE OSCILLATORS, REPLACE COIL L9 WITH
(GROUP 7) 19A700024P10, 560nH
(GROUP 8) 19A700024P9, 470nH
B. TRANSMIT OSCILLATORS, REPLACE COIL L41 WITH
(GROUP 7) 19A700024P14, 1.2uH
(GROUP 8) 19A700024P12, 820nH

(19D901663, Sh. 1, Rev. 8)

SCHEMATIC DIAGRAM

Sheet 1

Issue 3


PROBING POINTS FOR RECEIVER FRONT END AND TRANSMITTER (TUNE INDICATED PARTS FOR BEST READING):
AVAILABLE POWER (P_{AVL}) = PROBE CONN. TO PWR METER FOR USE AS A SENSOR.
SINAD = PROBE USED WITH A GENERATOR AS A SIGNAL INJECTOR, APPROX. 12 dB SINAD VALUE INDICATED.
→ = MEASURED TO GROUND.

-117 dBm SINAD @ F_c (C4,L31,C9,C12)

-119 dBm SINAD @ F_c (C4,L31,C9,C12)

-121 dBm SINAD @ F_c (C4,L31,C9,C12)

-90 dBm SINAD @ 21.4 MHz (C9, (C12)

-100 dBm SINAD @ 21.4 MHz

-107 dBm SINAD @ 21.4 MHz

-107 dBm SINAD @ 21.4 MHz

P_{AVL} APPROX -13 dBm
TUNE L48 OR L49 & C25

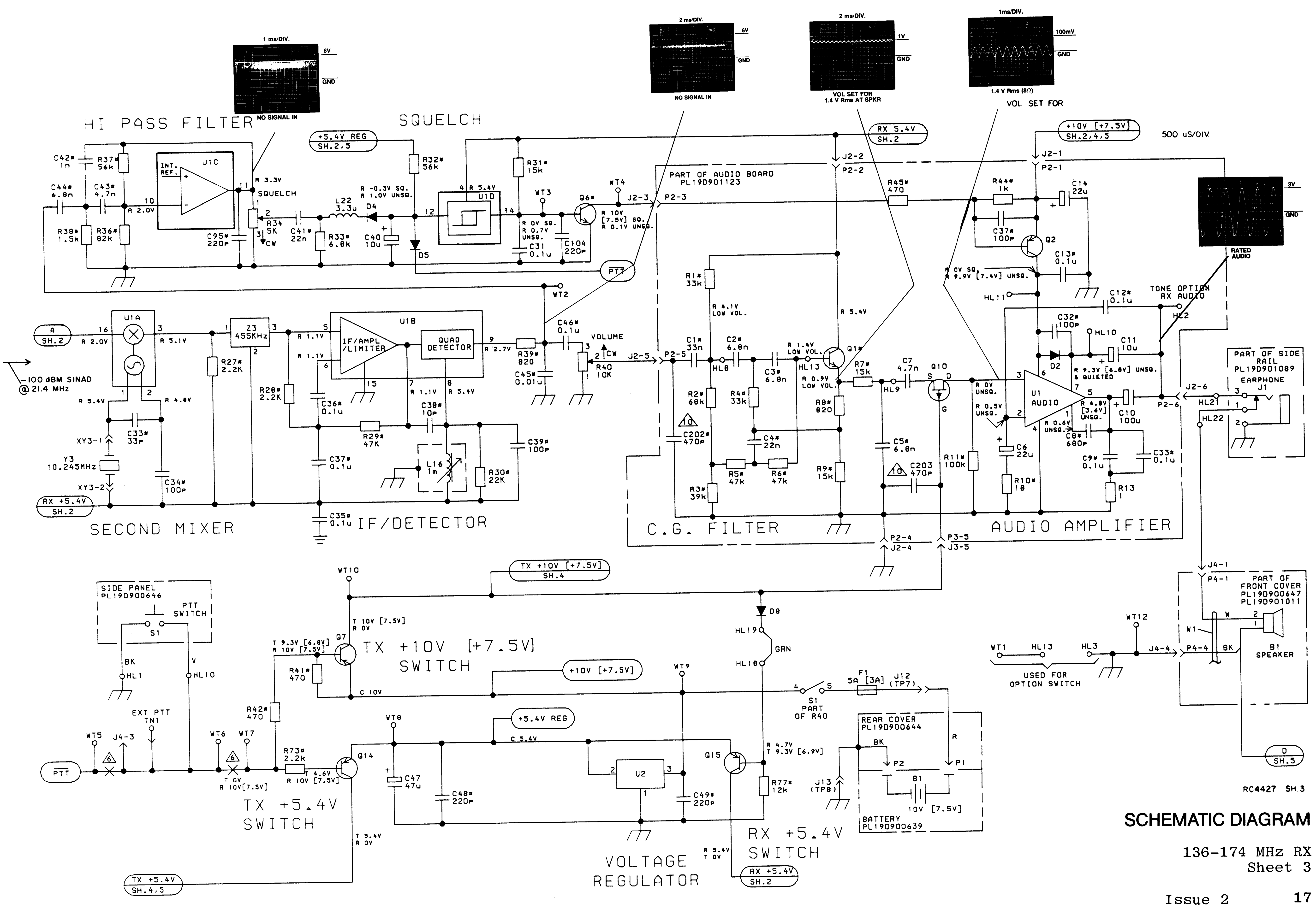
P_{AVL} APPROX. 0 dBm
TUNE L48 (L49), C25, L13, L14, L15

SCHEMATIC DIAGRAM

136-174 MHz RX
Sheet 2

(19D901663, Sh. 2, Rev. 2)

RC4427 S



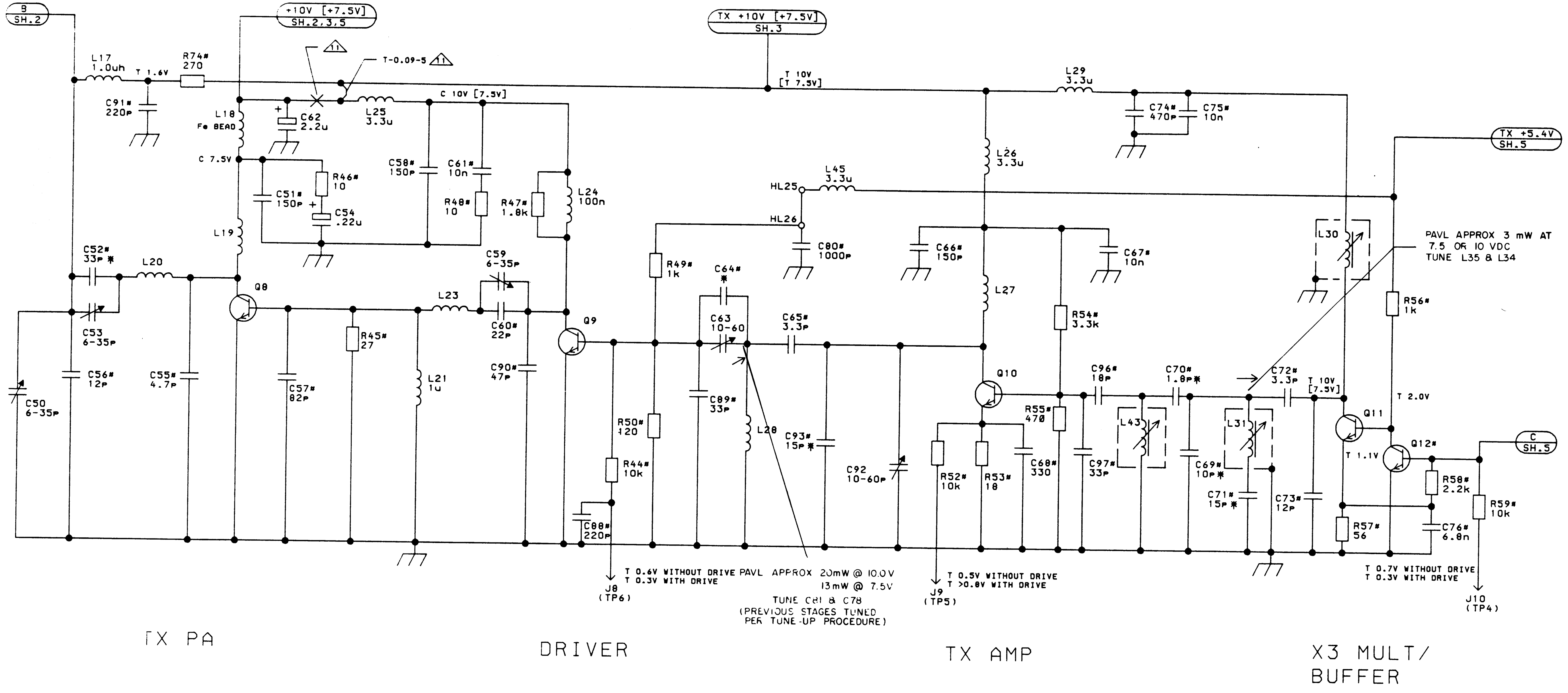
RC4427 SH.3

SCHEMATIC DIAGRAM

136-174 MHz RX
Sheet 3

Issue 2

(19D901663, Sh. 3, Rev. 3)

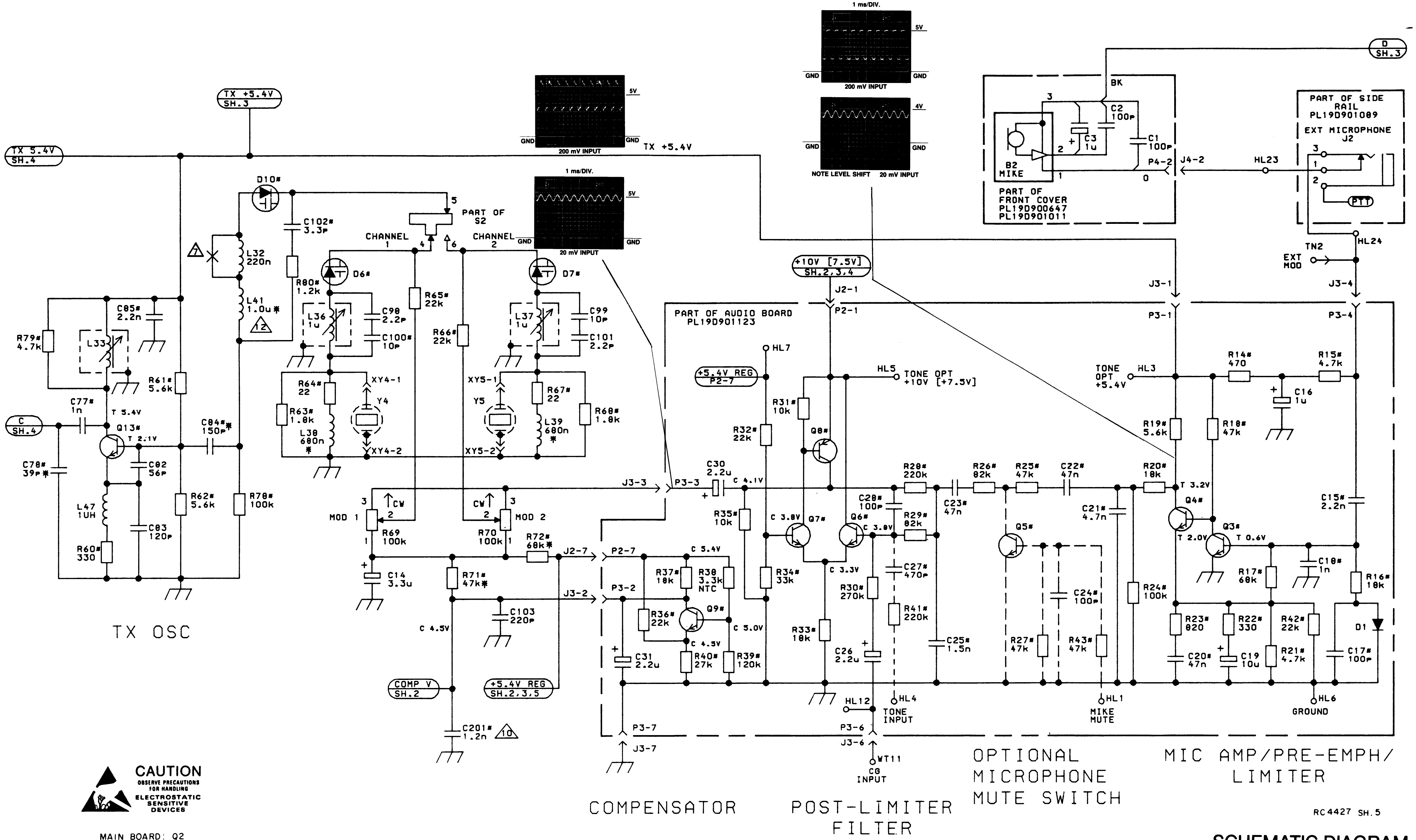


RC4427 SH 4

SCHEMATIC DIAGRAM

136-174 MHz TX
Sheet 4

(19D901663, Sh. 4, Rev. 1)



CAUTION
OBSERVE PRECAUTIONS FOR HANDLING
ELECTROSTATIC SENSITIVE DEVICES

MAIN BOARD: Q2
AUDIO BOARD: Q10

(19D901663, Sh. 5, Rev. 3)

SCHEMATIC DIAGRAM

136-174 MHz TX
Sheet 5

PARTS LIST

TRANSMIT/RECEIVE BOARD
19D901660G1 136-151 MHz
19D901660G2 150-174 MHz
19D901660G7 136-151 MHz (GOLD CONTACTS)
19D901660G8 150-174 MHz (GOLD CONTACTS)

ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
		NOTE: WHEN REPLACING BOARDS, CARE SHOULD BE TAKEN TO ASSURE THAT BOARD WITH GOLD CONTACTS ARE NOT INTERMIXED WITH BOARDS HAVING TIN CONTACTS. REPLACE THE BOARD ONLY WITH ONE HAVING THE SAME GROUP NUMBER AS THE ORIGINAL.
A1		FILTER BOARD 19B801130G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A700219P38	Ceramic: 18 pF ±10%, 100 VDCW, temp coef 0 PPM.
C2	19A700219P32	Ceramic: 13 pF ±5%, 100 VDCW, temp coef 0 PPM.
C3	19A700229P74	Ceramic: 180 pF ±5%, 100 VDCW, temp coef -3300 PPM.
		- - - - - - - - - - - DIODES - - - - - - - - - -
D1	19A702411P1	Silicon; sim to Hewlett Packard 5082-3188.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B233611P1	Coil.
L2	19A702472P30	Coil.
L3	19A702472P19	Coil.
L4	19B233611P4	Coil.
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A702061P25	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C2	19A702061P23	Ceramic: 16 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C3	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C4	19A702168P2	Variable, cermic: 3 to 11 pF 100 VDCW, temp coef N450+300 PPM; sim to JFD DV2SN11C.
C5	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C6 and C7	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30PPM.
C8	19A702061P7	Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM.
C9 and C10	19B800873P3	Variable, ceramic: 2.5 to 10 pF, 150 VDCW; sim to Johanson 9611.
C11 and C12	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C13	19A702061P43	Ceramic: 43 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C14	19B800650P15	Tantalum: 3.3 uF ±20%, 10 VDCW.
C16	19A702061P10	Ceramic: 5.6 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM.
C17	19A702061P13	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).
C17	19A702061P12	Ceramic: 8.2 pF ±0.5 pF, 50 VDCW, temp coef 0 ±60 PPM. (150-174 MHz).
C18	19A702052P10	Ceramic: 4700 pF ±10%, 50 VDCW.
C21	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C22	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C23	19A700226P50	Ceramic: 39 pF ±5%, 100 VDCW, temp coef -750 PPM.
C24	19A700229P69	Ceramic: 180 pF ±5%, 500 VDCW, temp coef -4200 PPM. (136-151 MHz).
C24	19A700229P65	Ceramic: 100 pF ±5%, 100 VDCW, temp coef -3300 PPM. (150-174 MHz).
C25	19A702168P4	Variable, ceramic: 5.2 to 30 pF, 100 VDCW, temp coef N750+300 PPM; sim to JFD DV2SN30D. (Green).
C28	19A702061P903	Ceramic: 1.5 pF ±.25 pF, 50 VDCW, temp coef 0 ±250 PPM.
C29	19A702168P3	Variable, ceramic: 4.2 to 20 pF, 100 VDCW, temp coef N750+300 PPM; sim to JFD DV2SN20D. (Red, 150-174 MHz).
C29	19A702168P4	Variable, ceramic: 5.2 to 30 pF, 100 VDCW, temp coef N750+300 PPM; sim to JFD DV2SN30D. (136-151 MHz).
C30	19A702061P903	Ceramic: 1.5 pF ±.25 pF, 50 VDCW, temp coef 0 ±250 PPM.
C31	19A116192P14	Ceramic: 0.1 uF ±20%, 50 VDCW; sim to Erie USCC CW20C104-M2.
C33	19A702061P37	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C34	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C35 thru C37	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C38	19A702061P13	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C39	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C40	19B800755P4	Electrolytic: 10 uF ±20%, 16 VDCW.
C41	19A702052P128	Ceramic: 0.022 uF ±5%, 50 VDCW.
C42	19A702052P105	Ceramic: 1000 pF ±5%, 50 VDCW.
C43	19A702052P110	Ceramic: 4700 pF ±5%, 50 VDCW.
C44	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C45	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C46	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C47	19A700003P9	Tantalum: 47 uF ±20%, 6.3 VDCW.
C48 and C49	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C50	19B800873P1	Ceramic, variable: 6 to 35 pF, 150 VDCW; sim to Johanson 9613.
C51	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C52	19A702236P46	Ceramic: 68 pF ±5%, 50 VDCW, temp coef 0 PPM ±30 PPM. (136-151 MHz).
C52	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (150-174 MHz).
C53	19B800873P1	Ceramic, variable: 6 to 35 pF, 150 VDCW; sim to Johanson 9613.
C54	162B3688P422K	Ceramic: 0.22 uF ±10%, 50 VDCW; sim to Erie 8131-M050-W5R-224K.
C55	19A702236P17	Ceramic: 4.7 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C56	19A702236P28	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C57	19A702236P48	Ceramic: 82 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C58	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C59	19B800873P1	Ceramic, variable: 6 to 35 pF, 150 VDCW; sim to Johanson 9613.
C60	19A702236P34	Ceramic: 22 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C61	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C62	19A703324P2	Electrolytic: 2.2 uF ±20%, 50 VDCW.
C63	19A702168P6	Variable, ceramic: 10 to 60 pF, 100 VDCW, temp coef N1200+500 PPM; sim to JFD DV25SN60Q. (Brown).
C64	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).
C65	19A702236P13	Ceramic: 3.3 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C66	19A702236P54	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C67	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C68	19A702061P73	Ceramic: 330 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C69	19A702061P17	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).
C69	19A702061P13	Ceramic: 10 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (150-174 MHz).
C70	19A702061P7	Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM. (136-151 MHz).
C70	19A702061P4	Ceramic: 1.8 pF ±0.5 pF, 50 VDCW, temp coef 0 ±250 PPM. (150-174 MHz).
C71	19A702061P25	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).
C71	19A702061P21	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (150-174 MHz).
C72	19A702061P7	Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM.
C73	19A702061P17	Ceramic: 12 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C74	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C75	19A702052P14	Ceramic: 0.01 uF ±10%, 50 VDCW.
C76	19A702052P12	Ceramic: 6800 pF ±10%, 50 VDCW.
C77	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C78	19A702061P45	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).
C78	19A702061P41	Ceramic: 39 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (150-174 MHz).
C79	19A702061P908	Ceramic: 3.9 pF ±.25 pF, 50 VDCW, temp coef 0 ±120 PPM.
C80	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C81	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C82	19A700229P56	Ceramic: 68 pF ±5%, 100 VDCW, temp coef -5600 PPM.
C83	19A700230P68	Ceramic: 120 pF ±5%, 50 VDCW, temp coef -4200 PPM.
C84	19A702061P53	Ceramic: 68 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).
C84	19A702061P65	Ceramic: 150 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (150-174 MHz).
C85	19A702052P7	Ceramic: 2200 pF ±10%, 50 VDCW.
C86	19A702168P3	Variable, ceramic: 4.2 to 20 pF, 100 VDCW, temp coef N750+300 PPM; sim to JFD DV2SN20D. (Red, 136-151 MHz).
C86	19A702168P2	Variable, ceramic: 3 to 11 pF 100 VDCW, temp coef N450+300 PPM; sim to JFD DV2SN11C. (White, 150-174 MHz).
C87	19A702061P908	Ceramic: 3.9 pF ±.25 pF, 50 FDCW, temp coef 0 ±120 PPM.
C88	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C89	19A702061P37	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C90	19A702236P42	Ceramic: 47 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C91	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C92	19A702168P6	Variable, ceramic: 10 to 60 pF, 100 VDCW, temp coef N1200+500 PPM; sim to JFD DV25SN60Q.
C93	19A702236P38	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (136-151 MHz).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	GE PART NO.	DESCRIPTION
C93	19A702236P30	Ceramic: 15 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (150-174 MHz).
C95	19A702061P69	Ceramic: 220 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C96	19A702061P25	Ceramic: 18 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C97	19A702061P37	Ceramic: 33 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM
C98	19A700228P9	Ceramic: 100 VDCW, temp coef -2200 PPM.
C99	19A700219P26	Ceramic: 10 pF ±5%, 100 VDCW, temp coef 0 PPM.
C100	19A702236P25	Ceramic: 10 pF ±.5 pF, 50 VDCW, temp coef 0 ±30 PPM.
C101	19A700228P9	Ceramic: 100 VDCW, temp coef -2200 PPM.
C102	19A702061P7	Ceramic: 3.3 pF ±0.5 pF, 50 VDCW, temp coef 0 ±120 PPM.
C103 and C104	19A702061P69	Ceramic: 220 pf ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - - - DIODES - - - - - - - - - - - -
D1	19A700155P2	Silicon; sim to Bat 18.
D2	19A700079P3	Silicon; sim to BBY 31.
D4 and D5	19A702015P1	Silicon; sim to IN458A.
D6 and D7	19A700079P3	Silicon; sim to BBY 31.
D8	19A702015P1	Silicon; sim to IN458A.
D9 and D10	19A700079P3	Silicon; sim to BBY 31.
		- - - - - - - - - - - - FUSES - - - - - - - - - - - -
F1	19A702169P9	Enclosed link; rated 3 amps @ 125 v; sim to Littelfuse 255003.
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J1	19B801108G1	Connector, coax: BNC Series, 500 VRMS.
J2 and J3	19A703248P4	Contact, electrical. (Groups 1 & 2).
J2 and J3	19A703248P14	Contact, electrical. (Gold Plated) (Groups 7 & 8).
J4	19A703248P1	Contact, electrical.
J5 and J6	19A703248P1	Contact, electrical.
J8 thru J10	19A703248P1	Contact, electrical.
J12 and J13	19A703248P1	Contact, electrical.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - - -
L1	19A702472P15	Coil.
L2	19A700024P5	Coil, RF: 220 nH ±10%.
L3	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L4 and L5	19A702472P14	Coil.
L6	19A700024P21	Coil, RF, fixed: 4.7 uH ±10%; sim to Jeffers 4436-8K.
L7 and L8	19A700024P14	Coil, RF: 1.2 uH ±10%. (136-151 MHz).
L7 and L8	19A700024P13	Coil, RF: 1.0 uH ±10%. (150-174 MHz).
L9	19B209420P11	COIL, RF: 820 nH ±10%. (136-151 MHz).
L9	19B209420P10	Coil, RF: 470 nH ±10%. (150-174 MHz).
L10	19A702472P25	Coil.
L12	19A702472P30	Coil.
L15	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L16	19A702213P1	Coil, RF: 1.0 mH ±6%; sim to TOKO 126AN-A5318HM.
L17	19A700024P13	Coil, RF: 1.0 uH ±10%.
L18	19A702473G1	Coil.
L19	19A702472P29	Coil.
L20	19A702472P28	Coil.
L21	19A700024P13	Coil, RF: 1.0 uH ±10%.
L22	19A700024P19	Coil, RF: 3.3 uH ±10%.
L23	19A702472P29	Coil.
L24	19A700024P1	Coil, RF: 100 nH ±10%, 0.08 ohms DC res max, 100 v.
L25 and L26	19A700024P19	Coil, RF: 3.3 uH ±10%.
L27	19A702472P8	Coil.
L28	19A702472P28	Coil.
L29	19A700024P19	Coil, RF: 3.3 uH ±10%.
L30	19C850826P312	Coil, RF: sim to Paul Smith SK-800-1.
L31	19C850826P612	Coil, RF; sim to Paul Smith SK-800-1.
L32	19A700024P5	Coil, RF: 220 nH ±10%.
L33	19C850826P512	Coil, RF.
L34 thru L37	19A703602G1	Coil, RF. Includes 19B800827P24 tuning slug.
L38 and L39	19A700024P11	Coil, RF: 680 nH ±10%. (150-174 MHz).
L38 and L39	19A700024P13	Coil, RF: 1.0 uH ±10%. (150-174 MHz).
L40	19A702472P13	Coil.
L41	19A700024P15	Coil, RF: 1.5 uH ±10%. (136-151 MHz).
L41	19A700024P13	Coil, RF: 1.0 uH ±10%. (150-174 MHz).
L43	19C850826P312	Coil, RF: sim to Paul Smith SK-800-1.
L44	19A700024P5	Coil, RF: 220 nH ±10%.
L45	19A700024P19	Coil, RF: 3.3 uH ±10%.
L46	19B209420P4	Coil, RF: .18 uH ±5%, .12 ohms DC res max; sim to Jeffers 4416-4J.
L47	19A700024P13	Coil, RF: 1.0 uH ±10%.
		- - - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A700236P4	Silicon, NPN.
Q2	19A702524P3	N-Type, field effect; sim to MMBFJ310.
Q3	19A700092P2	Silicon, NPN.
Q5	19A700092P2	Silicon, NPN.
Q6	19A700076P2	Silicon, NPN.
Q7	19A700026P1	Silicon, PNP.
Q8	19A701891P1	Silicon, NPN. VHF Amplifier, 5 watt, 12.5 v.
Q9	19A700063P1	Silicon, NPN.
Q10	19A134670P1	Silicon, NPN.
Q11	19A701808P1	Silicon, NPN; sim to MPS 6595.
Q12	19A700076P2	Silicon, NPN.
Q13	19A700092P2	Silicon, NPN.
Q14 and Q15	19A700026P1	Silicon, PNP.
		- - - - - - - - - - - RESISTORS - - - - - - - - - - -
R1	19B800607P122	Metal film: 1.2K ohms ±5%, 200 VDCW, 1/8 w.
R2	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R3	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R4	19B800607P750	Metal film: 75 ohms ±5%, 200 VDCW, 1/8 w.
R5	19B800607P682	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 w.
R6	19B800607P750	Metal film: 75 ohms ±5%, 200 VDCW, 1/8 w.
R7	19B800607P561	Metal film: 560 ohms ±5%, 200 VDCW, 1/8 w.
R8	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R9	19B800607P272	Metal film: 2.7K ohms ±5%, 200 VDCW, 1/8 w.
R10	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R11	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R13	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R14 and R15	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R16	19B800607P393	Metal film: 39K ohms ±5%, 200 VDCW, 1/8 w.
R17	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R18	19B800607P822	Metal film: 8.2K ohms ±5%, 200 VDCW, 1/8 w.
R19	19B800607P562	Metal film: 5.6K ohms ±5%, 200 VDCW, 1/8 w.
R20	19B800607P750	Metal film: 75 ohms ±5%, 200 VDCW, 1/8 w.
R21	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R27 and R28	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R29	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R30	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R31	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R32	19B800607P563	Metal film: 56K ohms ±5%, 200 VDCW, 1/8 w.
R33	19B800607P682	Metal film: 6.8K ohms ±5%, 200 VDCW, 1/8 w.
R34	19B800762P1	Variable, carbon film: 5K ohms ±20%, 150 VDCW, .1 w; sim to TOCOS RPR124.
R35	19B800607P182	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 w.
R36	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R37	19B800607P563	Metal film: 56K ohms ±5%, 200 VDCW, 1/8 w.
R38	19B800607P152	Metal film: 1.5K ohms ±5%, 200 VDCW, 1/8 w.
R39	19B800607P821	Metal film: 820 ohms ±5%, 200 VDCW, 1/8 w.
R40	19B801350P1	Variable, 5 ohms to 10K ohms ±20%, 1/4 w.
R41	19B800607P471	Metal film: 470K ohms ±5%, 200 VDCW, 1/8 w.
R42	19B801250P471	Composition: 470 ohms ±5%, 150 VDCW, 1/8 w.
R44	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R45	19B800607P270	Metal film: 27 ohms ±5%, 200 VDCW, 1/8 w.
R46	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w.
R47	19B800607P182	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 w.
R48	19B800607P100	Metal film: 10 ohms ±5%, 200 VDCW, 1/8 w.
R49	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R50	19B800607P121	Metal film: 120 ohms ±5%, 200 VDCW, 1/8 w.
R52	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R53	19B800607P180	Metal film: 18 ohms ±5%, 200 VDCW, 1/8 w.
R54	19B800607P332	Metal film: 3.3K ohms ±5%, 200 VDCW, 1/8 w.
R55	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R56	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R57	19B800607P560	Metal film: 56 ohms ±5%, 200 VDCW, 1/8 w.
R58	19B800607P222	Metal film: 2.2K ohms ±5%, 200 VDCW, 1/8 w.
R59	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R60	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R61 and R62	19B801250P562	Composition: 5.6K ohms ±5%, 150 VDCW, 1/8 w.
R63	19B800607P182	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 w.
R64	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R65 and R66	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R67	19B800607P220	Metal film: 22 ohms ±5%, 200 VDCW, 1/8 w.
R68	19B800607P182	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 w.
R69 and R70	19B800751P16	Variable, solid carbon: 100K ohms ±25%, 0.05 w; sim to ALSP H0651A.
R71	19A702931P379	Metal film: 64.9K ohms ±1%, 200 VDCW, 1/8 w. (136-151 MHz).
R71	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w. (150-174 MHz).
R72	19B800607P563	Metal film: 56K ohms ±5%, 200 VDCW, 1/8 w. (136-151 MHz).
R72	19B800607P683	Metal film: 68K ohms ±5%, 200 VDCW, 1/8 w. (150-174 MHz).
R73	19B801251P222	Composition: 2.2K ohms ±5%, 150 VDCW, 1/8 w.
R74	19B800607P271	Metal film: 270 ohms ±5%, 200 VDCW, 1/8 w.
R75	19B800607P182	Metal film: 1.8K ohms ±5%, 200 VDCW, 1/8 w.
R77	19B800607P123	Metal film: 12K ohms ±5%, 200 VDCW, 1/8 w.
R78	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R79	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R80	19B800607P122	Metal film: 1.2K ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - - - SWITCHES - - - - - - - - - - -
S1		(Part of R40).
S2	19A702244P1	Slide switch: DPDT, contact rating 1 mA @ 10 VDC; sim to Alps SSS02200.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - - - -
U1	19A701780P1	Linear: IF AMPLIFIER AND DETECTOR.
U2	19D438002G1	5.4 Volt Voltage Regulator.
		- - - - - - - - - - - - SOCKETS - - - - - - - - - - -
XY1 and XY2	19A115834P1	Contact, electrical: sim to AMP 2-330808-8. (Quantity 2 each).
XY3	19A700042P3	Contact, electrical: sim to AMP 2-332070-2.
XY4 and XY5	19A115834P1	Contact, electrical: sim to AMP 2-330808-8. (Quantity 2 each).
		- - - - - - - - - - - - NETWORKS - - - - - - - - - -
Z1	19A702068G1	Crystal, filter: 4 pole, 2 coupled-dual crystals.
Z2		(Part of Z1).
Z3	19A702171P1	Bandpass filter: 455 ±1.5 kHz; sim to Murata CFU455D2.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A702471P2	Crystal pad. (Used with Z1 and Z2).
	19D900564P1	Mounting. (Used with J1).
	19A134793P1804	Screw, thd. forming: No. 1-64 x 5/32. (Used with J1 mounting).
	19A702332P1	Nut, slotted: M7 x .75. (Secures J1).
	19A701332P1	Insulator disk. (Used with Q10).
	19C850929P2	Heat sink. (Used with Q8).
	19B801009P1	Heat sink. (Used with Q9).
	19A703669P1	Insulator.
		ASSOCIATED PARTS
		- - - - - - - - - - - - CRYSTALS - - - - - - - - - - -
		NOTE: When reordering specify GE part number and exact frequency needed.
		$Fx = \frac{Fo - 10.7}{3}$

SYMBOL	GE PART NO.	DESCRIPTION
Y1 and Y2	19A702375G2	Quartz.
Y3	19A702284G1	Quartz, 10,245.000 kHz.
	19A702284G2	(Alternate IF Crystal) 11155.0 kHz.
		$Fx = \frac{Fo}{3}$
Y4 and Y5	19A702375G1	Quartz.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19B800763P100	Helical antenna with cutting chart. (136-174 MHZ).
	19D900639G2	Battery Pack, 7 1/2 Volt.
	19D900639G3	Battery Pack. 10 Volt.
	19B800865G1	Top Cover.

PARTS LIST

FRONT COVER
19D900647G1 STANDARD
19D900647G2 LICENSEE
19D900647G4 CGE OPTION
ISSUE 4

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - SPEAKERS AND MIKES - - - - - - - - -
B1	19A134460P1	Loudspeaker, permanent magnet: 2 inches, 8 ohms ±10%, coil imp., 450 ±100 Hz resonance, 500 mW; sim to Pioneer A50AP13-01F.
B2	19J706041P1	Microphone cartridge: 200-850 ohms output imp., 1.5 to 10 VDC; sim to Primo EM-60.
		- - - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A700232P64	Ceramic: 100 pF ±10%, 100 VDCW, -5600 PPM temp coef.
C3	19B800650P13	Tantalum: 1 uF -20+40%, 10 VDCW.
		- - - - - - - - - - - - - PLUGS - - - - - - - - - - - - -
P4		Connector. Includes:
	19A702405P4	Shell.
	19A702405P28	Contact, electrical.
W1	19B800860G1	Cable assembly. (Includes P4).
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A702396P1	Nameplate. (GENERAL ELECTRIC).
	19C850975P1	Insulator.
	19A703346P1	Pad.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PARTS LIST

HARDWARE KIT
19A702379G1 SINGLE/MULTI FREQ
19A702379G2 UHF
19A702379G3 HIGH BAND
ISSUE 5

SYMBOL	GE PART NO.	DESCRIPTION
	19A702471P3	Crystal pad. (Used with Y3).
	19A702471P2	Crystal pad. (Used with Y1, Y2, Y4, Y5).
	19A702332P1	Nut, slotted: M7 x .75. (Secures R32 & S1).
	19B800849P1	Washer, rectangular. (Located between ON-OFF switch and housing).
	19A702314P2	Knurled nut. (Secures J11).
	19A703007P212	Machine screw, Torx drive: M2.5-.45 x 12. (Secures rear cover below nameplates).
	19A702362P208	Machine screw, Torx drive: M2.5-.45 x 8. (Secures rear cover at top).
	19B800859P1	Knob, push on.
	19A702364P105	Machine screw, Torx®Drive: M2-0.4 x 5. (Secures option cover).
	19A700032P1	Lockwasher, internal tooth: No. 2. (Secures option cover).
	19D900667P1	Option Cover.
	N248P15B	Hex nut.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PARTS LIST

AUDIO BOARD
19D901123G1 STANDARD
19D901123G2 DTMF
19D901123G7 STANDARD (GOLD CONTACTS)
19D901123G8 DTMF (GOLD CONTACTS)

ISSUE 1

SYMBOL	GE PART NO.	DESCRIPTION
		NOTE: WHEN CHANGING BOARDS, CARE SHOULD BE TAKEN TO ASSURE BOARDS WITH GOLD CONTACTS ARE NOT INTERMIXED WITH BOARDS HAVING TIN CONTACTS. REPLACE ONLY WITH SAME GROUP NUMBER AS THE ORIGINAL.
		- - - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A702052P120	Ceramic: 0.033 uF ±5%, 50 VDCW.
C2 and C3	19A702052P112	Ceramic: 6800 pF ±5%, 50 VDCW.
C4	19A702052P128	Ceramic: 0.022 uF ±5%, 50 VDCW.
C5	19A702052P12	Ceramic: 6800 pF ±10%, 50 VDCW.
C6	19A702844P1	Tantalum: 22 uF ±20%, 6.3 VDCW.
C7	19A702052P10	Ceramic: 4700 pF ±10%, 50 VDCW.
C8	19A702052P4	Ceramic: 680 pF ±10%, 50 VDCW.
C9	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C10	19B800755P7	Electrolytic: 100 uF ±20%, 10 VDCW.
C11	19B800755P4	Electrolytic: 10 uF ±20%, 16 VDCW.
C12 and C13	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C14	19A703324P1	Electrolytic: 22 uF ±20%, 16 VDCW.
C15	19A702052P107	Ceramic: 2200 pF ±5%, 50 VDCW.
C16	19A701534P4	Tantalum: 1 uF ±20%, 35 VDCW.
C17	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C18	19A702052P5	Ceramic: 1000 pF ±10%, 50 VDCW.
C19	19B800755P4	Electrolytic: 10 uF ±20%, 16 VDCW.
C20	19A702052P122	Ceramic: 0.047 uF ±5%, 50 VDCW.
C21	19A702052P110	Ceramic: 4700 pF ±5%, 50 VDCW.
C22 and C23	19A702052P122	Ceramic: 0.047 uF ±5%, 50 VDCW.
C24	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM. (G2 and G8 only).
C25	19A702052P106	Ceramic: 1500 pF ±5%, 50 VDCW.
C26	19B800755P2	Electrolytic: 2.2 uF ±20%, 50 VDCW.
C27	19A702061P77	Ceramic: 470 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C28	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C30 and C31	19B800755P2	Electrolytic: 2.2 uF ±20%, 50 VDCW.
C32	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
C33	19A702052P26	Ceramic: 0.1 uF ±10%, 50 VDCW.
C37	19A702061P61	Ceramic: 100 pF ±5%, 50 VDCW, temp coef 0 ±30 PPM.
		- - - - - - - - - - - - - DIODES - - - - - - - - - - - -
D1 and D2	19A700028P1	Silicon, fast recovery: fwd current 75 mA, 75 PIV; sim to Type 1N4148.
		- - - - - - - - - - - - - PLUGS - - - - - - - - - - - - -
P2 and P3	19A700041P56	Printed wire: 7 contacts rated @ 2.5 amps; sim to Molex 22-02-2075. (Groups 1 and 2 only).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	GE PART NO.	DESCRIPTION
P2 and P3	19A704779P56	Printed wire: 7 contacts rated @ 2.5 amps; Gold Plated Contacts. (Groups 7 and 8 only).
		- - - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A134739P2	Silicon, NPN.
Q2	19A700026P1	Silicon, PNP.
Q3 thru Q7	19A700076P2	Silicon, NPN.
Q8	19A700059P2	Silicon, PNP.
Q9	19A700076P2	Silicon, NPN.
Q10	19A702760P1	P type, field effect.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B800607P333	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 w.
R2	19B800607P683	Metal film: 68K ohms ±5%, 200 VDCW, 1/8 w.
R3	19B800607P393	Metal film: 39K ohms ±5%, 200 VDCW, 1/8 w.
R4	19B800607P333	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 w.
R5 and R6	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R7	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R8	19B800607P821	Metal film: 820 ohms ±5%, 200 VDCW, 1/8 w.
R9	19B800607P153	Metal film: 15K ohms ±5%, 200 VDCW, 1/8 w.
R10	19B800607P180	Metal film: 18 ohms ±5%, 200 VDCW, 1/8 w.
R11	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R13	19A702289P1	Metal film: 1 ohms ±5%, 1/4 w; sim to Corning FL55.
R14	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
R15	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R16	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R17	19B800607P683	Metal film: 68K ohms ±5%, 200 VDCW, 1/8 w.
R18	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R19	19B800607P562	Metal film: 5.6K ohms ±5%, 200 VDCW, 1/8 w.
R20	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R21	19B800607P472	Metal film: 4.7K ohms ±5%, 200 VDCW, 1/8 w.
R22	19B800607P331	Metal film: 330 ohms ±5%, 200 VDCW, 1/8 w.
R23	19B800607P821	Metal film: 820 ohms ±5%, 200 VDCW, 1/8 w.
R24	19B800607P104	Metal film: 100K ohms ±5%, 200 VDCW, 1/8 w.
R25	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R26	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R27	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w. (G2 and G8 only).
R28	19B800607P224	Metal film: 220K ohms ±5%, 200 VDCW, 1/8 w.
R29	19B800607P823	Metal film: 82K ohms ±5%, 200 VDCW, 1/8 w.
R30	19B800607P274	Metal film: 270K ohms ±5%, 200 VDCW, 1/8 w.
R31	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R32	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW. 1/8 w.
R33	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R34	19B800607P333	Metal film: 33K ohms ±5%, 200 VDCW, 1/8 w.
R35	19B800607P103	Metal film: 10K ohms ±5%, 200 VDCW, 1/8 w.
R36	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R37	19B800607P183	Metal film: 18K ohms ±5%, 200 VDCW, 1/8 w.
R38	19A701828P1	Thermistor: 3.3K ohms ±5%; sim to Philips 2322-642-63332.
R39	19B800607P124	Metal film: 120K ohms ±5%, 200 VDCW, 1/8 w.
R40	19B800607P273	Metal film: 27K ohms ±5%, 200 VDCW, 1/8 w.
R41	19B800607P224	Metal film: 220K ohms ±5%, 200 VDCW, 1/8 w.
R42	19B800607P223	Metal film: 22K ohms ±5%, 200 VDCW, 1/8 w.
R43	19B800607P473	Metal film: 47K ohms ±5%, 200 VDCW, 1/8 w.
R44	19B800607P102	Metal film: 1K ohms ±5%, 200 VDCW, 1/8 w.
R45	19B800607P471	Metal film: 470 ohms ±5%, 200 VDCW, 1/8 w.
		- - - - - - - - - INTEGRATED CIRCUITS - - - - - - -
U1	19A702410P1	Linear: Audio Amplifier; sim to TBA-820M.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A701622P1	Cotter pin. (Located between R15 & R19 - G2 and G8 only).

PARTS LIST

SIDE PANEL
19D900646G1 1 FREQ
19D900646G3 2 FREQ
ISSUE 3

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - SWITCHES - - - - - - - - - -
S1	19B800847P1	Push switch: contacts rated 25 mA @ 9 VDC; sim to Bowmar KB3256-1D.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B800864G1	Pushbutton.
	19C850854P1	Slide button.
	19A702460P1	Contact, electrical. (Quantity 2).
	19A702471P6	Crystal Pad.
	19A703672P1	Switch stop. (G1 only).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

REAR COVER
19D901087G1 HB HIGH POWER
19D901087G2 UHF HIGH POWER
19D901087G3 HB LOW POWER
19D901087G4 UHF LOW POWER
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - - PLUGS - - - - - - - - - - - -
P1		Connector. Includes:
	19B800852G1	Contact, electrical.
	19A701728P2	Washer, non-metallic.
	19A701488P2	Retaining ring.
	19B216401P5	Spring.
	19B800851P1	Insulator.
P2		Connector. Includes:
	19B800852G1	Contact, electrical.
	19A701728P2	Washer, non-metallic;
	19A701488P2	Retaining ring.
	19B216401P5	Spring.
P3 and P4	19A702405P26	Contact, electrical: rated @ 3 amps.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19C850865G1	Option receptacle.
	N327P9008E	Rivet, tubular.
	19A702471P6	Foam pad.
	19C850861P2	Insulator, glass epoxy

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PARTS LIST

SIDE PANEL
19D901089G1 1 FREQ
19D901089G2 2 FREQ
ISSUE 2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - - JACKS - - - - - - - - - - - -
J1 and J2	19A703304P1	Telephone jack: rated 1/8 amp @ 125 VAC; sim to Switchcraft MDSL-280.
		- - - - - - - - - - - SWITCHES - - - - - - - - - - -
S1	19B800847P1	Push switch: contacts rated 25 mA @ 9 VDC; sim to Bowmar KB3256-1D.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	19A702461P1	Screw, thread forming: No. 0-40 x 1/4. (Secures slide button).
	19B800864G1	Pushbutton.
	19C850854P1	Slide button.
	19A702460P1	Contact, electrical. (Used with S1).
	19B232415P1	Bushing.
	19A703672P1	Switch stop.
	19A702471P6	Crystal pad.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PRODUCTION CHANGES

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

REV. A - TRANSMITTER/RECEIVER BOARD 19D9016601,2

To facilitate manufacturing. Change interconnect pins from solder mount to stake mount type. This is a factory change to all boards manufactured after 1/10/86.

REV. B - TRANSMITTER/RECEIVER BOARD 19D901660G1,2
REV. A - TRANSMITTER/RECEIVER BOARD 19D901660G7,8

To prevent muting of receiver due o external contamination (dirt, water etc.) Across accessory jacks. Changed R41.

R41 was: 19B800607P103 metal film; 10K ohms 5%, 1/8W.

REV. C - TRANSMITTER/RECEIVER BOARD 19D901660G1
REV. B - TRANSMITTER/RECEIVER BOARD 19D901660G7

To prevent RF from radiating back into the PA and driver stages causing oscillation after radio is unkeyed. Cut pattern and added wire jumper between R74 and L25 as shown on revised schematics (note #11).

REV C - TRANSMITTER/RECEIVER BOARD 19D901660G7
REV B - TRANSMITTER/RECEIVER BOARD 19D901660G8,11
To improve the tuning range of High Band Oscillators, changed L9 and L41.

Changes for Group 7 were:
L9 was 19B209420P11 Coil, RF: 820 nH ± 10%.
L41 was 19A700024P15 Coil, RF: 1.5 uH ±10%.

Changes for Groups 8 and 11 were:
L9 was 19B209420P10 Coil, RF: 470 nH ± 10%.
L41 was 19A700024P13 Coil RF: 1.0 uH ± 10%.

REV D - TRANSMITTER/RECEIVER BOARD 19D901660G7
REV C - TRANSMITTER/RECEIVER BOARD 19D901660G8,11
To further enhance High Band tuning, changed L34,L35,L36, and L37.

L34,L35,L36,and L37 were 19A703602G1 Coil, RF.

FOR CANADIAN GE ONLY
REV. E - AUDIO BOARD 19D901123G1,3

To prevent audio from squealing when transmitter is keyed and microphone is rubbed against operator's cheek. Added C201, C202, and C203 to High Band modification Kit (19A703929G1). Schematics have been revised to show location of components. See partial schematics and instructions for modification kit.

ADDENDUM #1 TO LBI-31497B
(PCP5)

This addendum contains important revision letter changes to the HB MPI Personal Radio. For those radios with the DTMF option, the Canadian GE Installation Kit <u>19A703929G2</u>, has been added in order to eliminate the possibility of undesirable speaker noise.

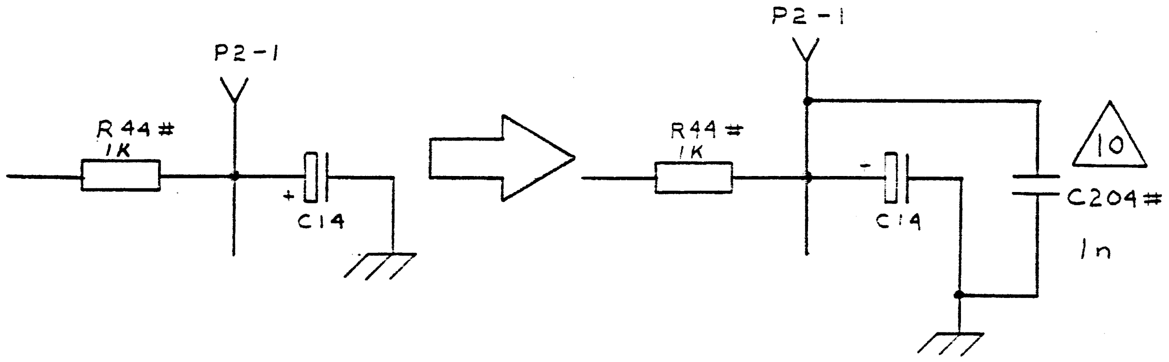
The following board numbers are affected by this change:

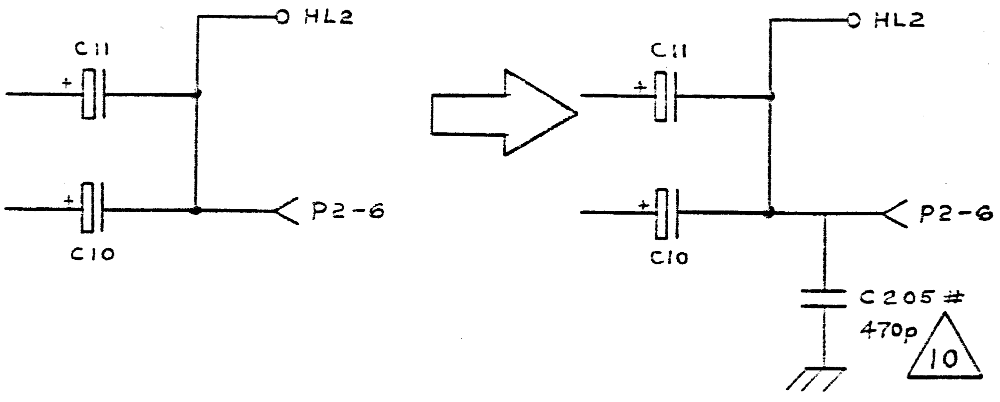
*	19D901123G8 (Audio)	Rev. B
*	19D901660G7 (Tx/Rx)	Rev. E
*	19D901660G8 (Tx/Rx)	Rev. D

The following diagrams illustrate the changes to the circuitry:

For 19D901123G8:

Before After





For 19D901660G7 & 19D901660G8: