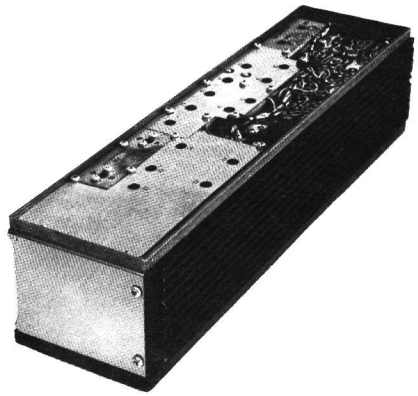
communications

MASTR Progress Line

66-88 MC RECEIVER MODELS 4ER40A10-15

Maintenance Manual LBI-3619



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)

ER-40-A

*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 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.

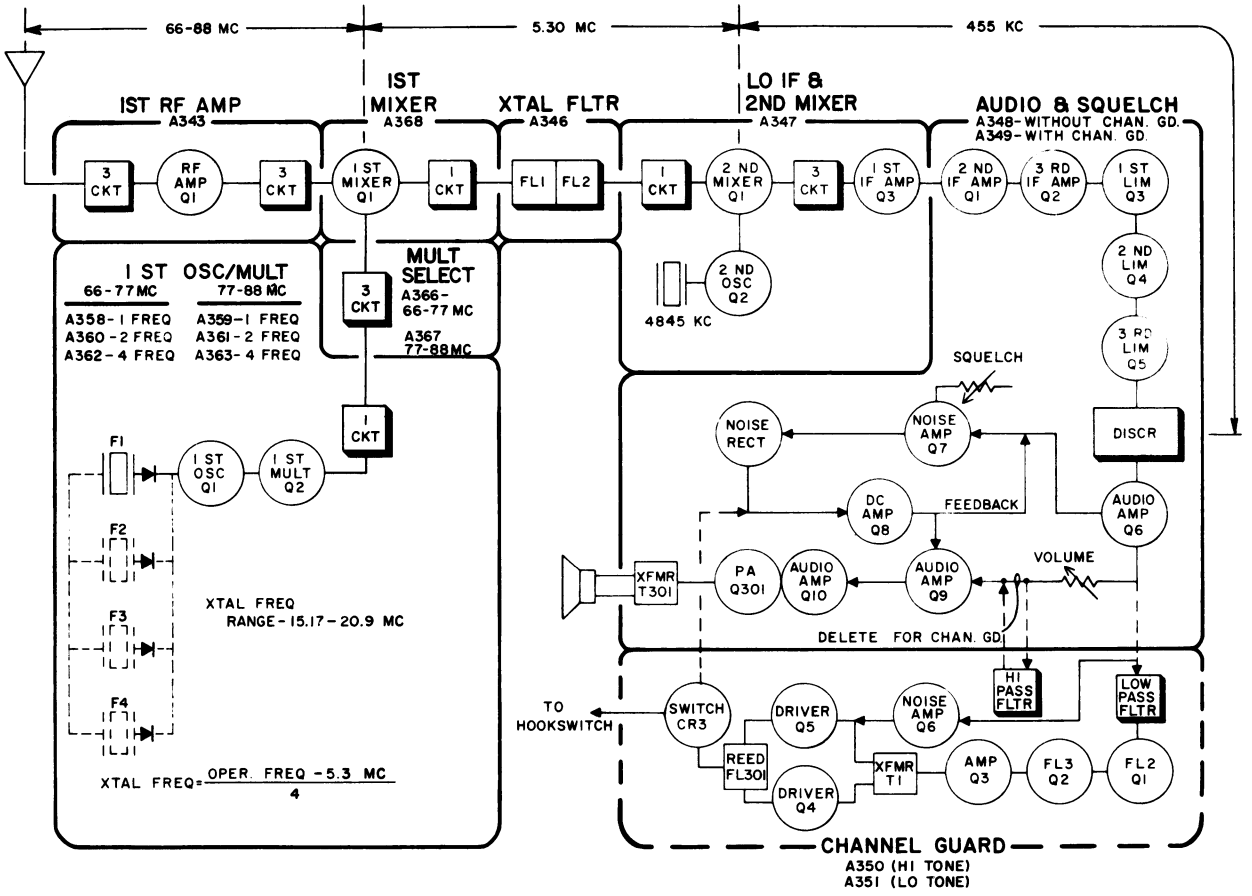
Centralized metering jack J442 is provided for use with General Electric Test Set, Model 4EX3A10, for ease of alignment and servicing. The Test Set meters the oscillator, multiplier, and limiter stages as well as the discriminator, audio PA, voice coil and regulated 10 volts.

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.



(RC-1211)

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 couples 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 (A348)

Following A347-Q3 are two additional RC coupled low IF amplifiers (A348-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 (A348-Q3, -Q4 and -Q5). The 1st limiter is metered at J442-3 through metering network C13, CR2, R18 and C15.

DISCRIMINATOR (A348)

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 (A348)

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 A348-J9. The VOLUME control arm connects to A348-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 milliamps 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-fence" operation.

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.

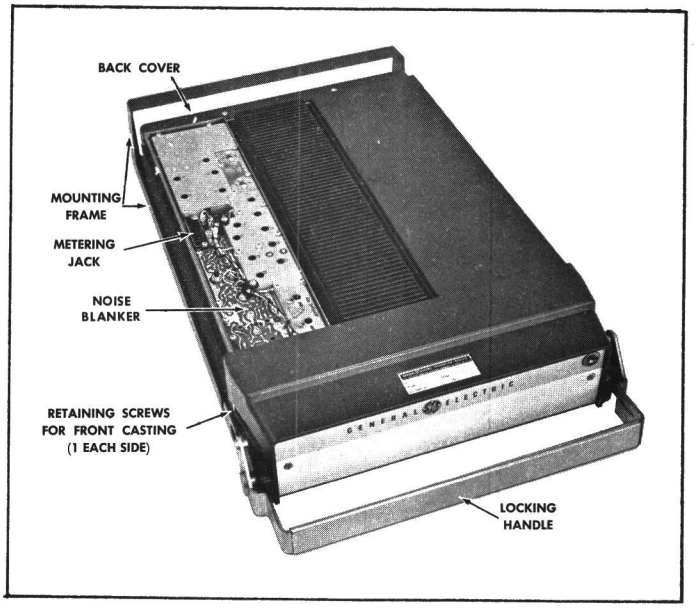


Figure 2 - Removing Top Cover

To service the receiver from the bottom—

1. Pull locking handle down. Pull radio out of mounting frame.

2. Remove screws in bottom cover. Pry up cover at back of receiver.

3. Slide cover back and lift off.

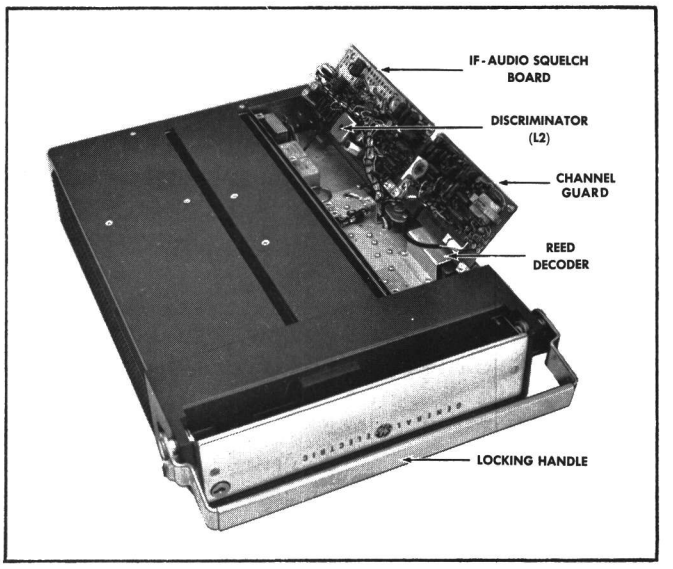


Figure 3 - Removing Bottom Cover

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 ot the system frame.

FRONT END ALIGNMENT

EQUIPMENT REQUIRED

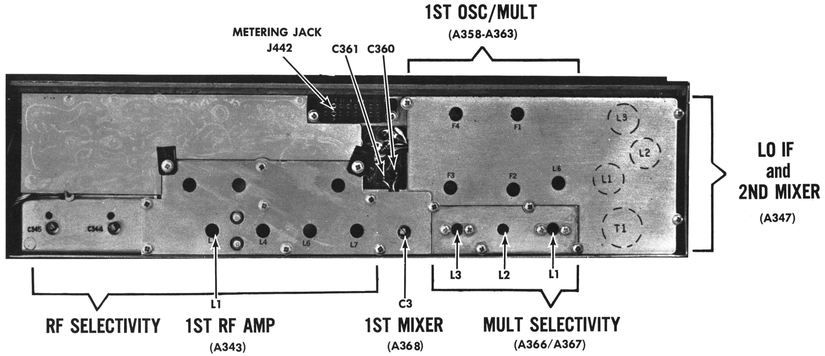
1. G-E Test Set Model 4EX3A10, station Meter Switching Panel or 20,000 ohms-per-volt Multimeter with a 1-volt scale.
2. A 455 KC and 66-88 MC signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

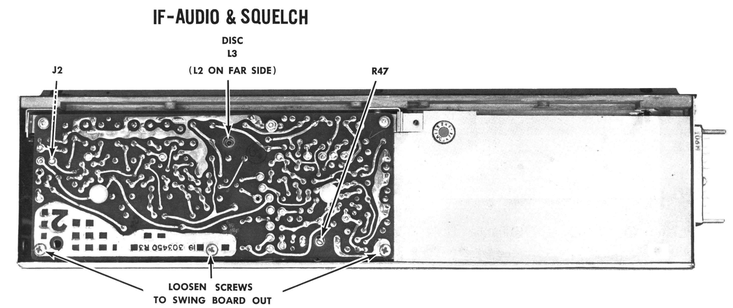
PRELIMINARY CHECKS AND ADJUSTMENTS

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 squelch control fully clockwise 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, squelch control fully clockwise 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 3 position. Alternately apply a 445-KC and 465-KC signal while adjusting L2 and L3 for readings of at least 1.7 volts, but not more than 2.1 volts. Both readings must be within 0.1 volt.
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: L6, L4, L1 — Tune: L7, L6, L4
6.	"	"	C343, C344 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), 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 and C3 have been aligned at the factory and will normally require no further adjustment. If alignment is necessary refer to the RECEIVER OUTLINE DIAGRAM for location of resistor loading points A, B and C.

TEST PROCEDURES

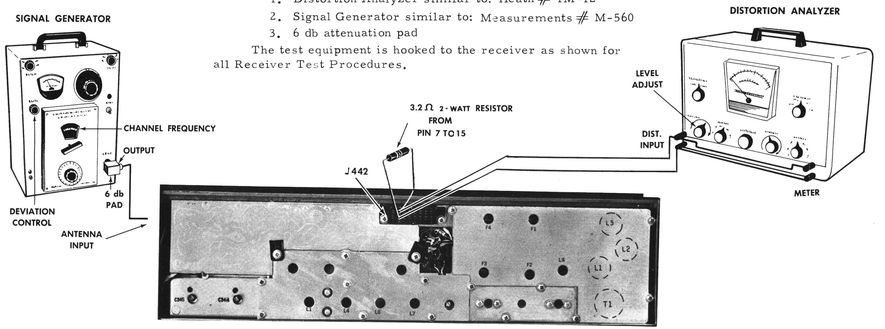
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

TEST EQUIPMENT REQUIRED

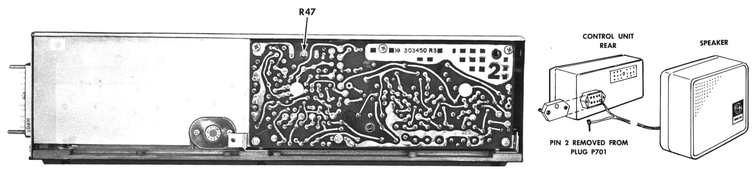
for test hookup shown:

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

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



COMPONENT TOP VIEW



COMPONENT BOARD WIRING VIEW

STEP 1

AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

1. Connect a 1,000-microvolt test signal modulated by 1,000 cycles ±3.3 KC deviation to the antenna jack J441.
2. Two-Watt Speaker:
   When speaker is used, disconnect speaker lead pin from J701-2 (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. Check BIAS ADJ for 0.65 VDC at J442-1 and -8 (STEP 2). 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 KC.

STEP 3- VOLTAGE RATIO READINGS

EQUIPMENT REQUIRED:

1. RF VOLTMETER (SIMILIAR TO BOONTON MODEL 91-CA OR MILLIVAC TYPE MV-18 C.
2. SIGNAL ON RECEIVER FREQUENCY (BELOW SATURATION). CORRECT FREQUENCY CAN BE DETERMINED BY ZEROING THE DISCRIMINATOR. USE 1,000 CYCLE SIGNAL WITH 2.3 KC DEVIATION FOR AUDIO STAGE.

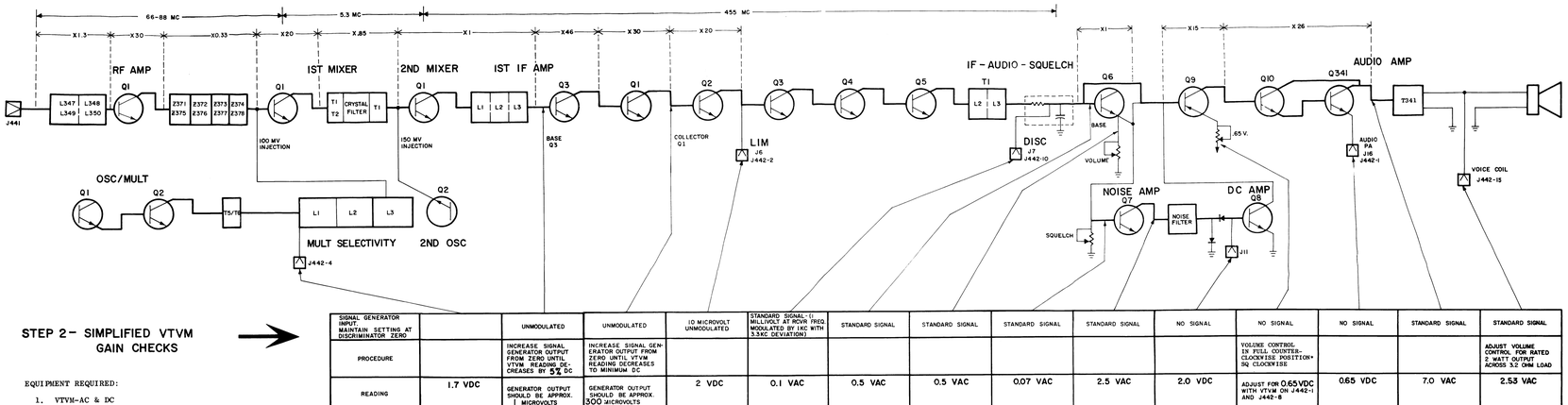
PROCEDURE:

1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, BASE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING MEASURED AND TAKE VOLTAGE READING (E_1).
2. MOVE PROBE TO INPUT OF FOLLOWING STAGE (1ST MIXER*). REPEAK FIRST RESONANT CIRCUIT THEN PEAK CIRCUIT BEING MEASURED AND TAKE READING (E_2).
3. CONVERT READINGS BY MEANS OF THE FOLLOWING FORMULA.

$$\text{VOLTAGE RATIO} = \frac{E_2}{E_1}$$

4. CHECK RESULTS WITH TYPICAL VOLTAGE RATIOS SHOWN ON DIAGRAM.

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



STEP 2- SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

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

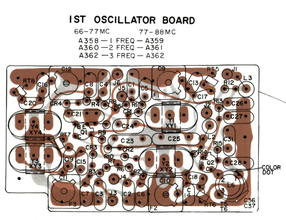
PRELIMINARY STEPS:

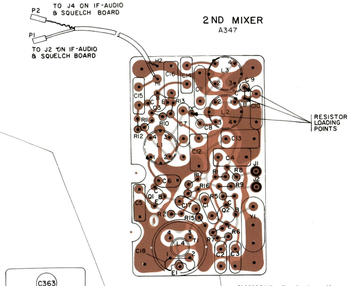
1. SET VOLUME CONTROL FULLY CLOCKWISE.
2. SET SQUELCH CONTROL FULLY COUNTERCLOCKWISE.
3. RECEIVER SHOULD BE PROPERLY ALIGNED.
4. CONNECT SIGNAL GENERATOR TO ANTENNA JACK.
5. VTVM CONNECTS BETWEEN GROUND AND POINTS INDICATED BY ARROWS.

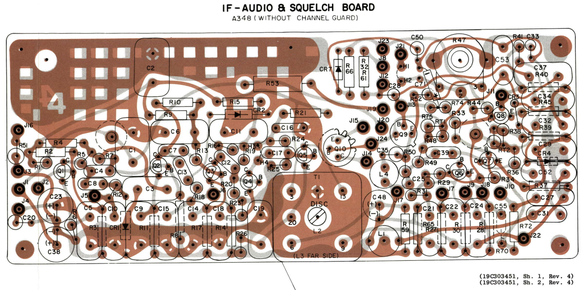
SIGNAL GENERATOR INPUT. MAINTAIN SETTING AT DISCRIMINATOR ZERO		UNMODULATED	UNMODULATED	10 MICROVOLT UNMODULATED	STANDARD SIGNAL (1 MILLIVOLT AT 30MR FREQ. MODULATED BY 1KC WITH 3.3KC DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	NO SIGNAL	NO SIGNAL	STANDARD SIGNAL	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* SQ CLOCKWISE			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 0.65VDC WITH VTVM ON J442-1 AND J442-8	0.65 VDC	7.0 VAC	2.53 VAC

RC-1217A

12-10-84



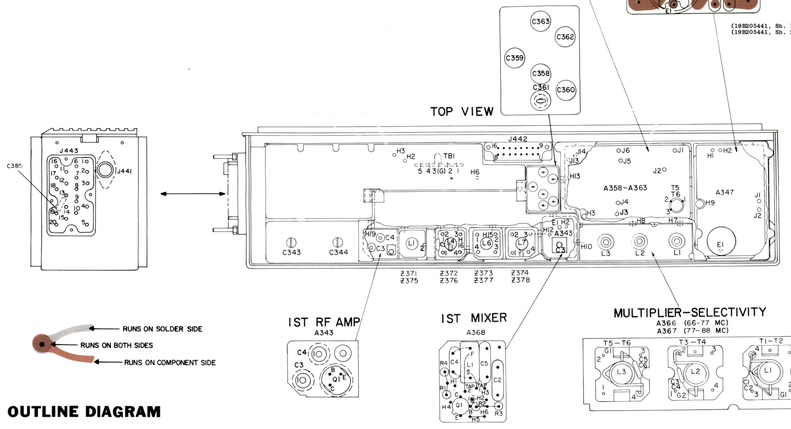




TRANSISTOR	EMITTER		BASE		COLLECTOR	
	—	+	—	+	—	+
A358/363-Q1	1K	1K	10K	2.8K	100Ω	100Ω
A358/363-Q2	70Ω	150Ω	1K	160Ω	100Ω	100Ω
A358-Q3	2.7K	2.7K	7.0K	3.8K	1.6K	1.6K
A363-Q3	300Ω	2500Ω	1.5K	4K	350Ω	400Ω
A347-Q1	3.8K	5.3K	8.5K	2.9K	200Ω	200Ω
A347-Q2	2.7K	6.8K	5.5K	2.7K	200Ω	200Ω
A347-Q3	2.2K	2.3K	2.3K	2. 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	7 K	2.8K	350Ω	350Ω
" " Q6	≠2.2K	≠MEG	36.0K	2.5K	0	0
" " Q7	1.7K	1.7K	11.0K	4.0K	7.0K	16K
" " Q8	180Ω	180Ω	190K	2.8K	11.0K	1MK
" " Q9	2.2K	2.2K	4.1K	45K	2.3K	2.3K
" " Q10	40Ω	35Ω	2.3K	2.3K	40Ω	36Ω
A348/349-Q30	1Ω	1Ω	40Ω	35Ω	40Ω	35Ω

*READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS.

(19B820743, Rev. 7)



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.

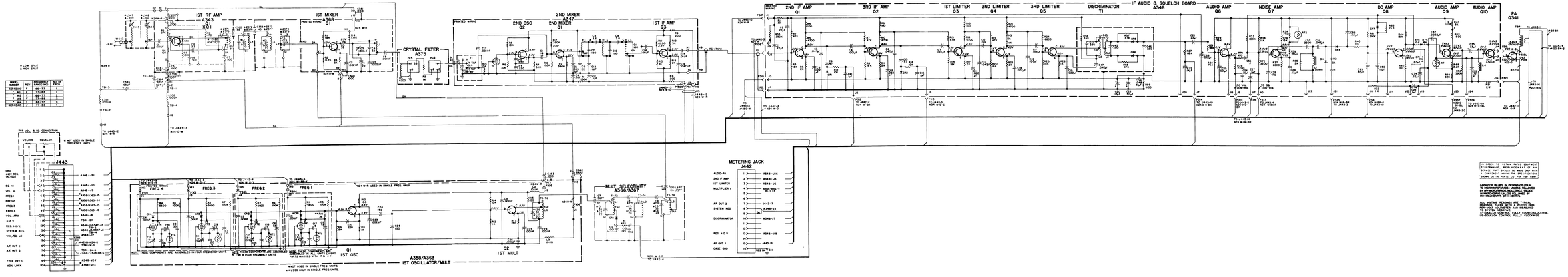
CAUTION

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

OUTLINE DIAGRAM

66 — 88 MC MASTR RECEIVER
MODELS 4ER40A10-15



(198620723, Rev. 17)

SCHEMATIC DIAGRAM

66 — 88 MC MASTR RECEIVER
MODELS 4ER40A10-15

PARTS LIST

LBI-3538A
66-88 MC RECEIVER
MODELS 4ER40A1D - 4ER60A15
(PL-19D320809 G5&-6G)
REV F

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - SUBASSEMBLIES - - - - - - - -
A343		RF AMPLIFIER ASSEMBLY PL-19B204179-G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C3 and C4	5493392-P7	Ceramic dielectric, feed-thru: .001 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FASC.
C5	5494481-P12	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C6 and C7	7484398-P4	Silver mica (uncased): 500 pf ±10%, 500 VDCW; sim to Underwood Type J-1-RF.
C8	5491601-P30	Tubular, molded: axial leads, 3.3 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	4038642-P1	Germanium.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115249-P2	Silicon, NPN; sim to Type 2N918.
		- - - - - - - - - RESISTORS - - - - - - - - -
R5	3R152-P273K	Fixed composition: 27,000 ohms ±10%, 1/4 w.
R6	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R7	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.
R8	3R152-P471K	Fixed composition: 470 ohms ±10%, 1/4 w.
R9	3R152-P302K	Fixed composition: 3000 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.
A375*		CRYSTAL FILTER ASSEMBLY PL-19B204616-G4
		- - - - - - - - - FILTERS - - - - - - - - -
FL5 and FL6	19C300094-G4	Bandpass filter.
		- - - - - - - - - RESISTORS- - - - - - - - -
R2	3R152-P103K	Fixed Composition: 1000 ohms ±10%, 1/2 w.
R3	3R152-P622J	Fixed composition: 6200 ohms ±5%, 1/4 w. In REV B and earlier: CRYSTAL FILTER ASSEMBLY PL-19B204616-G3
A346		
		- - - - - - - - - FILTERS- - - - - - - - -
FL5 and FL6	PL-19C304094-G4	Bandpass Filter.
		- - - - - - - - - RESISTORS- - - - - - - - -
R1	3R152-P432K	Fixed composition: 4300 ohms ±10%, 1/4 w.
R2	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
A347		SECOND MIXER ASSEMBLY PL-19B204438-G1
		- - - - - - - - - CAPACITORS- - - - - - - - -
C1	5490008-P9	Silver mica, dipped phen: radial leads, 18 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C2 and C3	5490008-P35	Silver mica, dipped phen: radial leads, 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C4*	19B209243-P7	Polyester dielectric: 0.1 pf ±20%, 40 VDCW. In REV. D and earlier: Mylar: dielectric: 0.1 pf ±20%, 50 VDCW.
C5*	19B209243-P4	Polyester dielectric: .033 pf ±20%, 40 VDCW. In REV. D and earlier: Mylar: dielectric: .033 pf ±20%, 50 VDCW.
C6	5494219-P47	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef 0 PPM.
C7*	5494219-P269	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -470 PPM. In REV. D: In REV. C and earlier: Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
	5494219-P566	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM.
C8* and C9*	5494219-P666	
C10* and C11*	5491601-P140	Tubular molded: 3.6 pf ±5%, 500 VDCW. In REV. D and earlier: Tubular molded: 2.7 pf ±5%, 500 VDCW.
	5491601-P28	
C12* and C13*	5494219-P269	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef 150 PPM. In REV. D: In REV. C and earlier: Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -330 PPM.
	5494219-P566	
	5494219-P666	Ceramic disc: 130 pf ±5%, 500 VDCW, temp coef -470 PPM.
C14* and C15*	19B209243-P1	Polyester dielectric: 0.01 pf ±20%, 40 VDCW. In REV. D and earlier: Mylar: dielectric: 0.01 pf ±20%, 50 VDCW.
	5491189-P101	
C16*	19B209243-P5	Polyester dielectric: .047 pf ±20%, 40 VDCW. In REV. D and earlier: Mylar: dielectric: .047 pf ±20%, 50 VDCW.
	5491189-P104	
C17	5494481-P112	Ceramic disc: .001 ±10%, 500 VDCW.
		- - - - - - - - - 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*	19C303062-G7	Coil, includes tuning slug T160519-P2. In REV. D and earlier: Coil, includes tuning slug T160519-P2.
L2*	19C303062-G8	Coil, includes tuning slug T160519-P2. In REV. D and earlier: Coil, includes tuning slug T160519-P2.
L3*	19C303064-G2	Coil, includes tuning slug T160519-P2. In REV. D and earlier: Coil, includes tuning slug T160519-P2.
L4*	19C303063-G3	
L5		(Part of L3). Deleted by REV. E. (Part of T1).

SYMBOL	G-E PART NO	DESCRIPTION
P1	4029840-P2	Contact, electrical: solder coated brass; sim to Amp 42027-2.
P2	4029840-P1	Contact, electrical: solder coated brass; sim to Amp 41854.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115345-P1	Silicon, NPN.
Q2 and Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152-P152K	Fixed composition: 1500 ohms ±10%, 1/4 w.
R2	3R152-P392K	Fixed composition: 3900 ohms ±10%, 1/4 w.
R5 and R6	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R7	3R152-P512J	Fixed composition: 5100 ohms ±5%, 1/4 w.
R8 and R9	3R152-P201J	Fixed composition: 200 ohms ±5%, 1/4 w.
R10	3R152-P303J	Fixed composition: 3000 ohms ±5%, 1/4 w.
R11	3R152-P623J	Fixed composition: 6200 ohms ±5%, 1/4 w.
R12	3R152-P302J	Fixed composition: 3000 ohms ±5%, 1/4 w.
R13	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R15	3R152-P153K	Fixed composition: 15,000 ohms ±10%, 1/4 w.
R16	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w.
R17	3R152-P394K	Fixed composition: 0.39 megohm ±10%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1		COIL ASSEMBLY PL-19B204414-G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C18	19C301540-P261	Ceramic disc: temp-comp, radial leads, 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P3	Tuning slug.
		- - - - - - - - - CRYSTALS - - - - - - - - -
Y1	19A110192-P3	Quartz: freq 4845 KCS ±100 cps at 25°C, temp range -30° to +75°C.
A348		IF/AUDIO ASSEMBLY PL-19D603237-G3
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	19A115028-P116	Mylar: dielectric, dipped phen: radial leads, 0.22 pf ±20%, 200 VDCW.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - CAPACITORS(Cont'd) - - - - -
C3	19A115028-P111	Mylar: dielectric, dipped phen: radial leads, .047 pf ±20%, 200 VDCW.
C4	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C5	19A115028-P109	Mylar: dielectric, dipped phen: radial leads, .022 pf ±20%, 200 VDCW.
C6	19A115028-P111	Mylar: dielectric, dipped phen: radial leads, .047 pf ±20%, 200 VDCW.
C7	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to Type JF Discap.
C8	5496219-P717	Ceramic disc: temp-comp, radial leads, 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C9	19A115028-P109	Mylar: dielectric, dipped phen: radial leads, .022 pf ±20%, 200 VDCW.
C10	19A115028-P114	Mylar: dielectric, dipped phen: radial leads, 0.1 pf ±20%, 200 VDCW.
C11	19A115028-P111	Mylar: dielectric, dipped phen: radial leads, .047 pf ±20%, 200 VDCW.
C12	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C13	5496219-P717	Ceramic disc: temp-comp, radial leads, 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C14	19A115028-P109	Mylar: dielectric, dipped phen: radial leads, .022 pf ±20%, 200 VDCW.
C15	19A115028-P114	Mylar: dielectric, dipped phen: radial leads, 0.1 pf ±20%, 200 VDCW.
C16	5496219-P421	Ceramic disc: temp-comp, radial leads, 100 pf ±10%, 500 VDCW, temp coef -220 PPM.
C17	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C18 and C19	19A115028-P109	Mylar: dielectric, dipped phen: radial leads, .022 pf ±20%, 200 VDCW.
C20	5496267-P14	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 15 pf ±20%, 20 VDCW; sim to Sprague Type 150D.
C21	19B209243-P9	Polyester dielectric: radial leads, 0.22 pf ±20%, 40 VDCW; sim to Amperex C280AA/P220K.
C22	19A115028-P107	Mylar: dielectric, dipped phen: radial leads, .01 pf ±20%, 200 VDCW.
C23	5491000-P1	Tubular, hermetically sealed, electrolytic: axial leads, 30 pf +75% -10%, 25 VDCW; sim to Sprague 345S53.
C24	19A115028-P107	Mylar: dielectric, dipped phen: radial leads, .01 pf ±20%, 200 VDCW.
C25	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C27	19B209243-P7	Polyester dielectric: radial leads, 0.1 pf ±20%, 40 VDCW; sim to Amperex C280AA/P100K.
C28	5496267-P17	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 1 pf ±20%, 35 VDCW; sim to Sprague Type 150D.
C29	19B209243-P9	Polyester dielectric: radial leads, 0.22 pf ±20%, 40 VDCW; sim to Amperex C280AA/P220K.
C31	19B209243-P5	Polyester dielectric: radial leads, .047 pf ±20%, 40 VDCW; sim to Amperex C280AA/P47K.
C32	19B209243-P9	Polyester dielectric: radial leads, 0.22 pf ±20%, 40 VDCW; sim to Amperex C280AA/P220K.
C33	5496267-P28	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 0.47 pf ±20%, 35 VDCW; sim to Sprague Type 150D.
C34	19B209243-P9	Polyester dielectric: radial leads, 0.22 pf ±20%, 40 VDCW; sim to Amperex C280AA/P220K.
C35	5496267-P6	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 33 pf ±20%, 10 VDCW; sim to Sprague Type 150D.
C37	19A115028-P305	Mylar: dielectric, dipped phen: radial leads, .0068 pf ±10%, 200 VDCW.
C38	5495670-P10	Tubular, hermetically sealed, electrolytic: axial leads, 100 pf +75% -10%, 15 VDCW; sim to Sprague 30D172A1.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - CAPACITORS(Cont'd) - - - - -
C39	5490008-P143	Silver mica, dipped phen: radial leads, 470 pf ±10%, 300 VDCW; sim to Electro Motive Type DM-15.
C48	5495670-P9	Tubular, hermetically sealed, electrolytic: axial leads, 35 pf +75% -10%, 15 VDCW; sim to Sprague 30D10941.
C50	5496267-P14	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 15 pf ±20%, 20 VDCW; sim to Sprague Type 150D.
C52	4029003-P16	Silver mica, dipped phen: radial leads, .0022 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C53	19A115028-P315	Mylar dielectric, dipped phen: radial leads, 0.15 pf ±10%, 200 VDCW.
C55	5491189-P1	Mylar: dielectric, dipped epoxy: radial leads, .01 pf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C71*	5496267-P28	Tubular: 0.47 pf ±20%, 35 VDCW. Added by REV. D.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	7777146-P3	Germanium; sim to Type 1N90.
CR3 and CR4	19A115250-P1	Silicon.
CR7	19A115250-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J24	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	PL-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.
Q4* and Q5*	19A115552-P1	Silicon, NPN. In REV. D and earlier:
	19A115123-P1	Silicon, NPN.
Q6 thru Q8	19A115123-P1	Silicon, NPN
Q9	19A115247-P1	Silicon, PNP; sim to Type 2N1024,
Q10	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77-P330K	Fixed composition: 33 ohms ±10%, 1/2 w.
R2	3R77-P473K	Fixed composition: 47,000 ohms ±10%, 1/2 w.
R3	3R77-P183J	Fixed composition: 18,000 ohms ±5%, 1/2 w.
R4	3R77-P101K	Fixed composition: 100 ohms ±10%, 1/2 w.
R5	3R77-P472K	Fixed composition: 4700 ohms ±10%, 1/2 w.
R6	3R77-P202J	Fixed composition: 2000 ohms ±5%, 1/2 w.
R7	3R77-P473K	Fixed composition: 47,000 ohms ±10%, 1/2 w.
R8	3R77-P183J	Fixed composition: 18,000 ohms ±5%, 1/2 w.
R9	3R77-P101K	Fixed composition: 100 ohms ±10%, 1/2 w.
R10	3R77-P472K	Fixed composition: 4700 ohms ±10%, 1/2 w.
R11	3R77-P202J	Fixed composition: 2000 ohms ±5%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - RESISTORS(Cont'd) - - - - - -
R12	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R13	3R77-P473K	Fixed composition: 47,000 ohms ±10%, 1/2 w.
R14	3R77-P183J	Fixed composition: 18,000 ohms ±5%, 1/2 w.
R15	3R77-P101K	Fixed composition: 100 ohms ±10%, 1/2 w.
R16	3R77-P472K	Fixed composition: 4700 ohms ±10%, 1/2 w.
R17	3R77-P202J	Fixed composition: 2000 ohms ±5%, 1/2 w.
R18	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R19	3R77-P473K	Fixed composition: 47,000 ohms ±10%, 1/2 w.
R20	3R77-P183J	Fixed composition: 18,000 ohms ±5%, 1/2 w.
R21	3R77-P472K	Fixed composition: 4700 ohms ±10%, 1/2 w.
R23	3R77-P202J	Fixed composition: 2000 ohms ±5%, 1/2 w.
R24	3R77-P682K	Fixed composition: 6800 ohms ±10%, 1/2 w.
R25	3R77-P183J	Fixed composition: 18,000 ohms ±5%, 1/2 w.
R26	3R77-P102J	Fixed composition: 1000 ohms ±5%, 1/2 w.
R27	3R77-P683K	Fixed composition: 68,000 ohms ±10%, 1/2 w.
R28	3R77-P222J	Fixed composition: 2200 ohms ±5%, 1/2 w.
R29 and R30	3R77-P753J	Fixed composition: 75,000 ohms ±5%, 1/2 w.
R31	3R77-P512J	Fixed composition: 5100 ohms ±5%, 1/2 w.
R32	3R77-P102J	Fixed composition: 1000 ohms ±5%, 1/2 w.
R33*	3R77-P104K	Fixed composition: 100,000 ohms ±10%, 1/2 w. Added by REV. F.
R34	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R36	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R37	3R77-P222J	Fixed composition: 2200 ohms ±5%, 1/2 w.
R38	3R77-P751J	Fixed composition: 750 ohms ±5%, 1/2 w.
R39	3R77-P562J	Fixed composition: 5600 ohms ±5%, 1/2 w.
R40	3R77-P113K	Fixed composition: 11,000 ohms ±10%, 1/2 w.
R41	3R77-P204K	Fixed composition: 0.2 megohm ±10%, 1/2 w.
R44	3R77-P153K	Fixed composition: 15,000 ohms ±10%, 1/2 w.
R45	3R77-P181K	Fixed composition: 180 ohms ±10%, 1/2 w.
R46*	3R77-P333K	Fixed composition: 33,000 ohms ±10%, 1/2 w. Deleted by REV. D.
R47	19B209115-P1	Variable, carbon film: 5000 ohms ±20%, 0.15 w, linear taper; sim to CTS Type UPE-70.
R48	3R77-P222J	Fixed composition: 2200 ohms ±5%, 1/2 w.
R49	3R77-P821K	Fixed composition: 820 ohms ±10%, 1/2 w.
R50	3R77-P392K	Fixed composition: 3900 ohms ±10%, 1/2 w.
R51	19B209922-P15	Wirewound, phen: 1 ohm ±5%, 2 w; sim to IRC Type BWH.
R52	3R77-P152K	Fixed composition: 1500 ohms ±10%, 1/2 w.
R53	5493048-P444	Deposited carbon: epoxy coated: 0.28 megohm ±1%, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R59	3R77-P512K	Fixed composition: 5100 ohms ±10%, 1/2 w.
R65	3R77-P123K	Fixed composition: 12,000 ohms ±10%, 1/2 w.
R66	3R77-P223K	Fixed composition: 22,000 ohms ±10%, 1/2 w.
R70	3R77-P471J	Fixed composition: 470 ohms ±5%, 1/2 w.
R71*	3R77-P913J	Fixed composition: 91,000 ohms ±5%, 1/2 w. Deleted by REV. F.
R72	3R77-P332J	Fixed composition: 3300 ohms ±5%, 1/2 w.
R74*	3R77-P153K	Fixed composition: 15 k ±10%, 1/2 w. Added by REV. D.
R75*	3R77-P183K	Fixed composition: 18 k ±10%, 1/2 w. Added by REV. D.
		- - - - - - - - -THERMISTORS - - - - - - - - -
RT1	19B209143-P2	Rod: axial leads, 4000 ohms ±10% res, 1 w max; sim to Global Type TB9F-12.
RT2	19B209143-P3	Rod: axial leads, 850 ohms ±10% res, 1 w max; sim to Global Type TB9F.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1		DISCRIMINATOR ASSEMBLY PL-19C303612-G3
		- - - - - - - - - CAPACITORS - - - - - - - - -
C41 and C42	19B209196-P1	Ceramic disc: temp-comp, radial leads, 280 pf ±5%, 500 VDCW, temp coef -125 ±30 PPM.
C45	7489162-P43	Silver mica, dipped phen: radial leads, 470 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C46	7489162-P35	Silver mica, dipped phen: radial leads, 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C47	5491189-P4	Mylar: dielectric, dipped epoxy: radial leads, .047 pf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C48	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C49	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C50	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C51	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C52	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C53	19A115250-P1	Silicon.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	PL-19A121532-G1	Coil,
L2 and L3		
		- - - - - - - - - RESISTORS - - - - - - - - -
R56	3R152-P331J	Fixed composition: 330 ohms ±5%, 1/4 w.
R57 and R58	3R152-P473J	Fixed composition: 47,000 ohms ±5%, 1/4 w.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7160519-P1	Tuning slug.
A358 thru A363		FIRST OSCILLATOR ASSEMBLY A358 19B204419-G7 (4ER40A1D) A359 19B204419-G10 (4ER40A11) A360 19B204419-G8 (4ER40A12) A361 19B204419-G11 (4ER40A13) A362 19B204419-G9 (4ER40A14) A363 19B204419-G12 (4ER40A15)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C2	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap. (Used in Models 4ER40A11-15).
C3 and C4	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap. (Used in Models 4ER40A14, 15).
C5	5496219-P751	Ceramic disc: temp-comp, radial leads, 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C6	5496219-P751	Ceramic disc: temp-comp, radial leads, 33 pf ±5%, 500 VDCW, temp coef -750 PPM. (Used in Models 4ER40A12-15).
C7 and C8	5496219-P751	Ceramic disc: temp-comp, radial leads, 33 pf ±5%, 500 VDCW, temp coef -750 PPM. (Used in Models 4ER40A14, 15).

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - CAPACITORS(Cont'd) - - - - -
C9	5491271-P106	Variable, air dielectric, subminiature: approx 1.88-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C10	5491271-P106	Variable, air dielectric, subminiature: approx 1.88-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5. (Used in Models 4ER40A12-15).
C11 and C12	5491271-P106	Variable, air dielectric, subminiature: approx 1.88-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5. (Used in Models 4ER40A14, 15).
C13	5496219-P40	Ceramic disc: temp-comp, radial leads, 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C14	5496219-P40	Ceramic disc: temp-comp, radial leads, 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C15 and C16	5496219-P40	Ceramic disc: temp-comp, radial leads, 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A14, 15).
C17	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM.
C18	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A12-15).
C19 and C20	19C300685-P93	Ceramic disc: temp-comp, radial leads, 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. (Used in Models 4ER40A14, 15).
C21	5496219-P771	Ceramic disc: temp-comp, radial leads, 220 pf ±5%, 500 VDCW, temp coef -750 PPM.
C23	5494481-P114	Ceramic disc: radial leads, .002 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C24	5490008-P31	Silver mica, dipped phen: radial leads, 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219-P467	Ceramic disc: temp-comp, radial leads, 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C29	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
C31	5494481-P112	Ceramic disc: radial leads, .001 pf ±10%, 500 VDCW; sim to EMC Type JF Discap.
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1*	19A115348-P1	Silicon. (Deleted in Models 4ER60A10, 11 by Rev A).
CR2	19A115348-P1	Silicon. (Used in Models 4ER40A12-15).
CR3 and CR4	19A115348-P1	Silicon. (Used in Models 4ER40A14, 15).
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 and J2	4033513-P4	Contact, electrical: sim to Bead Chain L93-3,
J3 and J4	4033513-P4	Contact, electrical: sim to Bead Chain L93-3. (Used in Models 4ER40A12-15).
J5	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
J6	4033513-P4	Contact, electrical: sim to Bead Chain L93-3. (Used in Models 4ER40A12-15).
		- - - - - - - - - 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.

(CONT'D ON PAGE 13)

(CONT'D FROM PAGE 12)

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P562J	Fixed composition: 5600 ohms ±5%, 1/4 w.
R2	3R152-P562J	Fixed composition: 5600 ohms ±5%, 1/4 w. (Used in Models 4ER40A12-15).
R3 and R4	3R152-P562J	Fixed composition: 5600 ohms ±5%, 1/4 w. (Used in Models 4ER40A14, 15).
R5*	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w. (Deleted in Models 4ER40A10, 11 by Rev A).
R6	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w. (Used in Models 4ER40A12-15).
R7 and R8	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w. (Used in Models 4ER40A14, 15).
R9	3R152-P153J	Fixed composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152-P102J	Fixed composition: 1000 ohms ±5%, 1/4 w.
R13	3R152-P151J	Fixed composition: 150 ohms ±5%, 1/4 w.
R14	3R152-P103J	Fixed composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w.
R19*	3R152-P360J	Fixed composition: 36 ohms ±5%, 1/4 w. (Added in Models 4ER40A10, 11 by Rev A).
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT5	19B209284-P7	Disc: 62 ohms res nominal at 25°C, color code violet.
RT6	19B209284-P7	Disc: 62 ohms res nominal at 25°C, color code violet. (Used in Models 4ER40A12-15).
RT7 and RT8	19B209284-P7	Disc: 62 ohms res nominal at 25°C, color code violet. (Used in Models 4ER40A14, 15).
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T5 and T6		COIL ASSEMBLY T5 19B204766-G1 (4ER40A10, 12, 14) T6 19B204766-G2 (4ER40A11, 13, 15)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C36	5496218-P250	Ceramic disc: temp-comp, radial leads, 30 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A10, 12, 14).
C37	5496218-P246	Ceramic disc: temp-comp, radial leads, 20 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A11, 13, 15),
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L5	19A121481-P1	Coil.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798-P5	Tuning slug.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1		Refer to Mechanical Parts (RC-1213).

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - SOCKETS(Cont'd) - - - - - -
XY2		Refer to Mechanical Parts (RC-1213). (Used in Models 4ER40A12-15).
XY3 and XY4		Refer to Mechanical Parts (RC-1213). (Used in Models 4ER40A14, 15).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		When reordering give G-E Part No. and specify exact freq needed.
		66-88 MC crystal freq = (OF -5.30 MC) ÷ 4.
Y1	19B206576-P6	Quartz: freq range 15175.000 to 17925.000 KC, temp range -30°C to +85°C. (66-77 MC). (Used in Models 4ER40A10, 12, 14).
Y1	19B206576-P7	Quartz: freq range 17925.001 to 20685.000 KC temp range -30°C to +85°C. (77-88 MC). (Used in Models 4ER40A11, 13, 15).
Y2	19B206576-P6	Quartz: freq range 15175.000 to 17925.000 KC, temp range -30°C to +85°C. (66-77 MC). (Used in Models 4ER40A12, 14).
Y2	19B206576-P7	Quartz: freq range 17925.001 to 20685.000 KC, temp range -30°C to +85°C. (77-88 MC). (Used in Models 4ER40A13, 15).
Y3 and Y4	19B206576-P6	Quartz: freq range 15175.000 to 17925.000 KC, temp range -30°C to +85°C. (66-77 MC). (Used in Models 4ER40A14).
Y3 and Y4	19B206576-P7	Quartz: freq range 17925.001 to 20685.000 KC, temp range -30°C to +85°C. (77-88 MC). (Used in Models 4ER40A15).
A366 and A367		MULTIPLIER SELECTIVITY ASSEMBLY A366 19B204827-G1 (4ER40A10, 12, 14) A367 19B204827-G2 (4ER40A11, 13, 15)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C8 and C9	5491601-P13	Tubular, molded: axial leads, 0.47 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P392K	Fixed composition: 3900 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B204822-G1 (4ER40A10, 12, 14) T2 19B204822-G2 (4ER40A11, 13, 15)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218-P251	Ceramic disc: temp-comp, radial leads, 33 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A10, 12, 14).
C2	5496218-P247	Ceramic disc: temp-comp, radial leads, 22 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A11, 13, 15).
C7	5491601-P15	Tubular, molded: axial leads, 0.56 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C12	5494481-P11	Ceramic disc: radial leads, .001 µf ±20%, 500 VDCW; sim to RMC Type JF Discap.

Feb 1084

(CONT'D ON PAGE 14)

(CONT'D FROM PAGE 13)

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	7777146-P3	Germanium; sim to Type 1N90.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A121552-P2	Coil.
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P5	Tuning slug.
T3 and T4		COIL ASSEMBLY T3 19B204981-G1 (4ER40A10, 12, 14) T4 19B204981-G2 (4ER40A11, 13, 15)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C3	5496218-P252	Ceramic disc: temp-comp, radial leads, 36 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A10, 12, 14).
C4	5496218-P248	Ceramic disc: temp-comp, radial leads, 24 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A11, 13, 15).
C13	5494481-P11	Ceramic disc: radial leads, .001 µf ±20%, 500 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L2	19A121552-P1	Coil.
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P5	Tuning slug.
T5 and T6		COIL ASSEMBLY T5 19B204548-G1 (4ER40A10, 12, 14) T6 19B204548-G2 (4ER40A11, 13, 15)
		- - - - - - - - - CAPACITORS - - - - - - - - -
C5	5496218-P252	Ceramic disc: temp-comp, radial leads, 36 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A10, 12, 14).
C6	5496218-P248	Ceramic disc: temp-comp, radial leads, 24 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in Models 4ER40A11, 13, 15).
C10*	5491601-P24	Tubular: 1.8 pf ±10%, 500 VDCW. (Used in models 4ER40A10, 12, 14).
	5491601-P26	In REV B and earlier: Tubular, molded: axial leads, 2.2 pf ±10% 500 VDCW; sim to Quality Components Type MC. (Used in Models 4ER40A10, 12, 14).
C11*	5491601-P18	Tubular: 0.75 pf ±10%, 500 VDCW. (Used in models 4ER40A11, 13, 15).
	5491601-P23	In REV B and earlier: Tubular, molded: axial leads, 1.5 pf ±10%, 500 VDCW; sim to Quality Components Type MC. (Used in Models 4ER40A11, 13, 15).
		- - - - - - - - - INDUCTORS- - - - - - - - -
L3	19A121552-P3	Coil.
		- - - - - - - - - MISCELLANEOUS- - - - - - - - -
	5491798-P5	Tuning slug.

SYMBOL	G-E PART NO	DESCRIPTION
A368		FIRST MIXER ASSEMBLY PL-19B204430-G4
		- - - - - - - - - CAPACITORS - - - - - - - - -
C2	5494481-P14	Ceramic disc: radial leads, .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C3	5491271-P106	Variable, air dielectric, subminiature: approx 1.98-12.4 pf, 750 v peak; sim to EF Johnson 189-6-5.
C4	5496218-P247	Ceramic disc: temp-comp, radial leads, 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P14	Ceramic disc: radial leads, .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C6	5494481-P12	Ceramic disc: radial leads, .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C7	5496218-P247	Ceramic disc: temp-comp, radial leads, 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - TERMINALS - - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	PL-19A121082-G1	Toroidal coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115342-P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152-P563J	Fixed composition: 56,000 ohms ±5%, 1/4 w.
R2	3R152-P822J	Fixed composition: 8200 ohms ±5%, 1/4 w.
R3	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R4	3R152-P102J	Fixed composition: 1000 ohms ±5%, 1/4 w.
		- - - - - - - - - CAPACITORS - - - - - - - - -
C352	5491601-P117	Tubular, molded: axial leads, 0.68 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C353	5491601-P112	Tubular, molded: axial leads, 0.43 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C358 thru C363	5493392-P7	Ceramic dielectric, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C383 and C384	5496267-P11	Tubular, hermetically sealed, tantalum, dry solid: axial leads, 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C385*	7774750-P4	Ceramic disc: .001 µf +100% -0%, 500 VDCW. Added by REV. B.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J441	19B209122-P1	Connector, coaxial: includes cable (W441), approx 5 inches long.
J442	19B209125-P2	Connector: 18 contacts rated at 5 amps min at 1000 VDC max.
J443	PL-19C303426-G1	Connector: 20 pin contacts.

(CONT'D ON PAGE 15)

(CONT'D FROM PAGE 14)

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L347 thru L350		COIL ASSEMBLY L347 19B204821-G1 (4ER40A10, 12, 14) L348 19B204821-G1 (4ER40A10, 12, 14) L349 19B204821-G2 (4ER40A11, 13, 15) L350 19B204821-G2 (4ER40A11, 13, 15)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C343	19B209159-P1	Variable, air dielectric, subminiature: approx 1.3-3.25 pf, 750 v peak; sim to EF Johnson 189-1-55. (Used in L347, 348).
C344	19B209159-P1	Variable, air dielectric, subminiature: approx 1.3-3.25 pf, 750 v peak; sim to EF Johnson 189-1-55. (Used in L349, 350).
L351 and L352	7488079-P72	Choke, RF: 100 µh ±10%, 2.6 ohms DC res; sim to Jeffers 4424-8.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P304 thru P309	4029840-P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P310	4029840-P1	Contact, electrical: solder coated brass; sim to Amp 41854.
P311 thru P320	4029840-P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P321	4029840-P1	Contact, electrical: solder coated brass; sim to Amp 41854.
P325	4029840-P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P329	4029840-P2	Contact, electrical: solder coated brass; sim to Amp 42827-2.
P337	4029840-P2	Contact, electrical: solder coated brass; sim to Amp 42827-2. (Used in Models 4ER40A12-15).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q341*	19A115246-P1	Silicon, NPN; sim to Type 2N1701.
		In Models earlier than Rev A:
	19A115527-P1	Silicon, NPN.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T341*	19B209083-P2	Audio freq: freq range 300 to 3000 cps, 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 earlier than Rev A:
	19B209083-P1	Audio freq: freq range 300 to 3000 cps, Pri 1: 19 ohms ±10% imp at 3 w, 0.866 ohm DC res max, Sec 1: 3.5 ohms ±10% imp at 3 w, 0.222 ohm DC res max.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424-P7	Miniature, phen: 4 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W441		(Part of J441).

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - TUNED CIRCUITS - - - - - - - - -
Z371		COIL ASSEMBLY PL-19B204842-G1 (Used in Models 4ER40A10, 12, 14)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218-P247	Ceramic disc: temp-comp, radial leads, 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601-P17	Tubular, molded: axial leads, 0.68 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A121590-P1	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P5	Tuning slug.
Z372		COIL ASSEMBLY PL-19B204832-G1 (Used in Models 4ER40A10, 12, 14)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218-P249	Ceramic disc: temp-comp, radial leads, 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A121564-P1	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P5	Tuning slug.
Z373		COIL ASSEMBLY PL-19B204830-G1 (Used in Models 4ER40A10, 12, 14)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218-P249	Ceramic disc: temp-comp, radial leads, 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A121564-P1	Coil.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	5491798-P5	Tuning slug.

(CONT'D ON PAGE 16)

(CONT'D FROM PAGE 15)

SYMBOL	G-E PART NO	DESCRIPTION
Z374* and Z378		COIL ASSEMBLY Z374 - PL-19B204831-G1 (Used in Models 4ER40A10, 12, 14) Z378 - PL-19B204831-G2 (Used in Models 4ER40A11, 13, 15)
		- - - - - - - - - CAPACITORS- - - - - - - - -
C1*	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW. (Used in Models 4ER40A11, 13, 15).
	5496218-P251	In REV B and earlier: Ceramic disc: 33 pf ±5%, 500 VDCW.
C2*	5496218-P251	Ceramic disc: 33 pf ±5%, 500 VDCW. (Used in Models 4ER40A11, 13, 15). Deleted by REV C.
C3*	5496218-P245	Ceramic disc: 18 pf ±5%, 500 VDCW. (Used in Models 4ER40A10, 12, 14).
	5496218-P256	In REV B and earlier: Ceramic disc: 51 pf ±5%, 500 VDCW.
C4*	5496218-P256	Ceramic disc: 51 pf ±5%, 500 VDCW. (Used in Models 4ER40A10, 12, 14). Deleted by REV C.
C5*	5494481-P13	Ceramic disc: .002 µf ±20%, 500 VDCW. Added by REV C.
		- - - - - - - - - -INDUCTORS- - - - - - - - -
L1*	19A121564P3	Coil.
	19A121564-P1	In REV B and earlier: Coil.
		- - - - - - - - -MISCELLANEOUS- - - - - - - -
	5491798-P5	Tuning slug.
Z375		COIL ASSEMBLY PL-19B204842-G2 (Used in Models 4ER40A11, 13, 15)
		- - - - - - - - - CAPACITORS- - - - - - - - -
C2	5496218-P244	Ceramic disc: temp-comp, radial leads, 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601-P17	Tubular, molded: axial leads, 0.68 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - - - - -INDUCTORS- - - - - - - - -
L1	19A121590-P1	Coil.
		- - - - - - - - -MISCELLANEOUS- - - - - - - -
	5491798-P5	Tuning slug.
Z376		COIL ASSEMBLY PL-19B204832-G2 (Used in Models 4ER40A11, 13, 15)
		- - - - - - - - - CAPACITORS- - - - - - - - -
C2	5496218-P246	Ceramic disc: temp-comp, radial leads, 20 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - -INDUCTORS- - - - - - - - -
L1	19A121564-P1	Coil.
		- - - - - - - - -MISCELLANEOUS- - - - - - - -
	5491798-P5	Tuning slug.
Z378		COIL ASSEMBLY PL-19B204831-G2 (Used in Models 4ER40A11, 13, 15)
		- - - - - - - - - CAPACITORS- - - - - - - - -
C3 and C4	5496218-P251	Ceramic disc: temp-comp, radial leads, 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - -INDUCTORS- - - - - - - - -
L1	19A121564-P1	Coil.
		- - - - - - - - -MISCELLANEOUS- - - - - - - -
	5491798-P5	Tuning slug.

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS (SEE RC-1213)
2	PL-19B204583-G3	Hinge.
3	4035439-P1	Transistor heat sink: approx 1/4 x 1/2 inches dia; sim to Birtcher 3AL-635-2R. (Used with Q10 in A348).
4	4036555-P1	Washer insulator: nylon. (Used with Q9 and Q10 in A348).
5	4032187-P1	Can: approx 1-1/8 x 1-1/8 x 1-1/8 inches. (Used with T1 in A348).
6	PL-19B204583-G1	Hinge.
7	19A121284-P1	Mica insulator: approx 11/16 inch dia. (Used with Q341).
8	19A121283-P1	Transistor support. (Used with Q341).
9	19D500812-P1	(Not used).
10	19E500812-P3	Chassis: approx 13-3/4 x 3 x 1-1/2 inches.
11	PL-19A121229-G1	(Not used).
12	PL-19B204583-G2	(Not used).
13	19A121676-P1	Guide pin: approx 1 x 1/8 inches dia with 4-40 mounting thread.
14	19B204673-P1	Cover: approx 2-5/8 x 1-3/8 x 1/32 inches thick.
15	19C303495-G4 19C303385-P1	Station receiver bottom cover. Mobile receiver bottom cover.
16	19A121297-P1	Angle: approx 1-5/16 x 1 x 1/2 inches.
17	7160861-P4	Nut, spring clip: sim to Tinnerman C6452-8Z-157.
18	4029851-P6	Cable clamp: nylon; sim to Weckesser 5/16-4.
19	N529P27C	Plug button: approx 15/16 inch dia.
20	19A115461-P2	Spring washer: approx 1/4 inch dia; sim to Shakeproof 3597-04-00. (Used with T1 in A347).
21	4034252-P5	Can: approx 1-3/16 x 3/4 dia; sim to Hudson Tool and Die HV-1236-2. (Used with T1 in A347).
22	19B204672-P1	Cover: approx 6 inches max length x 1-7/8 inches max width.
23	7162414-P1	Mounting ring, transistor socket: approx 7/16 inch dia; sim to Elco 757. (Used with Q1 in A343).
24	19B204917-P1	Support: approx 1-1/4 inches max length x 1 inch max width. (Used with A343).
25	19B204719-P1	Plate: approx 7-1/8 inches max length x 2 inches max width.
26	19C303495-G3	Station Receiver top cover (except repeater and VM stations).
	19C303676-G2 19C303385-P2	Repeater and VM station receiver top cover. Mobile receiver top cover.
27	4029851-P3	Cable clamp: nylon; sim to Weckesser 1/8-4.
28	19A121383-P1	Support: approx 1-3/16 x 7/8 x 1/32 inches.
29	4033089-P1	Clip. (Part of XY1-4 in A358-363).
30	19B200525-P8	Rivet. (Part of XY1-4 in A358-363).
31	4033751-P1	Electrical contact: sim to Methode 752 V (PB). (Part of XY1-4 in A358-363).
32	4039307-P1	Crystal socket. (Part of XY1-4 in A358-363).
33	19C303547-P1	Cover: approx 5-3/4 inches max length x 3-1/4 inches max width.
34	PL-19C303394-G2	Heat sink: approx 14-9/16 x x-7/32 x 13/32 inches thick.
35	PL-19C303389-G1	Chassis: approx 14-1/2 x 3-1/2 x 3-7/32 inches.

(SEE PAGE 17 FOR RC-1213)

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 - On single frequency units deleted CR1, R5 and added R19 to 1st Oscillator Board A358/363. To incorporate improved transistor and transformer. Changed Q341 and T431.

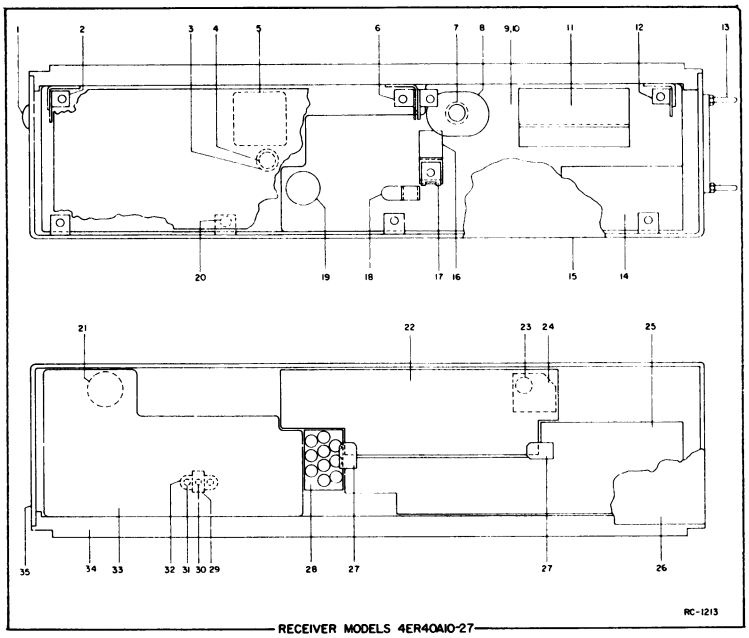
REV. B - To eliminate audio howling caused by feedback within receiver cabling. Added C385.

REV. C - To improve impedance matching to crystal filter. Changed Crystal Filter Assembly from A346 to A375, C10 and C11 in the Multiplier Selectivity Assembly A366/A367, Z374 and Z378.

REV. D - To provide better temperature compensation for low IF. Changed C7, C10, and C11 on the 2nd Mixer board A347. To reduce variation in discriminator output. Changed Q4 and Q5 on IF/Audio board A348. To reduce audio rumble produced when volume control is at minimum and squelch near critical. Deleted R46 and added R74, R75 and C71 to IF/Audio board A348.

REV. E - To improve temperature characteristics. Changed C4, C5, C7 thru C16, L1, L2, L3, deleted L5 and added L4 to T1 on 2nd Mixer board A347.

REV. F - To improve squelch sensitivity. Changed R71 to R33 on the IF/Audio board A348.



RECEIVER MODELS 4ER40A10-27

ADDENDUM TO LBI-3619

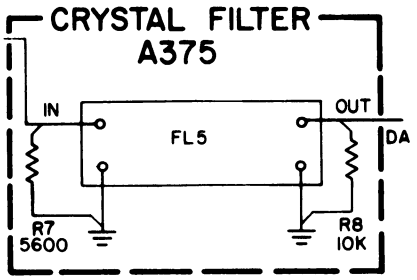
The following revision letter changes have been made to improve receiver performance and to facilitate production. The revision stamped on the unit includes all previous revisions.

REV. G - To improve DC bias stability of Q10 on IF/Audio Board A349. Added R80 (510 ohms ±5%, 1/2 w) from the emitter of Q10 to the junction of R51-1 and L4.

REV. H - To reduce receiver lock-up in areas of high RF signal level. Replaced C5 (19B209243-P4, 0.033 µf) on 2nd Mixer Board A347 with C26 (19A115028-P104, 0.0047 µf).

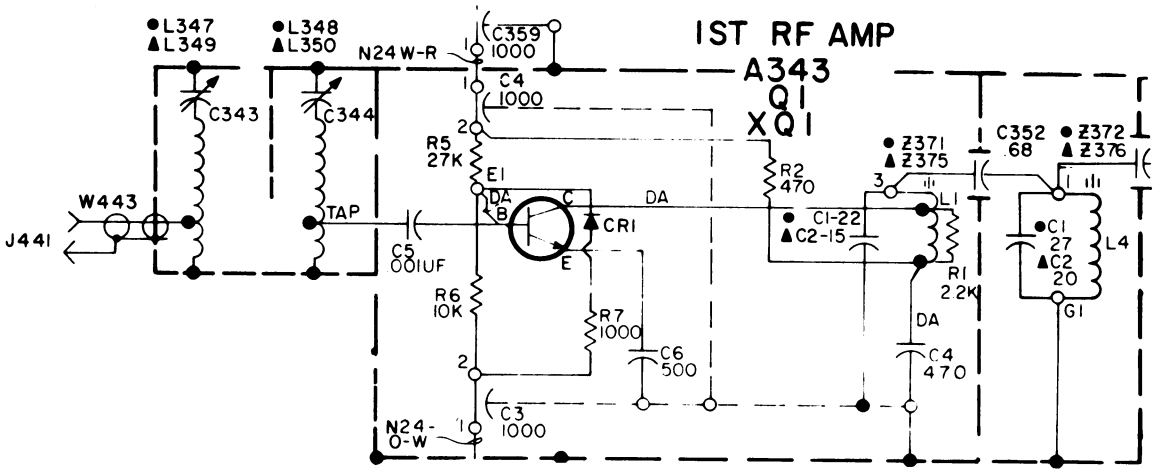
REV. J - To simplify manufacturing and provide better selectivity. Changed Crystal Filter A375 from 19B204616-G4 to 19B204616-G3, and deleted R15 from 2nd Mixer Board A347.

Filter Schematic Changed to:



REV. K - To eliminate instability in RF amplifier. Deleted C7, C8, R8 and R9 from RF amplifier A343. Added C4 (5494481-P7, 470 pf), R1 (2.2 K ±10%), and R2 (470 ohms ±10%) to Z371 and Z375.

Schematic Changed to:



ADDEMDUM TO LBI-3619

REV. L - To eliminate capacitor failures in positive ground installations.

Changed	From	To
C20 (on A348)	5496267-P14 (15 μf)	19A115680-P103 (20 μf)
C384	5496267-P11 (68 μf)	19A115680-P3 (20 μf)

REV. M - To protect the audio output transistor (Q341) from negative voltage spikes. Added CR301 (4037822-P1) in the 12-volt supply line for Q341.

REV. N - 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.

COMMUNICATION PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNCHBURG, VIRGINIA 24502

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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-3619

DF-1084

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COMMUNICATION PRODUCTS DEPARTMENT LYNCHBURG, VIRGINIA

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