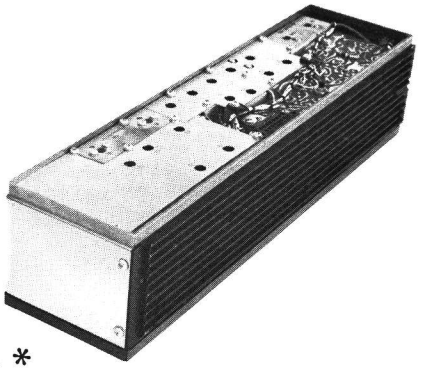
MOBILE RADIO

MASTR Progress Line

66-88 MC RECEIVER MODELS 4ER40B10-15 (WIDE BAND)



SPECIFICATIONS *

	ER-40-B
FCC Filing Designation	
Frequency Range	66-88 MC
Audio Output	2 watts at less than 10% distortion (using Speaker Model 4EZ16A10)
Sensitivity	
12-db SINAD (EIA method)	0.4 μv
20-db Quieting Method	0.5 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	0.25 μv
Maximum Squelch	Greater than 20 db quieting (less than 2 μv)
Intermodulation (EIA)	-60 db
Maximum Frequency Separation	0.4%
Frequency Response	+1 and -8 db of a standard 6-db per octave de-emphasis curve from 300 to 3000 cps (1000-cps reference)

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

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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-40-B 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 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 (A396-A401)

The receiver 1st osicllator operates in a transistorized Colpitts oscillator circuit. The oscillator crystal operates in a fundamental mode at a frequency of approximately 13 to 19 megacycles. The crystal is cut to provide temperature compensation at the high end of the temperature range and is thermistor compensated at low temperatures. This provides ±.0005% frequency stability as soon as the receiver is energized—without the warm-up time required by crystal ovens or warmers.

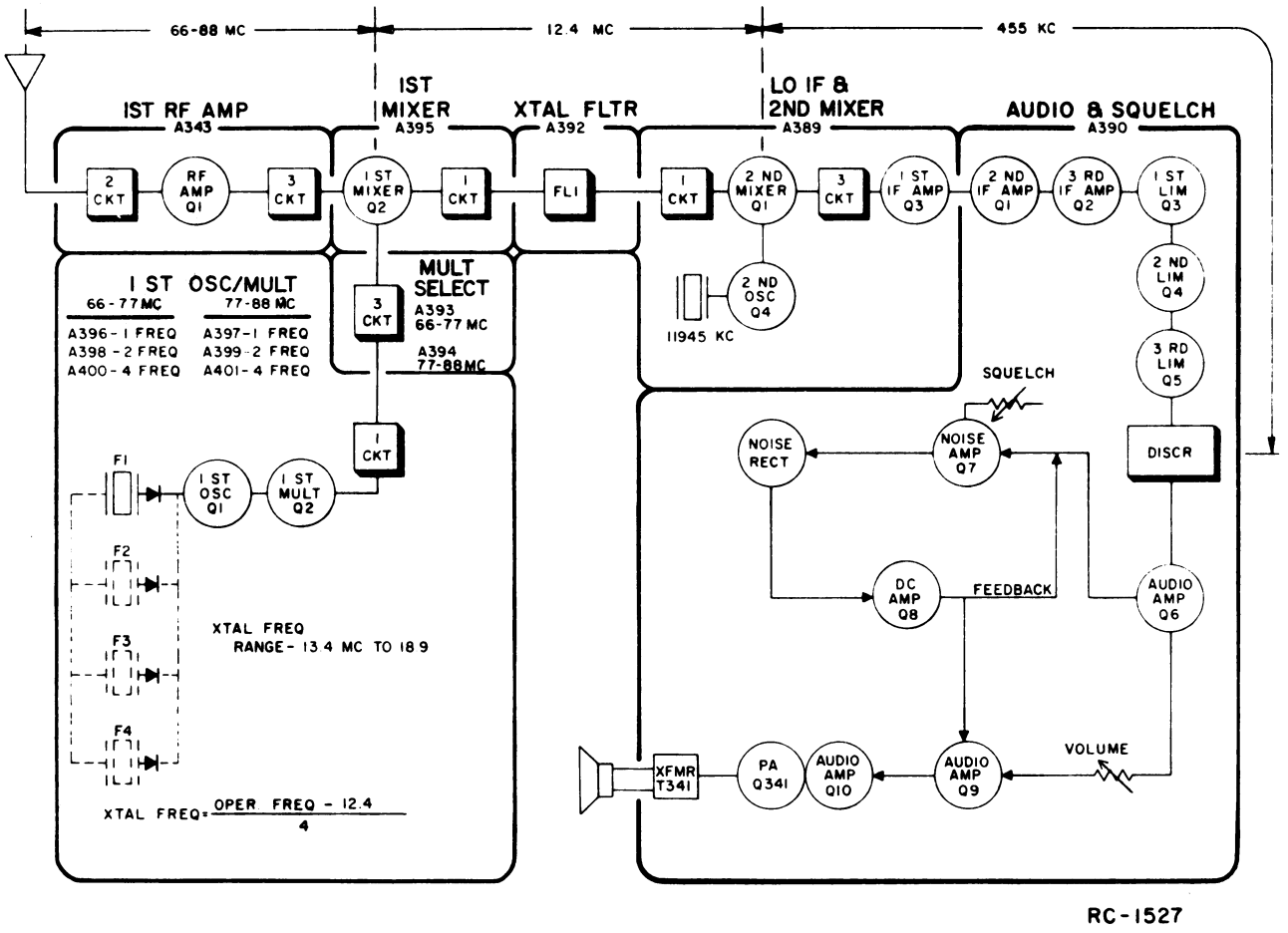


Figure 1 - Receiver Block Diagram

In single-frequency receivers, a jumper from P304 to C363 connects the regulated 10-volts to the crystal circuit.

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

Switch 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. The output is coupled to the base of 1st Multiplier.

The output of the 1st multiplier (quadrupler Q2) is transformer-coupled to multiplier selectivity assembly A393/A394. 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 (A393/A394)

Following the 1st multiplier tank (T5/T6) are three additional tuned circuits (A393/A394-L1, -L2 and -L3). Capacitor C20/C21 couples the multiplier selectivity output to the base of the first mixer.

1ST MIXER (A395) 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 A395-Q1. The mixer collector tank (L4 and C3) 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, 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 unit 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 termperature.

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 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 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 then 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.

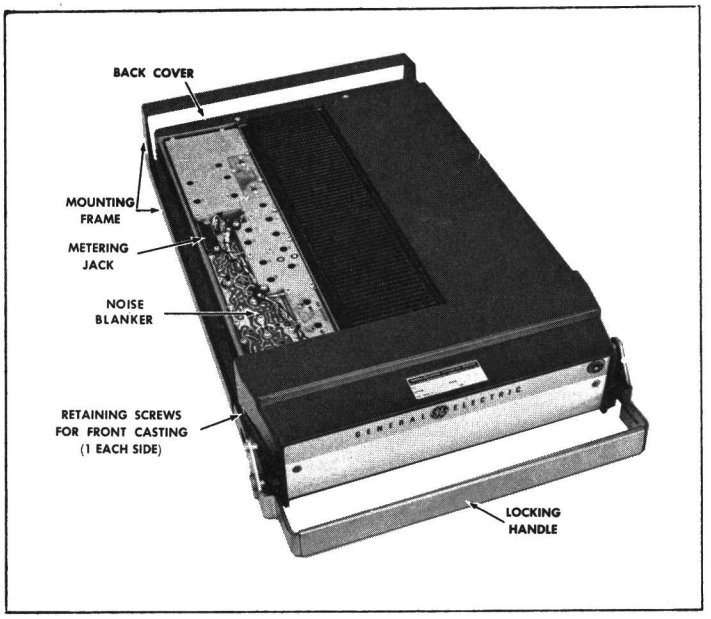


Figure 2 - Removing Top Cover

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.

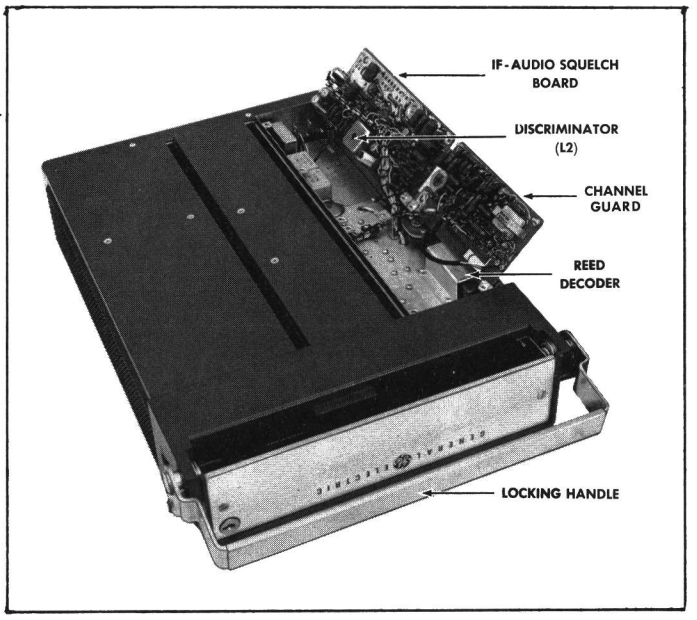


Figure 3 - Removing Bottom Cover

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

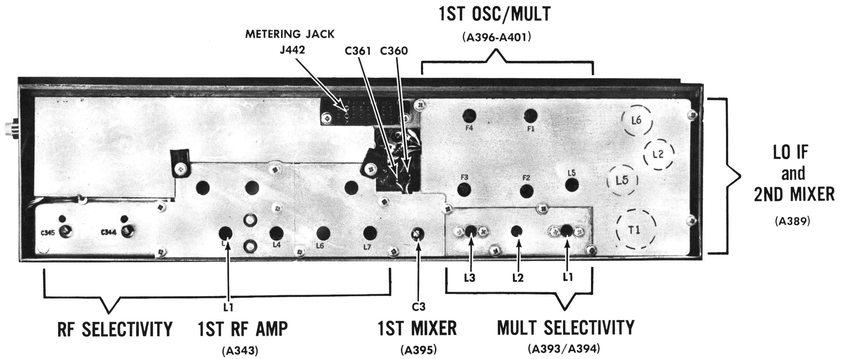
1. G-E Test Set Model 4EX3A10, station Meter Switching Panel or 20,000 ohms-per-volt Multimeter with a 1-volt scale.
2. A 455 KC and 66-88 MC signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

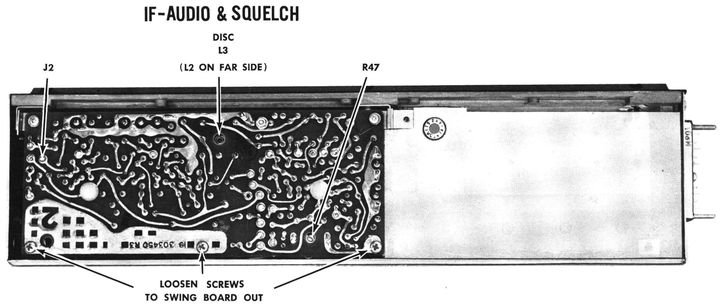
PRELIMINARY CHECKS AND ADJUSTMENTS

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	L5 (on 1st OSC/MULT and L1, L2, & L3 (on MULT SELECTIVITY)	See Procedure	Tune L5 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.	"	"	L5 (1st OSC/MULT) and L1, L2, and L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L5 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. 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, 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	L5 (on 1st OSC/MULT) and L1, L2, L3 (on MULT SELECTIVITY)	See Procedure	Tune L5 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.	"	"	L5 (1st OSC/MULT and L1, L2 and L3 (MULT SELECTIVITY)	Maximum	Apply an on-frequency signal as above, keeping below saturation. Tune L5 (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	T2 (2nd MIXER)	Maximum	Apply an on-frequency signal as above, and tune T2 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 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.

ALIGNMENT PROCEDURE

66 — 88 MC MASTR RECEIVER
MODELS 4EX40B10-15

TEST PROCEDURES

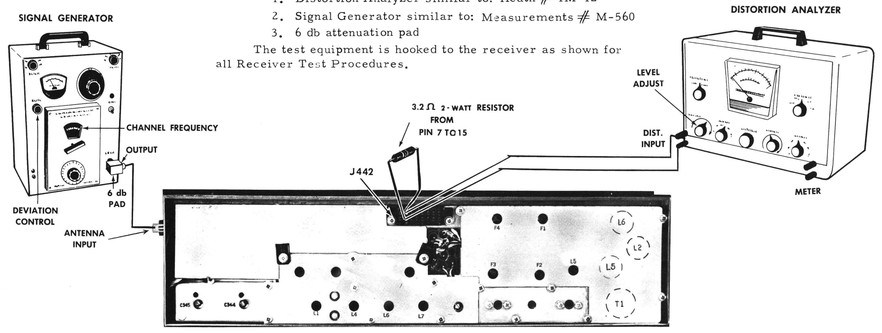
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

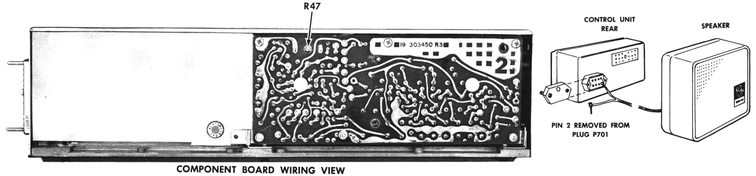
for test hookup shown:

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:

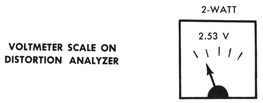
1. Connect a 1,000-microvolt test signal modulated by 1,000 cycles ±10 KC deviation to the antenna jack J441.
2. Two-Watt Speaker:
   When speaker is used, disconnect speaker lead pin from J701-2 (on rear of Control Unit). Hook up a 3.2-ohm load resistor from J442-15 to J442-7

   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.

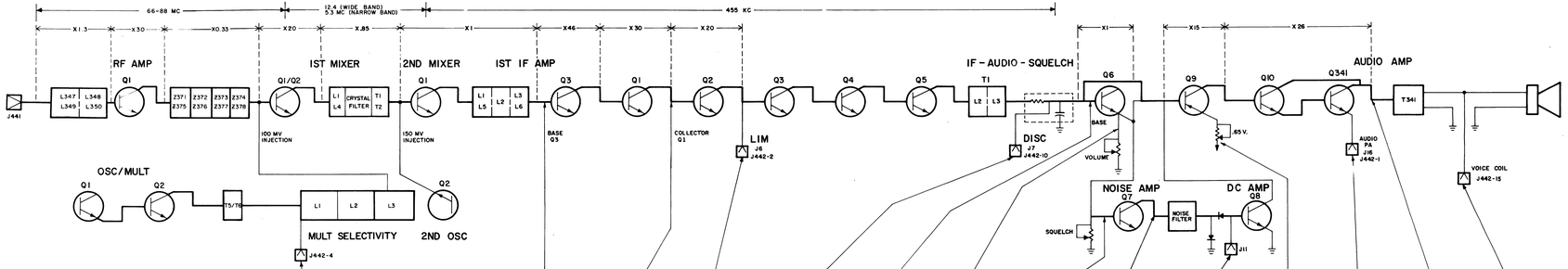
PROCEDURE:

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 M FULL COUNTER-CLOCKWISE POSITION			ADJUST VOLUME CONTROL FOR RATED 2 WATT OUTPUT ACROSS 3.2 OHM LOAD
READING	1.7 VDC	GENERATOR OUTPUT SHOULD BE APPROX. 1 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX. 300 MICROVOLTS	2 VDC	0.1 VAC	0.5 VAC	0.5 VAC	0.07 VAC	2.5 VAC	2.0 VDC	ADJUST FOR 0.65 VDC WITH VTVM ON J442-1 AND J442-8	0.65 VDC	7.0 VAC	2.53 VAC

RC-1217B

RESISTANCE READINGS

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

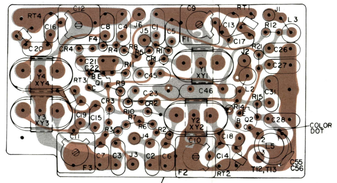
CAUTION

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

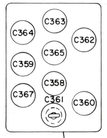
FOR READINGS OF:	USE SCALE:
1-100Ω	X 1
100-1K Ω	X 10
1K-50KΩ	X 1,000
50KΩ	X 100,000

1ST OSCILLATOR/MULTIPLIER

66-77 MC		77-88 MC
A396	1 FREQ	A397
A398	2 FREQ	A399
A400	4 FREQ	A401



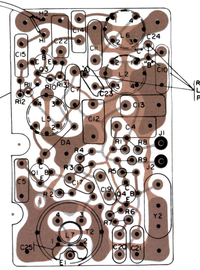
(19B204412, Sh. 1, Rev. 5)
(19B204412, Sh. 2, Rev. 5)



P2 TO J4 ON A390
P1 TO J2 ON A390

2ND MIXER

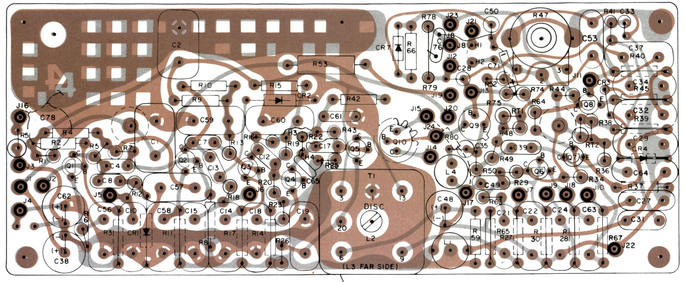
A389



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

IF-AUDIO & SQUELCH BOARD

A390



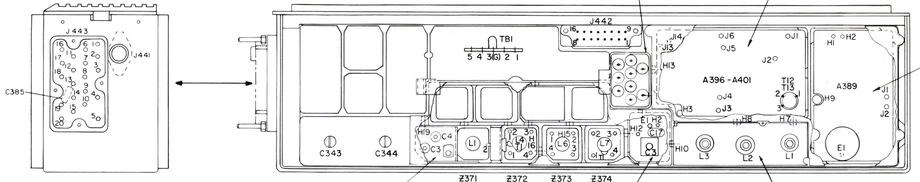
(19C303451, Sh. 1, Rev. 4)
(19C303451, Sh. 2, Rev. 4)

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	+	-	+	-	+	-
A396/401-Q1	1K	1K	4.5K	2.8K	120Ω	120Ω
A396/401-Q2	55Ω	80Ω	1K	1K	11KΩ	11KΩ
A393-Q2	2.7K	2.7K	7.5K	3.8K	600Ω	600Ω
A343-Q1	300Ω	500Ω	1.5K	4K	350Ω	400Ω
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	7.7K	10K
A390-Q8	180Ω	180Ω	100K	2.8K	11.0K	11K
A390-Q9	2.2K	2.2K	4.1K	45K	2.3K	2.3K
A390-Q10	*40Ω	3MΩ	2.3K	2.3K	40Ω	36Ω
A390-Q341	*1Ω	1Ω	40Ω	15Ω	40Ω	36Ω

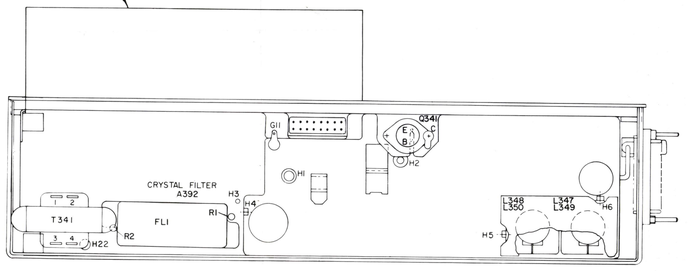
* READINGS MAY VARY DUE TO DIFFERENCES IN TRANSISTORS.

(19B612101, Rev. 2)

TOP VIEW



BOTTOM VIEW

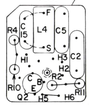


IST RF AMP

A343

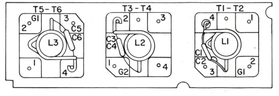
IST MIXER

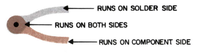
A395



MULTIPLIER-SELECTIVITY

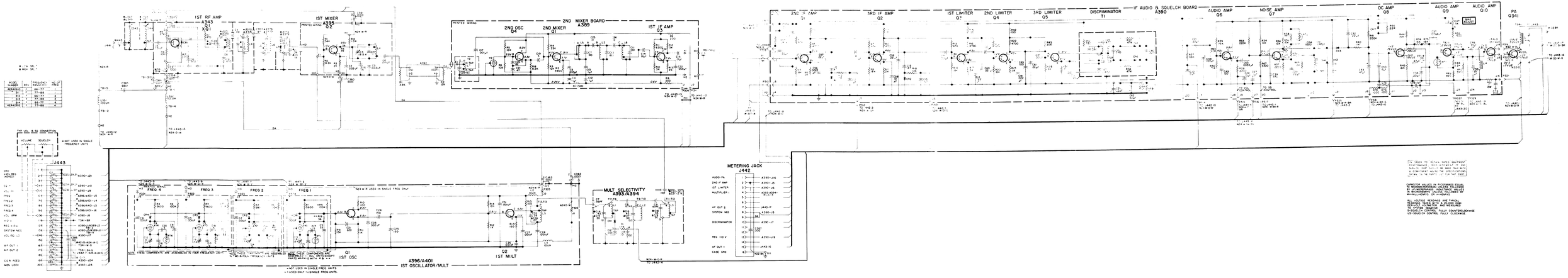
A366 (66-77 MC)
A367 (77-88 MC)





OUTLINE DIAGRAM

66 — 88 MC MASTR RECEIVER
MODELS 4ER40B10-15



(19R620786, Rev. B)

SCHEMATIC DIAGRAM

66 — 88 MC MASTR RECEIVER
MODELS 4ER40B10-15

PARTS LIST

LBI-38144

66-88 MHz RECEIVER - WIDE BAND
MODELS 4EX6081D - 4EX6081S
19D500809G2 - 87

SYMBOL	GE PART NO.	DESCRIPTION
		19D500809G82 Model: 4EX6081G 1 Freq 66-77 MHz
		19D500809G83 Model: 4EX6081L 1 Freq 77-88 MHz
		19D500809G84 Model: 4EX6081Z 2 Freq 66-77 MHz
		19D500809G85 Model: 4EX6081J 2 Freq 77-88 MHz
		19D500809G86 Model: 4EX6081X 4 Freq 66-77 MHz
		19D500809G87 Model: 4EX6081S 4 Freq 77-88 MHz
A343		RF AMPLIFIER ASSEMBLY 19B204739G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C3 and C4	5403392P7	Ceramic, feed-thru: 1000 pfd ±100%-50, 500 VDCW; sim to Allen Bradley Type FASC.
C5	5494481P12	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc.
C6	7484369P4	Silver mica: 500 pf ±10%, 500 VDCW; sim to Underwood Type J-1-HF.
C7*	7484369P4	Silver mica: 500 pf ±10%, 500 VDCW; sim to Underwood Type J-1-HF. Deleted by REV A.
C8*	5491601P130	Phenolic: 3.3 pf ±5%, 500 VDCW; sim to Quality Components Type MC. Deleted by REV A.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	4038642P1	Germanium.
		- - - - - - - - - TERMINALS - - - - - - - - -
E1	4029306P1	Terminal, feed-thru: sim to Sealectro FT-SB-27.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115342P2	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R5	3R152P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R6	3R153P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R8*	3R152P471K	Composition: 470 ohms ±10%, 1/4 w. Deleted by REV A.
R9*	3R152P302K	Composition: 3000 ohms ±5%, 1/4 w. Deleted by REV A.
XQ1	5490277P1	Transistor, phen: 4 contacts rated at 1 amp at 600 VRMS; sim to Elco 3303.
A389		SECOND MIXER ASSEMBLY 19B204439G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C4	19B209243P7	Polyester: 0.1 pf ±20%, 50 VDCW.
C5	19B209243P4	Polyester: .033 pf ±20%, 50 VDCW.
C7	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C10 and C11	5496219P399	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C12 and C13	19B209243P7	Polyester: 0.1 pf ±20%, 50 VDCW.
C14 and C15	19B209243P1	Polyester: .01 pf ±20%, 50 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C17	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc.
C19	5490008P1	Silver mica: 5 pf ±0.5 pf, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5493366P82G	Mica: 82 pf, ±2%, 100 VDCW; sim to Electro Motive Type DM-10.
C21	5493366P47G	Mica: 47 pf ±2%, 100 VDCW; sim to Electro Motive Type DM-10.
C22	19B209243P6	Polyester: .068 pf ±20%, 50 VDCW.
C23 and C24	5496218P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 and J2	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L2	19C311181G6	Coil.
L5	19C311181G8	Coil.
L6	19C311181G9	Coil.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029846P2	Contact, electrical: sim to AMP 42827-2.
P2	4029846P1	Contact, electrical: sim to AMP41854.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115345P1	Silicon, NPN.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4	19A115345P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152P152K	Composition: 1500 ohms ±10%, 1/4 w.
R2	3R152P392K	Composition: 3900 ohms ±10%, 1/4 w.
R3	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R4	3R152P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R5 and R6	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7 and R9	3R152P201J	Composition: 200 ohms ±5%, 1/4 w.
R10	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R11	3R152P622J	Composition: 6200 ohms ±5%, 1/4 w.
R12	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R13	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R14	3R152P822J	Composition: 8200 ohms ±5%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T2		COIL ASSEMBLY 19B204414G2
		- - - - - - - - - CAPACITORS - - - - - - - - -
C25	5496218P258	Ceramic disc: 62 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798P3	Tuning slug.
		- - - - - - - - - CRYSTALS - - - - - - - - -
Y2	19A110398P1	Quartz: freq 11845.00 KHz ± .002% at 25°C, temp range -30°C to +75°C.
A390		COMPONENT BOARD ASSEMBLY 19D403232G5
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A115028P116	Polyester: 0.22 pf ±20%, 200 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C2	5491189P108	Polyester: 0.22 pf ±20%, 50 VDCW.
C4	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to EMC Type JF Disc.
C7	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to EMC Type JF Disc.
C8	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C10	19A115028P114	Polyester: 0.1 pf ±20%, 200 VDCW.
C12	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to EMC Type JF Disc.
C13	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C14	19A115028P109	Polyester: .022 pf ±20%, 200 VDCW.
C15	19A115028P114	Polyester: 0.1 pf ±20%, 200 VDCW.
C17	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to EMC Type JF Disc.
C18 and C19	19A115028P109	Polyester: .022 pf ±20%, 200 VDCW.
L1	4031476G1	Choke.
L4	5491726P6	Choke: 3.5 mh ±10% ind at 1 KHz 2.5 ohms DC res max; sim to Aladdin 33-494.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4 and Q5	19A115552P1	Silicon, NPN; sim to Type 2N2714.
Q6 thru Q8	19A115123P1	Silicon, NPN; sim to Type 2N2712.
C33	5496267P28	Tantalum: 0.47 pf ±20%, 35 VDCW; sim to Sprague Type 150D.
C34	19B209243P9	Polyester: 0.22 pf ±20%, 50 VDCW.
C35	5496267P6	Tantalum: 33 pf ±20%, 10 VDCW; sim to Sprague Type 150D.
C37	19A115028P305	Polyester: .0068 pf ±10%, 200 VDCW.
C38	19A115680P107	Electrolytic: 100 pf +150%-10%, 15 VDCW; sim to Mallory Type TT.
C39	5490008P143	Silver mica: 470 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C48	5495670P9	Electrolytic: 35 pf +75% -10%, 15 VDCW; sim to Sprague 30D169A1.
C49	5496219P822	Ceramic disc: 120 pf ±10%, 500 VDCW, temp coef -1500 PPM.
C50	5496267P14	Tantalum: 15 pf ±20%, 30 VDCW; sim to Sprague Type 150D.
C53*	19B209243P11	Polyester: 0.15 pf ±20%, 40 VDCW. Added by REV C.
C56	19A115028P102	Polyester: .0022 pf ±20%, 200 VDCW.
C57	19B209243P9	Polyester: 0.22 pf ±20%, 50 VDCW.
C58	19A115028P107	Polyester: .01 pf ±20%, 200 VDCW.
C59 thru C61	19B209243P9	Polyester: 0.22 pf ±20%, 50 VDCW.
C62*	5491000P11	Electrolytic: 30 pf +75% -10%, 25 VDCW; sim to Sprague 30D379. In REV C and earlier:
	5496267P11	Tantalum: 68 pf ±20%, 15 VDCW; sim to Sprague Type 150D.
C63	19A115028P103	Polyester: .0033 pf ±20%, 200 VDCW.
C64	4029003P8	Silver mica: 1000 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C65	5496218P621	Ceramic disc: 100 pf ±10%, 500 VDCW, temp coef -1500 PPM.
C71	5496267P28	Tantalum: 0.47 pf ±20%, 35 VDCW; sim to Sprague Type 150D.
C76*	19B209243P3	Polyester: 0.022 pf ±20%, 50 VDCW. In REV B and earlier:
	19B209243P7	Polyester: 0.1 pf ±20%, 50 VDCW.

SYMBOL	GE PART NO.	DESCRIPTION
C77*	19B209243P6	Polyester: .068 pf ±20%, 50 VDCW. Deleted by REV C.
C78*	5494481P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to to EMC Type JF Disc. Added by REV F.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	4038656P1	Germanium: sim to GE Dwg. 44A2321600 Rev. 3.
CR3 and CR4	19A115250P1	Silicon.
CR7	19A115250P1	Silicon.
		- - - - - - - JACS AND RECEPTACLES - - - - - - -
J1 thru J24	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	4031476G1	Choke.
L4	5491726P6	Choke: 3.5 mh ±10% ind at 1 KHz 2.5 ohms DC res max; sim to Aladdin 33-494.
		- - - - - - - TRANSISTORS - - - - - - -
Q1 thru Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4 and Q5	19A115552P1	Silicon, NPN; sim to Type 2N2714.
Q6 thru Q8	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q9	19A115247P1	Silicon, PNP; sim to Type 2N1024.
Q10	19A115300P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - RESISTORS - - - - - - -
R1	3R77P330K	Composition: 33 ohms ±10%, 1/2 w.
R2	3R77P473K	Composition: 47,000 ohms ±10%,1/2 w.
R3	3R77P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R4	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R5	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R6	3R77P203J	Composition: 2000 ohms ±5%, 1/2 w.
R7	3R77P473K	Composition: 47,000 ohms ±10%,1/2 w.
R8	3R77P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R9	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R10	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R11	3R77P203J	Composition: 2000 ohms ±5%, 1/2 w.
R12	3R77P103K	Composition: 10,000 ohms ±10%,1/2 w.
R13	3R77P473K	Composition: 47,000 ohms ±10%,1/2 w.
R14	3R77P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R15	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R16	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R17	3R77P203J	Composition: 2000 ohms ±5%, 1/2 w.
R18	3R77P103K	Composition: 10,000 ohms ±10%,1/2 w.
R19	3R77P473K	Composition: 47,000 ohms ±10%,1/2 w.
R20	3R77P183J	Composition: 18,000 ohms ±5%, 1/2 w.
R23	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R24	3R77P203J	Composition: 2000 ohms ±5%, 1/2 w.
R25	3R77P163J	Composition: 16,000 ohms ±5%, 1/2 w.
R26	3R77P103J	Composition: 1000 ohms ±5%, 1/2 w.
R27	3R77P683K	Composition: 68,000 ohms ±10%, 1/2 w.
R28	3R77P223J	Composition: 2200 ohms ±5%, 1/2 w.

SYMBOL	GE PART NO.	DESCRIPTION
R29 and R30	3R77P753J	Composition: 75,000 ohms ±5%, 1/2 w.
R34	3R77P113K	Composition: 11,000 ohms ±10%, 1/2 w.
R36	3R77P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R37	3R77P223J	Composition: 2200 ohms ±5%, 1/2 w.
R38	3R77P751J	Composition: 750 ohms ±5%, 1/2 w.
R39	3R77P563J	Composition: 5600 ohms ±5%, 1/2 w.
R40	3R77P113K	Composition: 11,000 ohms ±10%, 1/2 w.
R41	3R77P394K	Composition: 0.2 megohm ±10%, 1/2 w.
R42	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R43*	3R77P303J	Composition: 30,000 ohms ±5%,1/2 w. In REV A and earlier:
	3R77P473K	Composition: 47,000 ohms ±10%,1/2 w.
R44	3R77P153K	Composition: 15,000 ohms ±10%,1/2 w.
R45	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R47	19B209115P1	Variable, carbon film: 5000 ohms ±30%, 0.15 w, sim to CTS Type UPE-70.
R48	3R77P223J	Composition: 2200 ohms ±5%, 1/2 w.
R49	3R77P821K	Composition: 820 ohms ±10%, 1/2 w.
R50	3R77P392K	Composition: 3900 ohms ±10%, 1/2 w.
R51	19B209022P15	Wirewound, phen: 1 ohm ±5%, 2 w; sim to IRC Type BWH.
R52	3R77P152K	Composition: 1500 ohms ±10%, 1/2 w.
R53	5495948P444	Deposited carbon: 0.28 megohm ±1%, 1/2 w; sim to Texas Instrument Type CDI/ZNH.
R59	3R77P512K	Composition: 5100 ohms ±10%, 1/2 w.
R63	3R77P623J	Composition: 62,000 ohms ±5%, 1/2 w.
R64	3R77P184K	Composition: 0.18 megohm ±10%, 1/2 w.
R65	3R77P123K	Composition: 13,000 ohms ±10%, 1/2 w.
R66	3R77P223K	Composition: 23,000 ohms ±10%, 1/2 w.
R67	3R77P332J	Composition: 3300 ohms ±5%, 1/2 w.
R74	3R77P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R75	3R77P183K	Composition: 18,000 ohms ±10%, 1/2 w.
R78	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R80	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT1	19B209143P2	Rod: 4000 ohms ±10%; sim to Global Type 789 F-12.
RT2	19B209143P3	Rod: 850 ohms ±10%; sim to Global Type 789 F-18.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19C303612G1	Discriminator assembly.
A392		CRYSTAL FILTER ASSEMBLY 19B203682G2
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19C304290G1	Bandpass filter.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P393K	Composition: 3900 ohms ±10%, 1/4 w.
R2	3R152P133K	Composition: 13,000 ohms ±10%, 1/4 w.
A393 and A394		MULTIPLEX SELECTIVITY ASSEMBLY 19B204927G3 4EX6081D, 12, and 14 19B204927G4 4EX6081I, 13, and 15
		- - - - - - - - - CAPACITORS - - - - - - - - -
C8 and C9	5491601P13	Phenolic: 0.47 pf ±10%, 500 VDCW; sim to Quality Components Type MC.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P473K	Composition: 47,000 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T7 and T8		COIL ASSEMBLY T7 19B204822G2 4EX6081D, 12 and 14 T8 19B204823G4 4EX6081I, 13 and 15
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C14	5496218P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in 19B204822G2).
C15	5496218P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in 19B204822G4).
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	7777146P2	Germanium.
	5491798P5	Tuning slug.
T9 and T10		COIL ASSEMBLY T9 19B204881G3 4EX6081D, 12 and 14 T10 19B204881G4 4EX6081I, 13 and 15
		- - - - - - - - - CAPACITORS - - - - - - - - -
C13	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to EMC Type JF Disc.
C16	5496218P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C17	5496218P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798P5	Tuning slug.
T11 and T12		COIL ASSEMBLY T11 19B204548G2 4EX6081D,12 and 14 T12 19B204548G4 4EX6081I,13 and 15
		- - - - - - - - - CAPACITORS - - - - - - - - -
C18	5496218P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C19	5496218P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C20	5491601P129	Phenolic: 3.0 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C21	5491601P127	Phenolic: 2.4 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
	5491798P5	Tuning slug.
A395		FIRST MIXER ASSEMBLY 19B204430G8
		- - - - - - - - - CAPACITORS - - - - - - - - -
C2	5494481P14	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to to EMC Type JF Disc.
C3	5491271P106	Variable: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3.
C5	5494481P14	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to to EMC Type JF Disc.
C6	5494481P12	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to to EMC Type JF Disc.
C15 and C16	5496218P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
L4	19A121082G6	Toroidal coil.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q2	19A115245P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R152P563J	Composition: 56,000 ohms ±5%, 1/4 w.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2	3R152P822J	Composition: 8200 ohms ±5%, 1/4 w.
R3	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R4	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
A396 thru A401		FIRST OSCILLATOR ASSEMBLY A396 19B204419G2X (4EX6081G) A397 19B204419G3Y (4EX6081I) A398 19B204419G2X (4EX6081G) A399 19B204419G3X (4EX6081I) A400 19B204419G2W (4EX6081G) A401 19B204419G2Y (4EX6081G)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc.
C2	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc. (Used in 4EX6081J-15).
C3 and C4	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc. (Used in 4EX6081J-15).
C5	5496219P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM. (Used in 4EX6081G-15).
C6	5496219P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM. (Used in 4EX6081J-15).
C7 and C8	5496219P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM. (Used in 4EX6081H and 15).
C9	5491271P106	Variable: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3.
C10	5491271P106	Variable: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3. (Used in 4EX6081J-15).
C11 and C12	5491271P106	Variable: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-3. (Used in 4EX6081H and 15).
C13	5496219P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C14	5496219P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. (Used in 4EX6081J-15).
C15 and C16	5496219P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. (Used in 4EX6081H and 15).
C17	19C300685P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C18	19C300685P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM. (Used in 4EX6081J-15).
C19 and C20	19C300685P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM. (Used in 4EX6081H and 15).
C21	5496219P771	Ceramic disc: 220 pf ±5%, 500 VDCW, -750 temp coef.
C23	5494481P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc.
C24	5490008P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C28	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc.
C31	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to EMC Type JF Disc.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A115348P1	Silicon. (Used in 4EX6081A and 15).
CR3 and CR4	19A115348P1	Silicon. (Used in 4EX6081A and 15).
		- - - - - - - - - JACKS AND RECEPTACLES - - - - - - - - -
J1 and J2	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
J3 and J4	4033513P4	Contact, electrical: sim to Bead Chain L83-3. (Used in 4EX6081J-15).

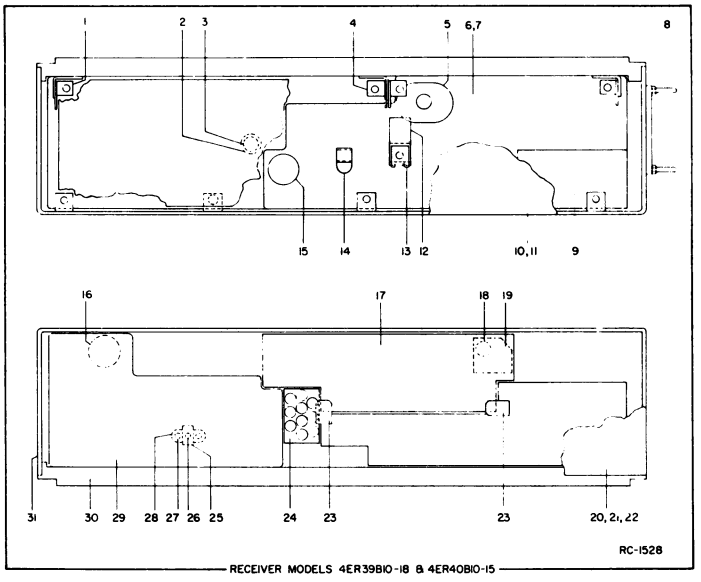
SYMBOL	GE PART NO.	DESCRIPTION
J5	4033513P4	Contact, electrical: sim to Bead Chain L83-3.
J6	4033513P4	Contact, electrical: sim to Bead Chain L83-3. (Used in 4EX6081J-15).
		- - - - - - - - - INDUCTORS - - - - - - - - -
L2 and L3	7488079P16	Choke, RF: 10 uh ±10%, 0.6 ohm DC res max; sim to Jeffers 4421-7K. (Used in 4EX6081I, 13 and 15).
Q1 and Q2	19A115330P1	Silicon, NPN.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P563J	Composition: 5600 ohms ±5%, 1/4 w.
R2	3R152P563J	Composition: 5600 ohms ±5%, 1/4 w. (Used in 4EX6081J-15).
R3 and R4	3R152P563J	Composition: 5600 ohms ±5%, 1/4 w. (Used in 4EX6081A and 15).
R5 and R6	3R152P104K	Composition: 0.1 megohm ±10%, 1/4 w. (Used in 4EX6081J-15).
R7 and R8	3R152P104K	Composition: 0.1 megohm ±10%, 1/4 w. (Used in 4EX6081A and 15).
R9	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R14	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R19	3R152P396J	Composition: 36 ohms ±5%, 1/4 w. (Used in 4EX6081J-15).
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT5	19B209284P7	Disc: 175 ohms DC res, color code violet; sim to GE 3D2115.
RT6	19B209284P7	Disc: 175 ohms DC res, color code violet; sim to GE 3D2115. (Used in 4EX6081J-15).
RT7 and RT8	19B209284P7	Disc: 175 ohms DC res, color code violet; sim to GE 3D2115. (Used in 4EX6081H and 15).
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T12 and T13		COIL ASSEMBLY T12 19B204766G3 4EX6081D, 12 and 14 T13 19B204766G4 4EX6081I, 13 and 15
		- - - - - - - - - CAPACITORS - - - - - - - - -
C55	5496218P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in 19B204766G3).
C56	5496218P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in 19B204766G4).
	5491798P5	Tuning slug.
		- - - - - - - - - SOCKETS - - - - - - - - -
XY1		Refer to Mechanical Parts (BC-1528).
XY2		Refer to Mechanical Parts (BC-1528).
XY3		Refer to Mechanical Parts (BC-1528).
XY4		Refer to Mechanical Parts (BC-1528).
		- - - - - - - - - CRYSTALS - - - - - - - - -
		NOTE: When reordering give GE Part No. and specify exact frequency needed.
Y1	19B206576P13	66-88 MHz crystal freq = (OF +12.4 MHz) ÷ 4, Quartz: freq range 12400.00 to 16150.00 KHz, temp range -30°C to +85°C. (66-77 MHz). (Used in 4EX6081D, 12 and 14).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
Y1	19B206576P14	Quartz: freq range 16150.001 to 18900.000 KHz, temp range -30°C to +85°C. (77-88 MHz). (Used in 4ER40B11, 13 and 15).
Y2	19B206576P13	Quartz: freq range 13400.00 to 16150.000 KHz, temp range -30°C to +85°C. (66-77 MHz). (Used in 4ER40B12 and 14).
Y2	19B206576P14	Quartz: freq range 16150.001 to 18900.000 KHz, temp range -30°C to +85°C. (77-88 MHz). (Used in 4ER40B13 and 15).
Y3	19B206576P13	Quartz: freq range 13400.000 to 16150.000 KHz, temp range -30°C to +85°C. (66-77 MHz). (Used in 4ER40B14).
Y3	19B206576P14	Quartz: freq range 16150.001 to 18900.000 KHz, temp range -30°C to +85°C. (77-88 MHz). (Used in 4ER40B15).
Y4	19B206576P13	Quartz: freq range 13400.000 to 16150.000 KHz, temp range -30°C to +85°C. (66-77 MHz). (Used in 4ER40B14).
Y4	19B206576P14	Quartz: freq range 16150.001 to 18900.000 KHz, temp range -30°C to +85°C. (77-88 MHz). (Used in 4ER40B15).
		- - - - - - - - - - CAPACITORS - - - - - - - -
C352	5491601P117	Phenolic: 0.68 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C353	5491601P112	Phenolic: 0.43 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C358 thru C363	5493392P7	Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C.
C383	5496267P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C384*	19A115680P3	Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
		In REV C and earlier:
	5496267P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C385	7774750P4	Ceramic disc: .001 µf +100% -0%, 500 VDCW.
C387	5494481P13	Ceramic disc: 2000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - DIODES AND RECTIFIERS - - - - -
CR301*	4037822P1	Silicon. Added by REV E.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J442	19B205689G2	Connector: 16 contacts.
J443	19C303426G1	Connector: 20 pin contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L347 thru L350		COIL ASSEMBLY L347 19B204821G1 (4ER40B10, 12 and 14) L348 19B204821G1 (4ER40B10, 12 and 14) L349 19B204821G2 (4ER40B11, 13 and 15) L350 19B204821G2 (4ER40B11, 13 and 15)
		- - - - - - - - - - CAPACITORS - - - - - - - -
C343	19B209159P1	Variable, air, sub-miniature: 1.40 to 3.25 pf, 750 v peak; sim to EF Johnson 189. (Used in L347 and L348).
C344	19B209159P1	Variable, air, sub-miniature: 1.40 to 3.25 pf, 750 v peak; sim to EF Johnson 189. (Used in L349 and L350).
L351 and L352	7488079P72	Choke, RF: 100 µh ±10%, 2.6 ohms DC res max; sim to Jeffers 4424-9K.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P304 thru P309	4029840P2	Contact, electrical: sim to AMP 42827-2.
P310	4029840P1	Contact, electrical: sim to AMP 41854.
P311 thru P320	4029840P2	Contact, electrical: sim to AMP 42827-2.
P321	4029840P1	Contact, electrical: sim to AMP 41854.

SYMBOL	GE PART NO.	DESCRIPTION
P325	4029840P2	Contact, electrical; sim to AMP 42827-2.
P329	4029840P2	Contact, electrical; sim to AMP 42827-2.
P337	4029840P2	Contact, electrical; sim to AMP42827-2. (Used in 4ER40B12 - 15).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q341	19A115527P1	Silicon, NPN.
		- - - - - - - - - TRANSFORMERS - - - - - - - -
T341	19B209083P2	Audio freq: 300 to 3000 Hz, 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.
		- - - - - - - - - - - CABLES - - - - - - - - - -
W443	19B205634G1	Cable assembly, approx 5 inches.
		- - - - - - - - - TUNED CIRCUITS - - - - - - - -
Z371 and Z372		COIL ASSEMBLY Z371 19B204842G1 4ER40B10, 12 and 14 Z372 19B204842G2 4ER40B10, 12 and 14
		- - - - - - - - - - CAPACITORS - - - - - - - -
C1	5496218P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in 19B204842G1).
C2	5496218P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM. (Used in 19B204842G1).
C3	5491601P17	Phenolic: 0.68 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
	5491798P5	Tuning slug.
Z373		COIL ASSEMBLY 19B204832G1 4ER40B10, 12 and 14
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496218P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798P5	Tuning slug.
Z374		COIL ASSEMBLY 19B204831G1 4ER40B10, 12 and 14
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496218P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481P13	Ceramic disc: 2000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
	5491798P5	Tuning slug.
Z375		COIL ASSEMBLY 19B204842G2 4ER40B11, 13 and 15
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C2	5496218P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601P17	Phenolic: 0.68 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
	5491798P5	Tuning slug.
Z376 and Z377		COIL ASSEMBLY 19B204832G2 4ER40B11, 13 and 15
		- - - - - - - - - - CAPACITORS - - - - - - - -
C2	5496218P246	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798P5	Tuning slug.
Z378		COIL ASSEMBLY 19B204831G2 4ER40B11, 13 and 15
		- - - - - - - - - - CAPACITORS - - - - - - - -
C3	5496218P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
C5	5494481P13	Ceramic disc: 2000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
	5491798P5	Tuning slug.
		MECHANICAL PARTS (SEE RC-1528)
1	19B204583G3	Hinge
2	4035439P1	Transistor heat sink; sim to Birtcher 3AL-635-2R. (Used with Q10 in A390).
3	4036555P1	Washer insulator: nylon. (Used with Q9 and Q10 in A390).
4	19B204583G1	Hinge.
5	19A115784P1	Insulated plate. (Used with Q341).
6	19E500812P3	Chassis.
7	19E500812P2	(Not Used).
8	19A121676P1	Guide pin: 4-40 mounting thread.
9	19B204673P1	Cover.
10	19C303385P1	Bottom cover, Mobile Receiver.
11	19C303495G4	Bottom cover, Station Receiver.
12	19A121297P1	Angle.
13	7160861P4	Nut, spring clip: sim to Tinnerman C6452-8Z-157.
14	4029851P6	Cable clamp: nylon; sim to Weckesser 5/16-4.
15	N529P38C	Plug button.
16	4034252P5	Can; sim to Hudson Tool and Die HV-1236-2. (Used with T1 in A389).
17	19B204672P1	Cover.
18	7167414P1	Mounting ring, transistor socket. (Used with XQ1 in A343).
19	19B204732P1	Support. (Used with A343).
20	19C303385P2	Top cover, Mobile Receiver.
21	19C303495G3	Top cover, Station Receiver. (Except Repeaters and VM Stations).
22	19C303676G2	Top cover, Station Receiver. (Repeaters and VM Stations).
23	4029851P3	Cable clamp: nylon; sim to Weckesser 1/8-4.
24	19A121383P1	Support.
25	4033089P1	Clip. (Part of XY1-4 in A396 - A401).
26	19B200525P1	Rivet. (Part of XY1-4 in A396 - A401).
27	19A115793P1	Electrical contact; sim to Malco 2700. (Part of XY1-4 in A396 - A401).
28	19C311172P1	Socket. (Part of XY1-4 in A396 - A401).
29	19C303547P1	Cover.
30	19C303394G1	Heat sink.
31	19C303389G1	Chassis.



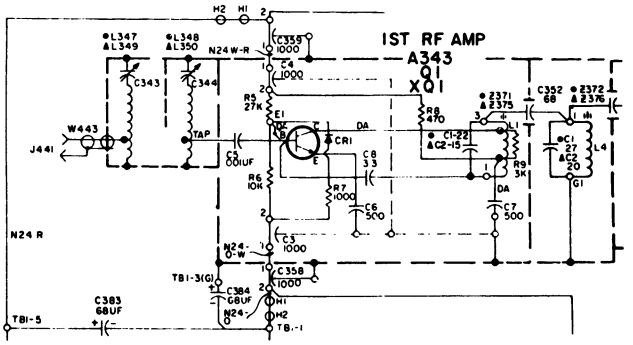
RECEIVER MODELS 4ER39BIO-18 & 4ER40BIO-15

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 eliminate instability in RF A343.
Deleted C7, C8, R8 and R9.
Added C4, R1 and R2.

Schematic Diagram was:



REV. B - To improve audio Sensitivity.
Changed R43.

REV. C - To improve operation.
Deleted C77, Changed C76 and added C53.

REV. D - To improve reliability.
Changed C62 and C384.
Added C320.

REV. E - To improve reliability.
Added CR301.

REV. F - To improve PA stability.
Added C78.

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-3785

DF-1084

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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PRINTED IN U.S.A.