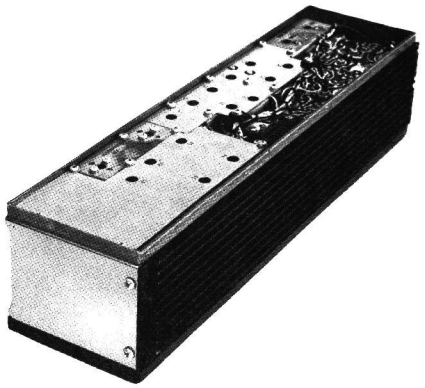
communications

MASTR Progress Line

25-50 MC RECEIVER MODELS 4ER39A19-27 & 4ER39A46-54 (WITH CHANNEL GUARD)



Maintenance Manual LBI-3591B

EP-39-A

SPECIFICATIONS *

FCC Filing Designation	**ER-39-A**
Frequency Range	25-50 MC
Audio Output	2 watts at less than 10% distortion (using Speaker Model 4EZ16A10)
Sensitivity	
12-db SINAD (EIA Method)	0.25 μv
20-db Quieting Method	0.35 μv
Selectivity	
EIA Two-Signal Method	-85 db (adjacent channel, 20 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 (narrow-band)
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)

Jul. 1083

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

GENERAL ELECTRIC

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

No one snould 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 is a double conversion, superheterodyne FM receiver with Channel Guard designed for operation on the 25-50 megacycle 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 Channel Guard board.

CIRCUIT ANALYSIS

The MASTR Progress Line Receiver 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 (A341)

RF Amplifier (A341) consists of two high-Q helical resonators and an RF amplifier stage (Q1). The RF signal from the antenna is coupled by an RF cable to a tap on L341/L343/L345. The tap is positioned to insure the proper impedance match to the antenna. RF energy is coupled through the two coils by an opening in the shield wall to the base of RF Amplifier Q1. The coils are tuned to the incoming frequency by air trimmer capacitors C341 and C342. The output of Q1 is coupled through three tuned circuits to the base of the first mixer.

1ST OSCILLATOR AND MULTIPLIER (A352-A357)

The receiver 1st oscillator operates in a transistorized Colpitts oscillator circuit. The oscillator crystal operates in a fundamental mode at a frequency of approximately 10 to 15 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.

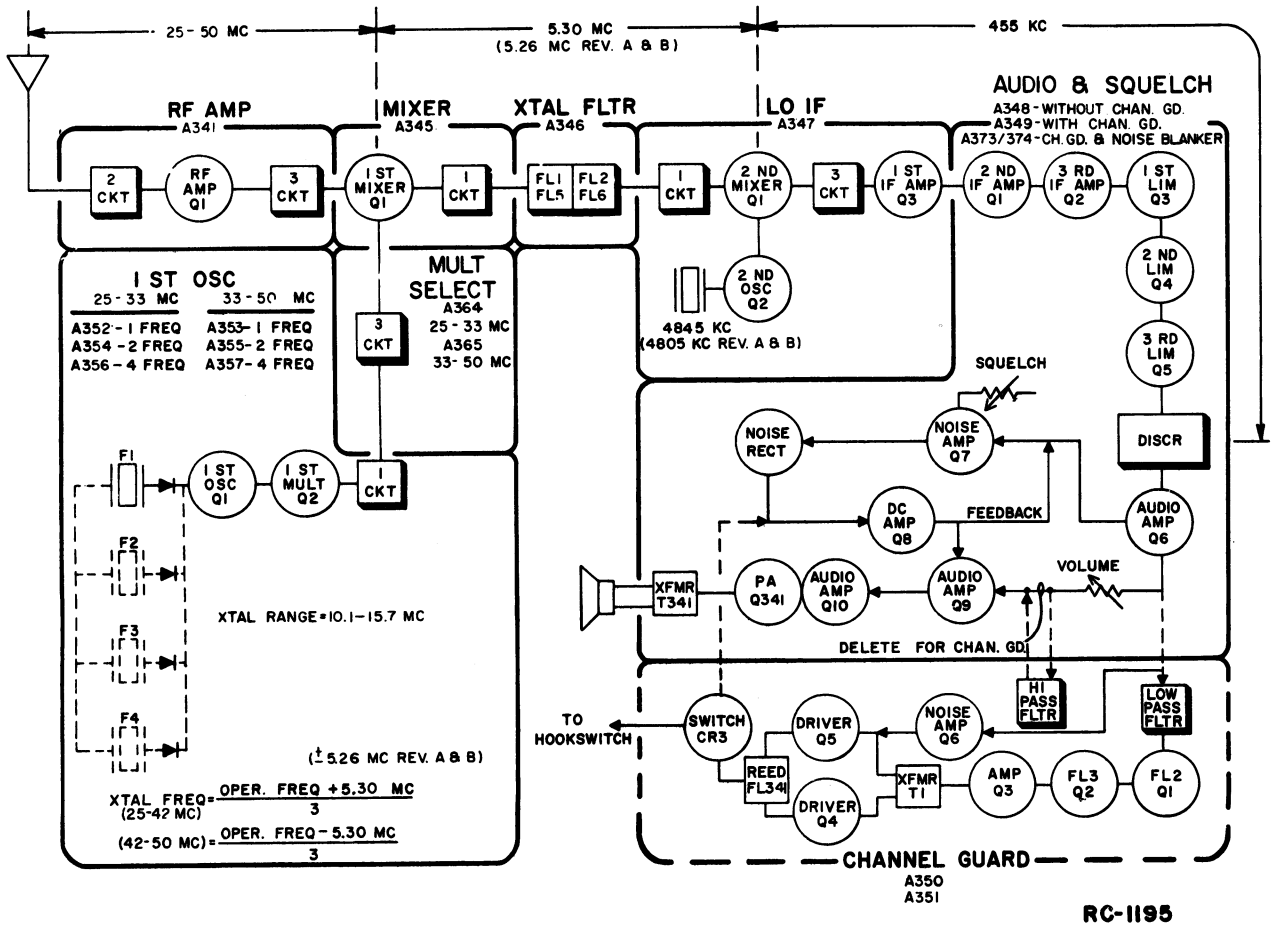


Figure 1 - Receiver Block Diagram

In single frequency receivers, bias for the oscillator transistor is obtained by a jumper from C363 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/C22. The output is coupled to the base of 1st multiplier Q2.

The output of the 1st multiplier is transformer-coupled (T3/T4) to multiplier selectivity assembly A364/A365. The 1st multiplier tank is tuned to three times the crystal frequency.

The stage is metered at centralized metering jack J442-4 through metering network CR1, R1, C7 and C8.

MULTIPLIER SELECTIVITY ASSEMBLY (A364/A365)

Following the 1st multiplier tank (T3/T4) are three additional tuned circuits (A364/A365-L1 -L2 and L3). Capacitor C12/C16 couples the multiplier selectivity output to the base of the first mixer.

1ST MIXER (A345) AND CRYSTAL FILTER (A346)

The RF signal from the RF amplifier and the injection voltage from the 1st multiplier are applied to the base of 1st mixer A345-Q2. The mixer collector tank (L2 and C3) is tuned to 5.3 megacycles (5.26 MC in Rev. A and B receivers) and provides impedance matching to the high IF filter.

The highly selective, two-stage crystal filter (FL5 and FL6) following the 1st mixer provides the major selectivity for the receiver. The output of the filter is fed through impedance matching transformer A347-T1 to the base of the 2nd mixer.

2ND OSCILLATOR, 2ND MIXER AND 1ST IF AMPLIFIER (A347)

The 2nd oscillator A347-Q2 operates in a Colpitts oscillator circuit, with feedback supplied through C2. Crystal Y1 maintains the oscillator frequency at 4845 KC (4805 KC in Rev. A and B receivers). The low-side injection voltage is fed to the base of the 2nd mixer.

The Hi-IF signal from the filter is fed to the base of 2nd mixer 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.

Capacitor C14 couples the low IF signal to the base of the 1st low IF amplifier, A347-Q3. The output of Q3 is RC coupled to the base of the 2nd IF amplifier.

2ND IF AMPLIFIERS AND LIMITERS (A349)

Following A347-Q3 are two additional RC coupled low IF amplifiers (A349-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 (A349-Q3, -Q4 and -Q5). The 1st limiter is metered at J442-3 through metering network C13, CR2, R18 and C15.

DISCRIMINATOR (A349)

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

1ST AUDIO AMPLIFIER (A349)

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 (A349)

When audio is present in the incoming signal, it is taken off the emitter of Q6 and connected to the VOLUME control through A349-J9. The VOLUME control arm connects to A349-J8 which feeds the audio signal to the base of the 2nd audio amplifier, Q9. C34, C53, C36, 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 and the squelch control fully clockwise (unsquelched). 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 Q341. 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 T341 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 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 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 Q341 are DC coupled, Q10 and Q341 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 in 12-volt systems.

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 (A350/A351)

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 A349-Q6 and is fed through A349-J9 to the VOLUME control and then to a high-pass filter (C20, C21, C22, C23 and L1) on the Channel Guard board through A349-J8, decoupling resistor R61 and A349-J12. The high-pass filter removes the tone from the audio signal, and the audio is then fed through A349-J13 to the base of Audio Amplifier A349-Q9.

To operate the Channel Guard Decoder, audio, tone and noise is picked up in the emitter circuit of A349-Q6 and is fed through A349-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, FL341. 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.

FL341 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 A349-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 A350/A351-J5, which forward biases diode CR3. This causes current to flow in the circuit, bypassing the decoder reed (FL341). 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 and channel guard board.

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.

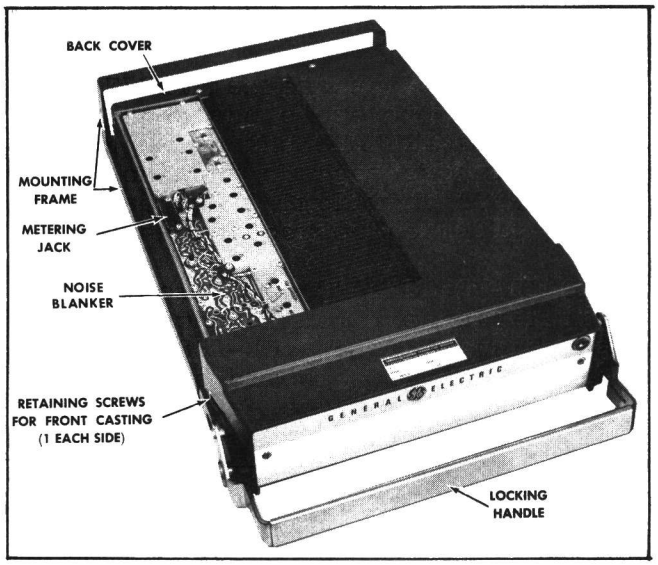


Figure 2 - Top Cover Removed

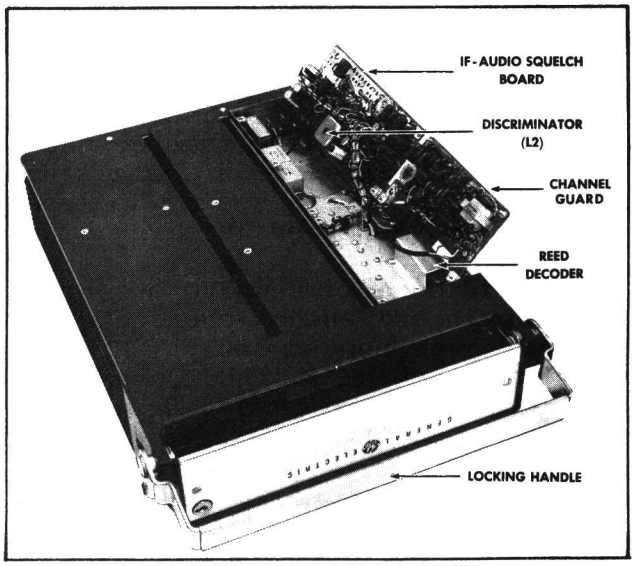


Figure 3 - Bottom Cover Removed

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. GE Test Set Model 4EX3A10 (or 20,000 ohms-per-volt Multimeter with a 1-volt scale).
2. A 455 kHz and 25-50 MHz signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

PRILIMINARY 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 fully counterclockwise and squelch control fully clockwise (receiver unsquelched) and Test Set in Position G, adjust R47 on 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).

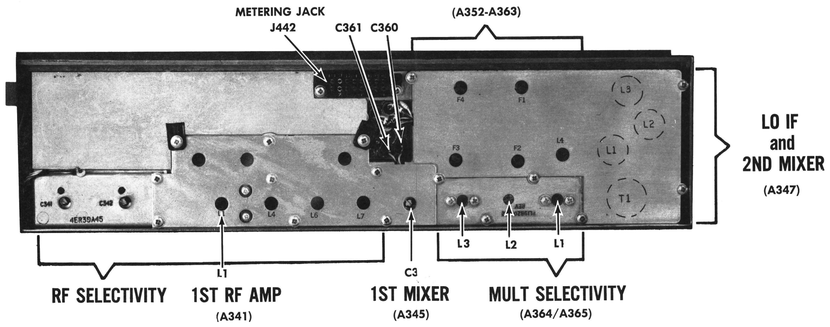
NOTE

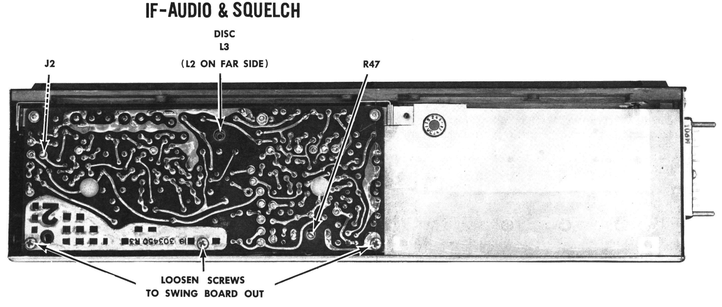
The adjustment of R47 should be made within 20 seconds after power is applied to the receiver. This will result in a reading of approximately 0.65 volts after the unit is fully warmed up.

3. With Test Set in Position J, check for regulated +10 volts. If using Multimeter, measure from C360 to C361.
4. If using Multimeter, connect the positive lead to J442-16 (Ground).
5. Disable Channel Guard (Models 4ER39A19-27 & 46-54 only).

ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	METERING POSITION Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			OSCILLATOR/MULTIPLIER		
1.	D (MULT-1)	Pin 4	L4 (on 1st OSC/MULT) and L1, L2 (on MULT SELECTIVITY)	See Procedure	Tune L4 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Then tune L2 for minimum meter reading. Change voltage scale if necessary.
			RF AMPLIFIER & SELECTIVITY		
2.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal adjacent to L7. Adjust the signal generator for discriminator zero.
3.	B (2nd IF Amp)	Pin 2	L1 (1st RF Amp). L6, L7, C341 and C342 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal to the antenna jack, keeping below saturation. Tune L1, L5, L7, C341, and C342 for maximum meter reading.
4.	"	"	L4 (1st OSC/MULT) and L1 and L2 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L4 on 1st OSC/MULT and L1 and L2 on MULT SELECTIVITY for maximum meter reading.
			FREQUENCY ADJUSTMENT		
5.	A (DISC)	Pin 10	C9 on 1st OSC (C10, C11 or 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.





COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Model 4EX3A10 (or 20,000 ohms-per-volt Multimeter with a 1-volt scale).
2. A 455 kHz and 25-50 MHz signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter 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 Receiver Centralized Metering Jack J442 and set meter sensitivity switch to the TEST 1 position.
2. Set crystal trimmer C9 to mid-capacity. In multi-frequency receivers, set C10, C11 or C12 to mid-capacity as required. 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.
3. With VOLUME control fully counterclockwise and squelch control fully clockwise (receiver unsquelched) and Test Set in Position G, adjust R47 on 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 results in a reading of approximately 0.65 volts after the unit is fully warmed up.

4. With Test Set in Position J, check for regulated +10 volts. If using Multimeter, measure from C360 to C361.
5. If using Multimeter, connect the positive lead to J442-16 (Ground).
6. 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 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) and L3 (bottom slug on IF-AUDIO & SQUELCH board)	1.7 volts (2.1 v. maximum)	Switch Test Set to TEST 3 position. Then alternately apply a 445-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.
3.	D (MULT-1)	Pin 4	L4 (on 1st OSC/MULT) and L1 on MULT SELECTIVITY (L2 & L3 (on MULT SELECTIVITY)	See Procedure	Tune L4 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Tune L2 for minimum meter reading. Change voltage scale if necessary. Then tune L3 for maximum meter reading. Repeat step 3.
			RF AMPLIFIER & SELECTIVITY		
4.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal adjacent to L7. Adjust the signal generator for discriminator zero.
5.	B (2nd IF AMP)	Pin 2	L7 and L6 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal and tune for maximum meter reading as shown below, keeping signal below saturation. Apply Signal Generator Probe to: L6 L1 — Tune: L7 L6
6.	"	"	C341, C342 and L1 (1st RF Amp)	Maximum	Apply an on-frequency signal to the antenna jack. Tune C341, C342 and L1 for maximum meter reading, keeping signal below saturation.
7.	"	"	L1 (1st RF Amp) L6, L7, C341, and C342 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L1, L6, L7, C341 and C342 for maximum meter reading.
8.	"	"	L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L2 & L3 (on MULT SELECTIVITY) for maximum meter reading.
			LO IF & 2ND MIXER		
9.	"	"	C3 (1st MIXER)		C3 does not peak, but provides impedance matching for the crystal filter input and should only be tuned when observing IF trace on oscilloscope.
10.	B (2nd IF AMP)	Pin 2	T1 (2nd MIXER)	Maximum	Apply an on-frequency signal as in Step 8, and tune T1 for maximum meter reading, keeping signal below saturation.
11.	"	"	L1, L2 and L3 (LO IF)	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 (C10, C11 or 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.

ALIGNMENT PROCEDURE

25—50 MHZ MASTR RECEIVER
MODELS 4ER39A19-27 &
MODELS 4ER39A46-54
(WITH CHANNEL GUARD)

TEST PROCEDURES

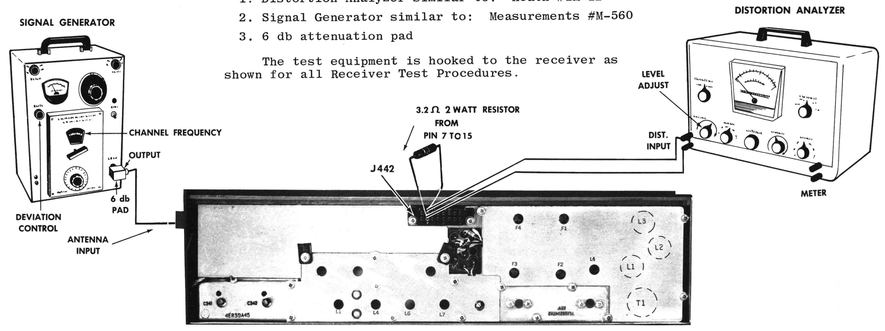
These Test Procedures are designed to help you service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect can 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 Trouble-shooting Procedure. Before starting with the Receiver Test Procedures, be sure the receiver is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

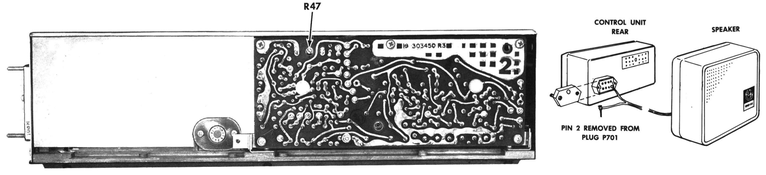
for test hookup shown:

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 hertz ±3.3 kHz 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.

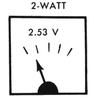
   OR

   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 ±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 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 (Q341) output current at J442-1. If reading is low-- a. Refer to Receiver Alignment Procedure for BIAS ADJ (R47). b. Check Q341. 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.

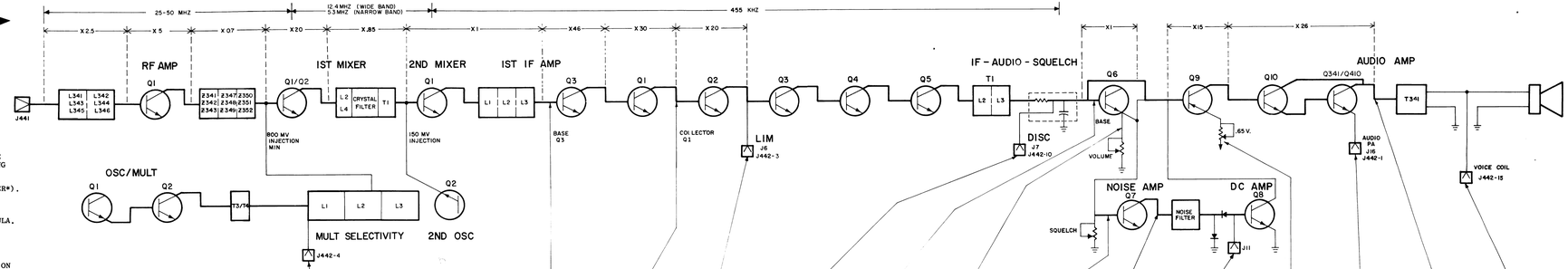
PROCEDURE:

1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, BASE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING 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.)

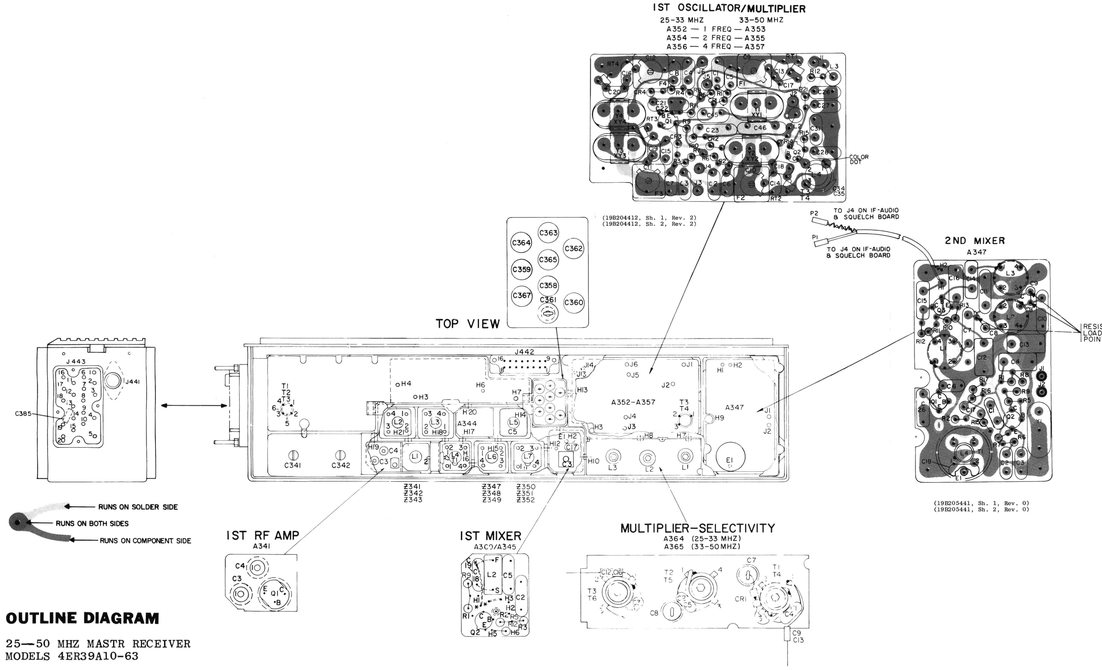
PRELIMINARY STEPS:

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	10 MICROVOLT UNMODULATED	STANDARD SIGNAL-(1000 MICROVOLTS AT RCVR FREQ MOD BY 1KHZ AT 3.3 KHZ (NBI OR 10 KHZ (WBI 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 FULLY COUNTERCLOCKWISE AND SQUELCH FULLY CLOCKWISE			ADJUST VOLUME CONTROL FOR RATED 2 WATT OUTPUT ACROSS 3.2 OHM LOAD
READING	2.4 VDC	GENERATOR OUTPUT SHOULD BE APPROX. 1000 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX. 300 MICROVOLTS	2 VDC	0.1 VAC	0.5 VAC	0.5 VAC	0.07 VAC	2.5 VAC	2.0 VDC	ADJUST FOR 0.65 VDC (SEE ALIGNMENT PROCEDURE)	0.65 VDC (SEE ALIGNMENT PROCEDURE)	7.0 VAC	2.53 VAC

* NEG. LEAD OF VTVM TO -10 V.

RC-1207C



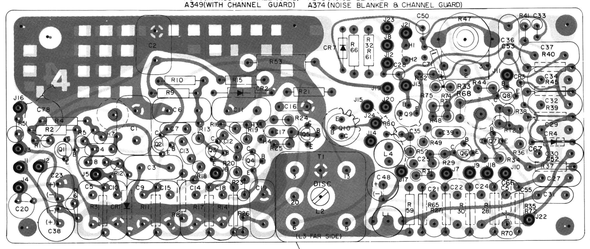
TRANSISTOR	EMITTER		BASE		COLLECTOR	
	+R	−R	+R	−R	+R	−R
A352/363-Q1	1K	1K	4.5K	2.8K	120Ω	170Ω
A352/363-Q2	55Ω	80Ω	1K	1K	110Ω	110Ω
A345-Q1	2.7K	2.7K	7.5K	3.8K	600Ω	600Ω
A341-Q1	450Ω	270Ω	800Ω	450Ω	350Ω	350Ω
A347-Q1	3.8K	5.3K	8.5K	2.9K	200Ω	200Ω
A347-Q2	2.7K	6.8K	5.5K	2.7K	200Ω	200Ω
A347-Q3	2.2K	2.3K	2.3K	2.2K	2.7K	3.2K
A348/374-Q1	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A348/374-Q2	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A348/374-Q3	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A348/374-Q4	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A348/374-Q5	1.0K	1.0K	7K	2.8K	350Ω	350Ω
A348/374-Q6	42.2K	P2 MEG	36.0K	2.5K	0	0
A348/374-Q7	1.7K	1.7K	11.0K	9.0K	7.0K	16K
A348/374-Q8	180Ω	180Ω	100K	2.8K	11.0K	16K
A348/374-Q9	2.2K	2.2K	4.1K	45K	2.3K	2.3K
A348/374-Q10	40Ω	35Ω	2.2K	2.3K	40Ω	36Ω
Q341	1Ω	1Ω	40Ω	35Ω	40Ω	36Ω

* READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS.

(19B620741, Rev. 23)

IF-AUDIO & SQUELCH BOARD

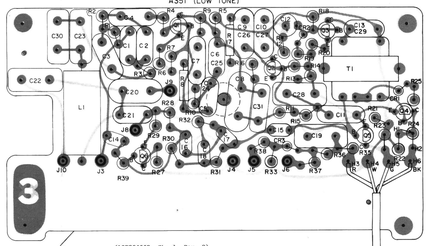
A348 (WITHOUT CHANNEL GUARD) A373 (NOISE BLANKER)
A349 (WITH CHANNEL GUARD) A374 (NOISE BLANKER & CHANNEL GUARD)



(19C303431, Sh. 1, Rev. 4)
(19C303431, Sh. 2, Rev. 4)

CHANNEL GUARD

A350 (HI TONE)
A351 (LOW TONE)

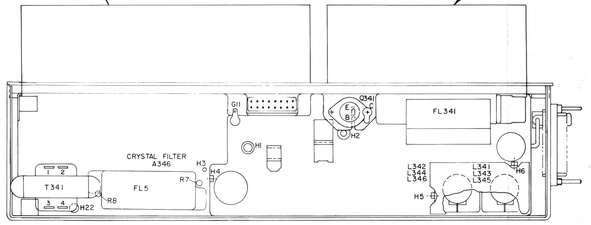


(19B204553, Sh. 1, Rev. 3)
(19B204553, Sh. 2, Rev. 3)

TO DECODER REED FL341

XFL1

BOTTOM VIEW



TRANSISTOR	EMITTER		BASE		COLLECTOR	
A350/351	+R	−R	+R	−R	+R	−R
Q1	50Ω	50Ω	8.2K	4.5K	0.5K	8.2K
Q2	270Ω	270Ω	8K	500Ω	5K	5.5K
Q3	1K	1K	75K	3K	1K	1K
Q4	0	0	1K	45Ω	1K	1K
Q5	0	0	1K	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 C361 (+10V) TO C360 (−10), AND ARE MEASURED FROM TRANSISTOR PINS TO C361, + OR — SIGNS SHOW METER LEAD TO C361.

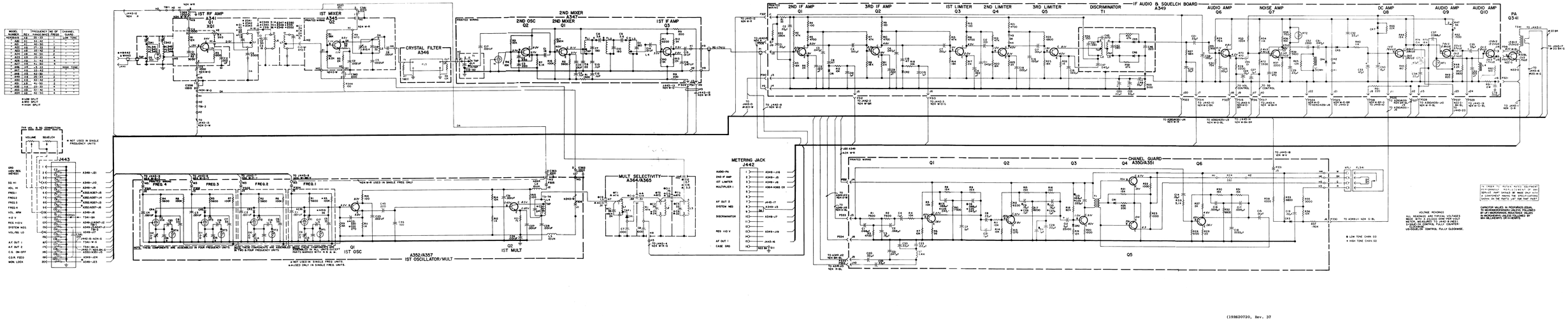
CAUTION

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

OUTLINE DIAGRAM

25—50 MHZ MASTR RECEIVER
MODELS 4ER39A10-63



(19B620720, Rev. 37

SCHEMATIC DIAGRAM

25—50 MHZ MASTR RECEIVER
MODELS 4ER39A19-27 &
MODELS 4ER39A46-54
(WITH CHANNEL GUARD)

PARTS LIST

LBI-3536A

25-50 MHz RECEIVER WITH CHANNEL GUARD
MODELS 4ER39A19-27, 46-54

4ER39A19, 22-27 (19E500809- G10, 13-18) REV XB
4ER39A20 and 21 (19E500809-G11 and 12) REV XC
4ER39A46-54 (19E500809-G37-45) REV XB

SYMBOL	G-E PART NO.	DESCRIPTION
A341		RF AMPLIFIER ASSEMBLY 19B204772-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481-P12	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C2	5494481-P14	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C3 and C4	5493392-P7	Ceramic, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	4038642-P1	Germanium. (Deleted by Rev C).
		- - - - - - - - - - TRANSISTORS - - - - - - - -
Q1	19A115342-P1	Silicon, NPN; sim to Type 2N918.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P123K	Composition: 12,000 ohms ±10%, 1/4 w.
R2	3R152-P302K	Composition: 3000 ohms ±10%, 1/4 w.
R3	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
R4	3R152-P391K	Composition: 390 ohms ±10%, 1/4 w.
		- - - - - - - - - - - SOCKETS - - - - - - - - - -
XQ1	5490277-P1	Transistor, mica-filled phen: 4 contacts rated at 1 amp at 400 VRMS; sim to Elco 3303.
A345		FIRST MIXER ASSEMBLY 19B204430-G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5494481-P14	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. Deleted in Models 4ER39A46-54 by Rev P. Deleted in Models 4ER39A19, 22-27 by Rev R. Deleted in Models 4ER39A20 and 21 by Rev S.
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.
C18*	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM. In Models 4ER39A46-54 of Rev T and earlier: In Models 4ER39A19, 22-27 of Rev U and earlier: In Models 4ER39A20 and 21 of Rev V and earlier:
	5496218-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM. Added in Models 4ER39A46-54 by Rev P. Added in Models 4ER39A19, 22-27 by Rev R. Added in Models 4ER39A20 and 21 by Rev S.
		- - - - - - - - - - TERMINALS - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - - - INDUCTORS - - - - - - - -
L2	19A121082-G2	Toroidal coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - -
Q2	19A115245-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P563J	Composition: 56,000 ohms ±5%, 1/4 w.
R2	3R152-P822J	Composition: 8200 ohms ±5%, 1/4 w.
R3	3R152-P202J	Composition: 2000 ohms ±5%, 1/4 w.
R4*	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w. Deleted in Models 4ER39A46-54 by Rev M. Deleted in Models 4ER39A19, 22-27 by Rev N. Deleted in Models 4ER39A20 and 21 by Rev P.
R5	3R152-P390J	Composition: 39 ohms ±5%, 1/4 w.
R9*	3R152-P471K	Composition: 470 ohms ±5%, 1/4 w. Added in Models 4ER39A46-54 by Rev M. Added in Models 4ER39A19, 22-27 by Rev N. Added in Models 4ER39A20 and 21 by Rev P.
A346*		CRYSTAL FILTER ASSEMBLY 19B204616-G3 Used in units of Rev C. Units of Rev B or earlier used Crystal Filter Assembly, 19B204616-G1 (see below).
		- - - - - - - - - - - FILTERS - - - - - - - - - -
FL5*	19B206692-G1	Bandpass. In Models 4ER39A46-54 of Rev T and earlier: In Models 4ER39A19, 22-27 of Rev U and earlier: In Models 4ER39A20 and 21 of Rev V and earlier:
	19C304094-G4	Bandpass.
FL6*	19C304094-G4	Bandpass. Deleted in Models 4ER39A46-54 by Rev U. Deleted in Models 4ER39A19, 22-27 by Rev V. Deleted in Models 4ER39A20 and 21 by Rev W.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152-P432K	Composition: 4300 ohms ±10%, 1/4 w. Deleted in Models 4ER39A46-54 by Rev U. Deleted in Models 4ER39A19, 22-27 by Rev V. Deleted in Models 4ER39A20 and 21 by Rev W.
R2*	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w. Deleted in Models 4ER39A46-54 by Rev U. Deleted in Models 4ER39A19, 22-27 by Rev V. Deleted in Models 4ER39A20 and 21 by Rev W.
R7*	3R152-P562K	Composition: 5600 ohms ±10%, 1/4 w. Added in Models 4ER39A46-54 by Rev U. Added in Models 4ER39A19, 22-27 by Rev V. Added in Models 4ER39A20 and 21 by Rev W.
R8*	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w. Added in Models 4ER39A46-54 by Rev U. Added in Models 4ER39A19, 22-27 by Rev V. Added in Models 4ER39A20 and 21 by Rev W.
A346*		CRYSTAL FILTER ASSEMBLY 19B204616-G1 In Models of Rev B or earlier.
		- - - - - - - - - - - FILTERS - - - - - - - - - -
FL1 and FL2	19C304094-G1	Bandpass.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P432K	Composition: 4300 ohms ±10%, 1/4 w.
R2	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
A347		SECOND MIXER ASSEMBLY 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%, 50 VDCW. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	5491189-P106	Polyester: 0.1 µf ±20%, 50 VDCW.
C5*	19B209243-P4	Polyester: .033 µf ±20%, 50 VDCW. Deleted in Models 4ER39A46-54 by Rev T. Deleted in Models 4ER39A19, 22-27 by Rev U. Deleted in Models 4ER39A20 and 21 by Rev V. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	5491189-P103	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. In Models 4ER39A46-54 of Rev M; In Models 4ER39A19, 22-27 of Rev N: In Models 4ER39A20 and 21 of Rev P:
	5496219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM. In Models 4ER39A46-54 of Rev K and earlier: In Models 4ER39A19, 22-27 of Rev L and earlier: In Models 4ER39A20 and 21 of Rev M and earlier:
	5496219-P666	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C8* and C9*	5491601-P140	Tubular: 3.6 pf ±5%, 500 VDCW. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	5491601-P28	Tubular: 2.7 pf ±10%, 500 VDCW.
C10* and C11*	5486219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef 150 PPM. In Models 4ER39A46-54 of Rev M: In Models 4ER39A19, 22-27 of REV N: In Models 4ER39A20 and 21 of Rev P:
	5496219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM. In Models 4ER39A46-54 of Rev K and earlier: In Models 4ER39A19, 22-27 of Rev L and earlier: In Models 4ER39A20 and 21 of Rev M and earlier:
	5496219-P666	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12* and C13*	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	5491189-P106	Polyester: 0.01 µf ±20%, 50 VDCW.
C14* and C15*	19B209243-P1	Polyester: 0.01 µf ±20%, 50 VDCW. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	5491189-P101	Polyester: 0.01 µf ±20%, 50 VDCW.
C16*	19B209243-P5	Polyester: 0.47 µf ±20%, 50 VDCW. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	5491189-P104	Polyester: .047 µf ±20%, 50 VDCW.
C17	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C26*	19B209243-P1	Polyester: 0.01 µf ±20%, 50 VDCW. Added in 4ER39A46-54 by Rev T. Added in 4ER39A19, 22-27 by Rev U. Added in 4ER39A20 and 21 by Rev V.
		- - - - - - - - - - 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 4038368-P1. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	19C303464-G1	Coil. Includes tuning slug 7160519-P2.
L2*	19C311181-G6	Coil. Includes tuning slug 4038368-P1. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	19C303464-G2	Coil. Includes tuning slug 7160519-P2.
L3*	19C311181-G6	Coil. Includes tuning slug 4038368-P1. In Models 4ER39A46-54 of Rev M and earlier: In Models 4ER39A19, 22-27 of Rev N and earlier: In Models 4ER39A20 and 21 of Rev P and earlier:
	19C303464-G3	Coil. Includes tuning slug 7160519-P2.
L4*		(Part of T1). Deleted in Models 4ER39A46-54 by Rev N. Deleted in Models 4ER39A19, 22-27 by Rev P. Deleted in Models 4ER39A20 and 21 by Rev R.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029840-P2	Contact, electrical: solder coated brass: 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; sim to Type 2N2712.
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-P104K	Composition: 0.4 megohm ±10%, 1/4 w. Deleted in Models 4ER39A19, 22-27, 46-54 by Rev E. Deleted in Models 4ER39A20 and 21 by Rev F. In Models 4ER39A19, 22-27, 46-54 of Rev D or earlier: In Models 4ER39A20 and 21 of Rev E or earlier:
	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R4*	3R152-P394K	Composition: 0.39 megohm ±10%, 1/4 w. Deleted in Models 4ER39A19, 22-27, 46-54 by Rev E. Deleted in Models 4ER39A20 and 21 by Rev F. In Models 4ER39A19, 22-27, 46-54 of Rev D or earlier: In Models 4ER39A20 and 21 of Rev E or earlier:
	3R152-P333K	Composition: 33,000 ohms ±10%, 1/4 w.
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 in Models 4ER39A19, 22-27, 46-54 by Rev E. Added in Models 4ER39A20 and 21 by Rev F. Deleted in Models 4ER39A46-54 by Rev U. Deleted in Models 4ER39A19, 22-27 by Rev V. Deleted in Models 4ER39A20 and 21 by Rev W.
R16*	3R152-P104K	Composition: 0.10 megohm ±10%, 1/4 w. Added in Models 4ER39A19, 22-27, 46-54 by Rev E. Added in Models 4ER39A20 and 21 by Rev F.
R17*	3R152-P394K	Composition: 0.39 megohm ±10%, 1/4 w. Added in Models 4ER39A19, 22-27, 46-54 by Rev E. Added in Models 4ER39A20 and 21 by Rev F.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T1		COIL ASSEMBLY 19B204414-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C18	5496218-P261	Ceramic disc: 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798-P3	Tuning slug.
		- - - - - - - - - - - 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.
A349		IF/AUDIO ASSEMBLY 19D402327-G4
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A115028-P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C2	19A115028-P108	Polyester: 0.015 µf ±20%, 200 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	5496219-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-P103	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Models 4ER39A19, 22-27, 46-54 of Rev V and earlier: In Models 4ER39A20 and 21 of Rev W and earlier:
	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague 150D.
C21	19B209243-P17	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%, 500 VDCW; sim to RMC Type JF Discap.
C27	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C29	19B209243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C31	19B209243-P5	Polyester: .047 µf ±20%, 50 VDCW.
C32	19B209243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C33	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague 150D.
C34	19B209243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C35	5496267-P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague 150D.
C37*	19A115028-P305	Polyester: .0068 µf ±10%, 200 VDCW. In Models 4ER39A46-54 of Rev E and earlier: In Models 4ER39A19, 22-27 of Rev F and earlier: In Models 4ER39A20 and 21 of Rev G and earlier:
	19A115028-P303	Polyester: .0033 µf ±10%, 200 VDCW.
C38	19A115680-P107	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TT.
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 150D.
C52	4029003-P16	Silver mica: .0022 µf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C53*	19A115028-P315	Polyester: 0.15 µf ±10%, 200 VDCW. In Models 4ER39A46-54 of Rev E or earlier: In Models 4ER39A19, 22-27 of Rev F or earlier: In Models 4ER39A20 and 21 of Rev G or earlier:
	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C55	5491189-P1	Polyester: .01 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C71*	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW. Added in Models 4ER39A46-54 by Rev L. Added in Models 4ER39A19, 22-27 by Rev M. Added in Models 4ER39A20 and 21 by Rev N.
C78*	5494481-P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Added in Models 4ER39A19, 22-27, 46-54 by Rev XB. Added in Models 4ER39A20 and 21 by Rev XC.
		- - - - - - DIODES AND RECTIFIERS - - - - -
CR1 and CR2	4038056-P1	Germanium.
CR3 and CR4	19A11250-P1	Silicon.
CR7	19A11250-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.
Q4* and Q5*	19A115552-P1	Silicon, NPN; sim to Type 2N2712. In Models 4ER39A46-54 of Rev K and earlier: In Models 4ER39A19, 22-27 of Rev L and earlier: In Models 4ER39A20 and 21 of Rev M and earlier:
	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q6	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q7	19A115889-P1	Silicon, NPN; sim to Type 2N2712.
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-P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R34	3R77-P113J	Composition: 11,000 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-P113J	Composition: 11,000 ohms ±5%, 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 in Models 4ER39A46-54 by Rev L. Deleted in Models 4ER39A19, 22-27 by Rev M. Deleted in Models 4ER39A20 and 21 by Rev N.
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-P512J	Composition: 5100 ohms ±5%, 1/2 w.
R61	3R77-P221K	Composition: 220 ohms ±10%, 1/2 w.
R65	3R77-P123K	Composition: 12,000 ohms ±10%, 1/2 w.
R66	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R70	3R77-P471J	Composition: 470 ohms ±5%, 1/2 w.
R72	3R77-P332J	Composition: 3300 ohms ±5%, 1/2 w.
R74*	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w. Added in Models 4ER39A46-54 by Rev L. Added in Models 4ER39A19, 22-27 by Rev M. Added in Models 4ER39A20 and 21 by Rev N.
R75*	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w. Added in Models 4ER39A46-54 by Rev L. Added in Models 4ER39A19, 22-27 by Rev M. Added in Models 4ER39A20 and 21 by Rev N.
R80*	3R152-P511J	Composition: 510 ohms ±5%, 1/4 w. Added in Models 4ER39A46-54 by Rev R. Added in Models 4ER39A19, 22-27 by Rev S. Added in Models 4ER39A20 and 21 by Rev T.
		- - - - - - - - - - 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	19A11250-P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L2 and L3	19A121532-G1	Coil. Includes tuning slug 7160519-P1.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R56	3R152-P331J	Composition: 330 ohms ±5%, 1/4 w.
R57 and R58	3R152-P473J	Composition: 47,000 ohms ±5%, 1/4 w.
A350 and A351		CHANNEL GUARD A350 19C303550-G1 (4ER39A19-27) A351 19C303550-G2 (4ER39A46-54)
		- - - - - - - - - - CAPACITORS - - - - - - - -
C1 and C2	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW.
C3	5491459-P102	Polyester: 0.15 µf ±10%, 50 VDCW.
C4	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW.
C5 and C6	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW.
C7	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW.
C8*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW. In Models 4ER39A46-54 of Rev R and earlier: In Models 4ER39A19, 22-27 of Rev S and earlier: In Models 4ER39A20 and 21 of Rev T and earlier:
	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW.
C9 and C10	5491459-P102	Polyester: 0.15 µf ±10%, 50 VDCW.
C11*	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW. In Models 4ER39A46-54 of Rev R and earlier: In Models 4ER39A19, 22-27 of Rev S and earlier: In Models 4ER39A20 and 21 of Rev T and earlier:
	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW.
C12	5495670-P14	Tubular: 5 µf +75% -10%, 25 VDCW; sim to Sprague 30D.
C13	5491459-P104	Polyester: 0.068 µf ±10%, 50 VDCW.
C14 and C15	5491459-P106	Polyester: .01 µf ±10%, 50 VDCW.
C16 and C17	5491459-P110	Polyester: .0015 µf ±10%, 50 VDCW.
C18	5491459-P111	Polyester: .0033 µf ±10%, 50 VDCW.
C19*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW. In Models 4ER39A46-54 of Rev R and earlier: In Models 4ER39A19, 22-27 of Rev S and earlier: In Models 4ER39A20 and 21 of Rev T and earlier:
	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW.
C20	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW.
C21*	5491459-P108	Polyester: .047 µf ±10%, 50 VDCW. In Models 4ER39A46-54 of Rev J and earlier: In Models 4ER39A19, 22-27 of Rev K and earlier: In Models 4ER39A20 and 21 of Rev L and earlier:
	5491459-P104	Polyester: .068 µf ±10%, 50 VDCW.
C22	5491459-P109	Polyester: 0.33 µf ±10%, 50 VDCW.
C23*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW. In Models 4ER39A46-54 of Rev R and earlier: In Models 4ER39A19, 22-27 of Rev S and earlier: In Models 4ER39A20 and 21 of Rev T and earlier:
	5491459-P112	Polyester: 0.47 µf ±10%, 50 VDCW.
C24 and C25	5491459-P108	Polyester: .047 µf ±10%, 50 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
C26 and C27	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW.
C28	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW.
C29	5491459-P101	Polyester: .033 µf ±10%, 50 VDCW.
C30*	5491459-P103	Polyester: 0.22 µf ±10%, 50 VDCW. Added in Models 4ER39A46-54 by Rev S. Added in Models 4ER39A19, 22-27 by Rev T. Added in Models 4ER39A20 and 21 by Rev U.
C31*	5491459-P105	Polyester: 0.1 µf ±10%, 50 VDCW. Added in Models 4ER39A46-54 by Rev S. Added in Models 4ER39A19, 22-27 by Rev T. Added in Models 4ER39A20 and 21 by Rev U.
		- - - - - - 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. In Models 4ER39A46-54 of Rev R and earlier: In Models 4ER39A19, 22-27 of Rev S and earlier: In Models 4ER39A20 and 21 of Rev T and earlier:
	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.
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 4ER39A19, 22-27 by Rev F. Added in Models 4ER39A20 and 21 by Rev G.
	3R77-P511J	Composition: 510 ohms ±5%, 1/2 w. Deleted in Models 4ER39A19, 22-27, 46-54 by Rev D. Deleted in Models 4ER39A20 and 21 by Rev E.

SYMBOL	G-E PART NO	DESCRIPTION
R25	3R77-P201J	Composition: 200 ohms ±5%, 1/2 w.
R26*	3R77-P203J	Composition: 20,000 ohms ±5%, 1/2 w. Deleted in Models 4ER39A19, 22-27 by Rev F. Deleted in Models 4ER39A20 and 21 by Rev G. Deleted in Models 4ER39A46-54 by Rev V.
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%, 1/2 w.
R37*	3R77-P184J	Composition: 0.18 megohm ±5%, 1/2 w. In Models of Rev C or earlier:
	3R77-P204J	Composition: 0.20 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 4ER39A19, 22-27 by Rev F. Added in Models 4ER39A20 and 21 by Rev G. Added in Models 4ER39A46-54 by Rev V.
		- - - - - - - - - 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, mica-filled phen: 7 pins rated at 1 amp at 500 VRMS.
A352 thru A357		FIRST OSCILLATOR ASSEMBLY A352 19B204419-G13 (4ER39A19 and 46) A353 19B204419-G16 (4ER39A20, 21, 47, 48) A354 19B204419-G14 (4ER39A22 and 49) A355 19B204419-G17 (4ER39A23, 24, 50, 51) A356 19B204419-G15 (4ER39A25 and 52) A357 19B204419-G18 (4ER39A26, 27, 53, 54)
		- - - - - - - - - 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.
C22	5496219-P773	Ceramic disc: 270 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: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. Deleted in Models 4ER39A46-54 by Rev M. Deleted in Models 4ER39A19, 22-27 by Rev N. Deleted in Models 4ER39A20 and 21 by Rev P.
C25*	5496219-P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM. Deleted in Models 4ER39A46-54 by Rev M. Deleted in Models 4ER39A19, 22-27 by Rev N. Deleted in Models 4ER39A20 and 21 by Rev P.

SYMBOL	G-E PART NO	DESCRIPTION
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.
C45*	5490008-P35	Silver mica: 220 pf ±5%, 500 VDCW. Added in Models 4ER39A46-54 by Rev M. Added in Models 4ER39A19, 22-27 by Rev N. Added in Models 4ER39A20 and 21 by Rev P.
C46*	5496219-P563	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -330 PPM. Added in Models 4ER39A46-54 by Rev M. Added in Models 4ER39A19, 22-27 by Rev N. Added in Models 4ER39A20 and 21 by Rev P.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	19A115348-P1	Silicon. Deleted in Models 4ER39A46-54 by Rev G. Deleted in Models 4ER39A19, 22-27 by Rev H. Deleted in Models 4ER39A20 and 21 by Rev J.
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%, 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 4ER39A46-54 by Rev G. Deleted in Models 4ER39A19, 22-27 by Rev H. Deleted in Models 4ER39A20 and 21 by Rev J.
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. Deleted in Models 4ER39A46-54 by Rev M. Deleted in Models 4ER39A19, 22-27 by Rev N. Deleted in Models 4ER39A20 and 21 by Rev P.
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 in Models 4ER39A46-54 by Rev G. Added in Models 4ER39A19, 22-27 by Rev H. Added in Models 4ER39A20 and 21 by Rev J.
R21*	3R152-P750J	Composition: 75 ohms ±5%, 1/4 w. Added in Models 4ER39A46-54 by Rev M. Added in Models 4ER39A19, 22-27 by Rev N. Added in Models 4ER39A20 and 21 by Rev P.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1 thru RT4	19B209284-P5	Disc: 43 ohms res nominal at 25°C, color code green.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - TRANSFORMERS - - - - - - -
T3* and T4*		COIL ASSEMBLY T3* 19B205416-G1 (4ER39A19, 23-25, 46, 50-52) In Models 4ER39A19, 23-25 of Rev M and earlier: In Models 4ER39A46, 50-52 of Rev L and earlier: 19B204763-G1 T4* 19B205416-G2 (4ER39A20-22, 26, 27, 47-49, 53, 54) In Models 4ER39A20, 21 in Rev N and earlier: In Models 4ER39A22, 26, 27 in Rev M and earlier: In Models 4ER39A47-49, 53, 54 in Rev L and earlier: 19B204763-G2
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C34	5496218-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C35	5496218-P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L4	19A121464-P2	Coil. Includes tuning slug 5491798-P5.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (RC-1199).
		- - - - - - - - - - CRYSTALS - - - - - - - - -
		When reordering give GE Part No. and specify exact freq needed. 25-42 MHz crystal freq = (OF +5.26 MHz) - 3. 42-50 MHz crystal freq = (OF -5.26 MHz) - 3.
Y1 thru Y4	19B206576-P1	Quartz: freq range 10086.666 to 12753.333 KHz, temp range -30°C to +85°C. (25-33 MHz).
Y1 thru Y4	19B206576-P2	Quartz: freq range 12753.333 to 15753.333 KHz, temp range -30°C to +85°C. (33-42 MHz).
Y1 thru Y4	19B206576-P3	Quartz: freq range 12246.666 to 16246.666 KHz, temp range -30°C to +85°C. (42-50 MHz).
A364* and A365*		MULTIPLIER SELECTIVITY ASSEMBLY A364 19B205326-G1 (4ER39A19, 22, 25, 46, 49,52) A365 19B205326-G2 (4ER39A20, 21, 23, 24, 26,27 47,48,50,51,53,54)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	5496218-P252	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C4 and C5	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C6	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C7 and C8	5493392-P107	Ceramic, feed-thru: 470 pf +100% -0%, 500 VDCW.
C9	5491601-P123	Tubular: 1.5 pf ±5%, 500 VDCW.
C10	5491601-P117	Tubular: 0.68 pf ±5%, 500 VDCW.
C11	5491601-P118	Tubular: 0.75 pf ±5%, 500 VDCW.
C12	5491601-P132	Tubular: 4.7 pf ±5%, 500 VDCW.
C13	5491601-P137	Tubular: 0.91 pf ±5%, 500 VDCW.
C14	5491601-P114	Tubular: 0.51 pf ±5%, 500 VDCW.
C15	5491601-P115	Tubular: 0.56 pf ±5%, 500 VDCW.
C16	5491601-P130	Tubular: 3.3 pf ±5%, 500 VDCW.

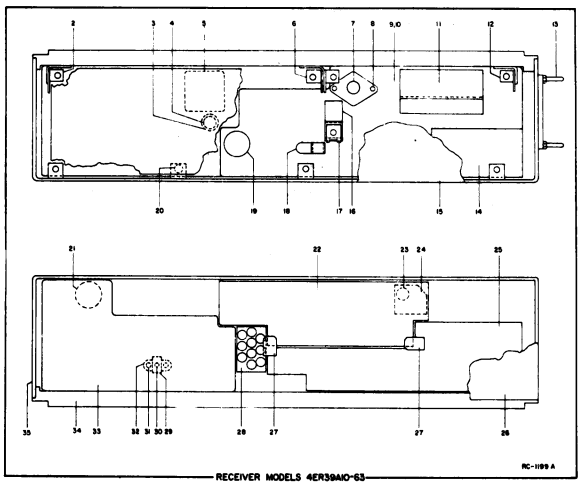
SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	4038056-P1	Germanium.
		- - - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152-P473K	Composition: 47,000 ohms ±10%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	19B205325-G2	Coil.
T2 and T3	19B205325-G1	Coil.
T4	19B205325-G2	Coil.
T5 and T6	19B205325-G1	Coil.
A364* and A365*		MULTIPLIER SELECTIVITY ASSEMBLY A364 19B204782-G1 (4ER39A19, 22, 25, 46, 49, 52) A365 19B204782-G2 (4ER39A20, 21, 23, 24, 26, 27, 47, 48, 50, 51, 53, 54) In Models 4ER39A46-54 of Rev L or earlier: In Models 4ER39A19, 22-27 of Rev M or earlier: In Models 4ER39A20 and 21 of Rev N or earlier:
		- - - - - - - - - CAPACITORS - - - - - - - - -
C5 and C6	5493392-P7	Ceramic, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C7 and C8	5491601-P115	Tubular: 0.56 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C10 and C11	5491601-P117	Tubular: 0.68 pf ±5% 500 VDCW; sim to Quality Components Type MC.
C13 and C14	5491601-P130	Tubular: 3.3 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	7777146-P3	Germanium; sim to Type 1N90.
		- - - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152-P392K	Composition: 3900 ohms ±10%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - -
T1 thru T4		COIL ASSEMBLY T1 19B204780-G1 (4ER39A19, 22, 25, 46, 49, 52) T2 19B204780-G2 (4ER39A19, 22, 25, 46, 49, 52) T3 19B204780-G3 (4ER39A20, 21, 23, 24, 26, 27, 47, 48, 50, 51, 53, 54) T4 19B204780-G4 (4ER39A20, 21, 23, 24, 26, 27, 47, 48, 50, 51, 53, 54)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	5496218-P252	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3 and C4	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A121510-P1	Coil. Includes tuning slug 5491798-P4.
L2	19A121510-P2	Coil. Includes tuning slug 5491798-P4.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C349	5491601-P114	Tubular: 0.51 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C350 and C351	5491601-P110	Tubular: 0.36 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C358 and C363	5493392-P7	Ceramic, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.

SYMBOL	G-E PART NO	DESCRIPTION
C385*	7774750-P4	Ceramic disc: .001 µf +100% -0%, 500 VDCW. Added in Models 4ER39A46-54 by Rev H. Added in Models 4ER39A19, 22-27 by Rev J. Added in Models 4ER39A20 and 21 by Rev K.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR301*	4037822-P1	Silicon. Added in Models 4ER39A19, 22-27, 46-54 by Rev XA. Added in Models 4ER39A20 and 21 by Rev XB.
		- - - - - - - - - - FILTERS - - - - - - - -
FL301		Reed, detector: coil - 600 ohms ±10%, standard 7-pin tube socket mounting.
	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
	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	19B209122-P1	Connector, coaxial: includes cable (W442, W443), approx 5 inches long.
J442	19B205689-G2	Connector: 18 contacts.
J443	19C303426-G1	Connector: 20 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L341 thru L346		COIL ASSEMBLY L341 19B204820-G5 (4ER39A19, 22, 25,46, 49,52) L342 19B204820-G6 (4ER39A19, 22, 25,46, 49,52) L343 19B204820-G1 (4ER39A20, 23, 26,47, 50,53) L344 19B204820-G2 (4ER39A20, 23, 26,47, 50,53) L345 19B204820-G3 (4ER39A21, 24, 27,48, 51,54) L346 19B204820-G4 (4ER39A21, 24, 27,48, 51,54)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C341 and C342	19B209159-P3	Variable,subminiature: approx 1.54-6.9 pf, 750 v peak; sim to EF Johnson 189.
		- - - - - - - - - INDICATING DEVICES - - - - - - - - -
DS301*	19B209067-P1	Lamp. Added in Models 4ER39A46-54 by Rev J. Added in Models 4ER39A19, 22-27 by Rev K. Added in Models 4ER39A20 and 21 by Rev L.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P304 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.
P327 thru P337	4029840-P2	Contact, electrical: sim to Amp 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - -
Q341*	19A115527-P1	Silicon, NPN. In Models 4ER39A46-54 of Rev F or earlier: In Models 4ER39A19, 22-27 of Rev G or earlier: In Models 4ER39A20 and 21 of Rev H or earlier:
	19A115246-P1	Silicon, NPN.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R343* and R344*	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w. Added in Models 4ER39A46-54 by Rev M. Added in Models 4ER39A19, 22-27 by Rev N. Added in Models 4ER39A20 and 21 by Rev P.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T341*	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 4ER39A46-54 of Rev F or earlier: In Models 4ER39A19, 22-27 of Rev G or earlier: In Models 4ER39A20 and 21 of Rev H 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-P10	Miniature, phen: 2 terminals.
		- - - - - - - - - - CABLES - - - - - - - - -
W442 and W443		(Part of J441).
		- - - - - - - - - TUNED CIRCUITS - - - - - - -
Z341 thru Z343		COIL ASSEMBLY Z341 19B204786-G1 (4ER39A19, 22, 25, 46, 49, 52) Z342 19B204786-G2 (4ER39A20, 23, 26, 47, 50, 53) Z343 19B204786-G3 (4ER39A21, 24, 27, 48, 51, 54)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1*	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM. In Models 4ER39A46, 49, 52 of Rev L and earlier: In Models 4ER39A19, 22, 25 of Rev M and earlier:
	5496218-P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C2	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C4	5494481-P14	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A121478-P2	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P1	Tuning slug. (Used in Z341).
	5491798-P4	Tuning slug. (Used in Z342).
	5491798-P5	Tuning slug. (Used in Z343).
Z347 thru Z349		COIL ASSEMBLY Z347 19B204767-G1 (4ER39A19, 22, 25, 46, 49, 52) Z348 19B204767-G2 (4ER39A20, 23, 26, 47, 50, 53) Z349 19B204767-G3 (4ER39A21, 24, 27, 48, 51, 54)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1*	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM. In Models 4ER39A46, 49, 52 of Rev L and earlier: In Models 4ER39A19, 22, 25 of Rev M and earlier:
	5496218-P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM.
C2	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A121475-P2	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798-P1	Tuning slug. (Used in Z347).
	5491798-P4	Tuning slug. (Used in Z348).
	5491798-P5	Tuning slug. (Used in Z349).

SYMBOL	G-E PART NO	DESCRIPTION
Z350* thru Z352*		COIL ASSEMBLY Z350 19B204784-G4 (4ER39A19, 22, 25, 46, 49, 52) In Models 4ER39A19, 22, 25 of Rev M and earlier: In Models 4ER39A46, 49, 52 of Rev L and earlier: 19B204784-G1 Z351 19B204784-G5 (4ER39A23, 23, 26, 47, 50, 53) In Models 4ER39A20, 23, 26 of Rev M and earlier: In Models 4ER39A46, 49, 52 of Rev L and earlier: 19B204784-G2 Z352 19B204784-G6 (4ER39A21, 24, 27, 48, 51, 54) In Models 4ER39A21, 24, 27 of Rev M and earlier: In Models 4ER39A48, 51, 54 of Rev L and earlier: 19B204784-G3
		- - - - - - - - - CAPACITORS - - - - - - - - -
C7 and C8	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C9	5496218-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C10	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A121475-P3	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P1	Tuning slug. (Used in Z350).
	5491798-P4	Tuning slug. (Used in Z351).
	5491798-P5	Tuning slug. (Used in Z352).
		MECHANICAL PARTS (SEE RC-1199)
2	19B204583-G3	Hinge.
3	4035439-P1	Heat sink. (Used with Q10 in A349).
4	4036555-P1	Washer, insulator. (Used with Q9 and Q10 in A349).
5	4032187-P1	Can. (Used with T1 in A349).
6	19B204583-G1	Hinge.
7	19A115784-P1	Insulator. (Used with Q341).
8	19A121989-P1	Bushing. (Used with Q341).
9	19E500812-P1	Chassis. (Used in Models 4ER39A20, 21, 23, 24, 26, 27, 47, 48, 50, 51, 53, 54).
10	19E500812-P2	Chassis. (Used in Models 4ER39A19, 22, 25, 46, 49, 52).
11	19A121229-G1	Support. (Holds FL341).
12	19B204583-G2	Hinge.
13	19A121676-P1	Guide pin.
14	19B204673-P1	Cover.
15	19C303495-G4	Station Receiver Bottom Cover.
	19C303385-P1	Mobile Receiver Bottom Cover.
16	19A121297-P1	Angle.
17	7160861-P4	Nut, spring clip.
18	4029851-P6	Cable clamp.
20	19A115461-P2	Spring washer. (Used with T1 in A347).
21	4034252-P5	Can. (Used with T1 in A347).
22	19B204672-P1	Cover.
23	7162414-P1	Mounting ring, transistor socket. (Used with Q1 in A341).
24	19B204917-P1	Support. (Used with A341).
25	19B204719-P1	Plate.
26	19C303495-G3	Station Receiver Top Cover. (Except Repeaters and VM Stations).

SYMBOL	G-E PART NO	DESCRIPTION
	19C303676-G2	Station Receiver Top Cover. (Repeaters and VM Stations only).
	19C303385-P2	Mobile Receiver Top Cover.
27	4029851-P3	Cable clamp.
28	19A121383-P1	Support.
29	4033089-P1	Clip. (Part of XY1-4 in A352-357).
30	19B200525-P9	Rivet. (Part of XY1-4 in A352-357).
31	19A115793-P1	Electrical contact. (Part of XY1-4 in A352-357).
32	19C311172-P1	Crystal socket. (Part of XY1-4 in A352-357).
33	19C303547-P1	Cover.
34	19C303394-G1	Heat sink.
35	19C303389-G1	Chassis.



RECEIVER MODELS 4ER39AI0-63

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 A346 and A347-Y1.

REV. D - Models 4ER39A20 and 21

To reduce squelch clipping. Changed R37.

REV. D - Models 4ER39A19, 22 thru 27 and Models 4ER39A46 thru 54)
REV. E - Models 4ER39A20 and 21)

To increase decoder bandwidths. Replaced R24 with wire jumper, and changed R26.

REV. E - Models 4ER39A19, 22 thru 27, 46 thru 54
REV. F - Models 4ER39A20, 21

To improve receiver performance in areas of high signal level. Deleted R3 and R4. Added R15, R16 and R17 on the 2nd Mixer Board A347.

REV. F - Models 4ER39A19, 22 thru 27
REV. G - Models 4ER39A20, 21

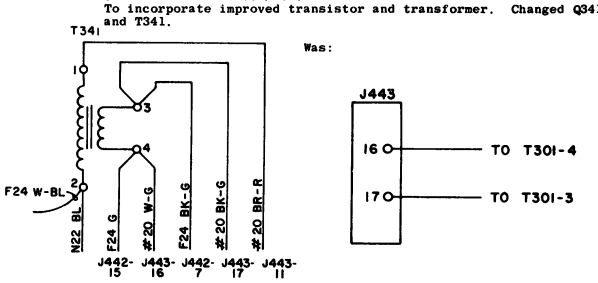
To reduce noise falsing. Changed R26 and replaced jumper from Q4 collector to H6 with R24 on the Channel Guard Board A350.

REV. F - Models 4ER39A46 thru 54
REV. G - Models 4ER39A19, 22 thru 27
REV. H - Models 4ER39A20, 21

To improve audio response. Changed C37 and C53 on IF Audio Board A349.

REV. G - Models 4ER39A46 thru 54
REV. H - Models 4ER39A19, 22 thru 27
REV. J - Models 4ER39A20, 21

On single frequency units deleted CR1, R5 and added R19 to 1st Oscillator board A352/357.
To incorporate improved transistor and transformer. Changed Q341 and T341.



REV. H - Models 4ER39A46 thru 54
REV. J - Models 4ER39A19, 22 thru 27
REV. K - Models 4ER39A20, 21

To eliminate audio howling caused by feedback within the receiver cabling. Added C385.

REV. J - Models 4ER39A46 thru 54
REV. K - Models 4ER39A19, 22 thru 27
REV. L - Models 4ER39A20, 21

To improve RF burnout protection of front-end air capacitor and RF transistor. Added neon lamp DS301 across L341/L343/L345 in 1st RF Amplifier A341.

REV. K - Models 4ER39A46-54
REV. L - Models 4ER39A19, 22 thru 27
REV. M - Models 4ER39A20, 21

To allow for variations in audio response caused by the tone filter. Changed C21 on the Channel Guard Board A350/A351.

REV. L - Models 4ER39A46-54
REV. M - Models 4ER39A19, 22 thru 27
REV. N - Models 4ER39A20, 21

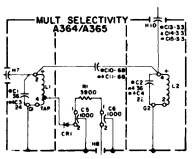
To provide better temperature compensation for low IF circuitry. To reduce variation in discriminator output, and reduce audio rumble produced when volume control is at minimum and squelch near critical. Changed Q4 and Q5, deleted R46, added R74, R75, and C71 on IF/Audio board A349. Changed C7, C10 and C11 on 2nd Mixer board A347.

REV. M - Models 4ER39A46-54
REV. N - Models 4ER39A19, 22-27
REV. P - Models 4ER39A20, 21

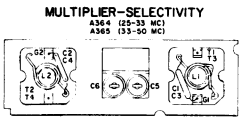
To improve spurious rejection. Changed C1 on coil assemblies Z341 and Z347. Changed core on coil assemblies Z341, Z342, Z347, and Z348. Changed coil assemblies Z350, Z351, and Z352. Added R343 and R344. Changed R4 to R9 on 1st Mixer Board A345. Changed R13 to R21, T3 and T4 on 1st Oscillator Assembly A352/A357. Changed Multiplier Selectivity board A364/A365.

Multiplier Selectivity Was:

Schematic



Outline Diagram



Changed RF Alignment. Front End Alignment Step 1 and Complete Receiver Alignment Step 3. Tuning Control was "L4 (on 1st OSC/MULT) and L1 and L2 (on MULT SELECTIVITY)", and Procedure was "Tune L4 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Tune L2 for minimum meter reading. Change voltage scale if necessary". Front End Alignment Step 4 and Complete Receiver Alignment Step 8 Tuning Control was "L4 (1st OSC/MULT) and L1 and L2 (MULT SELECTIVITY)", and Procedure was "Apply an on-frequency signal as above, keeping below saturation. Tune L4 (on 1st OSC/MULT) and L1 and L2 (on MULT SELECTIVITY) for maximum meter reading".

REV. N - Models 4ER39A46-54
REV. P - Models 4ER39A19, 22-27
REV. R - Models 4ER39A20-21

To improve temperature characteristics. Changed C4, C5, C7 through C16, L1, L2, and L3, deleted L4, and changed L5 to L4 on the 2nd Mixer Assembly A347.

REV. P - Models 4ER39A46-54
REV. R - Models 4ER39A19, 22-27
REV. S - Models 4ER39A20, 21

To provide mid-range tuning of tank circuit on First Mixer Assembly A345. Deleted C4 and added C18.

REV. R - Models 4ER39A46-54
REV. S - Models 4ER39A19, 22-27
REV. T - Models 4ER39A20, 21

To improve circuit D.C. bias stability of AUDIO AMP Q10. Added R80.

REV. S - Models 4ER39A46-54
REV. T - Models 4ER39A19, 22-27
REV. U - Models 4ER39A20, 21

To facilitate the procurement of parts. Changed C8, C19, C23, and L1 on A350 & A351. Changed C11 on A350. Added C30 and C31 to A350 & A351. Added C28 to A350.

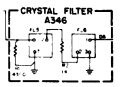
REV. T - Models 4ER39A46-54
REV. U - Models 4ER39A19, 22-27
REV. V - Models 4ER39A20, 21

To reduce receiver lock-up in areas of high RF signal level. Deleted C5, added C26 on A347.

REV. U - Models 4ER39A46-54
REV. V - Models 4ER39A19, 22-27
REV. W - Models 4ER39A20, 21

To simplify manufacturing and provide better selectivity. Changed C18 in 1st Mixer A345. Deleted R15 in 2nd Mixer A347. Changed FL5; deleted FL6, R1 and R2; and added R7 and R8 in Crystal Filter A346.

Crystal Filter Schematic WAS:



REV. V - Models 4ER39A46-54

To reduce noise falsing. Deleted R26 and added R24 & R39 to A351.

REV. W - Models 4ER39A19, 22-27 and 46-54
REV. XA- Models 4ER39A20, 21

To eliminate capacitor failures in positive ground installations. Changed C20 in A349.

REV. XA- Models 4ER39A19, 22-27 and 46-54
REV. XB- Models 4ER39A20, 21

To protect the audio output transistor (Q341) from negative voltage spikes. Added CR301 in the 12-volt supply line.

REV. XB- Models 4ER39A19, 22-27 and 46-54
REV. XC- Models 4ER39A20, 21

To eliminate high frequency oscillation in the receiver PA caused by the use of a higher gain PA transistor. Added C78 from A349-J19 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-3591

DF-1083

Progress Is Our Most Important Product

GENERAL ELECTRIC

COMMUNICATION PRODUCTS DEPARTMENT LYNCHBURG, VIRGINIA

(In Canada, Canadian General Electric Company, Ltd., 830 Lansdowne Rd., Toronto, Ontario)

PRINTED IN U.S.A.