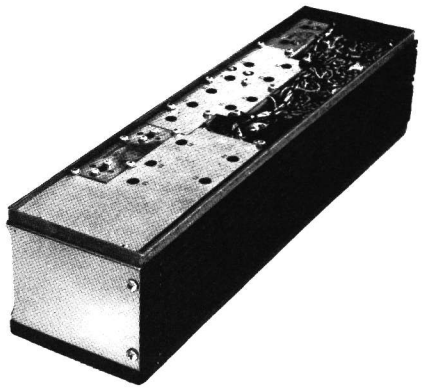
MOBILE RADIO

MASTR Progress Line

66-88 MC RECEIVER MODELS 4ER40A16-27 (WITH CHANNEL GUARD)



Maintenance Manual LBI-3620 B

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ER-40-A

SPECIFICATIONS *

FCC Filing Designation	**ER-40-A**
Frequency Range	66-88 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	0.4 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
Frequency Stability	±.0005%
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)

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

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

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

DESCRIPTION

General Electric MASTR Progress Line Receiver Type ER-40-A is a double-conversion, superheterodyne FM receiver designed for operation on the 66-88 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 optional Channel Guard board.

CIRCUIT ANALYSIS

The MASTR Progress Line Receiver is completely transistorized using a total of 18 silicon transistors. Input leads to the receiver are individually filtered by the 20-pin feed-through by-pass connector J443.

A regulated +10 volts is used for all receiver stages except the audio PA stage which operates from the 12-volt system supply.

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

RF AMPLIFIER (A343)

RF Amplifier (A343) consists of two high-Q helical resonators and an RF amplifier stage (Q1). The RF signal from the antenna is coupled by RF cable W441 to a tap on L347/L349. 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 C343 and C344. The output of Q1 is coupled through three tuned circuits to the base of the first mixer.

1ST OSCILLATOR AND MULTIPLIER (A358-A363)

The receiver 1st oscillator operates in a transistorized Colpitts oscillator circuit. The oscillator crystal operates in a fundamental mode at a frequency of approximately 15 to 20 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.

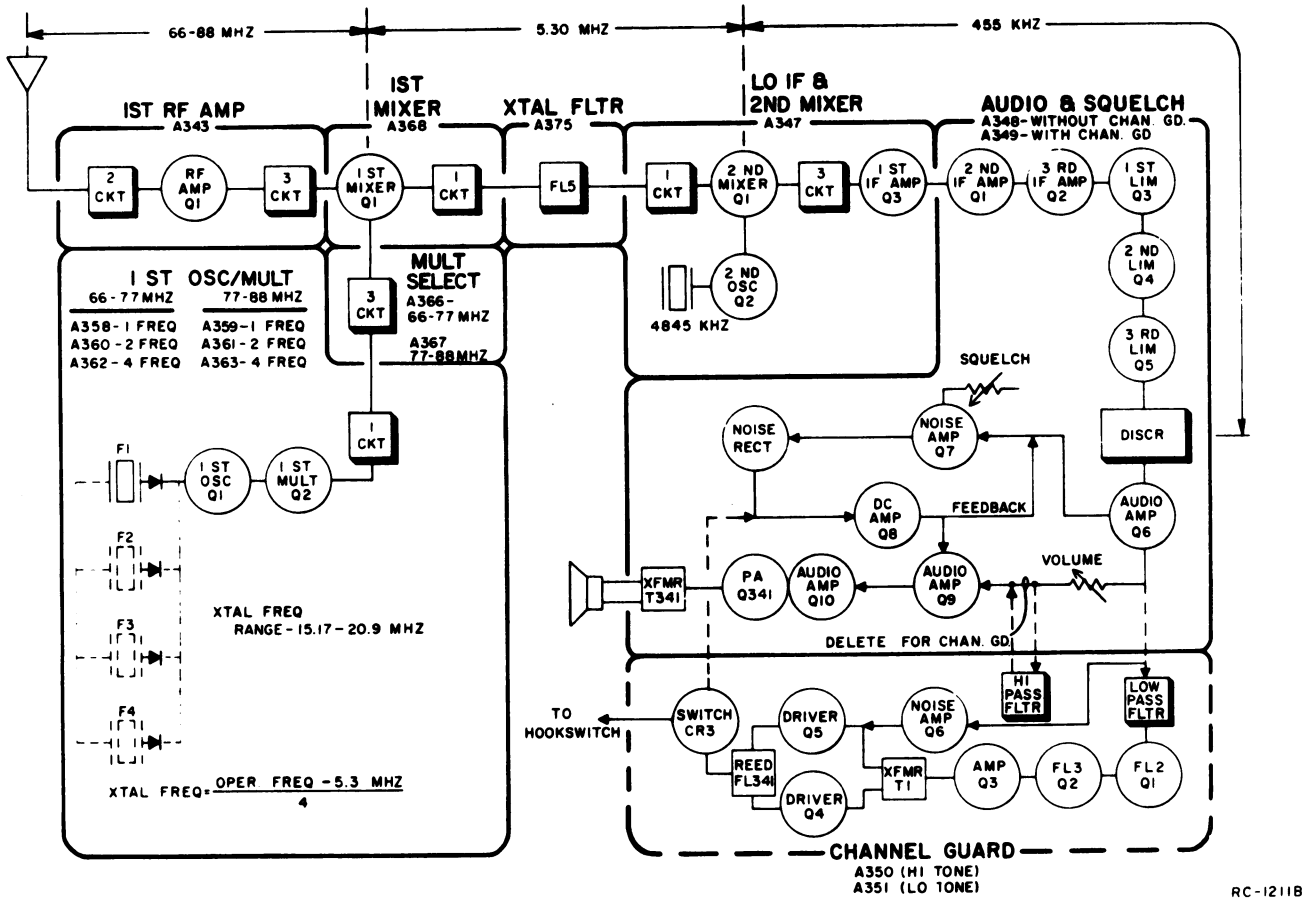


Figure 1 - Receiver Block Diagram

In single-frequency receivers, a jumper from P304 to C363 connects the regulated 10 volts to the crystal circuit, which forward biases diode CR1. Forward biasing the diode reduces its impedance, so that the crystal frequency is applied to the base of oscillator transistor Q1. Feedback for the oscillator is developed across C21/C22. The oscillator output is fed through C24 to the base of the 1st multiplier (Q2).

Multi-frequency receivers use only one oscillator transistor, and up to three additional crystal circuits, identical to the F1 crystal circuit, 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.

The output of the 1st multiplier (quadrupler Q2) is transformer-coupled (T5/T6) to multiplier selectivity assembly A366/A367. The 1st multiplier tank is tuned to four times the crystal frequency.

The stage is metered at centralized metering jack J442-4 through metering network CR1, R1, C12 and C13.

MULTIPLIER SELECTIVITY ASSEMBLY (A366/A367)

Following the 1st multiplier tank (T5/T6) are three additional tuned circuits (A366/A367-L1, -L2 and -L3). Capacitor C10/C11 coupled the multiplier selectivity output to the base of the first mixer.

1ST MIXER (A368) 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 A368-Q1. The mixer collector tank (L1 and C3) is tuned to 5.3 megacycles 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. 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

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, 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. 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 (C30 and L1) 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 through R33 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 millamps in 12-volt systems.

It should be noted that a hysteresis effect was designed into 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-fench" 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.

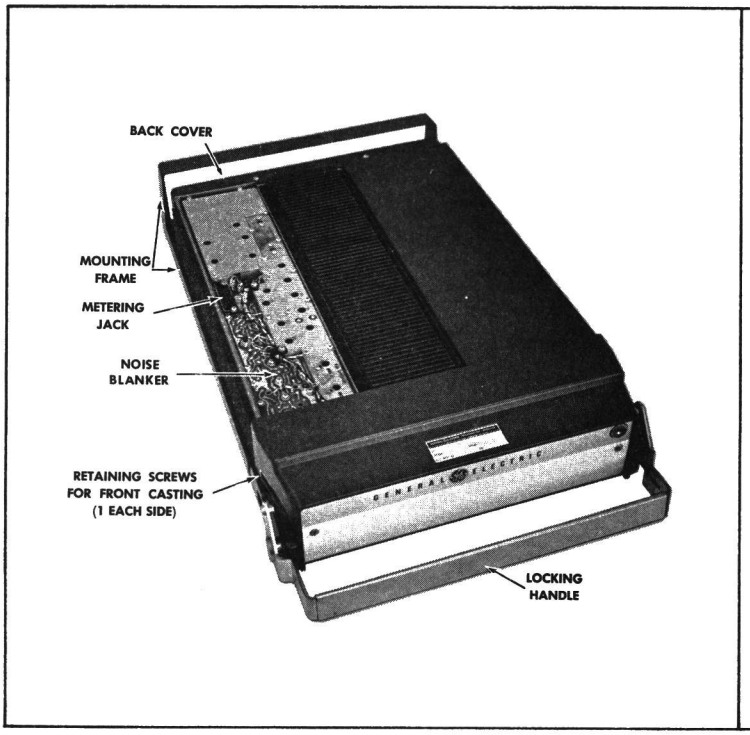


Figure 2 - Top Cover Removed

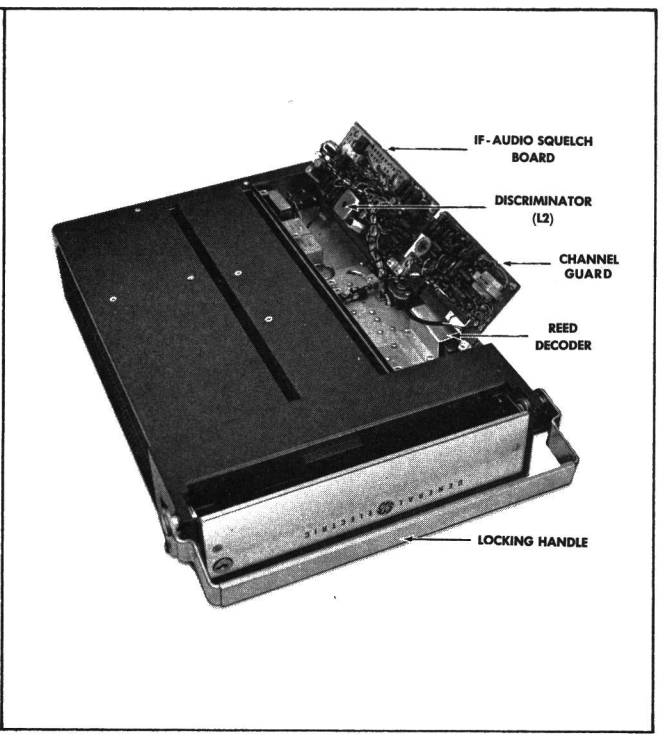


Figure 3 - Bottom Cover Removed

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

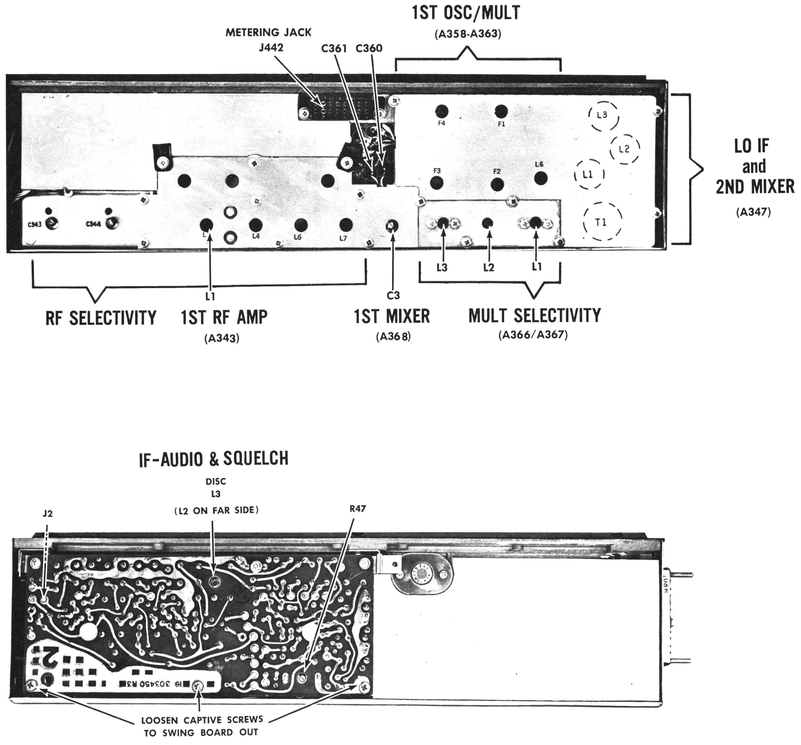
1. G-E Test Set Model 4EX3A10, station Meter Switching Panel or 20,000 ohms-per-volt Multimeter with a 1-volt scale.
2. A 455 KC and 66-88 MC signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

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 fully counterclockwise and Test Set in Position G, adjust R47 on 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).
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).

ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	METERING POSITION MULTIMETER - at J442	TUNING CONTROL	METER READING	PROCEDURE
OSCILLATOR/MULTIPLIER					
1.	D (MULT-1)	Pin 4	L6 (on 1st OSC/MULT and L1, L2, & L3 (on MULT SELECTIVITY)	See Procedure	Tune L6 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Next tune L2 for minimum meter reading. Then tune L3 for a maximum 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), L4, L6, L7, C343 and C344 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal to antenna jack, keeping below saturation. Tune L1, L4, L6, L7, C343 and C344 for maximum meter reading.
4.	"	"	L6 (1st OSC/MULT) and L1, L2, and L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L6 on 1st OSC/MULT and L1, L2 and L3 on MULT SELECTIVITY for maximum meter reading.
FREQUENCY ADJUSTMENT					
5.	A (DISC)	Pin 10	C9 on 1st OSC (C10, C11 or C12 for multifrequency)	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.



COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. G-E Test Set Model 4EX3A10, station Meter Switching Panel or 20,000 ohms-per volt Multimeter with a 1-volt scale.
2. A 455 KC and 66-88 MC 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 KC, align the unit on channel F1. If the frequency spacing is greater than 200 KC, align the receiver on the center frequency.
3. With VOLUME control fully counterclockwise and Test Set in Position G, adjust R47 on 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).
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).

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) and L3 (bottom slug on IF-AUDIO & SQUELCH board)	1.7 volts (2.1 v. maximum)	Loosen screws and swing IF-AUDIO & SQUELCH board open. Turn G-E Test Set to the TEST 2 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.
3.	D (MULT-1)	Pin 4	L6 (on 1st OSC/MULT and L1, L2, L3 (on MULT SELECTIVITY)	See Procedure	Tune L6 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Next tune L2 for minimum meter reading. Then tune L3 for maximum meter reading. Change voltage scale if necessary.
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, L6 and L4 (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: Tune: L6 L7 L4 L6 L1 L4
6.	"	"	C343, C344 and L4 (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), L4, L6, L7, C343 and C344 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L1, L4, L6, L7, C343 and C344 for maximum meter reading.
8.	"	"	L6 (1st OSC/MULT) and L1, L2 and L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L6 (on 1st OSC/MULT) and L1, L2 and L3 (on MULT SELECTIVITY) for maximum meter reading.
9.	"	"	C3 (1st MIXER)	Maximum	Apply an on-frequency signal as above, and tune C3 for maximum meter reading, keeping signal below saturation.
LO IF & 2ND MIXER*					
10.	B (2nd IF AMP)	Pin 2	T1 (2nd MIXER)	Maximum	Apply an on-frequency signal as above, 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 — 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

66—88 MHz MASTR RECEIVER
MODELS 4ER40A16-27

TEST PROCEDURES

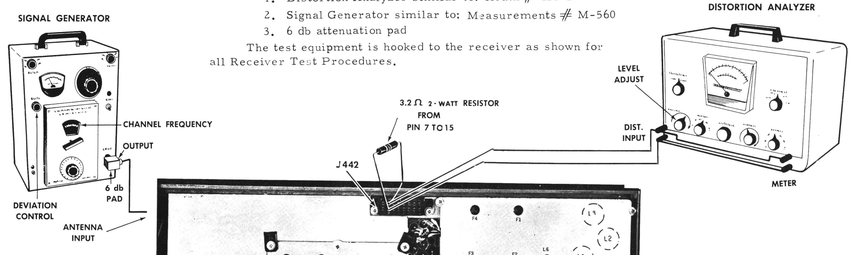
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

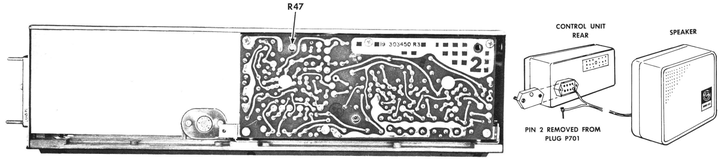
for test hookup shown:

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).

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. 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 (NB) or 10 kHz (WB) DEVIATION FOR AUDIO STAGE.

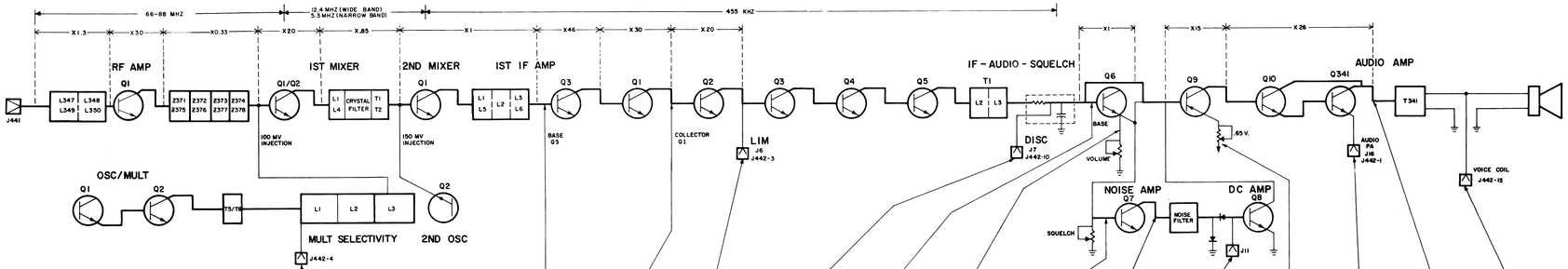
PROCEDURE:

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:

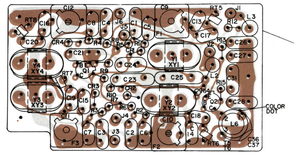
1. SET VOLUME CONTROL FULLY CLOCKWISE.
2. SET SQUELCH CONTROL FULLY COUNTERCLOCKWISE.
3. RECEIVER SHOULD BE PROPERLY ALIGNED.
4. CONNECT SIGNAL GENERATOR TO ANTENNA JACK.
5. VTVM CONNECTS BETWEEN GROUND AND POINTS INDICATED BY ARROWS.

SIGNAL GENERATOR INPUT. MAINTAIN SETTING AT DISCRIMINATOR ZERO		UNMODULATED	UNMODULATED	.10 MICROVOLT UNMODULATED	STANDARD SIGNAL-(1000 MICROVOLTS, AT RCVR FREQ MOD BY 1KHZ AT 3.1KHZ DEV (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	1.7 VDC	GENERATOR OUTPUT SHOULD BE APPROX. 1 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 WITH VTVM ON J442-1 AND J442-8	0.65 VDC	7.0 VAC	2.53 VAC

RC-1217B

1ST OSCILLATOR BOARD

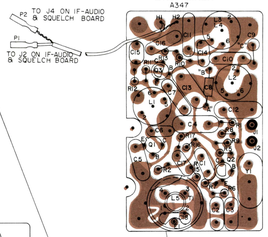
66-77MHZ 77-88MHZ
A358 — 1 FREQ — A359
A360 — 2 FREQ — A361
A362 — 3 FREQ — A362



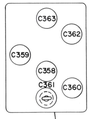
(19B204412, Sh. 1, Rev. 5)
(19B204412, Sh. 2, Rev. 5)

2ND MIXER

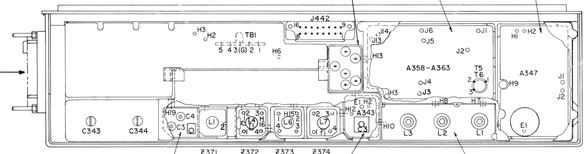
A347

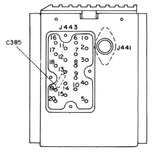


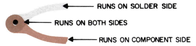
(19B204436, Sh. 1, Rev. 2)
(19B204436, Sh. 2, Rev. 2)



TOP VIEW





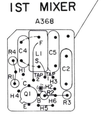


1ST RF AMP

A343

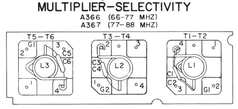
1ST MIXER

A368



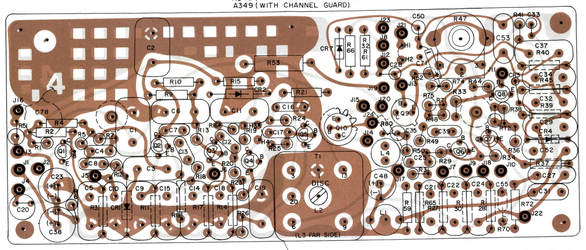
MULTIPLIER-SELECTIVITY

A366 (66-77 MHZ)
A367 (77-88 MHZ)



IF-AUDIO & SQUELCH BOARD

A348 (WITHOUT CHANNEL GUARD)
A349 (WITH CHANNEL GUARD)



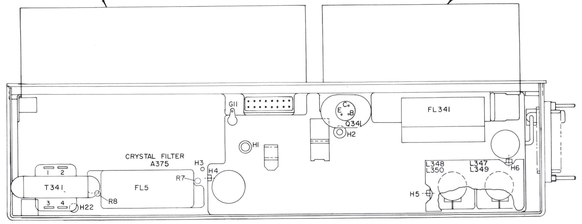
(19C303451, Sh. 1, Rev. 4)
(19C303451, Sh. 2, Rev. 4)

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	−	+	−	+	−	+
A358/363-Q1	1K	1K	10K	7.8K	100Ω	100Ω
A358/363-Q2	70Ω	150Ω	1K	160Ω	100Ω	100Ω
A368-Q1	2.7K	2.7K	7.5K	3.8K	1.6K	1.6K
A343-Q1	300Ω	500Ω	1.5K	4K	350Ω	400Ω
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. K	2.7K	3.2K
A348/349-Q1	2.1K	2K	13.5K	4.1K	4.1K	5.2K
" " Q2	2.1K	2K	13.5K	4.1K	4.1K	5.2K
" " Q3	2.1K	2K	13.5K	4.1K	4.1K	5.2K
" " Q4	2.1K	2K	13.5K	4.1K	4.1K	5.2K
" " Q5	1.0K	1.0K	7K	2.8K	350Ω	350Ω
" " Q6	★3.2K	★2MEG	36.0K	2.5K	0	0
" " Q7	1.7K	1.7K	11.0K	4.0K	7.0K	10K
" " Q8	180Ω	180Ω	100K	2.8K	11.0K	11K
" " Q9	2.2K	2.2K	4.1K	45K	2.2K	2.2K
" " Q10	40Ω	35Ω	2.3K	2.3K	40Ω	35Ω
A348/349-Q301	1Ω	1Ω	40Ω	35Ω	40Ω	35Ω

★READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS

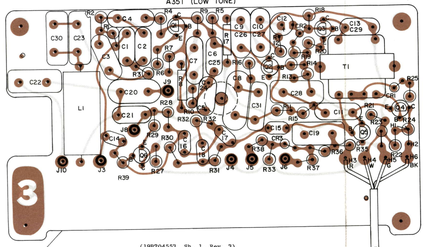
(19B620743, Rev. 16)

BOTTOM VIEW



CHANNEL GUARD

A350 (HI TONE)
A351 (LOW TONE)



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

TO DECODER NETO FL30

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	−	+	−	+	−	+
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	1kK	45Ω	1K	1K
Q5	0	0	1kK	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

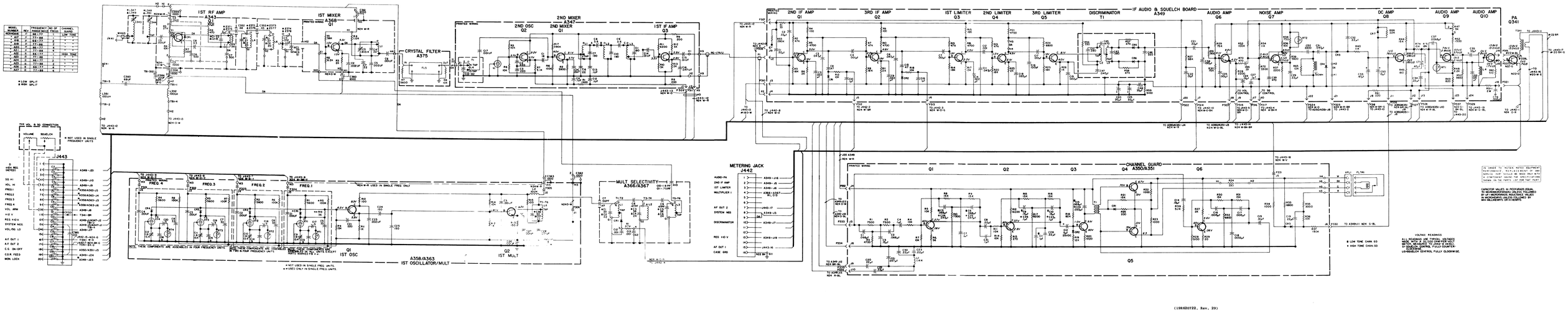
ALWAYS REMOVE THE SHORTING JUMPER AFTER MAKING RESISTANCE READINGS. APPLYING POWER WITH THE SHORTING JUMPER CONNECTED MAY DAMAGE THE UNIT

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

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

OUTLINE DIAGRAM

66—88 MHz MASTR RECEIVER
MODELS 4ER40A16-27



MODEL NUMBER	REV	FREQUENCY RANGE FROM	TO	CHANNEL SPACING	SUFFIX
A16	F	66-88	66-77	4	L
A17	F	77-99	77-88	4	L
A26	A	66-88	77-88	4	L
A27	A	77-99	77-88	4	L
A31	G	66-77	66-77	4	HIGH TONE
A32	G	77-88	77-88	4	L
A33	G	66-77	66-77	4	L
A34	G	77-99	77-88	4	L
A37	G	77-88	77-88	4	L

* LOW SPLIT
& HIGH SPLIT

(198620722, Rev. 29)

SCHEMATIC DIAGRAM
66—88 MHz MASTR RECEIVER
MODELS 4ER40A16-27
(WITH CHANNEL GUARD)

PARTS LIST

LBI-3637B

66-88 MHz RECEIVER WITH CHANNEL GUARD
MODELS: 4EH40A16 - 4EH40A27
19B500809G61-G72

SYMBOL	GE PART NO.	DESCRIPTION
A343		RF AMPLIFIER ASSEMBLY 19B204772G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3 and C4	5493392P7	Ceramic, feed-thru: 1000 pf ±100% -0%, 500 VDCW; sim to Allen-Bradley Type FA2C.
C5	5494481P12	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to NMC Type JF Discap.
C6	7484398P4	Silver mica: 500 pf ±10%, 500 VDCW; sim to Underwood Type J-1-HF.
C7*	7484398P4	Silver mica: 500 pf ±10%, 500 VDCW; sim to Underwood Type J-1-HF. Deleted by REV L.
C8*	5491601P130	Phenolic: 3.3 pf ±5%, 500 VDCW; sim to Quality Components Type MC. Deleted by REV L.
CR1	4038642P1	Germanium.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115342P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3B152P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R6	3B152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3B152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R8*	3B152P471K	Composition: 470 ohms ±10%, 1/4 w. Deleted by REV L.
R9*	3B152P303K	Composition: 3000 ohms ±10%, 1/4 w. Deleted by REV L.
XQ1	5490277P5	Transistor, phen: 3 contacts; sim to Alcon 1213L2.
A346*		CRYSTAL FILTER ASSEMBLY 19B204618G2 (Deleted by REV C).
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL5 and FL6	19C304094G4	Bandpass filter.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3B152P432K	Composition: 4300 ohms ±10%, 1/4 w.
R2	3B152P102K	Composition: 1000 ohms ±10%, 1/4 w.
A347		SECOND MIXER ASSEMBLY 19B204433G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5490008P9	Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C2 and C3	5490008P25	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C4*	19A116080P7	Polyester: 0.1 pf ±20%, 50 VDCW.
		In KEY E and earlier:
	5491189P106	Polyester: 0.1 pf ±20%, 50 VDCW.
	5491189P103	Polyester: 0.033 pf ±20%, 50 VDCW.
C6	5496219P47	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C7*	5496219P360	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
		In KEY E:
	5496219P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM.
		In KEY D and earlier:
	5496219P666	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C8* and C9*	5491601P140	Phenolic: 3.6 pf ±5%, 500 VDCW.
		In KEY E and earlier:
	5491601P28	Phenolic: 2.7 pf ±5%, 500 VDCW.
C10* and C11*	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
		In KEY E:
	5496219P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM.
		In KEY D and earlier:
	5496219P666	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12* and C13*	19A116080P7	Polyester: 0.1 pf ±20%, 50 VDCW.
		In KEY E and earlier:
	5491189P106	Polyester: 0.1 pf ±20%, 50 VDCW.
C14* and C15*	19A116080P1	Polyester: 0.01 pf ±20%, 50 VDCW.
		In KEY E and earlier:
	5491189P101	Polyester: 0.01 pf ±20%, 50 VDCW.
C16*	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
		In KEY E and earlier:
	5491189P104	Polyester: 0.047 pf ±20%, 50 VDCW.
C17	5494481P112	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to NMC Type JF Discap.
C26*	19A116080P1	Polyester: 0.01 pf ±20%, 50 VDCW. Added by REV J.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	4038104P1	Lug: solder dipped brass.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 and J2	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1*	19A115711P4	Transformer, freq: 455 KHz; sim to Automatic Mfg ES12P73.
		In KEY E and earlier:
	19C302464G1	Coil. Includes:
	7160519P2	Tuning slug.
L2*	19A115711P3	Transformer, freq: 455 KHz; sim to Automatic Mfg ES12P73.
		In KEY E and earlier:
	19C302464G2	Coil. Includes:
	7160519P2	Tuning slug.
L3*	19A115711P5	Transformer, freq: 455 KHz; sim to Automatic Mfg ES12P74.
		In KEY E and earlier:
	19C302464G3	Coil. Includes:
	7160519P2	Tuning slug.
L4*		(Part of T1). Added by REV F.
L5*		(Part of T1). Deleted by REV F.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	6029840P2	Contact, electrical; sim to Amp 42827-2.
P2	6029840P1	Contact, electrical; sim to Amp 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115245P1	Silicon, NPN.
Q2	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3B152P152K	Composition: 1500 ohms ±10%, 1/4 w.
R2	3B152P392K	Composition: 3900 ohms ±10%, 1/4 w.
R5 and R6	3B152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3B152P513J	Composition: 5100 ohms ±5%, 1/4 w.
R8 and R9	3B152P201J	Composition: 200 ohms ±5%, 1/4 w.
R10	3B152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R11	3B152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R12	3B152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R13	3B152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R15*	3B152P153K	Composition: 15,000 ohms ±10%, 1/4 w. Deleted by REV K.
R16	3B152P104K	Composition: 0.1 megohm ±10%, 1/4 w.
R17	3B152P394K	Composite: 0.39 megohm ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1		COIL ASSEMBLY 19B204414G3
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C18	19C301540P261	Ceramic disc: 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P3	Tuning slug.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1	19A116192P3	Quartz: freq 4845 KHz ±100 Hz at 25°C, temp range -30° to +75°C.
A349		IF/AUDIO ASSEMBLY 19D402327G4
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A115028P116	Polyester: 0.22 pf ±20%, 200 VDCW.
C2	19A116080P9	Polyester: 0.22 pf ±20%, 50 VDCW.
C3	19A115028P111	Polyester: 0.047 pf ±20%, 200 VDCW.
C4	5494481P112	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to NMC Type JF Discap.
C5	19A115028P109	Polyester: 0.022 pf ±20%, 200 VDCW.
C6	19A115028P111	Polyester: 0.047 pf ±20%, 200 VDCW.
C7	5494481P112	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to NMC Type JF Discap.
C8	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C9	19A115028P109	Polyester: .022 pf ±20%, 200 VDCW.
C10	19A115028P114	Polyester: 0.1 pf ±20%, 200 VDCW.
C11	19A115028P111	Polyester: 0.047 pf ±20%, 200 VDCW.
C12	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to NMC Type JF Discap.
C13	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C14*		(Part of T1). Added by REV F.
C15*		(Part of T1). Deleted by REV F.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	6029840P2	Contact, electrical; sim to Amp 42827-2.
P2	6029840P1	Contact, electrical; sim to Amp 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115245P1	Silicon, NPN.
Q2	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3B152P152K	Composition: 1500 ohms ±10%, 1/4 w.
R2	3B152P392K	Composition: 3900 ohms ±10%, 1/4 w.
R5 and R6	3B152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3B152P513J	Composition: 5100 ohms ±5%, 1/4 w.
R8 and R9	3B152P201J	Composition: 200 ohms ±5%, 1/4 w.
R10	3B152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R11	3B152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R12	3B152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R13	3B152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R15*	3B152P153K	Composition: 15,000 ohms ±10%, 1/4 w. Deleted by REV K.
R16	3B152P104K	Composition: 0.1 megohm ±10%, 1/4 w.
R17	3B152P394K	Composite: 0.39 megohm ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1		COIL ASSEMBLY 19B204414G3
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C18	19C301540P261	Ceramic disc: 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P3	Tuning slug.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y1	19A116192P3	Quartz: freq 4845 KHz ±100 Hz at 25°C, temp range -30° to +75°C.
A349		IF/AUDIO ASSEMBLY 19D402327G4
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A115028P116	Polyester: 0.22 pf ±20%, 200 VDCW.
C2	19A116080P9	Polyester: 0.22 pf ±20%, 50 VDCW.
C3	19A115028P111	Polyester: 0.047 pf ±20%, 200 VDCW.
C4	5494481P112	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to NMC Type JF Discap.
C5	19A115028P109	Polyester: 0.022 pf ±20%, 200 VDCW.
C6	19A115028P111	Polyester: 0.047 pf ±20%, 200 VDCW.
C7	5494481P112	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to NMC Type JF Discap.
C8	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C9	19A115028P109	Polyester: .022 pf ±20%, 200 VDCW.
C10	19A115028P114	Polyester: 0.1 pf ±20%, 200 VDCW.
C11	19A115028P111	Polyester: 0.047 pf ±20%, 200 VDCW.
C12	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to NMC Type JF Discap.
C13	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
L4*	5491736P6	Choke: 3.5 mh ±10%, 2.5 ohms DC res max; sim to Aladdin 33-494.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4* and Q5*	19A115552P1	Silicon, NPN.
		In KEY D and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q6	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q7	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q8	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q9	19A115247P1	Silicon, NPN; sim to Type 2N1024.
Q10	19A115530P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3B7729330K	Composition: 33 ohms ±10%, 1/2 w.
R2	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R3	3B7729183J	Composition: 18,000 ohms ±5%, 1/2 w.
R4	3B7729101K	Composition: 100 ohms ±10%, 1/2 w.
R5	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R6	3B7729202J	Composition: 2000 ohms ±5%, 1/2 w.
R7	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R8	3B7729183J	Composition: 18,000 ohms ±5%, 1/2 w.
R9	3B7729101K	Composition: 100 ohms ±10%, 1/2 w.
R10	3B7729473K	Composition: 47000 ohms ±10%, 1/2 w.
R11	3B7729202J	Composition: 2000 ohms ±5%, 1/2 w.
R12	3B7729103K	Composition: 10,000 ohms ±10%, 1/2 w.
R13	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R14	3B7729183J	Composition: 18,000 ohms ±5%, 1/2 w.
R15	3B7729101K	Composition: 100 ohms ±10%, 1/2 w.
R16	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R17	3B7729183J	Composition: 18,000 ohms ±5%, 1/2 w.
R18	3B7729101K	Composition: 100 ohms ±10%, 1/2 w.
R19	3B7729103K	Composition: 10,000 ohms ±10%, 1/2 w.
R20	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R21	3B7729183J	Composition: 18,000 ohms ±5%, 1/2 w.
R22	3B7729202J	Composition: 2000 ohms ±5%, 1/2 w.
R23	3B7729473K	Composition: 47,000 ohms ±10%, 1/2 w.
R24	3B7729652K	Composition: 6800 ohms ±10%, 1/2 w.
R25	3B7729183J	Composition: 18,000 ohms ±5%, 1/2 w.
R26	3B7729103J	Composition: 10000 ohms ±5%, 1/2 w.
R27	3B7729683K	Composition: 68,000 ohms ±10%, 1/2 w.
R28	3B7729222J	Composition: 2200 ohms ±5%, 1/2 w.
R29 and R30	3B7729753J	Composition: 75,000 ohms ±5%, 1/2 w.
CR1 and CR2	4038056P1	Germanium.
R31	3B7729513J	Composition: 5100 ohms ±5%, 1/2 w.
R33	3B7729104K	Composition: 0.10 megohm ±10%, 1/2 w.
R34	3B7729113J	Composition: 11,000 ohms ±5%, 1/2 w.
R36	3B7729153K	Composition: 15,000 ohms ±10%, 1/2 w.
R37	3B7729222J	Composition: 2200 ohms ±5%, 1/2 w.
R38	3B7729751J	Composition: 750 ohms ±5%, 1/2 w.
R39	3B7729565J	Composition: 5600 ohms ±5%, 1/2 w.
R40	3B7729113J	Composition: 11,000 ohms ±5%, 1/2 w.
R44	3B7729153K	Composition: 15,000 ohms ±10%, 1/2 w.
R45	3B7729181K	Composition: 180 ohms ±10%, 1/2 w.
R46*	3B7729333K	Composition: 33,000 ohms ±10%, 1/2 w. Deleted by REV L.
R47	19B209115P1	Variable, carbon film: 5000 ohms ±20%, 0.15 w; sim to CTS Type UPE-70.
R48	3B7729222J	Composition: 2200 ohms ±5%, 1/2 w.
R49	3B7729421K	Composition: 420 ohms ±10%, 1/2 w.
R50	3B7729392K	Composition: 3900 ohms ±10%, 1/2 w.
R51	19B209022P15	Wirewound, phen: 1 ohm ±5%, 2 w; sim to IRC Type BW2.
R52	3B7729152K	Composition: 1500 ohms ±10%, 1/2 w.
R53	19A116278P444	Metal film: 0.28 megohm ±2%, 1/2 w.
R59	3B7729513J	Composition: 5100 ohms ±5%, 1/2 w.
R61	3B7729222K	Composition: 2200 ohms ±10%, 1/2 w.
R65	3B7729123K	Composition: 12,000 ohms ±10%, 1/2 w.
R66	3B7729223K	Composition: 22,000 ohms ±10%, 1/2 w.
R70	3B7729471J	Composition: 470 ohms ±5%, 1/2 w.
R72	3B7729333J	Composition: 3300 ohms ±5%, 1/2 w.
R74*	3B7729153K	Composition: 15,000 ohms ±10%, 1/2 w. Added by REV K.
R75*	3B7729183K	Composition: 18,000 ohms ±10%, 1/2 w. Added by REV K.
R80*	3B152P511J	Composition: 510 ohms ±5%, 1/4 w. Added by REV G.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	19B209143P2	Rod: axial leads, 4000 ohms ±10% res, 1 w max; sim to Globar Type 789F-12.
RT2	19B209143P3	Rod: 850 ohms ±10% res, 1 w max; sim to Globar Type 789F.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1		DISCRIMINATOR ASSEMBLY 19C303612G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C41 and C42	19B209196P1	Ceramic disc: 280 pf ±5%, 500 VDCW, temp coef -115 PPM.
C45	7489162P43	Silver mica: 470 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C46	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C47	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR5 and CR6	19A115250P1	Silicon.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L3	19A121532G1	Coil. Includes tuning slug 7160519P1.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R56	3B152P331J	Composition: 330 ohms ±5%, 1/4 w.
R57 and R58	3B152P473J	Composition: 47,000 ohms ±5%, 1/4 w.
J3 thru J6	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
J8 thru J10	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1*	19A115690P2	Coil, RF: 1.4 HY ±5%, sim to Arted AC5910.
		In KEY H and earlier:
	19B204554G1	Coil.
C4	19A116080P107	Polyester: 0.1 pf ±10%, 50 VDCW.
C5 and C6	19A116080P106	Polyester: 0.068 pf ±10%, 50 VDCW.
C7	19A116080P107	Polyester: 0.1 pf ±10%, 50 VDCW.
C8*	19A116080P109	Polyester: 0.22 pf ±10%, 50 VDCW.
		In KEY G and earlier:
	5491459P109	Polyester: 0.33 pf ±10%, 50 VDCW.
C9 and C10	19A116080P108	Polyester: 0.15 pf ±10%, 50 VDCW.
C11*	19A116080P107	Polyester: 0.1 pf ±10%, 50 VDCW.
		In KEY G and earlier:
	5491459P109	Polyester: 0.33 pf ±10%, 50 VDCW.
C12	5495070P14	Electrolytic: 5 pf +75% -10%, 25 VDCW; sim to Sprague 30D.
C13	19A116080P106	Polyester: 0.068 pf ±10%, 50 VDCW.
C14 and C15	19A116080P101	Polyester: 0.01 pf ±10%, 50 VDCW.
C16	5491459P110	Polyester: 0.0015 pf ±10%, 50 VDCW.
C18	5491459P111	Polyester: 0.0033 pf ±10%, 50 VDCW.
C19*	19A116080P109	Polyester: 0.22 pf ±10%, 50 VDCW.
		In KEY G and earlier:
	5491459P109	Polyester: 0.33 pf ±10%, 50 VDCW.
C20	19A116080P109	Polyester: 0.22 pf ±10%, 50 VDCW.
C21*	19A116080P105	Polyester: 0.047 pf ±10%, 50 VDCW.
		In KEY C and earlier:
	5491459P104	Polyester: 0.068 pf ±10%, 50 VDCW.
C22	19A116080P110	Polyester: 0.33 pf ±10%, 50 VDCW.
C23*	19A116080P109	Polyester: 0.22 pf ±10%, 50 VDCW.
		In KEY G and earlier:
	5491459P112	Polyester: 0.47 pf ±10%, 50 VDCW.
C24 and C25	19A116080P105	Polyester: 0.047 pf ±10%, 50 VDCW.
C26 and C27	19A116080P107	Polyester: 0.1 pf ±10%, 50 VDCW.
C28*	19A116080P109	Polyester: 0.22 pf ±10%, 50 VDCW. Added by REV H.
C29	19A116080P104	Polyester: 0.033 pf ±10%, 50 VDCW.
C30*	19A116080P109	Polyester: 0.22 pf ±10%, 50 VDCW. Added by REV H.
C31*	19A116080P107	Polyester: 0.1 pf ±10%, 50 VDCW. Added by REV H.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 and CR2	4038056P1	Germanium.
CR3	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J3 thru J6	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
J8 thru J10	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1*	19A115690P2	Coil, RF: 1.4 HY ±5%, sim to Arted AC5910.
		In KEY H and earlier:
	19B204554G1	Coil.
Q1 thru Q6	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3B7729752J	Composition: 7500 ohms ±5%, 1/2 w.
R3	3B7729473J	Composition: 4700 ohms ±5%, 1/2 w.
R4 and R5	3B7729103J	Composition: 10,000 ohms ±5%, 1/2 w.
R6	3B7729560J	Composition: 56 ohms ±5%, 1/2 w.
R7	3B7729103J	Composition: 10,000 ohms ±5%, 1/2 w.
R8 and R9	3B7729753J	Composition: 15,000 ohms ±5%, 1/2 w.
R10	3B7729752J	Composition: 7500 ohms ±5%, 1/2 w.
R11	3B7729103J	Composition: 10,000 ohms ±5%, 1/2 w.
R12	3B7729622J	Composition: 6200 ohms ±5%, 1/2 w.
R13	3B7729271J	Composition: 270 ohms ±5%, 1/2 w.
R14	3B7729103J	Composition: 10,000 ohms ±5%, 1/2 w.
R15 and R16	3B7729753J	Composition: 15,000 ohms ±5%, 1/2 w.
R17	3B7729822J	Composition: 8200 ohms ±5%, 1/2 w.
R18	3B7729823J	Composition: 82,000 ohms ±5%, 1/2 w.
R19	3B7729123J	Composition: 12,000 ohms ±5%, 1/2 w.
R20	3B7729102J	Composition: 1000 ohms ±5%, 1/2 w.
R21	3B7729153J	Composition: 15,000 ohms ±5%, 1/2 w.
R22 and R23	3B7729102J	Composition: 1000 ohms ±5%, 1/2 w.
R24*	3B7729331J	Composition: 330 ohms ±5%, 1/2 w. Added by REV W.
R25	3B7729203J	Composition: 200 ohms ±5%, 1/2 w.
R26*	3B7729203J	Composition: 20,000 ohms ±5%, 1/2 w. Deleted by REV W.
R27	3B7729202J	Composition: 2000 ohms ±5%, 1/2 w.
R28	3B7729132J	Composition: 3100 ohms ±5%, 1/2 w.
R29	3B7729200J	Composition: 20 ohms ±5%, 1/2 w.
R30 and R31	3B7729153J	Composition: 15,000 ohms ±5%, 1/2 w.
R32 and R33	3B7729683J	Composition: 6800 ohms ±5%, 1/2 w.
R35	3B7729303J	Composition: 3000 ohms ±5%, 1/2 w.
R36	3B7729103J	Composition: 10,000 ohms ±5%, 1/2 w.
R37	3B7729204J	Composition: 0.2 megohm ±5%, 1/2 w.
R38	3B7729102J	Composition: 1000 ohms ±5%, 1/2 w.
R39*	3B7729513J	Composition: 5100 ohms ±5%, 1/2 w. Added by REV W.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	5490525P2	Audio: freq: 100 to 10,000 Hz, Pri: 35,000 ohms ±10% imp, 1500 ohms ±15% DC res, Sec 1: 2000 ohms imp, 250 ohms ±10% DC res, Sec 2: 2000 ohms imp, 250 ohms ±10% DC res.
XFL1	19A121292G2	Reed, mica-filled phen: 7 pins rated at 1 amp at 500 VRMS with 3-11/32 inches of cable.

SYMBOL	GE PART NO.	DESCRIPTION
A350		CHANNEL GUARD A350 19C303550G1 (4EH40A16-21) A351 19C303550G2 (4EH40A22-27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A115080P106	Polyester: 0.068 pf ±10%, 50 VDCW.
C3	19A116080P108	Polyester: 0.15 pf ±10%, 50 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
A358 thru A363		FIRST OSCILLATOR ASSEMBLY A358 19B204419G7 (4E804A16, 22) A359 19B204419G10 (4E804A17, 23) A360 19B204419G8 (4E804A18, 24) A361 19B204419G11 (4E804A19, 25) A362 19B204419G9 (4E804A20, 26) A363 19B204419G12 (4E804A21, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C4	5494481P112	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C5 thru C8	5496219P751	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef -750 PPM.
C9 thru C12	5491271P106	Variable, sub-miniature: approx 2.1-12.7 pF, 750 v peak; sim to EF Johnson 189.
C13 thru C15	5496219P40	Ceramic disc: 9.0 pF ±0.25 pF, 500 VDCW, temp coef 0 PPM.
C16 thru C19	19C300685P93	Ceramic disc: 5 pF ±0.1 pF, 500 VDCW, temp coef 0 PPM.
C21	5496219P771	Ceramic disc: 220 pF ±5%, 500 VDCW, temp coef -750 PPM.
C23	5494481P114	Ceramic disc: 2000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C24	5490008P31	Silver mica: 150 pF ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219P467	Ceramic disc: 150 pF ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C28	5494481P112	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C31	5494481P112	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1*	19A115603P1	Silicon. Deleted by REV A.
CR2 thru CR4	19A115603P1	Silicon.
		- - - - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J6	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	7488079P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res; sim to Jeffers 4421-7K.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A115330P91	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1 thru R4	3R152P562J	Composition: 5600 ohms ±5%, 1/4 w.
R5*	3R152P104K	Composition: 0.1 megohm ±10%, 1/4 w. Deleted by REV A.
R6 thru R8	3R152P104K	Composition: 0.1 megohm ±10%, 1/4 w.
R9	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R14	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R16*	3R152P360J	Composition: 36 ohms ±5%, 1/4 w. Added by REV A.

SYMBOL	GE PART NO.	DESCRIPTION
R25 thru R28	19B209284P7	Disc: 62 ohms res nominal at 25°C, color code violet.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T5 and T6		COIL ASSEMBLY T5 19B204766G1 (4E804A16, 18, 20, 22, 24, 26) T6 19B204766G2 (4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C36	5496218P250	Ceramic disc: 30 pF ±5%, 500 VDCW, temp coef -80 PPM.
C37	5496218P246	Ceramic disc: 20 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L5	19A121481P1	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (RC-1213).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact freq needed.
		66-88 MHz crystal freq = (CF -5.30 MHz) ÷ 4.
Y1 thru Y4	19B206576P6	Quartz: freq range 15175.000 to 17925.000 KHz, temp range -30°C to +85°C. (66-77 MHz).
Y1 thru Y4	19B206576P7	Quartz: freq range 17925.001 to 20685.000 KHz, temp range -30°C to +85°C. (77-88 MHz).
A366 and A367		MULTIPLIER SELECTIVITY ASSEMBLY A366 19B204827G1 (4E804A18, 19, 20, 22, 24, 26) A367 19B204827G2 (4E804A19, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C8 and C9	5491601P13	Phenolic: 0.47 pF ±10%, 500 VDCW.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152P473K	Composition: 47,000 ohms ±10%, 1/4 w. Deleted by REV A.
	3R152P392K	Composition: 3900 ohms ±10%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B204822G1 (4E804A18, 19, 20, 22, 24, 26) T2 19B204822G2 (4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218P251	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef -80 PPM.
C2	5496218P247	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -80 PPM.
C7	5491601P15	Phenolic: 0.56 pF ±10%, 500 VDCW.
C12	5494481P11	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	7777146P3	Germanium; sim to Hughes 1890.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204822P7	Coil.

SYMBOL	GE PART NO.	DESCRIPTION
	5491798P5	Tuning slug.
T3 and T4		COIL ASSEMBLY T3 19B204981G1 (4E804A16, 18, 20, 22, 24, 26) T4 19B204981G2 (4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3	5496218P252	Ceramic disc: 36 pF ±5%, 500 VDCW, temp coef -80 PPM.
C4	5496218P248	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef -80 PPM.
C13	5494481P11	Ceramic disc: 1000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B204981P6	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning coil.
T5 and T6		COIL ASSEMBLY T5 19B204548G1 (4E804A18, 19, 20, 22, 24, 26) T6 19B204548G2 (4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C5	5496218P252	Ceramic disc: 36 pF ±5%, 500 VDCW, temp coef -80 PPM.
C6	5496218P248	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef -80 PPM.
C10*	5491601P26	Phenolic: 1.8 pF ±10%, 500 VDCW. Deleted by REV K.
	5491601P26	Phenolic: 2.2 pF ±10%, 500 VDCW.
C11*	5491601P18	Phenolic: 0.75 pF ±10%, 500 VDCW. Deleted by REV K.
	5491601P23	Phenolic: 1.5 pF ±10%, 500 VDCW.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L3	19B204548P6	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
A368		FIRST MIXER ASSEMBLY 19B204430G4
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5494481P114	Ceramic disc: 2000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C3	5491271P106	Variable, sub-miniature: approx 2.1-12.7 pF, 750 v peak; sim to EF Johnson 189.
C4	5496218P247	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481P114	Ceramic disc: 2000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	5494481P12	Ceramic disc: 1000 pF ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C7	5496218P247	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	4032104P1	Lug: solder dipped brass.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A121082G1	Toroidal coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115342P1	Silicon, NPN.

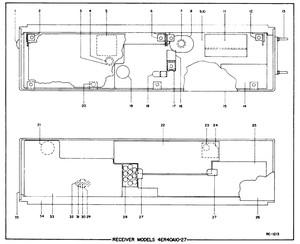
SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
		Tuning slug.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P563J	Composition: 56,000 ohms ±5%, 1/4 w.
R2	3R152P222J	Composition: 8200 ohms ±5%, 1/4 w.
R3	3R152P203J	Composition: 2000 ohms ±5%, 1/4 w.
R4	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
A375*		CRYSTAL FILTER ASSEMBLY 19B204616G3
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL5	19B206692G1	Bandpass filter. In REV J and earlier:
	19C304094G6	Bandpass filter.
FL6*	19C304094G6	Bandpass filter. Deleted by REV K.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152P432K	Composition: 4300 ohms ±10%, 1/4 w. Deleted by REV K.
R2*	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w. Deleted by REV K.
R7*	3R152P562K	Composition: 5600 ohms ±10%, 1/4 w. Added by REV K.
R8*	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w. Added by REV K.
		(In REV C-J)
A375*		CRYSTAL FILTER ASSEMBLY 19B204616G4
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL5	19B206692G1	Bandpass filter.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R8	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C352	5491601P117	Phenolic: 0.68 pF ±5%, 500 VDCW.
C353	5491601P112	Phenolic: 0.43 pF ±5%, 500 VDCW.
C358 thru C363	5493392P7	Ceramic, feed-thru: 1000 pF +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA3C.
C383	5496267P11	Tantalum: 68 µF ±20%, 15 VDCW; sim to Sprague Type 150D.
C384*	19A115680P3	Electrolytic: 20 uF +150% -10%, 25 VDCW; sim to No Mallory Type TT.
		In 4E804A16-21 of REV L and earlier: In 4E804A25-27 of REV M and earlier:
	5496267P11	Tantalum: 68 µF ±20%, 15 VDCW; sim to Sprague Type 150D.
C385*	7774750P4	Ceramic disc: .001 pF +100% -0%, 500 VDCW. Added by REV B.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR301*	4037822P1	Silicon. Added to 4E804A16-21 by REV N. Added to 4E804A23-27 by REV P.
FL341		Xtal, detector: coil - 600 ohms ±10%, standard 7-pin tube socket mounting.
	19C307140P670	67.0 Hz
	19C307140P719	71.9 Hz
	19C307140P770	77.0 Hz
	19C307140P825	82.5 Hz

SYMBOL	GE PART NO.	DESCRIPTION
	19C307140P885	88.5 Hz
	19C307140P948	94.8 Hz
	19C307141P1000	100.0 Hz
	19C307141P1035	103.5 Hz
	19C307141P1072	107.2 Hz
	19C307141P1109	110.9 Hz
	19C307141P1148	114.8 Hz
	19C307141P1188	118.8 Hz
	19C307141P1230	123.0 Hz
	19C307141P1273	127.3 Hz
	19C307141P1318	131.8 Hz
	19C307141P1365	136.5 Hz
	19C307141P1413	141.3 Hz
	19C307141P1462	146.2 Hz
	19C307141P1514	151.4 Hz
	19C307141P1567	156.7 Hz
	19C307140P1622	162.2 Hz
	19C307140P1679	167.9 Hz
	19C307140P1738	173.8 Hz
	19C307140P1799	179.9 Hz
	19C307140P1865	186.5 Hz
	19C307140P1935	193.5 Hz
	19C307140P2035	203.5 Hz
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J441	19B209132P1	Connector, coaxial: includes cable (W441), approx 5 inches long.
J442	19B205689G2	Jack: 16 contacts, includes (16) 19A115853P1 contacts.
J443	19C303426G1	Connector: 20 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L347 thru L350		COIL ASSEMBLY L347 19B204821G1 (4E804A16, 18, 20, 22, 24, 26) L348 19B204821G2 (4E804A17, 19, 21, 23, 25, 27) L349 19B204821G3 (4E804A16, 18, 20, 22, 24, 26) L350 19B204821G4 (4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C343 and C344	19B209159P1	Variable, air, sub-miniature: 1.4G-3.5 pF, 750 v peak; sim to EF Johnson 189.
L351 and L352	7488079P72	Choke, RF: 100 µh ±10%, 2.6 ohms DC res; sim to Jeffers 4434-2K.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P304 thru P309	4029840P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P310	4029840P1	Contact, electrical: solder coated brass; sim to Amp 41854.
P311 thru P320	4029840P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P321	4029840P1	Contact, electrical: solder coated brass; sim to Amp 41854.
P325	4029840P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P327 thru P337	4029840P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q341*	19A115527P1	Silicon, NPN. Earlier than REV A.
	19A115246P1	Silicon, NPN; sim to Type 2N1701.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T341*	19B209083P2	Audio freq: 300 to 3000 Hz. Pri 1: 19 ohms ±10% imp at 3 v, 0.866 ohm DC res max. Sec 1: 3.5 ohms ±10% imp at 3 v, 0.222 ohm DC res max.
		In Models earlier than REV A:
	19B209083P1	Audio freq: 300 to 3000 Hz. Pri 1: 19 ohms ±10% imp at 3 v, 0.866 ohm DC res max. Sec 1: 3.5 ohms ±10% imp at 3 v, 0.222 ohm DC res max.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424P7	Miniature, phen: 4 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W441		(Part of J441).
		- - - - - - - - TUNED CIRCUITS - - - - - - - -
Z371		COIL ASSEMBLY 19B204482G1 (Used in Models 4E804A16, 18, 20, 22, 24, 26)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218P247	Ceramic disc: 22 pF ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601P17	Phenolic: 0.68 pF ±10%, 500 VDCW.
C4*	5494481P7	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV L.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204843P8	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152P222K	Composition: 2200 ohms ±10%, 1/4 w. Added by REV L.
R2*	3R152P471K	Composition: 470 ohms ±10%, 1/4 w. Added by REV L.
	5491798P5	Tuning slug.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
Z372		COIL ASSEMBLY 19B204832G1 (Used in Models 4E804A19, 18, 20, 22, 24, 26)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218P249	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204832P6	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
Z373		COIL ASSEMBLY 19B204830G1 (Used in Models 4E804A16, 18, 20, 22, 24, 26)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218P249	Ceramic disc: 27 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204830P6	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
Z374		COIL ASSEMBLY 19B204831G1 (Used in Models 4E804A16, 18, 20, 22, 24, 26)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1*	5496218P248	Ceramic disc: 24 pF ±5%, 500 VDCW, temp coef -80 PPM. In REV B and earlier:
	5496218P251	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef -80 PPM.
C2*	5496218P251	Ceramic disc: 33 pF ±5%, 500 VDCW, temp coef -80 PPM. Deleted by REV C.

SYMBOL	GE PART NO.	DESCRIPTION
C5*	5494481P13	Ceramic disc: 3500 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV C.
C5*	5494481P13	Ceramic disc: 2000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV C.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L7*	19B204831P6	Coil. In REV B and earlier:
	19A121564P1	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
Z375		COIL ASSEMBLY 19B204832G2 (Used in Models 4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5496218P244	Ceramic disc: 15 pF ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601P17	Phenolic: 0.68 pF ±10%, 500 VDCW.
C4*	5494481P7	Ceramic disc: 470 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV L.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204842P8	Coil.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1*	3R152P222K	Composition: 2200 ohms ±10%, 1/4 w. Added by REV L.
R2*	3R152P471K	Composition: 470 ohms ±10%, 1/4 w. Added by REV L.
	5491798P5	Tuning slug.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
Z376		COIL ASSEMBLY 19B204832G3 (Used in Models 4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5496218P246	Ceramic disc: 20 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204832P6	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
Z377		COIL ASSEMBLY 19B204830G2 (Used in Models 4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5496218P246	Ceramic disc: 20 pF ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204830P6	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
Z378		COIL ASSEMBLY 19B204831G2 (Used in Models 4E804A17, 19, 21, 23, 25, 27)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3*	5496218P245	Ceramic disc: 18 pF ±5%, 500 VDCW, temp coef -80 PPM. In REV B and earlier:
	5496218P256	Ceramic disc: 51 pF ±5%, 500 VDCW, temp coef -80 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C4*	5496218P256	Ceramic disc: 51 pF ±5%, 500 VDCW, temp coef -80 PPM. Deleted by REV C.
C5*	5494481P13	Ceramic disc: 2000 pF ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV C.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L7*	19B204843P6	Coil. In REV B and earlier:
	19A121564P1	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798P5	Tuning slug.
		MECHANICAL PARTS (SEE RC-1213)
1	403398#P6	(Not Used).
2	19B204543G3	Hinge.
3	403543P91	Transistor heat sink: approx 1/4 x 1/2 inches dia; sim to Birtcher 3AL-535-2K. (Used with Q10 in A349).
4	403655P1	Washer insulator: nylon. (Used with Q8 and Q10 in A349).
5	403218P1	Can: approx 1-1/8 x 1-1/8 x 1-1/8 inches. (Used with T1 in A349).
6	19B204583G1	Hinge.
7	19A115784P1	Mica insulator. (Used with Q341).
8	19A121989P1	Bushing. (Used with Q341).
9	19E500312P1	(Not Used).
10	19E500812P3	Chassis: approx 13-3/4 x 3 x 1-1/2 inches.
11	19A121229G1	Support. (Mounts FL341).
12	19B204583G2	Hinge.
13	19A121676P1	Guide pin.
14	19B204673P1	Cover.
15	19C303396G2	Receiver cover, bottom.
16	19A121297P1	Angle.
17	7160361P4	Nut, spring clip: sim to Tinnerman C6452-HZ-157.
18	402985P3	(Not Used).
19	8529938C	Plug button.
20	19A115461P2	(Not Used).
21	403425P5	Can: sim to Hudson Tool and Die HY-1236-2. (Used with T1 in A367).
22	19B204672P1	Cover.
23	7162414P1	Mounting ring, transistor socket: approx 7/16 inch dia; sim to Elco 757. (Used with Q1 in A349).
24	19B204917P1	(Not Used).
25	19B204719P1	(Not Used).
26	19C303396G4	Receiver cover, top.
27	402985P3	Cable clamp: nylon; sim to Heckeswer 1/8-4.
28	19A121383P1	Support.
29	403308P1	Clip. (Part of XY1-4 in A358-363).
30	19B200025P9	Rivet. (Part of XY1-4 in A358-363).
31	19A115793P1	Contact, electrical: sim to Malco 2700. (Part of XY1-4 in A358-363).
32	403930P71	Crystal socket. (Part of XY1-4 in A358-363).
33	19C303547P1	Cover.
34	19C303394G1	Heat sink.
35	19C303389G1	Chassis: approx 14-1/2 x 3-1/2 x 3-7/32 inches.



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 - To incorporate improved transistor and transformer; changed Q341 and T341. To simplify alignment; changed R1 on Multiplier Selectivity Board A350/A351. On single frequency units deleted C91, R5 and added R39 on 1st Oscillator/Multiplier Board A350/A351.

REV. B - To eliminate feedback with receiver cabling. Added C385.

REV. C - To improve impedance matching to Crystal Filter.
Deleted A346 and added A375.

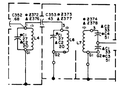
Changed C10 and C11 on A350/A351.

Changed C1 and L1 and deleted C2 on Z374.

Changed C3 and L7 and deleted C4 on Z378.

Added C5 to Z374/Z378.

Schematic Diagram was:



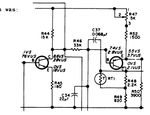
REV. D - To allow for variations in audio response.
Changed C21 on A350/A351.

REV. E - To improve temperature compensation.
Changed C7, C10 and C11 on A347.

To reduce variations in discriminator output.
Changed Q4 and Q5 on A349.

To reduce audio rumble. Deleted R46 and added C71 on A349.

Schematic Diagram was:



REV. F - To improve temperature characteristics. Changed C4, C5, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, L1, L2, L3, L4 and L5 on A347.

REV. G - To improve DC bias stability. Added R80 to A349.

REV. H - To facilitate the procurement of parts. Changed C8, C11, C19, C23 and L1 on A350/A351.

Added C28 on A350 and C30 and C31 to A350/A351.

REV. J - To reduce receiver lock-up. Replaced C5 with C26 on A347.

REV. K - To facilitate procurement of parts. Deleted R15 on A347 and changed A375.

Schematic Diagram was:

REV. L - To improve stability in RF amplifier. Deleted C7, C8, R8, and R9 on A343.

REV. M - 4ER40A22-27
To reduce falsing. Deleted R39 and added R24 on A351.

REV. N - 4ER40A16-21
Rev. N - 4ER40A22-27
To eliminate capacitor failures. Changed C20 on A349.

REV. O - 4ER40A16-21
REV. P - 4ER40A22-27
To protect the output transistor. Added CR301.

REV. P - 4ER40A16-21
REV. R - 4ER40A22-27
To improve PA stability. Added C78 to A349.

DP-1084

MOBILE RADIO DEPARTMENT
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