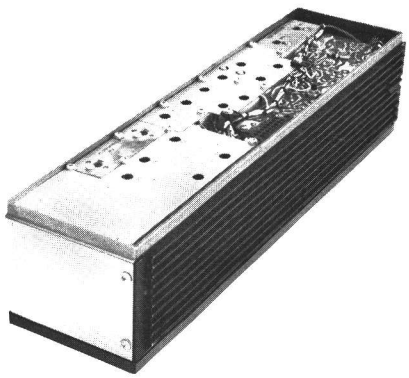
communications

MASTR Progress Line

26-50 MC RECEIVER MODELS 4ER39B10-18 (WIDE BAND)



SPECIFICATIONS *

FCC Filing Designation	**ER-39-B**
Frequency Range	26-50 MC
Audio Output	2 watts at less than 10% distortion (using Speaker Model 4EZ16A10)
Sensitivity	
12-db SINAD (EIA Method)	0.35 μv
20-db Quieting Method	0.40 μv
Selectivity	
EIA Two-Signal Method	-80 db (adjacent channel, 40 KC channels)
20-db Quieting Method	-100 db at -30 KC
Spurious Response	-75 db
First Oscillator Stability	±.0005% (-30°C to +60°C)
Modulation Acceptance	±15 KC (wide-band)
Squelch Sensitivity	
Critical Squelch	0.20 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)

File 1083

ER-39-B

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

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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-39-B is a double conversion, superheterodyne FM receiver designed for operation on the 26-50 megacycle band.

The receive 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.

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 (A341)

RF Amplifier (A341) consists of two high-Q helical resonators and an RF amplifier stage (Q1). The RF signal from the antenna is coupled by RF cable W442/W443 to a tap on L341/L343/L345. The tap is positioned to insure the proper impedance match to the antenna. RF energy is coupled through the two coils by an opening in the shield wall to the base of RF Amplifier Q1. The coils are tuned to the incoming frequency by air trimmer capacitors C341 and C342. The output of Q1 is coupled through three tuned circuits to the base of the first mixer.

1ST OSCILLATOR AND MULTIPLIER (A377-A385)

The receiver 1st oscillator operates in a transistorized Colpitts oscillator circuit. The oscillator crystal operates in a fundamental mode at a frequency of approximately 13 to 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.

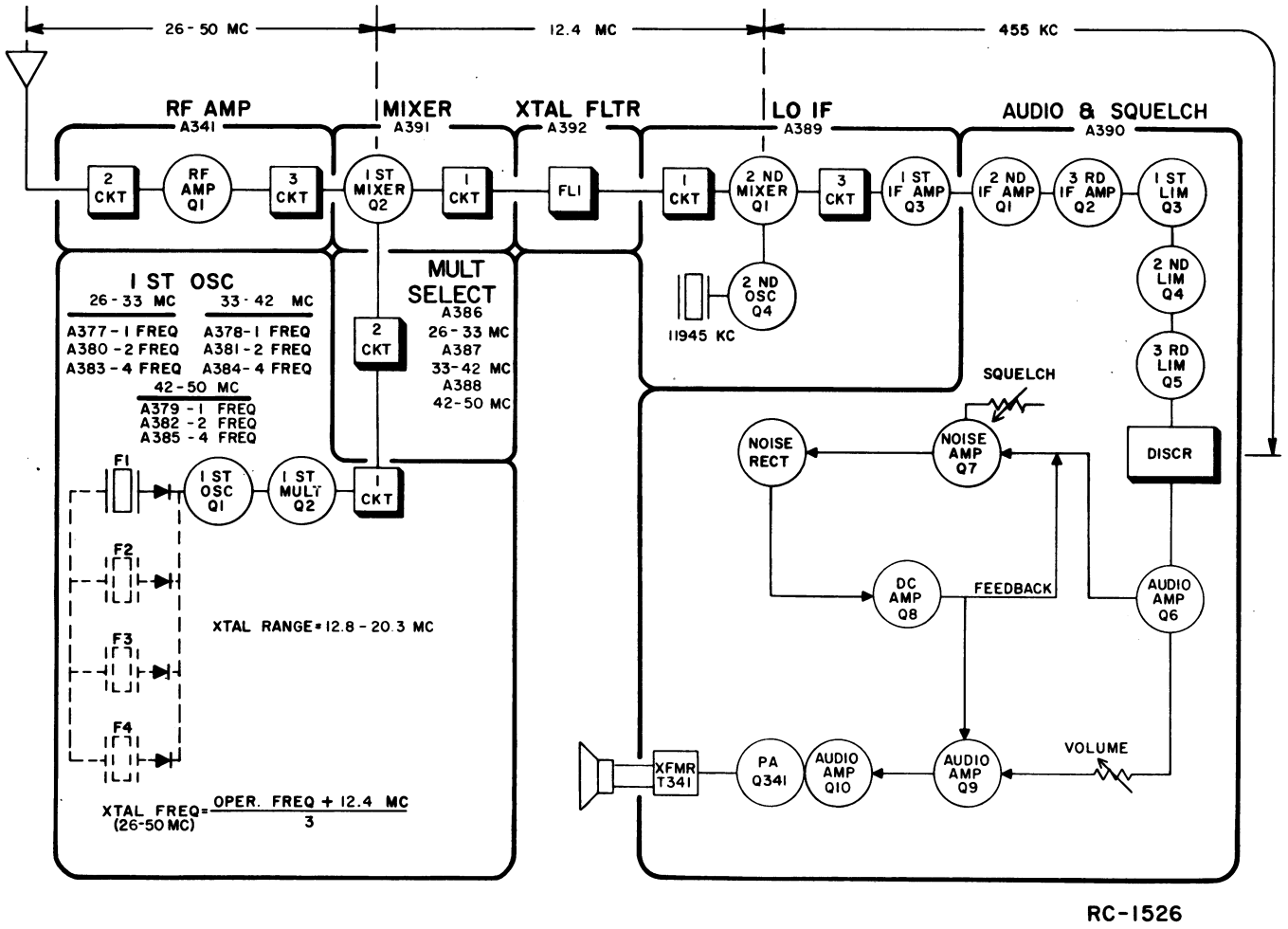


Figure 1 - Receiver Block Diagram

In single frequency receivers, bias for the oscillator transistor is obtained by a jumper from C363 to P304.

In multi-frequency receivers, a diode is connected in series with the crystal, and up to three addition crystal circuits can be added. The 10-volt jumper is removed and the proper frequency is selected by switching the desired crystal circuit to +10 volts by means of a frequency selector switch on the control unit.

Switching the +10 volts to the crystal circuit forward biases the diode and reduces its impedance. This applies the crystal frequency to the base of oscillator transistor Q1. Feedback for the oscillator is developed across C21/C22. The output is coupled to the base of 1st multiplier Q2.

The output of the 1st multiplier is transformer-coupled to multiplier selectivity assembly A386/A388. The 1st multiplier tank is tuned to three times the crystal frequency.

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

MULTIPLIER SELECTIVITY ASSEMBLY (A386/A388)

Following the 1st multiplier tank are three additional tuned circuits (A386/A388-L1 -L2 and -L3). Capacitor C16/C26/C33 couples the multiplier selectivity output to the base of the first mixer.

1ST MIXER (A391) AND CRYSTAL FILTER (A392)

The RF signal from the RF amplifier and the injection voltage from the 1st multiplier are applied to the base of 1st mixer A391-Q1. The mixer collector tank is tuned to 12.4 megacycles and provides impedance matching to the high IF filter.

The highly selective crystal filter following the 1st mixer provides the major selectivity for the receiver. The output of the filter is fed through impedance matching transformer A389-T2 to the base of the 2nd mixer.

2ND OSCILLATOR, 2ND MIXER AND 1ST IF AMPLIFIER (A389)

The 2nd oscillator A389-Q4 operates in a Colpitts oscillator circuit, with feedback supplied through C20. Crystal Y2 maintains the oscillator frequency at 11945 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 (L5, L2, L6). L5, L2 and L6 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, A389-Q3. The output of Q3 is RC coupled to the base of the 2nd IF amplifier.

2ND IF AMPLIFIERS AND LIMITERS (A390)

Following A389-Q3 are two additional RC coupled low IF amplifiers (A390-Q1 and -Q2). The 2nd IF amplifier stage is metered at J442-2 through metering network C8, CR1, R12 and C10.

After the IF amplifiers are three RC coupled limiter stages (A390-Q3, -Q4 and -Q5). The 1st limiter is metered at J442-3 through metering network C13, CR2, R18 and C15.

DISCRIMINATOR (A390)

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 (A390)

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 A390-J9. The VOLUME control arm connects to A390-J8 which feeds the audio signal to the base of the 2nd audio amplifier, Q9. C34, C37, C53, C35 and L4 make up the de-emphasis network. The collector current of Q9 should be adjusted to 650 milliamps by potentiometer R47 as indicated by a reading of 0.65 volts at metering jack J442-1. This adjustment should be made with the VOLUME control fully counterclockwise and the squelch control fully clockwise (unsquelched). Thermistor RT1 keeps the output current constant over wide variations in temperature after R47 has been set.

Following Q9 is a Darlington circuit, which consists of compound-connected transistors Q10 and Q341. The Darlington circuit provides a higher input impedance than is normally encountered in transistor amplifiers. Also, this circuit has a more linear operation, with less distortion at maximum power output.

The output of the amplifier stage is coupled by audio transformer T341 to the loudspeaker. Audio high and low are present at the centralized metering jack (J442). When the General Electric Test Set is connected to J442, these leads are connected to the black and green jacks for sensitivity, frequency response, distortion, power output and other measurements.

SQUELCH

Noise from audio amplifier Q6 is used to operate the squelch circuit. When no carrier is present in the receiver, noise is coupled to the base of noise amplifier Q7. The gain of the noise amplifier is determined by the SQUELCH control, which varies the bias on the base of Q7.

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

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

DC amplifier Q8 acts as a squelch switch. A negative output from the noise rectifiers cuts off the DC amplifier. When cut off, the collector is at the +10 volt supply potential. This positive voltage is fed to the base of Q9, a PNP transistor, cutting it off. Since audio stages Q9, Q10 and Q341 are DC coupled, Q10 and Q341 are cut off also.

The positive voltage from the collector circuit of the DC amplifieris used as feedback through R64 to the base of noise amplifier Q7, causing it to conduct more heavily. This feedback helps to sharply cut off Q8, providing sharp, rapid switching action.

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

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

With the receiver squelched, the final audio amplifiers are cut off; and the receiver drain is less than 50 milliamps in 12-volt systems.

It should be noted that a hysteresis effect exists in the squelch circuit and, as a result, the squelch does not operate in the same manner as other convential 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.

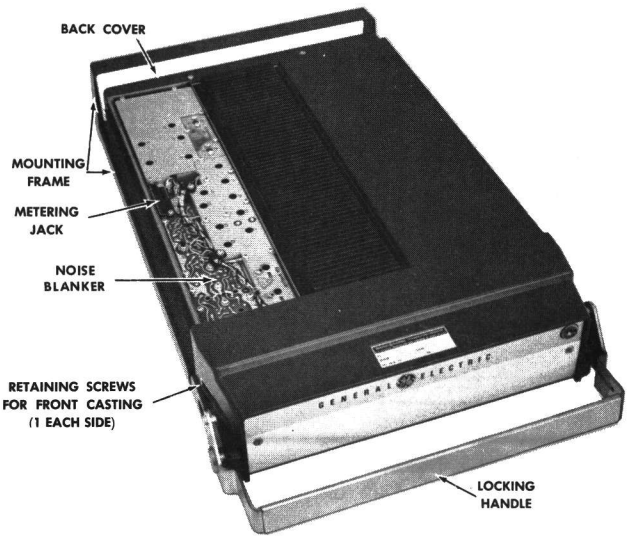


Figure 2 - Removing Top Cover

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.

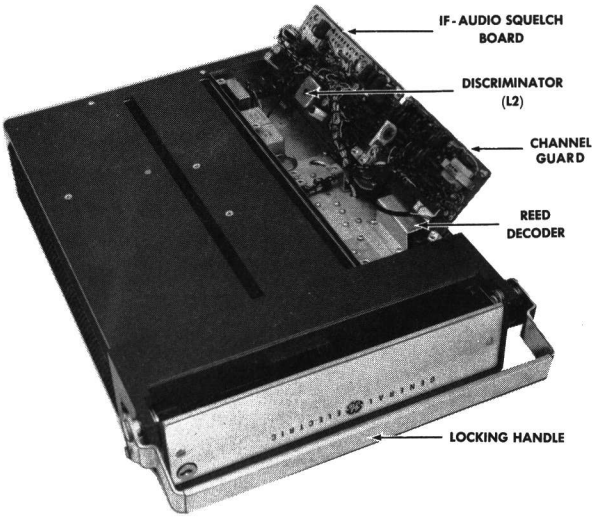


Figure 3 - Removing Bottom Cover

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 of the system frame.

FRONT END ALIGNMENT

EQUIPMENT REQUIRED

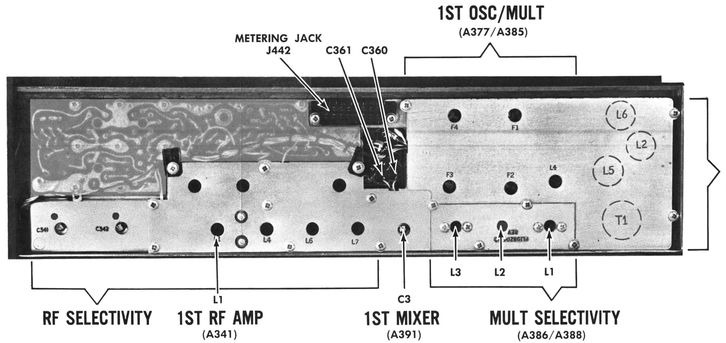
1. G-E Test Set Model 4EX3A10 (or 20,000 ohms-per-volt Multimeter with a 1-volt scale).
2. A 455 KC and 25-50 MC signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

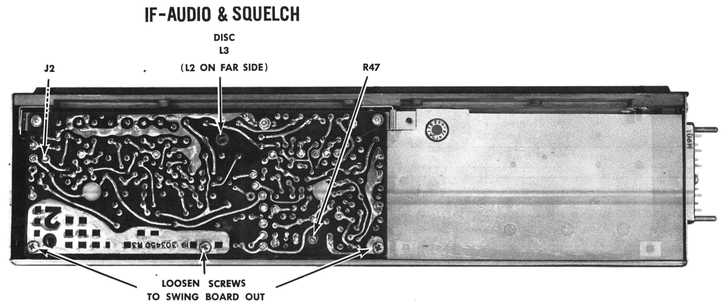
PRELIMINARY CHECKS AND ADJUSTMENTS

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 (receiver unsquelched) 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	L4 (on 1st OSC/MULT) and L1, L2 & L3 (on MULT SELECTIVITY)	See Procedure	Tune L4 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Tune L2 for minimum meter reading. Then Tune L3 for maximum meter reading. Change voltage scale if necessary. Repeat step 1.
		RF AMPLIFIER & SELECTIVITY			
2.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal adjacent to L7. Adjust the signal generator for discriminator zero.
3.	B (2nd IF Amp)	Pin 2	L1 (1st RF Amp), L6, L7, C341 and C342 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal to the antenna jack, keeping below saturation. Tune L1, L6, L7, C341, and C342 for maximum meter reading.
4.	"	"	L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune 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 multi-frequency)	Zero	Apply an on-frequency signal to the antenna jack. Tune C9 for zero discriminator reading. In multi-frequency units, tune C10, C11 or C12 as required. NOTE For proper frequency control of the receiver it is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90°F.





COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. G-E Test Set Model 4EX3A10 (or 20,000 ohms-per-volt Multimeter with a 1-volt scale).
2. A 455 KC and 25-50 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 trimer 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 squelch control fully clockwise (receiver unsquelched) 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).
6. Disable the Channel Guard.

ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	METERING POSITION Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
		DISCRIMINATOR			
1.	A (DISC)	Pin 10	L3 (bottom slug on IF-AUDIO & SQUELCH board)	Zero	Apply a 455-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)	Switch Test Set to TEST 3 position. Then alternately apply a 455-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	L4 (on 1st OSC/MULT) and L1, L2 & L3 (on MULT SELECTIVITY)	See Procedure	Tune L4 on 1st OSC/MULT and L1 on MULT SELECTIVITY for maximum meter reading. Tune L2 for minimum meter reading. Change voltage scale if necessary. Then tune L3 for maximum meter reading. Repeat step 3.
		RF AMPLIFIER & SELECTIVITY			
4.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal adjacent to L7. Adjust the signal generator for discriminator zero.
5.	B (2nd IF AMP)	Pin 2	L7 and L6 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal and tune for maximum meter reading as shown below, keeping signal below saturation. Apply Signal Generator Probe to: L6 L1 — Tune: L7 L6
6.	"	"	C341, C342 and L1 (1st RF Amp)	Maximum	Apply an on-frequency signal to the antenna jack. Tune C341, C342 and L1 for maximum meter reading, keeping signal below saturation.
7.	"	"	L1 (1st RF Amp), L6, L7, C341 and C342 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L1, L6, L7, C341 and C342 for maximum meter reading.
8.	"	"	L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L2 & L3 (on MULT SELECTIVITY) for maximum meter reading.
		LO IF & 2ND MIXER*			
9.	"	"	C3 (1st MIXER)		C3 does not peak, but provides impedance matching for the crystal filter input and should only be tuned when observing IF trace on oscilloscope.
10.	B (2nd IF AMP)	Pin 2	T1 (2nd MIXER)	Maximum	Apply an on-frequency signal as in Step 8, and tune T1 for maximum meter reading, keeping signal below saturation.
11.	"	"	L5, L2 and L6 (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 L5 and L6. Load L5 and L6 at Points A and C—Peak L2.
		FREQUENCY ADJUSTMENT			
12.	A (DISC)	Pin 10	C9 on 1st OSC (C10, C11 or C12 for multi-frequency)	Zero	Apply an on-frequency signal to the antenna jack. Tune C9 for zero discriminator reading. In multi-frequency units, tune C10, C11 or C12 as required. NOTE For proper frequency control of the receiver it is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90°F.

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

TEST PROCEDURES

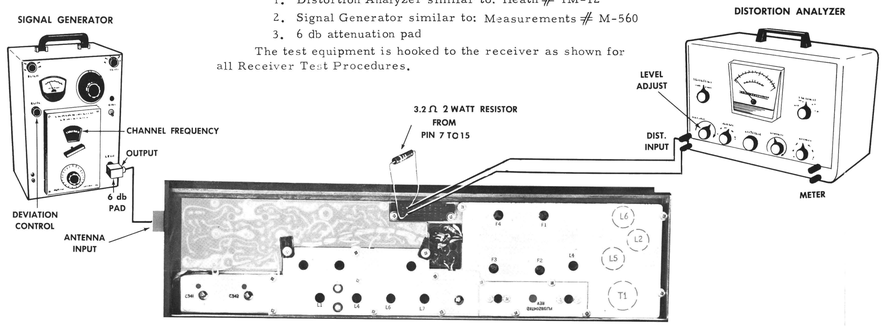
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

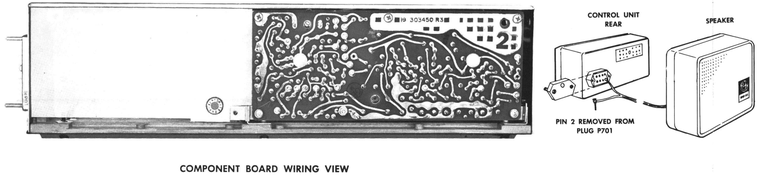
TEST EQUIPMENT REQUIRED

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.





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 ±10 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):

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 0.40 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 0.40 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.

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).

6. Deviation control reading for the 12-db difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±15 KC (but less than ±19 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 ±10 KC DEVIATION FOR AUDIO STAGE.**

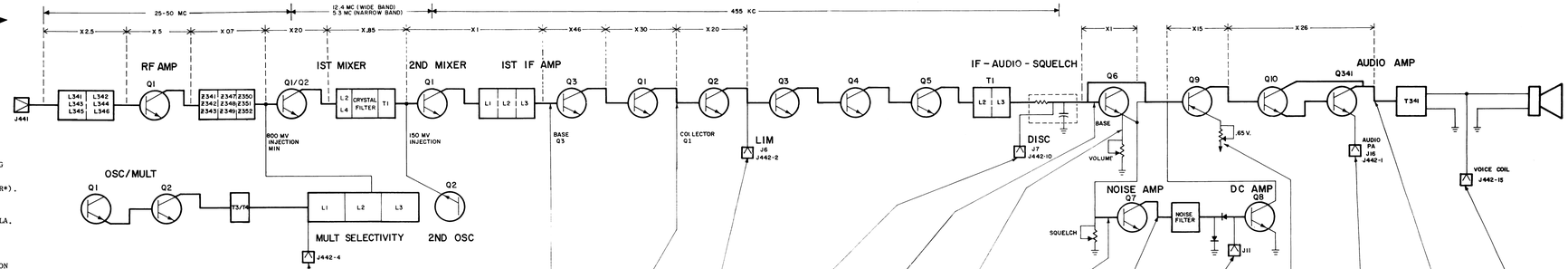
PROCEDURE:

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.)

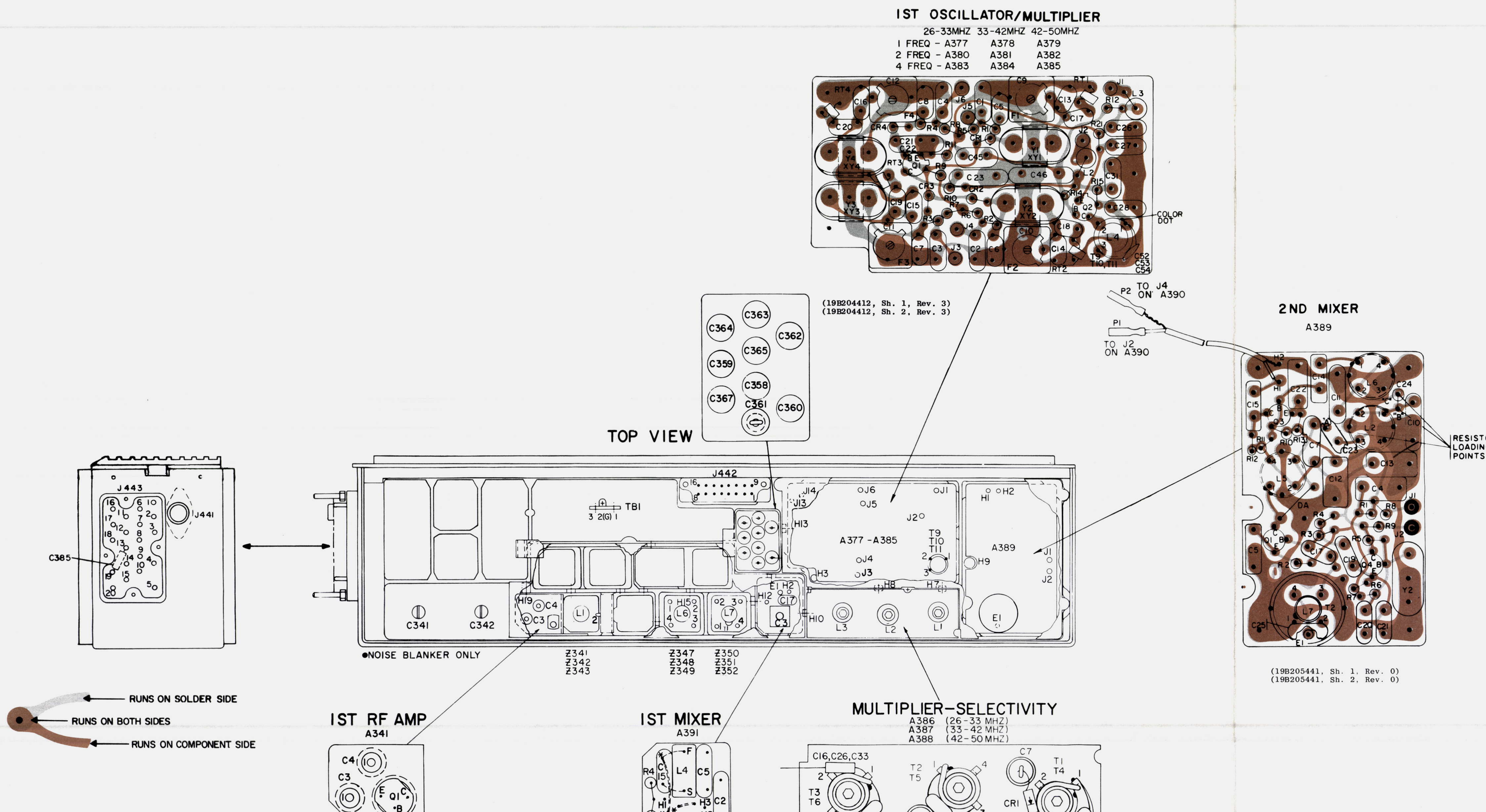
PRELIMINARY STEPS:

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 RCVR FREQ. MODULATED BY 1KC WITH 3.5KC 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 FULLY COUNTERCLOCKWISE AND SQUELCH FULLY CLOCKWISE			ADJUST VOLUME CONTROL FOR RATED 2 WATT OUTPUT ACROSS 3.2 OHM LOAD
READING	2.4 VDC	GENERATOR OUTPUT SHOULD BE APPROX. 1000 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX. 300 MICROVOLTS	2 VDC	0.1 VAC	0.5 VAC	0.5 VAC	0.07 VAC	2.5 VAC	2.0 VDC	ADJUST FOR 0.65 VDC WITH VTVM ON J442-1 AND J442-8	0.65 VDC	7.0 VAC	2.53 VAC

* NEG. LEAD OF VTVM TO -10 V.

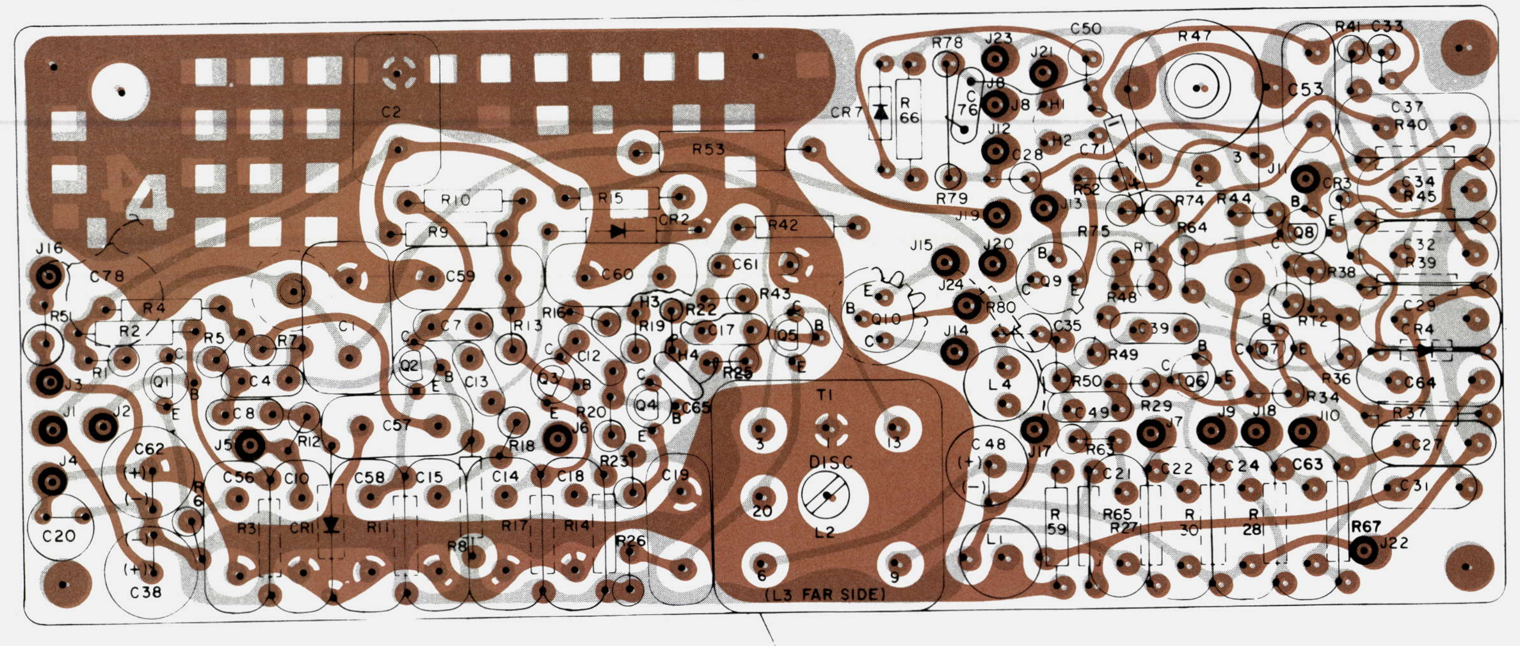
RC-1207B



OUTLINE DIAGRAM

26 — 50 MC. MASTR RECEIVER
MODELS 4ER39B10-18

IF-AUDIO & SQUELCH BOARD
A390



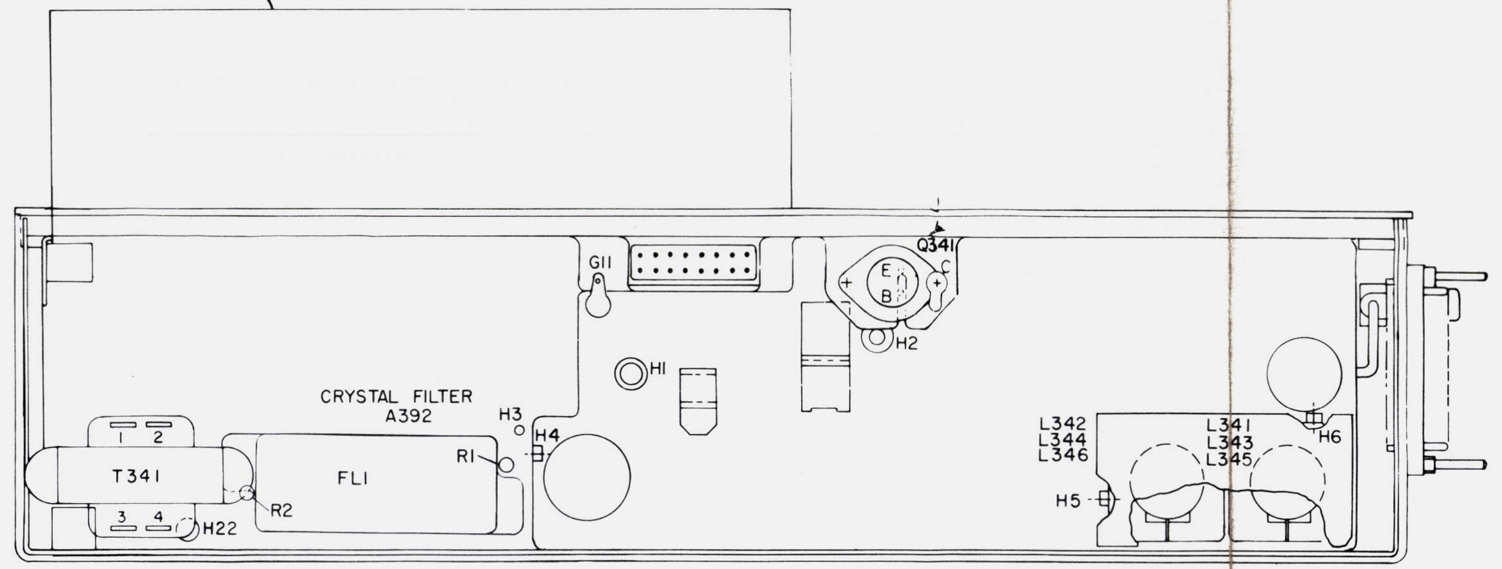
(19C303451, Sh. 1, Rev. 4)
(19C303451, Sh. 2, Rev. 4)

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	+	—	+	—	+	—
A377/385-Q1	1K	1K	4.5K	2.8K	120Ω	120Ω
A377/385-Q2	55Ω	80Ω	1K	1K	110Ω	110Ω
A391-Q2	2.7K	2.7K	7.5K	3.8K	600Ω	600Ω
A341-Q1	450Ω	270Ω	800Ω	450Ω	350Ω	350Ω
A389-Q1	3.8K	5.3K	8.5K	2.9K	200Ω	200Ω
A389-Q2	2.7K	6.8K	5.5K	2.7K	200Ω	200Ω
A389-Q3	2.2K	2.3K	2.3K	2.2K	2.7K	3.2K
A390-Q1	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A390-Q2	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A390-Q3	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A390-Q4	2.1K	2K	13.5K	4.1K	4.1K	5.2K
A390-Q5	1.0K	1.0K	7K	2.8K	350Ω	350Ω
A390-Q6	*3.2K	*2 MEG	36.0K	2.5K	0	0
A390-Q7	1.7K	1.7K	11.0K	4.0K	7.0K	16K
A390-Q8	180Ω	180Ω	100K	2.8K	11.0K	14K
A390-Q9	2.2K	2.2K	4.1K	45K	2.3K	2.3K
A390-Q10	* 40Ω	35Ω	2.3K	2.3K	40Ω	36Ω
A390-Q341	* 1 Ω	1 Ω	40Ω	35 Ω	40 Ω	36 Ω

* READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS.

(19B821200, Rev. 3)

BOTTOM VIEW



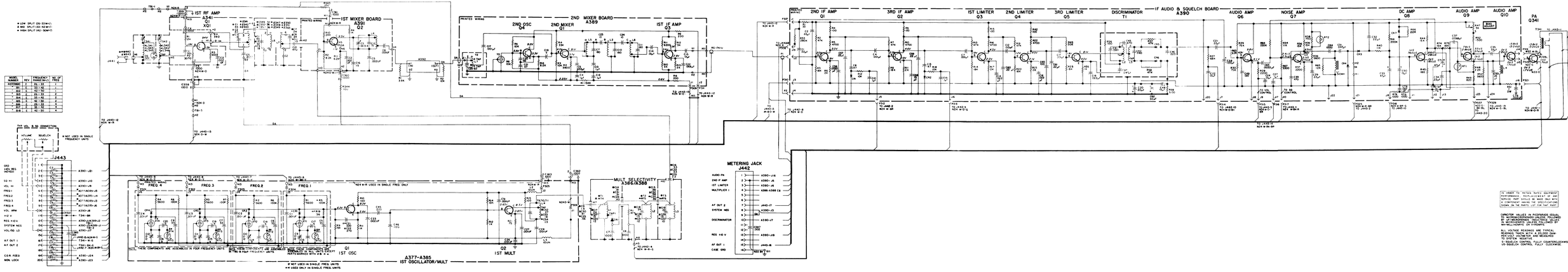
RESISTANCE READINGS

ALL READINGS ARE TYPICAL READINGS MEASURED WITH A 20,000 OHM-PER-VOLT METER, AND WITH CONTROL CABLE DISCONNECTED (OR IN STATIONS, PLUG TO J443 DISCONNECTED). READINGS ARE MADE WITH A SHORTING JUMPER CONNECTED FROM C361 (+10V) TO C360 (—10), AND ARE MEASURED FROM TRANSISTOR PINS TO C361. + OR — SIGNS SHOW METER LEAD TO C361.

CAUTION

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

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



MODEL NUMBER	REV	FREQUENCY RANGE (MHz)	NO. OF FREQ
ASSEMBLY			
4ER39B10	C	25 - 33	1
4ER39B11	C	33 - 42	1
4ER39B12	C	42 - 50	1
4ER39B13	C	33 - 42	2
4ER39B14	C	42 - 50	2
4ER39B15	C	25 - 33	4
4ER39B16	C	33 - 42	4
4ER39B17	C	42 - 50	4

(19B620785, Rev. 7)

SCHEMATIC DIAGRAM

26 — 50 MC MASTR RECEIVER
MODELS 4ER39B10-18

PARTS LIST

LBI-3813A

26-50 MHz RECEIVER - WIDE BAND
MODELS 4ER39B10 & 19EX500B19

SYMBOL	G-E PART NO.	DESCRIPTION
		19EX500B09-G73 Model 4ER39B10 1 FREQ 26-33 MHz
		19EX500B09-G74 Model 4ER39B11 1 Freq 33-42 MHz
		19EX500B09-G75 Model 4ER39B12 1 Freq 42-50 MHz
		19EX500B09-G76 Model 4ER39B13 2 Freq 26-33 MHz
		19EX500B09-G77 Model 4ER39B14 2 Freq 33-42 MHz
		19EX500B09-G78 Model 4ER39B15 2 Freq 42-50 MHz
		19EX500B09-G79 Model 4ER39B16 4 Freq 26-33 MHz
		19EX500B09-G80 Model 4ER39B17 4 Freq 33-42 MHz
		19EX500B09-G81 Model 4ER39B18 4 Freq 42-50 MHz
A341		RF AMPLIFIER ASSEMBLY 19B204772-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481-P12	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C2	5494481-P14	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C3 and C4	5493393-P7	Ceramic, feed-thru: .001 pf ±100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115343-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P123K	Composition: 12,000 ohms ±10%, 1/4 w.
R2	3R152-P300J	Composition: 3000 ohms ±5%, 1/4 w.
R3	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
R4	3R152-P390K	Composition: 390 ohms ±10%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XQ1	5490277-P1	Transistor, phen: 4 contacts; sim to Elco 3303.
A377 thru A383		FIRST OSCILLATOR ASSEMBLY A377 19BD0441B-G25 (4ER39B10) A378 19BD0441B-G26 (4ER39B11) A379 19BD0441B-G27 (4ER39B12) A380 19BD0441B-G28 (4ER39B13) A381 19BD0441B-G29 (4ER39B14) A382 19BD0441B-G2 (4ER39B15) A383 19BD0441B-G27 (4ER39B16) A384 19BD0441B-G30 (4ER39B17) A385 19BD0441B-G3 (4ER39B18)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C4	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C5 thru C8	5496219-P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C9 thru C12	5491271-P106	Variable: approx 1.98 to 12.4 pf, 750 v peak; sim to EF Johnson 189-4-3.
C13 thru C16	5496219-P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. (Used in 4ER39B16-18).
C19 thru C20	19C200685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C21	5496219-P771	Ceramic disc: 220 pf ±5%, 500 VDC, -750 temp coef.
C22	5496219-P773	Ceramic disc: 270 pf ±5%, 500 VDCW, -750 temp coef.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
C23	5494481-P114	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C26 thru C28	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C31	5494481-P112	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C45	5490008-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C46	5496219-P563	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -330.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR4	19A115348-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J6	4033513-P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	7488079-P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res max; sim to Jeffers 4423-7.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115330-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 thru R4	3R152-P562J	Composition: 5600 ohms ±5%, 1/4 w.
R5 thru R8	3R153-P104K	Composition: 0.1 megohm ±10%, 1/4 w.
R9	3R153-P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13		
R14	3R152-P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R19	3R152-P360J	Composition: 36 ohms ±5%, 1/4 w. (Used in 4ER39B10-12).
R21	3R152-P750J	Composition: 75 ohms ±5%, 1/4 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1 thru RT4	19B209284-P5	Disc: 115 ohms DC res, color code green; sim to GE 302118.
RT10 thru RT13	19B209284-P7	Disc: 175 ohms DC res, color code violet; sim to GE 302115.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T9	19B205416-G3	Coil.
T10	19B205416-G4	Coil.
T11	19B205416-G5	Coil.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XT1 thru XT4		Refer to Mechanical Parts (RC-1528).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		When reordering give GE Part No. and specify exact frequency needed.
		26-50 MHz crystal freq = (OF +12.4 MHz) ÷ 3.

SYMBOL	G-E PART NO	DESCRIPTION
Y1 thru Y4	19B206576-P10	Quartz: freq range 12800.000 to 13133.333 KHz, temp range -30°C to +85°C. (25-33 MHz).
Y1 thru Y4	19B206576-P11	Quartz: freq range 13133.334 to 18133.333 KHz, temp range -30°C to +85°C. (33-42 MHz).
Y1 thru Y4	19B206576-P12	Quartz: freq range 18133.334 to 20800.000 KHz, temp range -30°C to +85°C. (42-50 MHz).
A386 thru A388		MULTIPLE SELECTOR ASSEMBLY A386 19B205326-G3 (4ER39B10, 13 and 16). A387 19B205326-G5 (4ER39B11, 14 and 17). A388 19B205326-G4 (4ER39B12, 15 and 18).
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C7 and C8	5493392-P107	Ceramic: .001 pf ±100% -0%, 500 VDCW; sim to Allen-Bradley Type 830A.
C9	5491601-P123	Phenolic: 1.5 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C14	5491601-P114	Silver mica: 5 pf ±0.5 pf, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5493366-P82G	Mica: 82 pf ±2%, 100 VDCW; sim to Electro Motive Type DM-15.
C15	5491601-P115	Phenolic: 0.86 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C16	5491601-P130	Phenolic: 3.3 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C17 and C18	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW, -80 temp coef.
C19	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C20 and C21	5496218-P242	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -80 PPM.
C22	5496218-P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
C23	5491601-P115	Phenolic: 0.86 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C24	5491601-P112	Phenolic: 0.43 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C25	5491601-P111	Phenolic: 0.39 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C26	5491601-P126	Phenolic: 2.2 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C27 thru C29	5496218-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C30	5491601-P137	Phenolic: 0.91 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C31	5491601-P114	Phenolic: 0.51 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C32	5491601-P115	Phenolic: 0.56 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C33	5491601-P130	Phenolic: 3.3 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	4038056-P1	Germanium.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P473K	Composition: 47,000 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	19B205325-G2	Coil. Includes tuning slug 5491798-P4.
T2 and T3	19B205325-G1	Coil. Includes tuning slug 5491798-P4.
T4	19B205325-G2	Coil. Includes tuning slug 5491798-P4.
T5 and T6	19B205325-G1	Coil. Includes tuning slug 5491798-P4.

SYMBOL	G-E PART NO	DESCRIPTION
A389		SECOND MIXER ASSEMBLY 19BD0441B-G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C4	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW.
C5	19B209243-P4	Polyester: .033 µf ±20%, 40 VDCW.
C7	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C10 and C13	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C12 and C13	19B209243-P7	Polyester: 0.1 µf ±20%, 40 VDCW.
C14 and C15	19B209243-P1	Polyester: .01 µf ±20%, 40 VDCW.
C17	5494481-P112	Ceramic disc: .001 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C19	5490008-P1	Silver mica: 5 pf ±0.5 pf, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5493366-P82G	Mica: 82 pf ±2%, 100 VDCW; sim to Electro Motive Type DM-15.
C21	5493366-P47G	Mica: 47 pf ±2%, 100 VDCW; sim to Electro Motive Type DM-15.
C22	19B209243-P6	Polyester: .068 µf ±20%, 40 VDCW.
C23 and C24	5496218-P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, 0 temp coef.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 and J2	4033513-P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19C311181-G6	Coil.
L5	19C311181-G8	Coil.
L6	19C311181-G9	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029840-P2	Contact, electrical: brass; sim to AMP 42827-2.
P2	4029840-P1	Contact, electrical: brass; sim to AMP 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115345-P1	Silicon, NPN.
Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q4	19A115345-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R153-P152K	Composition: 1500 ohms ±10%, 1/4 w.
R2	3R152-P392K	Composition: 3900 ohms ±10%, 1/4 w.
R3	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R4	3R152-P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R5 and R6	3R153-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R8	3R152-P201J	Composition: 200 ohms ±5%, 1/4 w.
R9		
R10	3R152-P302J	Composition: 3000 ohms ±5%, 1/4 w.
R11	3R152-P623J	Composition: 6200 ohms ±5%, 1/4 w.
R12	3R153-P302J	Composition: 3000 ohms ±5%, 1/4 w.
R13	3R153-P203J	Composition: 2000 ohms ±5%, 1/4 w.
R14	3R153-P823J	Composition: 8200 ohms ±5%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T2	19E204414-G2	Coil.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y2	19A110398-P1	Quartz: 11945.00 KHz freq, temp range -30°C to +75°C.
A390		COMPONENT BOARD ASSEMBLY 19D403237-G5
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A115028-P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C2	5491188-P108	Polyester: 0.22 µf ±20%, 50 VDCW.
C4	5494481-P112	Ceramic disc: .001 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C7	5494481-P112	Ceramic disc: .001 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C8	5496219-P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C10	19A115028-P114	Polyester: 0.1 µf ±20%, 200 VDCW.
C12	5494481-P112	Ceramic disc: .001 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C13	5496219-P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C14	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C15	19A115028-P114	Polyester: 0.1 µf ±20%, 200 VDCW.
C17	5494481-P112	Ceramic disc: .001 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C18 and C19	19A115028-P109	Polyester: .022 µf ±20%, 200 VDCW.
C20*	19A115680-P103	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Kilroy Type T7. Added by Rev C.
C21	19BD09343-P17	Polyester: 0.22 µf ±20%, 0 VDCW.
C22	19A115028-P107	Polyester: .01 µf ±20%, 200 VDCW.
C24	19A115028-P107	Polyester: .01 µf ±20%, 200 VDCW.
C27	19BD09243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C28	5496287-P17	Tantalum: 0.22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C29	19BD09243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C31	19BD09243-P5	Polyester: .047 µf ±20%, 50 VDCW.
C32	19BD09343-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C33	5496287-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C34	19BD09243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C35	5496287-P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
Q4	19A115345-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P330K	Composition: 33 ohms ±10%, 1/2 w.
R2	3R177-P471K	Composition: 470 ohms ±10%, 1/2 w.
R3	3R177-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R4	3R177-P101K	Composition: 100 ohms ±10%, 1/2 w.
R5	3R177-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R6	3R177-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R7	3R177-P473K	Composition: 47,000 ohms ±10%,1/2 w.
R8	3R177-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R9	3R177-P101K	Composition: 100 ohms ±10%, 1/2 w.
R10	3R177-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R11	3R177-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R12	3R177-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R13	3R177-P473K	Composition: 47,000 ohms ±10%,1/2 w.
R14	3R177-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R15	3R177-P101K	Composition: 100 ohms ±10%, 1/2 w.
R16	3R177-P472K	Composition: 4700 ohms ±10%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
C63	19A115028-P103	Polyester: .0033 µf ±20%, 200 VDCW.
C64	4029003-P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-30.
C65	5496218-P821	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -1500 PPM.
C71	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C76*	19BD09243-P3	Polyester: 0.022 µf ±20%, 50 VDCW. In Models of REV A and earlier: Polyester: 0.1 µf ±20%, 50 VDCW.
C77*	19BD09243-P6	Polyester: .068 µf ±20%, 50 VDCW. Deleted by REV B.
C78*	5494481-P114	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV B.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 and CR2	4038056-P1	Germanium.
CR3	19A115250-P1	Silicon.
CR4 and CR5		
CR7	19A115250-P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J24	4033513-P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	4031476-G1	Choke: 310 mh ±10%, 310 ohms DC res max. Includes 7772023-P25 Tuning Slug.
L4	5491734-P6	Choke: 3.5 mh ±10% at 1 EC, 2.5 ohms DC res max; sim to Aladdin 33-494.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 thru Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q4 and Q5	19A115553-P1	Silicon, NPN; sim to Type 2N2714.
Q6	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q7	19A115889-P1	Silicon, NPN; sim to Type 2N2712.
Q8	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q9	19A115347-P1	Silicon, PNP; sim to Type 2N1024.
Q10	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R177-P330K	Composition: 33 ohms ±10%, 1/2 w.
R2	3R177-P471K	Composition: 470 ohms ±10%, 1/2 w.
R3	3R177-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R4	3R177-P101K	Composition: 100 ohms ±10%, 1/2 w.
R5	3R177-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R6	3R177-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R7	3R177-P473K	Composition: 47,000 ohms ±10%,1/2 w.
R8	3R177-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R9	3R177-P101K	Composition: 100 ohms ±10%, 1/2 w.
R10	3R177-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R11	3R177-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R12	3R177-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R13	3R177-P473K	Composition: 47,000 ohms ±10%,1/2 w.
R14	3R177-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R15	3R177-P101K	Composition: 100 ohms ±10%, 1/2 w.
R16	3R177-P472K	Composition: 4700 ohms ±10%, 1/2 w.

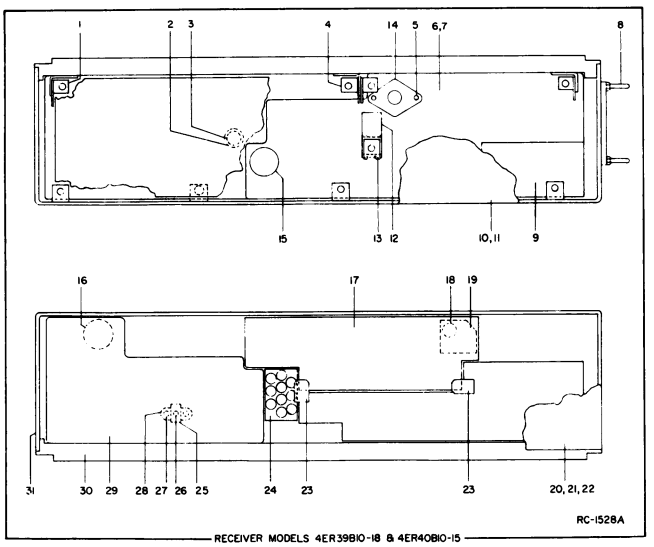
SYMBOL	G-E PART NO	DESCRIPTION
R17	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R18	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R19	3R77-P473K	Composition: 47,000 ohms ±10%,1/2 w.
R20	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R22	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R23	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R25	3R77-P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R26	3R77-P103J	Composition: 1000 ohms ±5%, 1/2 w.
R27	3R77-P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R29	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R29 and R30	3R77-P753J	Composition: 75,000 ohms ±5%, 1/2 w.
R34	3R77-P113J	Composition: 11,000 ohms ±5%, 1/2 w.
R36	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R37	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R38	3R77-P75lJ	Composition: 750 ohms ±5%, 1/2 w.
R39	3R77-P562J	Composition: 5600 ohms ±5%, 1/2 w.
R40	3R77-P113J	Composition: 11,000 ohms ±5%, 1/2 w.
R41	3R77-P204J	Composition: 0.2 megohm ±5%, 1/2 w.
R42	3R77-P101K	Composition: 100 ohms ±10%, 1/2 w.
R43*	3R77-P303J	Composition: 30,000 ohms ±5%, 1/2 w. In Models earlier than REV A.
R44	3R77-P473K	Composition: 47,000 ohms ±10%,1/2 w.
R45	3R77-P181K	Composition: 180 ohms ±10%, 1/2 w.
R47	19B209115-P1	Variable, carbon film: 5000 ohms ±20%, 0.15 w; sim to CTS Type UPE-70.
R48	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R49	3R77-P821K	Composition: 820 ohms ±10%, 1/2 w.
R50	3R77-P392K	Composition: 3900 ohms ±10%, 1/2 w.
R51	19B209032-P15	Wirewound, phen: 1.0 ohms ±5%, 2 w; sim to IRC Type BWA.
R52	3R77-P152K	Composition: 1500 ohms ±10%, 1/2 w.
R53	5495948-P444	Deposited carbon: 0.28 megohm ±1%, 1/2 w; sim to Texas Instrument Type CEC-7804.
R59	3R77-P513J	Composition: 5100 ohms ±5%, 1/2 w.
R63	3R77-P623J	Composition: 62,000 ohms ±5%, 1/2 w.
R64	3R77-P184K	Composition: 0.18 megohm ±10%, 1/2 w.
R65	3R77-P123K	Composition: 12,000 ohms ±10%, 1/2 w.
R66	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R67	3R77-P332J	Composition: 3300 ohms ±5%, 1/2 w.
R74	3R77-P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R75	3R77-P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R78 and R79	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
R80	3R153-P511J	Composition: 510 ohms ±5%, 1/4 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	19B209143-P2	Rod: 4000 ohms ±10%; sim to Globar Type 789J-12.
RT2	19B209143-P3	Rod: 850 ohms ±10%; sim to Globar Type 789 P-18.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	19C303613-G1	Discriminator.
A391		FIRST MIXER ASSEMBLY 19BD0430-G8
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481-P14	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.

SYMBOL	G-E PART NO	DESCRIPTION
C2	5494481-P114	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C3	5491271-P106	Variable: approx 1.98 to 12.4 pf, 750 v peak; sim to EF Johnson 189-4-3.
C5	5494481-P114	Ceramic disc: .002 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	5494481-P12	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C15 and C16	5496219-P244	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L4	19A121082-G4	Toroidal coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2	19A115345-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2	3R152-P822J	Composition: 8200 ohms ±5%, 1/4 w.
R4	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R10	3R153-P243J	Composition: 24,000 ohms ±5%, 1/4 w.
R11	3R152-P622J	Composition: 6200 ohms ±5%, 1/4 w.
A392		CRYSTAL FILTER ASSEMBLY 19BD0582-G1
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19C304290-G1	Bandpass filter.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P392K	Composition: 3900 ohms ±10%, 1/4 w.
R2	3R152-P123K	Composition: 12,000 ohms ±10%, 1/4 w.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C349	5491601-P114	Phenolic: 0.51 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C350	5491601-P110	Phenolic: 0.36 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C351	5491601-P110	Phenolic: 0.36 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C358 thru C363	5493392-P7	Ceramic, feed-thru: .001 pf ±100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C.
C365	7774750-P4	Ceramic disc .001 pf ±100% -0%, 500 VDCW.
C367	5494481-P13	Ceramic disc: .002 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR301*	4037823-P1	Silicon. Added by REV D.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J442	19B205689-G2	Connector: 16 contacts.
J443	19C303426-G1	Connector: 20 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L341 thru L346		COIL ASSEMBLY L341 19BD0482D-G6 (4ER39B10, 13 and 16) L342 19BD0482D-G6 (4ER39B10, 13 and 16) L343 19BD0482D-G2 (4ER39B11, 14 and 17) L344 19BD0482D-G2 (4ER39B11, 14 and 17) L345 19BD0482D-G2 (4ER39B12, 15 and 18) L346 19BD0482D-G6 (4ER39B12, 15 and 18)
		- - - - - - - - - - INDICATING DEVICES - - - - - - - - - -
DS301	19B209067-P1	Lamp, glow: sim to GE NE-2T.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P304 thru P309	4029840-P2	Contact, electrical; sim to AMP 42827-2.
P310	4029840-P1	Contact, electrical; sim to AMP 41854.
P311 thru P320	4029840-P2	Contact, electrical; sim to AMP 42827-2.
P321	4029840-P1	Contact, electrical; sim to AMP 41854.
P322	4029840-P2	Contact, electrical; sim to AMP 42827-2.
P325	4029840-P2	Contact, electrical; sim to AMP 42827-2.
P327	4029840-P2	Contact, electrical; sim to AMP 42827-2.
P329	4029840-P2	Contact, electrical; sim to AMP 42827-2.
P337	4029840-P2	Contact, electrical; sim to AMP 42827-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q341	19A115527-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R343 and R344	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T341	19B209083-P2	Audio freq: 300 to 3000 Hz, Pri: 0.866 ohms Sec: 0.222 ohms
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424-P10	Minature, phen: 2 terminals.
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W442	19B205634-G6	Cable assembly, approx 5 inches.
W443	19B205634-G3	Cable assembly, approx 5 inches.
		- - - - - - - - - - TUNED CIRCUITS - - - - - - - - -
Z341 thru Z343		COIL ASSEMBLY Z341 19B204786-G1 Z342 19B204786-G2 Z343 19B204786-G3
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C2	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C4	5494481-P14	Ceramic disc: .002 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798-P1	Tuning slug. (Used with Z341).
	5491798-P4	Tuning slug. (Used with Z342).
	5491798-P5	Tuning slug. (Used with Z343).
Z347 thru Z349		COIL ASSEMBLY Z347 19B204767-G1 Z348 19B204767-G2 Z349 19B204767-G3
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C2	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5496218-P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798-P1	Tuning slug. (Used with Z347).
	5491798-P4	Tuning slug. (Used with Z348).
	5491798-P5	Tuning slug. (Used with Z349).
Z350 thru Z352		COIL ASSEMBLY Z350 19B204784-G4 Z351 19B204784-G5 Z352 19B204784-G6
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C7 and C8	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C10	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798-P1	Tuning slug. (Used with Z350).
	5491798-P4	Tuning slug. (Used with Z351).
	5491798-P5	Tuning slug. (Used with Z352).
Z365		COIL ASSEMBLY 19B204784-G7
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C10	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C11	5496218-P243	Ceramic disc: 13 pf 5%, 500 VDCW; temp coef -80 PPM.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	5491798-P5	Tuning slug.
		MECHANICAL PARTS (SEE RC-1528A)
1	19B204583-G3	Hinge.
2	4035439-P1	Transistor heat sink; sim to Birtcher 3AL-635-2R (Used with Q10 in A390).
3	4036555-P1	Washer insulator: Nylon. (Used with Q9 and Q10 in A390).
4	19B204583-G2	Hinge.
5	19A121989-P1	Bushing. (Used with Q341).
6	19E500812-P1	Chassis. (Used in Models 4ER39B11, 12, 14, 15, 17 and 18).
7	19E500812-P2	Chassis. (Used in Models 4ER39B10, 13 and 16).
8	19A121676-P1	Guide pin: 4-40 mounting thread.
9	19B204673-P1	Cover.
10	19C303385-P1	Bottom cover, Mobile Receiver.
11	19C303495-G4	Bottom cover, Station Receiver.
12	19A121297-P1	Angle.
13	7160861-P4	Nut, spring clip; sim to Tinnerman C6452-8Z-157.
14	19A115784-P1	Insulated plate. (Used with Q341).
15	N529P38C	Plug button.
16	4034252-P5	(Not Used).
17	19B204672-P1	Cover.
18	7162414-P1	Mounting ring, transistor socket. (Used with XQ1 in A341).
19	19B204917-P1	Support. (Used with A341).
20	19C303385-P2	Top cover, Mobile Receiver.
21	19C303495-G3	Top cover, Station Receiver. (Except Repeaters and VM Stations).

SYMBOL	G-E PART NO	DESCRIPTION
22	19C303676-G2	Top cover, Station Receiver. (Repeaters and VM Stations).
23	4029851-P3	Cable clamp: nylon; sim to Weckesser 1/8-4.
24	19A121383-P1	Support.
25	4033089-P1	Clip. (Part of XY1-4 in A377-385).
26	19B200525-P9	Rivet. (Part of XY1-4 in A377-385).
27	19A115793-P1	Electrical contact; sim to Malco 2700. (Part of XY1-4 in A377-385).
28	19C311172-P1	Socket. (Part of XY1-4 in A377-385).
29	19C303547-P1	Cover.
30	19C303394-G1	Heat sink.
31	19C303389-G1	Chassis.



RECEIVER MODELS 4ER39B10-18 & 4ER40B10-15

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 improve audio sensitivity. Changed R43 on If/Audio board A390.

REV. B - To standardize manufacturing procedures. Changed C76, deleted C77 and added C53 on If/Audio board A390.

REV. C - To eliminate capacitor failures in positive ground installations. Added C20 and changed C62 on A390. Changed C320.

REV. D - To protect the PA transistor (Q301) from negative voltage spikes. Added CR301 in 12-volt supply line.

REV. E - To eliminate high frequency oscillations in the receiver PA caused by the use of a higher gain PA transistor. Added C78 from A390-J16 to ground.

ORDERING SERVICE PARTS

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

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

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

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

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

MAINTENANCE MANUAL

LBI-3784

DF-1083

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