MOBILE RADIO

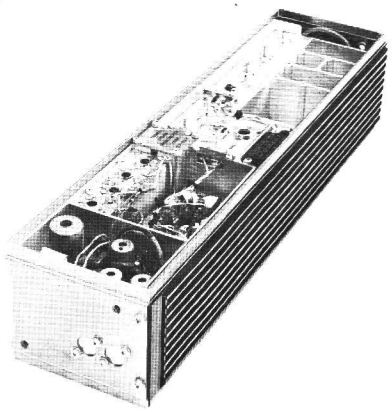
MASTR Progress Line

132-174 MC RECEIVER MODELS 4ER41A16-21 & 4ER41A34-39 (WITH CHANNEL GUARD)

Maintenance Manual LBI-3594C

* * * * *

ER-41-A



SPECIFICATIONS *

FCC Filing Designation	**ER-41-A**
Frequency Range	132-174 MC
Audio Output	2 watts at less than 10% distortion (using Speaker Model 4EZ16A10)
Sensitivity	
12-db SINAD (EIA Method)	0.35 μv
20-db Quieting Method)	0.5 μv
Selectivity	
EIA Two-Signal Method	-85 db (adjacent channel, 30 KC channels)
20-db Quieting Method	-100 db at ±15 KC
Spurious Response	-100 db
First Oscillator Stability	±.0005% (-30°C to +60°C)
Modulation Acceptance	±6 KC
Squelch Sensitivity	
Critical Squelch	0.15 μv
Maximum Squelch	Greater than 20 db quieting (less than 2 μv)
Intermodulation (EIA)	-60 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 cps (1000-cps reference)

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

GENERAL ELECTRIC

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 megacycle band.

The receiver is of single-unit construction and is completely housed in an aluminum casting for maximum shielding and rigidity. The top part of the casting contains the front end through the 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 unit is completely transistorized, using a total of 24 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)

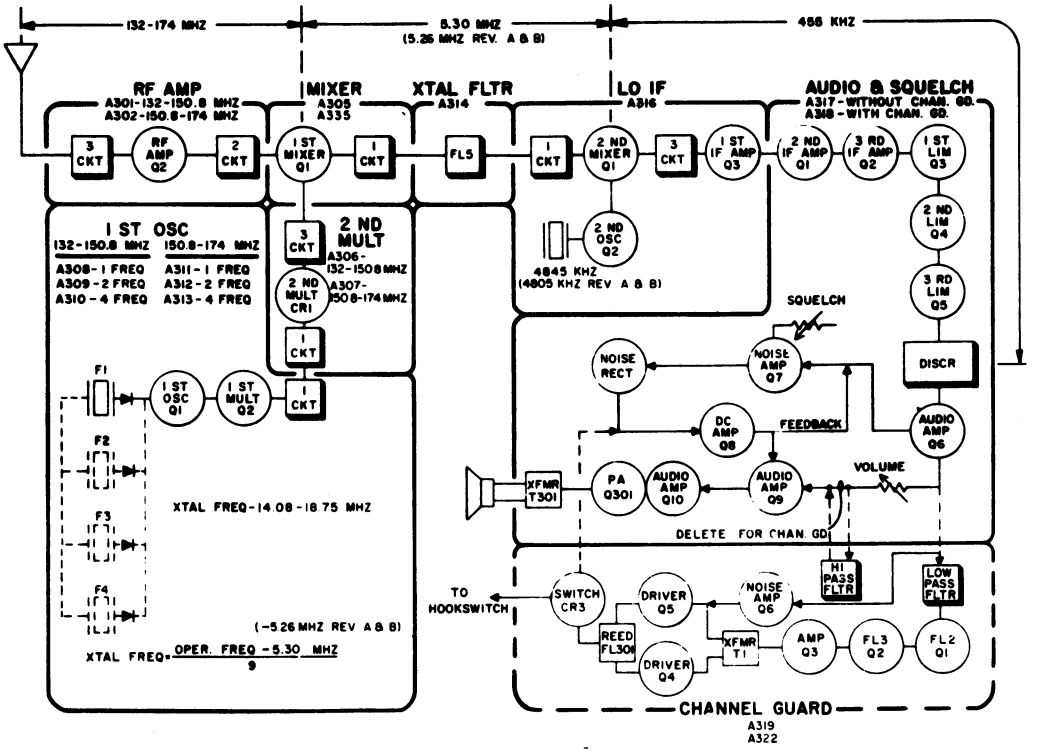
RF Amplifier A301 (132-150.8 MC) or A302 (150.8-174 MC) consists of three tuned helical resonators and an RF amplifier stage (Q2). The RF signal from the antenna is coupled by RF cable W441 to a tap on L301/L304. The tap is positioned to insure the proper impedance match to the antenna. RF energy is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

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

The receiver 1st oscillator is a transistorized Colpitts oscillator. 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 instant warm-up with a frequency stability of .0005% without 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 additional crystal circuits can be added. The 10-volt jumper is removed, and the proper frequency is selected



RC-1115A

Figure 1 - Receiver Block Diagram

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 it 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. This stage 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 (A305) 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 A305-Q1. The mixer collector tank (L1 and C3) is tuned to 5.3 megacycles (5.26 megacycles in Revisions A and B receivers), and provides impedance matching to the high IF filter.

The highly selective crystal filter 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 AMP (A316)

The 2nd oscillator A316-Q2 operates in a Colpitts oscillator circuit, with feedback supplied through C2. The oscillator frequency is 4845 KC (4805 KC 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 KC 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 provide some additional selectivity.

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 (A318)

Following A316-Q3 are two additional RC coupled low IF amplifiers (A318-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 (A318-Q3, -Q4 and -Q5). The 1st limiter is metered at J442-3 through metering network C13, CR2, R18 and C15.

DISCRIMINATOR (A318)

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 are for rectifying the 455 KC IF signals to recover the audio. The stage is metered at J442-10 through metering network R27 and C22.

1ST AUDIO AMPLIFIER (A318)

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 A318-J9. The VOLUME control arm connects to A318-J8 which feeds the audio signal to the base of the 2nd audio amplifier, Q9. De-emphasis is provided by C34, C35, C37 and L4. Potentiometer R47 is used to adjust the

current to 650 milliamps 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 amp 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 KC. 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 turned off, the collector potential is at the +10 volt supply. This positive voltage is fed to the base of Q9, a PNP transistor, cutting it off. As audio stages Q9, Q10 and Q301 are DC coupled, all of them are cut off. The positive voltage from the collector circuit of the DC amplifier is used as feedback through R33 to the base of noise amplifier Q7, causing it to conduct more heavily. The feedback helps to cut Q8 off sharply, resulting in sharp, quick-acting switching.

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

The 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 conventional squelch circuits. The circuit is designed so that a weak signal will open the squelch. The signal may be reduced by 3 to 5 db without the squelch closing. This limits squelch "flutter" or "picket fence" operation.

CHANNEL GUARD (A319/A322)

General Electric Channel Guard Decoder is designed to eliminate all calls that are not tone coded for the Channel Guard frequency. As long as the CHANNEL GUARD-OFF switch on the control unit is left in the CHANNEL GUARD position, all signals are locked out except those from transmitters that are continuously tone coded for positive identification by the receiver.

Placing the CHANNEL GUARD-OFF switch in the OFF position instantly disables the Channel Guard operation so that all calls on the channel can be heard. When the hookswitch option is used, lifting the microphone from its hanger disables the Channel Guard circuit.

Operation

Audio, tone and noise is picked up in the emitter circuit of Audio Amplifier A318-Q6 and is fed through A318-J9 to the VOLUME control and then to a high-pass filter (C20, C21, C22, C23, C30 and L1) on the Channel Guard board through A318-J8, decoupling resistor R61 and A318-J12. The high-pass filter removes the tone from the audio signal, and the audio is then fed through A318-J13 to the base of Audio Amplifier A318-Q9.

To operate the Channel Guard Decoder, audio, tone and noise is picked up in the emitter circuit of A318-Q6 and is fed through A318-J18 to the base of the first low-pass filter stage (Q1) through a 250-cps band pass filter consisting of R1, R2, R3, C1, C2 and C3. Following Q1 is a second low-pass filter stage, Q2. The filter output is amplified by Q3 and coupled to the push-pull driver stage (Q4 and Q5) through T1. Q4 and Q5 drive the reed decoder, FL301. Noise Amplifier Q6 picks up and amplifies any high frequency (in the 5 KC range) and feeds it back to the driver stage to decrease the sensitivity of the reed and prevent noise pulsing.

FL301 is resonant at the correct tone frequency and the reed contacts open and close at the tone frequency. When the CHANNEL GUARD-OFF switch is in the CHANNEL GUARD position, the opening and closing of the reed contacts charges capacitor C19, which applies a limited current to the base of DC Amplifier A318-Q8. The receiver noise squelch circuit continues to operate normally until a carrier quiets the receiver.

Placing the CHANNEL GUARD-OFF switch in the OFF position (or removing the microphone from its hanger in hookswitch options) opens the circuit to A319/A322-J5, which forward biases diode CR3. This causes current to flow in the circuit, bypassing the decoder reed (FL301). However, the receiver noise squelch circuit will operate until a carrier is received.

NOTE

If the Two-Way Radio is mounted on its side, rotate the decoder reed 90° in its mounting bracket so that the label showing the G-E Drawing and Part Number is facing the receiver heat sink. No change is required if the unit is mounted vertically. See Figure **3** for the location of the decoder reed.

MAINTENANCE

DISASSEMBLY

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 and pull radio out of mounting frame.
2. Remove the screws in bottom cover and pry up cover at back of receiver.
3. Slide cover back and lift off.

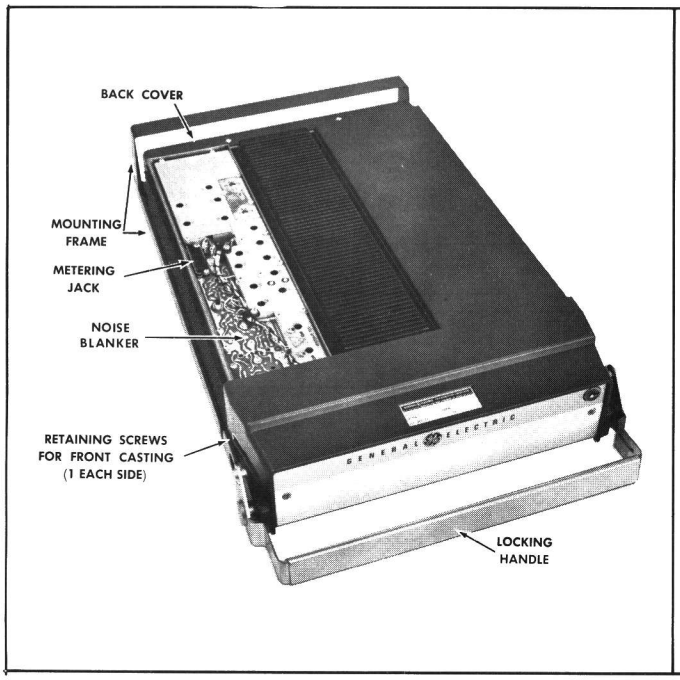


Figure 2 - Top Cover Removed

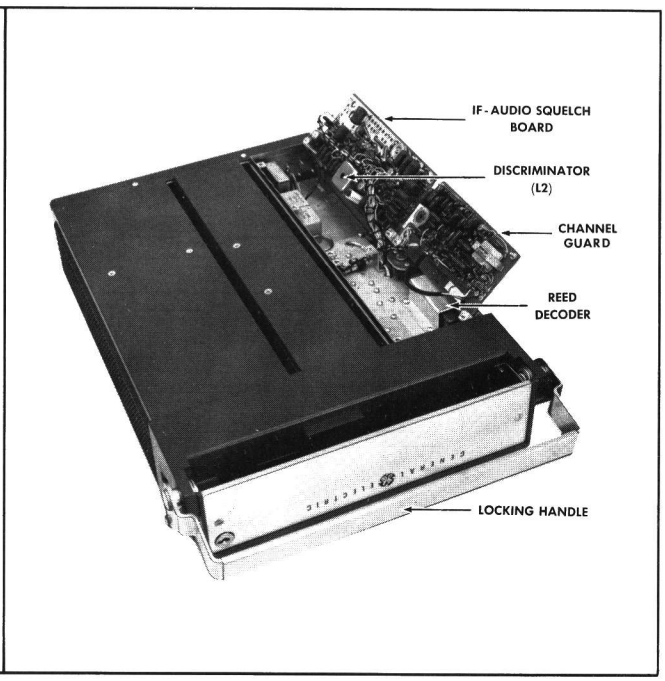


Figure 3 - Bottom Cover Removed

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

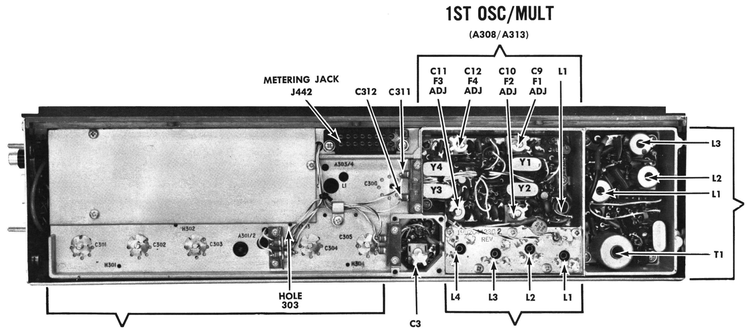
1. G-E Test Set Model 4EX3A10 (or 20,000 ohms-per-volt multimeter).
2. A 132-174 MC signal source. Connect a one-inch piece of insulated wire no larger than .065 inch to generator output probe.

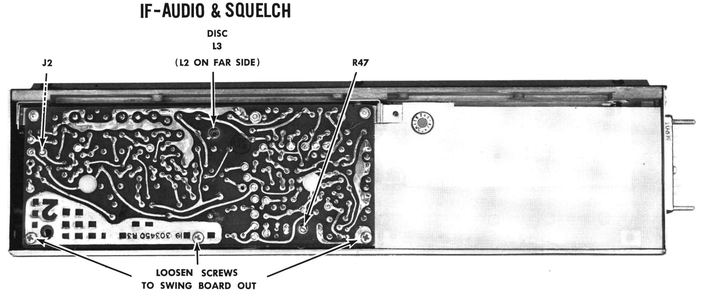
PRELIMINARY CHECKS AND ADJUSTMENTS

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 0.65 volts. If using Multimeter, connect leads to J442-1 (AUDIO-PA) and J442-8 (System Negative).
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).
5. Disable the Channel Guard.

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 AMPLIFIER		
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-KC and 132-174 MC signal source. Connect a one-inch piece of insulated wire no larger than .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 KC, align the unit on channel F1. If the frequency spacing is greater than 200 KC, align the receiver on the center frequency.
4. With VOLUME control full counterclockwise and Test Set in position J, adjust R47 on the IF-AUDIO & SQUELCH board for a reading of 0.65 volts. If using Multimeter, connect leads to J442-1 (AUDIO-PA) and J442-8 (System Negative).
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).
7. Disable the Channel Guard.

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-KC 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 max.	Loosen screws and swing IF-AUDIO & SQUELCH board open, and set G-E Test Set to TEST 3 position. Alternately apply a 445-KC and 465-KC 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 AMPLIFIER		
7.	B (2nd IF AMP)	Pin 2	C302, C303, C304 and C305	Maximum	Apply signal as above, keeping below saturation. 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

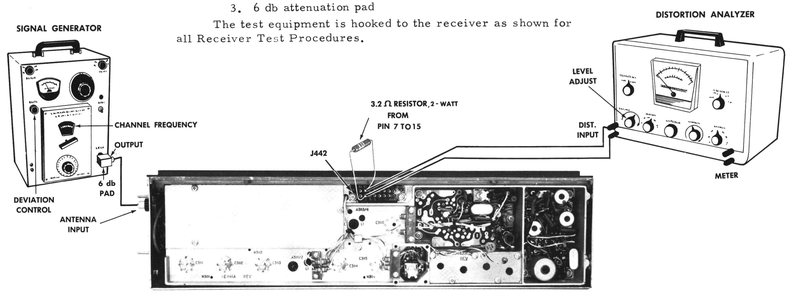
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

1. Connect a 1,000-microvolt test signal modulated by 1,000 cycles ±3.3 KC deviation to the antenna jack J441.
2. Two-Watt Speaker:
   When speaker is used, disconnect speaker lead pin from J701-2 (on rear of Control Unit). Hook up a 3.2-ohm load resistor from J442-15 to J442-7

   OR

   Handset:
   When handset is used, lift handset off of hookswitch.
3. Two-Watt Speaker:
   Connect Distortion Analyzer input across the 3.2-ohm resistor as shown

   OR

   Handset:
   Connect Distortion Analyzer input from J442-15 to J442-7.
4. Two-watt speaker--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.
2. Reduce the Signal Generator output from setting in Test Step 1.
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 the "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 ±6 KC (but less than ±9 KC).

SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, check the following:

1. Make gain measurements as shown on the Receiver Troubleshooting Procedure.
2. Voltage reading of Limiter (Q4) should read 0.4 volts RMS with a one-microvolt input signal on Test Set Meter or 0.9 volts with voltmeter. (Measure at J442-2).

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. Check BIAS ADJ for 0.65 VDC at J442-1 and -8 (STEP 2). 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 KC.

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 CYCLE SIGNAL WITH 2.3 KC DEVIATION FOR AUDIO STAGE.

PROCEDURE:

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

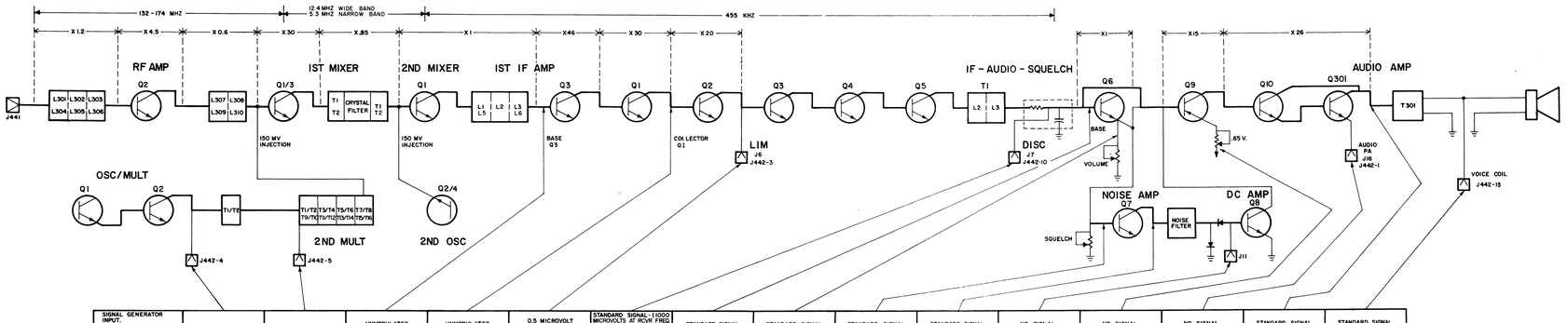
STEP 2- SIMPLIFIED VTVM GAIN CHECKS

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 AT RCVR FREQ MOD BY 1KHZ AT 3.3 KHZ (NB) 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

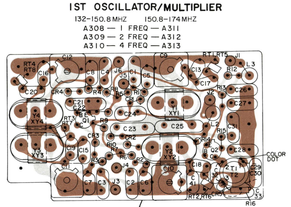
RC-1218C

OUTLINE DIAGRAM

132 — 174 MC RECEIVER
MODELS 4ER41A16-21 & 34-39

1ST OSCILLATOR/MULTIPLIER

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

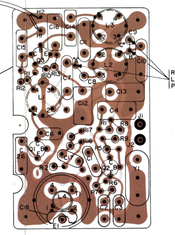


(19B204412, Sh. 1, Rev. 3)
(19B204412, Sh. 2, Rev. 3)

P2 TO J4 ON IF-AUDIO & SQUELCH BOARD
P1
TO J2 ON IF-AUDIO & SQUELCH BOARD

2ND MIXER

A316

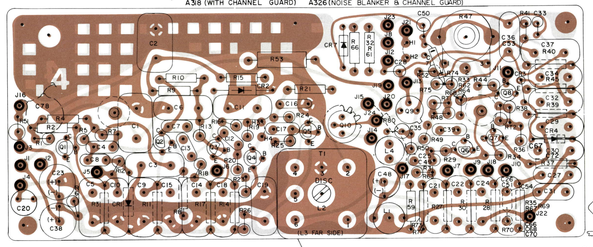


RESISTOR LOADING POINTS

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

IF-AUDIO & SQUELCH BOARD

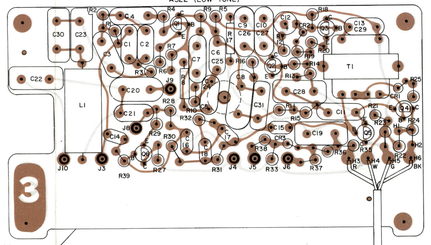
A317 (WITHOUT CHANNEL GUARD) A325 (NOISE BLANKER)
A318 (WITH CHANNEL GUARD) A326 (NOISE BLANKER & CHANNEL GUARD)



(19C303451, Sh. 1, Rev. 4)
(19C303451, Sh. 2, Rev. 4)

CHANNEL GUARD

A319 (HI TONE)
A322 (LOW TONE)



(19B204553, Sh. 1, Rev. 3)
(19B204553, Sh. 2, Rev. 3)

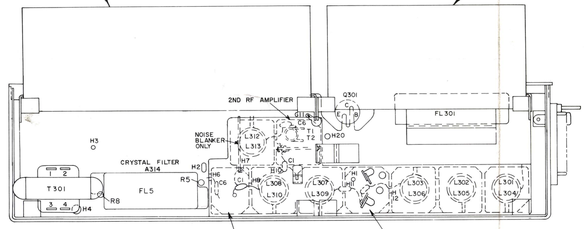
TO DECODER REED FL304

ON AUDIO AND SQUELCH BOARD A317 & A318, C26 & R82 ARE CONNECTED AS SHOWN.

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	—	+	—	+	—	+
A308/313-Q1	1K	1K	6.1K	2.8K	100Ω	100Ω
A308/313-Q2	70Ω	150Ω	1K	160Ω	100Ω	100Ω
A305-Q1	2.7K	2.7K	7.5K	3.8K	1.6K	1.6K
(A305/Y102-Q1) (A305/Y324-Q1)	290Ω	270Ω	340Ω	340Ω	100Ω	100Ω
A316-Q1	3.8K	5.3K	8.5K	2.9K	200Ω	200Ω
A316-Q2	2.7K	6.8K	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	∞3.2K	∞ MEG	36.0K	2.5K	0	0
A317-Q7	1.7K	1.7K	11.0K	4.0K	7.0K	16K
A317-Q8	180Ω	180Ω	100K	2.8K	11.0K	11K
A317-Q9	2.2K	2.2K	4.1K	45K	2.3K	2.3K
A317-Q10	40Ω	35Ω	2.3K	2.3K	40Ω	36Ω
A301/323-Q201	1Ω	1Ω	1KΩ	35Ω	40Ω	36Ω

* READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS.

BOTTOM VIEW



TRANSISTOR	EMITTER		BASE		COLLECTOR	
A319/322	—	+	—	+	—	+
Q1	56Ω	56Ω	8.3K	145Ω	6.5K	8.3K
Q2	270Ω	270Ω	8K	500Ω	5K	5.5K
Q3	1K	1K	75K	3K	1K	1K
Q4	0	0	1KΩ	45Ω	1K	1K
Q5	0	0	1KΩ	45Ω	1K	1K
Q6	20Ω	20Ω	4.5K	85Ω	2K	2K

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 (-12), AND ARE MEASURED FROM TRANSISTOR PINS TO C311-1, + OR — SIGNS SHOW METER LEAD TO C311-1.

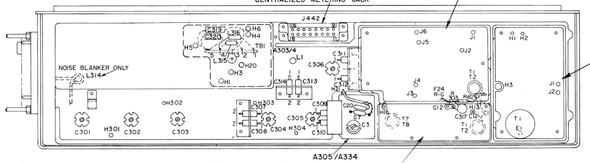
CAUTION

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:
1-100Ω	X 1
100-1K Ω	X 10
1K-50K Ω	X 1,000
50K Ω	X 100,000

TOP VIEW

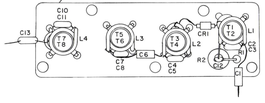
CENTRALIZED METERING JACK



A305/A334

2ND MULTIPLIER

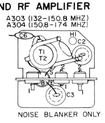
A306 (132-150.8MHZ)
A307 (150.8-174 MHZ)



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

2ND RF AMPLIFIER

A303 (132-150.8 MHZ)
A304 (150.8-174 MHZ)



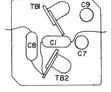
NOISE BLANKER ONLY

1ST MIXER

A334/A33C

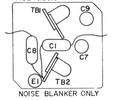
1ST RF AMPLIFIER

A301 (132-150.8MHZ)
A302 (150.8-174 MHZ)



1ST RF AMPLIFIER

A323 (132-150.8MHZ)
A324 (150.8-174MHZ)



NOISE BLANKER ONLY

(19B620737, Rev. 32)

(19B620709, Rev. 42)

SCHEMATIC DIAGRAM

132 — 174 MC RECEIVER
WITH CHANNEL GUARD
MODELS 4ER41A16-21 &
MODELS 4ER41A34-39

Issue 4

PARTS LIST

LBI-3540C

132-174 MHz RECEIVER WITH CHANNEL GUARD
4EX41A16, 18-21, 34, 35, 37-39 REV XX
4EX41A17 REV XY
4EX41A36 REV XD

SYMBOL	GE PART NO.	DESCRIPTION
A301* and A302*		RF AMPLIFIER ASSEMBLY 19C303414-G5 ADDED BY REV S in 4EX41A16, 18-21 ADDED BY REV T IN 4EX41A17 ADDED BY REV R IN 4EX41A34-35
		- - - - - - - - CAPACITORS - - - - - - - -
C1	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C7	5493392-P7	Ceramic, feed-thru: .001 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FASC.
C8	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C9	5493392-P7	Ceramic, feed-thru: .001 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FASC.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4038642-P1	Germanium.
		- - - - - - - - INDUCTORS - - - - - - - -
L2	7488079-P7	Choke, RF: 1.5 uh ±10%, 0.5 ohm DC res max; sim to Jeffers 4411-10K.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q2	19A115342-P1	Silicon, NPN.
		- - - - - - - - RESISTORS - - - - - - - -
R5	3R152-P153K	Composition: 15,000 ohms ±10%, 1/4 w.
R6	3R152-P513J	Composition: 5100 ohms ±5%, 1/4 w.
R7	3R152-P73J	Composition: 730 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.
		- - - - - - - - TERMINALS - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19A121082-G1	Toroidal coil.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A115342-P1	Silicon, NPN.
		- - - - - - - - RESISTORS - - - - - - - -
R2	3R152-P822J	Composition: 8200 ohms ±5%, 1/4 w.
R3*	3R152-P203J	Composition: 20000 ohms ±5%, 1/4 w. Deleted by REV R in Models 4EX41A16, 18-21. Deleted by REV L in Model 4EX41A17 Deleted by REV J in Models 4EX41A34-39.
R4	3R152-P103J	Composition: 1000 ohms ±5%, 1/4 w.
R10*	3R152-P243J	Composition: 24,000 ohms ±5%, 1/4 w. Changed by REV R in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV J in Models 4EX41A34-39.
		In Models earlier than REV above
	3R152-P183K	Composition: 18,000 ohms ±10%, 1/4 w.
R11*	3R152-P622J	Composition: 6200 ohms ±5%, 1/4 w. Added by REV R in Models 4EX41A16, 18-21 Added by REV L in Model 4EX41A17 Added by REV J in Models 4EX41A34-39.

SYMBOL	GE PART NO.	DESCRIPTION
T1 and T2		- - - - - - - - TRANSFORMERS* - - - - - - - - COIL ASSEMBLY T1 19A121076-G1 (4EX41A16, 18, 20, 34, 36, 38) T2 19A121076-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19A121078-G1	Coil.
	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 19B204430-G1 Deleted in Models 4EX41A16, 18-21 by REV XA. Deleted in Model 4EX41A17 by REV XB. Deleted in Models 4EX41A34-39 by REV W.
		- - - - - - - - CAPACITORS - - - - - - - -
C1 and C2	5494481-P14	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
C3	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C4	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P14	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
C6	5494481-P12	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
C7	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - TERMINALS - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19A121082-G1	Toroidal coil.
		- - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A115342-P1	Silicon, NPN.
		IN MODELS EARLIER THAN REV ABOVE
A301* and A302*		RF AMPLIFIER ASSEMBLY A301 19C303414-G1 (4EX41A16, 18, 20, 34, 36, 38) A302 19C303414-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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 pf +100%-0%, 500 VDCW; sim to Allen-Bradley Type 535A.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4038642-P1	Germanium.
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.

SYMBOL	GE PART NO.	DESCRIPTION
A306 and A307		MULTIPLIER ASSEMBLY A306 19B204423-G1 (4EX41A16, 18, 20, 34, 36, 38) A307 19B204423-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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 pf +100%-0%, 500 VDCW; sim to Allen-Bradley Type FASC.
C13	5496218-P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
		- - - - - - - - DIODES AND 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 19A121099-G1 (4EX41A16, 18, 20, 34, 36, 38) T2 19A121099-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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
	5491798-P5	Tuning slug.
T3 and T4		COIL ASSEMBLY T3 19A121095-G1 (4EX41A16, 18, 20, 34, 36, 38) T4 19A121095-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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
	5491798-P5	Tuning slug.
T5 and T6		COIL ASSEMBLY T5 19A121097-G1 (4EX41A16, 18, 20, 34, 36, 38) T6 19A121097-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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	19A131096-P1	Coil. Includes
	5491798-P5	Tuning slug.
T7 and T8		COIL ASSEMBLY T7 19A121111-G1 (4EX41A16, 18, 20, 34, 36, 38) T8 19A121111-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - CAPACITORS - - - - - - - -
C10	5496218-P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C11	5496218-P238	Ceramic disc: 7 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
L4	19A121110-P1	Coil. Includes
	5491798-P5	Tuning slug.
A308 thru A313		FIRST OSCILLATOR ASSEMBLY A308 19B204419-G1 (4EX41A16, 34) A309 19B204419-G2 (4EX41A18, 36) A310 19B204419-G3 (4EX41A20, 38) A311 19B204419-G4 (4EX41A17, 35) A312 19B204419-G5 (4EX41A19, 37) A313 19B204419-G6 (4EX41A21, 39)
		- - - - - - - - CAPACITORS - - - - - - - -
C1 thru C4	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
C5 thru C9	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C9 thru C12	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
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 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
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 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
C31	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	19A115603-P1	Silicon. (Deleted in Models 4EX41A16 by REV H). (Deleted in Model 4EX41A17 by REV J). (Deleted in Models 4EX41A34, 35 by REV G).
CR2 thru CR4	19A115603-P1	Silicon.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J6	4033513-P4	Contact, electrical: sim to Bead Chain L63-3.
L2 and L3	7488079-P16	Choke, RF: 10 uh ±10%, 0.6 ohm DC res; sim to Jeffers 4421-7K.
		- - - - - - - - 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: 0.10 megohm ±10%, 1/4 w. Deleted in Model 4EX41A16 by REV H. Deleted in Model 4EX41A17 by REV J. Deleted in Models 4EX41A34, 35 by REV G.
R6 thru R8	3R152-P104K	Composition: 0.10 megohm ±10%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
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-P103J	Composition: 1000 ohms ±5%, 1/4 w.
R2*	3R152-P102K	Composition: 10000 ohms ±10%, 1/4 w. Deleted in Models 4EX41A16, 18-21 by REV XA. Deleted in Model 4EX41A17 by REV XB. Deleted in Models 4EX41A34-39 by REV W.
R3	3R152-P332J	Composition: 3300 ohms ±5%, 1/4 w.
R13	3R152-P622J	Composition: 6200 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-P306J	Composition: 36 ohms ±5%, 1/4 w. Added in Model 4EX41A16 by REV H. Added in Models 4EX41A16, 18-21 by REV XA. Added in Model 4EX41A17 by REV J. Added in Models 4EX41A34, 35 by REV G.
		- - - - - - - - THERMISTORS - - - - - - - -
RT1 thru RT4	19B209284-P5	Disc: 43 ohms res nominal at 25°C, color code green.
		- - - - - - - - TRANSFORMERS - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B204421-G1 (4EX41A16, 18, 20, 34, 36, 38) T2 19B204421-G2 (4EX41A17, 19, 21, 35, 37, 39)
		- - - - - - - - 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 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR5	5491705-P2	Silicon.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	19A121093-P1	Coil. Includes
	5491798-P5	Tuning slug.
		- - - - - - - - RESISTORS - - - - - - - -
R16	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
		- - - - - - - - SOCKETS - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (RC-1167).
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 pf ±20%, 50 VDCW. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV R in Models 4EX41A34-39.
	5491189-P106	Polyester: 0.1 pf ±20%, 50 VDCW; sim to Good-All Type 601PE. (In Models earlier than REV above).
T1 thru T4	19B206576-P4	Quartz: freq range 14077.777 to 16166.666 KHz, temp range -30°C to +85°C.
T1 thru T4	19B206576-P5	Quartz: freq range 16166.667 to 18744.444 KHz, temp range -30°C to +85°C.
A314*		CRYSTAL FILTER ASSEMBLY 19B204416-G4 ADDED BY REV K IN MODELS 4EX41A16, 18-21 ADDED BY REV L IN MODELS 4EX41A17 ADDED BY REV J IN MODELS 4EX41A34-39
		- - - - - - - - FILTERS - - - - - - - -
FL5*	19B206693-G1	Bandpass filter. In Models 4EX41A16, 18-21 of REV W and earlier: In Model 4EX41A17 of REV XA and earlier: In Models 4EX41A34-39 of REV V and earlier:
	19C304094-G4	Bandpass filter.

SYMBOL	GE PART NO.	DESCRIPTION
FL6*	19C304094-G4	Bandpass filter. Deleted in Models 4EX41A16, 18-21 by REV XA. Deleted in Model 4EX41A17 by REV XB. Deleted in Models 4EX41A34-39 by REV W.
		- - - - - - - - RESISTORS - - - - - - - -
R2*	3R152-P102K	Composition: 10000 ohms ±10%, 1/4 w. Deleted in Models 4EX41A16, 18-21 by REV XA. Deleted in Model 4EX41A17 by REV XB. Added to Models 4EX41A34-39 by REV W.
R5	3R152-P632J	Composition: 6200 ohms ±5%, 1/4 w.
R8*	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w. Added to Models 4EX41A16, 18-21 by REV XA. Added to Model 4EX41A17 by REV XB. Added to Models 4EX41A34-39 by REV W.
		IN MODELS EARLIER THAN REV ABOVE AND LATER THAN REV N.
A314*		CRYSTAL FILTER ASSEMBLY 19B204416-G3
		- - - - - - - - FILTERS - - - - - - - -
FL5 and FL6	19C304094-G4	Bandpass filter.
		- - - - - - - - RESISTORS - - - - - - - -
R1	3R152-P432K	Composition: 4300 ohms ±10%, 1/4 w.
R2	3R152-P102K	Composition: 10000 ohms ±10%, 1/4 w.
A314*		CRYSTAL FILTER ASSEMBLY 19B204416-G2 In Models of REV N or earlier.
		- - - - - - - - FILTERS - - - - - - - -
FL1 and FL2	19C304094-G1	Bandpass filter.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	5491705-P2	Silicon.
		- - - - - - - - INDUCTORS - - - - - - - -
L1	3R152-P432K	Composition: 4300 ohms ±10%, 1/4 w.
R2	3R152-P102K	Composition: 10000 ohms ±10%, 1/4 w.
A316		SECOND MIXER ASSEMBLY 19B204438-G1
		- - - - - - - - CAPACITORS - - - - - - - -
C1	5490008-P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2	5490008-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C4*	19B209243-P7	Polyester: 0.1 pf ±20%, 50 VDCW. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV R in Models 4EX41A34-39.
	5491189-P106	Polyester: 0.1 pf ±20%, 50 VDCW; sim to Good-All Type 601PE. (In Models earlier than REV above).
C5*	19B209243-P7	Polyester: 0.1 pf ±20%, 50 VDCW. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV R in Models 4EX41A34-39.
	5491189-P103	Polyester: .033 pf ±20%, 50 VDCW; sim to Good-All Type 601PE. (In Models earlier than REV above).
C6	5496219-P47	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -750 PPM.
C7*	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV R in Models 4EX41A34-39.
	5496219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV R in Models 4EX41A34-39. In Models earlier than REV above Deleted by REV P in Models 4EX41A16, 18-21 Deleted by REV L in Model 4EX41A17 Deleted by REV R in Models 4EX41A34-39.
	5496219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C8* and C9*	5491601-P140	Phenolic: 3.0 pf ±5%, 500 VDCW; sim to Quality Components Type MC. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV L in Models 4EX41A34-39.
		In Models earlier than REV above
C9* and C10*	5491601-P28	Tubular: 2.7 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C10* and C11*	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV L in Models 4EX41A34-39.
L4*	5496219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM. Changed by REV R in Models 4EX41A16, 18-21 Changed by REV L in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.
L5*		(Part of T1). Deleted by REV P in Models 4EX41A16, 18-21 Deleted by REV R in Model 4EX41A17 Deleted by REV L in Models 4EX41A34-39.
	5496219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12* and C13*	19B209243-P7	Polyester: 0.1 pf ±20%, 50 VDCW. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.
	5491189-P106	Polyester: 0.1 pf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C14* and C15*	19B209243-P1	Polyester: .01 pf ±20%, 50 VDCW. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.
		In Models earlier than REV above
	5491189-P101	Polyester: .01 pf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C16*	19B209243-P5	Polyester: .047 pf ±20%, 50 VDCW. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.
		In Models earlier than REV above
	5491189-P104	Polyester: .047 pf ±10%, 500 VDCW; sim to Good-All Type 601PE.
C17	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Dipcap.
C26*	19B209243-P1	Polyester: 0.01 pf ±20%, 50 VDCW. In Models 4EX41A16, 18-21 of REV W and earlier: In Model 4EX41A17 of REV XA and earlier: In Models 4EX41A34-39 of REV V and earlier:
	19A115028-P104	Polyester: .0047 pf ±20%, 200 VDCW. Added by REV W in Models 4EX41A16, 18-21 Added by REV W in Model 4EX41A17 Added by REV U in Models 4EX41A34-39.
		- - - - - - - - TERMINALS - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 and J2	4033513-P4	Contact, electrical: sim to Bead Chain L63-3,
		- - - - - - - - INDUCTORS - - - - - - - -
L1*	19A115711-P4	Transformer, freq: 455 KHz; sim to Automatic Mfg EX13972. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.
		In Models earlier than REV above
	19C303464-G1	Coil. Includes:
	7160319-P2	Tuning slug.
L2*	19A115711-P3	Transformer, freq: 455 KHz; sim to Automatic Mfg EX13972. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.

SYMBOL	GE PART NO.	DESCRIPTION
		In Models earlier than REV above
	19C303464-G2	Coil. Includes:
	7160319-P2	Tuning slug.
L3*	19A115711-P5	Transformer, freq: 455 KHz; sim to Automatic Mfg EX13972. Changed by REV P in Models 4EX41A16, 18-21 Changed by REV R in Model 4EX41A17 Changed by REV N in Models 4EX41A34-39.
		In Models earlier than REV above
	19C303464-G3	Coil. Includes:
	7160319-P2	Tuning slug.
L4*		(Part of L2). Deleted by REV P in Models 4EX41A16, 18-21 Deleted by REV R in Model 4EX41A17 Deleted by REV N in MODELS 4EX41A34-39.
L5*		(Part of T1). Deleted by REV P in Models 4EX41A16, 18-21 Deleted by REV R in Model 4EX41A17 Deleted by REV N in Models 4EX41A34-39.
	19C303464-G4	Coil. Includes:
	7160319-P2	Tuning slug.
L6*		Added in Models 4EX41A16, 18-21, 34-39 by REV K. Added in Model 4EX41A17 by REV F.
L7*		Added in Models 4EX41A16, 18-21, 34-39 by REV K. Added in Model 4EX41A17 by REV F.
		- - - - - - - - TRANSFORMERS - - - - - - - -
T1		COIL ASSEMBLY 19B204411-G1
		- - - - - - - - CAPACITORS - - - - - - - -
C18	19C301468-P261	Ceramic disc: 82 pf ±5%, 200 VDCW, temp coef -80 PPM.
	5491798-P3	Tuning slug.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1*	19A110192-P3	Quartz: freq 4845 KHz ±100 Hz at 25°C, temp range -30° to +75°C.
		In Models of REV B or earlier:
	19A110192-P1	Quartz: freq 4805 KHz ±100 Hz at 25°C, temp range -30° to +75°C.
A318		IF/AUDIO ASSEMBLY 19D402327-G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A115028-P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C3	19A115028-P111	Polyester: .047 µf ±20%, 200 VDCW.
C4	5494481-P112	Ceramic disc: .001 µf ±10%, 1000 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%, 1000 VDCW; sim to RMC Type JF Discap.
C8	5496218-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%, 1000 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%, 1000 VDCW; sim to RMC Type JF Discap.
C18 and C19	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C20*	19A115680-P103	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
		In Models 4ER41A16, 18-21, 34-39 of REV XB and earlier: In Model 4ER41A17 of REV XC and earlier:
	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C21	19B209243-P9	Polyester: 0.22 µf ±20%, 50 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%, 1000 VDCW; sim to RMC Type JF Discap.
C26*	19A116080-P1	Polyester: 0.01 µf ±20%, 50 VDCW. Added to Models 4ER41A16, 18-21 by REV XB. Added to Model 4ER41A17 by REV XC. Added to Models 4ER41A34-39 by REV XA.
	19A115028-P107	Polyester: .01 µf ±20%, 200 VDCW. Deleted by REV L in Models 4ER41A16, 18-21 Deleted by REV M in Model 4ER41A17 Deleted by REV K in Models 4ER41A34-39.
C27	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C29	19B209243-P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C31	19B209243-P5	Polyester: .047 µf ±20%, 50 VDCW.
C32	19B209243-P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C33	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C34	19B209243-P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C35	5496267-P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C37*	19A115028-P305	Polyester: .0068 µf ±10%, 200 VDCW.
		In Models 4ER41A16, 18-21 of REV G or earlier: In Model 4ER41A17 of REV H or earlier: In Models 4ER41A34-39 of REV F or earlier:
	19A115028-P303	Polyester: .0033 µf ±10%, 200 VDCW.
C38	5495670-P10	Tubular: 100 µf +75% -10%, 15 VDCW; sim to Sprague 30D172A1.
C39	5490008-P143	Silver mica: 470 pf ±10%, 300 VDCW; sim to Electro Motive Type DM-15.
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 Type 150D.
C52*	4029003-P16	Silver mica: .0022 µf ±5%, 500 VDCW; sim to Electro Motive Type DM-20. Deleted by REV L in Models 4ER41A16, 18-21 Deleted by REV M in Model 4ER41A17 Deleted by Rev K in Models 4ER41A34-39.
C53*	19A115028-P315	Polyester: 0.15 µf ±10%, 200 VDCW.
		In Models 4ER41A16, 18-21 of REV G or earlier: In Model 4ER41A17 of REV H or earlier:B In Models 4ER41A34-39 of REV F or earlier:
	5491189-P106	Polyester: 0.1 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C67*	4029003-P205	Silver mica: 2000 pf ±2%, 500 VDCW; sim to Electro Motive Type DM-20. Added by REV L in Models 4ER41A16, 18-21 Added by REV M in Model 4ER41A17 Added by REV K in Models 4ER41A34-39.
C70*	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW. Added by REV L in Models 4ER41A16, 18-21 Added by REV M in Model 4ER41A17 Added by REV K in Models 4ER41A34-39 Deleted in Models 4ER41A16, 18-21 by REV XB. Deleted in Model 4ER41A17 by REV XC. Deleted in Models 4ER41A34-39 by REV XA.
C71*	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Added by REV N in Models 4ER41A16, 18-21 Added by REV P in Model 4ER41A17 Added by REV M in Models 4ER41A34-39.
C73*	19B209243-P9	Polyester: 0.22 µf ±20%, 50 VDCW. Added by REV R in Models 4ER41A16, 18-21 Added by REV S in Model 4ER41A17 Added by REV P in Models 4ER41A34-39. Deleted in Models 4ER41A16, 18-21 by REV XB. Deleted in Model 4ER41A17 by REV XC. Deleted in Models 4ER41A34-39 by REV XA.
C78*	5494481-P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Added to Models 4ER41A16,18-21,34,35,37-39 by REV XE. Added to Model 4ER41A17 by REV XF. Added to Model 4ER41A36 by REV XD.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	7777146-P3	Germanium; sim to Type 1N90.
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	4031476-G1	Choke. Includes:
	7773023-P25	Tuning slug.
L4	5491736-P6	Choke: 3.5 mh ±10%, 2.5 ohms DC res max; sim to Aladdin 33-494.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.

SYMBOL	GE PART NO.	DESCRIPTION
Q4* and Q5*	19A115552-P1	Silicon, NPN: sim to Type 2N2714. Changed by REV N in Models 4ER41A16, 18-21 Changed by REV P in Model 4ER41A17 Changed by REV M in Models 4ER41A34-39. In Models earlier than REV above
	19A115123-P1	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.
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.
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.
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 N in Models 4ER41A16, 18-21 Deleted by REV P in Model 4ER41A17 Deleted by REV M in Models 4ER41A34-39.
R47	19B209115-P1	Variable, carbon film: 5000 ohms ±20%, 0.15 w sim to CTS Type UPE-70.

SYMBOL	GE PART NO.	DESCRIPTION
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.
R61	3R77-P221K	Composition: 220 ohms ±10%, 1/2 w.
R65*	3R77-P123K	Composition: 12,000 ohms ±10%, 1/2 w. Deleted by REV L in Models 4ER41A16, 18-21 Deleted by REV M in Model 4ER41A17 Deleted by REV K in Models 4ER41A34-39.
R66	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R73*	3R77-P203J	Composition: 20,000 ohms ±5%, 1/2 w. Added by REV L in Models 4ER41A16, 18-21 Added by REV M in Model 4ER41A17 Added by REV K in Models 4ER41A34-39. Deleted by REV R in Models 4ER41A16, 18-21 Deleted by REV S in Model 4ER41A17 Deleted by REV P in Models 4ER41A34-39.
R74*	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w. Added by REV N in Models 4ER41A16, 18-21 Added by REV P in Model 4ER41A17 Added by REV M in Models 4ER41A34-39.
R75*	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w. Added by REV N in Models 4ER41A16, 18-21 Added by REV P in Model 4ER41A17 Added by REV M in Models 4ER41A34-39.
R76*	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w. Added by REV R in Models 4ER41A16, 18-21 Added by REV S in Model 4ER41A17 Added by REV P in Models 4ER41A34-39. Deleted in Models 4ER41A16, 18-21 by REV XB. Deleted in Model 4ER41A17 by REV XC. Deleted in Models 4ER41A34-39 by REV XA.
R77*	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w. Added by REV R in Models 4ER41A16, 18-21 Added by REV S in Model 4ER41A17 Added by REV P in Models 4ER41A34-39.
R80*	3R152-P511J	Composition: 510 ohms ±5%, 1/4 w. Added by REV T in Models 4ER41A16, 18-21 Added by REV U in Model 4ER41A17 Added by REV S in Models 4ER41A34-39.
R82*	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w. Added to Models 4ER41A16, 18-21 by REV XB. Added to Model 4ER41A17 by REV XC. Added to Models 4ER41A34-39 by REV XA.
		- - - - - - - - - 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 19C303612-G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C41 and C42	19B209196-P1	Ceramic disc: 280 pf ±5%, 500 VDCW, temp coef -115 ±30 PPM.
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.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	19A121532-G1	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R56	3R152-P331J	Composition: 330 ohms ±5%, 1/4 w.
R57 and R58	3R152-P473J	Composition: 47,000 ohms ±5%, 1/4 w.
A319 and A322		CHANNEL GUARD A319 19C303550-G1 (4ER41A16-21) A322 19C303550-G2 (4ER41A34-39)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C3	5491459-P102	Polyester: 0.15 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C4	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C5 and C6	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C7	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C8*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW. Changed by REV U in Models 4ER41A16, 18-21 Changed by REV V in Model 4ER41A17 Changed by REV T in Models 4ER41A34-39. In Models earlier than REV above
	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C9 and C10	5491459-P102	Polyester: 0.15 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C11*	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW. Changed by REV U in Models 4ER41A16, 18-21 Changed by REV V in Model 4ER41A17 In Models earlier than REV above
	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C12	5495670-P14	Tubular: 5 µf +75% -10%, 25 VDCW; sim to Sprague 30D.
C13	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C14 and C15	5491459-P106	Polyester: .01 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C16 and C17	5491459-P110	Polyester: .0015 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C18	5491459-P111	Polyester: .0033 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C19*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW; sim to Good-All Type 601PE. Changed by REV U in Models 4ER41A16, 18-21 Changed by REV V in Model 4ER41A17 Changed by REV T in Models 4ER41A34-39. In Models earlier than REV above
	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C20	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C21*	5491459-P108	Polyester: .047 µf ±10%, 50 VDCW; sim to Good-All Type 601PE. Changed by REV M in Models 4ER41A16, 18-21 Changed by REV N in Model 4ER41A17 Changed by REV L in Models 4ER41A34-39. In Models earlier than REV above
	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C22	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C23*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW; sim to Good-All Type 601PE. Changed by REV U in Models 4ER41A16, 18-21 Changed by REV V in Model 4ER41A17 Changed by REV T in Models 4ER41A34-39. In Models earlier than REV above
	5491459-P112	Polyester: 0.47 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C24 and C25	5491459-P108	Polyester: .047 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C26 and C27	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C28*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW; sim to Good-All Type 601PE. Added by REV U in Models 4ER41A16, 18-21 Added by REV V in Model 4ER41A17
C29	5491459-P101	Polyester: .033 µf ±10%, 50 VDCW; sim to Good-All Type 601PE.
C30*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW; sim to Good-All Type 601PE. Added by REV U in Models 4ER41A16, 18-21 Added by REV V in Model 4ER41A17 Added by REV T in Models 4ER41A34-39.
C31*	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW; sim to Good-All Type 601PE. Added by REV U in Models 4ER41A16, 18-21 Added by REV V in Model 4ER41A17 Added by REV T in Models 4ER41A34-39.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	4038056-P1	Germanium.
CR3	19A115250-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J3 thru J6	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
J8 thru J10	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1*	19A115690-P2	Coil, RF: 880 mh ±5%, sim to Artted AC5672. Changed by REV U in Models 4ER41A16, 18-21 Changed by REV V in Model 4ER41A17 Changed by REV T in Models 4ER41A34-39. In Models earlier than REV above
	19B204554-G1	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q6	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R77-P752J	Composition: 7500 ohms ±5%, 1/2 w.
R3	3R77-P472J	Composition: 4700 ohms ±5%, 1/2 w.
R4 and R5	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R6	3R77-P560J	Composition: 56 ohms ±5%, 1/2 w.
R7	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R8 and R9	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R10	3R77-P752J	Composition: 7500 ohms ±5%, 1/2 w.
R11	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R12	3R77-P622J	Composition: 6200 ohms ±5%, 1/2 w.
R13	3R77-P271J	Composition: 270 ohms ±5%, 1/2 w.
R14	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.

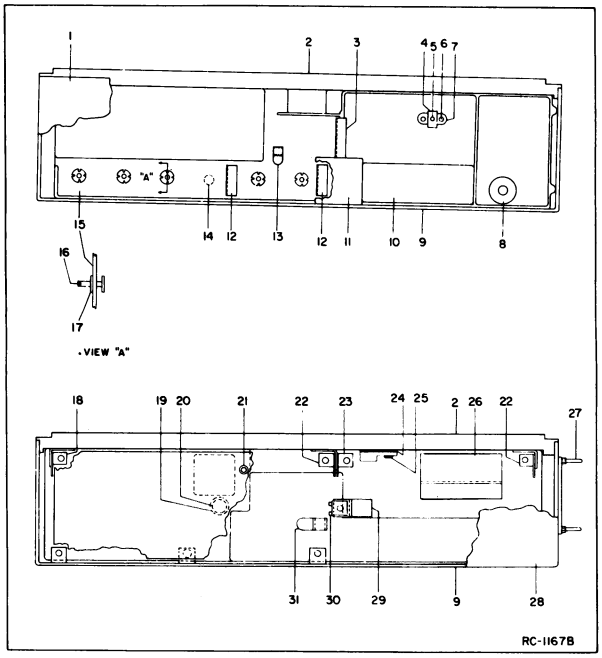
SYMBOL	GE PART NO.	DESCRIPTION
R15 and R16	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R17	3R77-P822J	Composition: 8200 ohms ±5%, 1/2 w.
R18	3R77-P823J	Composition: 82,000 ohms ±5%, 1/2 w.
R19	3R77-P123J	Composition: 12,000 ohms ±5%, 1/2 w.
R20	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R21	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R22 and R23	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R24*	3R77-P331J	Composition: 330 ohms ±5%, 1/2 w. Added in Models 4ER41A16, 18-21 by REV F. Added in Model 4ER41A17 by REV G. Added in Models 4ER41A34-39 by REV XB.
		In Models earlier than REV above
	3R77-P511J	Composition: 510 ohms ±5%, 1/2 w. Deleted in Models 4ER41A16, 18-21, 34-39 REV D. Deleted in Model 4ER41A17 by REV E.
R25	3R77-P201J	Composition: 200 ohms ±5%, 1/2 w.
R26*	3R77-P203J	Composition: 20,000 ohms ±5%, 1/2 w. Deleted in Models 4ER41A16, 18-21 by REV F. Deleted in Model 4ER41A17 by REV G. Deleted in Models 4ER41A34-39 by REV XB.
		In Models 4ER41A16, 18-21, 34-39 of REV C and earlier: In Model 4ER41A17 of REV D and earlier:
	3R77-P512J	Composition: 5100 ohms ±5%, 1/2 w.
R27	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R28	3R77-P512J	Composition: 5100 ohms ±5%, 1/2 w.
R29	3R77-P200J	Composition: 20 ohms ±5%, 1/2 w.
R30 and R31	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R32 and R33	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w.
R35	3R77-P302J	Composition: 3000 ohms ±5%, 1/2 w.
R36	3R77-P103J	Composition: 10,000 ohms ±5%, 11/2 w.
R37*	3R77-P184J	Composition: 0.18 megohm ±5%, 1/2 w.
		In Models 4ER41A16, 18-21, 34-39 REV C or earlier: In Model 4ER41A17 of REV D or earlier:
	3R77-P204J	Composition: 0.2 megohm ±5%, 1/2 w.
R38	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R39*	3R77-P512J	Composition: 5100 ohms ±5%, 1/2 w. Added in Models 4ER41A16, 18-21 by REV F. Added in Model 4ER41A17 by REV G. Added in Models 4ER41A34-39 by REV XB.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	5490525-P2	Audio freq: freq range 100 to 10,000 Hz, Pri: 35,000 ohms ±10% imp, 1200 ohms ±15% DC res, Sec 1: 2000 ohms imp, 250 ohms ±10% DC res, Sec 2: 2000 ohms imp, 250 ohms ±10% DC res.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL1	19A121920-G2	Reed: 7 pins rated at 1 amp at 500 VRMS with 3-11/32 inches of cable.
A335*		FIRST MIXER 19B204430-G11 (Added to 19E500810-G7-12, 25-30 by REV G)
		- - - - - - - - - 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, subminiature: approx 2.1-12-7 pf 750 v peak; sim to EF Johnson 189.

SYMBOL	GE PART NO.	DESCRIPTION
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-P12	Ceramic disc: .001 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	Toroidal 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.
		CHASSIS AND RF CIRCUIT 19E500810-G7 thru 12, 25 thru 30
		- - - - - - - - - CAPACITORS - - - - - - - - -
C301 thru C305		Refer to Mechanical Parts (RC-1167).
C307 thru C312	19B209135-P1	Ceramic, feed thru: 1000 pf +150%-0%, 500 VDCW.
C315* and C316*	5496267-P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Deleted in Models 4ER41A16, 18-21 by REV XA. Deleted in Model 4ER41A17 by REV XB. Deleted in Models 4ER41A34-39 by REV W.
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 in Models 4ER41A16, 18-21 by REV J. Added in Model 4ER41A17 by REV K. Added in Models 4ER41A34-39 by REV H.
C319*	5496267-P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Added to Models 4ER41A16, 18-21 by REV XA. Added to Model 4ER41A17 by REV XB. Added to Models 4ER41A34-39 by REV W.
C320*	19A115680-P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
		In Models 4ER41A16, 18-21, 34-39 of REV XB and earlier: In Model 4ER41A17 of REV XC and earlier:
	5496267-P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Added to Models 4ER41A16, 18-21 by REV XA. Added to Model 4ER41A17 by REV XB. Added to Models 4ER41A34-39 by REV W.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR301*	4037822-P1	Silicon. Added to Models 4ER41A16, 18-21, 34-39 by REV XD. Added to Model 4ER41A17 by REV XE.
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL301		Reed, detector: coil - 600 ohms ±10%, standard 7-pin tube socket mounting.
	19C307140-P670	67.0 Hz
	19C307140-P719	71.9 Hz
	19C307140-P770	77.0 Hz
	19C307140-P825	82.5 Hz
	19C307140-P885	88.5 Hz
	19C307140-P948	94.8 Hz
	19C307140-P1000	100.0 Hz
	19C307140-P1035	103.5 Hz
	19C307140-P1072	107.2 Hz

SYMBOL	GE PART NO.	DESCRIPTION
	19C307140-P1109	110.9 Hz
	19C307140-P1148	114.8 Hz
	19C307140-P1188	118.8 Hz
	19C307140-P1230	123.0 Hz
	19C307140-P1273	127.3 Hz
	19C307140-P1318	131.8 Hz
	19C307140-P1365	136.5 Hz
	19C307140-P1413	141.3 Hz
	19C307140-P1462	146.2 Hz
	19C307140-P1514	151.4 Hz
	19C307140-P1567	156.7 Hz
	19C307140-P1622	162.2 Hz
	19C307140-P1679	167.9 Hz
	19C307140-P1738	173.8 Hz
	19C307140-P1799	179.9 Hz
	19C307140-P1862	186.2 Hz
	19C307140-P1928	192.8 Hz
	19C307140-P2035	203.5 Hz
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - -
J441		(Part of W441).
J442	19B205689-G2	Jack: 16 19A115853-P1 contacts.
J443	19C303426-G1	Connector: 20 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L301	19B204461-G4	Coil.
L302	19B204461-G17	Coil.
L303	19B204461-G4	Coil.
L304	19B204461-G1	Coil.
L305	19B204461-G16	Coil.
L306	19B204461-G1	Coil.
L307*	19B204461-G13	Coil. Changed by REV S in Models 4ER41A16, 18, and 20. Changed by REV R in Models 4ER41A34, 36, and 38.
		In Models earlier than REV above
	19B204461-G4	Coil.
L308	19B204461-G6	Coil.
L309*	19B204461-G14	Coil. Changed by REV S in Models 4ER41A19 and 21 Changed by REV T in Model 4ER41A17 Changed by REV R in Models 4ER41A35, 37 and 39.
		In Models earlier than REV above
	19B204461-G3	Coil.
L310	19B204461-G5	Coil.
L315* and L316*	7488079-P16	Choke, RF: 10.0 µh ±10%, 0.60 ohms DC res max; sim to Jeffers 4421-7. Added to Models 4ER41A16, 18-21 by REV XA. Added to Model 4ER41A17 by REV XB. Added to Models 4ER41A34-39 by REV W.
		- - - - - - - - - - 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.
P322 thru P337	4029840-P2	Contact, electrical: sim to Amp 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q301*	19A116203-P2	Silicon, NPN. In Models 4ER41A16, 18-21 of REV H or earlier: In Model 4ER41A17 of REV J or earlier: In Models 4ER41A34-39 of REV G or earlier:
	19A115246-P1	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.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - 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. In Models 4ER41A16, 18-21 of REV H or earlier: In Model 4ER41A17 of REV J or earlier: In Models 4ER41A34-39 of REV G or earlier:
	19B209083-P1	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.
		- - - - - - - - - - CABLES - - - - - - - - - -
W441	19B205634-G2	Connector, coaxial: includes cable jack (J441), approx 5 inches long.
W442	19B205634-G4	Connector, coaxial: approx 5 inches long.
		MECHANICAL PARTS (SEE RC-1167)
1	7145451-P1	Cable clamp.
2	19C303495-G4	Station Receiver bottom cover.
	19C303385-G1	Mobile Receiver bottom cover.
3	19B204890-P1	(Not Used)
4	19C317344-P1	Heat sink.
5	19A121222-P1	Angle support. (Used with C311, 312 in 19C303472-G1, 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	Contact, electrical: sim to Malco 2700. (Part of XY1-4 in A308-313).
9	4039307-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	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 19C303472-G1, 2).
16	7162414-P1	Mounting ring, transistor socket: sim to Elco 757. (Used with Q1 in A301, 302).
17	19B204397-P1	(Not Used)
18	4036765-G2	(Not Used)
19	19D402607-P1	RF chassis. (Used in 19C303472-G1, 2).
20	4036765-G4	Screw: 6-32 threads. (Part of C301-305 in 19C303472-G1, 2).
21	7117825-P1	Spring, washer: sim to Tinnerman C4578B-632-24. (Part of C301-305 in 19C303472-G1, 2).
22	4036899-P4	(Not Used)
23		(Not Used)
24	19B204583-G3	Hinge.
25	4035439-P1	Transistor heat sink: sim to Birtcher 3AL-635-2R. (Used with Q10 in A318).
26	4036555-P1	Washer insulator: nylon. (Used with Q9, 10 in A318).
27	4035306-P11	Fiber washer. (Used with L1 in A318).
28	19B204583-G1	Hinge.
29	19A121284-P1	(Not Used)
30	19A121283-P1	(Not Used)

SYMBOL	GE PART NO.	DESCRIPTION
31	19A121229-G1	Angle support.
32	19B204583-G2	Hinge.
33	19A121676-P1	Guide pin: with 4-40 mounting thread.
34	19C303495-G3	Station Reveiver top cover. (Except Repeater and VM stations).
	19C303676-G2	Repeater and VM Station Receiver top cover.
	19C303385-G2	Mobile Station top cover.
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 4ER41A10-45

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 - Model 4ER41A17
To improve squelch clipping. Changed R37 on Channel Guard board A319-A322.

REV. D - Models 4ER41A16, 18-21, 34-39
REV. E - Model 4ER41A17
To improve Channel Guard reliability. Replaced R24 with a jumper and changed R26 on Channel Guard board A319-A322.

REV. E - Models 4ER41A16, 18-21, 34-39
REV. F - Model 4ER41A17
To improve receiver performance in areas of high signal level. Changed R3 to R16, R4 to R17 and added R15 to 2nd Mixer board A316.

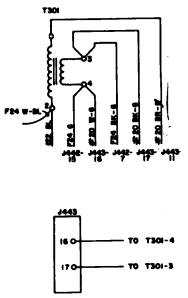
REV. F - Models 4ER41A16, 18-21
REV. G - Model 4ER41A17
To reduce noise falsing. Changed R24, R26 and added R39 to Channel Guard board A319-A322.

REV. G - Models 4ER41A16, 18-21
REV. H - Model 4ER41A17
REV. F - Models 4ER41A34-39
To improve audio response and raise maximum squelch sensitivity. Changed C37 and C53 on the IF Audio board A318.

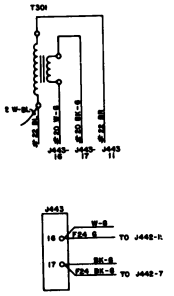
REV. H - Models 4ER41A16, 18-21
REV. J - Model 4ER41A17
REV. G - Models 4ER41A34-39
On single frequency units deleted CR1, R5 and added R19 on 1st Oscillator board A308/A313. To incorporate improved transistor and transformer. Changed Q301 and T301.

Schematic Diagram Changes

WAS



CHANGED TO



REV. J - Models 4ER41A16, 18-21
REV. K - Model 4ER41A17
REV. H - Models 4ER41A34-39
To eliminate audio howling caused by feedback within the cabling of the receiver. Added C318.

REV. K - Models 4ER41A16, 18-21
REV. L - Model 4ER41A17
REV. J - Models 4ER41A34-39
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 A314.

REV. L - Models 4ER41A16, 18-21
REV. M - Model 4ER41A17
REV. K - Model 4ER41A34-39
To increase maximum squelch sensitivity. Replaced C26 with C70, C52 with C67 and R65 with R73 on IF/Audio Assembly.

REV. M - Models 4ER41A16, 18-21
REV. N - Models 4ER41A17
REV. L - Models, 4ER41A34-39
To allow for variations in audio response. Changed C21 on Channel Guard Board A319/A322.

REV. N - Models 4ER41A16, 18-21
REV. P - Model 4ER41A17
REV. M - Models 4ER41A34-39
To provide better temperature compensation for low IF circuitry. Changed C7, C10, and C11 on 2nd Mixer Board A316. 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, and added R74, R75, and C71 on the IF/Audio Board A318.

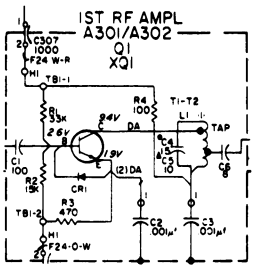
REV. P - Models 4ER41A16, 18-21
REV. R - Model 4ER41A17
REV. N - Models 4ER41A34-39
To improve temperature characteristics. Changed C4, C5, C7 through C16, L1, L2, L3, deleted L4 and changed L5 to L4 on 2nd Mixer Board A316.

REV. R - Models 4ER41A16, 18-21
REV. S - Model 4ER41A17
REV. P - Models 4ER41A34-39
To provide more uniform squelch performance and reduce squelch clipping. Changed R73, added C73 and R76 on IF/Audio Board A318.

REV. S - Models 4ER41A16, 18-21
REV. T - Model 4ER41A17
REV. R - Models 4ER41A34-39
To increase reliability of the RF Amplifier. Changed A301/A302 and L307/L309.

A301/A302 was:

A301/A302 was:



NOTE

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

REV. T - Models 4ER41A16, 18-21
REV. U - Model 4ER41A17
REV. S - Models 4ER41A34-39
To improve circuit DC bias stability of Audio Amplifier Q10. Added R80.

REV. U - Models 4ER41A16, 18-21
REV. V - Model 4ER41A17
REV. T - Models 4ER41A34-39
To facilitate the procurement of parts. Changed C8, C11, C19, C23 and L1 on A319/A322. Added C28 to A319. Added C30 and C31 to A319/A322.

REV. V - Models 4ER41A16, 18-21
REV. W - Model 4ER41A17
REV. U - Models 4ER41A34-39
To reduce receiver lock-up in areas of high RF signal level. Deleted C5 and added C26 on the 2nd Mixer Board A316.

REV. W - Models 4ER41A16, 18-21
REV. XA - Model 4ER41A17
REV. V - Models 4ER41A34-39
No changes. Revision letter assignment for record purposes only.

REV. XA - Models 4ER41A16, 18-21
REV. XB - Model 4ER41A17
REV. W - Models 4ER41A34-39

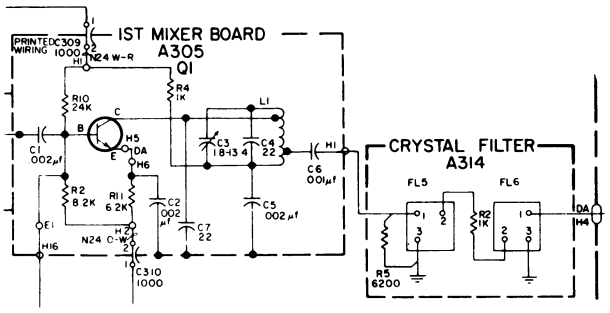
To improve selectivity. Changes FL5, deleted FL6 & R2 and added R8 on Crystal Filter A314.

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:



PRODUCTION CHANGES

REV. XB - Models 4ER41A16, 18-21
REV. XC - Model 4ER41A17
REV. XA - Models 4ER41A34-39
To eliminate squelch lock-up. Deleted C70, C73 and R76. Added C26 and R82 on A318 board.

REV. XB - Models 4ER41A34-39
To reduce noise falsing. Deleted R26 and added R24 & R39 to A322.

REV. XC - Models 4ER41A16, 18-21, 34-39
REV. XD - Model 4ER41A17
To eliminate capacitor failures in positive ground installations. Changed C20 in A318.

REV. XD - Models 4ER41A16, 18-21, 34-39
REV. XE - Model 4ER41A17
To protect the audio output transistor (Q301) from negative voltage spikes. Added CR301 in the 12-Volt supply line.

REV. XE - Models 4ER41A16, 18-21, 34-39
REV. XF - Model 4ER41A17
To eliminate high frequency oscillation in the receiver PA caused by the use of a higher gain PA transistor. Added C78 from A318 - J16 to ground.

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and G-E Part Number.

Service parts may be obtained from Authorized G-E Communication Equipment Service Stations or through any G-E Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. G-E Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-3594

DF-1085

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

PRINTED IN U.S.A.