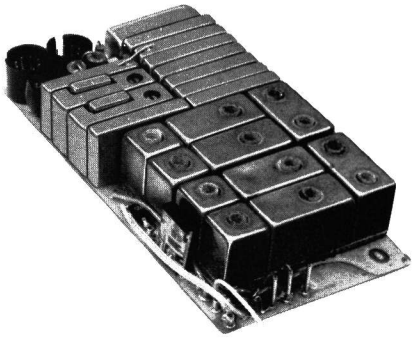
MOBILE RADIO

DUAL FRONT END RECEIVERS

ER-73-A, ER-74-A AND ER-77-A THRU ER-86-A FOR PE MODELS AND Porta-Mobile II™



SPECIFICATIONS *

AUDIO OUTPUT (EIA) 500 milliwatts at less than 5% distortion

AUDIO RESPONSE Within +2 and -10 dB of a standard 6 dB per octave de-empnasis curve from 300 to 3000 Hz (1000 Hz reference)

	FREQUENCY BANDS			
	30-50 MHz	150.8-174 MHz	450-470 MHz	470-512 MHz
Channel Spacing	20 kHz	30 kHz	25 kHz	25 kHz
Sensitivity		FET HS		
12 dB SINAD (EIA Method)	0.28 µV	0.35 µV 0.28 µV	0.4 µV	0.4 µV
20 dB Quieting Method	0.35 µV	0.50 µV 0.35 µV	0.6 µV	0.6 µV
Selectivity				
EIA Two-Signal	-60 dB	-85 dB @ ±30 kHz -75 dB	-65 dB @ ±25 kHz	-70 dB
20 dB Quieting Method	-80 dB	-110 dB @ ±30 kHz	-90 dB @ ±25 kHz	-100 dB
Spurious Response	-70 dB	-80 dB -70 dB	-60 dB	-60 dB
Image	-80 dB	--	--	--
Intermodulation (EIA)	-70 dB	-75 dB -60 dB	-60 dB	-65 dB
Modulation Acceptance	±6.5 kHz	±7.0 kHz ±7.5 kHz	±7.5 kHz	±7 kHz
Squelch Sensitivity				
Critical Squelch	0.15 µV	0.25 µV 0.15 µV	0.20 µV	0.20 µV
Maximum Squelch	>20 dB Quieting	>20 dB Quieting	>20 dB Quieting	>20 dB Quieting
Maximum Frequency Spacing	1.2% (highest frequency) no degradation	0.60 MHz No degradation	0.4% (highest frequency) no degradation. 0.8% (highest freq. < 1 dB degradation	3.5 MHz no degradation

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

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

No one should be permitted to handle any portion of the equipment that is supplied with high voltage; or to connect any external apparatus to the units while the units are supplied with power. KEEP AWAY FROM LIVE CIRCUITS!

DESCRIPTION

General Electric Dual Front End (DFE) receivers are single conversion super hetrodyne receivers for use in crossband or in-band operation where adjacent channels do not fall within the nominal two frequency spread of the standard receiver. A total of eight models are available that provide four in-band and four crossband applications. The chart below identifies valid crossband combinations. Double arrow indicates DFE No. 1 can be assigned to either band.

Radios equipped with DFE receivers provide up to five transmit and receive channels. A maximum of two frequencies (F1 & F2) are received via DFE No. 1 and three frequencies (F3, F4 & F5) via DFE No. 2. Receive oscillators F1 and F2 are mounted on the receiver board while F3, F4 and F5 receive oscillators are mounted on the system board.

When SLM (Search Lock Monitor) is provided, DFE No. 2 is limited to two channels since the SLM module occupies spaces normally reserved for receive oscillators F4 and F5. In this configuration, receive oscillator F4 is located on the receiver board permitting operation on five transmit and four receive channels.

The receiver mounts on a single printed wiring board. Both discrete components and integrated circuit modules (IC's) are used.

With the exception of the low band front end and buffer amplifier modules, all IC's within the receiver are interchangeable with like modules (same part number) from other PE radios.

DFE receivers are compatible with all standard options available for PE radios.

The application of each receiver model is identified in the chart below.

References to symbol numbers mentioned in the following text are found on the Schematic Diagram, Outline Diagram and Parts List (see Table of Contents). Typical circuit diagrams illustrated are representative of the actual IC modules. A block diagram of the receiver is shown in Figure 1.

Cross Band Applications

Low Band			Hi-Band	UHF	UHF-X
30-36 MHz	36-42 MHz	42-50 MHz	150.8-174 MHz	450-470 MHz	470-512 MHz
In Band Only	In Band Only	←	DFE-1	→	DFE-2
			←	→	→
				←	→

Model Identification Chart

Receiver Model	DFE No. 1	DFE No. 2
ER-73-A	30 - 50 MHz	30 - 50 MHz
ER-74-A, ER-83-A	30 - 50 MHz	150 - 174 MHz
ER-77-A, ER-84-A	150 - 174 MHz	150 - 174 MHz
ER-78-A, ER-85-A	150 - 174 MHz	450 - 470 MHz
ER-79-A, ER-86-A	150 - 174 MHz	470 - 512 MHz
ER-80-A	450 - 470 MHz	450 - 470 MHz
ER-81-A	450 - 470 MHz	470 - 512 MHz
ER-82-A	470 - 512 MHz	470 - 512 MHz

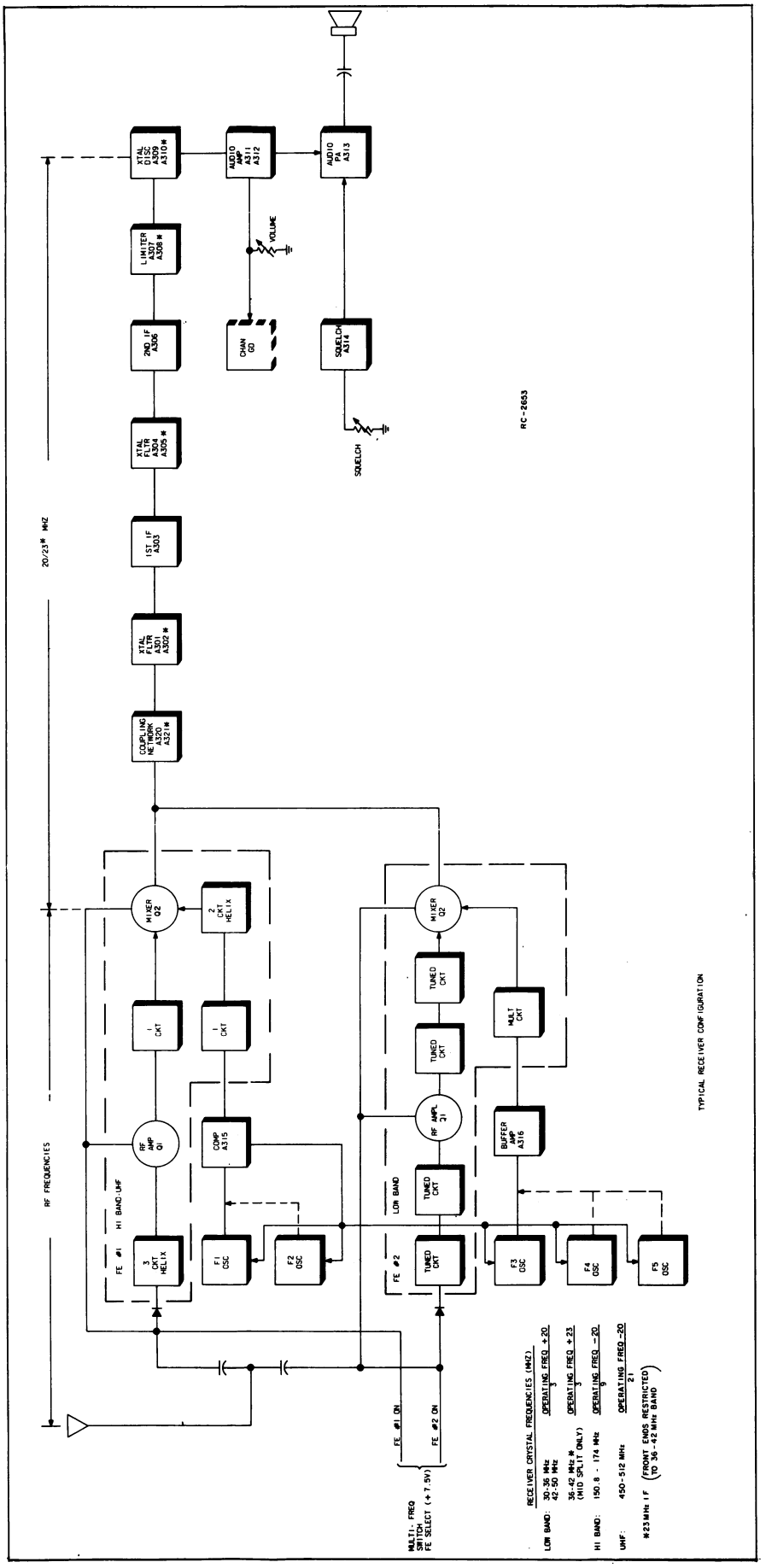


Figure 1 - DFE Receiver Block Diagram

Supply voltages for the receiver includes a continuous regulated 5.4 volts for the compensator modules, a continuous 7.5 volts for the squelch module and switched 7.5 volts for the remaining receiver stages.

CIRCUIT ANALYSIS

FRONT END SELECTION CIRCUIT

The antenna is coupled to the receiver front ends via a series connected capacitor and a PIN diode. Turning the PIN diode "on" or "off" connects/disconnects the antenna to the associated front end. When turned on the PIN diode presents a very low impedance (1 to 5 ohms) in series with the 50 ohm input impedance to the DFE and when turned off it presents a resistance of approximately 1000 ohms. The PIN diodes are controlled by the switched 7.5 volt line from the multi-frequency switch.

FREQUENCY INJECTION AND COMPENSATION

Frequency injection for DFE No. 1 is obtained from oscillator modules F1 and F2 which feed into the compensator.

Frequency injection for DFE No. 2 is obtained from the three receive oscillator modules (F3, F4 and F5) on the systems board. The output of these oscillators is buffered and applied to DFE No. 2.

OSCILLATOR MODULES

Oscillator modules consist of a crystal controlled Colpitts oscillator similar to the oscillator module used in the transmitter (see Figure 2). The entire oscillator is contained in a metal can with the receiver operating frequency printed on top. The crystal frequency ranges and associated multiplication factor for all oscillator models are given in the table below.

The oscillator frequency is temperature compensated to provide instant frequency compensation with a frequency stability of ±0.0002% from 0°C to +55°C and ±0.0005% from -30°C to +60°C. The temperature compensation network is contained in compensator module A315.

Receive oscillator modules are mounted on both the systems board and the receiver board. Oscillators F1 and F2 are located on the receiver board and F3, F4 and F5 are located on the Systems board in spaces normally occupied by transmit oscillators F6, F7 and F8.

When SLM is provided, the SLM module is located in receive oscillator spaces F4 and F5. F4 is relocated to the receiver board and the receiver is limited to four frequencies.

The proper frequency is selected by applying +7.5 volts (switched) to the selected oscillator module through multi-frequency switch S1 on the control unit.

NOTE

All oscillator modules are individually compensated at the factory and cannot be repaired in the field. Any attempt to remove the oscillator cover will void the warranty.

COMPENSATOR A315

Compensator module A315 contains a buffer-amplifier stage and temperature compensation network for the oscillator (see Figure 3).

RF from the oscillator is coupled through a DC blocking capacitor to the base of Q1. The output of Q1 connects to multiplier coil L1 on the multiplier assembly.

In the compensation network, the regulated 5.4 Volts at pin 2 is applied to a thermistor-compensated voltage divider. The output at pin 3 (2.35 Volts measured with a VTVM) of the compensator is applied to pin 3 of the oscillator module. At temperatures below -10°C, the compensated voltage increases to maintain the correct voltage on the oscillator voltage-variable capacitor.

SERVICE NOTE

An abnormally low VTVM reading (or no reading) at pin 3 may indicate a short or leakage path in the oscillator. This can be checked by unsoldering pin 3 , raising it off of the printed board and taking another reading. If this reading is normal, the problem is in the oscillator module. If the reading remains low (or zero), the problem is in the compensator.

Oscillator	Frequency Band	Crystal Freq. Range	Crystal MULT Factor
4EG28A11	150.8-174 MHz	14.53-17.11 MHz	9
4EG28A13	470-512 MHz	22.38-23.5 MHz	21
4EG28A17	30-36 & 42-50 MHz	16.6 -23.3 MHz	3
4EG28A18	36-42 MHz	16.6 -23.3 MHz	3

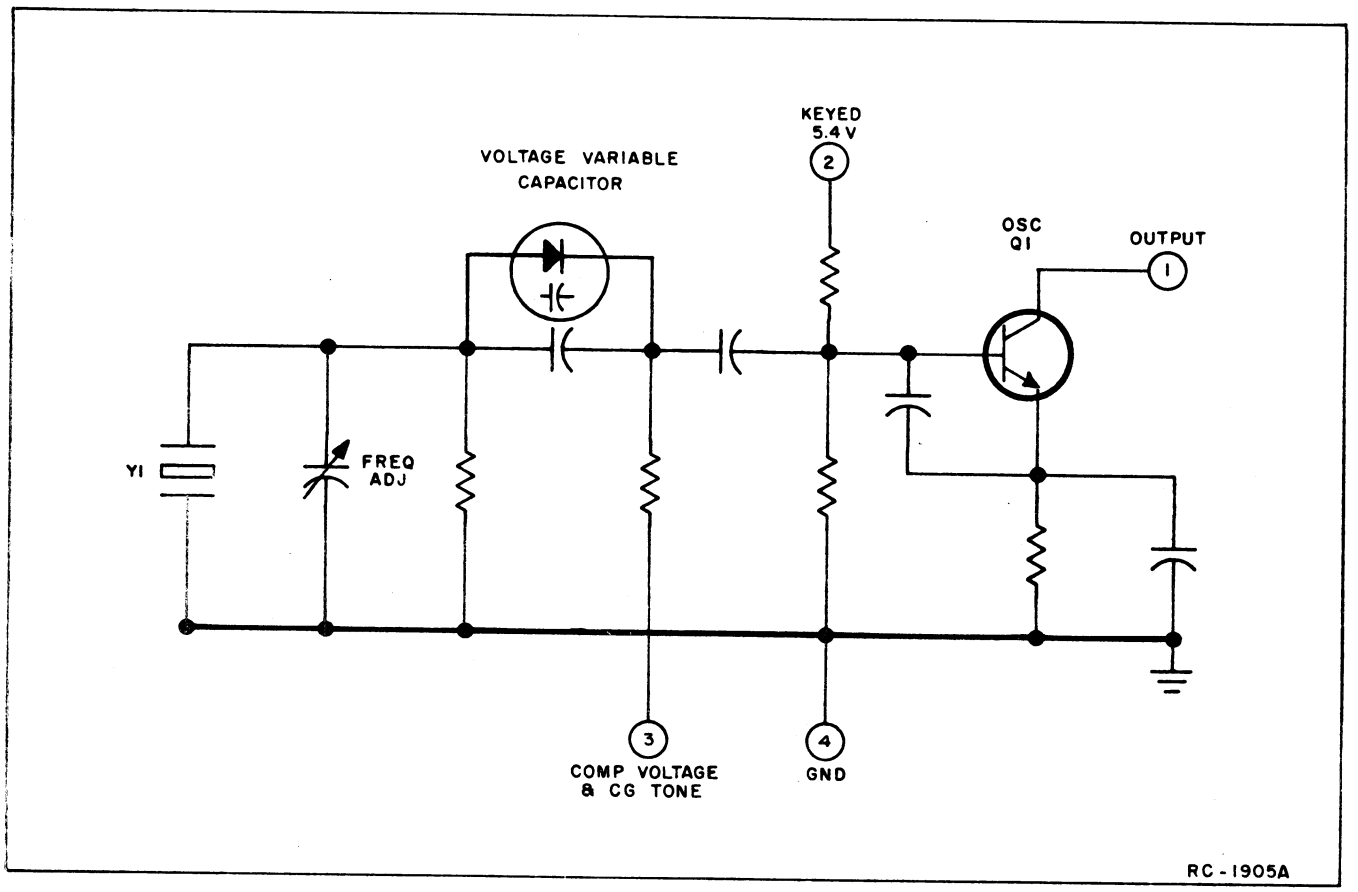


Figure 2 - Typical Oscillator Circuit

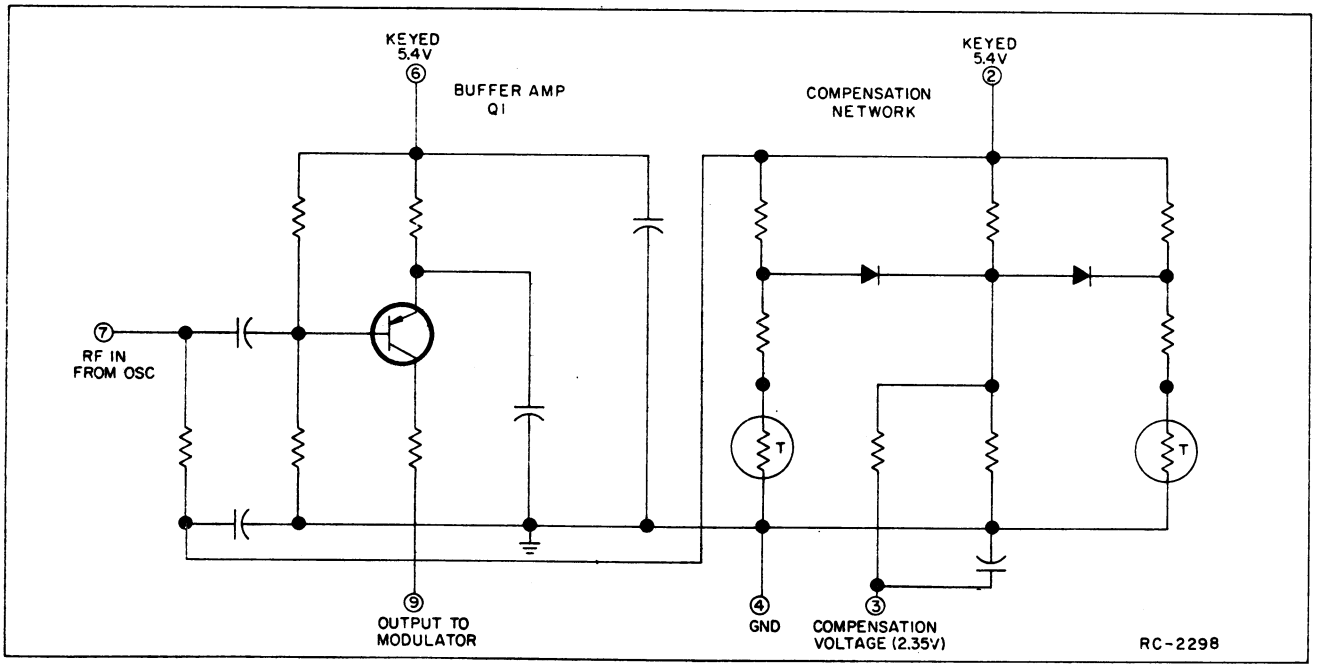


Figure 3 - Typical Compensator Circuit

BUFFER AMPLIFIER A316

Buffer amplifier module A316 amplifies the selected oscillator frequency applied to DFE No. 2 and provides frequency injection for the multiplier circuits.

FRONT END NOMENCLATURE

Front ends used in DFE receivers may be identical to each other or different as dictated by the frequency of the operating channels of each front end. A total of six front ends provide operation in the frequency bands identified below. Different model numbers are assigned to like front ends when used as DFE No. 1 or DFE No. 2. The table below identifies the model number and operating frequency of each front end.

30-50 MHz FRONT ENDS A322-324 and A328-A330

The 30-50 MHz front ends consist of two slug tuned coils and dual-gate field effect transistor (FET) RF amplifier stage (refer to diagram 19D417486). The RF signal from the antenna is coupled through a tap on L1/L2 to L3/L4. A tap from L3/L4 is connected to gate 1 of FET Q1. The output of Q1 is developed across tuned circuit L5/L6 and C13-C15 and coupled through C16-C18 and L7/L8 to gate 1 of mixer Q2.

Multiplier and Mixer (30-50 MHz)

The output of the compensator module is applied to a tap on L9/L10 in the multiplier assembly. L9/L10 is tuned to three times the crystal frequency and is in the source circuit of FET mixer Q2. High side injection is used.

The RF signal from RF amplifier Q1 is applied to gate 1 of Q2 and the high side injection frequency from the multiplier assembly is applied to the source. The resultant 20/23-MHz IF is coupled through the mixer drain tank circuit L11 and C25 to the input of coupling network A320/A321.

FRONT END A336/A337
(Replaced 19C317295G9)

Receiver Front End Assembly 19C317295G11 consists of RF helical resonators Z28, Z29 and Z30, and Mixer, Multiplier and injection filter circuit A17. A17 consists of Mixer-Multiplier circuit A2 and Injection Filter A2 and A3.

The crystal frequency from the receiver compensator module is applied to resonator circuit L1, C1 and C2 in Multiplier Circuit A1. Resonator circuit L1, C1 and C2 is tuned to three times the 14.53 to 17.11 MHz crystal frequency and is connected in the base circuit of multiplier transistor Q1. The collector of Q1 is connected to the input of injection filter A1-A3. Injection filter A2-A3 is tuned to nine times the crystal frequency for an injection frequency of 130.8 to 154 MHz. The output of A2-A3 is connected to the source of Field Effect Transistor (FET) Q2 in mixer circuit A1.

RF from the antenna is connected to the tap on helical L27. The tap is positioned to provide proper impedance matching to the antenna. RF energy is coupled to helical coil L7 through openings in the sides of the cans. RF is coupled from a tap on L8 through capacitor C10 to L5 in mixer circuit A2. L5 is connected in the gate circuit of FET Q2. The result of the RF signal on the gate of FET Q2 and the injection frequency on the source is a 20 MHz IF on the drain. The 20 MHz IF is coupled through C12 to the input of the receiver crystal filters and coupling networks.

150.8-174 MHz FET Front End A334/A335
(Replaced by 19C317295G11)

Receiver Front End Assembly 19C317295G9 consists of RF helical resonators Z26, Z7 and Z27, Mixer circuit A15, multiplier circuit A13 and injection filter circuit A14. (Refer to 19C321481). Three times the crystal frequency from the receiver compensator module is applied to resonator circuit L1, C1 and C2 in Multiplier module A13. Resonator circuit L1, C1 and C2 is tuned to three times the 14.53 to 17.11 MHz crystal frequency and is connected in the base of multiplier transistor Q1. The collector of Q1 is connected to the input of injection filter A14. Injection filter A14 is tuned to nine times the crystal frequency for an injection frequency of 130.8 to 154 MHz. The output of A14 is connected to the source of Field Effect Transistor (FET) Q1 in mixer module A15.

RF from the antenna is connected to a tap on helical L26. The tap is positioned to provide proper impedance matching to the antenna. RF energy is coupled to helical coil L8 through openings in the sides of the cans. RF is coupled from a tap on L8 through capacitor C8 to L1 in mixer module A15. L1 is connected in the gate circuit of FET Q1. The result of the RF signal on the gate of FET Q1 and the injection frequency on the source is a 20 MHz IF on the drain. The 20 MHz IF is coupled through matching network C4 and C5 to the input of the receiver crystal filters and coupling networks.

150.8-174 MHz HIGH SENSITIVITY FRONT ENDS A325/A331

The 150.8-174 MHz front ends consist of three tuned helical resonators and an RF amplifier stage (refer to 19C320888). The

MODEL		FREQ. Band	MODEL		FREQ. Band
FE#1	FE#2		FE#1	FE#2	
A322	A328	30-36 MHz	A325 A335 A336	A331 A334 A337	150.8-174 MHz
A323	A329	36-42 MHz	A326	A332	450-470 MHz
A324	A330	42-50 MHz	A327	A333	470-512 MHz

RF signal from the antenna is coupled through RF cable W301 to a tap on L6. The tap is positioned to provide the proper impedance match to the antenna. RF energy is coupled to the third coil (L8) through openings in the sides of the cans and then from a tap on L8 through C1 to the base of RF amplifier Q1. The output of Q1 is developed across tuned circuit C2/L1 and is applied to the base of the mixer.

Multiplier and Mixer (150.8-174 MHz)

The output of the compensator module is applied to L2 in the multiplier assembly. L2 is tuned to three times the crystal frequency and is metered at the Mult test point (H8 H7 on DFE No. 2) on the receiver board. The output of L2 is applied to the anode of multiplier diode CR1. The two helical resonators following CR1 are tuned to three times the first multiplier frequency for a total multiplication of 9 times. The output of the helical resonators is direct-coupled to the emitter mixer transistor Q2.

The RF signal from the RF amplifier is applied to the base of mixer Q2 and the low side injection voltage from the multiplier assembly is applied to the emitter. The resultant 20-MHz IF frequency is coupled through the mixer collector tank (L2 & C6) to coupling network Q320/A321. The collector tank also provides impedance matching to the coupling network.

450-470 MHz FRONT ENDS A326/A332

The 450-470 front ends consist of three tuned helical resonators and an RF amplifier stage. (Refer to drawing 19C320887). The RF signal from the antenna is coupled through RF cable W301 to a tap on L11/L16. The tap is positioned to provide the proper impedance match to the antenna. RF energy is coupled to the third coil (L13/L18) through openings in the sides of the cans. RF is then coupled from a tap on L13/L18 through C8 to the base of RF amplifier Q1. The output of Q1 is developed across tuned circuit C9/C10 and L1 and is applied to the base of the mixer.

Multiplier and Mixer

The output of the compensator module is applied to L3 in the multiplier assembly. L3 is tuned to three times the crystal frequency and is metered at the Mult test point, H8, (H7 on DFE No. 2) on the receiver board. The output of L3 is applied to the anode of multiplier diode CR2. The two helical resonators following CR2 are tuned to seven times the first multiplier frequency for a total multiplication of 21 times. The output of the helical resonators is direct-coupled to the emitter of the mixer transistor. Low side injection is used.

The RF signal from the RF amplifier is applied to the base of mixer A1 and the injection voltage from the multiplier assembly is applied to the emitter. The resultant 20-MHz IF frequency is coupled through the mixer collector tank (L2 & C6) to coupling network A320/A321. The collector tank also provides impedance matching to the coupling network.

470-512 MHz FRONT ENDS A327/A333

The 470-512 MHz front ends consist of three tuned helical resonators and an RF amplifier stage. (Refer to drawing 19C320886). The RF signal from the antenna is coupled through RF cable W301 to a tap on L21. The tap is positioned to provide the proper impedance match to the antenna. RF energy is coupled to the third coil (L23) through openings in the sides of the cans. RF is then coupled from a tap on L23 through openings in the sides of the cans. RF is then coupled from a tap on L23 through C8 to the base of RF amplifier Q1. The output of Q1 is developed across tuned circuit C6 and L4, and is applied to the base of the mixer.

Multiplier and Mixer

The output of the compensator module is applied to L3 in the multiplier assembly. L3 is tuned to three times the crystal frequency and is metered at the Mult test point, H8, (H7 on DFE No. 2) on the receiver board. The output of L3 is applied to the

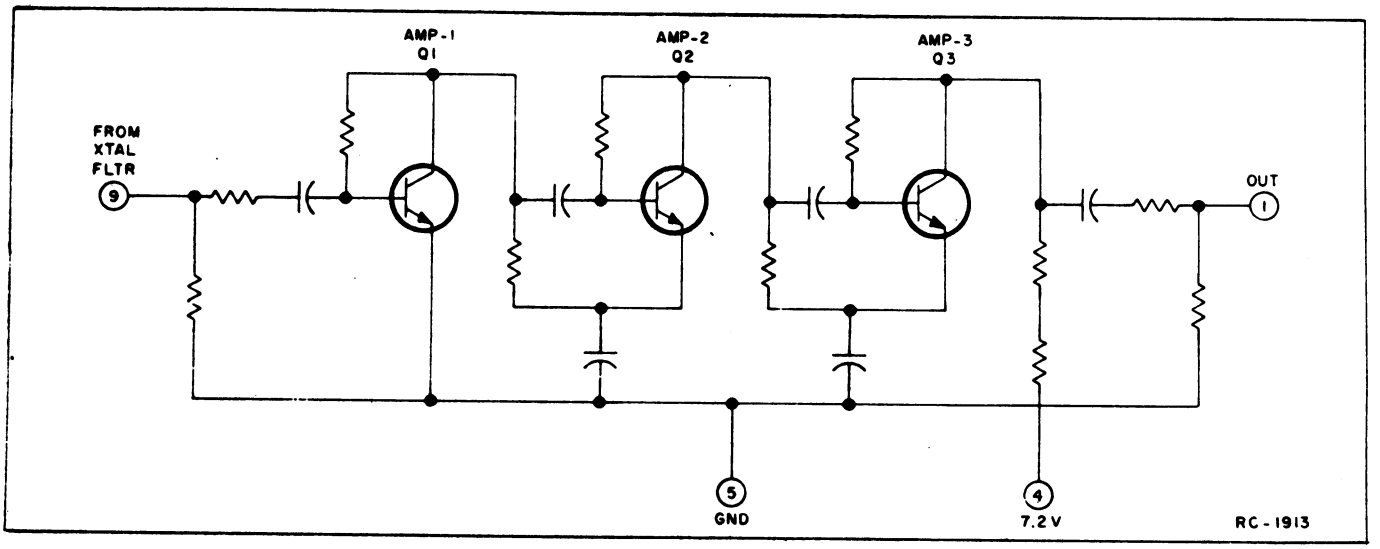


Figure 4 - Typical IF Amplifier Circuit

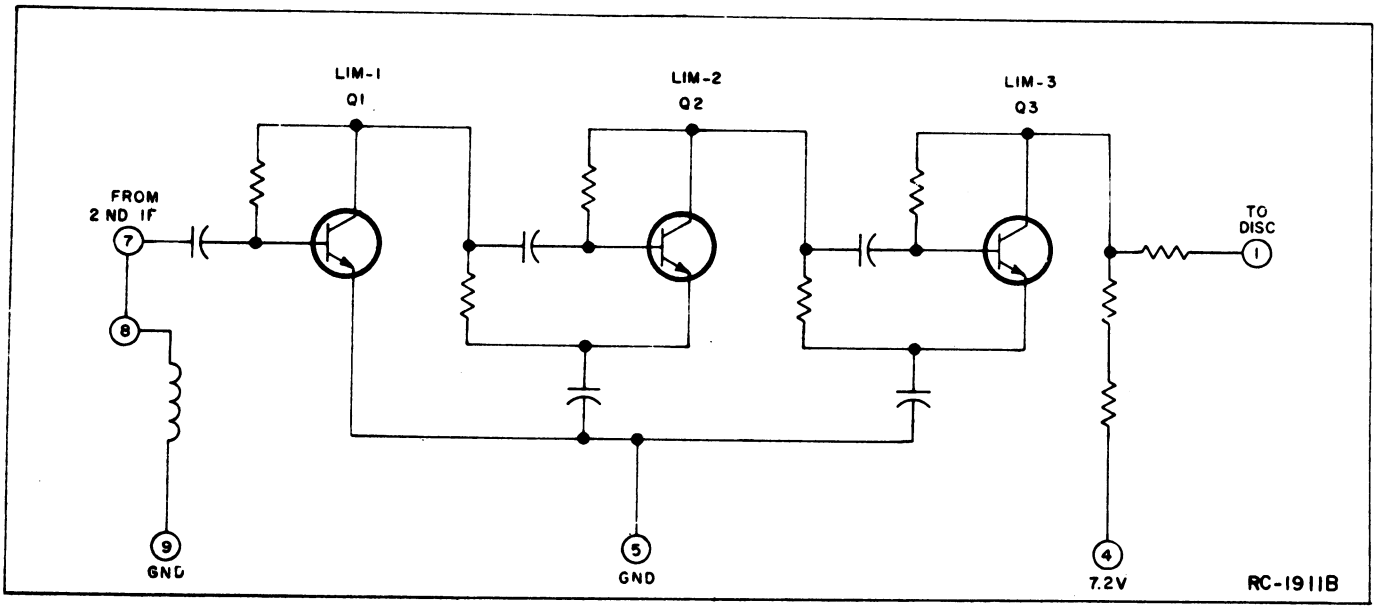


Figure 5 - Typical Limiter Circuit

anode of multiplier diode CR2. The two helical resonators following CR2 are tuned to seven times the first multiplier frequency for a total multiplication of 21 times. The output of the helical resonators is direct-coupled to the emitter of the mixer transistor. Low side injection is used.

The RF signal from the RF amplifier is applied to the base of mixer Q2 and the high or low side injection voltage from the multiplier assembly is applied to the emitter. The resultant 20-MHz IF frequency is coupled through the mixer collector tank (L2 & C6) to coupling network A320/A321. The collector tank also provides impedance matching to the coupling network.

COUPLING NETWORK A320/A321

The coupling network matches the impedance of the combined mixer outputs of DFE No. 1 and DFE No. 2 with the input to crystal filter A301/A302.

CRYSTAL FILTERS A301 and A304

Crystal filter A301 follows the multiplier-mixer stage, and its output is applied to the 1st IF amplifier module, filter A304 follows the IF amplifier module. The two crystal filters provide the major selectivity for the receiver. A301 and A304 each provide a minimum of 40-45 dB stopband attenuation.

IF AMPLIFIERS A303 and A306

An IF amplifier module follows each of the crystal filters, and contains the resistor-matching networks for the filters. A typical IF amplifier circuit is shown in Figure 4.

Each of the IF amplifier modules consists of three RC coupled amplifier stages that are series-connected for reduced drain. The two IF modules provide a total gain of approximately 85 dB.

LIMITER A307 AND DISCRIMINATOR A309

Limiter A307 consists of three RC coupled limiter stages that are series connected for reduced drain. The limiter module also provides some gain. The output of the limiter is applied to the discriminator. A typical limiter circuit is shown in Figure 5.

The receiver uses a 20/23 MHz, fixed-tuned crystal discriminator A309/A310 to recover the audio from the IF signal. The discriminator output is applied to the audio amplifier module.

AUDIO AMPLIFIER A311/A312

Audio and noise from the discriminator is applied to audio amplifier module A311 (A312 in Channel Guard applications). A typical audio amplifier circuit is shown in Figure 6.

Audio and noise is applied to the base of Q1. This stage operates as an emitter-follower for matching the impedance of the discriminator to the amplifier stage (Q2) and the volume control. The output of Q1 connects from pin 2 to the base of amplifier Q2 (pin 4) through the volume control. The output of Q1 is also applied to the input of the squelch module.

Following amplifier Q2 is an active lowpass filter (Q3). Audio from the filter is connected from pin 9 to the audio PA module. In audio amplifier module A312, an active high-pass filter is added in series with the low-pass filter to provide the required tone frequency roll-off.

AUDIO PA A313

When the receiver is quieted by a signal, audio from the active filter is connected to pin 1 of audio PA module A313, and then to the base of amplifier Q1. Q1 feeds the audio signal to the base of Q2, which drives PA transistors Q4 and Q5. A typical audio PA circuit is shown in Figure 7.

PA transistors Q4 and Q5 operate as complementary emitter-followers, providing a 500 milliwatt output into an 8-ohm load. Audio from pin 9 is coupled through capacitor C302 on the receiver board to the loudspeaker.

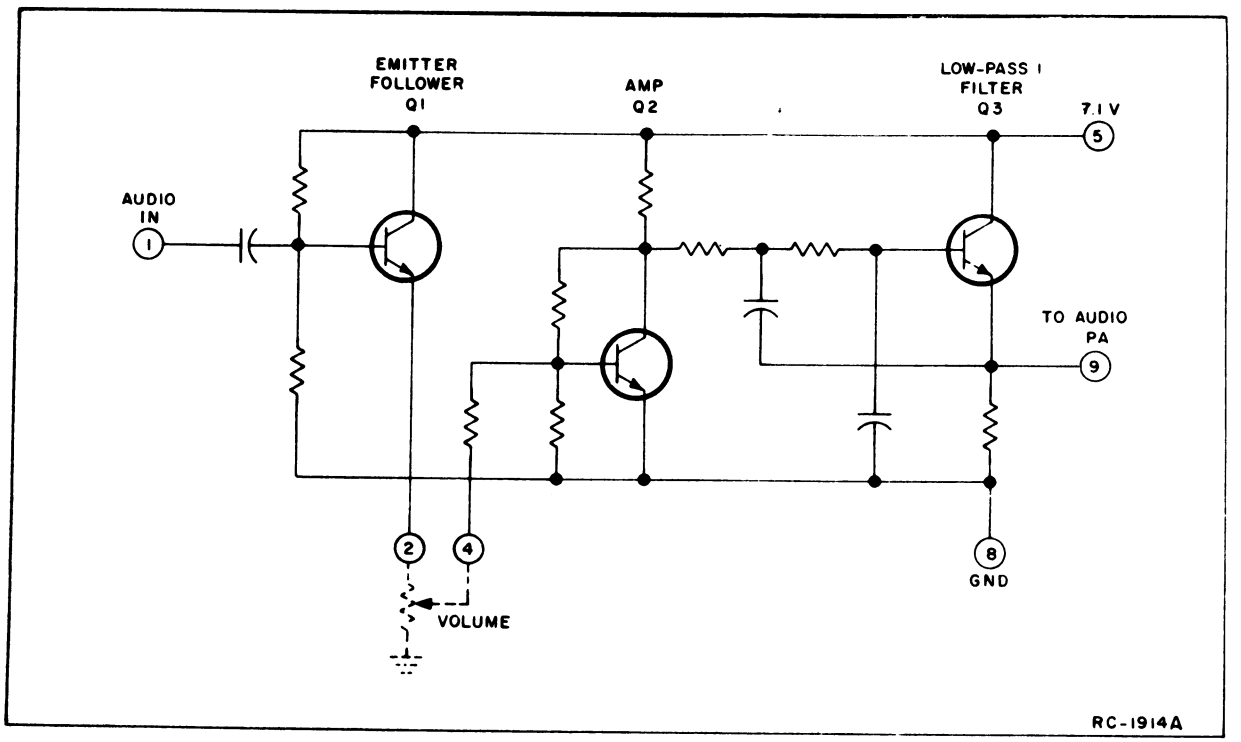


Figure 6 - Typical Audio Amplifier Circuit

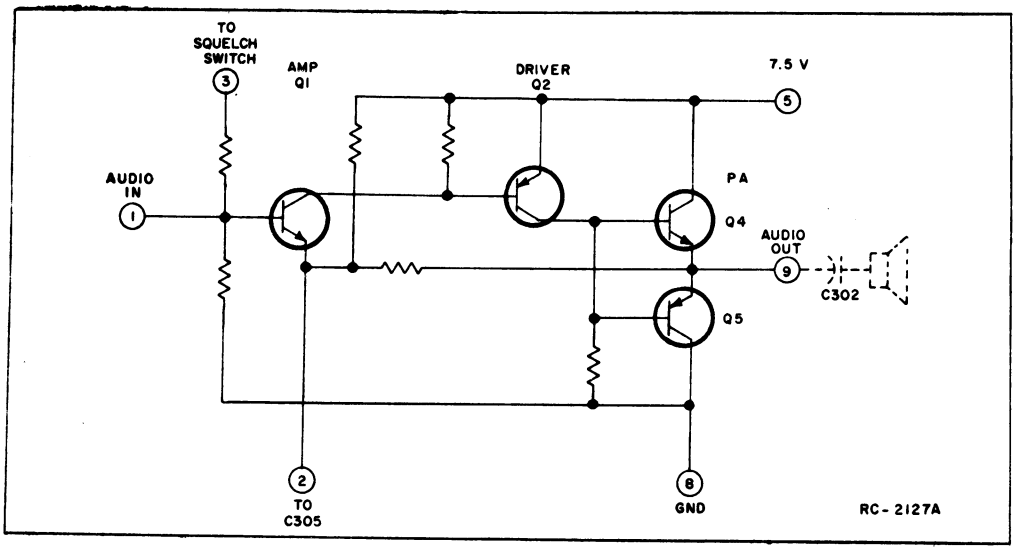


Figure 7 - Typical Audio PA Circuit

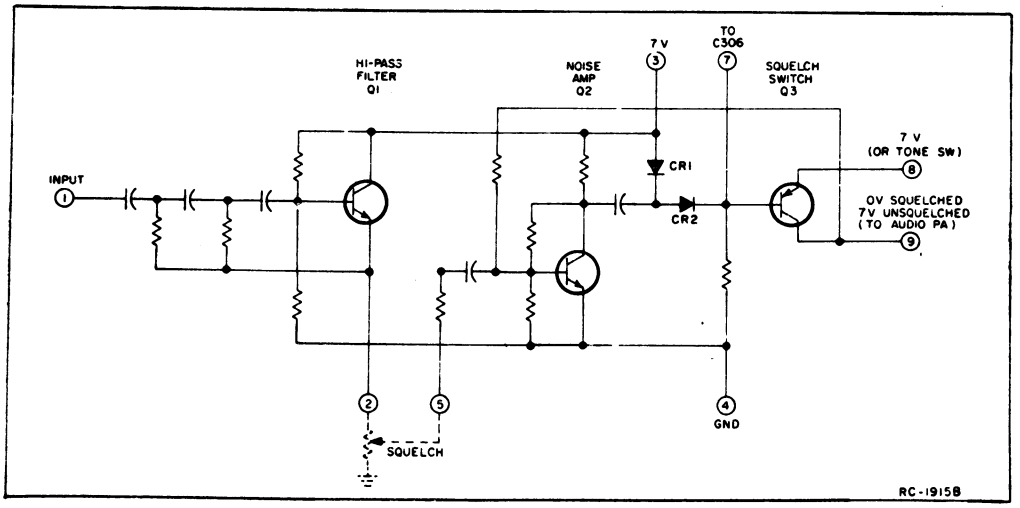


Figure 8 - Typical Squelch Circuit

SQUELCH CONTROL A314

Noise from audio amplifier A311/A312 operates the squelch circuit. A typical squelch circuit is shown in Figure 8.

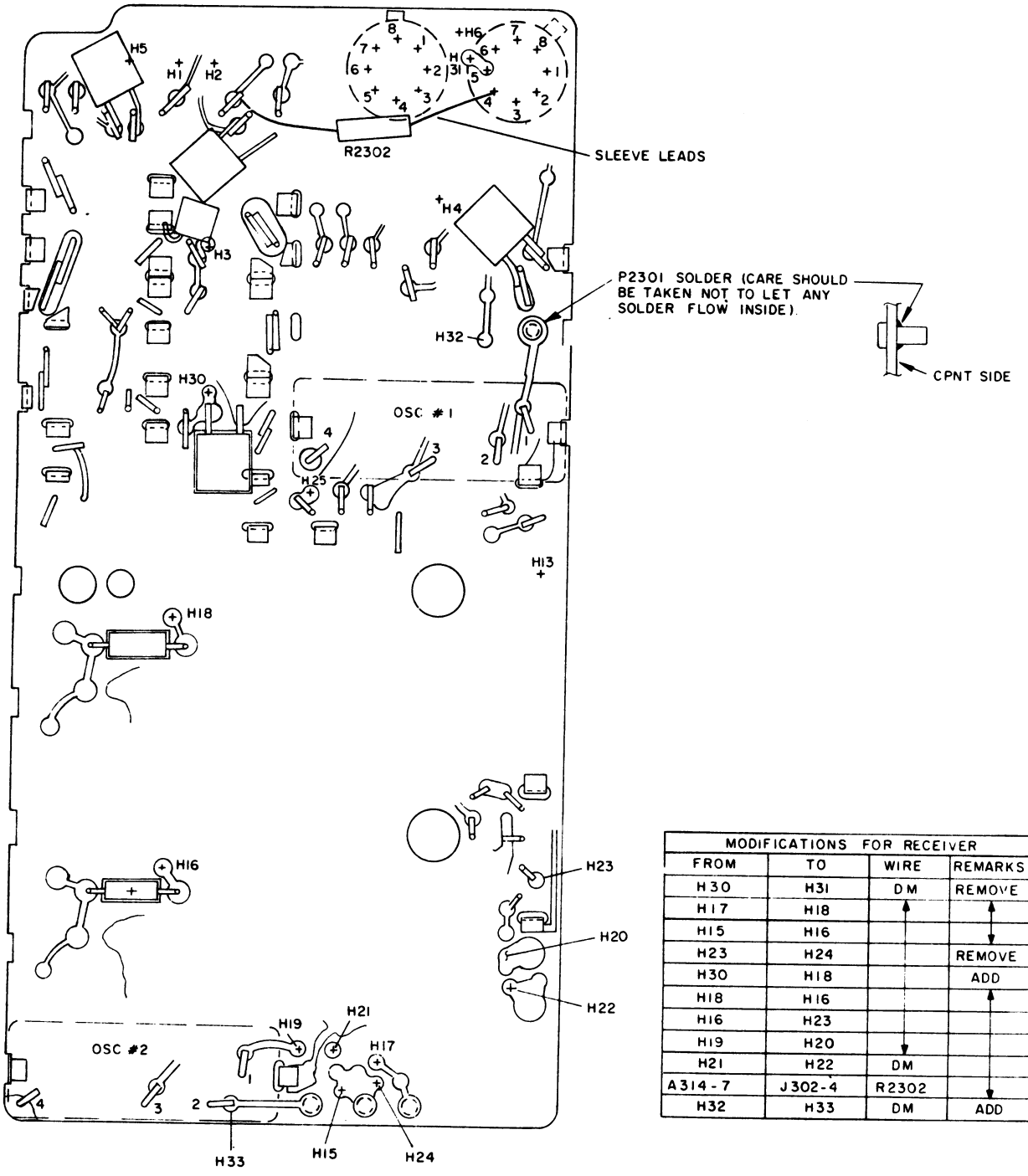
When no carrier is present in the receiver, the noise output of active highpass filter Q1 is coupled to the base of noise amplifier Q2 through SQUELCH control R708. R708 controls the gain of the noise amplifier.

The output of noise amplifier Q2 is detected by diodes CR1 and CR2, and the resultant positive voltage turns off the PNP squelch switch Q3. In standard radios, the emitter of Q3 is connected to +7V by means of a jumper from H1 to H2. When noise turns off Q3, its collector drops to A-. As the collector of Q3 is connected to the base of amplifier Q1 in the audio PA module, turning off Q3 also turns off Q1, keeping the audio PA turned off.

When the receiver is quieted by a signal, squelch switch Q3 turns on. This applies +7V to the base of amplifier Q1 in the audio PA module, turning the audio PA circuit on so that audio is heard at the speaker.

In tone decoder applications, the 7V jumper from H1 to H2 is removed. The emitter of squelch switch Q3 is connected to 7V by a DC switch on the decoder board.

An RF adaptor cable is available for connecting the receiver to a signal generator. Connecting the RF adaptor cable to J702 opens a set of contacts on the antenna strip line assembly. This disconnects the antenna and connects the receiver input to J702-1. Connection to chassis ground is made at J702-4.



MODIFICATIONS FOR RECEIVER			
FROM	TO	WIRE	REMARKS
H30	H31	DM	REMOVE
H17	H18		
H15	H16		
H23	H24		REMOVE
H30	H18		ADD
H18	H16		
H16	H23		
H19	H20		
H21	H22	DM	
A314-7	J302-4	R2302	
H32	H33	DM	ADD

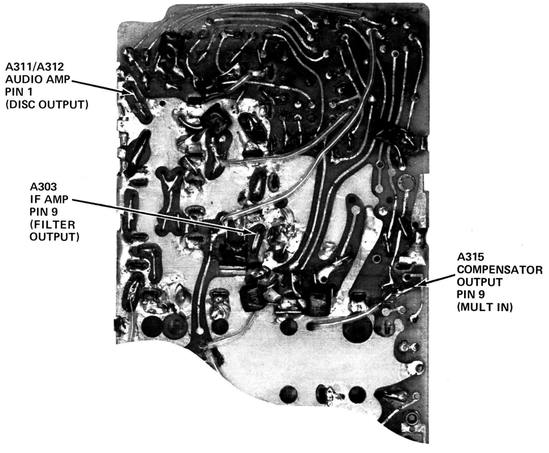
VIEW OF SOLDER SIDE OF DUAL FRONT RCVR

(19D423760, Sh. 2, Rev. 3)

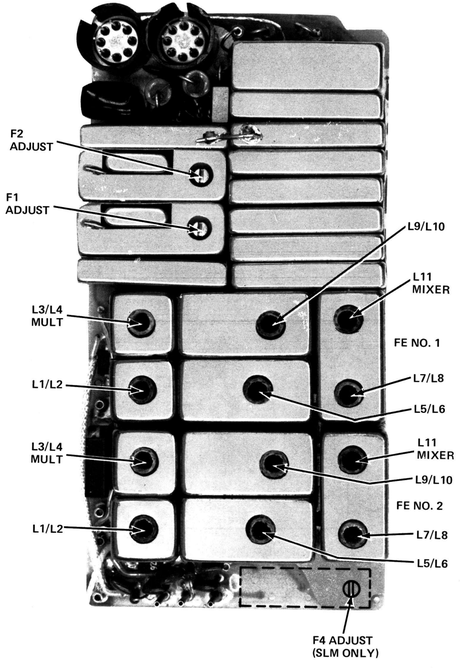
RECEIVER MODIFICATION

FOR Porta•Mobile II™ APPLICATION

SOLDER SIDE



COMPONENT SIDE



RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. A 20-MHz signal source (GE IF Generator Model 4EX9A10 or equivalent) and a 30-50 MHz source connected to Antenna Switch J702 by Receiver Test Cable 19C317633G1.
2. GE Test Set Model 4EX3A10 or 4EX8K11 or voltmeter with equivalent sensitivity.
3. GE Test Amplifier Model 4EX16A10 and RF probe 19C311370G1, or equivalent RF voltmeter.
4. Distortion Analyzer or AC-VTVM.
5. Tektronix Oscilloscope Model No. 515A or equivalent.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Set the slugs L1 thru L8 to the bottom of the coil form for frequencies in the high end of the band. Set the slugs near the middle of the coil form for frequencies near the low end of the band. L11 should be set near the middle of the coil in all cases.
2. Set multi-frequency switch to F1.

ALIGNMENT PROCEDURE

Step No.	Tuning Control	Procedure
1	MULT L9/L10	Connect RF Detector Probe to Pin 9 of A315. Tune L9/L10 for maximum meter reading on voltmeter.
2	L1 thru L8	Apply an on-frequency signal to J702 and adjust L1 thru L8 for best quieting sensitivity.
3	MULT L9/L10	Readjust L9/L10 for best quieting sensitivity. NOTE All circuits will tune with the slug in two positions. The correct position is the one closest to the board.
4	MIXER L11	Modulate the 20 KHz signal generator with the sawtooth output of the oscilloscope. Set the sweep rate for 2 ms/cm. Connect the output of the detector probe to the vertical input of the scope. Set the vertical sensitivity of the scope for highest sensitivity. With the probe connected to pin 9 of A303 increase the input of the generator until the IF band pass is displayed on the scope. Adjust L11 for peak amplitude.
5		Set multi-frequency switch to F3 and repeat Alignment Procedure.
6	MIXER L11	Set multi-frequency switch to F1. Alternately adjust L11 on both Front Ends until the band pass curve displayed is as flat as possible. Set multi-frequency switch to F3 and note same response curves. If response curve is not the same readjust L11 on Front End 2 slightly.
FREQUENCY ADJUSTMENT		
7		While applying an on-frequency signal to J702, loosely couple a 20-MHz signal to the Mixer. Adjust the Oscillator trimmer(s) for a zero beat frequency between the two signals. Alternate Method: Apply a strong 20 MHz signal to the Mixer. Measure the output of the Discriminator with a DC-VTVM at pin 1 of A311/A312. Note the reading. Next, remove the 20-MHz signal and apply a strong on-frequency signal to J702. Then tune the oscillator trimmer(s) for the meter reading obtained at pin 1 of A311/A312.

TEST PROCEDURES

These Test Procedures are designed to help you service a receiver that is operating --- but not properly. The problems encountered could be low power, poor sensitivity, distortion, 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. To check Dual Front End receivers set multi-frequency switch as follows:

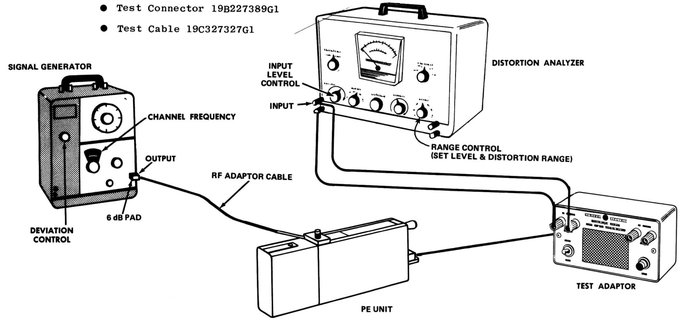
FE#1 Multi-Freq. Switch to F1 or F2
FE#2 Multi-Freq. Switch to F3X

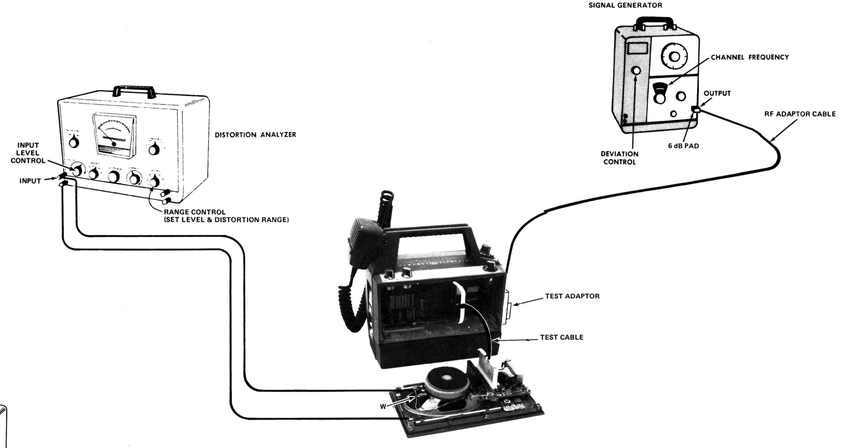
TEST EQUIPMENT REQUIRED

- Distortion Analyzer similar to: Heath IM-12
- Signal Generator similar to: Measurements M-800
- 6-dB attenuation pad
- Test Adaptor Model 4EX12A10
- RF Adaptor Cable 19C317633G1
- Test Connector 19B227389G1
- Test Cable 19C327327G1

PRELIMINARY ADJUSTMENTS

1. Connect the test equipment to the receiver as shown for all steps of the receiver Test Procedure.
2. Turn the SQUELCH control fully clockwise for all steps of the Test Procedure.
3. Turn on all of the equipment and let it warm up for 20 minutes.





STEP 1

AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power output as follows:

A. Connect a 1,000-microvolt test signal modulated by 1,000 hertz ±3.0 kHz deviation to the Antenna Switch J702.

B. Set the Volume Control for a 500 milliwatt output (2 volts RMS).

C. Make distortion measurements according to manufacturer's instructions. Reading should be less than 10% (5% is typical). 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 0.5 watt, make the following checks:

D. Battery voltage---low voltage will cause distortion. (Refer to Receiver Schematic Diagram for voltages.)

E. Audio Gain (Refer to Receiver Troubleshooting Procedure).

STEP 2

USABLE SENSITIVITY (12 dB SINAD)

TEST PROCEDURE

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 J702.

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. While reducing the signal generator output, switch the RANGE control from SET LEVEL to the distortion range 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 specification with an audio output of at least 250 milliwatts.

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, and make the gain measurements as shown on the Troubleshooting Procedure.

STEP 3

MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

TEST PROCEDURE

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.

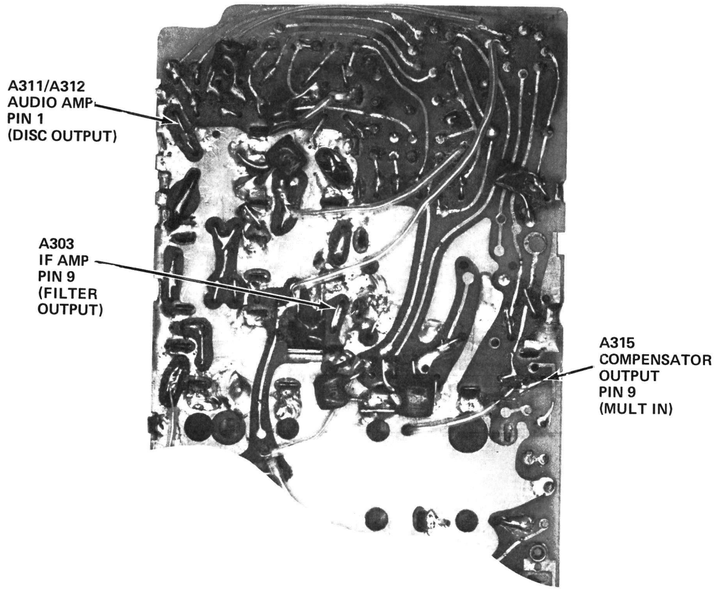
C. While increasing the deviation of the Signal Generator, switch the RANGE control from SET LEVEL to distortion range until a 12-dB difference is obtained between the SET LEVEL and distortion range readings (from +2 dB to -10 dB).

D. The deviation control reading for the 12-dB difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±7 kHz (but less than ±9 kHz).

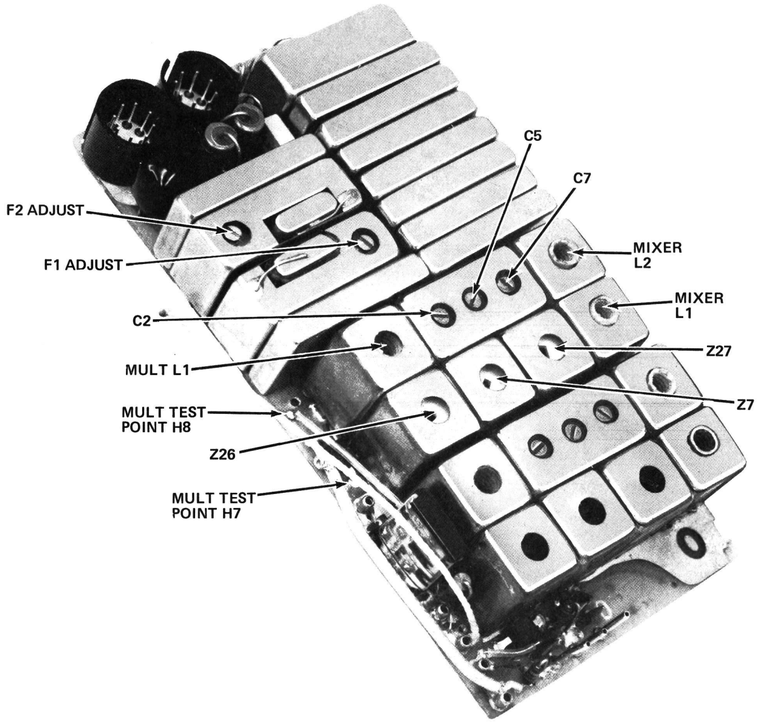
SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, make gain measurements as shown on the Receiver Troubleshooting Procedure.

SOLDER SIDE



COMPONENT SIDE



RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. A 20 MHz signal source (GE IF Generator Model 4EX9A10 or equivalent) and a 150.8-174 MHz source at 50 millivolts connected to Antenna Switch J702 by Receiver Test Cable 19C317633G1.
2. GE Test Amplifier Model 4EX16A10 and RF probe 19C311370G1, or equivalent RF voltmeter.
3. Distortion Analyzer of AC-VTVM.
4. Tektronix Oscilloscope Model 515A or equivalent.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. In multi-frequency receivers where the maximum frequency spacing is less than one MHz, align the receiver on the F1 channel. Where the frequency spacing is more than one MHz, align the receiver on the highest frequency.
2. Set helical resonators Z26/Z28, Z7/Z29, and Z27/Z30 at the top of the can for frequencies at the high end of the range and at the bottom of the can for frequencies at the low end of the range.
3. On Front End 2, set L2/L6 (mixer output coil) to center position.
4. Set tuning slug in multiplier coil L1 at the top of the can for frequencies at the Hi end of the range, middle of the can for frequencies in the middle of the range and at the bottom of the can for frequencies at the Lo end of the range.
5. Connect the AC-VTVM across the speaker leads.
6. Set multi-frequency switch to F1.

ALIGNMENT PROCEDURE
(Front End 19C317295G9 & -G11)

Step No.	Tuning Control	Procedure
1.	Z26, Z7 & Z27 Z26/Z28, Z7/Z29, & Z27/Z30	With an on frequency signal applied to the antenna jack, tune helicals Z26/Z28, Z7/Z29 and Z27/Z30 for maximum quieting sensitivity.
2.	Mixer L1/L5	Tune L1/L5 for maximum quieting sensitivity.
3.	Filter C1/C2, C3/C5 & C5/C7	Tune C1/C2, C3/C5 & C5/C7 for maximum quieting sensitivity.
4.	Mult. L1	Tune L1 for maximum quieting sensitivity. (L1 of A13 for 19C317295G9 Front End)
5.	Mixer L2/L6	Modulate the 20 kHz signal generator with the sawtooth output of the oscilloscope. Set the sweep rate for 2 ms/cm. Connect the output of the detector probe to the vertical input of the scope. Set the vertical sensitivity of the scope for highest sensitivity. With the probe connected to pin 9 of A304 increase the input of the generator until the IF bandpass is displayed on the scope. Adjust L2/L6 for maximum flatness. NOTE: The mixer will tune with the slug in two positions. The correct position is the one closest to the board.
6.		Repeat alignment for Front End 2. Set multi-frequency switch to F3.
7.	Mixer L2/L6	Set multi-frequency switch to F1. Alternately adjust L2 on both Front Ends until the band pass curve is displayed as flat as possible. Set multi-frequency switch to F3 and note same response curve. If response is not the same readjust L2 on Front End 2 slightly.
		FREQUENCY ADJUSTMENT
8.		While applying an on-frequency signal to J702, loosely couple a 20-MHz signal to the Mixer. Adjust the Oscillator trimmer(s) for a zero beat frequency between the two signals. Alternate Method: Apply a strong 20 MHz signal to the Mixer. Measure the output of the Discriminator with a DC-VTVM at pin 1 of A311/A312. Note the reading. Next, remove the 20-MHz signal and apply a strong on-frequency signal to J702. Then tune the oscillator trimmer(s) for the meter reading obtained at pin 1 of A309/A310.

RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. A 20 MHz signal source (GE IF Generator Model 4EX9A10 or equivalent) and a 150.8-174 MHz source connected to Antenna Switch J702 by Receiver Test Cable 19C317633G1.
2. GE Test Set Model 4EX3A10 or 4EX8K11 or voltmeter with equivalent sensitivity.
3. GE Test Amplifier Model 4EX16A10 and RF probe 19C311370G1, or equivalent RF voltmeter.
4. Distortion Analyzer or AC-VTVM.
5. Tektronix Oscilloscope Model 515A or equivalent.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. In multi-frequency receivers where the maximum frequency spacing is less than one MHz, align the receiver on the F1 channel. Where the frequency spacing is more than one MHz, align the receiver on the highest frequency.
2. Set the slugs in Z6 thru Z10 to the bottom of the coil form for frequencies in the low end of the band. Set the slugs near the top of the coil form for frequencies near the high end of the band.
3. On Front End 2, set L2 (mixer output coil) to center position.
4. Set the slug in RF AMP L1 to the top of the coil form for frequencies in the low end of the band, and near the bottom of the coil form for frequencies near the high end of the band.
5. Connect the negative lead of the DC Test Set to the Mult Test Point H8, (FE#1) or H7 (FE#2) and the positive lead to ground. Connect the AC-VTVM across the speaker leads.
6. Set multi-frequency switch to F1.

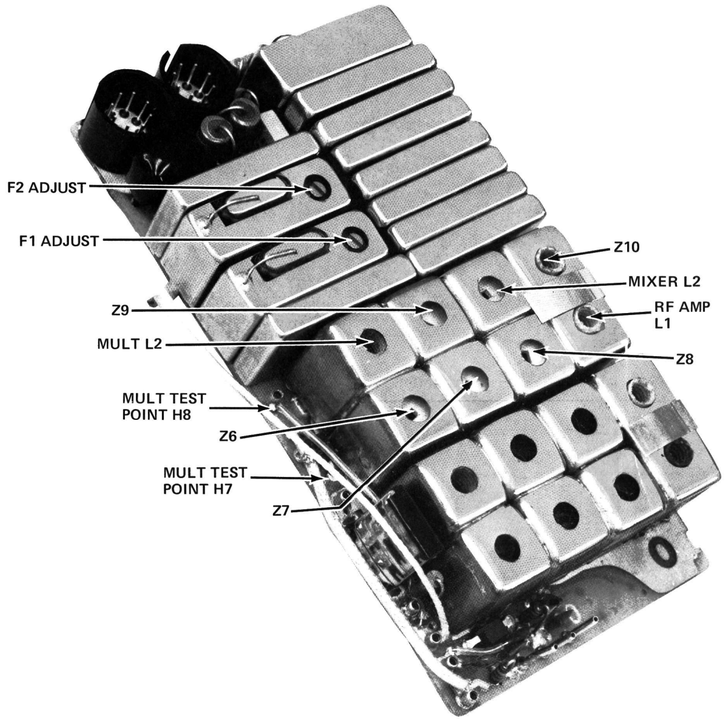
ALIGNMENT PROCEDURE

Step No.	Tuning Control	Procedure
1	MULT L2	Adjust L2 for maximum meter reading.
2	Z9 and Z10	Adjust Z9 and then Z10 for a slight change in meter reading.
3	Z6 thru Z8 and RF Amp L1	Apply an on-frequency signal to J702 and adjust Z6, Z7, Z8, and L1 for best quieting sensitivity.
4	Mixer L2	Modulate the 20 KHz signal generator with the sawtooth output of the oscilloscope. Set the sweep rate for 2 ms/cm. Connect the output of the detector probe to the vertical input of the scope. Set the vertical sensitivity of the scope for highest sensitivity. With the probe connected to pin 9 of A303, increase the input of the generator until the IF band pass is displayed on the scope. Adjust mixer output Coil L2 for peak amplitude.
5	MULT L2, Z9 and Z10	De-tune L2. Next, increase the on-frequency input signal and tune Z9 and Z10 for best quieting sensitivity. Now re-adjust L2 for maximum meter reading. Where the frequency spread is more than one MHz, de-tune L2 one-eighth turn counterclockwise.
6		Repeat alignment for Front End 2. Set multi-frequency switch to F3.
7	Mixer L2	Set multi-frequency switch to F1. Alternately adjust L2 on both Front Ends until the band pass curve is displayed as flat as possible. Set multi-frequency switch to F3 and note same response curve. If response is not the same readjust L2 on Front End 2 slightly.
		FREQUENCY ADJUSTMENT
8		While applying an on-frequency signal to J702, loosely couple a 20-MHz signal to the Mixer. Adjust the Oscillator trimmer(s) for a zero beat frequency between the two signals. Alternate Method: Apply a strong 20 MHz signal to the Mixer. Measure the output of the Discriminator with a DC-VTVM at pin 1 of A311/A312. Note the reading. Next, remove the 20-MHz signal and apply a strong on-frequency signal to J702. Then tune the oscillator trimmer(s) for the meter reading obtained at pin 1 of A309/A310.

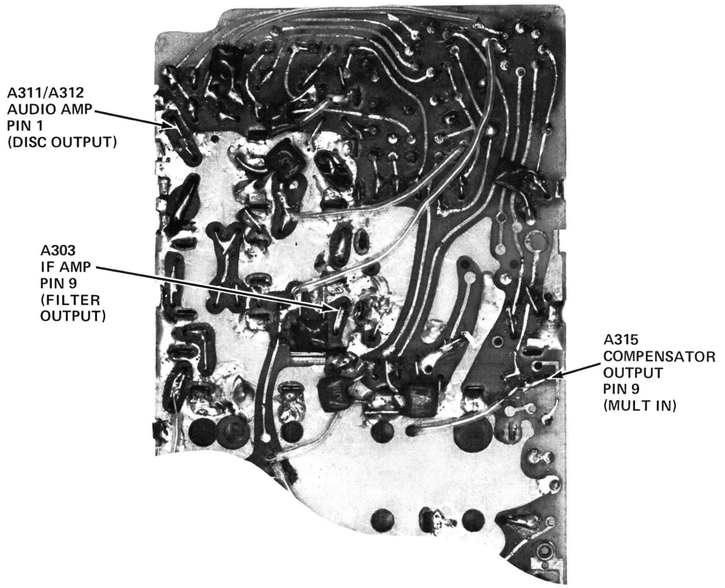
ALIGNMENT PROCEDURE

150.8—174 MHz HIGH SENSITIVITY
DUAL FRONT END

COMPONENT SIDE



SOLDER SIDE



RECEIVER ALIGNMENT

EQUIPMENT

1. A 20-MHz signal source (GE IF Generator Model 4EX9A10 or equivalent) and a 450-512 MHz source connected to Antenna Switch J702 by Receiver Test Cable 19C317633G1.
2. GE Test Set Model 4EX3A10 or 4EX8K11 or voltmeter with equivalent sensitivity.
3. GE Test Amplifier Model 4EX16A10 and RF probe 19C311370G1, or equivalent RF voltmeter.
4. Distortion Analyzer or AC-VTVM.
5. Tektronix Oscilloscope Model No. 515A or equivalent.

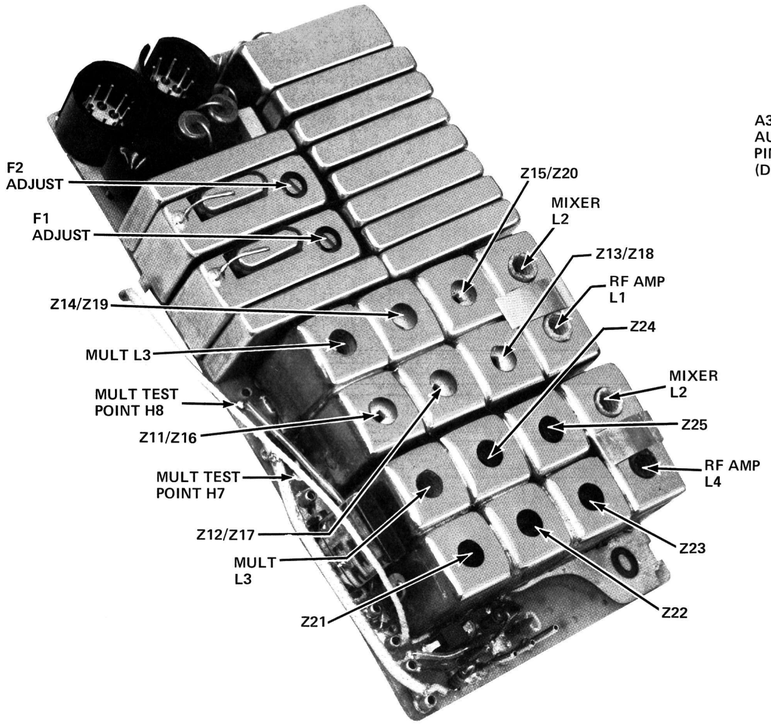
PRELIMINARY CHECKS AND ADJUSTMENTS

1. In multi-frequency receivers where the maximum frequency spacing is less than one MHz, align the receiver on the F1 channel. Where the frequency spacing is more than one MHz, align the receiver on the center frequency.
2. Set the slugs in Z11/Z16 thru Z15/Z20 (Z21-Z25) to the bottom of the coil form for frequencies in the low end of the band. Set the slugs near the top of the coil form for frequencies near the high end of the band.
3. On Front End 2, set L2, mixer output coil to center position.
4. Set the slug in RF AMP L1 (L4) to the top of the coil form for frequencies in the low end of the band, and near the bottom of the coil form for frequencies near the high end of the band.
5. Connect the negative lead of the DC Test Set to the Mult Test Point (H8, FE#1; H7, FE#2) and the positive lead to ground. Connect the Distortion Analyzer or AC-VTVM across the speaker leads.
6. Set multi-frequency switch to F1.

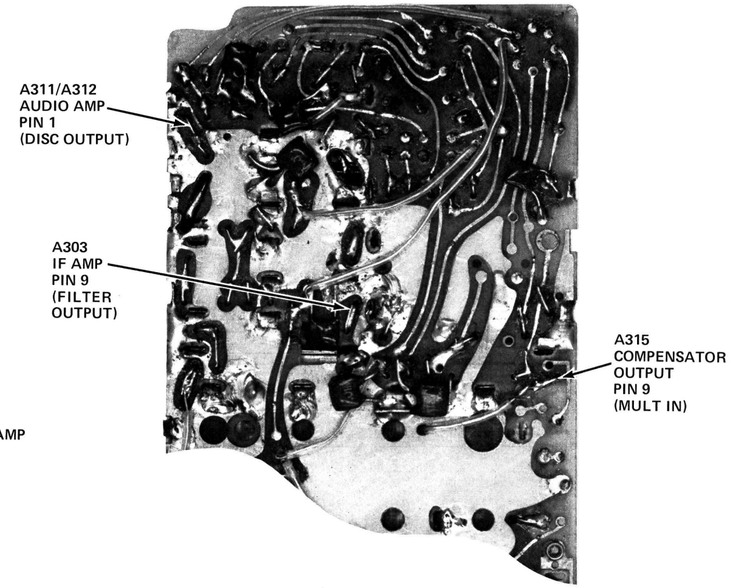
ALIGNMENT PROCEDURE

Step No.	Tuning Control 450-470	Tuning Control 470-512	Procedure
			NOTE: Adjustment controls for 470-512 MHz frequency band are enclosed in brackets "( )".
1	MULT L3	L3	Adjust L3 for maximum meter reading.
2	Z14/Z19 Z15/Z20	Z24 Z25	Ajust Z14/Z19 (Z24) and then Z15/Z20 (Z25) for slight change in meter reading.
3	Z11/Z16 thru Z13/Z18 and L1	Z21 thru Z23 and L4	Apply an on-frequency signal to J702 and adjust Z11/Z16, Z12/Z17, Z13/Z18, and L1 (L4) for best quieting sensitivity.
4	Mixer L2	Mixer L2	Modulate the 20 KHz signal generator with the sawtooth output of the oscilloscope. Set the sweep rate for 2 ms/cm. Connect the output of the detector probe to the vertical input of the scope. Set the vertical sensitivity of the scope for highest sensitivity. With the probe connected to pin 9 of A303, increase the input of the generator until the IF band pass is displayed on the scope. Adjust mixer output coil L2 for peak amplitude.
5	MULT L3 Z14/Z19, Z15/Z20	MULT L3 Z24, Z25	De-tune L3. Next, increase the on-frequency input signal and tune Z14/Z19 (Z24) and Z15/Z20 (Z25) for best quieting sensitivity. Now re-adjust L3 for maximum meter reading.
6			Repeat alignment for Front End 2; set multi-frequency switch to F3
7	Mixer L2		Set multi-frequency switch to F1. Alternately adjust mixer output coil on both front ends until the band pass curve displayed is as flat as possible. Set multi-frequency switch to F3 and note the same response curve. If response is not the same, adjust L2 on Front End 2 slightly.
			FREQUENCY ADJUSTMENT
8			While applying an on-frequency signal to J702, loosely couple a 20-MHz signal to the Mixer. Adjust the Oscillator trimmer(s) for a zero beat frequency between the two signals. Alternate Method: Apply a strong 20 MHz signal to the Mixer. Measure the output of the Discriminator with a DC-VTVM at pin 1 of A311/A312. Note the reading. Next, remove the 20-MHz signal and apply a strong on-frequency signal to J702. Then tune the oscillator trimmer(s) for the meter reading obtained at pin 1 of A311/A312.

COMPONENT SIDE



SOLDER SIDE



PARTS LIST

LBI-4853

DUAL FRONT END
19D417149G4 30-36 MHz
19D417149G5 36-47 MHz
19D417149G6 42-50 MHz

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116114P2063	Ceramic: 91 pf ±5%, 100 VDCW; temp coef -80 PPM.
C2	19A116114P2059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -80 PPM.
C3	19A116114P2056	Ceramic: 56 pf ±5%, 100 VDCW; temp coef -80 PPM.
C4	5491601P126	Phenolic: 2.2 pf ±5%, 500 VDCW.
C5	5491601P123	Phenolic: 1.5 pf ±5%, 500 VDCW.
C6	5491601P122	Phenolic: 1.2 pf ±5%, 500 VDCW.
C7	19A116114P2063	Ceramic: 91 pf ±5%, 100 VDCW; temp coef -80 PPM.
C8	19A116114P2059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -80 PPM.
C9	19A116114P2056	Ceramic: 56 pf ±5%, 100 VDCW; temp coef -80 PPM.
C10	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C11 and C12	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121-050-W5R.
C13	19A116114P2063	Ceramic: 91 pf ±5%, 100 VDCW; temp coef -80 PPM.
C14	19A116114P2059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -80 PPM.
C15	19A116114P2056	Ceramic: 56 pf ±5%, 100 VDCW; temp coef -80 PPM.
C16	5491601P123	Phenolic: 1.5 pf ±5%, 500 VDCW.
C17	5491601P122	Phenolic: 1.2 pf ±5%, 500 VDCW.
C18	5491601P119	Phenolic: 0.82 pf ±5%, 500 VDCW.
C19	19A116114P2063	Ceramic: 91 pf ±5%, 100 VDCW; temp coef -80 PPM.
C20	19A116114P2059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -80 PPM.
C21 and C22	19A116114P2056	Ceramic: 56 pf ±5%, 100 VDCW; temp coef -80 PPM.
C23 and C24	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121-050-W5R.
C25	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
C26	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie
C27	5491674P28	Tantalum: 1.0 µf ±20%, 25 VDCW; sim to Sprague Type 162D.
C32	19A116114P2047	Ceramic: 33 pf ±5%, 100 VDCW; temp coef -80 PPM.
C33	19A116114P2044	Ceramic: 27 pf ±5%, 100 VDCW; temp coef -80 PPM.
C34	19A116114P2012	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef -80 PPM.
		- - - - - - - - DIODES AND RECTIFIERS - - - - -
CR1	19A115250P1	Silicon.
CR2	19A116925P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19C320379G12	Coil. Includes:
	19B209436P1	Tuning slug.
L2	19C320379G13	Coil. Includes:
	19B209436P1	Tuning slug.
L3	19C320379G14	Coil. Includes:
	19B209436P1	Tuning slug.
L4	19C320379G15	Coil. Includes:
	19B209436P1	Tuning slug.
L5	19C320379G5	Coil. Includes:
	19B209436P1	Tuning slug.
L6	19C320379G6	Coil. Includes:
	19B209436P1	Tuning slug.
L7	19C320379G5	Coil. Includes:
	19B209436P1	Tuning slug.
L8	19C320379G6	Coil. Includes:
	19B209436P1	Tuning slug.
L9	19C320379G9	Coil. Includes:
	19B209436P1	Tuning slug.
L10	19C320379G10	Coil. Includes:
	19B209436P1	Tuning slug.
L11	19C320379G11	Coil. Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q1 and Q2	19A116818P2	N Channel, field effect.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1 and R2	3R151P273J	Composition: 27,000 ohms ±5%, 1/8 w.
R3	3R151P391J	Composition: 390 ohms ±5%, 1/8 w.
R4	3R151P472J	Composition: 4700 ohms ±5%, 1/8 w.
R5	3R151P243J	Composition: 24,000 ohms ±5%, 1/8 w.
R6	3R151P511J	Composition: 510 ohms ±5%, 1/8 w.
R7	3R151P273J	Composition: 27,000 ohms ±5%, 1/8 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - -
	4035306P11	Washer, fiber. (Used with Q1 and Q2).

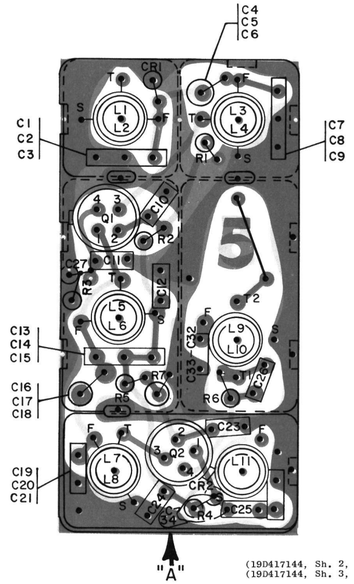
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PRODUCTION CHANGES

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

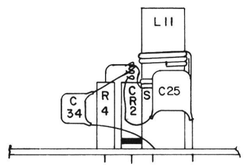
REV. A - Component Board 19D417149G4-G6.

Incorporated in initial shipment.

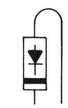


(19D417144, Sh. 2, Rev. 5)
(19D417144, Sh. 3, Rev. 5)

COMPONENT SIDE

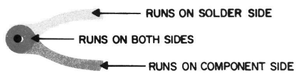


VIEW "A"



TYP. ASM. FOR CR1

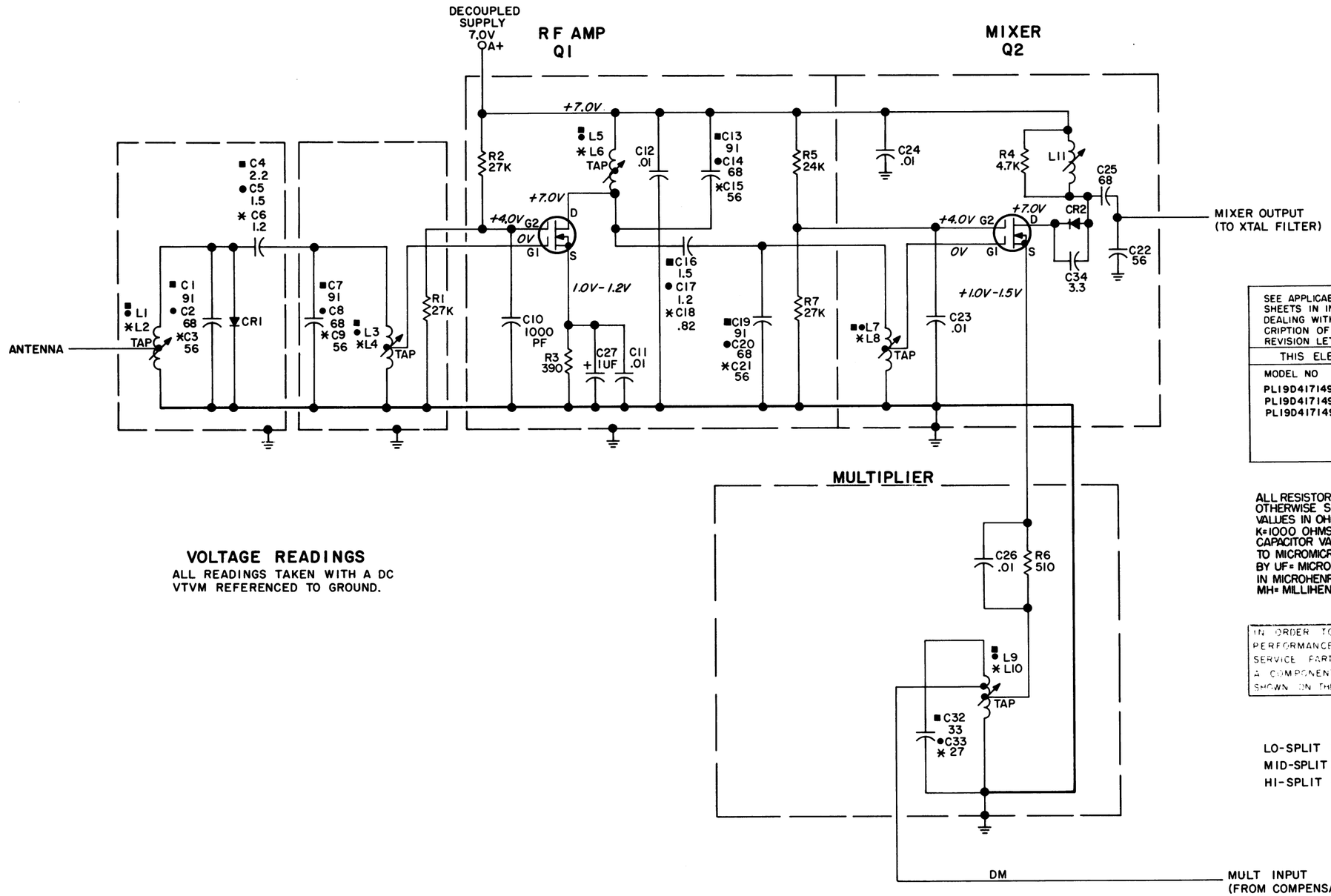
LEAD IDENTIFICATION FOR Q1 & Q2 - VIEW FROM LEAD END.



(19C321529, Rev. 0)

OUTLINE DIAGRAM

30—50 MHz DUAL FRONT END



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

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
PLI9D417149G4	A
PLI9D417149G5	A
PLI9D417149G6	A

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG = 1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

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

LO-SPLIT 30-36MHZ
MID-SPLIT 36-42MHZ
HI-SPLIT 42-50MHZ

VOLTAGE READINGS

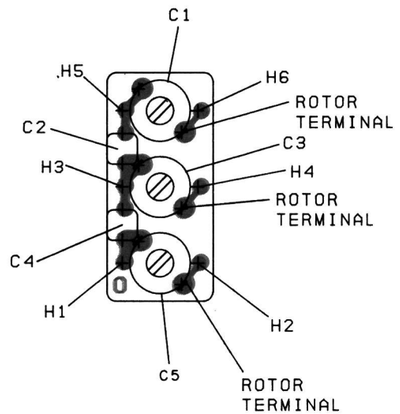
ALL READINGS TAKEN WITH A DC VTVM REFERENCED TO GROUND.

(19D417486, Rev. 3)

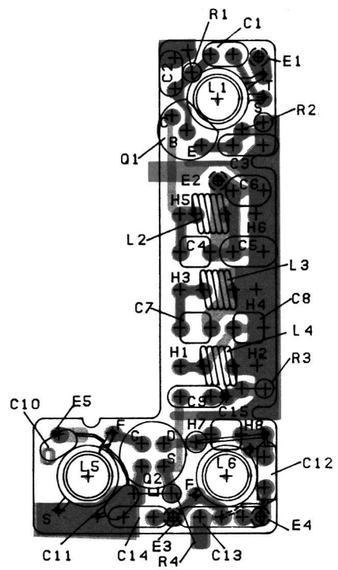
SCHEMATIC DIAGRAM

30--50 MHz DUAL FRONT END

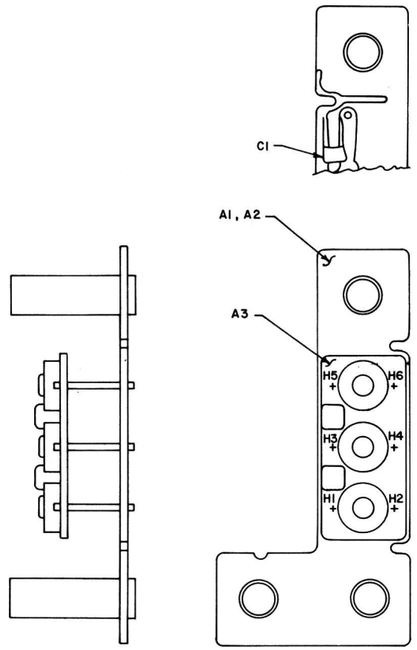
Issue 1



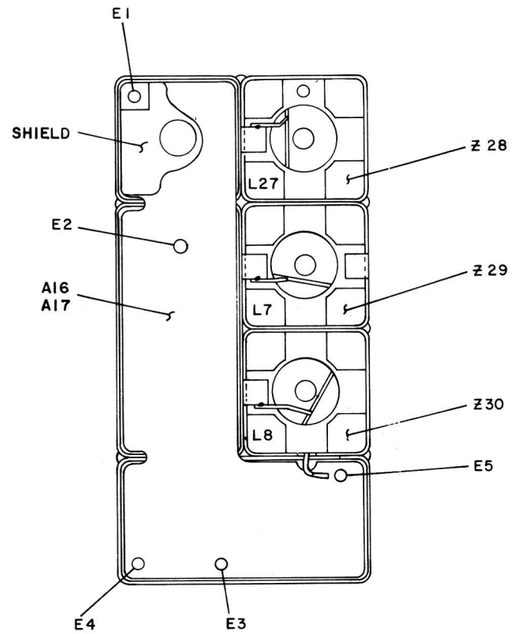
(19C327737, Rev. 0)
(19A137037, Sh. 1, Rev. 0)
(19A137037, Sh. 2, Rev. 0)



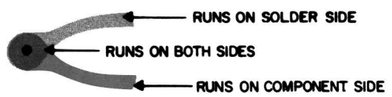
(19D424748, Rev. 1)
(19B227948, Sh. 1. Rev. 0)
(19B227948, Sh. 2, Rev. 0)

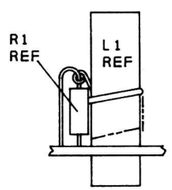


(19C328166, Rev. 0)

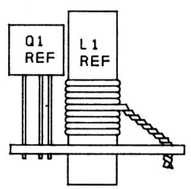


(19C328177, Rev. 0)

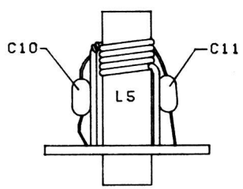




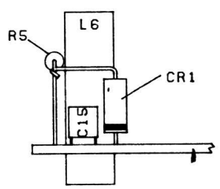
ASSY. FOR
L1 AND R1



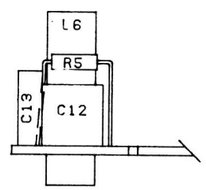
ASSY. FOR
L1 AND Q1



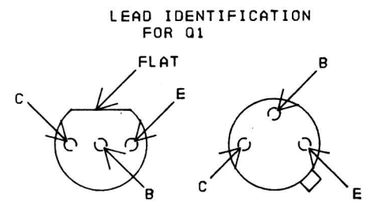
ASSY. FOR L5
C10 AND C11



ASSY. FOR L6,
R5, CR1, AND C15



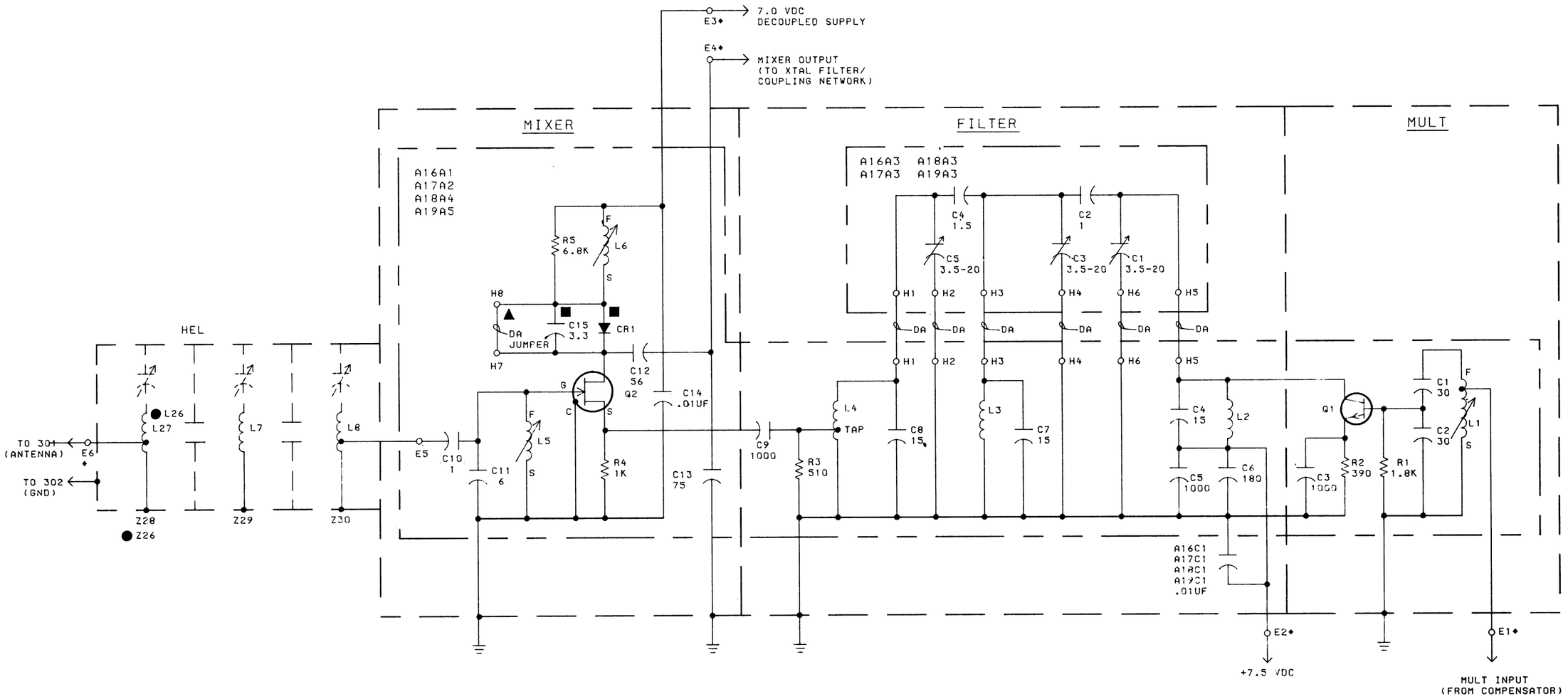
ASSY. FOR L6, R5,
C12 AND C13



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

OUTLINE DIAGRAM

150.8--174 FET FRONT END
19C317395G11 (A336/A337)



ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

MODEL NO	REV LETTER
PL19C317295G8	E
PL19C317295G9	E
PL19C317295G10	
PL19C317295G11	

● PRESENT ON 19C317295G8 & G9 ONLY

▲ PRESENT ON 19C317295G10 (A16),19C317295G8 (A18) ONLY

■ PRESENT ON 19C317295G11 (A17),19C317295G9 (A19) ONLY

◆ PRESENT ON 19C317295G10 (A16) ONLY
◆ PRESENT ON 19C317295G11 (A17) ONLY

(19D424705, Rev. 0)

SCHEMATIC DIAGRAM

150.8--174 FET FRONT ENDS
19C317395G9 (REV. E AND LATER) (A334/A335)
19C317395G11 (A336/ 337)

Issue 1

PARTS LIST

150.8-174 MHz DUAL FRONT END
19C317295G9 (REV E AND LATER)
19C317295G11 (FET)

SYMBOL	GE PART NO.	DESCRIPTION
A17, A19		MULTIPLIER/MIXER A17 19C327738G2 A19 19C327738G4
A2, A5		MIXER BOARD A2 19D424746G2 A5 19D424746G4
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	19A116114P2045	Ceramic: 30 pf ±5%, 100 VDCW; temp coef -80 PPM.
C3	5495323P12	Ceramic: 0.001 µf +100% -20%, 75 VDCW.
C4	19A116114P3036	Ceramic: 15 pf ±5%, 100 VDCW; temp coef -150 PPM.
C5	5495323P12	Ceramic: 0.001 µf +100% -20%, 75 VDCW.
C6	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C7 and C8	19A116114P3036	Ceramic: 15 pf ±5%, 100 VDCW; temp coef -150 PPM.
C9	5495323P12	Ceramic: 0.001 µf +100% -20%, 75 VDCW.
C10	19A116114P1	Ceramic: 1 pf ±5%, 100 VDCW; temp coef 0 PPM.
C11	19A116114P2020	Ceramic: 6 pf ±5%, 100 VDCW; temp coef -80 PPM.
C12	19A116114P3056	Ceramic: 56 pf ±5%, 100 VDCW; temp coef -150 PPM.
C13	19A116114P2060	Ceramic: 75 pf ±5%, 100 VDCW; temp coef -80 PPM.
C14	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C15	19A116114P2011	Ceramic: 3.3 pf ±10%, 100 VDCW; temp coef -80 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116925P1	Silicon, pin: 35 volt Reverse Breakdown, 400 mW.
		- - - - - - - - - TERMINALS - - - - - - - - -
E1 thru E4	19A134458P1	Terminal, stud.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19B226718G1	Coil. Includes:
	19B209436P1	Tuning slug.
L2 and L3	19A130474P1	Coil.
L4	19A130473P1	Coil.
L5	19B226750G1	Coil.
L6	19C320379G11	Coil. Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q2	19A116960P1	N Type, field effect; sim to Type 2N4416.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R151P182J	Composition: 1.8K ohms ±5%, 1/8 w.
R2	3R151P391K	Composition: 390 ohms ±10%, 1/8 w.
R3	3R151P511J	Composition: 510 ohms ±5%, 1/8 w.
R4	3R151P102J	Composition: 1K ohms ±5%, 1/8 w.
R5	3R151P682J	Composition: 6.8K ohms ±5%, 1/8 w.
A3		FILTER BOARD 19C327735G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A134162P3	Variable, ceramic: approx 3.5 to 20 pf; sim to Erie Style 513-001.
C2	19A116114P1	Ceramic: 1 pf ±10%, 100 VDCW; temp coef 0 PPM.
C3	19A134162P3	Variable, ceramic: approx 3.5 to 20 pf; sim to Erie Style 513-001.
C4	19A116114P4	Ceramic: 1.5 pf ±5%, 100 VDCW; temp coef 0 PPM.
C5	19A134162P3	Variable, ceramic: approx 3.5 to 20 pf; sim to Erie Style 513-001.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L7	19B216441G3	Helical resonator. (Part of Z29). Includes:
	19C311727P1	Tuning slug.
L8	19B216441G12	Helical resonator. (Part of Z30). Includes:
	19C311727P1	Tuning slug.
L26	19B216441G16	Helical resonator. (Part of Z26). Includes:
	19C311727P1	Tuning slug.
L27	19B216441G17	Helical resonator. (Part of Z28). Includes:
	19C311727P1	Tuning slug.
		- - - - - - - - HELICAL RESONATORS - - - - - - - -
Z26		Consists of L26 and 19C327717G1 can.
Z28		Consists of L27 and 19C327717G1 can.
Z29		Consists of L7 and 19C327717G1 can.
Z30		Consists of L8 and 19C327717G1 can.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4035306P11	Washer, fiber. (Used with Q2 on A2).
	19B227856P1	Shield.

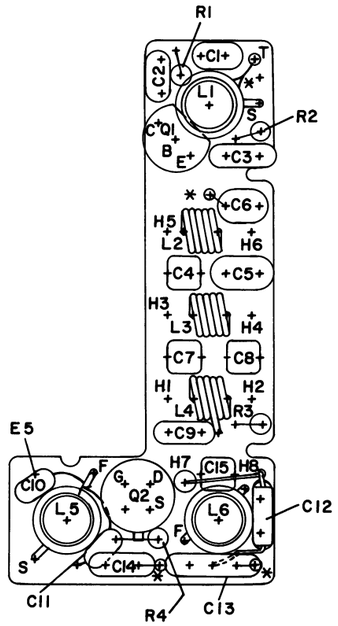
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PRODUCTION CHANGES

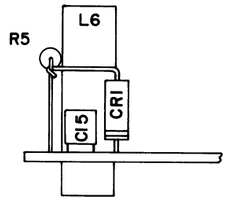
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. E - Receiver Front End 19C317295G9

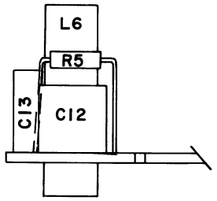
To build 19C317295G9 for Service Parts with same material required in Front End 19C317295G11.



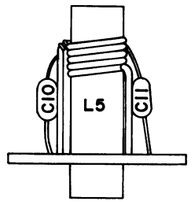
A4, A5



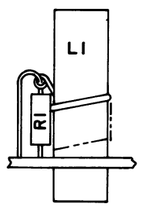
ASSY. FOR L6, R5, CR1, & C15



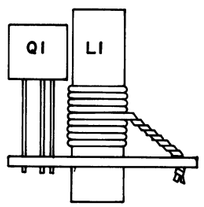
ASSY. FOR L6, R5, C12 & C13



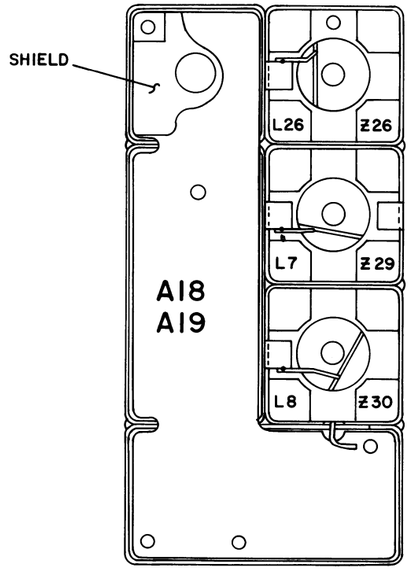
ASSY. FOR L5, C10 & C11

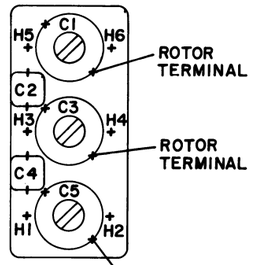


ASSY. FOR L1 & R1

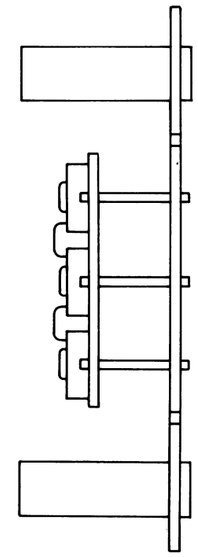


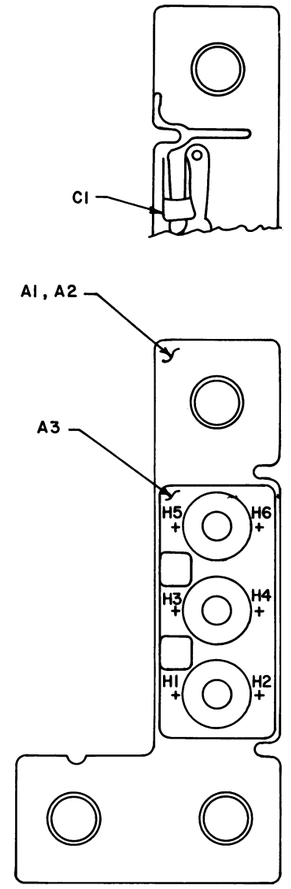
ASSY. FOR L1, & Q1





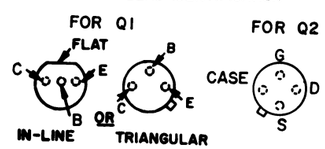
A3





(19C328166, Rev. 0)

LEAD IDENTIFICATION



TOP VIEW

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

(19D423645, Rev. 3)

OUTLINE DIAGRAM

150.8--174 FET FRONT END
19C317395G9,(A334/A335)
REVISION E

PARTS LIST

LBI-4854B

DUAL FRONT END
150.8-174 MHz
19C317295G2

SYMBOL	GE PART NO.	DESCRIPTION
A1*		RF AMPLIFIER 19C327300G1 (Added by REV C)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116114P11064	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -4200 PPM.
C2	19A116114P8053	Ceramic: 47 pf ±5%, 100 VDCW; temp coef -1500 PPM.
C3	19A116114P2030	Ceramic: 9 pf ±5%, 100 VDCW; temp coef -80 PPM.
C5	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C6 and C7	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116052P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B216950G1	Coil.
L2	19B216948G1	Coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116159P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R151P184J	Composition: 0.18 megohm ±5%, 1/8 w.
R2	3R151P302J	Composition: 3000 ohms ±5%, 1/8 w.
R4	3R151P204J	Composition: 0.20 megohm ±5%, 1/8 w.
R5	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R6	3R151P562J	Composition: 5600 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
A1*		RF AMPLIFIER 19C317445G1 (Deleted by REV C)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116114P11064	Ceramic: 100 pf ±10%, 100 VDCW; temp coef -4200 PPM.
C2	19A116114P8053	Ceramic: 47 pf ±5%, 100 VDCW; temp coef -1500 PPM.
C3	19A116114P2020	Ceramic: 6 pf ±5%, 100 VDCW; temp coef -80 PPM.
C5	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C6 and C7	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1*	19A116052P1	Silicon. Added by REV B.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B216950G1	Coil.
L2	19B216948G1	Coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116159P1	Silicon, NPN.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R151P184J	Composition: 0.18 megohm ±5%, 1/8 w.
R2	3R151P302J	Composition: 3000 ohms ±5%, 1/8 w.
R4	3R151P204J	Composition: 0.20 megohm ±5%, 1/8 w.
R5	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R6	3R151P562J	Composition: 5600 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
A4		MULTIPLIER 19C311873G5
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A116114P7068	Ceramic: 120 pf ±5%, 100 VDCW; temp coef -750 PPM.
C3	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C6	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116081P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216296P2	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R151P432J	Composition: 4300 ohms ±5%, 1/8 w.
R9	3R151P432J	Composition: 4300 ohms ±5%, 1/8 w.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L6	19B216441G2	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L7	19B216441G3	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L8	19B216441G12	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L9 and L10	19B216441G4	Helical resonator. Includes:
	19C311727P1	Tuning slug.
		- - - - - - - - - - NETWORKS - - - - - - - - - -
Z6		Consists of L6 and 19D413132P16 can.
Z7		Consists of L7 and 19D413132P3 can.
Z8		Consists of L8 and 19D413132P17 can.
Z9		Consists of L9 and 19D413132P19 can.
Z10		Consists of L10 and 19D413132P20 can.

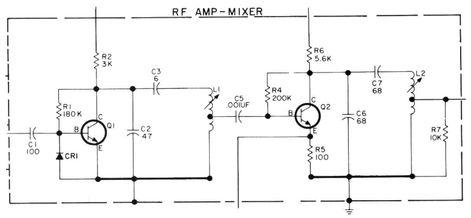
PRODUCTION CHANGES

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.

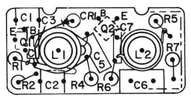
REV. A & B - Receiver Front End 19C317295G2
Incorporated into initial shipment.

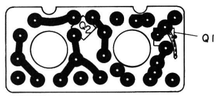
REV. C - To improve ease in assembly, troubleshooting, and repair. Changed A1 and moved C312 and C313 to component side of receiver PWB.

Schematic Diagram was:

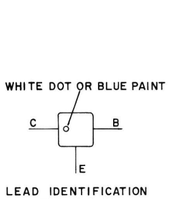


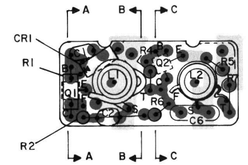
Outline Diagram was:



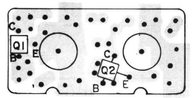


COMPONENT SIDE



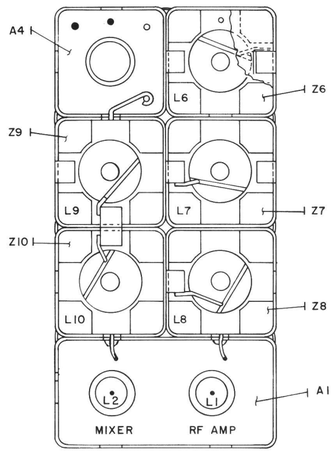


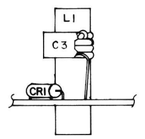
(19B227499, Sh. 1, Rev. 0)
(19B227499, Sh. 2, Rev. 1)



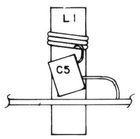
SOLDER SIDE

(19B227499, Sh. 2, Rev. 1)

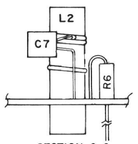




SECTION A-A
(ROTATED 90° CCW)

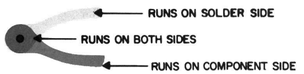


SECTION B-B
(ROTATED 90° CW)



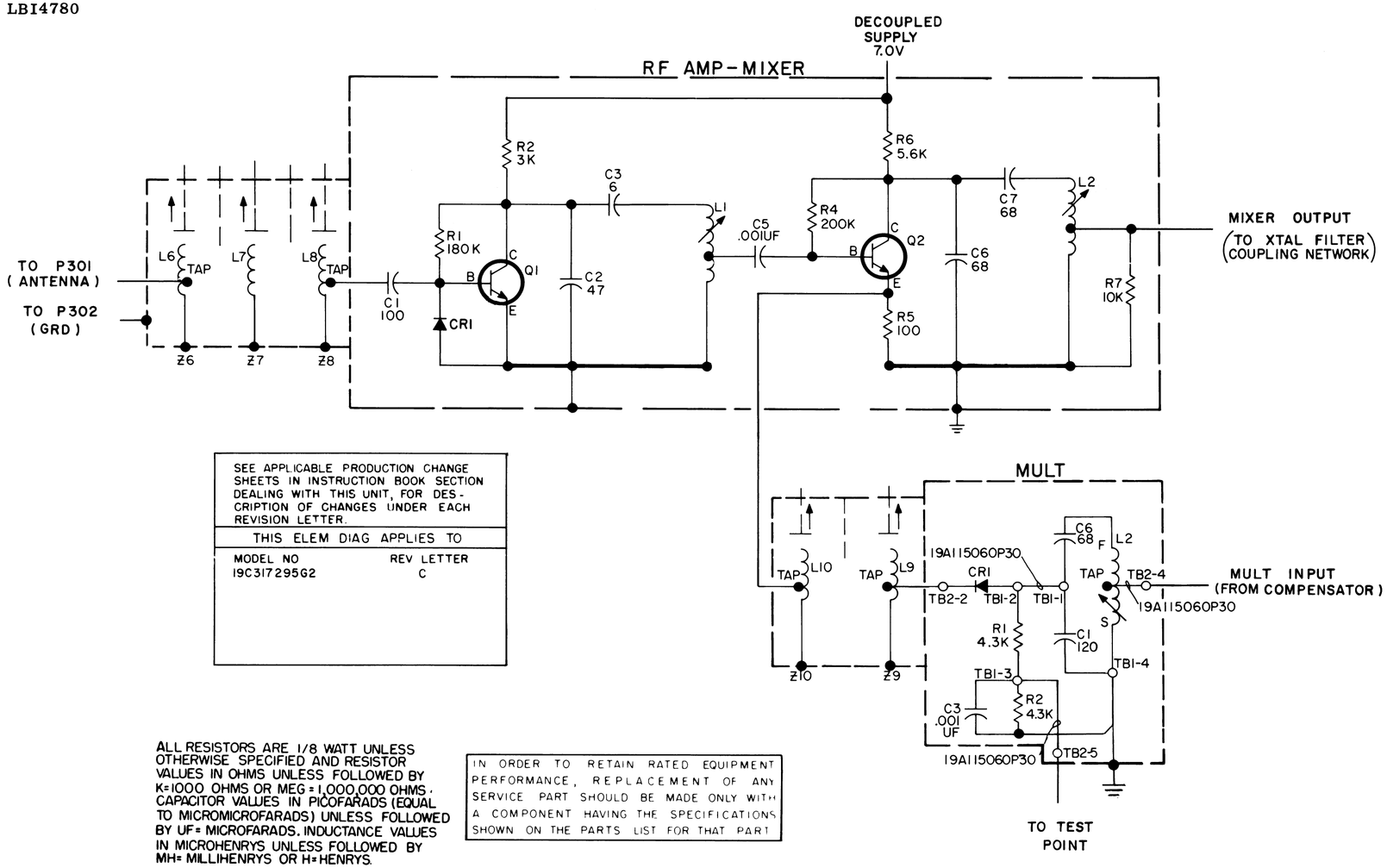
SECTION C-C
(ROTATED 90° CCW)

(19C321536, Rev. 4)



OUTLINE DIAGRAM

150.8—174 MHz HIGH SENSITIVITY
DUAL FRONT END RECEIVER



SCHEMATIC DIAGRAM

(19C320888, Rev. 4)

150.8—174 MHz HIGH SENSITIVITY
DUAL FRONT END RECEIVER

PARTS LIST

LBI-4855B

450-512 MHz DUAL FRONT END
A326 19D417295G6
A327 19D417295G7
A332 19D417295G5
A333 19D417295G7

SYMBOL	GE PART NO.	DESCRIPTION
A6*		RF AMPLIFIER 450-470 MHz 19C327300G4 (Added by REV C)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C5	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C6 and C7	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
C8	19A116114P6038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -470 PPM.
C10	19A116114P2014	Ceramic: 4 pf ±5%, 100 VDCW; temp coef -80 PPM.
C11	19A116114P2035	Ceramic: 13 pf ±5%, 100 VDCW; temp coef -80 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116052P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216948G1	Coil.
L3	19A128005G1	Coil. Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116159P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R4	3R151P204J	Composition: 0.20 megohm ±5%, 1/8 w.
R5	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R6	3R151P562J	Composition: 5600 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R14	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R15	3R151P102J	Composition: 1000 ohms ±5%, 1/8 w.
R16	3R151P333J	Composition: 33,000 ohms ±5%, 1/8 w.
A6*		RF AMPLIFIER 450-470 MHz 19C317445G4 (Deleted by REV C)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C5	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C6 and C7	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
C8	19A116114P6038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -470 PPM.
C10	19A116114P2014	Ceramic: 4 pf ±5%, 100 VDCW; temp coef -80 PPM.
C11	19A116114P2035	Ceramic: 13 pf ±5%, 100 VDCW; temp coef -80 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1*	19A116052P1	Silicon. Added by REV B.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216948G1	Coil.
L3	19A128005G1	Coil. Includes:
	19B209436P1	Tuning slug.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116159P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R4	3R151P204J	Composition: 0.20 megohm ±5%, 1/8 w.
R5	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R6	3R151P562J	Composition: 5600 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R14	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R15	3R151P102J	Composition: 1000 ohms ±5%, 1/8 w.
R16	3R151P333J	Composition: 33,000 ohms ±5%, 1/8 w.
A10		MULTIPLIER 19C311873G7
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C13	19A116114P2038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -80 PPM.
C14	19A116114P2054	Ceramic: 51 pf ±5%, 100 VDCW; temp coef -80 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR2	19A116809P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3	19B216296P3	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R7	3R151P563J	Composition: 5600 ohms ±5%, 1/8 w.
R8	3R151P5R6J	Composition: 5.6 ohms ±5%, 1/8 w.
R10	3R151P562J	Composition: 5600 ohms ±5%, 1/8 w.
A11*		RF AMPLIFIER 470-512 MHz 19C327300G5 (Added by REV C)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C6 and C7	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
C8	19A116114P6038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -470 PPM.
C12	19A116114P2012	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef -80 PPM.
C13	19A116114P2020	Ceramic: 6 pf ±5%, 100 VDCW; temp coef -80 PPM.
C14	19A116244P1	Ceramic: 0.0047 µf ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A116052P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216948G1	Coil.
L4	19A128005G3	Coil. Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116159P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R8	3R151P223J	Composition: 22,000 ohms ±5%, 1/8 w.
R9	3R151P682J	Composition: 6800 ohms ±5%, 1/8 w.
R10	3R151P182J	Composition: 1800 ohms ±5%, 1/8 w.
R11	3R151P223J	Composition: 22,000 ohms ±5%, 1/8 w.
R12	3R151P682J	Composition: 6800 ohms ±5%, 1/8 w.
R13	3R151P392J	Composition: 3900 ohms ±5%, 1/8 w.

SYMBOL	GE PART NO.	DESCRIPTION
A11*		RF AMPLIFIER 470-512 MHz 19C317445G5 (Deleted by REV C)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C6 and C7	19A116114P4059	Ceramic: 68 pf ±5%, 100 VDCW; temp coef -220 PPM.
C8	19A116114P6038	Ceramic: 18 pf ±5%, 100 VDCW; temp coef -470 PPM.
C12	19A116114P2012	Ceramic: 3.3 pf ±5%, 100 VDCW; temp coef -80 PPM.
C13	19A116114P2020	Ceramic: 6 pf ±5%, 100 VDCW; temp coef -80 PPM.
C14	19A116244P1	Ceramic: 0.0047 µf ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1*	19A116052P1	Silicon. Added by REV B.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216948G1	Coil.
L4	19A128005G3	Coil. Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A116159P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R7	3R151P103J	Composition: 10,000 ohms ±5%, 1/8 w.
R8	3R151P223J	Composition: 22,000 ohms ±5%, 1/8 w.
R9	3R151P682J	Composition: 6800 ohms ±5%, 1/8 w.
R10	3R151P182J	Composition: 1800 ohms ±5%, 1/8 w.
R11	3R151P223J	Composition: 22,000 ohms ±5%, 1/8 w.
R12	3R151P682J	Composition: 6800 ohms ±5%, 1/8 w.
R13	3R151P392J	Composition: 3900 ohms ±5%, 1/8 w.
L16	19B216439G7	Helical resonator. Includes:
	19C311750P1	Tuning slug.
L17	19B216439G2	Helical resonator. Includes:
	19C311750P1	Tuning slug.
L18	19B216439G1	Helical resonator. Includes:
	19C311750P1	Tuning slug.
L19	19B216439G4	Helical resonator. Includes:
	19C311750P1	Tuning slug.
L20	19B216439G3	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L21	19B216439G16	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L22	19B216439G12	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L23	19B216439G13	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L24	19B216439G15	Helical resonator. Includes:
	19C311727P1	Tuning slug.
L25	19B216439G14	Helical resonator. Includes:
	19C311727P1	Tuning slug.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - NETWORKS - - - - - - - - -
Z16		Consists of L16 and 19D413132P24 can.
Z17		Consists of L17 and 19D413132P3 can.
Z18		Consists of L18 and 19D413132P25 can.
Z19		Consists of L19 and 19D413132P19 can.
Z20		Consists of L20 and 19D413132P20 can.
Z21		Consists of L21 and 19D413132P24 can.
Z22		Consists of L22 and 19D413132P3 can.
Z23		Consists of L23 and 19D413132P25 can.
Z24		Consists of L24 and 19D413132P19 can.
Z25		Consists of L25 and 19D413132P20 can.

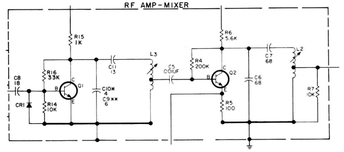
PRODUCTION CHANGES

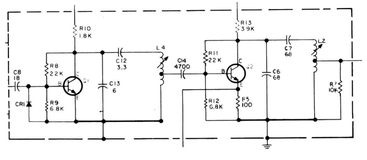
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A & B - Receiver Front End 19C317295G6 & G7
Incorporated into initial shipment.

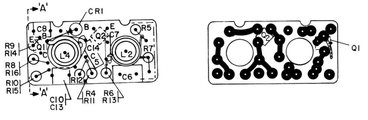
REV. C - To improve ease in assembly, troubleshooting and repair. Changed A1 and moved C312 and C313 to component side of receiver PWB.

Schematic Diagram was:

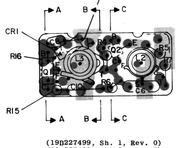




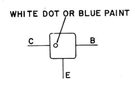
Outline Diagram was:



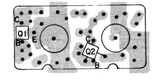
COMPONENT SIDE



(19B227499, Sh. 1, Rev. 0)
(19B227499, Sh. 2, Rev. 1)

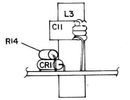


LEAD IDENTIFICATION FOR Q1 & Q2

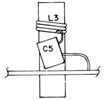


SOLDER SIDE

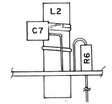
(19B227499, Sh. 2, Rev. 1)



SECTION A-A
(ROTATED 90° CCW)

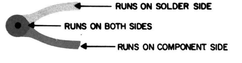


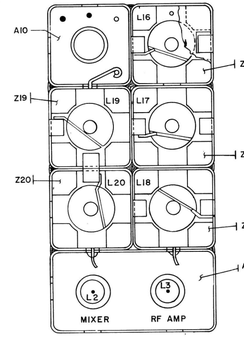
SECTION B-B
(ROTATED 90° CW)



SECTION C-C
(ROTATED 90° CCW)

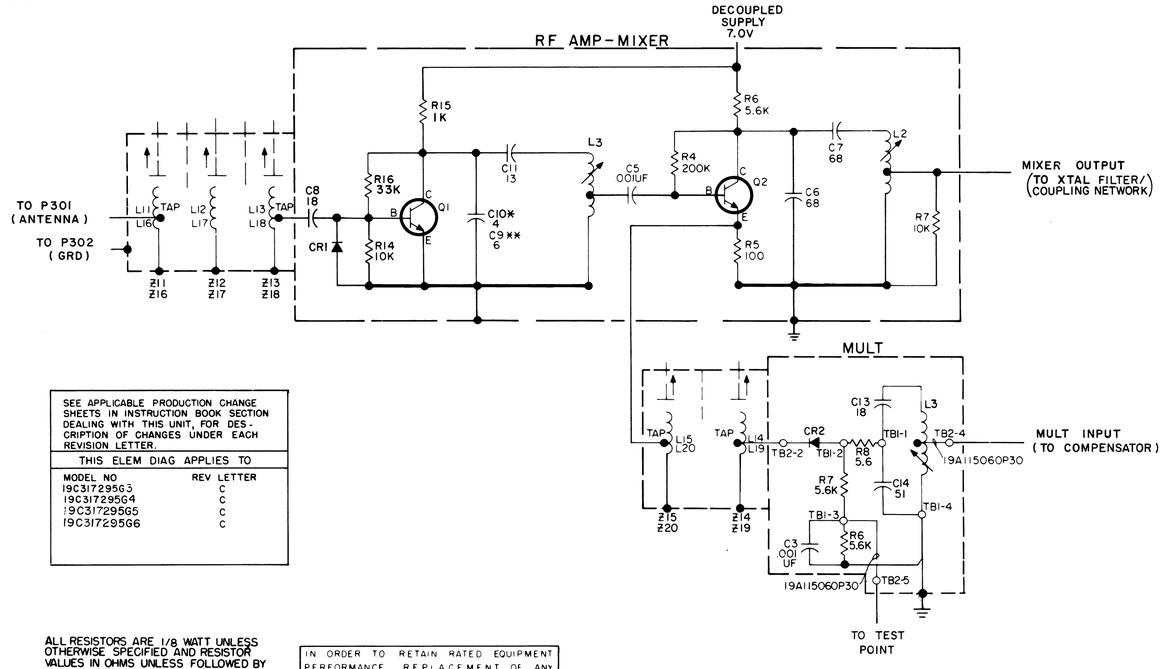
(19C321537, Rev. 5)





OUTLINE DIAGRAM

450--512 MHz DUAL FRONT END



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

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
19C317295G3	C
19C317295G4	C
19C317295G5	C
19C317295G6	C

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

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

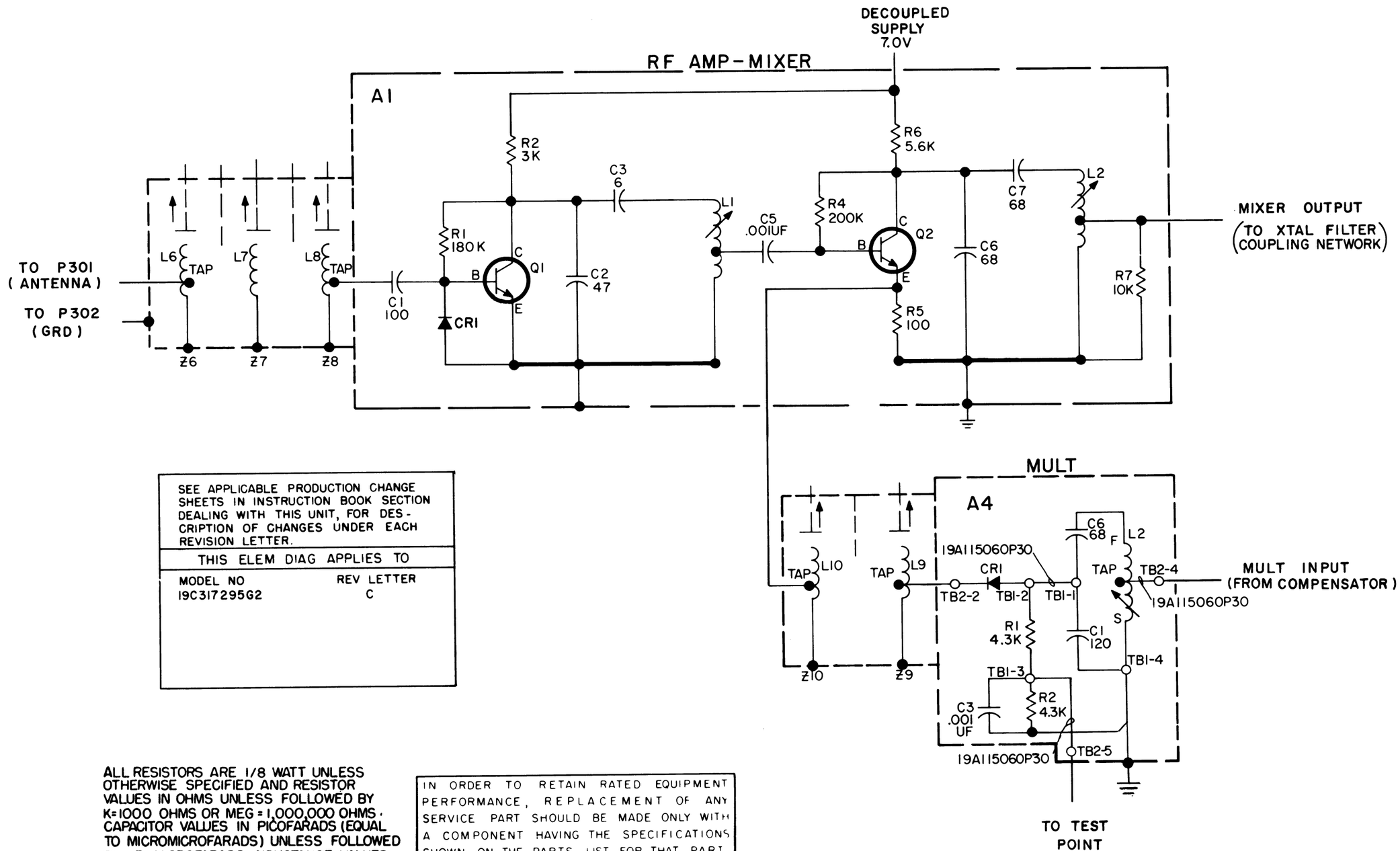
* HI SPLIT (450-470)

** LO SPLIT (406-420)

(19C320887, Rev. 5)

SCHEMATIC DIAGRAM

450--470 MHz DUAL FRONT END



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.	
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
19C31729G2	C

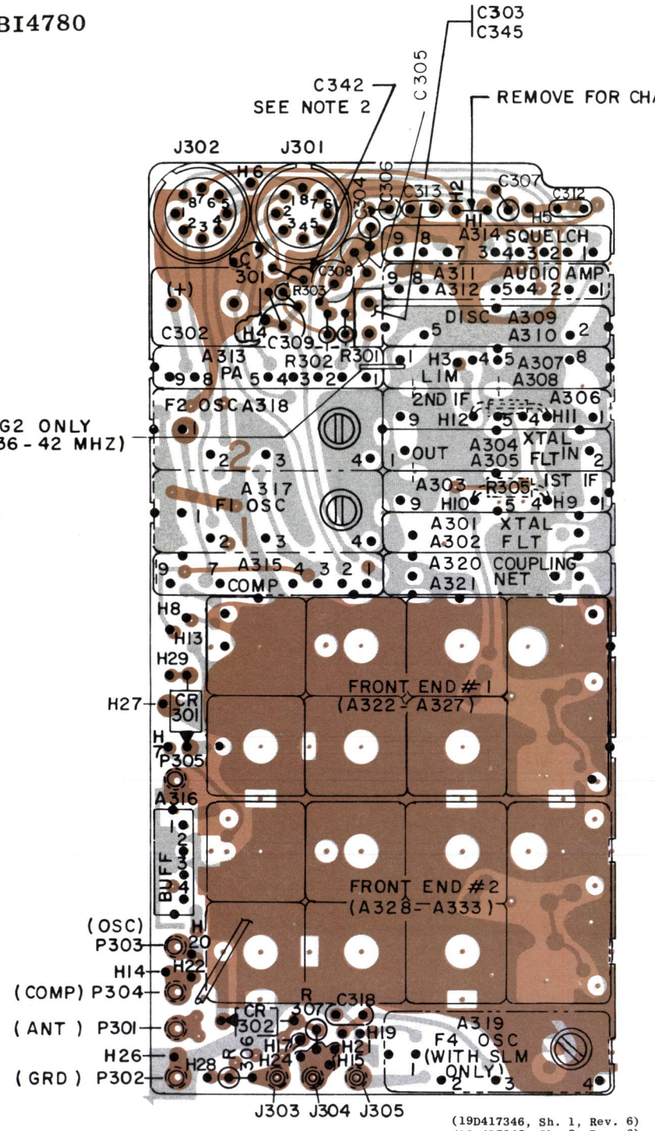
ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG = 1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

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

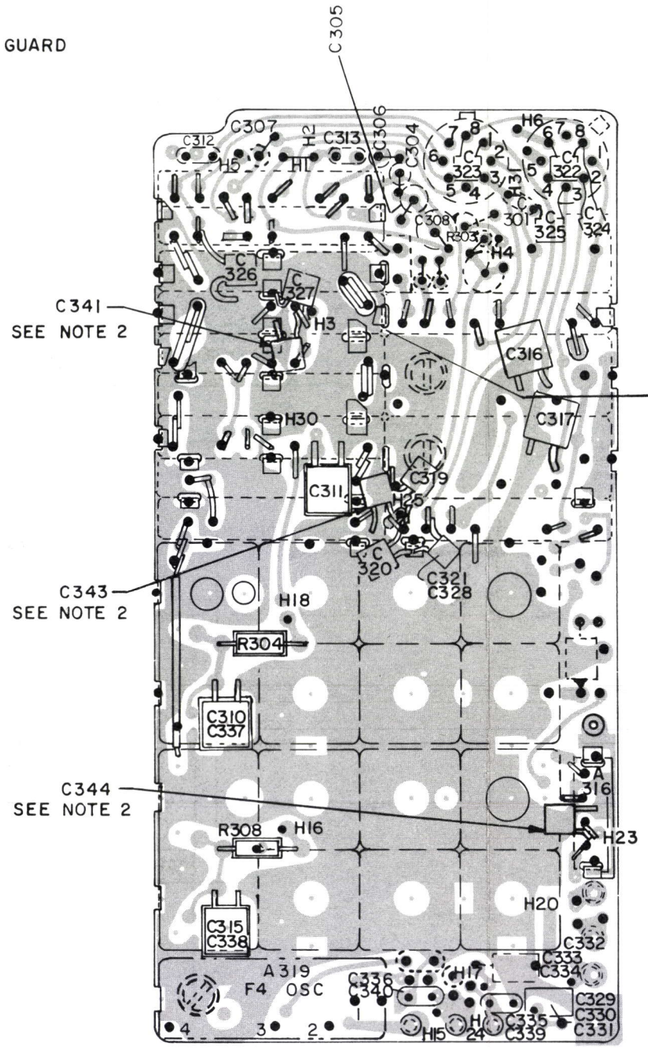
(19C320886, Rev. 5)

SCHEMATIC DIAGRAM

470--512 MHz DUAL FRONT END



COMPONENT SIDE



SOLDER SIDE

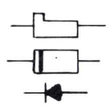
NOTE:

1. SEE WIRING DIAGRAM FOR APPLICABILITY OF CAPACITORS ON SOLDER SIDE OF RECEIVER BOARD.
2. C341, C342, C343 & C344 USED FOR F.E.T. FRONT END OPTION ONLY.

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8
J301	5.4V	AUDIO OUT	SWITCH 7.5V	SQ ARM	VOL ARM	SQ HI	VOL HI	GND
J302		FREQ 1	FREQ 2		SWITCHED 7.5V	7.5V	TONE SWITCH	GND

OUTLINE DIAGRAM

DUAL FRONT END RECEIVER BOARD
19D417337 G1 & G2

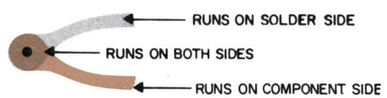


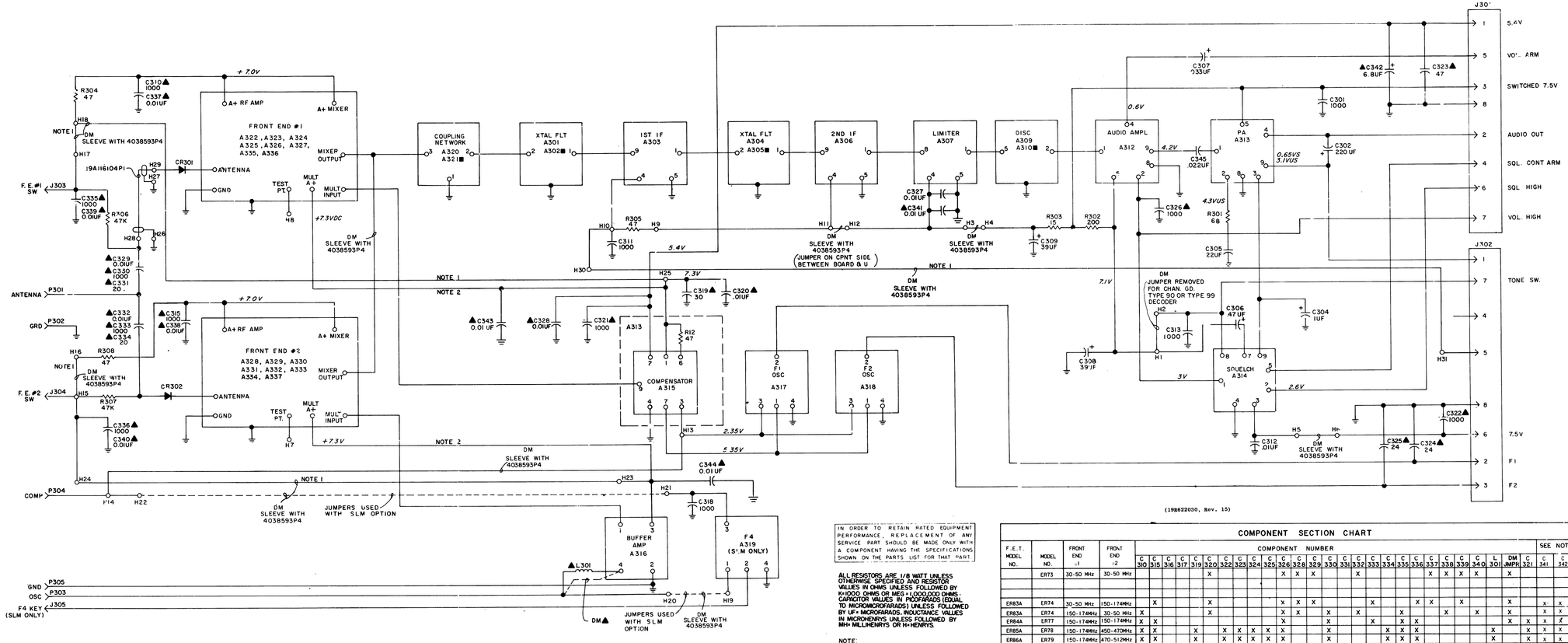
LEAD IDENTIFICATION FOR CR301 & CR302

C305, C307, C308, C342

C304, C306 & C309

(19C321550, Rev. 4)





(198622030, Rev. 15)

COVERAGE	MODEL	AUDIO AMPL	CAPACITOR KIT	REV
	PLI9D417337G1			G
	PLI9D417337G2			F
LB-LB	ER73A		19A129898G1	A
LB-HB	ER74A		19A129898G6	A
HB-LB	ER74A		19A129898G7	A
HB-HB	ER77A		19A129898G2	A
UHF-HB	ER78A		19A129898G4	A
HB-UHF	ER78A		19A129898G5	A
HB-UHFX	ER79A		19A129898G4	A
UHF-UHF	ER80A		19A129898G3	A
UHF-UHFX	ER81A		19A129898G3	A
UHFX-UHFX	ER82A		19A129898G3	A
LB-HB	ER83A		19A129898G12	B
HB-LB	ER83A		19A129898G11	B
HB-HB	ER84A		19A129898G8	B
HB-UHF	ER85A		19A129898G9	B
UHF-HB	ER85A		19A129898G10	B
HB-UHFX	ER86A		19A129898G9	B

NOTES:
1. IN RADIOS EQUIPPED WITH DUAL FRONT END AND SLM THE RECEIVER IS MODIFIED N ACCORDANCE WITH THE CHART BE.OW.
2. IN RADIOS EQUIPPED WITH F.E.T. FRONT END.

RECEIVER BOARD MODIFICATION

DM WIRE		CONNECTION	
FROM	TO	REMOVED	ADDED
H30	H31	X	
H17	H18	X	
H15	H16	X	
H23	H24	X	
H30	H18		X
H18	H16		X
H16	H23		X

VOLTAGE READINGS

ALL READINGS TAKEN WITH A DC VTVM REFERENCED TO GROUND. READINGS FOLLOWED BY "S" INDICATE RECEIVER SQUELCHED. READINGS FOLLOWED BY "US" INDICATE RECEIVER UNSQUELCHED.

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

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS: CAPACITOR VALUES IN MICROFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

NOTE:
▲ SEE COMPONENT SECTION CHART FOR APPLICABILL COMPONENT USED WITH MODEL NO.
■ USED WITH 23MHz IF RECEIVERS (36-42MHz FREQENCY BAND)

COMPONENT SECTION CHART

F.E.T. MODEL NO.	MODEL NO.	FRONT END -1	FRONT END -2	COMPONENT NUMBER																												SEE NOTE 2			
				C 310	C 315	C 316	C 317	C 319	C 320	C 322	C 323	C 324	C 325	C 326	C 328	C 329	C 330	C 331	C 332	C 333	C 334	C 335	C 336	C 337	C 338	C 339	C 340	L 301	DM JMPR	C 321	C 341	C 342	C 343	C 344
	ER73	30-50 MHz	30-50 MHz					X						X	X	X			X					X	X	X	X		X					
ER83A	ER74	30-50 MHz	150-174MHz		X			X						X	X	X			X			X	X		X			X		X	X	X	X	X	X
ER83A	ER74	150-174MHz	30-50 MHz	X				X						X	X		X		X		X			X		X		X		X	X	X	X	X	X
ER84A	ER77	150-174MHz	150-174MHz	X	X									X			X			X	X								X	X	X	Z	X	X
ER85A	ER78	150-174MHz	450-470MHz	X	X		X		X	X	X	X	X				X			X	X	X						X		X	X	X	Y	X
ER86A	ER79	150-174MHz	470-512MHz	X	X		X		X	X	X	X	X				X			X	X	X						X		X	X	X	X	X	X
ER85A	ER78	450-470MHz	150-174MHz	X	X		X		X	X	X	X	X					X		X	X	X						X		X	X	X	Y	X	
	ER80	450-470MHz	450-470MHz	X	X		X		X	X	X	X	X					X		X	X	X						X		X					
	ER81	450-470MHz	470-512MHz	X	X		X		X	X	X	X	X					X		X	X	X						X		X					
	ER82	470-512MHz	470-512MHz	X	X		X		X	X	X	X	X					X		X	X	X						X		X					

SCHEMATIC DIAGRAM

DUAL FRONT END RECEIVER BOARD
19D417337 G1 & G2

Issue 4

PARTS LIST

LBI4781C

DUAL FRONT END RECEIVER BOARD
19D417337G1 20 MHz
19D417337G2 23 MHz

SYMBOL	GE PART NO.	DESCRIPTION
A301	19C304824G1	Crystal Filter.
A302	19C304824G3	Crystal Filter.
A303	19C311879G3	1st IF Amplifier.
A304	19C304824G1	Crystal Filter.
A305	19C304824G3	Crystal Filter.
A306	19C311879G4	2nd IF Amplifier.
A307	19C311876G4	Limiter. (20 MHz).
A308	19C311876G4	Limiter. (23 MHz).
A309	19C304504G3	Discriminator. (20 MHz).
A310	19C304504G6	Discriminator. (23 MHz).
A311*	19C311878G2	Audio Amplifier. Deleted by REV G.
A312	19C311995G4	Audio Amplifier. (Includes Tone Filter).
A313*	19C311877G4	PA. In 19D417337G1 of REV E and earlier: In 19D417337G2 of REV D and earlier:
	19C311877G2	PA.
A314	19C311880G4	Squelch.
A315	19C320061G1	Compensator.
A316	19C320722G1	Buffer Amplifier.
		- - - - - - - - - OSCILLATORS - - - - - - - - -
A317 thru A319		NOTE: When reordering, give GE Part Number and specify exact frequency needed.
	4EG28A11	Oscillator Module. 150.8-174 MHz. Fx = Fo - 20 / 9
	4EG28A13	Oscillator Module. 450-512 MHz. Fx = Fo - 20 / 21
	4EG28A17	Oscillator Module. 30-36,42-50 MHz. Fx = Fo + 20 / 3
	4EG28A18	Oscillator Module. 36-42 MHz. Fx = Fo + 23 / 3
A320	19B226075G1	Coupling Network.
A321	19B226075G2	Coupling Network.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C301	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C302	19A116178P7	Tantalum: 220 µf ±20%, 6 VDCW.
C303*	19A116089P1	Ceramic: 0.1 µf ±20%, 50 VDCW, temp range -55 to +85°C. Deleted by REV G.
C304	5491674P28	Tantalum: 1.0 µf ±20%, 25 VDCW; sim to Sprague Type 162D.
C305	5491674P35	Tantalum: 22 µf ±20%, 4 VDCW; sim to Sprague Type 162D.
C306	5491674P27	Tantalum: .47 µf ±20%, 35 VDCW; sim to Sprague Type 162D.
C307	5491674P31	Tantalum: .033 µf ±20%, 35 VDCW; sim to Sprague Type 162D.
C308 and C309	5491674P30	Tantalum: 39 µf ±20%, 10 VDCW; sim to Sprague Type 162D.
C311	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C312	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C313	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C318	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C327	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C345*	19A116192P6	Ceramic: 0.022 µf ±20%, 50 VDCW; sim to Erie 8131-M050-W5R-223M. Added by REV G.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR301 and CR302	19A116925P5	Silicon, pin: 35 volt Reverse Breaddown, 400 mW. a
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J301 and J302	19A116122P1	Feed-thru: sim to Warren Co 1-B-2994-4.
J303 thru J305	19A116366P1	Contact, electrical: sim to Cambion 460-3232-01-03.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P301 thru P305	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R301*	3R151P680J	Composition: 68 ohms ±5%, 1/8 w. In 19D417337G1 of REV C and earlier: In 19D417337G2 of REV B and earlier:
	3R151P101J	Composition: 100 ohms ±5%, 1/8 w.
R302	3R151P201J	Composition: 200 ohms ±5%, 1/8 w.
R303	3R151P150J	Composition: 15 ohms ±5%, 1/8 w.
R304 and R305	3R151P470J	Composition: 47 ohms ±5%, 1/8 w.
R306 and R307	3R151P473J	Composition: 47K ohms ±5%, 1/8 w.
R308	3R151P470J	Composition: 47 ohms ±5%, 1/8 w.
		RECEIVER KIT 19A129898G1 LB/LB 19A129898G2 HB/HB 19A129898G3 UHF/UHF 19A129898G4 HB/UHF 19A129898G5 UHF/HB 19A129898G6 HB/LB 19A129898G7 LB/HB
		- - - - - - - - - CAPACITORS - - - - - - - - -
C310	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C315	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C316* and C317*	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW. Deleted by REV A.
C319	19A116114P2045	Ceramic: 30 pf ±5%, 100 VDCW; temp coef -80 PPM.
C320	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C321 and C322	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C323	19A116114P8053	Ceramic: 47 pf ±5%, 100 VDCW; temp coef -1500 PPM.
C324 and C325	19A116114P2042	Ceramic: 24 pf ±5%, 100 VDCW; temp coef -80 PPM.
C326*	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW. Added to G2, G5-G7 by REV A.
C328 and C329	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C330	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C331	19A116114P2039	Ceramic: 20 pf ±5%, 100 VDCW; temp coef -80 PPM.
C332	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C333	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C334	19A116114P2039	Ceramic: 20 pf ±5%, 100 VDCW; temp coef -80 PPM.
C335 and C336	5495323P12	Ceramic: .001 µf +100% -20%, 75 VDCW.
C337 thru C340	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L301	19B209420P103	Coil, RF: 0.15 µh ±10%, 0.10 ohms DC res max; sim to Jeffers 4416-2K.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B216316P1	Insulator. (Used with J301, J302).
		PORTA-MOBILE II RECEIVER MODIFICATION KIT 19A130979G1
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1301 thru CR1312	19A115100P1	Silicon; sim to Type 1N458A.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J85	19A116366P6	Contact, electrical: sim to Concord 10-891-2.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P2301	19A115834P4	Contact, electrical: sim to AMP 2-332070-9.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2302	3R151P103K	Composition: 10K ohms ±10%, 1/8 w.
		- - - - - - - - - - CABLES - - - - - - - - - -
	19B232697G24	Cable: approx 3-3/4 inches long. Includes:
	19A115834P4	Contact, electrical.
	19B232697G25	Cable: approx 3-3/4 inches long. Includes:
	19A115834P4	Contact, electrical.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PRODUCTION CHANGES

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

REV. A, B - Dual Front End Receiver Board 19D417337G1, G2.

Incorporated in initial shipment.

REV. C - Dual Front End Receiver Board 19D417337G1.

Incorporated in initial shipment.

REV. D - Dual Front End Receiver Board 19D417337G1
REV. C - Dual Front End Receiver Board 19D417337G2

To improve audio sensitivity and stability.
Deleted C314 and Changed R301.

REV. E - Dual Front End Receiver Board 19D417337G1
REV. D - Dual Front End Receiver Board 19D417337G2

To improve audio frequency response and attack time. Added C345.

REV. F - Dual Front End Receiver Board 19D417337G1
REV. E - Dual Front End Receiver Board 19D417337G2

To improve audio quality.
Changed A313.

REV. G - Dual Front End Receiver Board 19D417337G1
REV. F - Dual Front End Receiver Board 19D417337G2

To eliminate non-Channel Guard Receiver boards.
From Schematic Diagram deleted callout A311 and (⊕) in front of A312. Deleted callout of C303 .1 µf and the circle (⊕) for C345.
Deleted NOTE: ⊕Use with Channel Guard Receivers.

REV. A - Receiver Kits 19A129898G1,G2,G6,G7,G8,G-11 & G12

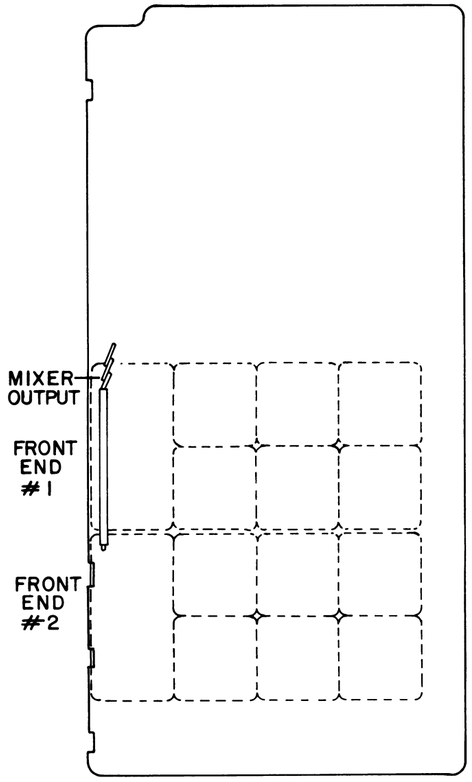
To improve IF filtering.
Added C326

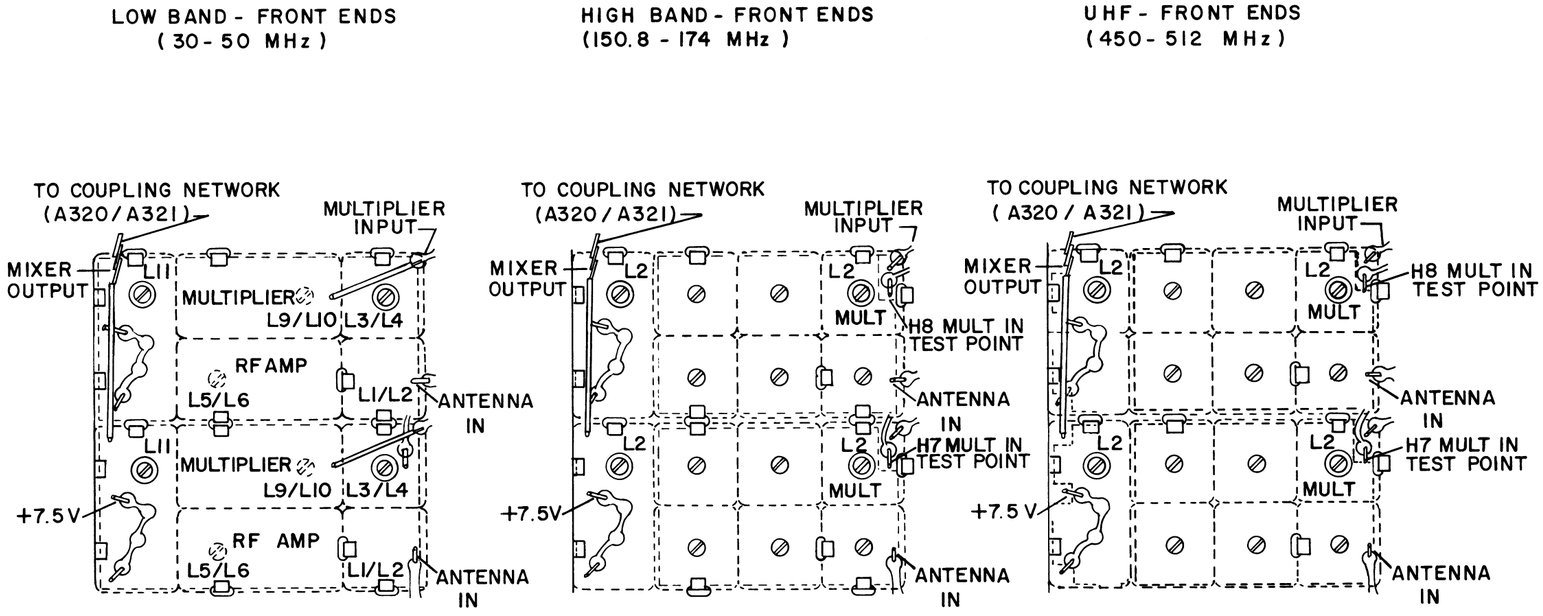
REV. A - Receiver Kits 19A129898G3-G5,G9&G10

To improve reliability.
Deleted C316 & C317.

REV. B - Receiver Kits 19A129898G8-G12

To repackage HI-IM receiver front ends.
Added A336 to front end box #1 and
A337 to front end box #2.





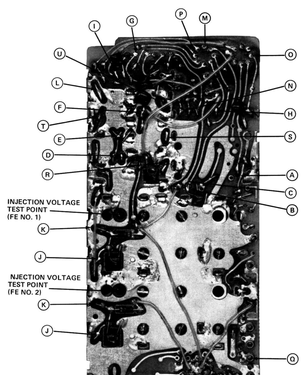
(19C321533, Rev. 0)

INTERCONNECTION DIAGRAM

DUAL FRONT END RECEIVER
MODELS ER-73-A, ER-74-A
AND ER-77-A THRU ER-86-A

QUICK CHECKS

SYMPTOM	PROCEDURE
No Audio	1. Check audio waveform at the top of the Volume Control (see Step 2). 2. If audio is present, check voltage readings of Audio and Squelch modules (see Schematic Diagram). 3. If audio is not present, check gain and current readings of Front End and IF modules (see Steps 1 & 3).
Poor Sensitivity	1. Measure the RF injection voltage for a minimum level of 750 millivolts. If the reading is low, check the output of the Oscillator and Compensator modules with an RF voltmeter. 2. Measure the gain of the Mixer stage (see Step 3). If low, measure the gain of the RF amplifier and IF modules.
Improper Squelch Operation	1. Check the noise waveform at the input to the Squelch module and at Squelch Control high (see Step 2). 2. Measure the DC voltages for the Squelch module (squelched and unsquelched).



TROUBLESHOOTING PROCEDURE

DUAL FRONT END RECEIVER
MODELS ER-73-A, ER-74-A
AND ER-77-A THRU ER-86-A

STEP 3 - RF GAIN CHECKS

EQUIPMENT REQUIRED:

1. RF probe and Test Amplifier Model 4EX16A10 connected to GE Test Set Model 4EX3A11, or an RF voltmeter.
2. A signal generator (M-800 or equivalent) connected to P301 (High) and P302 (Low).

PROCEDURE FOR MIXER & 1ST IF:

1. Switch the Test Set to the Test 1 position and the Test Amplifier to the X50 position.
2. Connect the RF probe across the input of the stage to be measured as shown on the diagram. Increase the signal generator output to obtain a reference reading on Test Set 4EX3A11. Note the Test Set reading and the dB reading on the generator (dB1).
3. Connect the RF probe to the output of the stage to be measured as shown on the diagram. Decrease the generator output until the Test Set reference reading in Step 2 is obtained. Note the dB reading on the generator (dB2).
4. Subtract the dB1 reading from the dB2 reading and check the results with the typical gains shown on the diagram.

Example: 35 dB (dB2) − 15 dB (dB1) = 20 dB gain

PROCEDURE FOR 2ND IF:

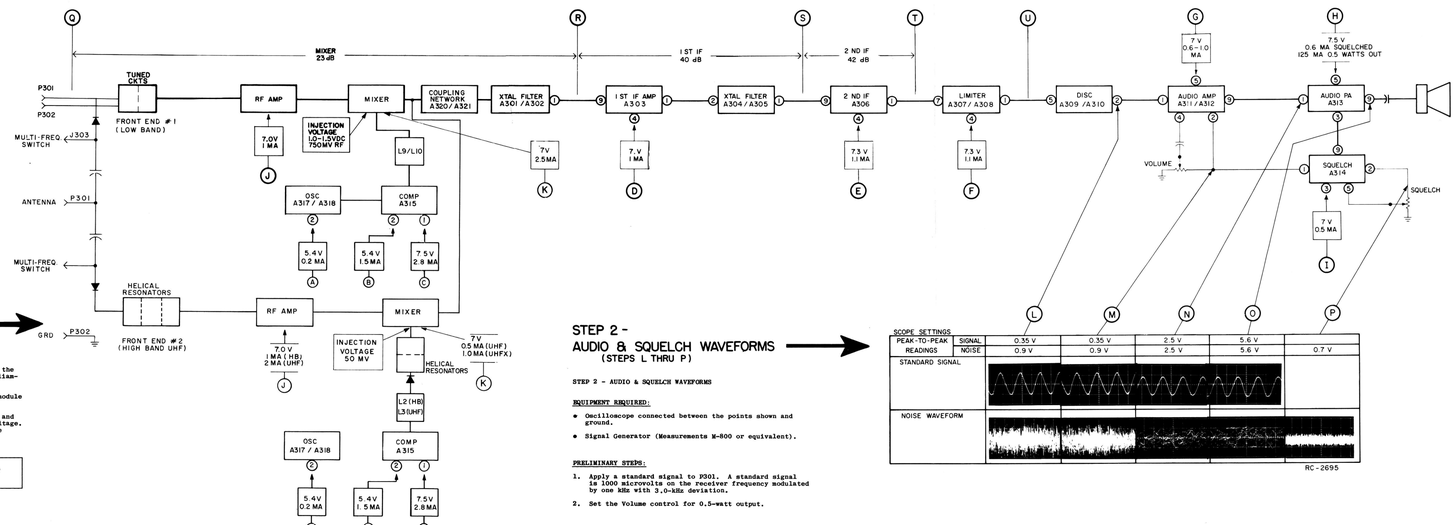
1. With no signal in, connect the RF probe to the output of the 2nd IF module. Increase the signal generator output until the Test Set reading increases by approximately 0.2 volt. Note Test Set and signal generator reading (dB2).
2. Connect the probe to the input of the 2nd IF module. Increase the signal generator until the Test Set reference reading is obtained, and note the dB reading (dB1).
3. Now subtract dB2 from dB1 to obtain the gain of the 2nd IF amplifier module.

LIMITER CHECK

The Limiter module limits on noise so that the gain of the circuit cannot be measured. The following procedure provides a check to determine if the module is limiting.

1. Switch the Test Amplifier to the X1 position and the Test Set to the Test 1 position. Then connect the RF probe to the output of the Limiter module and check for a reading of approximately 0.4 volt.
2. Increase the signal generator output. There should be no appreciable increase in the limiter output meter reading.

STEP 3 - RF GAIN CHECKS (STEPS Q THRU U)



STEP 1 - MODULE CURRENT CHECKS (STEPS A THRU K)

STEP 1 - MODULE CURRENT CHECKS

These current readings provide a method of checking the operation of each Integrated Circuit module using a milliammeter (Triplett 630 or equivalent).

1. Unsolder the + lead as shown in the Diagram of the module to be checked.
2. Connect the milliammeter in series with the + lead, and check for the indicated current drain and supply voltage. No current drain indicates that the module should be replaced.

CAUTION

When checking the current of Audio PA module A311, do not short Pin 4 to ground or to + (Pin 5). To do so will destroy the Audio PA module.

STEP 2 - AUDIO & SQUELCH WAVEFORMS (STEPS L THRU P)

STEP 2 - AUDIO & SQUELCH WAVEFORMS

EQUIPMENT REQUIRED:

- Oscilloscope connected between the points shown and ground.
- Signal Generator (Measurements M-800 or equivalent).

PRELIMINARY STEPS:

1. Apply a standard signal to P301. A standard signal is 1000 microvolts on the receiver frequency modulated by one KHz with 3.0-kHz deviation.
2. Set the Volume control for 0.5-watt output.

PARTS LIST

150.8-174 MHz DUAL FRONT END
19C317295G9 (REV E AND LATER)
19C317295G11 (FST)

SYMBOL	GE PART NO.	DESCRIPTION
A17, A19		MULTIPLIER/MIXER A17 19C327773G2 A19 19C327736G4
A2, A5		MIXER BOARD A2 19D424746G2 A5 19D424746G4
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	19A116114P2045	Ceramic: 30 pf ±5%, 100 VDCW; temp coef -80 PPM.
C3	5493323P12	Ceramic: 0.001 µf +100% -20%, 75 VDCW.
C4	19A116114P3036	Ceramic: 15 pf ±5%, 100 VDCW; temp coef -150 PPM.
C5	5493323P12	Ceramic: 0.001 µf +100% -20%, 75 VDCW.
C6	19A116114P10073	Ceramic: 180 pf ±10%, 100 VDCW; temp coef -3300 PPM.
C7 and C8	19A116114P3036	Ceramic: 15 pf ±5%, 100 VDCW; temp coef -150 PPM.
C9	5493323P12	Ceramic: 0.001 µf +100% -20%, 75 VDCW.
C10	19A116114P1	Ceramic: 1 pf ±5%, 100 VDCW; temp coef 0 PPM.
C11	19A116114P3020	Ceramic: 6 pf ±5%, 100 VDCW; temp coef -80 PPM.
C12	19A116114P3056	Ceramic: 56 pf ±5%, 100 VDCW; temp coef -150 PPM.
C13	19A116114P2060	Ceramic: 75 pf ±5%, 100 VDCW; temp coef -80 PPM.
C14	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
C15	19A116114P2011	Ceramic: 3.3 pf ±10%, 100 VDCW; temp coef -80 PPM.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1	19A116925P1	Silicon, pin: 35 volt Reverse Breakdown, 400 mW.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 thru E4	19A134458P1	Terminal, stud.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B226718G1	Coil. Includes:
	19B209436P1	Tuning slug.
L2 and L3	19A130474P1	Coil.
L4	19A130473P1	Coil.
L5	19B226730G1	Coil.
L6	19C320379G11	Coil. Includes:
	19B209436P1	Tuning slug.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115910P1	Silicon, NPN; sim to Type 2N3904.
Q2	19A115696P01	N Type, field effect; sim to Type 2N4416.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3B151P182J	Composition: 1.8K ohms ±5%, 1/8 w.
R2	3B151P391K	Composition: 390 ohms ±10%, 1/8 w.
R3	3B151P511J	Composition: 510 ohms ±5%, 1/8 w.

SYMBOL	GE PART NO.	DESCRIPTION
R4	3B151P102J	Composition: 1K ohms ±5%, 1/8 w.
R5	3B151P682J	Composition: 6.8K ohms ±5%, 1/8 w.
A3		FILTER BOARD 19C327735G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A134162P3	Variable, ceramic: approx 3.5 to 20 pf; sim to Erie Style 513-001.
C2	19A116114P1	Ceramic: 1 pf ±10%, 100 VDCW; temp coef 0 PPM.
C3	19A134162P3	Variable, ceramic: approx 3.5 to 20 pf; sim to Erie Style 513-001.
C4	19A116114P4	Ceramic: 1.0 pf ±5%, 100 VDCW; temp coef 0 PPM.
C5	19A134162P3	Variable, ceramic: approx 3.5 to 20 pf; sim to Erie Style 513-001.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116192P1	Ceramic: 0.01 µf ±20%, 50 VDCW; sim to Erie 8121 SPECIAL.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L7	19B216441G3	Helical resonator. (Part of Z29). Includes:
	19C311727P1	Tuning slug.
L8	19B216441G12	Helical resonator. (Part of Z30). Includes:
	19C311727P1	Tuning slug.
L26	19B216441G16	Helical resonator. (Part of Z26). Includes:
	19C311727P1	Tuning slug.
L27	19B216441G17	Helical resonator. (Part of Z28). Includes:
	19C311727P1	Tuning slug.
		- - - - - - - HELICAL RESONATORS - - - - - - -
Z26		Consists of L26 and 19C327717G1 can.
Z28		Consists of L27 and 19C327717G1 can.
Z29		Consists of L7 and 19C327717G1 can.
Z30		Consists of L8 and 19C327717G1 can.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4035306P11	Washer, fiber. (Used with Q2 on A2).
	19B227856P1	Shield.

*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.

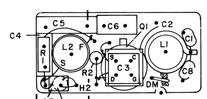
REV. A - Receiver Front End 19D317295G9

To improve sensitivity.
Changed C1 on A13.
Changed C2 and C3 on A14.
Changed R1 on A13.

REV. B - To improve tuning.
Deleted C2, C3 and changed R1 on A15 as shown.

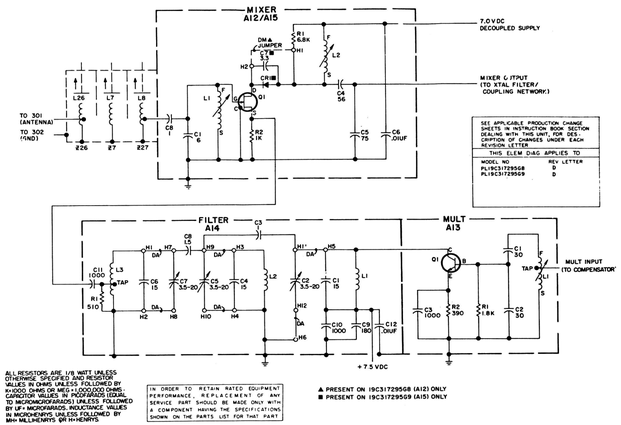
Schematic Diagram was:

Outline Diagram was:



REV. C - To improve tuning.
Changed C1 and C3 on A13.
Added R1 to A14.
Changed design of L1 on A15.

REV. D - To standardize assemblies added C12 to Filter Board 19C321453G1 (A14).



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

THIS ELEM DIAG APPLIES TO

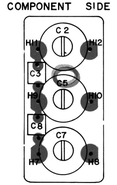
MODEL NO.	REV LETTER
PLI9CS17295GB	D
PLI9CS17295G9	D

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY: K=1000 OHMS OR MEG=1,000,000 OHMS. ALL CAPACITORS ARE IN MMFD UNLESS OPTIONAL OR MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR M=HENRYS.

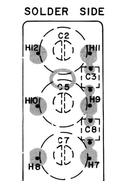
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

▲ PRESENT ON 19C317295G8 (A13) ONLY
■ PRESENT ON 19C317295G9 (A13) ONLY

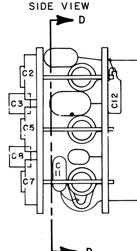
(19C321481, Rev. 7)

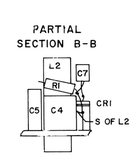


(19C321448, Sh. 2, Rev. 0)
(19C321448, Sh. 3, Rev. 0)

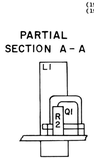


(19C321448, Sh. 2, Rev. 0)



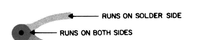


ROTATED 90° CCW

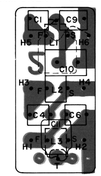


ROTATED 90° CCW

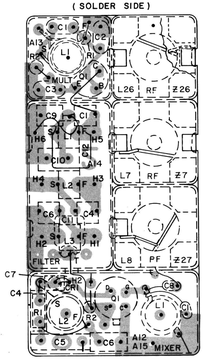
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION. TAB INDICATES EMITTER LEAD.



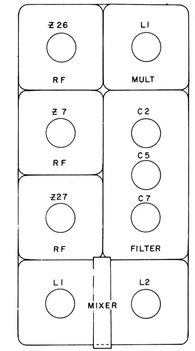
(19C321439, Sh. 2, Rev. 1)
(19C321439, Sh. 3, Rev. 1)



(19C321449, Sh. 2, Rev. 2)
(19C321449, Sh. 3, Rev. 2)

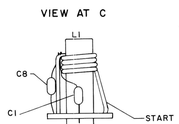


(19C321439, Sh. 2, Rev. 1)
(19C321449, Sh. 2, Rev. 2)
(19C321250, Sh. 2, Rev. 0)



(19C321250, Sh. 2, Rev. 0)
(19C321250, Sh. 3, Rev. 0)

(19D423645, Rev. 2)



ROTATED 90° CCW

SERVICE SHEET

RECEIVER FRONT END
19C317295G9 (A334/A335)
REVISION D