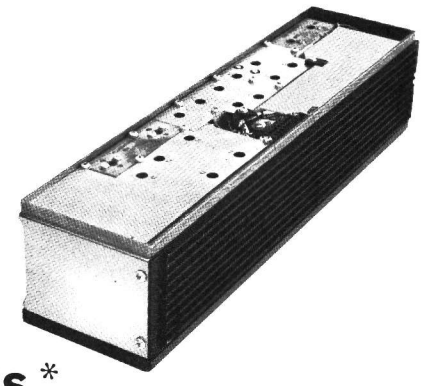
MOBILE RADIO

MASTR Progress Line

66–88 MHz RECEIVER MODELS 4ER40D10–15 (WIDE BAND)



SPECIFICATIONS *

FCC Filing Designation	**ER-40-D**
Frequency Range	66—88 MHz
Audio Output	5 watts at less than 5% distortion
Sensitivity	
12-dB SINAD (EIA Method)	0.4 μV
20-dB Quieting Method	0.5 μV
Selectivity	
EIA Two-Signal Method	-85 dB (adjacent channel, 40 kHz channels)
20-dB Quieting Method	-100 dB at ±30 kHz
Spurious Response	-7.5 dB
Frequency Stability	±.0005%
Modulation Acceptance	±15 kHz (wide-band)
Squelch Sensitivity	
Critical Squelch	0.2 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 Hz (1000-Hz reference)

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

1097

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

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

DESCRIPTION

General Electric MASTR Progress Line Receiver Type ER-40-D is a double-conversion, superheterodyne FM receiver designed for operation on the 66-88 megahertz band.

The receiver is of single-unit construction and is completely housed in a copper-plated 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 silicon transistors for added reliability. 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 Models 4EX3A10 or 4EX8K10, 11 for ease of alignment and servicing. The Test Set meters the oscillator, multiplier, and limiter stages as well as the discriminator and regulated 10 volts.

RF AMPLIFIER (A343)

RF Amplifier (A343) consists of two high-Q helical resonators and an RF amplifier stage (Q1). The RF signal from the antenna is coupled by RF cable W441 to a tap on L347/L349. The tap is positioned to insure the proper impedance match to the antenna. RF energy is coupled through the two coils by an opening in the shield wall to the base of RF Amplifier Q1. The coils are tuned to the incoming frequency by air trimmer capacitors C343 and C344. The output of Q1 is coupled through four tuned circuits to the base of the first mixer.

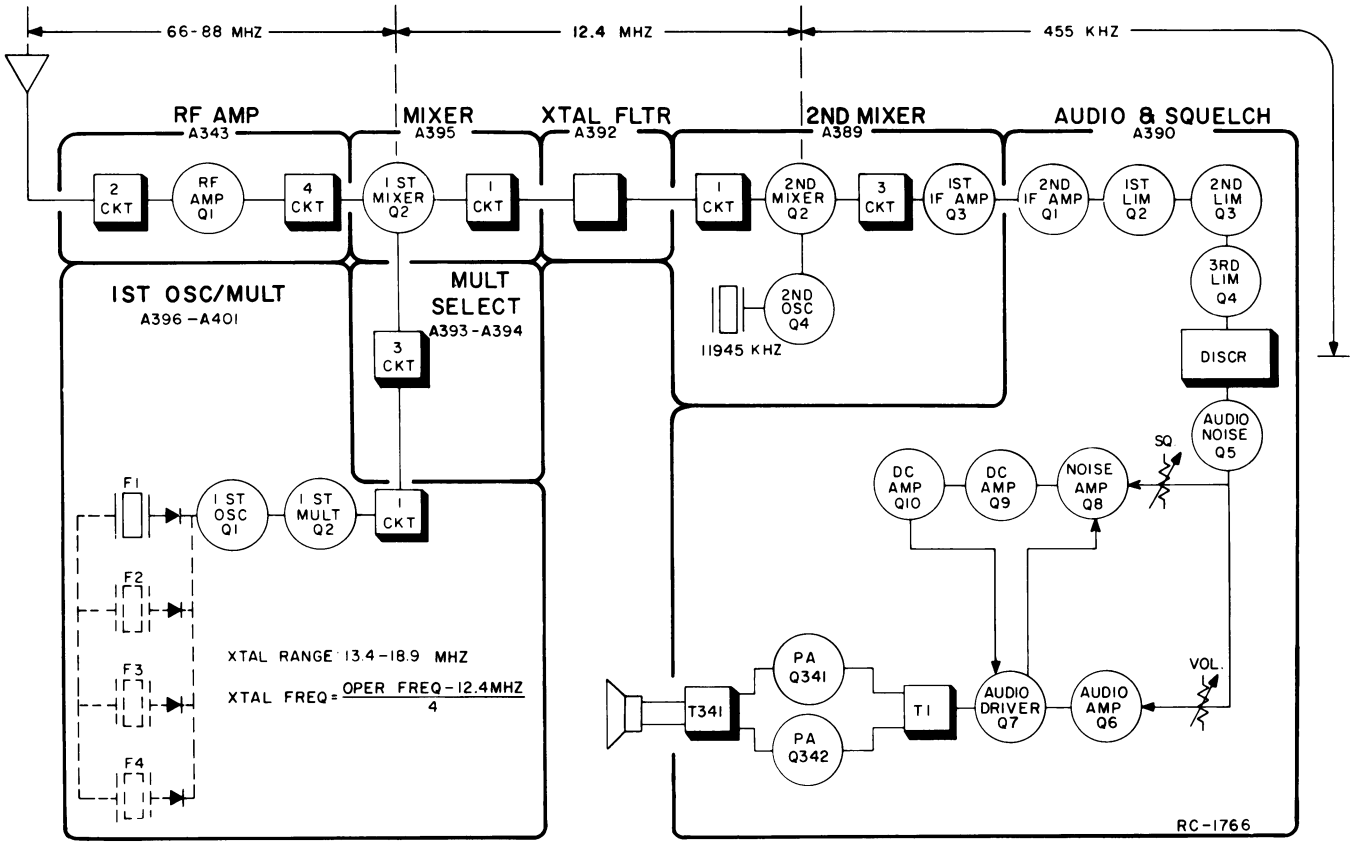


Figure 1 - Receiver Block Diagram

1ST OSCILLATOR AND MULTIPLIER (A396-A40)

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 19 megahertz. 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.

In single-frequency receivers, bias for the oscillator transistor is obtained by a jumper from H1 to H2 on the oscillator board.

In mult-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.

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. The output is coupled to the base of 1st multiplier.

The output of the 1st multiplier (quadrupler Q2) is transformer-coupled (T12/T13) 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 (T12/T13) 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 megahertz and provides impedance matching to the high IF filter.

2ND OSCILLATOR, 2ND MIXER AND 1ST LO IF AMPLIFIER

A389-Q4 operates in a Colpitts oscillator circuit, with feedback supplied through C18. The oscillator low-side injection voltage (11945 kHz) is applied to the base of the 2nd mixer.

The High IF signal from the filter and the injection voltage from the 2nd oscillator is applied to the base of 2nd mixer Q2. The 445-kHz mixer output is applied to three tuned low IF circuits, L1, L2 and L3. These tuned circuits are required for shaping the nose of the IF waveform, and for rejecting any undesired output frequencies from the 2nd mixer.

The low IF signal is applied to the base of 1st low IF amplifier Q3. The output of Q3 is R-C coupled to the base of the 2nd low IF amplifier.

2ND LO IF AMPLIFIER AND LIMITERS (A390)

Additional amplification of the low IF signal going to the limiter stages is provided by 2nd low IF amplifier A390-Q1. This stage is metered at J442-2 through a metering network consisting of C19, CR3 and R25.

Following the 2nd low IF amplifier are three R-C coupled limiter stages (A390-Q2, -Q3 and -Q4). The 1st limiter is metered at J442-3 through metering network C20, CR4 and R26.

DISCRIMINATOR (A390)

The limiter output is applied to a Foster-Seely type discriminator, where diodes CR1 and CR2 rectify the 455-kHz signal to recover the audio. The discriminator is metered at J442-10 through metering network C16 and R23.

AUDIO-NOISE AMPLIFIER (A390)

The discriminator output is coupled through a low-pass filter (C16, C18, R21 and R22) to the base of audio-noise amplifier Q5. The filter removes any 455-kHz signal remaining in the discriminator output. Q5 operates as a emitter-follower to match the discriminator impedance to the VOLUME and SQUELCH control. The stage also provides power gain.

AUDIO AMPLIFIERS (A390)

Any audio present in the incoming signal is coupled from the emitter of Q5 through the VOLUME control and a de-emphasis network to the base of audio amplifier Q6. The de-emphasis network consists of C22, C23, C24, R30 and R31.

Audio driver Q7 follows the audio amplifier. Base bias and AC feedback for Q6 are connected from the base of Q7 through R32, R33, R63, C42 and C29. Negative feedback and base bias for Q7 is supplied through R37. The audio driver output is coupled

through transformer T1 to provide phase inversion for the push-pull audio PA stage.

Q341 and Q342 operate as a push-pull, class AB audio PA stage. The PA output is coupled through audio transformer T341 to the loudspeaker. The yellow and white tertiary windings of T341 supply balanced feedback to the emitter of Q7. The feedback winding minimizes distortion and prevents the pick-up of external electrical noise.

The PA stage provides a 5-watt output at less than 5% distortion into a 3.5-ohm load at the receiver output terminals (3.2-ohms at the Control Unit). Base bias for the PA stage and the elimination of cross-over distortion is controlled by bias adjust potentiometer R43. The potentiometer is set at the factory as shown in STEP 1 of the receiver Test Procedure.

NOTE

Do not adjust bias adjust potentiometer R43 unless PA transistors Q341 and Q342 have been replaced.

Audio high and low are also present at centralized metering jack J442, and can be used as shown in STEP 1 of the Test Procedure.

SQUELCH (A390)

Noise from the audio-noise amplifier operates the squelch circuit. With no carrier present in the receiver, this noise is coupled to the base of noise amplifier Q8 through a high-pass filter which attenuates frequencies below 3 kHz. The filter consists of C30, C31 and R45, as well as C34 and L3 in the collector circuit of Q8. The gain of Q8 is determined by the Squelch control, which varies the bias on the base of Q8. Thermistor RT2 keeps the critical squelch constant over wide variations in temperature.

The output of noise amplifier Q8 is rectified by diodes CR5 and CR6, and filtered by C36 and C37 to produce a negative DC voltage. This DC voltage is applied to the base of DC amplifier Q9, turning it off. When turned off, the collector voltage of Q9 rises to approximately 8 volts, turning on DC amplifier Q10. When conducting, the collector voltage of Q10 drops to almost ground potential, which removes the base bias to audio amplifier Q6 and audio driver Q7, turning them off.

When the receiver is quieted by a signal (unsquelches), the noise in the receiver is reduced, turning DC amplifier Q9 on and DC amplifier Q10 off. This allows the audio stages to conduct so that sound is heard in the speaker. A network composed of C38, CR7 and R62 slows down the switching action of Q10, preventing an obnoxious "thump" from being heard in the speaker.

Resistor R53 connects from the emitter of audio driver Q7 to the emitter of noise amplifier Q8, providing a hysteresis loop in the squelch circuit. When a weak signal opens the squelch, the signal level may be reduced by 4 to 6 dB without the squelch closing. This limits squelch "flutter" or "picket-fense" operation.

With audio driver Q7 conducting, a positive voltage through R53 helps to reduce the gain of noise amplifier Q8. This positive feedback provides a quick, positive switching action in the squelch circuit. When the receiver squelches, audio driver Q7 turns off and its emitter potential drops to zero. This reduces the DC feedback through R53 to the emitter of noise amplifier Q8. Reducing the feedback causes Q8 to conduct harder, turning the audio stages off quickly.

Keying the transmitter removes the +10 volts from J19, turning off DC amplifier Q9 and turning on Q10 to mute the receiver.

MAINTENANCE

DISASSEMBLY

To service the receiver from the top --

1. Pull locking handle down and pull radio about one inch out of mounting frame.
2. Pry up cover at rear of receiver.
3. Slide cover back and lift off.

To service the receiver from the bottom --

1. Pull locking handle down. Pull radio out of mounting frame.
2. Remove screws in bottom cover. Pry up cover to back of receiver.
3. Slide cover back and lift off.

To remove the receiver from the system frame --

1. Loosen the two Phillips-head retaining screws in from 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 the system frame.

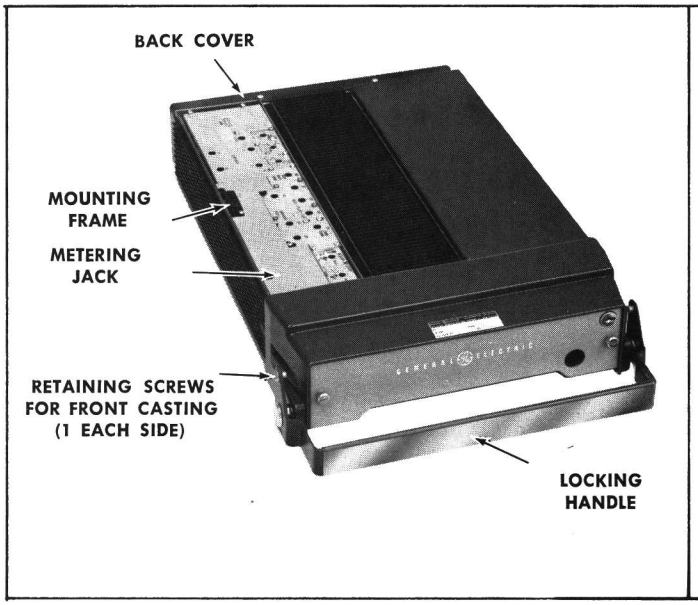


Figure 2 - Removing Top Cover

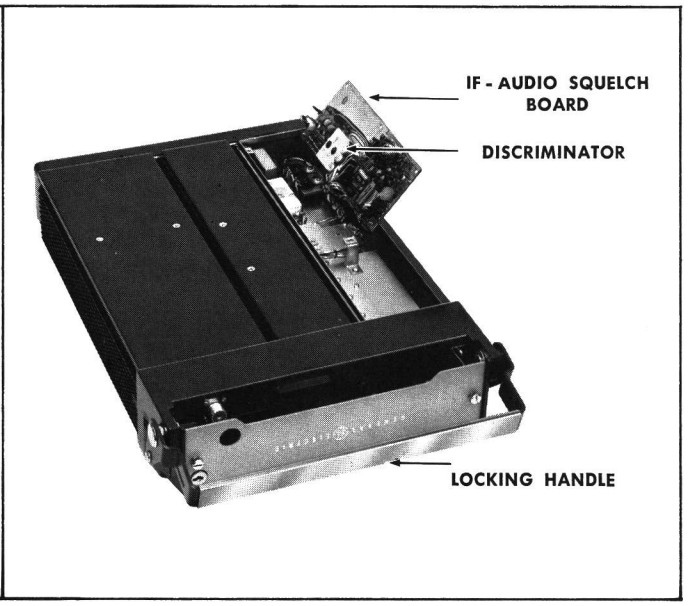


Figure 3 - Removing Bottom Cover

FRONT END ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Models 4EX3A10, 4EX8K10, 11 (or 20,000 ohms-per-volt Multimeter with a 1-volt scale).

2. A 455 kHz and 66-88 MHz signal source. Connect a one-inch piece of insulated wire no larger than .065-inch diameter to generator output probe.

PRELIMINARY CHECKS AND ADJUSTMENTS

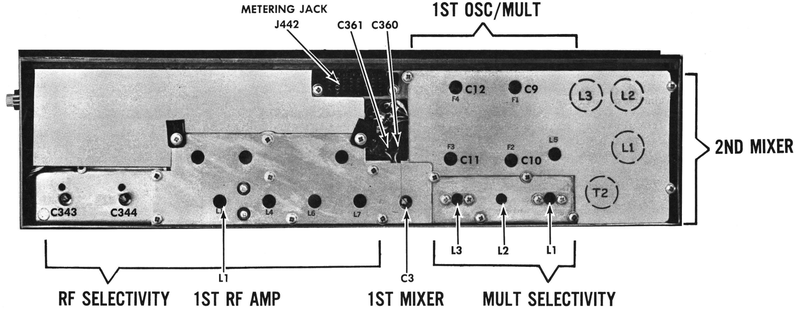
1. Connect Test Set to Receiver Centralized Metering Jack J442 and set meter sensitivity switch to the TEST 1 position (or 1-volt position on 4EX8K10, 11).

2. With Test Set in Position J, check for regulated +10 volts. If using Multimeter, measure from C360 to C361.

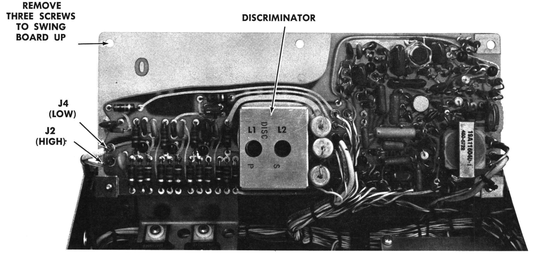
3. If using Multimeter, connect the positive lead to J442-16 (Ground).

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.



IF-AUDIO & SQUELCH



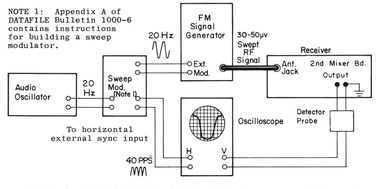


Figure 4 - Test Setup for 20-Hz Double-Trace Sweep Alignment

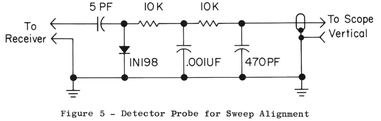


Figure 5 - Detector Probe for Sweep Alignment

COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Models 4EX3A10, 4EX8K10, 11 (or 20,000 ohms-per-volt Multimeter with a 1-volt scale).

2. A 455-kHz signal source (GE Test Set Model 4EX7A10) and 66-88 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 to Receiver Centralized Metering Jack J442, and set meter sensitivity switch to the TEST 1 position (or 1-volt position on 4EX8K10, 11).

2. For a large change in frequency or a badly mis-aligned receiver, 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 150 kHz, align the unit on channel F1. If the frequency spacing is greater than 150 kHz, align the receiver with a center frequency crystal.

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 GE Test Set	METERING POSITION Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			DISCRIMINATOR & OSCILLATOR		
1.	A (DISC)	Pin 10	L1 and L2 (on IF-AUDIO SQUELCH board)	Zero	Remove three screws and swing open the IF-AUDIO & SQUELCH board. Adjust L1 (disc primary) 1/2 turn counterclockwise from the bottom of coil. Next, apply a 455-kHz signal to J2 and J4 and adjust L2 (disc secondary) for zero meter reading.
2.	A (DISC)	Pin 10		See Procedure	Alternately apply a 450-kHz and 460-kHz signal and check for readings of at least 0.3 volt, but not more than 0.5 volt on GE Test Set. Both readings must be within .05 volt. Do not attempt to balance disc closer than readings obtained if within .05 volt limit.
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. 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, L6 and L4 (RF SELECTIVITY)	Maximum	Apply an on-frequency signal and tune for maximum meter reading as shown below, keeping signal below saturation. Apply Signal Generator Probe to: — Tune: L6 — L7 L7 — L6 L1 — L4
6.	"	"	C343, C344 and L1 (1st RF Amp)	Maximum	Apply an on-frequency signal to the antenna jack. Tune C343, C344 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, C341 and C342 for maximum meter reading.
8.	"	"	L2 (MULT SELECTIVITY)	Maximum	Apply on-frequency signal as above, keeping below saturation. Tune L2 and L3 (on MULT SELECTIVITY) for maximum meter reading.
			2ND MIXER		
			The 1st and 2nd mixer, and low IF circuits have been aligned at the factory and will normally require no further adjustment. If adjustment is necessary, use the procedure outlined in STEPS 9, 10 and 11. C3 (on 1st mixer) provides impedance matching for the crystal filter input and should only be tuned with observing IF trace on oscilloscope. — NOTE — Refer to DATAFILE BULLETIN 1000-6 IF Alignment of Two-Way Radio RE Receivers for helpful suggestions on how to determine when IF Alignment is required.		
9.	B (2nd IF AMP)	Pin 2	L3, L2, L1, T2 (2nd Mixer)	Maximum	Apply on-frequency, unmodulated signal and tune L3, L2, L1 and T2 for maximum meter reading, keeping signal below saturation.
10.			L3, L2, L1, T2 (2nd Mixer)		Connect scope, signal generator and detector as shown in Figure 4. Set signal generator level for 30-50 µV and modulate with 16-20 kHz at 20 Hz. With detector at the collector of Q3 (2nd mixer board output), tune L2, L2, T1, T2 (2nd Mixer) and C3 (1st Mixer) for double trace as shown on scope pattern.
11.	A (DISC)	Pin 10		See Procedure	Check to see that discriminator idling voltage is within ±.05 volt of zero with no signal applied. Check to see that modulation acceptance bandwidth is greater than 15 kHz.
			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 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.

ALIGNMENT PROCEDURE
66—88 MHz MASTR RECEIVER
MODELS 4ER40D10-15

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.

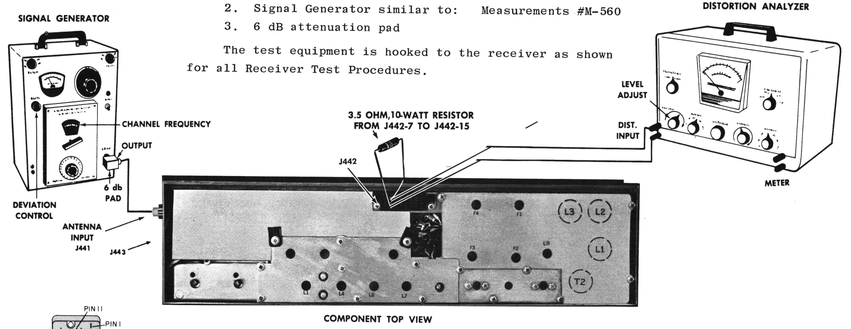
Once the defective stage is pin-pointed, refer to the "Service Check" listed to correct the problem. Additional corrective measures are included in the Troubleshooting Procedure. Before starting with the Receiver Test Procedures, be sure the receiver is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

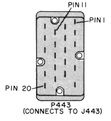
for test hookup shown:

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

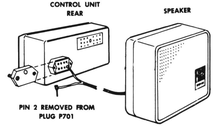
The test equipment is hooked to the receiver as shown for all Receiver Test Procedures.



COMPONENT TOP VIEW



IF-AUDIO & SQUELCH BOARD (COMPONENT VIEW)



STEP 1

AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

A. Connect a 1,000-microvolt test signal modulated by 1,000 hertz ±3.3 kHz deviation to the antenna jack J441.

B. With Five-Watt Speaker:

Disconnect speaker lead pin from J701-2 (on rear of Control Unit).

Connect a 3.5-ohm load resistor from J442-15 to J442-7. Connect the Distortion Analyzer input across the resistor as shown.

OR

With Handset:

Lift the handset off of the hookswitch. Connect the Distortion Analyzer input from J442-15 to J442-7.

VOLTMETER SCALE ON DISTORTION ANALYZER

C. Set the VOLUME control for five-watt output (4.18 VRMS).

D. Make distortion measurements according to manufacturer's instructions. Reading should be less than 5%.

SERVICE CHECK

If the distortion is more than 5%, or maximum audio output is less than five watts, make the following checks:

E. Battery and regulator voltage---low voltage will cause distortion. (Refer to Receiver Schematic Diagram for voltages.)

F. P.A. Bias Adjust (R43)--Turn the SQUELCH control fully counterclockwise. Then connect a milliameter in series with the +12-volt lead at P443-11. With no signal in, adjust R43 for a reading of approximately 20 milliamps. This adjustment should not be necessary unless an output transistor has been replaced.

G. Audio Gain (Refer to Receiver Troubleshooting Procedure).

H. 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:

A. Be sure Test Step 1 checks out properly.

B. Reduce the Signal Generator output from setting in Test Step 1A.

C. Adjust Distortion Analyzer LEVEL control for a +2 dB reading.

D. Set CONTROL from LEVEL to DISTORTION reading. Repeat Steps 2B and 2C until difference in reading is 12 dB (+2 dB to -10 dB).

E. The 12-dB difference (Signal plus Noise and Distortion to noise plus distortion ratio) is "usable" sensitivity level. Reading should be less than 0.4 microvolts with audio output at least 2.5 watts (2.9 volts RMS across the 3.5-ohm receiver load).

SERVICE CHECK

If the sensitivity level is more than 0.4 microvolts, make the following checks:

F. Alignment of RF stages (Refer to RF Alignment in Receiver Alignment on reverse side of page).

G. Gain measurements as shown on the Receiver Troubleshooting Procedure.

STEP 3

MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

TEST PROCEDURE

A. Be sure Test Steps 1 and 2 check out properly.

B. Set Signal Generator output for twice the microvolt reading obtained in Test Step 2D.

C. Increase Signal Generator frequency deviation.

D. Adjust LEVEL Control for +2 dB.

DB SCALE ON DISTORTION ANALYZER

LEVEL DISTORTION ON DISTORTION ANALYZER

E. Set CONTROL from LEVEL to DISTORTION reading. Repeat Steps 3C, 3D and 3E until difference between readings becomes 12 dB (from +2 dB to -10 dB).

F. Deviation control reading for the 12-dB difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±15 kHz (but less than ±19 kHz).

SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, make gain measurements as shown on the Receiver Troubleshooting Procedure.

STEP I - QUICK CHECKS

TEST SET CHECKS

These checks are typical voltage readings measured with GE Test Set Model 4EX3A10 in the Test 1 position, or Model 4EX8K10 or 11 in the 1-volt position.

Metering Position	Reading With No Signal In	Reading with 1 Microvolt Unmodulated
A (Disc Idling)	Less than ±.05 VDC	
B (2nd IF)	.03 VDC	0.2 VDC
C (1st Lim)	0.5 VDC	0.8 VDC
D (Mult-1)	0.6 VDC	
J (Reg. +10 volts)	+10 VDC (15 volts full scale)	

SYMPTOM 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 1ST 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 1st Limiter stages as shown in STEP 2A.
LOW OSCILLATOR READING	Check alignment of Oscillator (Refer to Front End Alignment Procedure). Check voltage readings of 1st Oscillator Multiplier Q1/Q2. Check crystal Y1.
LOW RECEIVER SENSITIVITY	Check Front End Alignment (Refer to Front End Alignment Procedure). Check antenna connections, cable and relay. Check voltage readings of RF Amp and 1st and 2nd Mixers. Make SIMPLIFIED GAIN CHECKS (STEP 2A).
LOW AUDIO	Check Audio PA voltage readings (Q341/Q342). Make simplified gain and waveform checks of Audio and Squelch stages (Steps 2A and 2B). Check unsquelched voltage readings in Audio section (Refer to Schematic Diagram).
IMPROPER SQUELCH OPERATION	Check voltage and resistance readings of Squelch circuit (Refer to Schematic Diagram). Make gain and waveform checks (Steps 2A and 2B).
DISCRIMINATOR IDLING TOO FAR OFF ZERO	See if discriminator zero is on 455 kHz. Check alignment of IF coils (Refer to Alignment Procedure).
HIGH DISTORTION AT LOW AUDIO LEVELS	Check PA Bias Adjust R43 (Refer to STEP 1 of Test Procedure).

STEP 3-VOLTAGE RATIO READINGS

EQUIPMENT REQUIRED:

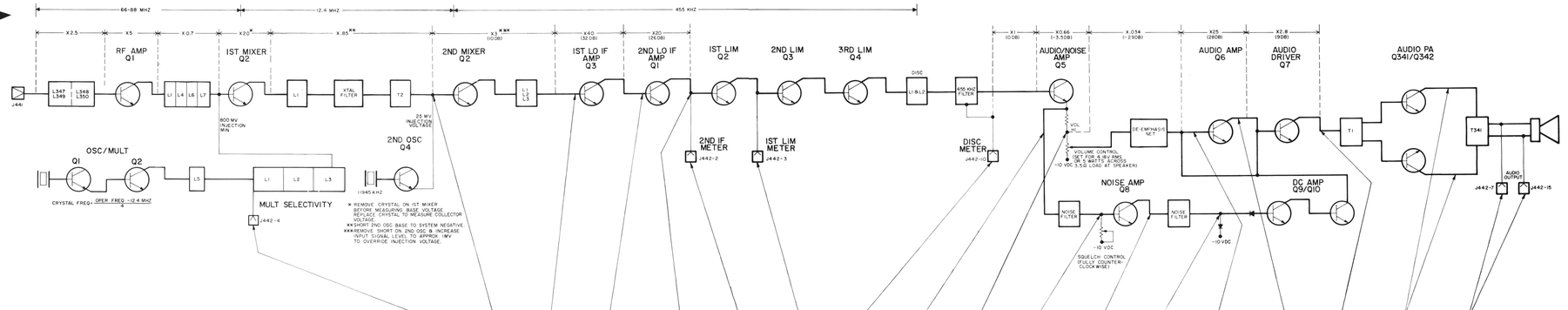
1. RF VOLTMETER (SIMILAR TO BOONTON MODEL 91-CA OR MILLIVAC TYPE MV-18 C.
2. SIGNAL ON RECEIVER FREQUENCY (BELOW SATURATION). CORRECT FREQUENCY CAN BE DETERMINED BY ZEROING THE DISCRIMINATOR. USE 1,000 HERTZ SIGNAL WITH 3.3 KHZ DEVIATION.

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.



STEP 2A-SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

1. VTVM-AC & DC
2. Signal generator (measurements M560 to equivalent).

PRELIMINARY STEPS:

1. Set VOLUME control for 4.18 volts across 3.5-ohm load. If this cannot be obtained, set to approx. 70% of max. rotation.
2. Set SQUELCH control fully counterclockwise.
3. Receiver should be properly aligned.
4. Connect VTVM between system negative and points indicated by arrow.

SIGNAL GENERATOR INPUT AT J441 MAINTAIN SETTING AT DISCRIMINATOR ZERO		UNMODULATED	UNMODULATED	UNMODULATED	UNMODULATED	1 MICROVOLT UNMODULATED	NO SIGNAL INPUT	STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1KHZ WITH 3.3KHZ DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
PROCEDURE		INCREASE GENERATOR OUTPUT UNTIL VTVM READING ON 7.5 V SCALE INCREASES BY 50 MV	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5 %	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5 %	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5 %											CONNECT VTVM OR SCOPE ACROSS 3.5Ω LOAD RESISTOR J442-7 AND J442-15 WITH SPEAKER DISCONNECTED.	
READING	2.4 VDC	GENERATOR OUTPUT SHOULD BE APPROX 20 MILLIVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 600 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 5 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 0.3 MICROVOLTS	-0.6 VDC	-2 VDC	0.8 VAC	0.75 VAC	0.55 VAC	0.15 VAC	2.3 VAC	0.05 VAC		0.5 VAC	1.4 VAC	10 VAC	4.18 VAC

STEP 2B-AUDIO & SQUELCH WAVEFORMS

EQUIPMENT REQUIRED:

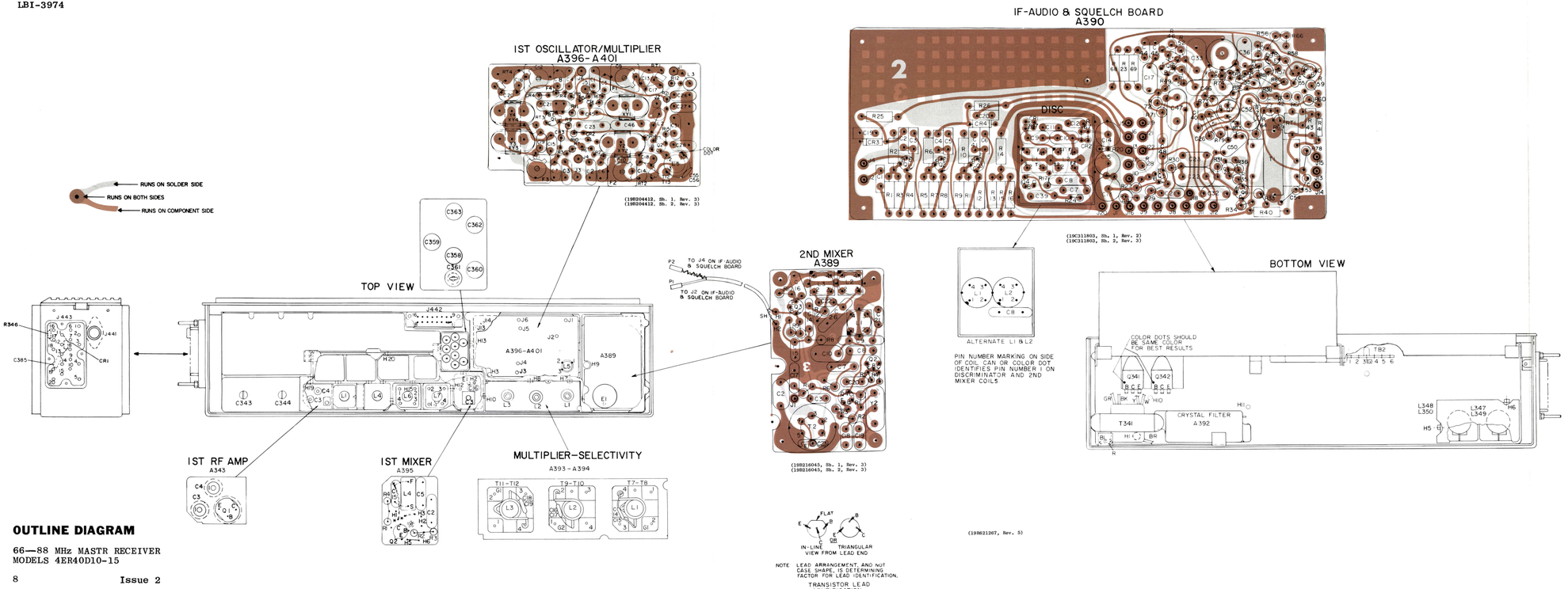
1. Oscilloscope.
2. Signal generator (measurements M560 to equivalent).

PRELIMINARY STEPS:

1. Set VOLUME control for 4.18 volts across 3.5-ohm load. If this cannot be obtained, set to approx. 70% of max. rotation.
2. Set SQUELCH control fully counterclockwise.
3. Receiver should be properly aligned.
4. Connect oscilloscope between system negative and points indicated by arrow.

SCOPE SETTING		0.5 MS/DIV 1 VOLT/DIV 2 V P-P	0.5 MS/DIV 1 VOLT/DIV 1.4 V P-P	0.5 MS/DIV 1 VOLT/DIV 1 V P-P (NOISE)	0.5 MS/DIV 2 VOLTS/DIV 5.7 V P-P (NOISE)	0.5 MS/DIV 0.5 VOLTS/DIV 3 V P-P (NOISE)	0.5 MS/DIV 50 MILLIVOLTS/DIV 0.1 V P-P	0.5 MS/DIV 1 VOLT/DIV 1.9 V P-P	0.5 MS/DIV 2 VOLTS/DIV 4 V P-P	0.5 MS/DIV 10 VOLTS/DIV 30 V P-P	0.5 MS/DIV 5 VOLTS/DIV 12 V P-P
STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1KHZ WITH 3.3 KHZ DEVIATION)											
NOISE WAVE FORM (NO SIGNAL INPUT)											

RC-1767



OUTLINE DIAGRAM

66—88 MHz MASTR RECEIVER
MODELS 4ER40D10-15

PARTS LIST

LBI-3976A

66-88 MHz RECEIVER
MODELS 4ER40D10 - 4ER40D15

SYMBOL	GE PART NO.	DESCRIPTION
A343		RF AMPLIFIER ASSEMBLY 19B204772-G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C3 and C4	5493392-P7	Ceramic, feed-thru: .001 µf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C5	5494481-P12	Ceramic disc: .001 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	7484398-P4	Silver mica: 500 pf ±10%, 500 VDCW; sim to Underwood Type J-1-HF.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - -
CR1	4038642-P1	Germanium.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115342-P1	Silicon, NPN; sim to Type 2N918.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R5	3R152-P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R6	3R152-P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3R152-P102K	Composition: 1000 ohms ±10%, 1/4 w.
		- - - - - - - - - - - SOCKETS - - - - - - - - - -
XQ1	5490277-P1	Transistor: 4 contacts rated at 1 amp at 400 VRMS; sim to Elco 3303.
A389		SECOND MIXER 19B216119-G2 REV A
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C2	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C3	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C7 and C8	19B209243-P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C9	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C10	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C12*	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM. Deleted by REV A.
C14	5496219-P471	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -220 PPM.
C15	7491395-P109	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JL.
C16	19B209243-P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C17	19B209243-P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C18	5490008-P25	Silver mica: 82 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C19	5490008-P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5490008-P1	Silver mica: 5 pf ±5%, 500 VDCW; sim to Electro Motive Type DM15.
C21 and C22	5496219-P49	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef 0 PPM.
C26*	5496219-P368	Ceramic disc: 160 pf ±5%, 500 VDCW, temp coef -150 PPM. Added by REV A.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1	4033513-P4	Contact, electrical; sim to Bead Chain L93-3.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 thru L3	19C311181-G3	Coil. Includes tuning slug 4038368-P1.
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P1	4029840-P2	Contact, electrical: sim to Amp 42827-2.
P2	4029840-P1	Contact, electrical: sim to AMP 41854.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2	19A115245-P1	Silicon, NPN.
Q3	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q4	19A115245-P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R3	3R77-P512J	Composition: 5100 ohms ±5%, 1/2 w.
R4	3R152-P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R5	3R152-P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R6	3R77-P332K	Composition: 3300 ohms ±10%, 1/2 w.
R7	3R77-P123K	Composition: 12,000 ohms ±10%, 1/2 w.
R8	3R77-P622J	Composition: 6200 ohms ±5%, 1/2 w.
R9	3R77-P302J	Composition: 3000 ohms ±5%, 1/2 w.
R10	3R77-P202J	Composition: 2000 ohms ±5%, 1/2 w.
R11	3R77-P201J	Composition: 200 ohms ±5%, 1/2 w.
R12*	3R77-P513J	Composition: 51,000 ohms ±5%, 1/2 w. Earlier than REV A.
	3R77-P822J	Composition: 8200 ohms ±5%, 1/2 w.
		- - - - - - - - - - - TRANSFORMERS - - - - - - - -
T2		COIL ASSEMBLY 19B216120-G2
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C23	5496218-P258	Ceramic disc: 62 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491798-P3	Tuning slug.
		- - - - - - - - - - - CRYSTALS - - - - - - - - -
Y2	19A110398-P1	Quartz: freq 11945.00 KHz, temp range -30°C to +75°C.
A390		IF AUDIO AND SQUELCH 19D413129-G2 REV B
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C1	5494481-P111	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	5496219-P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C3	5494481-P111	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4	5496219-P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C5 and C6	5494481-P111	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19B209243-P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C8	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150.
C9 and C10	5490008-P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C11	5496219-P656	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -470 PPM.
C12	5494481-P108	Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C13	19A115680-P107	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TT.
C14 and C15	19A115680-P104	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C17	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C18	5494481-P108	Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C21*	19B209243-P3	Polyester: 0.022 µf ±20%, 50 VDCW. Earlier than REV B.
	19B209243-P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C22	19B209243-P116	Polyester: 0.15 µf ±10%, 50 VDCW.
C23	19B209243-P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C24*	19B209243-P106	Polyester: .068 µf ±10%, 50 VDCW. Deleted by REV B.
C25	5496267-P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C26*	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Earlier than REV B.
	19B209243-P14	Polyester: 0.33 µf ±20%, 50 VDCW.
C27	5496267-P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C28*	5496267-P229	Tantalum: 0.68 µf ±10%, 35 VDCW; sim to Sprague Type 150D. Deleted by REV B.
C29*	5496267-P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Deleted by REV B.
C30*	19B209243-P16	Polyester: 0.15 µf ±20%, 50 VDCW. Deleted by REV A.
C31*	19B209243-P102	Polyester: 0.015 µf ±20%, 50 VDCW. Deleted by REV A.
C32	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C33	19B209243-P17	Polyester: 0.22 µf ±20%, 50 VDCW.
C35	19B209243-P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C36	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C37*	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Earlier than REV B.
	5496267-P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C38*	5496267-P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Earlier than REV B.
	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C39	19B209243-P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C40*	5496267-P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Earlier than REV B.
	19B209243-P117	Polyester: 0.22 µf ±10%, 50 VDCW.
C41	5490008-P129	Silver mica: 120 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C42*	19B209243-P4	Polyester: 0.033 µf ±20%, 50 VDCW. Deleted by REV B.
C43*	5496267-P213	Tantalum: 2.2 µf ±10%, 20 VDCW; sim to Sprague Type 150D. Deleted by REV B.
C44*	5494481-P124	Ceramic disc: 1500 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A.
	4029003-P104	Silver mica: 680 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-20.
C45*	5490008-P27	Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. Earlier than REV A.
	5494481-P104	Ceramic disc: 220 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C46	4029003-P108	Silver mica: 1000 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-20.
C47*	19B209243-P17	Polyester: 0.22 µf ±20%, 50 VDCW. Added by REV A.
C48*	19B209243-P1	Polyester: 0.01 µf ±20%, 50 VDCW. Added by REV A.
C49*	5496267-P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Added by REV B.
C50*	19B209243-P7	Polyester: 0.1 µf ±20%, 50 VDCW. Added by REV B.
C51*	5494481-P127	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV B.
C52*	19B209243-P117	Polyester: 0.22 µf ±20%, 50 VDCW. Added by REV B.
C53* and C54*	5496267-P213	Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D. Added by REV B.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A115250-P1	Silicon.
CR3 and CR4	4038056-P1	Germanium.
CR5 thru CR7	19A115250-P1	Silicon.
CR8*	19A155250-P1	Silicon. Added by REV B.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J22	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19C311181-G1	Coil. Includes tuning slug 4038368-P1.
L2	19C311181-G2	Coil. Includes tuning slug 4038368-P1.
L3	19A127134-G1	Choke. Includes tuning slug 7486872-P7.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q6	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q7	19A115300-P4	Silicon, NPN; sim to Type 2N3053.
Q8	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q9	19A115362-P1	Silicon, NPN; sim to Type 2N2925.
Q10	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R2	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R3	3R77-P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R4	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R5	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R6	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R7	3R77-P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R8	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R9	3R77-P102K	Composition: 1000 ohms ±10%, 1/2 w.
R10	3R77-P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R11	3R77-P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R12	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R13	3R77-P272K	Composition: 2700 ohms ±10%, 1/2 w.
R14	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R15	3R77-P333J	Composition: 33,000 ohms ±5%, 1/2 w.
R16	3R77-P181K	Composition: 180 ohms ±10%, 1/2 w.
R17	3R152-P471J	Composition: 470 ohms ±5%, 1/4 w.
R20	3R152-P472K	Composition: 4700 ohms ±10%, 1/4 w.
R23	3R77-P104K	Composition: 0.1 megohms ±10%, 1/2 w.
R24	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R25 and R26	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R27 and R28	3R77-P753J	Composition: 75,000 ohms ±5%, 1/2 w.
R29	3R77-P182J	Composition: 1800 ohms ±5%, 1/2 w.
R30	3R77-P102J	Composition: 1000 ohms ±5%, 1/2 w.
R31	3R77-P821J	Composition: 820 ohms ±5%, 1/2 w.
R32*	3R77-P752J	Composition: 7500 ohms ±5%, 1/2 w. Deleted by REV B.
R33*	3R77-P912J	Composition: 9100 ohms ±5%, 1/2 w. Earlier than REV B.
	3R77-P203J	Composition: 20,000 ohms ±5%, 1/2 w.
R34	3R77-P332K	Composition: 3300 ohms ±10%, 1/2 w.
R35	3R77-P330K	Composition: 33 ohms ±10%, 1/2 w.
R36	3R77-P681J	Composition: 680 ohms ±5%, 1/2 w.
R37*	3R77-P822J	Composition: 8200 ohms ±5%, 1/2 w. Deleted by REV B.
R38*	3R77-P752J	Composition: 7500 ohms ±5%, 1/2 w. Earlier than REV B.
	3R77-P622J	Composition: 6200 ohms ±5%, 1/2 w.
R39*	3R77-P820J	Composition: 82 ohms ±5%, 1/2 w. Earlier than REV B.
	3R77-P131J	Composition: 130 ohms ±5%, 1/2 w.
R40	3R77-P241J	Composition: 240 ohms ±5%, 1/2 w.
R41*	3R152-P240J	Composition: 24 ohms ±5%, 1/4 w. Earlier than REV B.
	3R77-P300J	Composition: 30 ohms ±5%, 1/2 w.
R42*	3R77-P200J	Composition: 20 ohms ±5%, 1/2 w. Earlier than REV B.
	3R77-P160J	Composition: 16 ohms ±5%, 1/2 w.
R43	19B209358-P101	Variable, carbon film: approx 25 to 250 ohms ±20%, 0.2 w; sim to CTS Type X-201.
R44	19B209022-P101	Wirewound: .27 ohms ±10%, 2 w; sim to IRC Type BWH.
R45*	3R77-P123J	Composition: 12,000 ohms ±5%, 1/2 w. Deleted by REV A.
R46	3R77-P913J	Composition: 91,000 ohms ±5%, 1/2 w.
R47	3R152-P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R48*	3R77-P332J	Composition: 3300 ohms ±5%, 1/2 w. Deleted by REV A.
R49	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R50	3R77-P222J	Composition: 2200 ohms ±5%, 1/2 w.
R51	3R77-P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R52	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w.
R53*	3R77-P303J	Composition: 30,000 ohms ±5%, 1/2 w. Deleted by REV A.
R54*	3R77-P822J	Composition: 8200 ohms ±5%, 1/2 w. Deleted by REV A.
R55	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R56	3R77-P224J	Composition: 0.22 megohms ±5%, 1/2 w.
R57	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R58	3R77-P181K	Composition: 180 ohms ±10%, 1/2 w.
R59	3R77-P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R60 and R61	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R62*	3R77-P103K	Composition: 10,000 ohms ±10%, 1/2 w. Earlier than REV B.
	3R77-P223K	Composition: 22,000 ohms ±10%, 1/2 w.
R63*	3R77-P432J	Composition: 4300 ohms ±5%, 1/2 w. Deleted by REV B.
R64	3R77-P180J	Composition: 18 ohms ±5%, 1/2 w.
R65*	3R77-P154K	Composition: 0.15 megohms ±10%, 1/2 w. Deleted REV B.
R66	3R77-P472K	Composition: 4700 ohms ±10%, 1/2 w.
R67	3R152-P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R68*	3R77-P682J	Composition: 6800 ohms ±5%, 1/2 w. Earlier than REV A.
	3R77-P752J	Composition: 7500 ohms ±5%, 1/2 w.
R69	3R77-P752J	Composition: 7500 ohms ±5%, 1/2 w.
R71*	3R77-P133J	Composition: 13,000 ohms ±5%, 1/2 w. Added REV B.
R72*	3R77-P362J	Composition: 3600 ohms ±5%, 1/2 w. Added by REV B.
R73*	3R77-P473J	Composition: 47,000 ohms ±5%, 1/2 w. Added by REV B.
R74*	3R77-P362J	Composition: 3600 ohms ±5%, 1/2 w. Added by REV B.
R75*	3R77-P473J	Composition: 47,000 ohms ±5%, 1/2 w. Added by REV B.
R76*	3R77-P912J	Composition: 9100 ohms ±5%, 1/2 w. Added by REV B.
R77*	3R152-P562J	Composition: 5600 ohms ±5%, 1/4 w. Added by REV B.
R78*	3R77-P100J	Composition: 10 ohms ±5%, 1/2 w. Added by REV B.
R79*	3R152-P393J	Composition: 39,000 ohms ±5%, 1/4 w. Added by REV B.
		- - - - - - - - - - THERMISTORS - - - - - - - - -
RT1	5490828-P41	Thermistor: 30 ohms ±10%, color code black, white, sim to Globar Type B1211H-4.
RT2	5490828-P9	Thermistor: 10,000 ohms ±10%, color code yellow; sim to Globar Type 551H8.
RT3*	5490828-P9	Thermistor: 10,000 ohms ±10%, color code yellow; sim to Globar Type 551H8. Added by REV B.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19A116040-P1	Audio: Pri: 19.3 ohms ±10% DC res, Sec: 23.5 ohms ±10% DC res.
A392		CRYSTAL FILTER ASSEMBLY 19B205682-G2
		- - - - - - - - - - FILTERS - - - - - - - - - - -
FL1	19C304290-G1	Bandpass, 12.4 MHz.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P392K	Composition: 3900 ohms ±10%, 1/4 w.
R3	3R152-P362J	Composition: 3600 ohms ±5%, 1/4 w.
A393 and A394		MULTIPLIER SELECTIVITY ASSEMBLY A393 19B204827-G3 (4ER40D10, 12, 14) A394 19B204827-G4 (4ER40D11, 13, 15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C8 and C9	5491601-P13	Tubular: 0.47 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P473K	Composition: 47,000 ohms ±10%, 1/4 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - -
T7 and T8		COIL ASSEMBLY T7 19B204822-G3 T8 19B204822-G4
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C7	5491601-P15	Tubular: .56 pf ±10%, 500 VDCW.
C12	5494481-P11	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C14	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C15	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	7777146-P3	Germanium; sim to Type 1N90.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B204822-P7	Coil.
	5491798-P5	Tuning slug.
T9 and T10		COIL ASSEMBLY T9 19B204981-G3 T10 19B204981-G4
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C13	5494481-P11	Ceramic disc: .001 µf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C16	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C17	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B204981-P6	Coil.
	5491798-P5	Tuning slug.
T11 and T12		COIL ASSEMBLY T11 19B204548-G3 T12 19B204548-G4
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C18	5496218-P254	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM.
C19	5496218-P250	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM.
C20	5491601-P129	Tubular: 3.0 pf ±10%, 500 VDCW.
C21	5491601-P127	Tubular: 2.4 pf ±5%, 500 VDCW.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L3	19B204548-P6	Coil.
	5491798-P5	Tuning slug.
A395		FIRST MIXER ASSEMBLY 19B204430-G9
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C2	5494481-P114	Ceramic disc: .002 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C3	5491271-P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-5.
C5	5494481-P114	Ceramic disc: .002 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C6	5494481-P12	Ceramic disc: .001 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C15 and C16	5496218-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - - TERMINALS - - - - - - - - - -
E1	4038104-P1	Lug: solder dipped brass.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L4	19A121082-G4	Toroidal coil.
		- - - - - - - - - - - TRANSISTORS - - - - - - - - -
Q2	19A115245-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152-P563J	Composition: 56,000 ohms ±5%, 1/4 w.
R2	3R152-P822J	Composition: 8200 ohms ±5%, 1/4 w.
R3	3R152-P202J	Composition: 2000 ohms ±5%, 1/4 w.
R4	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
A396 thru A401		FIRST OSCILLATOR ASSEMBLY A396 19B204419-G34 (4ER40D10) A397 19B204419-G37 (4ER40D11) A398 19B204419-G35 (4ER40D12) A399 19B204419-G38 (4ER40D13) A400 19B204419-G36 (4ER40D14) A401 19B204419-G39 (4ER40D15)
		- - - - - - - - - - - CAPACITORS - - - - - - - - -
C1 thru C4	5494481-P112	Ceramic disc: .001 µf ±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, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189-6-5.
C13 thru C16	5496219-P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C17 thru C20	19C300685-P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C21	5496219-P771	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -750 PPM.
C23	5494481-P114	Ceramic disc: .002 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C24	5490008-P31	Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C25	5496219-P467	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM.
C26 thru C28	5494481-P112	Ceramic disc: .001 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C31	5494481-P112	Ceramic disc: .001 µf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR4	19A115348-P1	Silicon.
		- - - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J6	4033513-P4	Contact, electrical; sim to Bead Chain L93-3.
		- - - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	7488079-P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res; sim to Jeffers 4421-7K.
		- - - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	19A115330-P1	Silicon, NPN.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1 thru R4	3R152-P562J	Composition: 5600 ohms ±5%, 1/4 w.
R5 thru R8	3R152-P104K	Composition: 0.10 megohm ±10%, 1/4 w.
R9	3R152-P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152-P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3R152-P151J	Composition: 150 ohms ±5%, 1/4 w.
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.
		- - - - - - - - - - - THERMISTORS - - - - - - - - -
RT5 thru RT8	19B209284-P7	Disc: 62 ohms res nominal at 25°C, color code violet.

(Con'd on Pg. 12)

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

MODEL NO.	FREQ. RANGE	NO. FREQ.
4ER40D10	66-77 MHZ	1
4ER40D11	77-82 MHZ	1
4ER40D12	66-77 MHZ	2
4ER40D13	77-82 MHZ	2
4ER40D14	66-77 MHZ	4
4ER40D15	77-82 MHZ	4

REV. LTR. BLOCK	REV.
PL19E500873G2	C
PL19E500873G3	C
A389 PL19D615902	A
A390 PL19D615202	C

IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=KILOHMS, M=MEGOHMS. CAPACITOR VALUES IN MICROFARADS (DUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

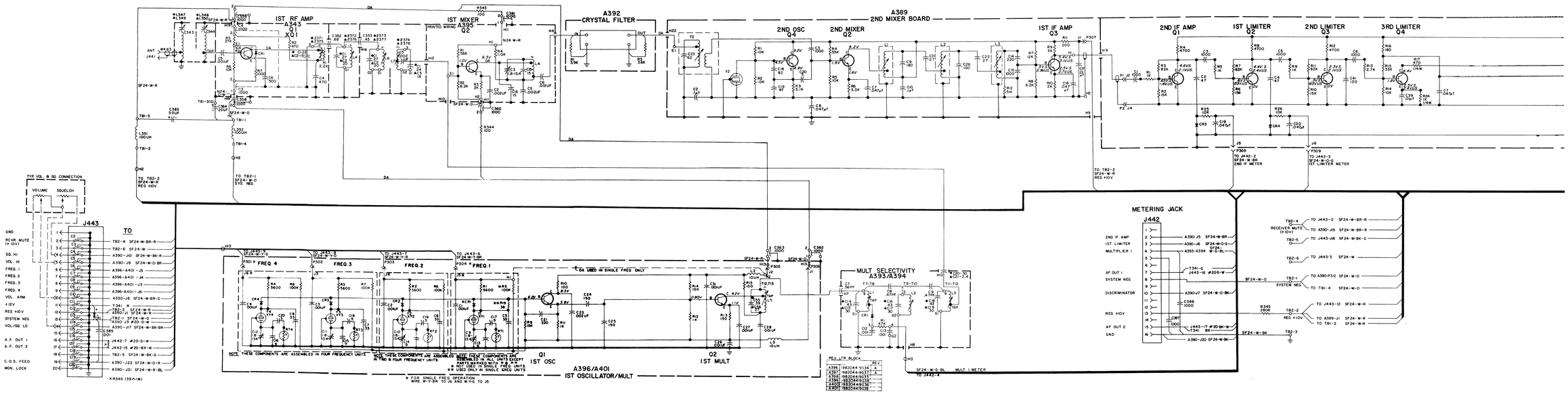
VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE (J443-8) WITH TEST SET MODEL 4EX340 OR A 20,000 OHM-PER-VOLT METER.

S= NO SIGNAL IN WITH SQUELCH CONTROL FULLY COUNTERCLOCKWISE (MAXIMUM SQUELCH)

US= SQUELCH CONTROL FULLY CLOCKWISE WITH A ONE MILLIVOLT MODULATED SIGNAL (UNSQUELCHED) AND 5 WATT AUDIO OUTPUT.

● LOW SPLIT 66-77MHZ
▲ HIGH SPLIT 77-88MHZ

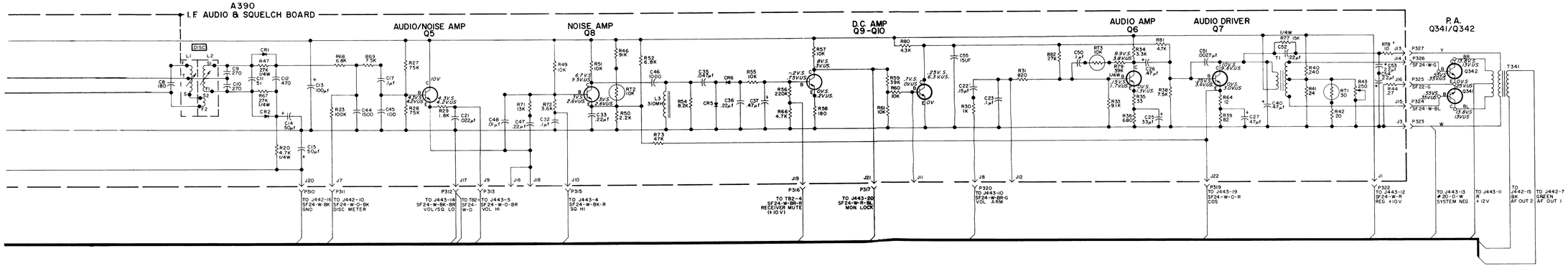


(190413167, Rev. 2)

(198621243, Rev. 10)

SCHEMATIC DIAGRAM

66—88 MHz MASTR RECEIVER
MODELS 4ER40D10-15



(19R621243, Rev. 10)

SCHEMATIC DIAGRAM

66—88 MHz MASTR RECEIVER
MODELS 4ER40D10-15

Issue 2

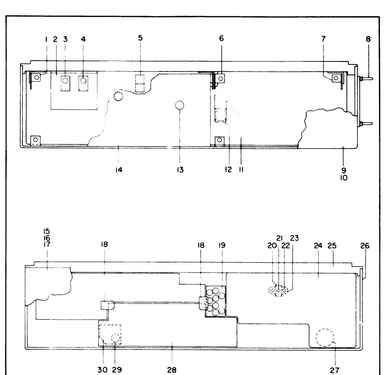
(Cont'd from Pg. 9)

SYMBOL	GE PART NO.	DESCRIPTION
		---------- TRANSFORMERS ----------
T12 and T13		COIL ASSEMBLY T12 19B204766-G3 T13 19B204766-G4
		---------- CAPACITORS ----------
C55	5496218-P253	Ceramic disc: 39 pf ±5%, 500 VLW, temp coef -80 PPM.
C56	5496218-P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
		---------- INDUCTORS ----------
L5	19A121481-P1	Coil.
	5491798-P5	Tuning slug.
		---------- SOCKETS ----------
XY1 thru XY4		Refer to Mechanical Parts (RC-1692).
		---------- CRYSTALS ----------
		When reordering, give GE Part number and specify exact frequency needed.
		66-88 MHz crystal freq = (OF - 5.30 MHz) ÷ 4.
Y1 thru Y4	19B206576-P13	Quartz: freq range 13400.00 to 16150.00 KHz, temp range -30°C to +85°C. (66-77 MHz)
		CHASSIS 19E500872-G12 4EK40D10, 12, 14 19E500873-G13 4EK40D11, 13, 15 REV B
		---------- CAPACITORS ----------
C352	5491601-P117	Tubular: 0.68 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C353	5491601-P112	Tubular: 0.43 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.
C383	19A115680-P4	Electrolytic: 50 pf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C384	19A115680-P3	Electrolytic: 20 pf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C385	7774750-P4	Ceramic disc: .001 pf +100% -0%, 500 VDCW.
C387 and C388	5494481-P12	Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- DIODES AND RECTIFIERS ----------
CR1*	19A116062-P2	Selenium: sim to 6RS20W1BAA. Added by REV A.
		---------- JACKS AND RECEPTACLES ----------
J441	19B209122-P1	Connector, coaxial: includes cable (W441), approx 5 inches long.
J442	19B205689-G2	Connector: 18 contacts.
J443	19C303426-G1	Connector: 20 pin contacts.
		---------- INDUCTORS ----------
L347 thru L350		COIL ASSEMBLY L347 and L348 19B204821-G1 L349 and L350 19B204821-G2
		---------- CAPACITORS ----------
C343 and C344	19B209150-P1	Variable, subminiature: approx 1.40-3.25 pf, 750 v peak; sim to EF Johnson 189.
L351 and L352	7488079-P72	Choke, RF: 100 µh ±10%, 2.6 ohms DC res; sim to Jeffers 4434-9K.

SYMBOL	GE PART NO.	DESCRIPTION
		---------- PLUGS ----------
P301 thru P313	4039840-P2	Contact, electrical; sim to Amp 42827-2.
P315 thru P317	4039840-P2	Contact, electrical; sim to Amp 42827-2.
P319 and P320	4039840-P2	Contact, electrical; sim to Amp 42827-2.
P322	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P323	4029840-P1	Contact, electrical; sim to Amp 41854.
P324	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P325	4029840-P1	Contact, electrical; sim to Amp 41854.
P326	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P327	4029840-P1	Contact, electrical; sim to Amp 41854.
		---------- TRANSISTORS ----------
Q341* and Q342*	19A116203-P2 19A115948-P1	Silicon, NPN. Earlier than REV B. Silicon, NPN.
		---------- RESISTORS ----------
R343 and R344	3R152-P101K	Composition: 100 ohms ±10%, 1/4 w.
R345	5495948-P444	Deposited carbon: 0.28 megohms ±1%, 1/2 w; sim to Texas Instrument CD1/2M8.
R346*	3R78-P390X	Composition: 39 ohms ±10%, 1 w. Added by REV B.
		---------- TRANSFORMERS ----------
T341	19A116041-P1	Audio freq: freq range 300 to 4000 Hz, Pri: 1.00 ohm ±15% DC res, Sec 1: .23 ohm ±10% DC res, Sec 2: 10.5 ohms ±15% DC res.
		---------- TERMINAL BOARDS ----------
TB1	7487424-P7	Miniature, phen: 4 terminals.
TB2	7487424-P26	Miniature, phen: 6 terminals.
		---------- CABLES ----------
W443	19B205634-G3	(Part of J441).
		---------- TUNED CIRCUITS ----------
Z371		COIL ASSEMBLY 19B204842-G1
		---------- CAPACITORS ----------
C1	5496218-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601-P17	Tubular: 0.68 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C4	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- INDUCTORS ----------
L1	19B204842-P8	Coil.
	5491798-P5	Tuning slug.
		---------- RESISTORS ----------
R1	3R152-P222K	Composition: 2200 ohms ±10%, 1/4 w.
R2	3R152-P471K	Composition: 470 ohms ±10%, 1/4 w.
Z372 and Z373		COIL ASSEMBLY 19B204832-G1
		---------- CAPACITORS ----------
C1	5496218-P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.

SYMBOL	GE PART NO.	DESCRIPTION
		---------- INDUCTORS ----------
L1	19B204832-P6	Coil.
	5491798-P5	Tuning slug.
Z374		COIL ASSEMBLY 19B204831-G1
		---------- CAPACITORS ----------
C1	5496218-P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P13	Ceramic disc: .002 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- INDUCTORS ----------
L1	19B204831-P6	Coil.
	5491798-P5	Tuning slug.
Z375		COIL ASSEMBLY 19B204842-G2
		---------- CAPACITORS ----------
C2	5496218-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5491601-P17	Tubular: 0.68 pf ±10%, 500 VDCW; sim to Quality Components Type MC.
C4	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- INDUCTORS ----------
L1	19B204842-P8	Coil.
		---------- RESISTORS ----------
R1	3R152-P222K	Composition: 2200 ohms ±10%, 1/4 w.
R2	3R152-P471K	Composition: 470 ohms ±10%, 1/4 w.
		---------- MISCELLANEOUS ----------
	5491798-P5	Tuning slug.
Z376 and Z377		COIL ASSEMBLY 19B204832-G2
		---------- CAPACITORS ----------
C2	5496218-P246	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -80 PPM.
		---------- INDUCTORS ----------
L1	19B204832-P6	Coil.
	5491798-P5	Tuning slug.
Z378		COIL ASSEMBLY 19B204831-G2
		---------- CAPACITORS ----------
C3	5496218-P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C5	5494481-P13	Ceramic disc: .002 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		---------- INDUCTORS ----------
L7	19B204831-P6	Coil.
	5491798-P5	Tuning slug.
		MECHANICAL PARTS (SEE RC-1692)
1	19B204583-G3	Hinge.
2	19B216727-P1	Support. (Used with Q301 and Q302).
3	19A116023-P2	Plate, insulated. (Used with Q301 and Q302).

SYMBOL	GE PART NO.	DESCRIPTION
4	19A116022-P1	Insulator. (Used with Q301 and Q302).
5	4029851-P6	Clip, loop.
6	19B204583-G1	Hinge.
7	19B204583-G2	(Not Used).
8	19A121676-P1	Guide pin.
9	19C303495-G4	Bottom cover. (Station)
10	19C303385-G1	Bottom cover. (Mobile)
11	19A121297-P1	Angle.
12	7160861-P4	Nut. (Used to secure cover).
13	4036555-P1	Insulator disc. (Used with Q7 on A390).
14	4035267-P2	Button, plug. (Used with A390).
15	19C303495-G3	Top cover. (Station, except Repeaters and VM).
16	19C303676-G2	Top cover. (Station, Repeaters and VM only).
17	19C303385-P2	Top cover. (Mobile)
18	4029851-P3	Clip, loop.
19	19A121383-P1	Support.
20	4033089-P1	Clip. (Part of XY1-XY4).
21	19B200525-P9	Rivet. (Part of XY1-XY4).
22	19A115793-P1	Contact. (Part of XY1-XY4).
23	19C311172-P1	Crystal socket. (Part of XY1-XY4).
24	19C303547-P1	Cover.
25	19C317344-P3	Heat sink.
26	19C303389-G1	Chassis.
27	4034252-P5	Can. (Used with T1 on A389).
28	19B204672-P1	Cover.
29	7162414-P1	Retainer, transistor. (Used with Q1 on A343).
30	19B204732-P1	Support.



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.

CHASSIS AND RF ASSEMBLY 19E500873-G12 & 13

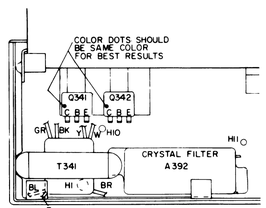
REV. A - To protect the receiver against positive voltage transients. Added thyrector CR1 (19A116062-P2) between J443-11 and J443-13.

REV. B - To incorporate new PA transistors.

Changed	From	To
Q341/Q342	19A115948-P1	19A116203-P2
Insulator for:		
Q341/Q342	19A116023-P1	19A116023-P2

Added: R346 (3R78-P390K, 39 ohm ±10% 1 watt) between J443-16 and J443-17.

Outline Diagram Was:



REV. C - To eliminate squelch opening thump in receivers with Channel Guard. Removed white-orange wire between J443-13 and TB2-1. Added a white-orange wire between P312 (or J17 on IF-Audio and squelch board) and TB2-1.

SECOND MIXER 19B216119-G2

REV. A - To facilitate tuning of low IF.

Changed	From	To
C12	5496219-P369, 180 pF	5496219-P368, 160 pF

Added: R12 (3R77-P513J, 51,000 ohms ±5%) across L3.

IF AUDIO & SQUELCH BOARD A390 (19D413129-G2)

REV. A - To improve critical squelch.

Changed the following components:

From	To
C30 (19B209243-P16, 0.15 µF)	C47 (19B209243-P17, 0.22 µF)
C31 (19B209243-P102, .015 µF)	C48 (19B209243-P1, .01 µF)
C44 (5494481-P110, 680 pF)	C44 (5494481-P124, 1500 pF)
C45 (5494481-P104, 220 pF)	C45 (5490008-P27, 100 pF)
R45 (3R77-P123J, 12K)	R71 (3R77-P133J, 13K)
R48 (3R77-P533J, 3.3K)	R72 (3R77-P562J, 3.6K)
R53 (3R77-P303J, 30K)	R73 (3R77-P473J, 47K)
R54 (3R77-P822J, 8.2K)	R74 (3R77-P362J, 3.6K)
R68 (3R77-P752J, 7.5K)	R68 (3R77-P682J, 6.8K)

REV. B - To make IF Audio & Squelch Board compatible with new PA transistors and to improve squelch operation.

Deleted: C24, C28, C29, C42, C43, R32, R37, R63 and R65.

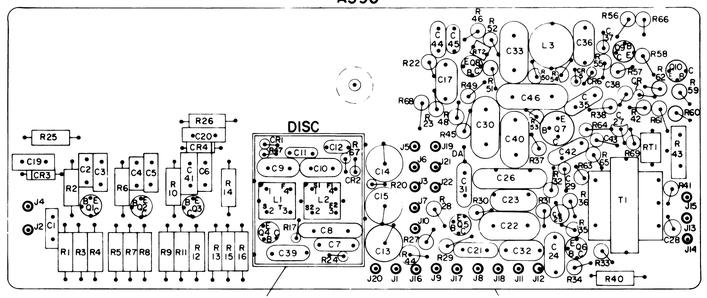
Added:

C49	(5496267-P9, 3.3 µF)
C50	(19B209243-P7, 0.1 µF)
C51	(5494481-P127 0.0027 µF)
C52	(19B209243-P117, 0.22 µF)
C53	(5496267-P213, 2.2 µF)
C54	(5496267-P213, 2.2 µF)
C88	(19A115250-P1)
R75	(3R77-P473J, 47,000 ohms ±5%)
R76	(3R152-P912J, 9,100 ohms ±5%)
R77	(3R152-P562J, 5,600 ohms ±5%)
R78	(3R77-P100J, 10 ohms ±5%)
R79	(3R152-P393J, 39,000 ohms ±5%)
R73	(5490828-P9, 10,000 ohms)

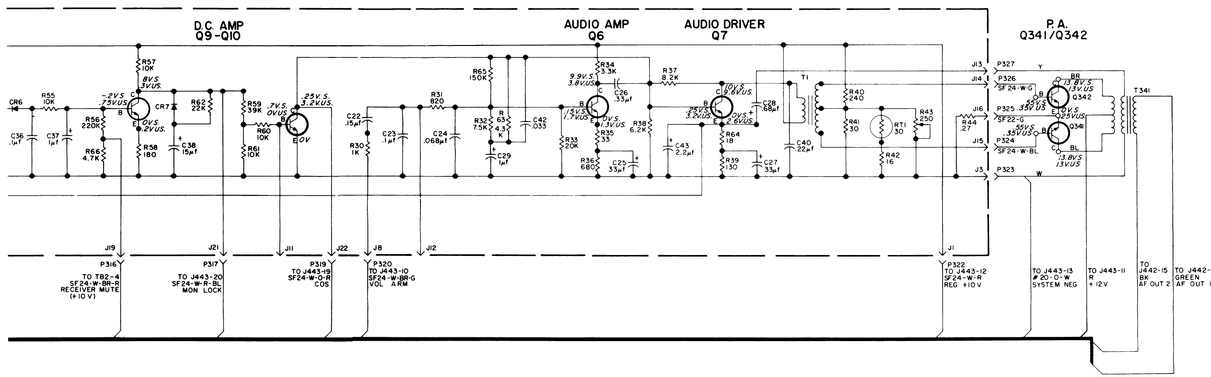
Changed	From	To
C21	19B209243-P1, (01 µF)	19B209243-P3 (.022 µF)
C26	19B209243-P14 (.33 µF)	5496267-P25 (.47 µF)
C27	5496267-P17 (1 µF)	5496267-P28 (.47 µF)
C38	5496267-P14 (15 µF)	5496267-P10 (22 µF)
C40	19B209243-P117 (.22 µF)	5496267-P28 (.47 µF)
R33	C3R77P203J (20K)	C3R77P912J (9.1K)
R38	C3R77P622J (6.2K)	C3R77P752J (7.5K)
R39	C3R77P131J (130)	C3R77P820J (82)
R41	C3R77P300J (30)	C3R77P240J 24)
R42	C3R77P160J (16)	C3R77P200J (20)
R48	C3R77P533J (3.3K)	C3R77P302J (3K)
R53	C3R77P303J (30K)	C3R77P473J (47K)
R62	C3R77P223J (22K)	C3R77P103J (10K)

Outline Diagram Was:

IF-AUDIO & SQUELCH BOARD
A390



Schematic Diagram Was:



PRODUCTION CHANGES

66—88 MHz MASTR RECEIVER
MODELS 4ER40D10-15

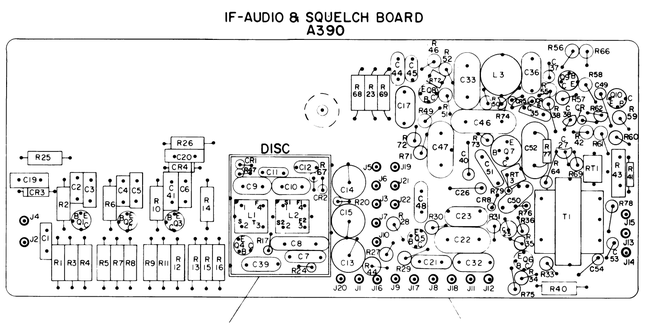
REV. C - To eliminate audible squelch switching transients and to reduce receiver squelch tail.

Deleted: C38, C49, C87, C88, R62, R75 and R76

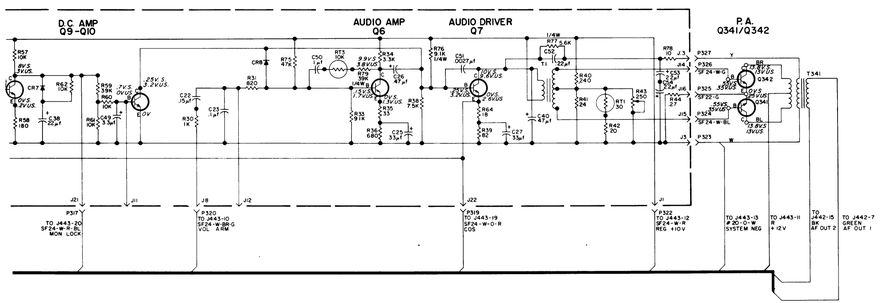
Added: C55 (5496267P14, 15 µF)
R80 (3R152P432J, 4.3K ohms ±5%)
R81 (3R152P472J, 4.7K ohms ±5%)
R82 (3R77P273J, 27K ohms ±5%)

Changed	From	To
C27	5496267-P6 (33 µF)	5496267-P2 (47 µF)
C36	19B209243-P7 (0.1 µF)	19B209243-P17 (0.22 µF)
R53	3R77-P473 (47K ohms)	3R77-P303J (30K ohms)
R64	3R77-P180J (19 ohms)	3R77-P120J (12 ohms)
R77	3R152-P562J (5.6 ohms)	3R152-P153J (15K ohms)

Outline Diagram Was:



Schematic Diagram Was:



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 GE Part Number.

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

1. GE 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-3974

DF-1097

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