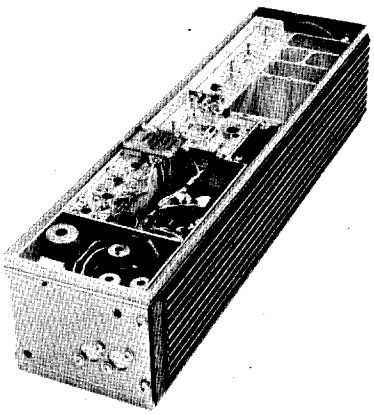
MOBILE RADIO

MASTR® Progress Line

132-174 MHz RECEIVER MODELS 4ER41A10-15



SPECIFICATIONS *

FCC Filing Designation	**ER-41-A**
Frequency Range	132-174 MHz
Audio Output	2 watts at less than 10% distortion
Sensitivity	
12-db SINAD (EIA Method)	0.35 μv
20-db Quieting Method	0.5 μv
Selectivity	
EIA Two-Signal Method	-90 db (adjacent channel, 30 kHz channels)
20-db Quieting Method	-100 db at ±15 kHz
Spurious Response	-100 db
First Oscillator Stability	±.0005% (-30°C to +60°C)
Modulation Acceptance	±7 kHz (narrow-band)
Squelch Sensitivity	
Critical Squelch	0.15 μv
Maximum Squelch	Greater than 20-db quieting (less than 2 μv)
Intermodulation (EIA)	-65 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.

TABLE OF CONTENTS

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 MASTR® Progress Line Receiver Type ER-41-A is a double conversion, superheterodyne 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, converter, high IF and 1st low IF amplifier stages. The bottom portion of the casting contains the audio squelch board and the optional Channel Guard Board.

CIRCUIT ANALYSIS

The MASTR Progress Line Receiver is completely transistorized, using a total of 18 silicon transistors. 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, for ease of alignment and servicing. The Test Set meters the oscillator, multiplier, and limiter stages as well as the discriminator, audio PA, voice coil and regulated 10 volts.

RF AMPLIFIER (A301-A302)

RF Amplifier A301 (132-150.8 MHz) or A302 (150.8-174 MHz) consists of three tuned helical resonators and an RF amplifier stage (Q2). The RF signal from the antenna is coupled by RF cable W441 to a tap on L301/L304. The tap is positioned to insure the proper impedance match to the antenna. RF energy is coupled through the three coils by openings in the shield walls, to the base of RF amplifier Q2. The output of Q2 is coupled through C8 to helical resonators L307/L309 and L308/L310, and then to the 1st mixer (A305-Q1).

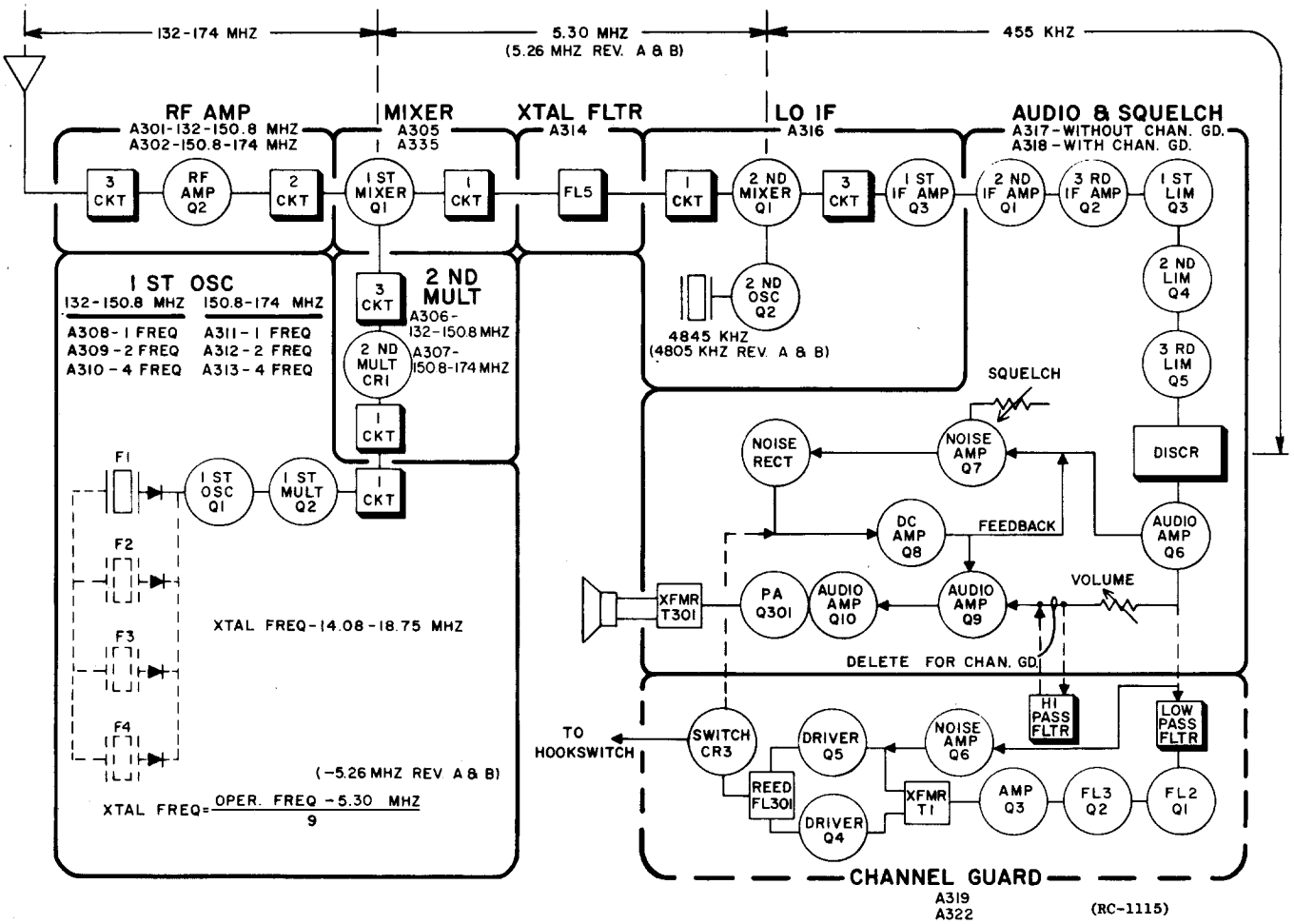


Figure 1 - Receiver Block Diagram

1ST OSCILLATOR AND MULT-1 (A308-A313)

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 megacycles. The crystal is cut to provide temperature compensation at the high end of the temperature range and is thermistor compensated at low temperatures. 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 C311 to P304.

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, R303 and C32.

2ND MULTIPLIER (A306/A307)

Coupling from the 1st multiplier tank is through A306-T1/T2 to the anode of multiplier diode A306-CR1. Three resonant LC circuits (T3/T4, T5/T6 and T7/T8) follow CR1 and are tuned to nine times the crystal frequency. The 2nd multiplier output is fed through C13 to the base of the first mixer.

1ST MIXER (A335) AND CRYSTAL FILTER (A314)

The RF signal from the RF amplifier and the low-side injection voltage from the 2nd multiplier are applied to the base of 1st mixer A335-Q1. The mixer collector tank is tuned to 5.30 megahertz (5.26 MHz in Revision A and B receivers), and provides impedance matching to the high IF filter.

The highly selective crystal filter (A314) following the 1st mixer provides the major selectivity for the receiver. The output of the filter is fed through impedance matching transformer A316-T1 to the base of the 2nd mixer.

2ND OSCILLATOR, 2ND MIXER AND 1ST IF AMPLIFIER (A316)

The 2nd oscillator A316-Q2 operates in a Colpitts oscillator circuit, with feedback supplied through C2. The oscillator frequency is 4845 kHz (4805 kHz in Revision A and B receivers) with the low-side injection voltage fed to the base of the 2nd mixer.

The Hi IF signal from the filter is fed to the base of 2nd mixer A316 (Q1) with the 2nd oscillator output. The 455 kHz 2nd mixer output is fed to three tuned low IF circuits (L1, L2, L3). L1, L2 and L3 are required for shaping the nose of the IF waveform, and also reject the undesired output frequencies from the mixer.

The low IF signal is coupled through C14 to the base of the 1st low IF amplifier A316-Q3. The output of A316-Q3 is RC coupled to the base of the 2nd IF amplifier.

2ND IF AMPLIFIERS AND LIMITERS (A317)

Following A316-Q3 are two additional RC coupled low IF amplifiers (A317-Q1 and -Q2). The 2nd IF amplifier stage is metered at J442-2 through metering network C8, CR1 and R12.

After the IF amplifiers are three RC coupled limiter stages (A317-Q3, Q4 and -Q5). First limiter metering is provided at J442-3 through metering network C13, CR2, R18 and C15.

DISCRIMINATOR (A317)

The receiver utilizes a Foster-Seely type discriminator. The output of the 3rd limiter is connected to a tap on the primary tuned circuit of discriminator T1. This allows the discriminator to operate at a higher level. Diodes CR5 and CR6 rectify the 455 kHz IF signals to recover the audio. The stage is metered at J442-10 through metering network R27 and C22.

1ST AUDIO AMPLIFIER (A317)

The output of the discriminator is fed to the 1st audio amplifier (Q6). This stage operates as an emitter-follower to match the impedance of the discriminator to the noise amplifier stage and VOLUME control. Q6 also provides some power gain.

AUDIO AMPLIFIERS

When audio is present in the incoming signal, it is taken off the emitter of Q6 and connected to the VOLUME control through A317-J9. The VOLUME control arm connects to A317-J8 which feeds the audio signal to the base of the 2nd audio amplifier, Q9. C34, C35, C37 and L4 make up the de-emphasis network. The collector current of Q9 should be adjusted to 650 milliamps by potentiometer R47 as indicated by a reading of 0.65 volts at metering jack J442-1. This adjustment should be made with the VOLUME control fully counterclockwise. Thermistor RT1 keeps the output current constant over wide variations in temperature after R47 has been set.

Following Q9 is a Darlington circuit, which consists of compound-connected transistors Q10 and Q301. The Darlington circuit provides a higher input impedance than is normally encountered in transistor amplifiers. Also, this circuit has a more linear operation, with less distortion at maximum power output.

The output of the amplifier stage is coupled by audio transformer T301 to the loudspeaker. Audio high and low are present at the centralized metering jack (J442). When the General Electric Test Set is connected to J442, these leads are connected to the black and green jacks for sensitivity, frequency response, distortion, power output and other measurements.

SQUELCH

Noise from audio amplifier Q6 is used to operate the squelch circuit. When no carrier is present in the receiver, noise is coupled

to the base of noise amplifier Q7. The gain of the noise amplifier is determined by the SQUELCH control, which varies the bias on the base of Q7.

The noise amplifier output is fed through a high-pass filter which attenuates frequencies below 3 kHz. Thermistor RT2 keeps the critical squelch constant over wide variations in temperature.

Noise from the high-pass filter is rectified by CR3 and CR4, and the negative DC output of the noise rectifiers is fed to the base of DC amplifier Q8.

DC amplifier Q8 acts as a squelch switch. A negative output from the noise rectifiers cuts off the DC amplifier. When cut off, the collector is at the +10 volt supply potential. This positive voltage is fed to the base of Q9, a PNP transistor, cutting it off. Since audio stages Q9, Q10 and Q301 are DC coupled, Q10 and Q301 are cut off also. The positive voltage from the collector circuit of the DC amplifier is used as feedback to the base of noise amplifier Q7, causing it to conduct more heavily. This feedback helps to sharply cut off Q8, providing sharp, rapid switching action.

When the receiver is quieted by a signal, noise voltage from the noise rectifiers is reduced; and the DC amplifier conducts. While conducting, the collector potential of Q8 is negative; and negative feedback to the base of noise amplifier Q7 causes it to conduct less.

This negative voltage is applied to the base of PNP transistor Q9 and causes it to conduct. Now, all the audio stages are turned on and sound is heard at the loudspeaker.

With the receiver squelched, the final audio amplifiers are cut off; and the receiver drain is less than 50 milliamps.

It should be noted that a hysteresis effect exists in the squelch circuit and, as a result, the squelch does not operate in the same manner as other convential squelch circuits. The circuit is designed so that a weak signal will open the squelch. The signal may be reduced by a 3 to 5 dB without the squelch closing. This limits squelch "flutter" or "picket-fence" operation.

MAINTENANCE

DISASSEMBLY

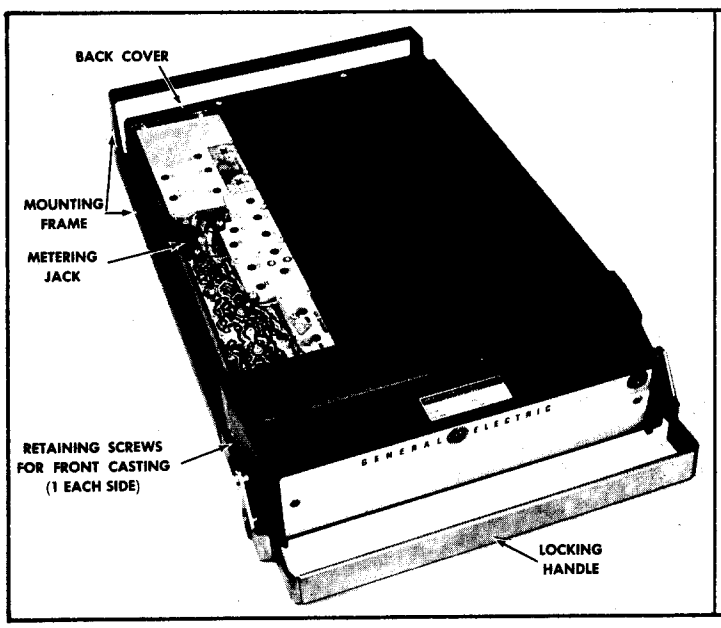


Figure 2 - Removing Top Cover

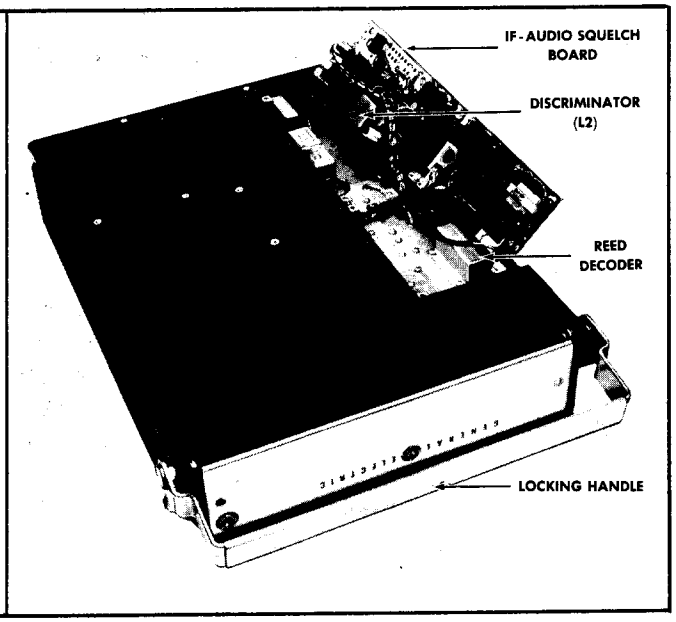


Figure 3 - Removing Bottom Cover

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 2), 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.

FRONT END ALIGNMENT

EQUIPMENT REQUIRED

1. G E Test Set Model 4EX3A10 (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 .065 inch to generator output probe.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect Test Set Model 4EX3A10 to receiver centralized metering jack J442 and set meter sensitivity switch to the TEST 1 position.
2. With VOLUME control full counterclockwise and Test Set in position G, adjust R47 on IF-AUDIO & SQUELCH Board for reading of 0.55 volts. If using Multimeter, connect leads to J442-1 (AUDIO-PA) and J442-8 (Systes Negative).

NOTE

The adjustment of R47 should be made within 20 seconds after power is applied to the receiver. This will result in a reading of approximately 0.65 volts after the unit is fully warmed up.

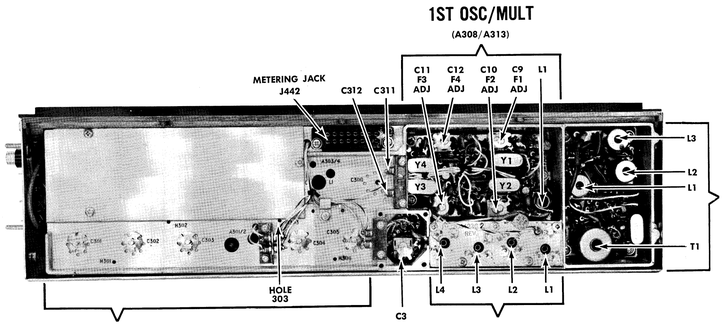
3. With Test Set in position J, check for regulated +10 volts. If using Multimeter, measure from C311 to C312.
4. If using Multimeter, connect the positive lead to J442-16 (ground).

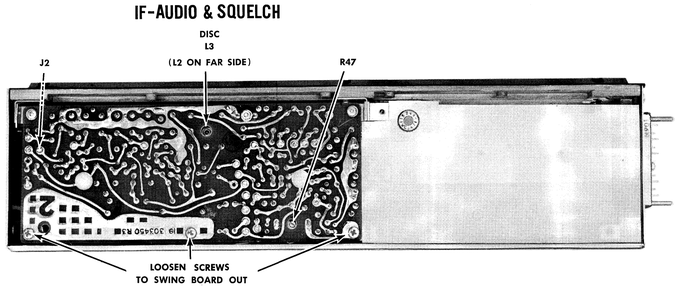
ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	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 (on 2nd MULT)	Maximum	Tune L1 (1st OSC/MULT) and L1 (2nd MULT) for maximum meter reading.
3.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal into Hole 304. Adjust the signal generator for discriminator zero.
4.	B (2nd IF AMP)	Pin 2	L2, L3 and L4 (on 2nd MULT)	Maximum	Apply an on-frequency signal as above. Tune L2, L3 and L4 for maximum meter reading, keeping signal below saturation.
			RF SELECTIVITY		
5.	B (2nd IF AMP)	Pin 2	C301, C302, C303, C304 and C305	Maximum	Apply an on-frequency signal to the antenna jack. Tune C301 through C305 for maximum meter reading, keeping signal below saturation.
			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.





COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. G E Test Set Model 4EX3A10 (or 20,000 ohms-per volt multimeter).
2. A 455-kHz and 132-174 MHz signal source. Connect a one-inch piece of insulated wire no larger then .065 inch to generator output probe.
3. Two 33,000-ohm resistors for tuning low IF coils.*

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect Test Set Model 4EX3A10 to receive centralized metering jack J442 and set meter sensitivity switch to the TEST 1 position.
2. Set crystal trimmer C9 on 1st OSC/MULT board 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 VOLUME control full counterclockwise and Test Set in position G, adjust R47 on the IF-AUDIO & SQUELCH board for a reading of 0.55 volts. If using Multimeter, connect leads to J442-1 (AUDIO-PA) and J442-8 (System Negative).

NOTE

The adjustment of R47 should be made within 20 seconds after power is applied to the receiver. This will result in a reading of approximately 0.65 volts after the unit is fully warmed up.

5. With Test Set in position J, check for regulated +10 volts. If using Multimeter, measure from C311 to C312.
6. If using Multimeter, connect the positive lead to J442-16 (ground).

ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	METERING POSITION Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			DISCRIMINATOR		
1.	A (DISC)	Pin 10	L3 (Bottom slug on IF-AUDIO-SQUELCH board)	Zero	Apply a 455-kHz signal to J2 on IF-AUDIO & SQUELCH board and adjust L3 (disc secondary) for zero meter reading.
2.	A (DISC)	Pin 10	L2 (top slug) and L3 (bottom slug on IF-AUDIO & SQUELCH board	1.7 v nax.	Loosen screws and swing IF-AUDIO & SQUELCH board open, and set G-E Test Set to TEST 3 position. Alternately apply a 440-kHz and 465-kHz signal while adjusting L2 and L3 for readings of at least 1.7 volts, but not more than 2.1 volts. Both readings must be within 0.1 volt.
			OSCILLATOR AND MULTIPLIERS		
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 (on 2nd MULT)	Maximum	Tune L1 (1st OSC/MULT) and L1 (2nd MULT) for maximum meter reading.
5.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal into Hole 304. Adjust the signal generator for discriminator zero.
6.	B (2nd IF AMP)	Pin 2	L2, L3 and L4 (on 2nd MULT)	Maximum	Apply an on-frequency signal as above. Tune L2, L3 and L4 for maximum meter reading, keeping signal below saturation.
			RF SELECTIVITY		
7.	B (2nd IF AMP)	Pin 2	C302, C303, C304 and C305	Maximum	Apply signal as above, keeping below staturation. Tune C302 through C305 for maximum meter reading as shown below: Insert Generator Probe In: — Tune 1. Hole 304 — C305 2. Hole 303 — C304 3. Hole 302 — C303 4. Hole 301 — C302
8.	B (2nd IF AMP)	Pin 2	C301, C302, C303, C304, C305	Maximum	Apply an on-frequency signal to the antenna jack. Tune C301 through C305 for maximum meter reading, keeping signal below saturation.
			MIXERS & LO IF *		
9.	B (2nd IF AMP)	Pin 2	C3 (on 1st MIXER)	Maximum	Apply an on-frequency signal as above, and tune C3 for maximum meter reading, keeping signal below saturation.
10.	"	"	T1 (on 2nd MIXER)	Maximum	Apply an on-frequency signal as above, and tune T1 for maximum meter reading, keeping signal below saturation.
11.	B (2nd IF AMP)	Pin 2	L1, L2 and L3 (on 2nd MIXER)	Maximum	With one end of the 33,000-ohm resistors to ground, load and peak as follows: Load L2 at point B--Peak L1 and L3. Load L1 and L3 at Points A and C--Peak L2.
			FREQUENCY ADJUSTMENT		
12.	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.

*NOTE--The low IF coils have been aligned at the factory and will normally require no further adjustment. If alignment is necessary, refer to the RECEIVER OUTLINE DIAGRAM for location of resistor loading points A, B and C.

TEST PROCEDURES

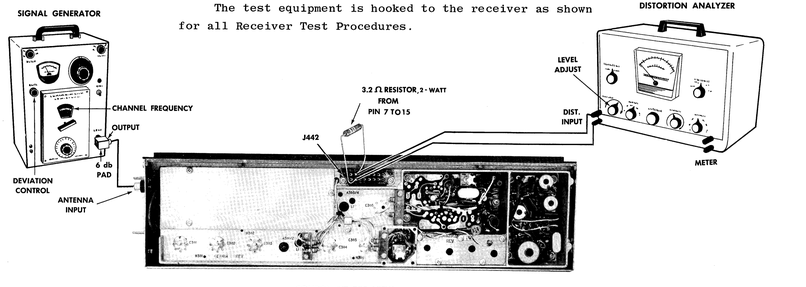
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. by following the sequence of test steps starting with Step 1, the defect 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

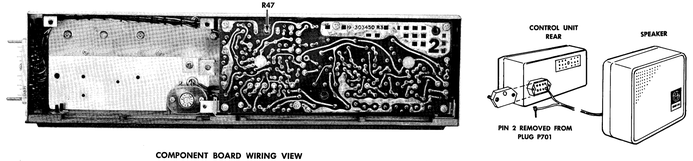
for test hookup shown:

1. Distortion Analyzer similar to: Heath #1M-12
2. Signal Generator similar to: Measurements #M-560
3. 6 db attenuation pad

The test equipment is hooked to the receiver as shown for all Receiver Test Procedures.



COMPONENT TOP VIEW



COMPONENT BOARD WIRING VIEW

STEP 1

AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Output as follows:

1. Connect a 1,000-microvolt test signal modulate by 1,000 hertz ±3.3 kHz deviation to the antenna jack J441.
2. Mobile Combination: disconnect speaker lead from J701-2 (on rear of Control Unit). Connect a 3.2-ohm, 2-watt load resistor from J442-15 to J442-7.

   Station Combination: disconnect the speaker (if used) or the 3.5-ohm, 4-watt resistor from TB502-5. Connect a 3.2-ohm, 2-watt load resistor from J442-15 to J442-7.
3. Connect Distortion Analyzer input across the 3.2-ohm load resistor
4. Set volume control for two-watt output (2.53 VRMS).

VOLTMETER SCALE ON DISTORTION ANALYZER

5. Make distortion measurements according to manufacturer's instructions. Reading should be less than 10% (5% is typical).

SERVICE CHECK

If the distortion is more than 10%, or maximum audio output is less than two watts (for two-watt speaker) make the following checks:

1. Battery and regulator voltage---low voltage will cause distortion. (Refer to Receiver Schematic Diagram for voltages.)
2. Audio Bias Adjust (R47)---should be adjusted for 0.65 volts. (Refer to Receiver Alignment on reverse side of page.)
3. Audio Gain (Refer to Receiver Troubleshooting Procedure).
4. Discriminator Alignment (Refer to Receiver Alignment on reverse side of page).

STEP 2

USABLE SENSITIVITY (12 db SINAD)

TEST PROCEDURE

Measure sensitivity of the receiver modulated at the standard test modulation as follows:

1. Be sure Test Step 1 checks out properly.
3. Adjust Distortion Analyzer LEVEL control for a +2 db reading.
4. Set CONTROL from LEVEL to DISTORTION reading. Repeat Steps 1,2 and 3 until difference in reading is 12 db (+2 db to -10 db).
5. The 12-db difference (Signal plus Noise and Distortion to noise plus distortion ratio) is "usable" sensitivity level. Reading should be less than 0.35 microvolts with audio output at least one watt (1.83 volts RMS across the 3.2-ohm receiver load).

SERVICE CHECK

If the sensitivity level is more than 0.35 microvolts, make the following checks:

1. Alignment of RF stages (Refer to RF Alignment in Receiver Alignment on reverse side of page).
2. Gain measurements as shown on the Receiver Troubleshooting Procedure.

STEP 3

MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

TEST PROCEDURE

1. Be sure Test Steps 1 and 2 check out properly.
2. Set Signal Generator output for twice the microvolt reading obtained in Test Step 2 - 4.
3. Increase Signal Generator frequency deviation.
4. Adjust LEVEL Control for +2 db.

DB SCALE ON DISTORTION ANALYZER

5. Set CONTROL from LEVEL to DISTORTION reading. Repeat Steps 3, 4 and 5 until difference between readings becomes 12 db (from +2 db to -10 db).

LEVEL DISTORTION ON DISTORTION ANALYZER

6. 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.

STEP 1 - QUICK 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 2ND LIM READING	Check supply voltages and then check oscillator reading at J442-4 & 5 as shown in STEP 2. Make SIMPLIFIED VTVM GAIN CHECKS from 2nd Mixer through 2nd Limiter stages as shown in STEP 2.
LOW OSCILLATOR READING	Check alignment of Oscillator (Refer to Front End Alignment Procedure). Check voltage and resistance reading 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 voltage and resistance readings of RF Amp and 1st and 2nd Mixers. Make SIMPLIFIED GAIN CHECKS (STEP 2).
LOW AUDIO	Check Audio PA (Q301) output current at J442-1. If reading is low-- a. Refer to Receiver Alignment Procedure for Bias ADJ (R47). b. Check Q301. Check unsquelched voltage readings in Audio section (Refer to Receiver Schematic Diagram). Check voltage and resistance readings on Channel Guard receiver.
IMPROPER SQUELCH OPERATION	Check voltage and resistance readings of Squelch circuit (Refer to Receiver Schematic Diagram).
DISCRIMINATOR IDLING TOO FAR OFF ZERO	See if discriminator zero is on 455 kHz.

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 3.3 kHz DEVIATION FOR AUDIO STAGE.

PROCEDURE

1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, BASE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING MEASUED AND TAKE VOLTAGE READING (E_1).
2. MOVE PROBE TO INPUT OF FOLLOWING STAGE (1ST. MIXER*). REPEAT FIRST RESONANT CIRCUIT THEN PEAK CIRCUIT BEING MEASURED AND 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.

* NOTE: ON 1ST MIXER, REMOVE CRYSTAL BEFORE MEASURING BASE VOLTAGE. REPLACE CRYSTAL TO MEASURE COLLECTOR VOLTAGE.
ON 2ND MIXER, INCREASE SIGNAL INPUT TO APPROX. 0.3 V TO OVERRIDE INJECTION VOLTAGE.

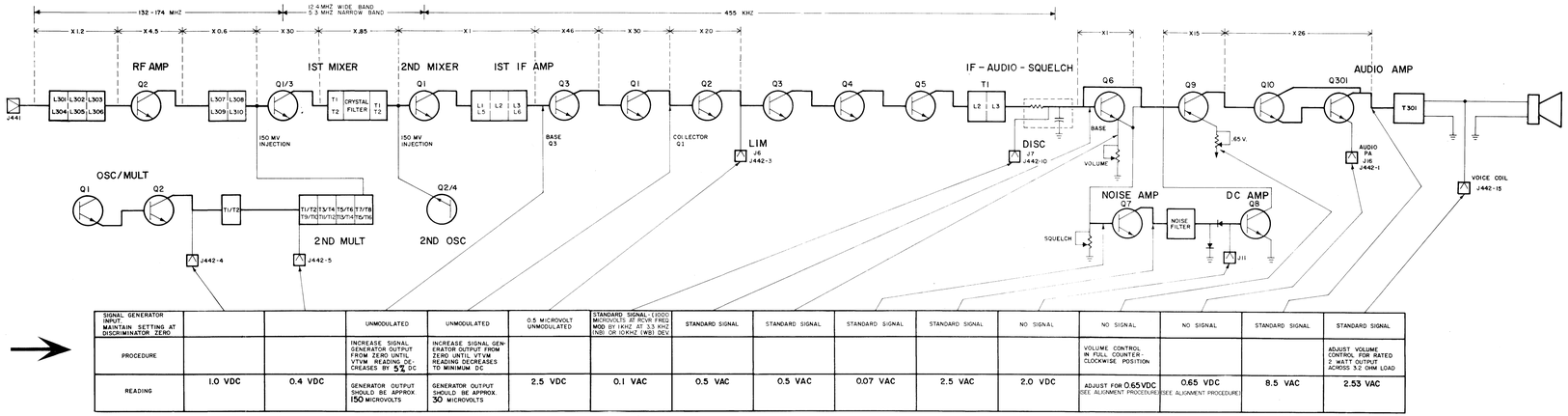
STEP 2- SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

1. VTVM-AC & DC
2. SIGNAL GENERATOR (MEASUREMENTS M560 EQUIV.)

PRELIMINARY STEPS:

1. SET VOLUME CONTROL FULLY CLOCKWISE.
2. SET SQUELCH CONTROL FULLY COUNTERCLOCKWISE.
3. RECEIVER SHOULD BE PROPERLY ALIGNED.
4. CONNECT SIGNAL GENERATOR TO ANTENNA JACK.
5. VTVM CONNECTS BETWEEN GROUND AND POINTS INDICATED BY ARROWS.



SIGNAL GENERATOR INPUT MAINTAIN SETTING AT DISCRIMINATOR ZERO			UNMODULATED	UNMODULATED	0.5 MICROVOLT UNMODULATED	STANDARD SIGNAL (1000 MICROVOLTS .707 MV RMS) MODULATED 30% AT 1 KHZ WITH 5 KHZ (WB) OR 10 KHZ (WB) DEV	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	NO SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
PROCEDURE			INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5% DC	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES TO MINIMUM DC								VOLUME CONTROL IN FULL COUNTER-CLOCKWISE POSITION			ADJUST VOLUME CONTROL FOR RATED 2 WATT OUTPUT ACROSS 3.2 OHM LOAD
READING	1.0 VDC	0.4 VDC	GENERATOR OUTPUT SHOULD BE APPROX 150 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX. 30 MICROVOLTS	2.5 VDC	0.1 VAC	0.5 VAC	0.5 VAC	0.07 VAC	2.5 VAC	2.0 VDC	ADJUST FOR 0.65VDC (SEE ALIGNMENT PROCEDURE)	0.65 VDC (SEE ALIGNMENT PROCEDURE)	8.5 VAC	2.53 VAC

RC - 1218C

TROUBLESHOOTING PROCEDURE

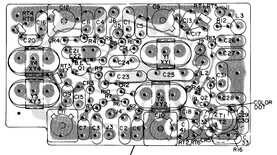
132 — 174 MHz, MASTR RECEIVER
MODELS 4ER41A10-15

OUTLINE DIAGRAM

132 — 174 MHz, MASTR RECEIVER
MODELS 4ER41A10-45

1ST OSCILLATOR/MULTIPLIER

132-150.8 MHZ 150.8-174 MHZ
A308 — 1 FREQ — A311
A309 — 2 FREQ — A312
A310 — 4 FREQ — A313

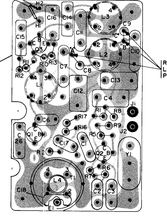


(19B204412, Sh. 1, Rev. 2)
(19B204412, Sh. 2, Rev. 2)

P2 TO J4 ON IF-AUDIO & SQUELCH BOARD

P1 TO J2 ON IF-AUDIO & SQUELCH BOARD

2ND MIXER
A316

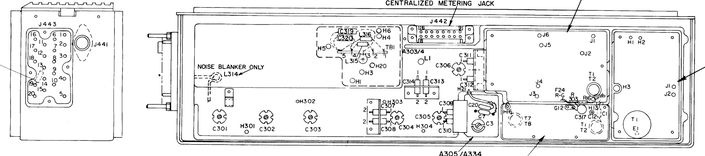


(19B205441, Sh. 1, Rev. 0)
(19B205441, Sh. 2, Rev. 0)

RESISTOR LOADING POINTS

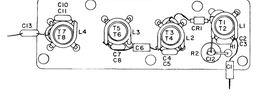
TOP VIEW

CENTRALIZED METERING JACK



A305/A334

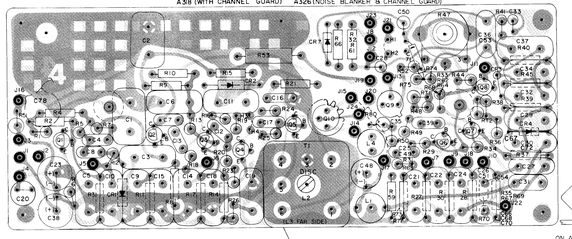
2ND MULTIPLIER
A306 (132-150.8 MHZ)
A307 (150.8-174 MHZ)



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

IF-AUDIO & SQUELCH BOARD

A327 (WITHOUT CHANNEL GUARD) A325 (NOISE BLANKER)
A328 (WITH CHANNEL GUARD) A326 (NOISE BLANKER & CHANNEL GUARD)



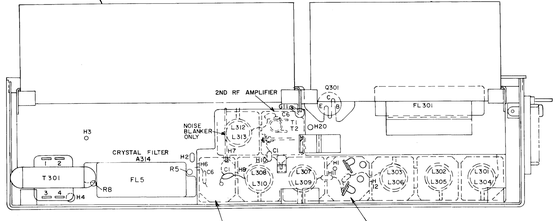
(19C200451, Sh. 1, Rev. 4)
(19C200451, Sh. 2, Rev. 4)

ON AUDIO AND SQUELCH BOARD A327 & A328, L26 & R82 ARE CONNECTED AS SHOWN.

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	—	+	—	+	—	+
A308/A309-Q1	1K	1.1K	5.2K	21K	100Ω	100Ω
A308/A309-Q2	70Ω	150Ω	1K	190Ω	100Ω	100Ω
A305-Q1	2.7K	2.7K	7.5K	3.8K	1.6K	1.6K
(A301/A302-Q1) (A305/A334-Q1)	290Ω	470Ω	240Ω	240Ω	100Ω	100Ω
A316-Q1	3.8K	5.3K	8.5K	2.9K	200Ω	200Ω
A316-Q2	2.7K	5.8K	5.5K	2.7K	200Ω	200Ω
A316-Q3	2.2K	2.3K	2.3K	2.2K	2.7K	3.2K
A317-Q1	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A317-Q2	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A317-Q3	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A317-Q4	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A317-Q5	1.0K	1.0K	13.5K	2.8K	350Ω	350Ω
A317-Q6	∞3.3K	∞ MEG	35.0K	2.5K	0	0
A317-Q7	1.7K	1.7K	11.0K	4.0K	7.0K	18K
A317-Q8	180Ω	180Ω	100K	2.8K	11.0K	1MK
A317-Q9	2.2K	2.2K	4.1K	45K	2.3K	2.3K
A317-Q10	40Ω	35Ω	2.3K	2.3K	40Ω	35Ω
A301/323-Q30	1Ω	1Ω	40Ω	35Ω	40Ω	36Ω

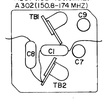
* READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS.

BOTTOM VIEW



1ST MIXER
A334/A337

1ST RF AMPLIFIER
A301 (132-150.8MHZ)
A302 (150.8-174 MHZ)



(19B620737, Rev. 32)

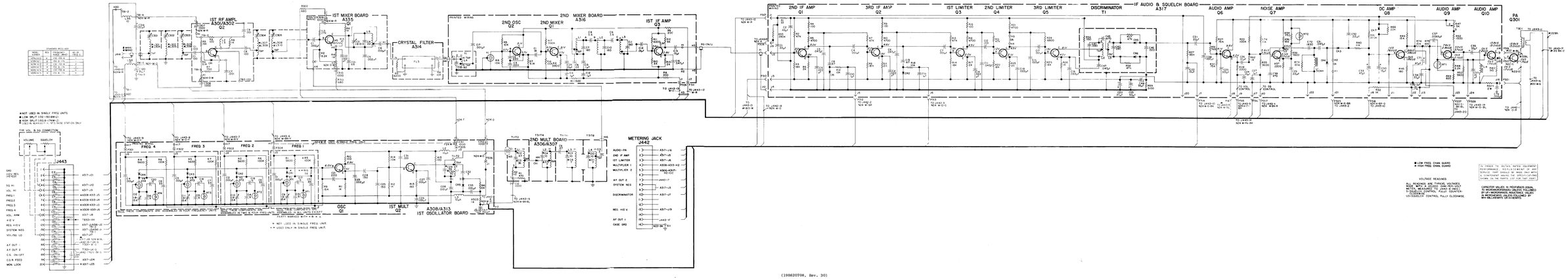
RESISTANCE READINGS

ALL READINGS ARE TYPICAL READINGS MEASURED WITH A 20,000 OHM-PER-VOLT METER, AND WITH CONTROL CABLE DISCONNECTED (OR IN STATIONS, PLUG TO J443 DISCONNECTED). READINGS ARE MADE WITH A SHORTING JUMPER CONNECTED FROM C311-1 (+12V) TO C312-1 (-12V), AND ARE MEASURED FROM TRANSISTOR PINS TO C311-1, + OR — SIGNS SHOW METER LEAD TO C311-1.

CAUTION

ALWAYS REMOVE THE SHORTING JUMPER AFTER MAKING RESISTANCE READINGS, APPLYING POWER WITH THE SHORTING JUMPER CONNECTED MAY DAMAGE THE UNIT

FOR READINGS OF:	USE SCALE:
1-100 Ω	X 1
100-1K Ω	X 10
1K-50K Ω	X 1,000
50K Ω	X 100,000



SCHEMATIC DIAGRAM

132 — 174 MHz RECEIVER
MODELS 4ER41A10-15

PARTS LIST

LBI-3539F

132-174 MHz RECEIVER
MODELS 4ER41A10 - 4ER41A15
(PL-19E500810 G1-6)
REV V

SYMBOL	G-E PART NO.	DESCRIPTION
A301* and A302*		RF AMPLIFIER ASSEMBLY PL-19C303414-G5
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C7	5493392-P7	Ceramic, stand-off: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type SS5A.
C8	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C9	5493392-P7	Ceramic, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type SS5A.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	4038642-P1	Germanium.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	7488079-P7	Choke, RF: 1.5 µh ±10%, 0.5 ohms DC res max, sim to Jeffers 4411-10.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2	19A115666-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R152-P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R6	3R152-P512J	Composition: 5100 ohms ±5%, 1/4 w.
R7	3R152-P751J	Composition: 750 ohms ±5%, 1/4 w.
R8	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
R9	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1 and TB2	7487424-P15	Miniature, phen: 2 terminals.
		In Models of Rev L and earlier:
A301* and A302*		RF AMPLIFIER ASSEMBLY A301 - PL-19C303414-G1 (4ER41A10, A12, A14) A302 - PL-19C303414-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C2 and C3	5493392-P107	Ceramic, stand-off: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type SS5A.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	4038642-P1	Germanium.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115342-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P333J	Composition: 33,000 ohms ±5%, 1/4 w.
R2	3R152-P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R3	3R152-P471J	Composition: 470 ohms ±5%, 1/4 w.
R4	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 - PL-19A121076-G1 (4ER41A10, A12, A14) T2 - PL-19A121076-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C4	5496218-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5496218-P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C6	5496218-P239	Ceramic disc: 8 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
	5491798-P5	Tuning slug.
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424-P15	Miniature, phen: 2 terminals.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XQ1	5490277-P5	Transistor, phen: 3 contacts rated at 1 amp at 400 VRMS; sim to Alcon 1213LL2.
A305*		FIRST MIXER ASSEMBLY PL-19B204430-G1 (Deleted by Rev R)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5494481-P14	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C2	5494481-P114	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C3	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C4	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P114	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C6	5494481-P12	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C7	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	PL-19A121082-G1	Toroidal coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115342-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2	3R152-P822J	Composition: 8200 ohms ±5%, 1/4 w.
R3*	3R152-P202J	Composition: 2000 ohms ±5%, 1/4 w. Deleted by Rev H.
R4	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R10*	3R152-P243J	Composition: 24,000 ohms ±5%, 1/4 w.
	3R152-P183K	In Models of Rev G and earlier: Composition: 18,000 ohms ±10%, 1/4 w.
R11*	3R152-P622J	Composition: 6200 ohms ±5%, 1/4 w. Added by Rev H.
A306 and A307		MULTIPLIER ASSEMBLY A306 - PL-19B204423-G1 (4ER41A10, A12, A14) A307 - PL-19B204423-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5491601-P120	Tubular: 1 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C6	5491601-P107	Tubular: 0.27 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C12	5493392-P7	Ceramic, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C13	5496218-P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
		- - - - - - - - - - RECTIFIERS - - - - - - - - -
CR1	19A122650-P1	Silicon.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P471J	Composition: 470 ohms ±5%, 1/4 w.
R2	3R152-P100J	Composition: 10 ohms ±5%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 - PL-19A121109-G1 (4ER41A10, A12, A14) T2 - PL-19A121109-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C2	5496218-P255	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P252	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A121108-P1	Coil. Includes tuning slug 5491798-P5.
T3 and T4		COIL ASSEMBLY T3 - PL-19A121095-G1 (4ER41A10, A12, A14) T4 - PL-19A121095-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C4	5496218-P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C5	5496218-P238	Ceramic disc: 7 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19A121094-P1	Coil. Includes tuning slug 5491798-P5.
T5 and T6		COIL ASSEMBLY T5 - PL-19A121097-G1 (4ER41A10, A12, A14) T6 - PL-19A121097-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C7	5496218-P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C8	5496218-P238	Ceramic disc: 7 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3	19A121096-P1	Coil. Includes tuning slug 5491798-P5.
T7 and T8		COIL ASSEMBLY T7 - PL-19A121111-G1 (4ER41A10, A12, A14) T8 - PL-19A121111-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C10	5496218-P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C11	5496218-P238	Ceramic disc: 7 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L4	19A121110-P1	Coil. Includes tuning slug 5491798-P5.
A308 thru A313		FIRST OSCILLATOR ASSEMBLY A308 - PL-19B204419-G1 (4ER41A10) A309 - PL-19B204419-G2 (4ER41A12) A310 - PL-19B204419-G3 (4ER41A14) A311 - PL-19B204419-G4 (4ER41A11) A312 - PL-19B204419-G5 (4ER41A13) A313 - PL-19B204419-G6 (4ER41A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C4	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C5 thru C8	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C9 thru C12	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C13 thru C16	5496219-P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C17 thru C20	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C21	5496219-P771	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -750 PPM.
C23	5494481-P114	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C24	5490008-P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219-P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C28	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C31	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1*	19A115348-P1	Silicon. (Deleted in Models 4ER41A10, 11 by Rev F)
CR2 thru CR4	19A115348-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J6	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	7488079-P16	Choke, RF: 10 µh ±10% ind at 640 ma, 0.6 ohm DC res; sim to Jeffers 4421-7.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115330-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 thru R4	3R152-P562J	Composition: 5600 ohms ±5%, 1/4 w.
R5*	3R152-P104K	Composition: 0.1 megohm ±10%, 1/4 w. Deleted in Models 4ER41A10, 11 by Rev F.
R6 thru R8	3R152-P104K	Composition: 0.1 megohm ±10%, 1/4 w.
R9	3R152-P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3R152-P151J	Composition: 150 ohms ±5%, 1/4 w.
R14	3R152-P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R19*	3R152-P360J	Composition: 36 ohms ±5%, 1/4 w. Added by Rev F.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1 thru RT4	19B209284-P5	Disc: 43 ohms res nominal at 25°C, color code green.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 - PL-19B204421-G1 (4ER41A10, A12, A14) T2 - PL-19B204421-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C29	5496218-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C30	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C32	5496218-P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C33	5494481-P12	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR5	19A115250-P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A121093-P1	Coil. Includes tuning slug 5491798-P5.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R16	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (RC-1167).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		When reordering give G-E Part No. and specify exact frequency needed. Crystal freq = (OF - 5.3 MC) ÷ 9 In units of REV. B and earlier: Crystal freq = (OF - 5.26 MC) ÷ 9
Y1* thru Y4*	19B206576-P4	Quartz: freq range 14077.777 to 16166.666 KC, temp range -30° to +85°C. (Used in Models 4ER41A10, 12, 14).
	19B206176-P4	In Models of REV. B and earlier: Quartz: freq range 14082.222 to 16171.111 KC, temp range -30° to +85°C.
Y1* thru Y4*	19B206576-P5	Quartz: freq range 16166.667 to 18744.444 KC, Temp range -30° to +85°C. (Used in Models 4ER41A11, 13, 15).
	19B206176-P5	In Models of REV. B and earlier: Quartz: freq range 16171.111 to 18748.888 KC, temp range -30° to +85°C.
A314*		CRYSTAL FILTER ASSEMBLY PL-19B204616-G4 Used in units of Rev H and later. Units of Rev G or earlier see below.
		- - - - - - - - - - FILTERS - - - - - - - - -
FL5	19B206692-G1	Bandpass.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R152-P622J	Composition: 6200 ohms ±5%, 1/4 w.
R8	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
A314*		CRYSTAL FILTER ASSEMBLY PL-19B204616-G3 Used in units of Rev C thru Rev G. Units of Rev B or earlier see below.
		- - - - - - - - - - FILTERS - - - - - - - - -
FL5*	19B206692-G1	Bandpass.
	19C304094-G4	In Models of Rev P and earlier: Bandpass.
FL6*	19C304094-G4	Bandpass. (Deleted by Rev R).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152-P432K	Composition: 4300 ohms ±10%, 1/4 w. Deleted by Rev R.
R2*	3R152-P102K	Composition: 10000 ohms ±10%, 1/4 w. Deleted by Rev R.
R7*	3R152-P562K	Composition: 5600 ohms ±10%, 1/4 w. Added by Rev R.
R8*	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w. Added by Rev R.
A314*		CRYSTAL FILTER ASSEMBLY PL-19B204616-G1 In Models of Rev B or earlier.
		- - - - - - - - - - FILTERS - - - - - - - - -
FL1 and FL2	PL-19C304094-G1	Bandpass.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P432K	Composition: 4300 ohms ±10%, 1/4 w.
R2	3R152-P102K	Composition: 10000 ohms ±10%, 1/4 w.
A316		SECOND MIXER ASSEMBLY PL-19B204438-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5490008-P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2 and C3	5490008-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C4*	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW.
	5491189-P106	In Models of Rev J and earlier: Polyester: 0.1 µf ±20%, 50 VDCW.
C5*	19B209243-P4	Polyester: .033 µf ±20%, 40 VDCW. Deleted by Rev P.
	5491189-P103	In Models of Rev J and earlier: Polyester: .033 µf ±20%, 50 VDCW.
C6	5496219-P47	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C7*	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef 150 PPM.
	5496219-P566	In Models of Rev J: Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM.
	5496219-P666	In Models of Rev H and earlier: Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C8* and C9*	5491601-P140	Tubular: 3.6 pf ±5%, 500 VDCW.
	5491601-P28	In Models of Rev J and earlier: Tubular: 2.7 pf ±10%, 500 VDCW.
C10* and C11*	5496219-P369	Ceramic disc: 180 pf, ±5%, 500 VDCW, temp coef 150 PPM.
	5496219-P566	In Models of Rev J: Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM.
	5496219-P666	In Models of Rev H and earlier: Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12* and C13*	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW.
	5491189-P106	In Models of Rev J and earlier: Polyester: 0.01 µf ±20%, 50 VDCW.
C14* and C15*	19B209243-P1	Polyester: 0.01 µf ±20%, 40 VDCW.
	5491189-P101	In Models of Rev J and earlier: Polyester: 0.01 µf ±20%, 50 VDCW.
C16*	19B209243-P5	Polyester: .047 µf ±20%, 40 VDCW.
	5491189-P104	In Models of Rev J and earlier: Polyester: .047 µf ±20%, 40 VDCW.
C17*	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW.
C26*	19B209243-P1	Polyester: 0.01 µf ±20%, 40 VDCW.
	19A115028-P104	In Models of Rev P: Polyester: .0047 µf ±20%, 200 VDCW. Added by Rev P.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 and J2	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1*	19C311181-G5	Coil. Includes tuning slug 7160519-P2.
	PL-19C303464-G1	In Models of Rev J and earlier: Coil. Includes tuning slug 7160519-P2.
L2*	19C311181-G6	Coil. Includes tuning slug 7160519-P2.
	19C303464-G2	In Models of Rev J and earlier: Coil. Includes tuning slug 7160519-P2.
L3*	19C311181-G7	Coil. Includes tuning slug 7160519-P2.
	19C303464-G3	In Models of Rev J and earlier: Coil. Includes tuning slug 7160519-P2.
L4*		(Part of L3). Deleted by Rev K.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P2	4029840-P1	Contact, electrical; sim to Amp 41854.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115245-P1	Silicon, NPN.
Q2	19A115889-P1	Silicon, NPN.
Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P152K	Composition: 1500 ohms ±10%, 1/4 w.
R2	3R152-P392K	Composition: 3900 ohms ±10%, 1/4 w.
R3*	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w. Deleted by Rev D.
R4*	3R152-P333K	Composition: 33,000 ohms ±10%, 1/4 w. Deleted by Rev D.
R5 and R6	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3R152-P512J	Composition: 5100 ohms ±5%, 1/4 w.
R8 and R9	3R152-P201J	Composition: 200 ohms ±5%, 1/4 w.
R10	3R152-P302J	Composition: 3000 ohms ±5%, 1/4 w.
R11	3R152-P622J	Composition: 6200 ohms ±5%, 1/4 w.
R12	3R152-P302J	Composition: 3000 ohms ±5%, 1/4 w.
R13	3R152-P202J	Composition: 2000 ohms ±5%, 1/4 w.
R15*	3R152-P153K	Composition: 15,000 ohms ±10%, 1/4 w. Added by Rev D. Deleted by Rev R.
R16*	3R152-P104K	Composition: 0.1 megohm ±10%, 1/4 w. Added by Rev D.
R17*	3R152-P394K	Composition: 0.39 megohm ±10%, 1/4 w. Added by Rev D.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T1		COIL ASSEMBLY PL-19B204414-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C18	5496219-P261	Ceramic disc: 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798-P3	Tuning slug.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		When reordering give GE Part No. and specify exact freq needed.
Y1*	19A110192-P3	Quartz: freq 4845 KHz ±100 Hz at 25°C, temp range -30° to +75°C.
	19A110192-P1	In Models of Rev B or earlier: Quartz: freq 4805 KHz ±100 Hz at 25°C, temp range -30° to +75°C.
A317		IF/AUDIO ASSEMBLY PL-19D402327-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A115028-P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C2	5491189-P108	Polyester: 0.22 µf ±20%, 50 VDCW.
C3	19A115028-P111	Polyester: .047 µf ±20%, 200 VDCW.
C4	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C5	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C6	19A115028-P111	Polyester: .047 µf ±20%, 200 VDCW.
C7	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C8	5496219-P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C9	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C10	19A115028-P114	Polyester: 0.1 µf ±20%, 200 VDCW.
C11	19A115028-P111	Polyester: .047 µf ±20%, 200 VDCW.
C12	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C13	5496218-P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C14	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C15	19A115028-P114	Polyester: 0.1 µf ±20%, 200 VDCW.
C16	5496219-P421	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -220 PPM.
C17	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C18 and C19	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C20	19A115680-P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
	5496267-P14	In Models of Rev S and earlier: Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague 150D.
C21	19B209243-P17	Polyester: 0.22 µf ±20%, 250 VDCW.
C22	19A115028-P107	Polyester: .01 µf ±20%, 200 VDCW.
C23	5491000-P1	Tubular: 30 µf +75% -10%, 25 VDCW; sim to Sprague S45553.
C24	19A115028-P107	Polyester: .01 µf ±20%, 200 VDCW.
C25	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C26*	19B209243-P1	Polyester: .01 µf ±20%, 40 VDCW.
	19A115028-P109	In Models of Rev R and earlier: Polyester: .022 µf ±20%, 200 VDCW.
	19A115028-P107	In Models of Rev K and earlier: Polyester: .01 µf ±20%, 200 VDCW.
C27	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW.
C28	5496267-P17	Tantalum: 1 µf ±20%, 35 VDCW; sim to Sprague 150D.
C29	19B209243-P17	Polyester: 0.22 µf ±20%, 250 VDCW.
C31	19B209243-P5	Polyester: .047 µf ±20%, 40 VDCW.
C32	19B209243-P17	Polyester: 0.22 µf ±20%, 250 VDCW.
C33	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague 150D.
C34	19B209243-P17	Polyester: 0.22 µf ±20%, 250 VDCW.
C35	5496267-P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague 150D.
C37*	19A115028-P305	Polyester: .0068 µf ±10%, 200 VDCW.
	19A115028-P303	In Models of Rev D and earlier: Polyester: .0033 µf ±10%, 200 VDCW.
C38	5495670-P107	Tubular: 100 µf +75% -10%, 15 VDCW; sim to Sprague 30D.
C39	5490008-P143	Silver mica: 470 pf ±10%, 300 VDCW; sim to Electro Motive Type DM-15.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

(Cont'd on page 13)

SYMBOL	G-E PART NO	DESCRIPTION
C48	5495670-P9	Tubular: 35 µf +75% -10%, 15 VDCW; sim to Sprague 30D.
C50	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague 150D.
C52*	4029003-P16	Silver mica: .0022 µf ±5%, 500 VDCW; sim to Electro Motive Type DM-20. Deleted by Rev L.
C53*	19A115028-P315	Polyester: 0.15 µf ±10%, 200 VDCW.
	5491189-P106	In Models of Rev D and earlier: Polyester: 0.1 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C71*	5496267-P28	Tubular: 0.47 µf, ±20%, 35 VDCW. Added by Rev J.
C72*	4029003-P207	Silver mica: 1830 pf ±2%, 500 VDCW. Added by Rev L.
C78*	5494481-P114	Ceramic disc. 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV. V.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	4038056-P1	Germanium.
CR3 and CR4	19A115250-P1	Silicon.
CR7	19A115250-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J24	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	PL-4031476-G1	Choke. Includes:
	7773023-P25	Tuning slug.
L4	5491736-P6	Choke: 3.5 mh ±10% ind at 1 KC, 2.5 ohms DC res max; sim to Aladdin 33-494.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q4* and Q5*	19A115552-P1	Silicon, NPN.
	19A115123-P1	In Models of Rev H and earlier: Silicon, NPN; sim to Type 2N2712.
Q6 thru Q8	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q9	19A115247-P1	Silicon, PNP; sim to Type 2N1024.
Q10	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77-P330K	Composition: 33 ohms ±10%, 1/2 w.
R2	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R3	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R4	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R5	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R6	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R7	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R8	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R9	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R10	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R11	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R12	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R13	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R14	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R15	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R16	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R17	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
R18	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R19	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
R20	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R21	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R23	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R24	3R77-P682K	Composition: 6800 ohms ±10%, 1/2 w.
R25	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R26	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R27	3R77-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R28	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R29 and R30	3R77-P753J	Composition: 75,000 ohms ±5%, 1/2 w.
R31	3R77-P512J	Composition: 5100 ohms ±5%, 1/2 w.
R32	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R33	3R77-P104K	Composition: 0.1 megohm ±10%, 1/2 w.
R34	3R77-P113K	Composition: 11,000 ohms ±10%, 1/2 w.
R35	3R77-P362J	Composition: 3600 ohms ±5%, 1/2 w.
R36	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R37	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R38	3R77-P751J	Composition: 750 ohms ±5%, 1/2 w.
R39	3R77-P562J	Composition: 5600 ohms ±5%, 1/2 w.
R40	3R77-P113K	Composition: 11,000 ohms ±10%, 1/2 w.
R41 thru R43	3R77-P204K	Composition: 0.2 megohm ±10%, 1/2 w.
R44	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R45	3R77-P181K	Composition: 180 ohms ±10%, 1/2 w.
R46*	3R77-P333K	Composition: 33,000 ohms ±10%, 1/2 w. Deleted by Rev J.
R47	19B209115-P1	Variable, carbon film: 5000 ohms ±20%, 0.15 w; sim to CTS Type UPE-70.
R48	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R49	3R77-P821K	Composition: 820 ohms ±10%, 1/2 w.
R50	3R77-P392K	Composition: 3900 ohms ±10%, 1/2 w.
R51	19B209022-P15	Wirewound: 1 ohm ±5%, 2 w; sim to IRC Type BWH.
R52	3R77-P152K	Composition: 1500 ohms ±10%, 1/2 w.
R53	5495948-P444	Deposited carbon: 0.28 megohm ±1%, 1/2 w; sim to Texas Instruments Type CD1/2MR.
R59	3R77-P512K	Composition: 5100 ohms ±10%, 1/2 w.
R65*	3R77-P123K	Composition: 12,000 ohms ±10%, 1/2 w. Deleted by Rev L.
R66	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R73*	3R77-P203J	Composition: 20,000 ohms ±5%, 1/2 w. Added by Rev S.
R74*	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w. Added by Rev J.
R75*	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w. Added by Rev J.
R80*	3R152-P511J	Composition: 510 ohms ±5%, 1/4 w. Added by Rev N.
R82*	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w. Added by Rev S.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	19B209143-P2	Rod: 4000 ohms ±10% res, 1 w max; sim to Globar Type 789F-12.
RT2	19B209143-P3	Rod: 850 ohms ±10% res, 1 w max; sim to Globar Type 789F.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1		DISCRIMINATOR ASSEMBLY PL-19C303612-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C41 and C42	19B209196-P1	Ceramic disc: 280 pf ±5%, 500 VDCW, temp coef -115 ±30 PPM.

(Cont'd on page 14)

(Cont'd from page 13)

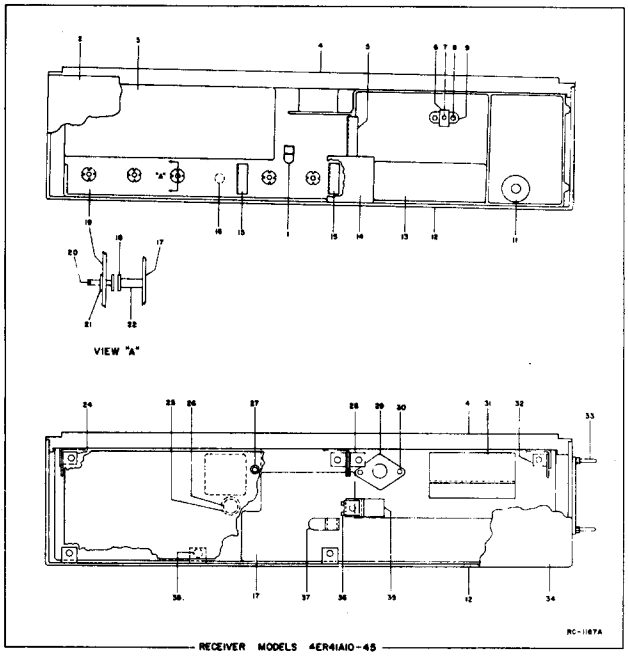
SYMBOL	G-E PART NO	DESCRIPTION
C45	7489162-P43	Silver mica: 470 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C46	7489162-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C47	5491189-P4	Polyester: .047 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR5 and CR6	19A115250-P1	Silicon.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R56	3R152-P331J	Composition: 330 ohms ±5%, 1/4 w.
R57 and R58	3R152-P473J	Composition: 47,000 ohms ±5%, 1/4 w.
A335*		FIRST MIXER ASSEMBLY PL-19B204430-G11 (Added by Rev R)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481-P14	Ceramic disc: .002 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C2	5494481-P114	Ceramic disc: .002 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C3	5491271-P106	Variable: approx 1.98 to 12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C4	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P114	Ceramic disc: .002 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	5494481-P18	Ceramic disc: .004 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C21	5496218-P259	Ceramic disc: 68 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L6	19A121082-G6	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115342-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2	3R152-P822J	Composition: 8200 ohms ±5%, 1/4 w.
R4	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3R152-P100J	Composition: 10 ohms ±5%, 1/4 w.
R14	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R15	3R152-P273J	Composition: 27,000 ohms ±5%, 1/4 w.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C315* and C316*	5496267-P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague 150D. Deleted by Rev R.
C317	5494481-P12	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C318*	7774750-P4	Ceramic disc: .001 µf +100 -0%, 500 VDCW. Added by Rev G.
C319*	5496267-P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Added by Rev R.
C320*	19A115680-P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
	5496267-P10	In Models of Rev S and earlier: Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Added by Rev R.
		- - - - - - - -DIODES & RECTIFIERS - - - - - - - -
CR301*	4037822-P1	Silicon. Added by REV. U.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J442	19B205689-G2	Connector: 18 contacts.
J443	19C303426-G1	Connector: 20 pin contacts.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L315* and L316*	7488079-P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res max; sim to Jeffers 4421-6. Added by Rev R.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P301 thru P309	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P310	4029840-P1	Contact, electrical; sim to Amp 41854.
P311 thru P320	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P321	4029840-P1	Contact, electrical; sim to Amp 41854.
P325	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P329	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P337	4029840-P2	Contact, electrical; sim to Amp 42827-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q301*	19A115527-P1	Silicon, NPN.
	19A115246-P1	In Models of Rev E and earlier: Silicon, NPN; sim to Type 2N1701.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R301 and R302	3R152-P681K	Composition: 680 ohms ±10%, 1/4 w.
R303	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T301*	19B209083-P2	Audio freq: Pri 1: 19 ohms ±10% imp at 3 w, 0.866 ohm DC res max, Sec 1: 3.5 ohms ±10% imp at 3 w, 0.222 ohm DC res max.
	19B209083-P1	In Models of Rev E and earlier: Audio freq: Pri 1: 19 ohms ±10% imp at 3 w, 0.866 ohm DC res max, Sec 1: 3.5 ohms ±10% imp at 3 w, 0.222 ohm DC res max.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424-P7	Miniature, phen: 4 terminals.
		RF CIRCUIT ASSEMBLY PL-19C303472-G1 (4ER41A10, A12, A14) PL-19C303472-G2 (4ER41A11, A13, A15)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C301 thru C305		Refer to Mechanical Parts (RC-1167).
C307 thru C312	19B209135-P1	Ceramic, feed-thru: 1000 pf +150% -0%, 500 VDCW.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J441		(Part of W441).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L301	19B204461-G4	Coil.
L302	19B200616-P2	Coil.
L303	19B204461-G4	Coil.
L304	19B204461-G1	Coil.
L305	19B200616-P1	Coil.
L306	19B204461-G1	Coil.
L307	19B204461-G4	Coil.
L308	19B204461-G6	Coil.
L309	19B204461-G3	Coil.
L310	19B204461-G5	Coil.

(Cont'd on page 15)

(Cont'd from page 14)

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W441	19B205634-G2	Connector, coaxial: includes cable jack (J441), approx 5 inches long.
W442	19B205634-G4	Connector, coaxial: includes cable jack approx 5 inches long.
		MECHANICAL PARTS
		(SEE RC-1167)
1	7145451-P1	Cable clamp.
2	19C303495-G3	Top Cover, Station Receiver. (Except Repeaters and VM's).
	19C303676-G2	Top Cover, Station Receiver. (Repeater and VM)
	19C303385-P2	Top Cover, Mobile.
3	19B204890-P1	Plate.
4	19C303394-G1	Heat sink.
5	19A121222-P1	Angle support. (Used with C311 and C312 in RF Circuit Assembly, PL-19C303472-G1 and 2).
6	4033089-P1	Clip. (Part of XY1-4 in A308-313).
7	19B200525-P9	Rivet. (Part of XY1-4 in A308-313).
8	19A115793-P1	Electrical contact. (Part of XY1-4 in A308-313).
9	19C311172-P1	Crystal socket. (Part of XY1-4 in A308-313).
10	4029739-P2	Not Used.
11	4034252-P5	Can. (Part of T1 in A316).
12	PL-19C303389-G1	Chassis.
13	19B204396-P1	Support. (Used in A306 and 307).
14	19A121071-P1	Plate.
15	19A121221-P1	Angle support. (Used with C307-310 in RF Circuit Assembly, PL-19C303472-G1 and 2).
16	7162414-P1	Mounting ring, transistor socket: sim to Elco 757. (Used with Q1 in A301 and 302).
17	19B204397-P1	RF plate.
18	4036765-G2	Screw. (Part of C301-305 in RF Circuit Assembly PL-19C303472-G1 and 2).
19	19C303562-P1	RF chassis. (Used in RF Circuit Assembly, PL-19C303472-G1 and 2).
20	PL-4036765-G4	Screw. (Part of C301-305 in RF Circuit Assembly, PL-19C303472-G1 and 2).
21	7117825-P1	Spring, washer; sim to Tinnerman C4578B-632-24. (Part of C301-305 in RF Circuit Assembly, PL-19C303472-G1 and 2).
22	4036899-P4	Ceramic insulator; sim to Centralab 3HX845C. (Part of C301-305 in RF Circuit Assembly, PL-19C303472-G1 and 2).
24	PL-19B204583-G3	Hinge.
25	4035439-P1	Transistor heat sink; sim to Birtcher 3AL-635-2R. (Used with Q10 in A317).
26	4036555-P1	Washer insulator: nylon. (Used with Q9 and 10 in A317).
27	4035306-P11	Fiber washer. (Used with L1 in A317).
28	PL-19B204583-G1	Hinge.
29	19A115784-P1	Insulator. (Used with Q301).
30	19A121989-P1	Support. (Used with Q301).
31	19A121229-G1	(Not used).
32	19B204583-G2	(Not used).
33	19A121676-P1	Guide pin.
34	19C303495-G4	Bottom Cover, Station Receiver.
	19C303385-G1	Bottom Cover, Mobile Receiver.
35	19A121297-P1	Angle.
36	7160861-P4	Spring clip nut: sim to Tinnerman C6452-8Z-157.
37	4029851-P6	Cable clamp: nylon; sim to Weckesser 5/16-4.



RECEIVER MODELS 4ER41AI0-45

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 - These revisions were incorporated into initial shipments.

REV. C - To minimize chance of interference, IF frequency changed from 5.26 MC to 5.30 MC. Changed crystal filter A314 and A316-Y1.

REV. D - To improve receiver performance in areas of high signal level. Deleted R3, R4, and added R15, R16, and R17 on the 2nd Mixer board A316.

REV. E - To raise maximum squelch sensitivity. Changed C37 and C53 on the IF Audio board A317.

REV. F - To incorporate improved transistor and transformer. Changed Q301 and T301. Deleted F24 green wire from T301-4 and F24 black-green wire from T301-3. Connected green wire from J443-16 to J442-15 and black-green wire from J443-17 to J442-7.

REV. G - To eliminate feedback within receiver cabling. Added C318.

REV. H - To eliminate spurious responses and to optimize the input load on the crystal filter. Deleted R3, changed R10 and added R11 on 1st Mixer A305. Replaced R1 with R5 on Crystal Filter.

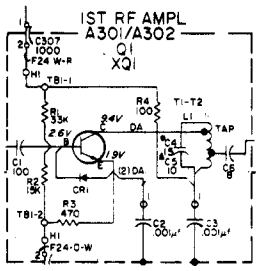
REV. J - To provide better temperature compensation for low IF circuitry. Changed C7, C10, and C11 on 2nd Mixer board. To reduce variation in discriminator output, and reduce audio rumble produced when volume control is at minimum and squelch near critical. Changed Q4 and Q5, deleted R46, added R74, R75, and C71 on IF/Audio board.

REV. K - To improve temperature characteristics. Changed C4, C5, C7 through C16, L1, L2, L3, deleted L4, and changed L5 to L4 on 2nd Mixer board.

REV. L - To improve squelch performance. Changed C26, deleted R65, C52, and added C72 on the IF/Audio Assembly board.

REV. M - To increase reliability of the RF Amplifier. Changed A301/A302 and L307/L309.

A301/A302 was:



NOTE

Models REV. L and earlier: In steps 7 and 8 of ALIGNMENT PROCEDURE, also tune L1 (on 1st RF Amp) for maximum.

REV. N - To improve circuit DC bias stability of Audio Amplifier Q10. Added R80.

REV. P - To reduce receiver lock-up in areas of high RF signal level. Deleted C5 and added C26 on the 2nd Mixer board.

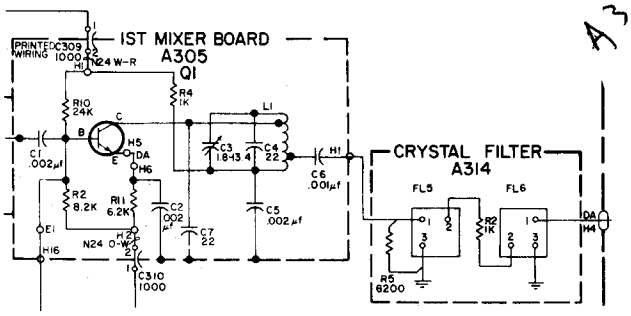
REV. R - To improve selectivity. Changed FL5, deleted FL6 & R2 and added R8 on Crystal Filter A314.

To improve 2nd Mixer stability. Changed C26 on A316.

To reduce receiver spurious response. Added L315, L316, C319 & C320, and deleted C315 & C316.

To improve Intermodulation (EIA) performance. Changed 1st Mixer Board from A305 to A335.

Schematic Diagram was:



REV. S - To eliminate squelch lock-up. Changed C26 and added R73 on A317.

REV. T - To eliminate capacitor failures in positive ground installations. Changed C20 on A317. Changed C320.

REV. U - To protect the audio output transistor (Q301) from negative voltage spikes. Added CR301 in the 12-volt supply line for Q301.

REV. V - To eliminate high frequency oscillation in the receiver PA caused by the use of a higher gain PA transistor. Added C78 from A317-J16 to ground.