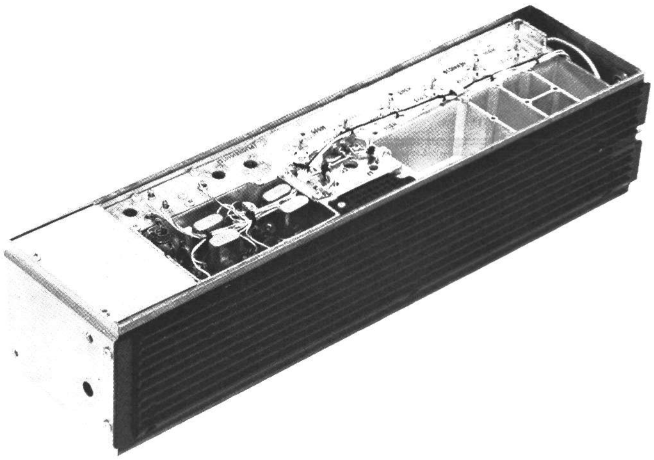
GE MOBILE RADIO

MASTR® PROGRESS LINE

132 - 174 MHz RECEIVER MODELS 4ER41D10 - 15 (WIDE BAND)

Maintenance Manual LBI4170B

DATAFILE FOLDER - DF1094 ***********



SPECIFICATIONS *

FCC Filing Designation	**ER-41-D**
Frequency Range	132—174 MHz
Audio Output	5 watts at less than 5% distortion
Sensitivity	
12-dB SINAD (EIA Method)	0.40 uV
20-dB Quieting Method	0.55 uV
Selectivity	
EIA Two-Signal Method	-85 dB (adjacent channel, ±60 kHz channels)
20-dB Quieting Method	-100 dB at ±35 kHz
Spurious Response	-100 dB
First Oscillator Stability	±.0005% (-30°C to +60°C)
Modulation Acceptance	±17 kHz (wide-band)
Squelch Sensitivity	
Critical Squelch	0.2 uV
Maximum Squelch	Greater than 20 dB quieting (less than 2 uV)
Intermodulation (EIA)	-70 dB
Maximum Frequency Separation	0.4%
Frequency Response	+1 and -8 dB of a standard 6-dB per octave de-emphasis curve from 300 to 3000 Hz (1000-Hz reference)

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

ER-41-D

GENERAL ELECTRIC

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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 MASTR Progress Line Receiver Type ER-41-D is a double conversion, superheterodyne wide-band FM receiver designed for operation on the 132-174 megahertz band.

The receiver is of single-unit construction and is completely housed in an aluminum casting for maximum shielding and rigidity. The top compartment of the casting contains the RF, oscillator, mixer, high IF and 1st low IF amplifier stages. The bottom portion of the casting contains the audio squelch board, crystal filter and audio PA stage.

CIRCUIT ANALYSIS

The MASTR Progress Line Receiver is completely transistorized, using silicon transistors throughout for added reliability. Input leads to the receiver are individually filtered by the 20-pin feed-through by-pass connector J443. A regulated +10 volts is used for all receiver stages except the audio PA stage which operates from the 12-volt system supply.

Centralized metering jack J442 is provided for use with General Electric Test Set Model 4EX3A10 or 4EX8K11 for ease of alignment and servicing. The Test Set meters the oscillator, multiplier, and limiter stages as well as the discriminator and regulated 10 volts.

A block diagram of the receiver is shown in Figure 1.

HELICAL RESONATORS

Five tuned helical resonators (L301/L302 through L309/L310) provide the RF selectivity in the front end. RF cable W441 connects the RF signal from the antenna to a tap on L301/L302. The tap on L301/L302

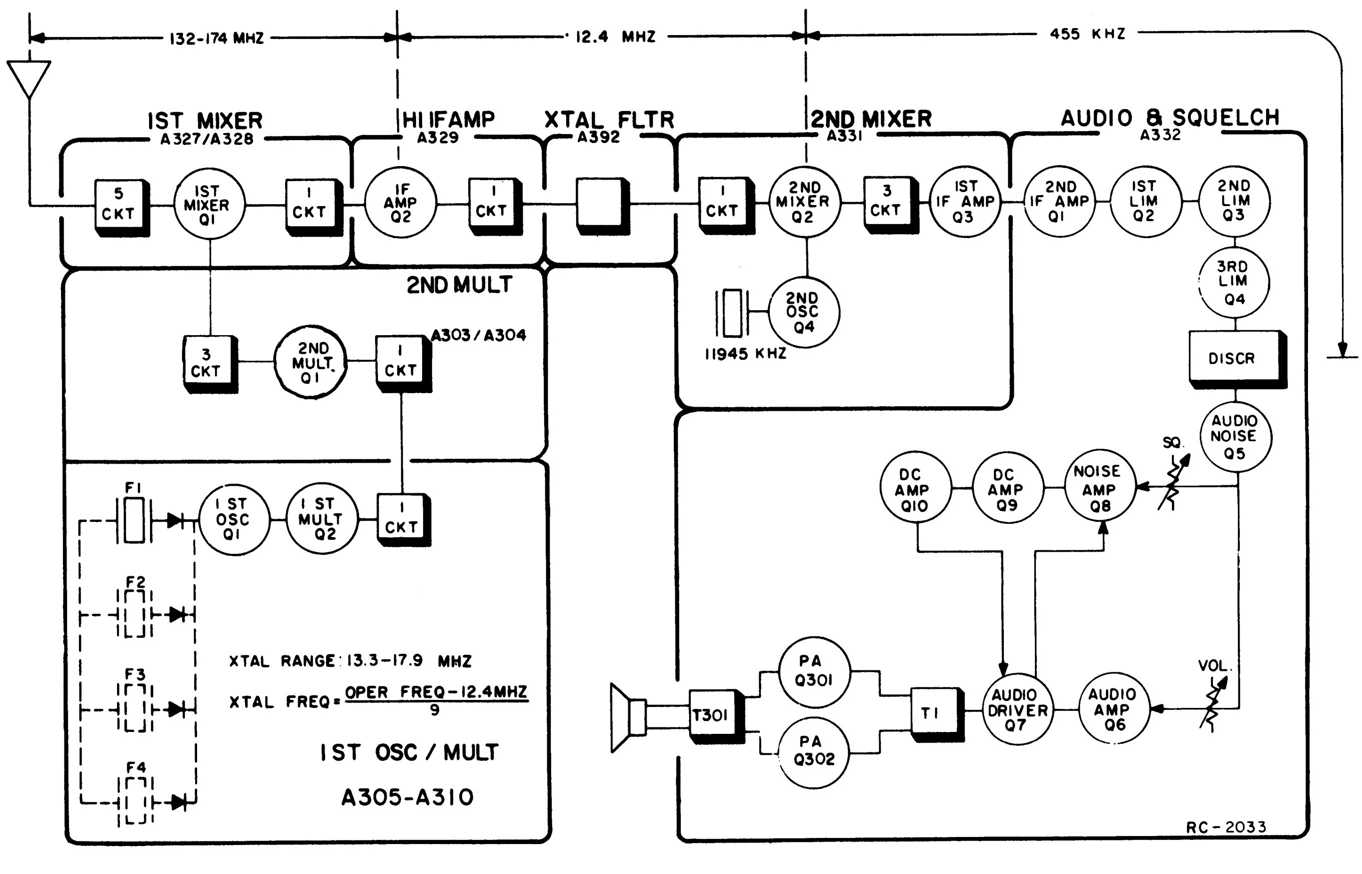


Figure 1 - Receiver Block Diagram

is positioned to provide the proper impedance match to the first mixer. The output of the helical resonators is coupled through C3 to the 1st Mixer Assembly.

OSCILLATOR/MULTIPLIER (A305-A310)

The receiver 1st oscillator operates in a transistorized Colpitts oscillator circuit. The oscillator crystal operates in a fundamental mode at a frequency of approximately 13 to 18 megahertz. The crystal is cut to provide temperature compensation at the high end of the temperature range and is thermistor compensated at low temperature. This provides ±.0005% frequency stability as soon as the receiver is energized -- without the warm-up time required by crystal ovens or warmers.

In single frequency receivers, bias for the oscillator transistor is obtained by a jumper from H1 to H2 on the oscillator board.

In multi-frequency receivers, a diode is connected in series with the crystal, and up to three addition crystal circuits can be added. The 10-volt jumper is removed, and the proper frequency is selected by switching the desired crystal circuit to +10 volts by means of a frequency selector switch on the control unit.

Switching the +10 volts to the crystal circuit forward biases the diode and reduces its impedance. This applies the crystal frequency to the base of oscillator transistor Q1. Feedback for the oscillator is developed across C21. The output is coupled to the base of 1st multiplier Q2.

The output of the 1st multiplier (tripler Q2) is transformer-coupled (T1/T2) to the 2nd multiplier assembly. The 1st multiplier tank is tuned to three times the crystal frequency, and is metered at centralized metering jack J442-4 through metering network CR5, R16, R5 and C33.

2ND MULTIPLIER (A303/A304)

The 1st multiplier output is transformer-coupled through A303-T1/T2 to the base of 2nd multiplier A303-Q1. Following the 2nd multiplier are two resonant L-C circuits and a helical resonator tuned to nine times the crystal frequency. The output is taken from a tap on L311/L312 and applied to the 1st mixer.

1ST MIXER (A327/A328)

The 1st mixer uses a Field-Effect Transistor (FET) as the active device. The FET may be considered a semiconductor current path (or channel) whose resistance is varied by a voltage applied to the control element (gate). Lead identification for the FET is shown in Figure 2A.

The FET has several advantages over a conventional transistor, including a high input impedance, high power gain, and an output that is relatively free of harmonics (low in intermodulation products). The FET also has voltage-controlled characteristics, and may be compared to a vacuum tube in operation (see Figure 2B).

RF from the helical resonators is applied to the gate of Q1, and injection voltage from the multiplier is applied to the source. The mixer output is taken from the drain with the output tuned to the 12.4 MHz high IF frequency.

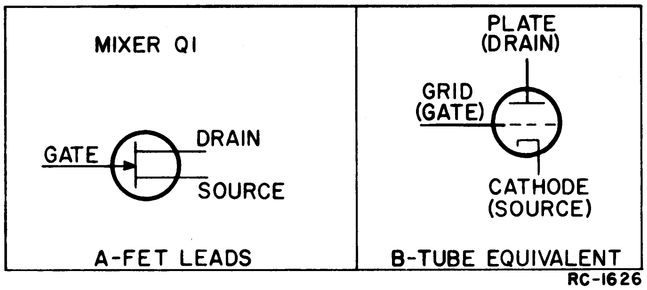


Figure 2 - FET Nomenclature

HI IF AMPLIFIER (A329) AND CRYSTAL FILTER (A330)

The mixer output is coupled through A327-C6 to the emitter of the high IF amplifier A329. The transistor is connected as a grounded-base amplifier which provides a low impedance for the mixer input. The amplifier output is coupled through transformer T1 to the crystal filter.

The highly-selective crystal filter (A330) provides the major selectivity for the receiver. The output of the filter is coupled through impedance-matching transformer A331-T2 to the base of the 2nd mixer.

2ND OSCILLATOR, 2ND MIXER AND 1ST LO IF AMPLIFIER (A331)

A331-Q4 operates in a Colpitts oscillator circuit, with feedback supplied through C18. The oscillator low-side injection voltage (11,945 kHz) is applied to the base of the 2nd mixer.

The High IF signal from the filter and the injection voltage from the 2nd oscillator is applied to the base of 2nd mixer Q2. The 445-kHz mixer output is applied to three tuned low IF circuits, L1, L2 and L3. These tuned circuits are required for shaping the nose of the IF waveform, and for rejecting any undesired output frequencies from the 2nd mixer.

The low IF signal is applied to the

base of 1st low IF amplifier Q3. The output of Q3 is R-C coupled to the base of the 2nd low IF amplifier.

2ND LO IF AMPLIFIER AND LIMITERS (A332)

Additional amplification of the low IF signal going to the limiter stages is provided by 2nd low IF amplifier A332-Q1. This stage is metered at J442-2 through a metering network consisting of C19, CR3 and R25.

Following the 2nd low IF amplifier are three R-C coupled limiter stages (Q2, Q3 and Q4). The 1st limiter is metered at J442-3 through metering network C20, CR4 and R26.

DISCRIMINATOR (A332)

The limiter output is applied to a Foster-Seely type discriminator, where diodes CR1 and CR2 rectify the 455-kHz signal to recover the audio. The discriminator is metered at J442-10 through metering network C56 and R23.

AUDIO - NOISE AMPLIFIER (A322)

The discriminator output is coupled through a low-pass filter (C56, C18, R69 and R83) to the base of audio-noise amplifier Q5. The filter removes any 455-kHz signal remaining in the discriminator output. Q5 operates as an emitter-follower to match the discriminator impedance to the VOLUME and SQUELCH CONTROL. The stage also provides power gain.

AUDIO AMPLIFIERS (A332)

Any audio present in the incoming signal is coupled from the emitter of Q5 through the VOLUME control, and applied to the base of audio amp Q6 through a de-emphasis network. The de-emphasis network consists of C22, C23, R30 and R31.

Audio driver Q7 follows the audio amplifier. The output of Q7 is coupled through transformer T1 to provide phase inversion for the push-pull audio PA stage.

Q301 and Q302 operate as a push-pull, Class AB audio PA stage. The PA output is coupled through audio transformer T301 to the loudspeaker. The yellow and white tertiary windings of T301 supply balanced feedback to the collector of Q7 to minimize distortion.

Base bias for the PA stage and the elimination of crossover distortion is controlled by bias adjust potentiometer R43. The potentiometer is set at the factory as shown in STEP 1 of the receiver Test Procedure.

NOTE

Do not adjust bias adjust potentiometer R43 unless PA transistors Q301 and Q302 have been replaced.

Audio high and low are also present at centralized metering jack J442, and can be used as shown in STEP 1 of the Receiver Test Procedure. The output stage provides 5 watts at less than 5% distortion into a 3.5-ohm load at the receiver output terminals (3.2-ohm load at the Control Unit).

SQUELCH (A332)

Noise from the audio-noise amplifier (Q5) operates the squelch circuit. With no carrier present in the receiver, this noise is coupled to the base of noise amplifier Q8 through a high-pass filter which attenuates frequencies below 3 kHz. The filter consists of C58, C59 and R45, as well as C57 and L3 in the collector circuit of Q8. The gain of Q8 is determined by the SQUELCH control, which varies the bias on the base of Q8. Thermistor RT2 keeps the critical squelch constant over wide variations in temperature.

The output of noise amplifier Q8 is rectified by diodes CR5 and CR6, and filtered by C36 and C37 to produce a negative DC voltage. This DC voltage is applied to the base of DC amplifier Q9, turning it off. When turned off, the collector voltage of Q9 rises to approximately 8 volts, turning on DC amplifier Q10. When conducting, the collector voltage of Q10 drops to almost ground potential, which removes the base bias to audio amplifier Q6 and audio driver Q7, turning them off.

When the receiver is quieted by a signal (unsquelches), the noise in the receiver is reduced, turning DC amplifier Q9 on and DC amplifier Q10 off. This allows the audio states to conduct so that sound is heard in the speaker.

Resistor R73 connects from the emitter of audio driver Q7 to the emitter of noise amplifier Q8, providing a hysteresis loop in the squelch circuit. When a weak signal opens the squelch, the signal level may be reduced by 4 to 6 dB without the squelch closing. This limits squelch "flutter" or "picket-fence" operation.

With audio driver Q7 conducting, a positive voltage through R73 helps to reduce the gain of noise amplifier Q8. This positive feedback provides a quick, positive switching action in the squelch circuit. When the receiver squelches, audio driver Q7 turns off and its emitter potential drops to zero. This reduces the DC feedback causes Q8 to conduct harder, turning the audio stages off quickly.

Keying the transmitter removes the +10 volts from J19, turning off DC amplifier Q9 and turning on Q10 to mute the receiver.

MAINTENANCE

To service the receiver from the top—

1. Pull locking handle down and pull radio about one inch out of mounting frame.
2. Pry up cover at rear of receiver.
3. Slide cover back and lift off.

To service the receiver from the bottom—

1. Pull locking handle down. Pull radio out of mounting frame.
2. Remove screws in bottom cover. Pry up cover at back of receiver.
3. Slide cover back and lift off.

To remove the receiver from the system frame—

1. Loosen the two Phillips-head retaining screws in front casting (see Figure 3), and pull casting away from system frame.
2. Remove the four screws in the back cover.
3. Remove the two screws holding the receiver at each end of the system frame.
4. Disconnect the antenna jack and the 20-pin connector from the front of the receiver, and slide the unit out of the system frame.

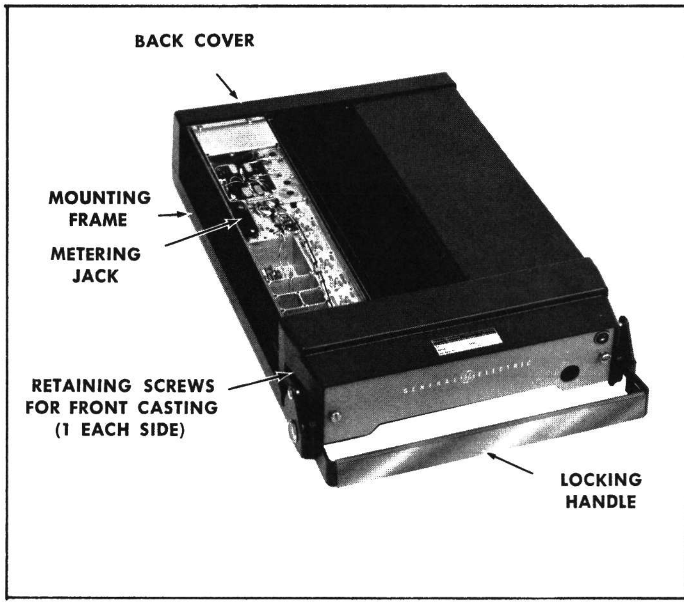


Figure 3 - Removing Top Cover

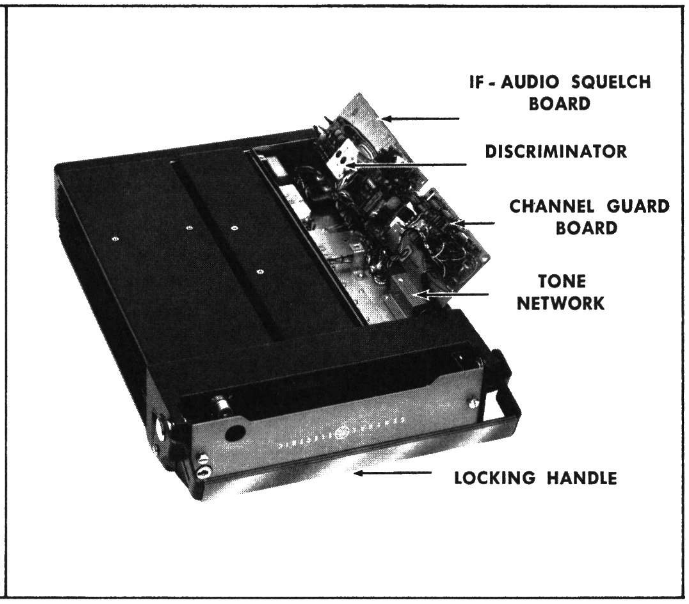


Figure 4 - Removing Bottom Cover

FRONT END ALIGNMENT

EQUIPMENT REQUIRED

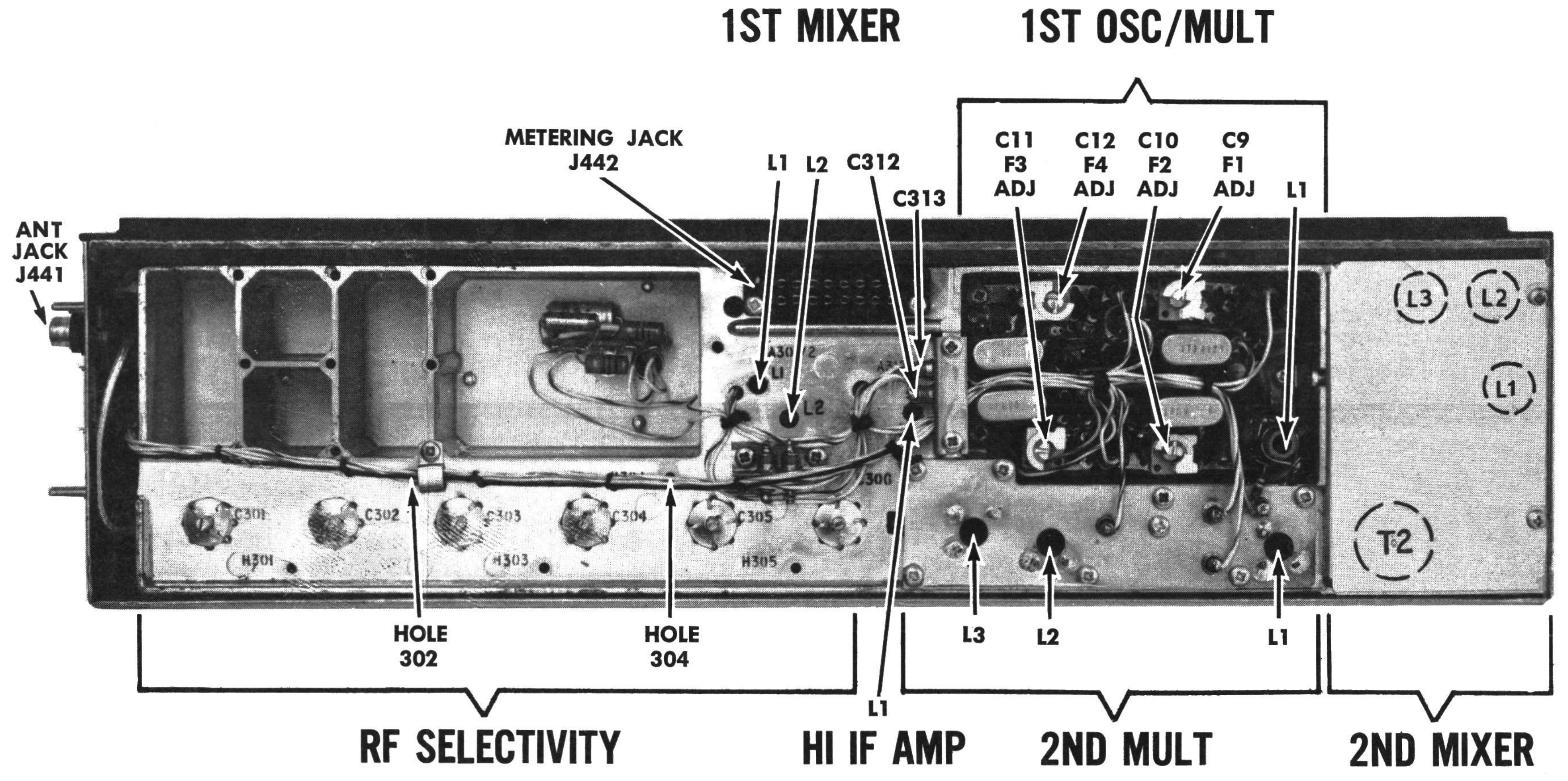
1. GE Test Set Model 4EX3A10, 4EX8K11, station test meter panel or 20,000 ohms-per-volt multimeter.
2. A 132-174 MHz signal source. Connect a one-inch piece of insulated wire no larger than 0.065 inch to generator output probe.

PRELIMINARY CHECKS AND ADJUSTMENTS

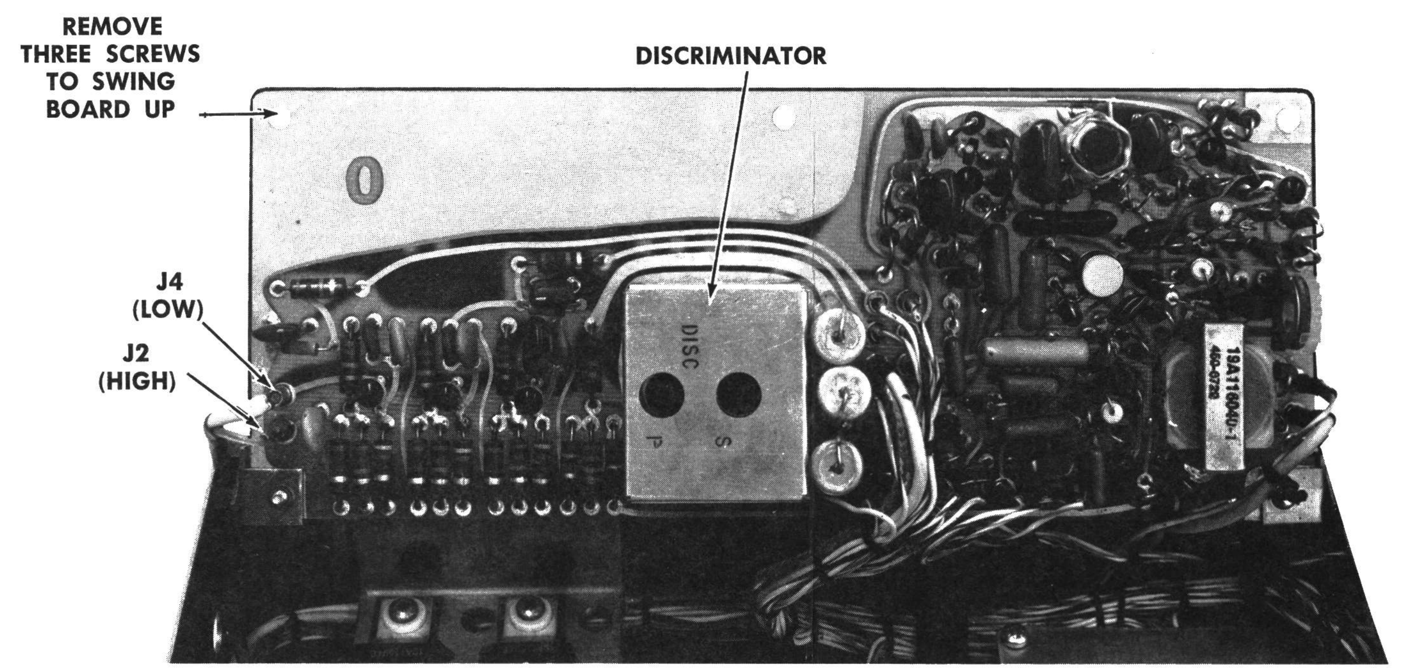
1. Connect Test Set to receive centralized metering jack J442 and set meter sensitivity switch to the TEST 1 or 1-volt position.
2. With Test Set in position J, check for regulated +10 volts. If using Multimeter, measure from C312 to C313.
3. If using Multimeter, connect the positive lead to J442-16 (ground).

ALIGNMENT PROCEDURE

STEP	METERING POSITION: GE Test Set or Meter Panel	METERING POSITION: Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			OSCILLATOR AND MULTIPLIERS		
1.	D (MULT-1)	Pin 4	L1 (on 1st OSC/MULT) and L1 (on 2nd MULT)	See Procedure	Tune L1 (1st OSC/MULT) for maximum meter reading. Then tune L1 (2nd MULT) for minimum meter reading.
2.	E (MULT-2)	Pin 5	L1 (on 1st OSC/MULT) and L1, L2 and L3 (on 2nd MULT)	See Procedure	Tune L1 (1st OSC/MULT) and L1 and L2 (2nd MULT) for maximum meter reading. Then tune L3 (2nd MULT) for minimum meter reading.
3.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal into Hole 305. Adjust the signal generator for discriminator zero.
4.	B (2nd IF AMP)	Pin 2	L2 and L3 (on 2nd MULT) and C306 (on RF selectivity)	Maximum	Apply an on-frequency signal as above. Tune L2, L3 and C306 for maximum meter reading, keeping signal below saturation.
			RF SELECTIVITY		
5.	B (2nd IF AMP)	Pin 2	C301, C302, C303, C304, C305 and C306	Maximum	Apply an on-frequency signal to the antenna jack. Tune C301 through C306 for maximum meter reading, keeping signal below saturation. Then retune C301 through C306 slightly for maximum quieting.
			FREQUENCY ADJUSTMENT		
6.	A (DISC)	Pin 10	C9 on 1st OSC/MULT (C10, C11 and C12) for multi-frequency	Zero	Apply an on-frequency signal to the antenna jack. Tune C9 for zero discriminator reading. In multi-frequency units, tune C10, C11 and C12 as required. —— NOTE —— For proper frequency control of the receiver, it is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90°F.



IF-AUDIO & SQUELCH



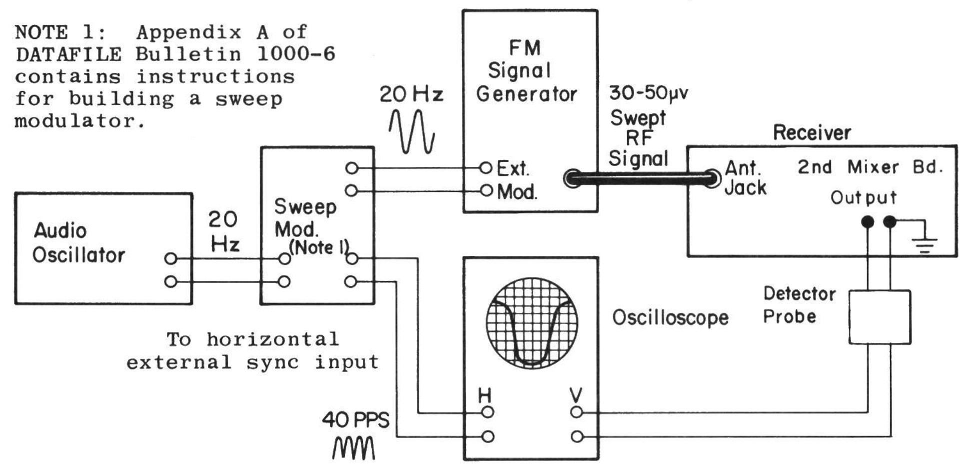


Figure 5 — Test Setup for 20-Hz Double-Trace Sweep Alignment

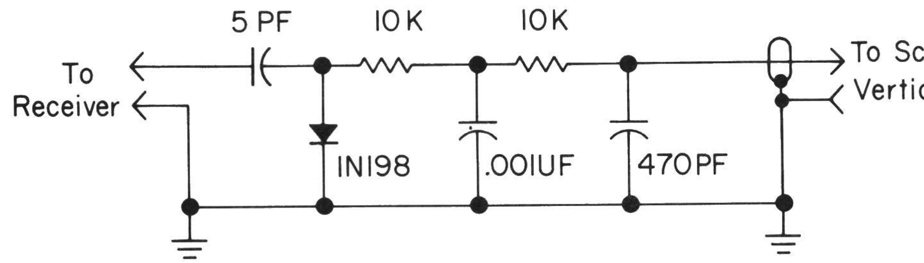


Figure 6 — Detector Probe for Sweep Alignment

COMPLETE RECEIVER ALIGNMENT

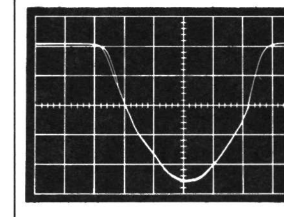
EQUIPMENT REQUIRED

1. GE Test Set Models 4EX3A10, 4EX8K11, station test meter panel, or 20,000 ohms-per-volt multimeter.
2. A 450 to 460 kHz source (GE Test Set Model 4EX3A10), and 132-174 MHz signal source. Connect a one-inch piece of insulated wire no larger than .065 inch to generator output probe.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect Test Set to receiver centralized metering jack J442, and set meter sensitivity switch to the TEST 1 or 1-volt position.
2. For a large change in frequency or a badly mis-aligned receiver, set crystal trimmer C9 on 1st OSC/MULT board (A305-A310 only) to mid-capacity. In multi-frequency receivers, set C10, C11 or C12 to mid-capacity as required.
3. In multi-frequency receivers where the maximum frequency spacing is less than 200 kHz, align the unit on channel F1. If the frequency spacing is greater than 200 kHz, align the receiver on the center frequency.
4. With Test Set in position J, check for regulated +10 volts. If using Multimeter, measure from C312 to C313.
5. If using Multimeter, connect the positive lead to J442-16 (ground).

ALIGNMENT PROCEDURE

STEP	METER POSITION: GE Test Set or Meter Panel	METER POSITION: Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			DISCRIMINATOR		
1.	A (DISC)	Pin 10	L1 and L2 (on IF-AUDIO SQUELCH board)	Zero	Remove three screws and swing open the IF-AUDIO & SQUELCH board. Adjust L1 (disc primary) 1/2 turn counterclockwise from the bottom of coil. Next, apply a 455-kHz signal to J2 and J4 and adjust L2 (disc secondary) for zero meter reading.
2.	A (DISC)	Pin 10		See Procedure	Alternately apply a 450-kHz and 460-kHz signal and check for readings of at least 0.25 volt, but not more than 0.5 volt on GE Test Set. Both readings must be within .05 volt. Do not attempt to balance reading any closer than 0.05 volt.
			OSCILLATOR, MULTIPLIERS & 1ST MIXER		
3.	D (MULT-1)	Pin 4	L1 (on 1st OSC/MULT) and L1 (on 2nd MULT)	See Procedure	Tune L1 (1st OSC/MULT) for maximum meter reading. Then tune L1 (2nd MULT) for minimum meter reading.
4.	E (MULT-2)	Pin 5	L1 (on 1st OSC/MULT) and L1, L2 and L3 (on 2nd MULT)	See Procedure	Tune L1 (1st OSC/MULT) and L1 and L2 (2nd MULT) for maximum meter reading. Then tune L3 (2nd MULT) for minimum meter reading.
5.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal into Hole 305. Adjust the signal generator for discriminator zero.
6.	B (2nd IF AMP)	Pin 2	L2 and L3 (on 2nd MULT) and C306 (on RF SELECTIVITY)	Maximum	Apply an on-frequency signal as above. Tune L2, L3 and C306 for maximum meter reading, keeping signal below saturation.
7.	B (2nd IF AMP)	Pin 2	L2 and L1 (on 1st MIXER)	Maximum	Apply an on-frequency signal into Hole 304 and tune L2 and L1 for maximum meter reading, keeping signal below saturation.
			RF SELECTIVITY		
8.	B (2nd IF AMP)	Pin 2	C306, C305, C304, C303 and C302	Maximum	Apply an on-frequency signal in the Hole shown below, keeping the signal below saturation. Tune C302 through C306 for maximum meter reading as shown below: Insert Generator Probe In: / Tune 1. Hole 305 — C306 2. Hole 304 — C305 3. Hole 303 — C304 4. Hole 302 — C303 5. Hole 301 — C302
9.	B (2nd IF AMP)	Pin 2	C301, C302, C303, C304, C305 and C306	Maximum	Apply an on-frequency signal to antenna jack J441. Tune C301 through C306 for maximum quieting.
			2ND MIXER & HI IF		
			The 2nd mixer, and high IF circuits have been aligned at the factory and will normally require no further adjustment. If adjustment is necessary, use the procedure outlined in STEPS 10, 11 and 12. — NOTE — Refer to DATAFILE BULLETIN 1000-6 IF Alignment of Two-Way Radio FM Receivers for helpful suggestions on how to determine when IF alignment is required.		
10.	B (2nd IF AMP)	Pin 2	L3, L2, L1, T2 (2nd Mixer) and T1 (Hi IF AMP)	Maximum	Apply on-frequency, unmodulated signal and tune L3, L2, L1, T2 (2nd mixer) and T1 (Hi IF AMP) for maximum meter reading, keeping signal below saturation.
11.			L3, L2, L1, T2 (2nd Mixer) and T1 (Hi IF AMP) 		Connect scope, signal generator, and detector as shown in Figure 5. Set signal generator level for 30-50 μv and modulate with 16 to 20 kHz at 20 Hz. With detector at the collector of Q3 (2nd mixer board output), tune for double trace as shown on scope pattern.
12.	A (DISC)	Pin 10		See Procedure	Check to see that discriminator idling voltage is within ±.05 volt of zero with no signal applied. Check to see that modulation acceptance bandwidth is between 15 and 19 kHz.
			FREQUENCY ADJUSTMENT		
13.	A (DISC)	Pin 10	C9 (on 1st OSC/MULT) (C10, C11 and C12 for multi-frequency)	Zero	Apply an on-frequency signal to the antenna jack. Tune C9 for zero discriminator reading. In multi-frequency units tune C10, C11 or C12 as required. - NOTE - For proper frequency control of the receiver, it is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90°F.

TEST PROCEDURES

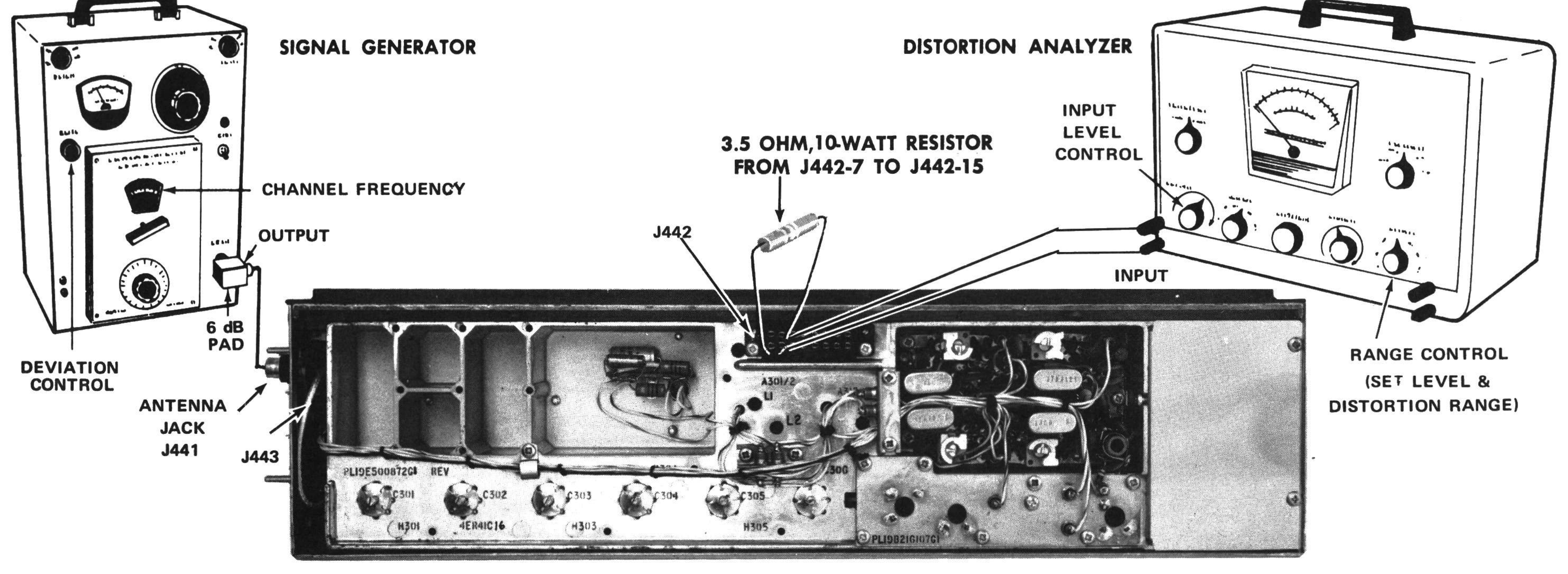
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

TEST EQUIPMENT REQUIRED

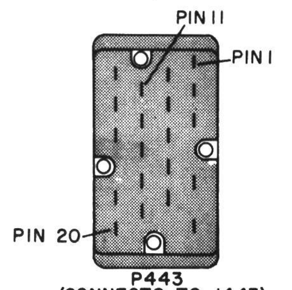
- Distortion Analyzer similar to: Heath IM-12
- Signal Generator similar to: Measurements M-560
- 6-dB attenuation pad, and 3.5-ohm, 10-watt resistor

PRELIMINARY ADJUSTMENTS

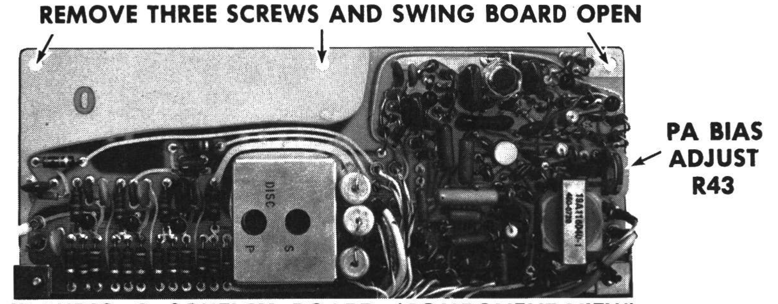
1. Connect the test equipment to the receiver as shown for all steps of the receiver Test Procedure.
2. Turn the SQUELCH control fully clockwise for all steps of the Test Procedure.
3. Turn on all of the equipment and let it warm up for 20 minutes.



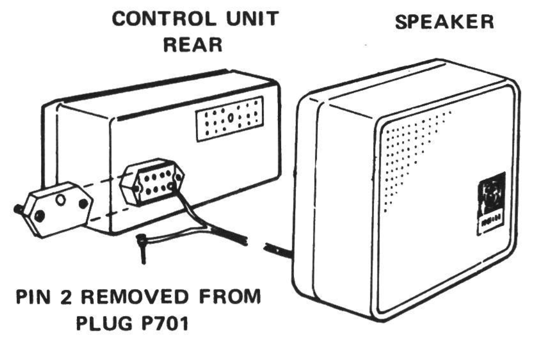
COMPONENT TOP VIEW



P443
(CONNECTS TO J443)



IF-AUDIO & SQUELCH BOARD (COMPONENT VIEW)



STEP 1
AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

A. Apply a 1,000-microvolt, on-frequency test signal modulated by 1,000 hertz with ±10 kHz deviation to antenna jack J441.

B. With Five-Watt Speaker:

Disconnect speaker lead pin from J701-2 (on rear of Control Unit).

Connect a 3.5-ohm load resistor from J442-15 to J442-7. Connect the Distortion Analyzer input across the resistor as shown.

OR

With Handset:

Lift the handset off of the hookswitch. Connect the Distortion Analyzer input from J442-15 to J442-7.

C. Adjust the VOLUME control for five-watt output (4.18 VRMS using the Distortion Analyzer as a VTVM).

D. Make distortion measurements according to manufacturer's instructions. Reading should be less than 5%. If the receiver sensitivity is to be measured, leave all controls and equipment as they are.

SERVICE CHECK

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

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

F. P.A. Bias Adjust (R43) -- Turn the SQUELCH control fully counterclockwise. Then connect a milliammeter in series with the +12 volt lead at P443-11. With no signal in, adjust R43 for a reading of approximately 20 milliamps. This adjustment should not be necessary unless an output transistor has been replaced.

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

H. Discriminator Alignment (Refer to Receiver Alignment on reverse side of page).

STEP 2
USABLE SENSITIVITY (12-dB SINAD)

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

A. **Apply a 1000-microvolt, on-frequency signal modulated by 1000 Hz with 10-kHz deviation to J441.**

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 2.5 watts (2.9 volts RMS across the 3.5-ohm receiver load using the Distortion Analyzer as a VTVM).**

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)

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 ±15 kHz (but less than ±19 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.

STEP 1-QUICKCHECKS

TEST SET CHECKS

These checks are typical voltage readings measured with GE Test Set Model 4EX3A10 in the Test 1 position, or Model 4EX8K10 or 11 in the 1-volt position.

Metering Position	Reading with No Signal in	Reading with 1 µv unmodulated input
A Disc idling	Less than ±.05 VDC	
B 2nd IF	0.2 VDC	0.2 VDC
C 1st Lim	0.7 VDC	0.8 VDC
D Mult 1	0.6 VDC	
E Mult 2	.8 VDC	
J Regulated +10 Volts	10 VDC	

SYMPTON CHECKS

SYMPTOM	PROCEDURE
NO SUPPLY VOLTAGE	• Check power connections and continuity of supply leads, and check fuse in power supply. If fuse is blown, check receiver for short circuits.
NO REGULATED 10-VOLTS	• Check the 12-volt supply. Then check regulator circuit (See Troubleshooting Procedure for Power Supply).
LOW 1ST LIM READING	• Check supply voltages and then check oscillator reading at J442-4 & 5 as shown in STEP 2A. • Make SIMPLIFIED VTVM GAIN CHECKS from 2nd Mixer through 1st Limiter stages as shown in STEP 2A.
LOW OSCILLATOR/MULTIPLIER READINGS	• Check alignment of Oscillator (Refer to Front End Alignment Procedure). • Check voltage and resistance readings of 1st Oscillator/Multiplier Q1/Q2. • Check crystal Y1.
LOW RECEIVER SENSITIVITY	• Check Front End Alignment (Refer to Receiver Alignment Procedure). • Check antenna connections, cable and relay. • Check 1st and 2nd Oscillator injection voltage. • Check voltage and resistance readings of 1st Mixer, HI IF Amp and 2nd Mixer. • Make SIMPLIFIED GAIN CHECKS (STEP 2A).
LOW AUDIO	• Check Audio PA (Q301 & Q302) voltage readings on schematic diagram. • Make simplified gain and waveform checks of audio and squelch stages (Steps 2A and 2B). • Make unsquelched voltage readings in Audio section (Refer to Receiver Schematic Diagram). • Check voltage and resistance readings on Channel Guard board.
HIGH DISTORTION AT LOW AUDIO LEVELS (50 MW)	• Set PA bias adjust R43 as specified under Service. • Checks in STEP 1 of TEST PROCEDURES.
IMPROPER SQUELCH OPERATION	• Check voltage and resistance readings of Squelch circuit (Refer to Receiver Schematic Diagram). • Make gain and waveform checks of audio and squelch stages (Steps 2A and 2B).
DISCRIMINATOR IDLING TOO FAR OFF ZERO	• See if discriminator zero is in center of IF bandpass.

STEP 3-VOLTAGE RATIO READINGS

EQUIPMENT REQUIRED:

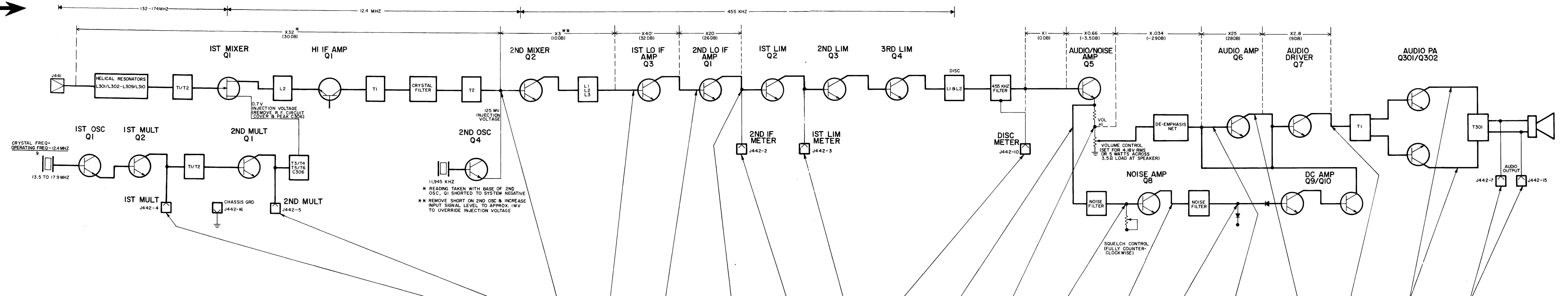
1. RF Voltmeter (Similiar to Boonton Model 91-CA or Millivac Type MV-18 C).
2. Signal on receiver frequency (below saturation). Correct frequency can be determined by zeroing the discriminator. Use 1,000 Hertz signal with 3.0 kHz deviation for audio stage.

PROCEDURE

1. Apply probes to input of stage and system negative (-10 VDC). Take voltage reading (E_1).
2. Move probes to input of following stage and system negative. Take reading (E_2).
3. Convert readings by means of the following formula:

$$\text{Voltage Ratio} = \frac{E_2}{E_1}$$

4. Check results with typical voltage ratios shown on diagram.



STEP 2A-SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

1. VTVM-AC & DC
2. Signal Generator (measurements M560 or equiv.)

PRELIMINARY STEPS:

1. Set VOLUME control for 4.18 volts across 3.5-ohm load. If this cannot be obtained, set to approx. 70% of max. rotation.
2. Set SQUELCH control fully counterclockwise.
3. Receiver should be properly aligned.
4. Connect VTVM between system negative and points indicated by arrow (except for 1st and 2nd MULT which reference chassis ground).

SIGNAL GENERATOR INPUT AT J441 MAINTAIN SETTING AT DISCRIMINATOR ZERO			UNMODULATED	UNMODULATED	UNMODULATED	UNMODULATED	1 MICROVOLT UNMODULATED	NO SIGNAL INPUT	STANDARD SIGNAL-(1 MILLIVOLT AT RCVR FREQ, MODULATED BY 1KHZ WITH 10 KHZ DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
PROCEDURE			INCREASE GENERATOR OUTPUT UNTIL VTVM READING ON 1.5 V SCALE DECREASES BY 50 MV	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%													CONNECT VTVM OR SCOPE ACROSS 3.5Ω LOAD BETWEEN J442-7 AND J442-15 WITH SPEAKER DISCONNECTED.
READING	5 VDC GE TEST SET (POS. D. 0.6V)	2.5 VDC GE TEST SET (POS. E .8V)	GENERATOR OUTPUT SHOULD BE APPROX 20 MILLIVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 600 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 5 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 0.3 MICROVOLTS	0.6 VDC GE TEST SET (POS. B. 0.2V)	2 VDC GE TEST SET (POS. C. 0.7V)	0.8 VAC	0.75 VAC	0.55 VAC	0.15 VAC	2.3 VAC	0.05 VAC		0.5 VAC	1.4 VAC	10 VAC	4.18 VAC

STEP 2B-AUDIO & SQUELCH WAVEFORMS

EQUIPMENT REQUIRED:

1. Oscilloscope.
2. Signal generator (measurements M560 to equivalent).

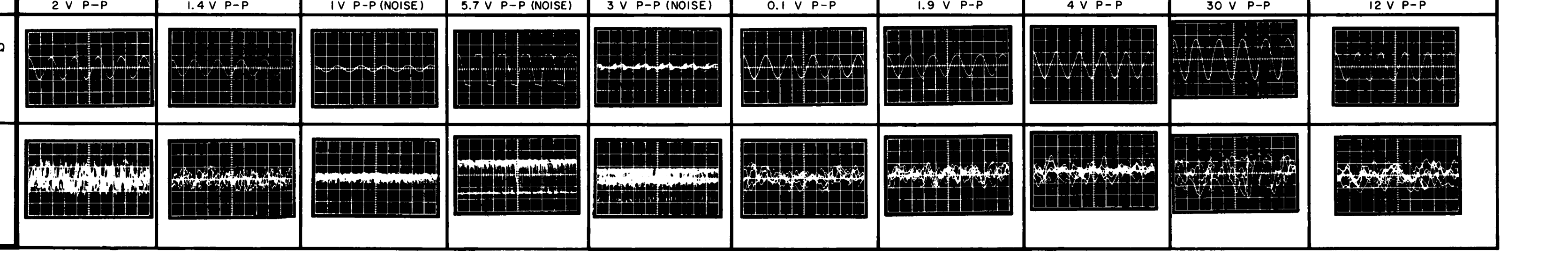
PRELIMINARY STEPS:

1. Set VOLUME control for 4.18 volts across 3.5-ohm load. If this cannot be obtained, set to approx. 70% of max. rotation.
2. Set SQUELCH control fully counterclockwise.
3. Receiver should be properly aligned.
4. Connect oscilloscope between system negative and points indicated by arrow.

SCOPE SETTING										
	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV
	1 VOLT/DIV	1 VOLT/DIV	1 VOLT/DIV	2 VOLTS/DIV	0.5 VOLTS/DIV	50 MILLIVOLTS/DIV	1 VOLT/DIV	2 VOLTS/DIV	10 VOLTS/DIV	5 VOLTS/DIV
	2 V P-P	1.4 V P-P	1 V P-P (NOISE)	5.7 V P-P (NOISE)	3 V P-P (NOISE)	0.1 V P-P	1.9 V P-P	4 V P-P	30 V P-P	12 V P-P

STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1KHZ WITH 10 KHZ DEVIATION)

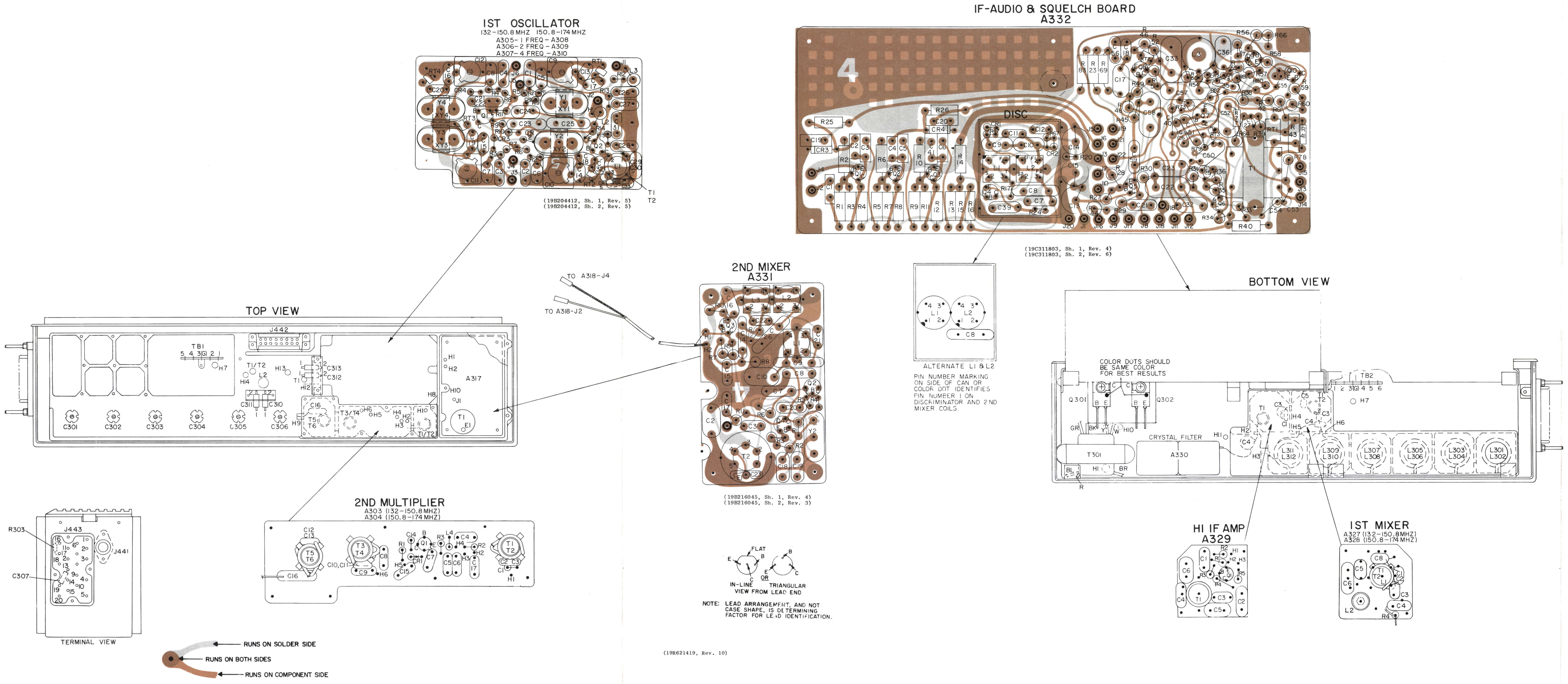
NOISE WAVE FORM (NO SIGNAL INPUT)



(RC-2034)

TROUBLE SHOOTING PROCEDURE

132—174 MHz MASTR RECEIVER
MODELS 4ER41D10-15



OUTLINE DIAGRAM

132—174 MHz MASTR RECEIVER
MODELS 4ER41D10-15

PARTS LIST

LBI4199B

132-174 MHz RECEIVER
MODELS 4ER41D10-15

SYMBOL	GE PART NO.	DESCRIPTION
A303* and A304*		SECOND MULTIPLIER A303 19B219908G1 LOW SPLIT A304 19B219908G2 HIGH SPLIT (Added by REV C)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5491601P107	Phenolic: 0.27 pf ±5%, 500 VDCW.
C4	5496203P133	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -3300 PPM.
C5	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C6	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C7	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C9	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C14	5491601P16	Phenolic: 0.62 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C15	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C17	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - - INDUCTORS - - - - - - - - -
L4	19B209420P111	Coil, RF: 0.68 µh ±10%, 0.54 ohms DC res max; sim to Jeffers 4426-4K.
		- - - - - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A115440P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P103K	Composition: 10K ohms ±10%, 1/4 w.
R2	3R152P104K	Composition: 100K ohms ±10%, 1/4 w.
R3	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B216097G3 T2 19B216097G4
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5496218P255	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218P252	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
	19B216097P6	Coil.
	5491798P5	Tuning slug.
T3 and T4		COIL ASSEMBLY T3 19B216106G3 T4 19B216106G4
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C10	5496218P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C11	5496218P238	Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216106P6	Coil.
	5491798P5	Tuning slug.
T5 and T6		COIL ASSEMBLY T5 19B216102G1 T6 19B216102G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C12	5496218P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C13	5496218P239	Ceramic disc: 8.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C16	5496218P770	Ceramic disc: 200 pf ±5%, 500 VDCW, temp coef -750 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3	19B216102P6	Coil.
	5491798P5	Tuning slug.
		IN REV B and earlier:
A303* and A304*		SECOND MULTIPLIER A303 19B216107G1 A304 19B216107G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C5	5493392P7	Ceramic, feed-thru: 1000 pf +100% -0%, 500 VDCW; sim to Allen Bradley Type FA5C.
C6	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C7	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C8	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
C14	5491601P16	Phenolic: 0.62 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C15	5493392P7	Ceramic, feed-thru: 1000 pf +100% -0%, 500 VDCW; sim to Allen Bradley Type FA5C.
C17 and C18	5493392P7	Ceramic, feed-thru: 1000 pf +100% -0%, 500 VDCW; sim to Allen Bradley Type FA5C.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L4	19B209420P111	Coil, RF: 0.68 µh ±10%, 0.54 ohms DC res max; sim to Jeffers 4426-4K.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115440P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P392K	Composition: 3.9K ohms ±10%, 1/4 w.
R2	3R152P103K	Composition: 10K ohms ±10%, 1/4 w.
R3	3R152P331K	Composition: 330 ohms ±10%, 1/4 w.
R4	3R152P103K	Composition: 10K ohms ±10%, 1/4 w.
R5	3R152P104K	Composition: 100K ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B216097G1 T2 19B216097G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5491601P107	Phenolic: 0.27 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C2	5496218P255	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218P252	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM.
C4	5496203P133	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -3300 PPM.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B216097P6	Coil.
	5491798P5	Tuning slug.

SYMBOL	GE PART NO.	DESCRIPTION
T3 and T4		COIL ASSEMBLY T3 19B216106G1 T4 19B216106G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C9	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C10	5496218P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C11	5496218P238	Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - -
CR1	19A115250P1	Silicon.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216106P6	Coil.
	5491798P5	Tuning slug.
T5 and T6		COIL ASSEMBLY T5 19B216102G1 T6 19B216102G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - - -
C12	5496218P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C13	5496218P239	Ceramic disc: 8.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C16	5496218P770	Ceramic disc: 200 pf ±5%, 500 VDCW, temp coef -750 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3	19B216102P6	Coil.
	5491798P5	Tuning slug.
		- - - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424P7	Miniature, phen: 4 terminals.
A305 thru A310		FIRST OSCILLATOR A305 19B204419G1 REV B A306 19B204419G4 REV B A307 19B204419G2 A308 19B204419G5 A309 19B204419G3 A310 19B204419G6
		- - - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C4	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C5 thru C8	5496219P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C9 thru C12	5491271P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-5.
C13 thru C16	5496219P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C17 thru C20	19C300685P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C21	5496219P771	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -750 PPM.
C23	5494481P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C24	5490008P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C28	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.

SYMBOL	GE PART NO.	DESCRIPTION
C31	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR4	19A115603P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J6	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - - INDUCTORS - - - - - - - - -
L2 and L3	7488079P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res; sim to Jeffers 4421-7K.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A115330P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - -
R1 thru R4	3R152P562J	Composition: 5.6K ohms ±5%, 1/4 w.
R5 thru R8	3R152P104K	Composition: 100K ohms ±10%, 1/4 w.
R9	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R10	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R13	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R14	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R15	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R19	3R152P360J	Composition: 36 ohms ±5%, 1/4 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1 thru RT4	19B209284P5	Disc: 43 ohms nominal, color code green.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B204421G1 T2 19B204421G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C29	5496218P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C30	5496218P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C32	5496218P34	Ceramic disc: 3.0 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C33	5494481P12	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR5	19A115250P1	Silicon, fast recovery, 225 mA, 50 PIV.
		- - - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A121093P1	Coil.
		- - - - - - - - - - - RESISTORS - - - - - - - - -
R16	3R152P103K	Composition: 10K ohms ±10%, 1/4 w.
	5491798P5	Tuning slug.
		- - - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (RC2036).

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part No. and specify exact freq needed.
		Crystal freq = (OF -12.4 MHz) / 9
Y1 thru Y4	19B206576P8	Quartz: freq range 13288.888 to 15377.777 KHz, temp range -30°C to +85°C. (132-150.8 MHz)
Y1 thru Y4	19B206576P9	Quartz: freq range 15377.778 to 17955.555 KHz, temp range -30°C to +85°C. (150.8-174 MHz)
A327 and A328		FIRST MIXER A327 19B216928G1 A328 19B216928G2
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C4	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C7	5496218P215	Ceramic disc: 33 pf ±10%, 500 VDCW, temp coef -80 PPM.
C8	5496372P149	Ceramic disc: 220 pf ±10%, 500 VDCW, temp coef -3300 PPM.
		- - - - - - - - - - - INDUCTORS - - - - - - - - -
L2	19B216576G1	Coil.
		- - - - - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A116960P1	N Type, field effect; sim to Type 2N4416.
		- - - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R2	3R152P302K	Composition: 3K ohms ±10%, 1/4 w.
R3	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R4*	3R152P331K	Composition: 330 ohms ±10%, 1/4 w. Added by REV D.
		- - - - - - - - - - - TRANSFORMERS - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B216100G1 T2 19B216100G2
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496218P235	Ceramic disc: 4.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C2	5496218P234	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C3	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19B216100P6	Coil.
		- - - - - - - - - - - RESISTORS - - - - - - - - -
R6	3R152P103K	Composition: 10K ohms ±10%, 1/4 w.
	5493185P5	Tuning slug.
A329		HI IF AMPLIFIER 19B216927G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	5490008P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C3	5496218P650	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -470 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C4	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C5 and C6	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115328P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P301J	Composition: 300 ohms ±5%, 1/4 w.
R2	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R3	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R4	3R152P682J	Composition: 6800 ohms ±5%, 1/4 w.
R5	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19B216372G3	Coil. Includes:
	5491798P7	Tuning slug.
A330		CRYSTAL FILTER 19B216703G1
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19C304094G5	Bandpass: 12.2 MHz.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w.
R2	3R152P362J	Composition: 3600 ohms ±5%, 1/4 w.
A331		SECOND MIXER 19B216119G2
		- - - - - - - - - - CAPACITORS - - - - - - - -
C2	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C3	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C7 and C8	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C9	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C10	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C14	19A116656P220J2	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -220 PPM.
C15	7491395P109	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JL.
C16	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C17	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C18	5490008P25	Silver mica: 82 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C19	5490008P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5490008P1	Silver mica: 5 pf ±0.5 pf, 500 VDCW; sim to Electro Motive Type DM-15.
C21 and C22	5496219P49	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef 0 PPM.
C23		(Part of T2).
C26	5496219P368	Ceramic disc: 160 pf ±5%, 500 VDCW, temp coef -150 PPM.
		- - - - - - - - JACKS AND RECEPTACLES - - - - -
J1	4033513P4	Contact, electrical; sim to Bead Chain L93-3.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19C311181G3	Coil. Includes:
	4038368P1	Tuning slug.

SYMBOL	GE PART NO.	DESCRIPTION
L2 and L3	19A115711P1	Transformer, freq: 455 KHz; sim to Automatic Mfg EX12670.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029840P2	Contact, electrical: sim to Amp 42827-2.
P2	4029840P1	Contact, electrical: sim to AMP 41854.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q2	19A115245P1	Silicon, NPN.
Q3	19A115123P1	Silicon, NPN.
Q4	19A115245P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R3	3R77P512J	Composition: 5.1K ohms ±5%, 1/2 w.
R4	3R152P333K	Composition: 33K ohms ±10%, 1/4 w.
R5	3R152P103J	Composition: 10K ohms ±5%, 1/4 w.
R6	3R77P332K	Composition: 3.3K ohms ±10%, 1/2 w.
R7	3R77P123K	Composition: 12K ohms ±10%, 1/2 w.
R8	3R77P622J	Composition: 6.2K ohms ±5%, 1/2 w.
R9	3R77P302J	Composition: 3K ohms ±5%, 1/2 w.
R10	3R77P202J	Composition: 2K ohms ±5%, 1/2 w.
R11	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
R12	3R77P513J	Composition: 51K ohms ±5%, 1/2 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T2		COIL ASSEMBLY 19B216120G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C23	5496218P258	Ceramic disc: 62 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798P3	Tuning slug.
		- - - - - - - - - - CRYSTALS - - - - - - - - -
Y2	19A110398P1	Quartz: freq 11945.00 KHz ±.002%, temp range -30°C to +75°C.
A332		IF AUDIO AND SQUELCH 19D413129G4
		- - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C3	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C5 and C6	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C8	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C9 and C10	5490008P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C11	5496219P656	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12	5494481P108	Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C13	19A115680P107	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TT.

Cont'd on Page 11

MODEL NUMBER	FREQ RANGE	NO. FREQ		
4ER41D10	132-150.8	1		
4ER41D11	150.8-174	1		
4ER41D12	132-150.8	2		
4ER41D13	150.8-174	2		
4ER41D14	132-150.8	4		
4ER41D15	150.8-174	4		

REVISION LETTER BLOCK

		REV
	PL19E500872G5	E
	PL19E500872G6	E
A331	PL19B216119G2	A
A332	PL19D413129G4	P

		REV
A305	PL19B204419G1	B
A306	PL19B204419G4	B
A307	PL19B204419G2	
A308	PL19B204419G5	
A309	PL19B204419G3	
A310	PL19B204419G6	

SCHEMATIC DIAGRAM

132—174 MHz RECEIVER
MODELS 4ER41D10-15

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 1/2 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.

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE (J442-8) WITH TEST SET MODEL 4EX3A10 OR A 20,000 OHM-PER-VOLT METER.

S = NO SIGNAL IN WITH SQUELCH CONTROL FULLY COUNTERCLOCKWISE (MAXIUM SQUELCH).

US = SQUELCH CONTROL FULLY CLOCKWISE WITH A ONE MILLIVOLT MODULATED SIGNAL (UNSQUELCHED) AND 5 WATT AUDIO OUTPUT.

NOTE: DC VOLTAGES FOR 1ST MIXER, MULTIPLIER, AND 1ST IF AMPLIFIER TAKEN WITH MODULES REMOVED FROM CASTING AND 10 VOLTS APPLIED TO INPUT LEADS.

● LOW SPLIT 132 - 150.8 MHZ
▲ HIGH SPLIT 150.8 - 174 MHZ

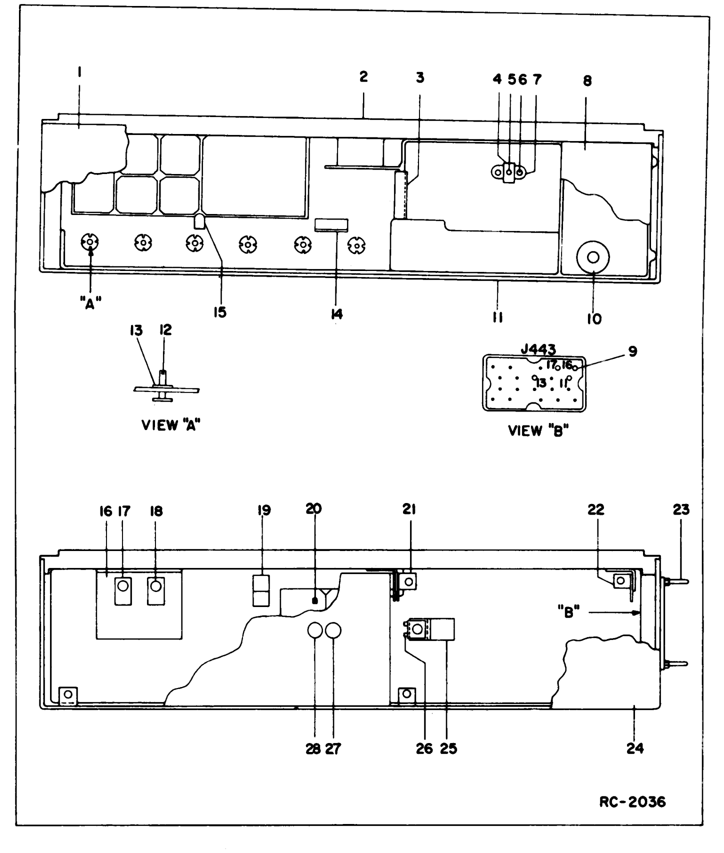
SCHEMATIC DIAGRAM

132—174 MHz RECEIVER
MODELS 4ER41D10-15

Issue 3

Cont'd from Page 9

SYMBOL	GE PART NO.	DESCRIPTION
C14 and C15	19A115680P104	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C16	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C17	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C18	5494481P108	Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C19 and C20	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C21	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW.
C22	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C23	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C25	5496267P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C26*	19A116080P110	Polyester: 0.33 µf ±10%, 50 VDCW.
		In REV M and earlier:
	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C27	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C32	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C33	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C35	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C36	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C37	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C39	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C40*	5496267P29	Tantalum: 0.68 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
		In REV K and earlier:
	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C41	5490008P129	Silver mica: 120 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C50	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C51	19A116655P22	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C52	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C53 and C54	5496267P213	Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C55	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C56	5494481P108	Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C57	4029003P107	Silver mica: 910 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-20.
C58	19A116080P8	Polyester: 0.15 µf ±20%, 50 VDCW.
C59	19A116080P2	Polyester: 0.015 µf ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR3* and CR4*	19A115250P1	Silicon.
		In REV F and earlier:
	4038056P1	Germanium.
CR5 and CR6	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J22	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A115711P6	Transformer, freq: 455 KHz; sim to TOKO PEFCN-14733-CX12.
L2	19A115711P7	Transformer, freq: 455 KHz; sim to TOKO PEFCN-BNL2.
L3	19A127134G1	Choke. Includes tuning slug 7486872P7.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q4	19A115123P1	Silicon, NPN.
Q5	19A115889P1	Silicon, NPN.
Q6	19A115123P1	Silicon, NPN.
Q7	19A115300P4	Silicon, NPN.
Q8	19A115123P1	Silicon, NPN.
Q9	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q10	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R2	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R3	3R77P823K	Composition: 82K ohms ±10%, 1/2 w.
R4	3R77P472K	Composition: 4.7K ohms ±10%, 1/2 w.
R5	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R6	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R7	3R77P823K	Composition: 82K ohms ±10%, 1/2 w.
R8	3R77P472K	Composition: 4.7K ohms ±10%, 1/2 w.
R9	3R77P102K	Composition: 1K ohms ±10%, 1/2 w.
R10	3R77P153J	Composition: 15K ohms ±5%, 1/2 w.
R11	3R77P823K	Composition: 82K ohms ±10%, 1/2 w.
R12	3R77P472K	Composition: 4.7K ohms ±10%, 1/2 w.
R13	3R77P272K	Composition: 2.7K ohms ±10%, 1/2 w.
R14	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R15	3R77P333J	Composition: 33K ohms ±5%, 1/2 w.
R16	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R17	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R20	3R152P472K	Composition: 4.7K ohms ±10%, 1/4 w.
R23	3R77P104K	Composition: 100K ohms ±10%, 1/2 w.
R24	3R152P102J	Composition: 1K ohms ±5%, 1/4 w.
R25 and R26	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R27 and R28	3R77P753J	Composition: 75K ohms ±5%, 1/2 w.
R29	3R77P182J	Composition: 1.8K ohms ±5%, 1/2 w.
R30 and R31	3R77P821J	Composition: 820 ohms ±5%, 1/2 w.
R33	3R77P912J	Composition: 9.1K ohms ±5%, 1/2 w.
R34	3R77P332K	Composition: 3.3K ohms ±10%, 1/2 w.
R35	3R77P330K	Composition: 33 ohms ±10%, 1/2 w.
R36	3R77P681J	Composition: 680 ohms ±5%, 1/2 w.
R38	3R77P752J	Composition: 7.5K ohms ±5%, 1/2 w.
R39	3R77P820J	Composition: 82 ohms ±5%, 1/2 w.
R40*	3R77P221J	Composition: 220 ohms ±5%, 1/2 w.
		In REV H and earlier:
	3R77P241J	Composition: 240 ohms ±5%, 1/2 w.
R41	3R152P240J	Composition: 24 ohms ±5%, 1/4 w.
R42	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
R43	19B209358P101	Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R44	19B209022P101	Wirewound: 0.27 ohms ±10%, 2 w; sim to IRC Type BWH.
R45	3R77P123J	Composition: 12K ohms ±5%, 1/2 w.
R46	3R77P913J	Composition: 91K ohms ±5%, 1/2 w.
R47	3R152P273K	Composition: 27K ohms ±10%, 1/4 w.
R48*	19A116278P249	Metal film: 3.16K ohms ±2%, 1/2 w. Added by REV E.
R49	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R50	3R77P222J	Composition: 2.2K ohms ±5%, 1/2 w.
R51	3R77P103J	Composition: 10K ohms ±5%, 1/2 w.
R52	3R77P682J	Composition: 6.8K ohms ±5%, 1/2 w.
R54	3R77P822J	Composition: 8.2K ohms ±5%, 1/2 w.
R55	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R56	3R77P224J	Composition: 220K ohms ±5%, 1/2 w.
R57	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R58	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R59	3R77P393K	Composition: 39K ohms ±10%, 1/2 w.
R60 and R61	3R77P103K	Composition: 10K ohms ±10%, 1/2 w.
R64	3R77P120J	Composition: 12 ohms ±5%, 1/2 w.
R66	3R77P472K	Composition: 4.7K ohms ±10%, 1/2 w.
R67	3R152P273K	Composition: 27K ohms ±10%, 1/4 w.
R69	3R77P752J	Composition: 7.5K ohms ±5%, 1/2 w.
R72*	3R77P362J	Composition: 3.6K ohms ±5%, 1/2 w. Deleted by REV E.
R73	3R77P473J	Composition: 47K ohms ±5%, 1/2 w.
R77	3R152P153J	Composition: 15K ohms ±5%, 1/4 w.
R78	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
R79	3R152P393J	Composition: 39K ohms ±5%, 1/4 w.
R80*	3R152P272J	Composition: 2.7K ohms ±5%, 1/4 w.
		In REV L and earlier:
	3R152P432J	Composition: 4.3K ohms ±5%, 1/4 w.
R81	3R152P472J	Composition: 4.7K ohms ±5%, 1/4 w.
R82	3R77P273J	Composition: 27K ohms ±5%, 1/4 w.
R83	3R77P752J	Composition: 7.5K ohms ±5%, 1/4 w.
R85*	3R152P102J	Composition: 1K ohms ±5%, 1/4 w. Deleted by REV L.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1	5490828P41	Thermistor: 30 ohms ±10%, color code black/white; sim to Carborundum Type B1211H-4.
RT2 and RT3	5490828P9	Thermistor: 10,000 ohms ±10%, color code yellow; sim to Carborundum Type 551J8.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19A116040P1	Audio: 300 to 4000 Hz, Pri: 19.3 ohms ±10% DC res, Sec: 23.5 ohms ±10% DC res.
		CHASSIS AND RF CIRCUIT 19E500872G5 and G6
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C301 thru C306		(See RC2036 items 12, 13).
C307	7774750P4	Ceramic disc: .001 µf +100% -0%, 500 VDCW.
C310 thru C313	19B209135P1	Ceramic, feed-thru: 1000 pf +150% -0%, 500 VDCW.
C314	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C315	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TTX.
C317 and C318	5494481P12	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	19A116062P2	Selenium. Deleted by REV A.
		- - - - - - - JACKS AND RECEPTACLES - - - - -
J441		(Part of W441).
J442	19B205689G2	Connector: 18 contacts.
J443	19C303426G1	Connector: 20 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L301	19B216112G4	Coil.
L302	19B216112G3	Coil.
L303	19B216112P8	Coil.
L304	19B216112P7	Coil.
L305	19B216112P8	Coil.
L306	19B216112P7	Coil.
L307	19B216112P8	Coil.
L308	19B216112P7	Coil.
L309	19B216112G6	Coil.
L310	19B216112G5	Coil.
L311	19B216112G2	Coil.
L312	19B216112G1	Coil.
L313 and L314	7488079P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res max; sim to Jeffers 4421-7K.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P301 thru P311	4029840P2	Contact, electrical; sim to Amp 42827-2.
P312	4029840P3	Contact, electrical; sim to Amp 42101-2.
P313	4029840P2	Contact, electrical; sim to Amp 42827-2.
P315 thru P317	4029840P2	Contact, electrical; sim to Amp 42827-2.
P319 and P320	4029840P2	Contact, electrical; sim to Amp 42827-2.
P322	4029840P2	Contact, electrical; sim to Amp 42827-2.
P323	4029840P1	Contact, electrical; sim to Amp 41854.
P324 thru P326	4029840P2	Contact, electrical; sim to Amp 42827-2.
P327	4029840P1	Contact, electrical; sim to Amp 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q301* and Q302*	19A116741P1	Silicon, NPN.
		In REV A and earlier:
	19A116203P2	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R301*	3R152P331K	Composition: 330 ohms ±10%, 1/4 w. Deleted by REV D.
R302	19A116278P444	Metal film: 280K ohms ±2%, 1/2 w.
R303	3R78P390K	Composition: 39 ohms ±10%, 1 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T301	19A116041P2	Audio: 300-4000 Hz, Pri: 1.00 ohm ±15% DC res, Sec 1: .23 ohm ±15% DC res, Sec 2: 10.5 ohms ±15% DC res.
		- - - - - - - - - - TERMINAL BOARDS - - - - - - -
TB1	7487424P7	Miniature, phen: 4 terminals.
TB2	7487424P26	Miniature, phen: 6 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W441	19B205634G1	Coaxial: approx 5 inches long. Includes J441.
		HARNESS ASSEMBLY 19E500872G7 (Includes C307, C317, C318, J442, J443, P301-P304, P307-P313, P315-P317, P319, P320, P322-P327, R302, R303, T301, TB2)
		MECHANICAL PARTS (SEE RC2036)
1	19C303495G4	Bottom cover. (Station)
	19C303385P1	Bottom cover. (Mobile)
2	19C317344P3	Heat sink.
3	19A121222P1	Support. (Mounts C312 and C313).
4	4033089P1	Clip. (Part of XY1-XY4).
5	19B200525P9	Rivet. (Part of XY1-XY4).
6	19A115793P1	Contact. (Part of XY1-XY4).
7	4039307P1	Crystal socket. (Part of XY1-XY4).
8	19B216073P1	Cover. (Used with A331).
9	19A115700P2	Core, toroidal; sim to FAIR-RITE SL207.
10	4034252P5	Can. (Used with T1).
11	19C303389G1	Chassis.
12	4036765G4	Screw. (Part of C301 thru C306).
13	7137968P8	Nut, stamped: thd. size No. 6-32; sim to Palnut TO632005. (Part of C301 thru C306).
14	19A121221P1	Support. (Mounts C310 and C311).
15	7145451P1	Cleat.
16	19B216727P1	Support. (Used with Q301 and Q302).
17	19A116023P2	Plate, insulated. (Used with Q301 and Q302).
18	19A115222P3	Insulator, bushing. (Used with Q301 and Q302).
19	4029851P6	Clip, loop.
20	19A115793P1	Contact, electrical; sim to Malco 2700.
21	19B204583G1	Hinge.
22	19B204583G3	Hinge.
23	19A121676P1	Guide pin.
24	19C303495G3	Top cover. (Station, except Repeaters and VM).
	19C303676G2	Top cover. (Station, Repeater and VM only).
	19C303385G2	Top cover. (Mobile).
25	19A121297P1	Angle.
26	7160861P4	Nut, sheet spring; sim to Tinnerman C6452-8Z-67. (Used to secure cover).
27	4035267P2	Button, plug. (Used with A332).
28	4036555P1	Insulator, disc: nylon. (Used with Q7 on A332).



RC-2036

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-D - IF/Audio & Squelch Board (19D413129G4)
Incorporated in initial shipment.

REV. E - To prevent squelch lock up. Delete R72, Add R48.

REV. F - To compensate for vendor change. Changed C26.

REV. G - To incorporate silicon diodes. Changed CR3 and CR4.

REV. H - To improve squelch action at -30°C. Changed Q10.

REV. J - To correct PA bias. Changed R40.

REV. K - To improve stability of audio output with no load. Added R85.

REV. L - To improve frequency response at 300 Hz. Deleted R85 and changed C40.

REV. M - To improve audio quality. Changed R80.

REV. N - To improve frequency response. Changed C26.

REV. P - To improve stability. Changed Q5.

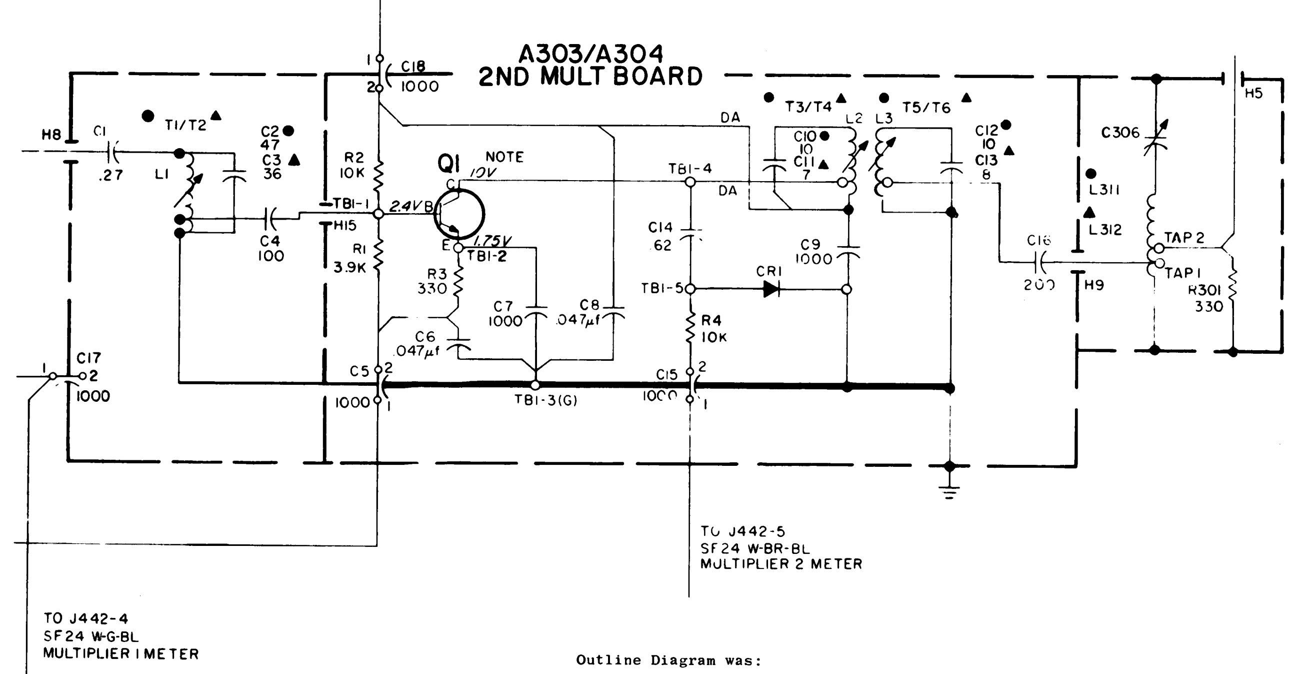
CHASSIS & RF CIRCUIT 19E500872G5 and G6

REV. A - To remove unnecessary protection. Deleted CR1.

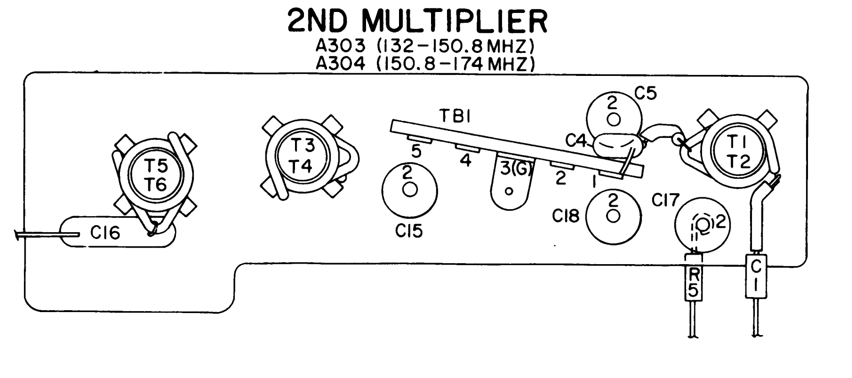
REV. B - To incorporate new PA transistors. Changed Q301 & Q302.

REV. C - To incorporate improved design. Changed 2nd Mult Board (A303/A304).

Schematic Diagram was:

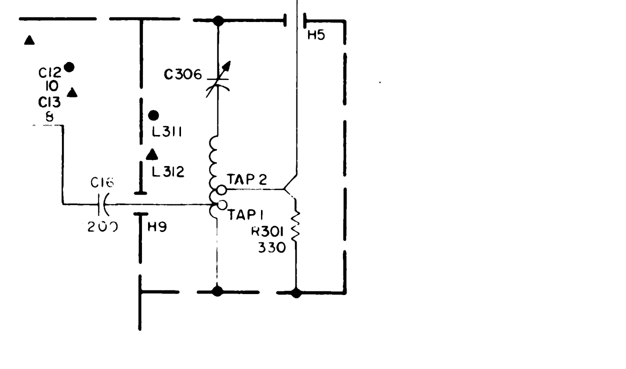


Outline Diagram was:



REV. D - To improve stability of First Mixer A327/A328. Added R4. Deleted R301 in 2nd Mult Board A303/A304.

Schematic Diagram was:



REV. E - Incorporate new transistor. Changed Q1.