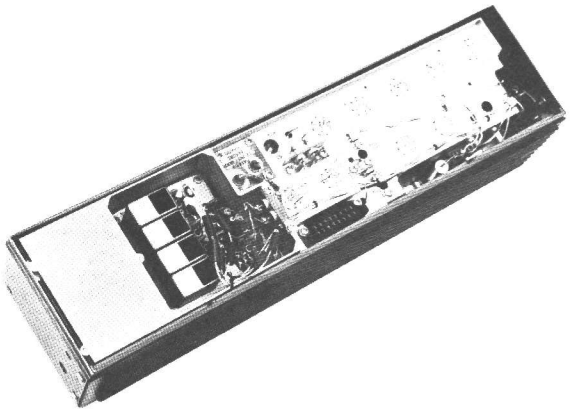
MOBILE RADIO

MASTR Progress Line

406—470 MHz, RECEIVER MODELS 4ER42F10—27 & 4ER42H10—27



SPECIFICATIONS *

ER-42-F & H

FCC Filing Designation		
Frequency Range	406—420 & 450—470 MHz	
Audio Output	5 watts at less than 5% distortion	
Sensitivity	Standard Receiver	Ultra-High Sensitivity Receiver
12-dB SINAD (EIA Method)	0.35 μV	0.20 μV
20-dB Quieting Method	0.50 μV	0.25 μV
Intermodulation (EIA)	-75 dB	-70 dB
Selectivity		
EIA Two-Signal Method	-85 dB (adjacent channel, 50 kHz channels)	
20-dB Quieting Method	-100 dB at ±35 kHz	
Spurious Response	-100 dB	
First Oscillator Stability		
Type ER-42-F Receivers	±.0005% (-30°C to +60°C)	
Type ER-42-H Receivers	±.0002% (-30°C to +60°C)	
Modulation Acceptance	±19 kHz	
Squelch Sensitivity		
Critical Squelch		
Standard Receiver	0.2 μV	
UHS Receiver	0.15 μV	
Maximum Squelch	Greater than 20 dB quieting (less than 1.5 μV)	
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.

ER-42-F & H

GENERAL ELECTRIC

TABLE OF CONTENTS

ILLUSTRATIONS

WARNING

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

DESCRIPTION

General Electric MASTR Progress Line Receivers Types ER-42-F and H are double-conversion, superheterodyne FM receivers designed for operation on the 406-420 and 450-470 megahertz bands. The Type ER-42-F Receivers contain a standard oscillator with a frequency stability of ±0.0005%, while the Type ER-42-H Receivers contain an Integrated Circuit Oscillator Module (ICOM) with a frequency stability of ±0.0002%. Standard and ultra-high sensitivity (UHS) versions are available for both types.

The receivers are of single-unit construction and are completely housed in an aluminum casting for maximum shielding and rigidity. The top part of the casting contains the front end through the 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 throughout for added reliability. Input leads to the receiver are indificually 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 4EX8K11, 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 (A410/A411)

RF Amplifier A410/A411 is used only in ultra-high sensitivity (UHS) receivers and consists of two tuned helical resonators and an RF amplifier (Q1).

RF from the antenna is coupled through cable W444 to a tap on L410/L412. The tap is positioned to provide the proper impedance match to the antenna. RF energy is coupled to L411/L413 through an opening in the shield wall, and then to the base of Q1.

The amplified output is taken from the collector of Q1 and coupled through cable W445 to the input of five helical resonators.

HELICAL RESONATORS

In receivers without the UHS option, the front end RF selectivity is provided by five tuned helical resonators (L414/L419 through L418/L423). RF cable W441 connects the RF signal from the antenna to a tap on

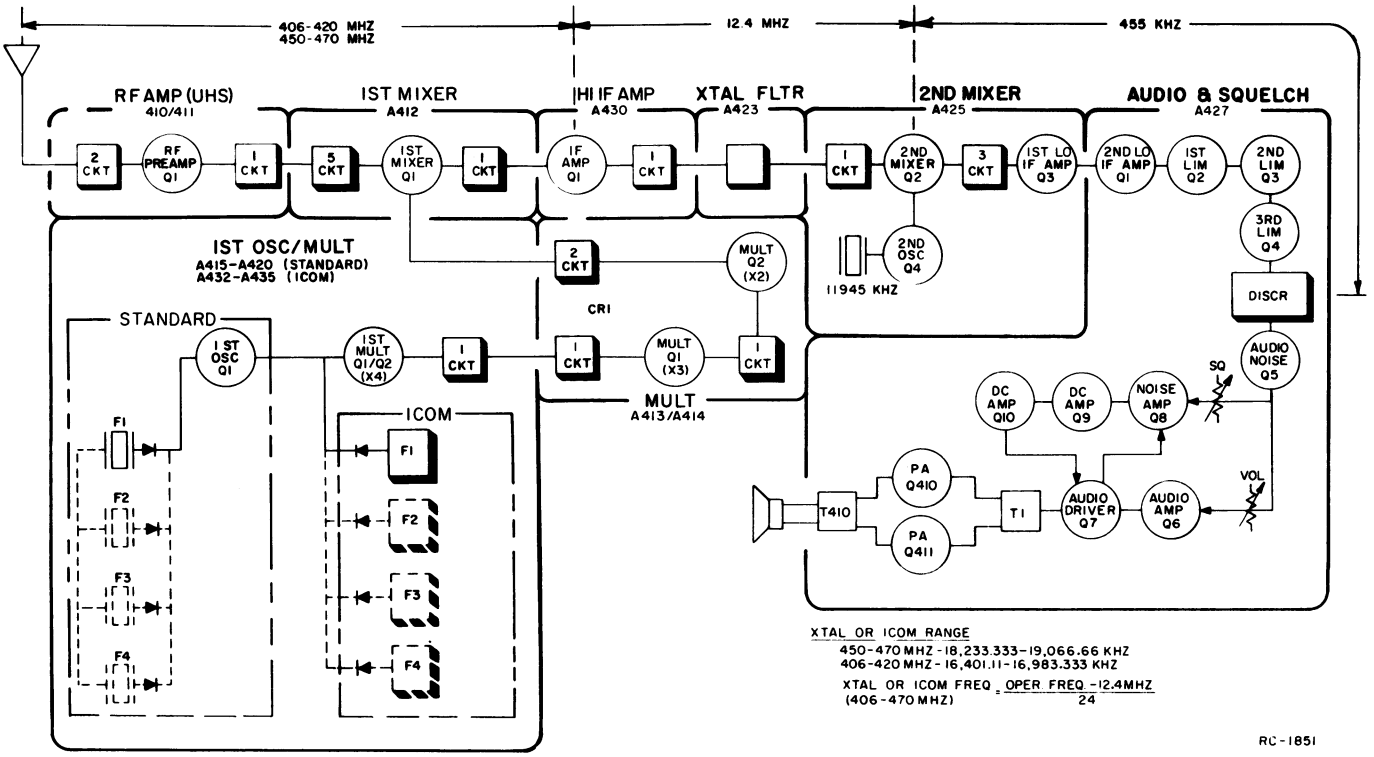


Figure 1 - Receiver Block Diagram

L414/L419. The tap is positioned to provide the proper impedance match to the antenna. The output of L418/L423 is coupled through capacitor C1 to the 1st mixer assembly.

1ST OSCILLATOR AND MULTIPLIER

Receiver Models 4ER42F10-27 are equipped with standard Oscillator/Multiplier Boards A415-A420. Receiver Models 4ER42H10-27 are equipped with Oscillator/Multiplier Boards which use the Integrated Circuit Oscillator Module (ICOM).

Standard Oscillator/Multiplier Board (A415-A420)

The oscillator in the standard Oscillator/Multiplier Board is a transistorized Colpitts oscillator. The oscillator crystal operates in a fundamental mode at a frequency of approximately 16 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 instant warm-up with a frequency stability of ±0.0005% without crystal ovens or warmers.

In single-frequency receivers, a jumper from H1 to H2 connects regulated +10 volts to the crystal circuit. Feedback for the oscillator is developed across C47.

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. Switching the +10 volts to the crystal circuit forward biases the diode in series with the desired crystal, and the crystal frequency is applied to the base of oscillator transistor Q1. The oscillator output is coupled through C45 to the base of 1st Multiplier Q2.

The 1st multiplier output is coupled through T1/T2 to Multiplier Board A413/A414. T1/T2 is tuned to four times the crystal frequency. The 1st multiplier stage is metered at J442-4 through metering network C38, CR6, R17 and R18.

Oscillator/Multiplier Board With ICOM (A432-A435)

Oscillator/Multiplier Boards A432-A435 uses ICOM Module Model 4EG26A10. The ICOM module consists of a crystal-controlled Colpitts oscillator, a voltage regulator, and a buffer output stage. The entire module (including crystal) is enclosed in a dust-proof aluminum can, with the ICOM frequency and the receiver operating frequency printed on the top. Access to the oscillator trimmer is obtained by prying off the plastic GE decal on the top of the can.

The oscillator frequency is temperature-compensated at both ends of the temperature range to provide instant frequency compensation, with a frequency stability of ±0.0002% without crystal ovens or warmers.

In single-frequency receivers, +10 volts for operating the ICOM is obtained by a jumper from H1 to H2. With the ICOM operating, diode CR1 is forward biased and the oscillator output is applied to the 1st multiplier Q1.

The 1st multiplier output is coupled through T1/T2 to multiplier board A413/A414. T1/T2 is tuned to four times the ICOM frequency. The 1st multiplier stage is metered at J442-4 through metering network C4, CR5, R5 and R6.

In multi-frequency receivers, up to three additional ICOM modules can be plugged into the board. The 10-volt jumper is removed and the proper frequency is selected by switching the desired ICOM to +10 volts by means of a frequency selector switch on the control unit.

CAUTION

All ICOM modules are individually compensated at the factory, and cannot be repaired in the field. Any attempt to remove the ICOM cover will void the warranty.

MULTIPLIER BOARD (A413/A414)

Following the oscillator board are two multiplier stages. A413-Q1 operates as a tripler, and Q2 operates as a doubler. Q2 is metered at J442-1 across metering resistor R6.

The output of Q2 is coupled through two helical resonator circuits to the source terminal of the 1st mixer. The helical resonators are tuned to six times the 1st multiplier output for a total multiplication of 24 times the crystal frequency.

1ST MIXER (A412)

The 1st Mixer uses a Field-Effect Transistor (FET) as the active device. A

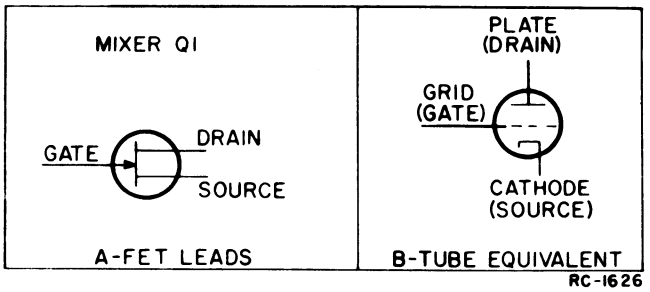


Figure 2 - FET Nomenclature

FET may be considered a semiconductor current path (or channel) whose resistance is varied by a voltage applied between the "gate" and "source" terminals. Lead identification for the FET is shown in Figure 2A. The FET has voltage-controlled characteristics, and may be compared to a vacuum tube in operation (see Figure 2B).

The FET mixer has several advantages over a conventional transistor mixer, including a high input impedance and an output that is relatively free of harmonics (low in intermodulation products).

RF from the helical resonators is applied to the gate of Q1, and injection voltage from the multiplier is applied to the source. The mixer output is taken from the drain with the output tuned to the 12.4 MHz high IF frequency.

HI IF AMPLIFIER (A430) AND CRYSTAL FILTER (A423)

The mixer output is coupled to the emitter of the high IF amplifier A430. The transistor is connected as a grounded-base amplifier which provides a low impedance for the mixer input. The amplifier output is coupled through transformer T1 to the crystal filter.

Highly-selective crystal filter A423 provides the major selectivity for the receiver. The output of the filter is coupled through impedance-matching transformer A425-T2 to the base of the 2nd mixer.

2ND OSCILLATOR, 2ND MIXER AND 1ST LO IF AMPLIFIER (A425)

A 425-Q4 operates in a Colpitts oscillator circuit, with feedback supplied through C18. The oscillator low-side injection voltage (11,945 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 (A427)

Additional amplification of the low IF signal going to the limiter stages is provided by 2nd low IF amplifier A427-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 (A427-Q2, -Q3 and -Q4). The 1st limiter is metered at J442-3 through metering network C20, CR4 and R26.

DISCRIMINATOR (A427)

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 C44 and R23.

AUDIO - NOISE AMPLIFIER (A427)

The discriminator output is coupled through a low-pass filter (C44, C45, R68 and R69) to the base of audio-noise amplifier Q5. The filter removes any 455-kHz signal remaining in the discriminator out-out. Q5 operates as an emitter-follower to match the discriminator impedance to the VOLUME and SQUELCH control. The stage also provides power gain.

AUDIO AMPLIFIERS (A427)

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, R30 and R31.

Audio driver Q7 follows the audio amplifier. The output of Q7 is coupled through transformer T1 to provide phase inversion for the push-pull audio PA stage.

Q410 and Q411 operate as a push-pull Class AB audio PA stage. The PA output is coupled through audio transformer T410 to the loudspeaker. The yellow and white tertiary windings of T410 supply balanced feedback to the collector of Q7. The feedback winding minimizes distortion and prevents the pick-up of external electrical noise.

Base bias for the PA stage and the elimination of crossover 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 Q410 and Q411 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 receiver

Test Procedure. The output stage provides 5 watts at less than 5% distortion into a 3.5-ohm load at the receiver output terminals (3.2-ohm load at the Control Unit).

SQUELCH (A426)

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 C47, C48 and R71, as well as C46 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 (unsquelched), 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 R73 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-fence" operation.

With audio driver Q7 conducting, a positive voltage through R73 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 R73 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 (see Fig. 3).
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 (see Fig. 4).
2. Remove screws in bottom cover. Pry up cover at 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 3), 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.

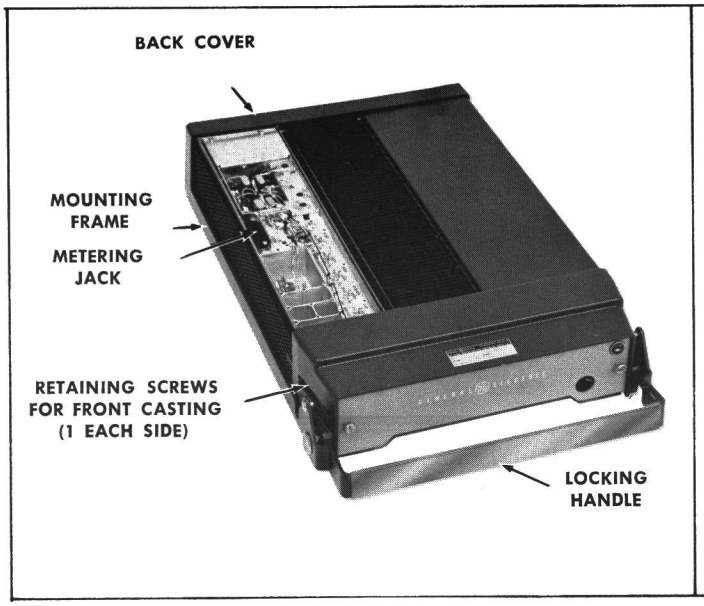


Figure 3 - Removing Top Cover

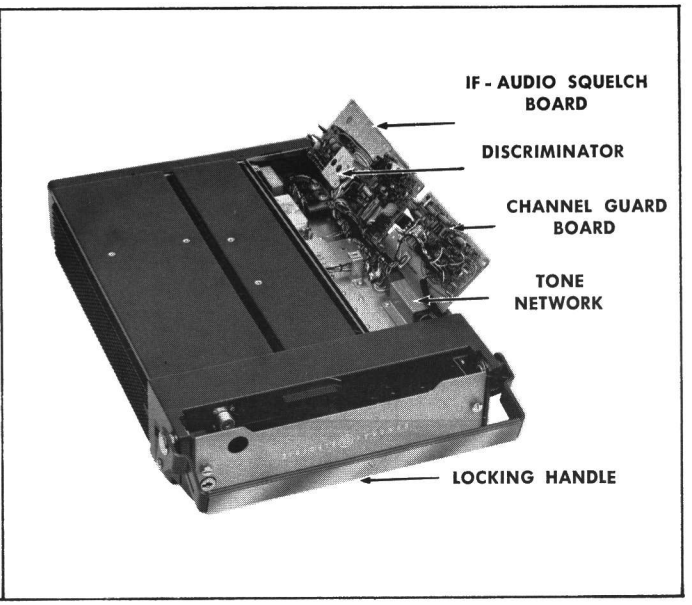
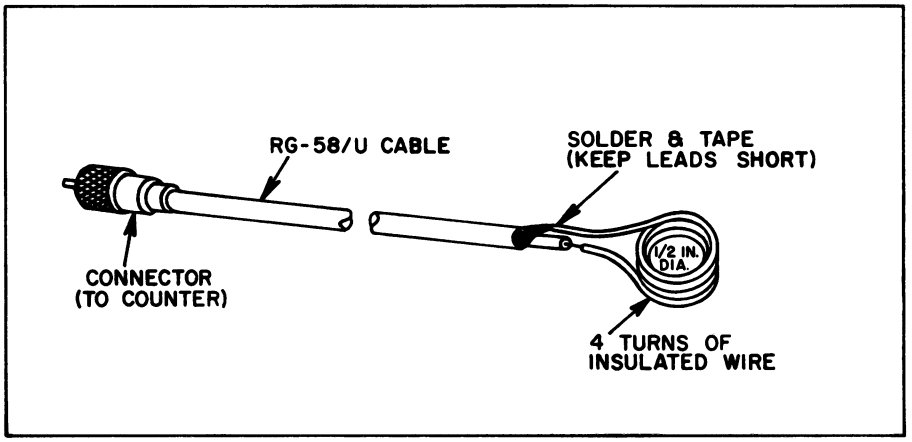


Figure 4 - Removing Bottom Cover



RC-1600

Figure 5 - Coaxial Cable and Test Loop

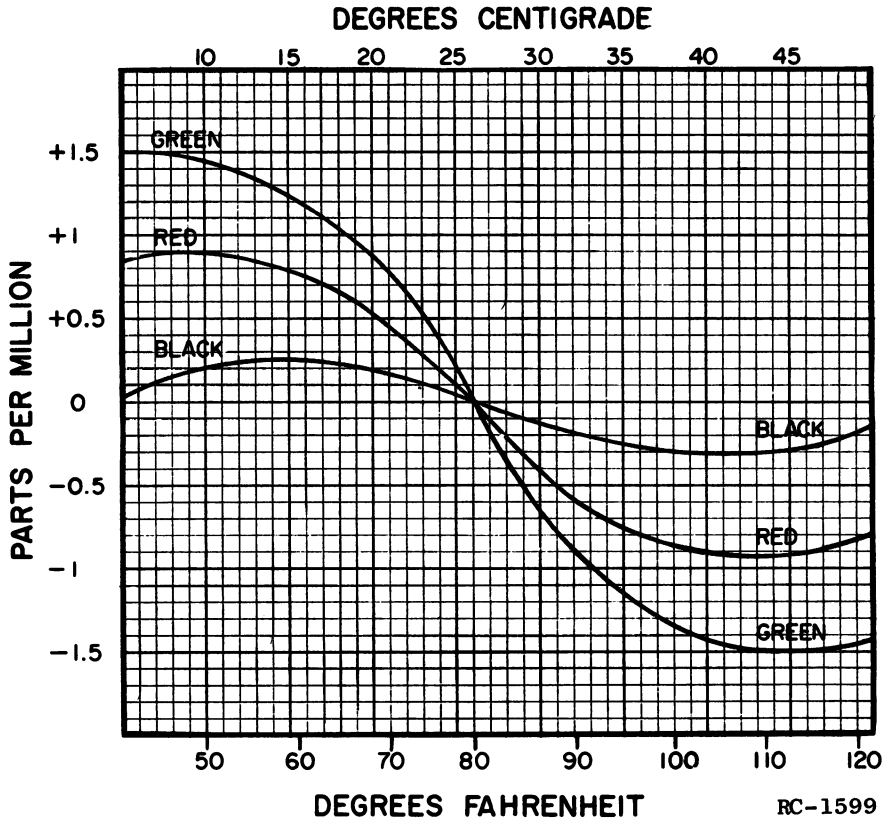


Figure 6 - ICOM Correction Curves

ALIGNMENT PROCEDURE

406—470 MHz MASTR RECEIVER
MODELS 4ER42F10-27 & 4ER42H10-27

FREQUENCY ADJUSTMENT

STANDARD OSCILLATOR

METERING POSITION 4EX3A10	Multi-meter -at J442	TUNING CONTROL	METER READING	PROCEDURE
A (Disc)	Pin 10	C9 (on 1st OSC/ MULT) C10, C11 and 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.

ICOM MODULE

Due to the high stability of the ICOM module, it is not recommended that zero discriminator be used as the indication for setting the oscillator frequency. Instead, measure the ICOM frequency as described in the following procedure.

EQUIPMENT REQUIRED:

1. Frequency Counter capable of measuring the 70-80 MHz frequency range. (The counter should have an accuracy of 0.4 part-per million.)
2. Coaxial cable with test loop as described in Figure 5.
3. Mercury thermometer.

PROCEDURE:

1. Check the ICOM temperature by taping the mercury thermometer to the side of the ICOM.
2. Connect the frequency counter to L5 (on the 1st Osc/Mult) using the 4-turn test loop and cable shown in Figure 5.
3. If the ICOM temperature is 80°F (±4°F) or 26.5°C (±2°C), the frequency indication on the counter should be 4 times the frequency stenciled on the ICOM case. Adjust the ICOM trimmer (if necessary) to obtain this frequency.
4. If the temperature is not within the 80°F (±4°F) or 26.5°C (±2°C) range, use the correction curves of Figure 6 for setting the ICOM frequency as follows:
   a. Check the color dot beneath the GE emblem and select the matching curve to determine the correction factor in parts-per-million (PPM).
   b. Multiply the frequency stenciled on the ICOM by 4 and then multiply this figure by the correction factor (from Figure 6) observing the sign (±) given to the correction factor.
   c. The frequency measured at L5 should be 4 times the ICOM frequency ± the correction factor. Adjust the ICOM trimmer (if required) to obtain this frequency.

FOR EXAMPLE

ICOM Frequency - 18.233333 MHz
ICOM Color Dot - Green
Ambient Temperature - 35°C (95°F)
Correction Factor - -1.15 PPM
(from Figure 6)

Multiply ICOM Frequency by 4:
(18.233333 MHz x 4 = 72.933332 MHz)

Multiply preceding figure by correction factor:
(72.933 MHz x -1.15 PPM = -83.87 hertz (or -84 hertz)

Set the frequency measured at L5 for 72.933248 MHz;

72.933332 MHz
- .000084 MHz
72.933248 MHz

COMPLETE RECEIVER ALIGNMENT

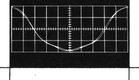
EQUIPMENT REQUIRED

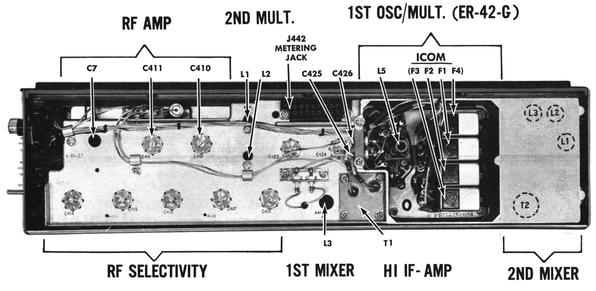
1. GE Test Set Models 4EX3A10, 4EX8K11, station test meter panel, or 20,000 ohms-per-volt multimeter.
2. A 450 to 460 kHz source (GE Test Set Model 4EX7A10), and 406-470 MHz signal source. Connect a one-inch piece of insulated wire no larger than .065 inch to generator output probe.

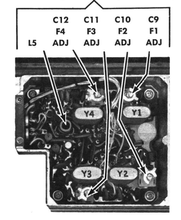
PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect Test Set to receiver centralized metering jack J442, and set meter sensitivity switch to the TEST 1 or 1-volt position.
2. For a large change in frequency or a badly mis-aligned receiver, set crystal trimmer C9 on 1st OSC/MULT board (ER-42-E only) to mid-capacity. In multi-frequency receivers, set C10, C11 or C12 to mid-capacity as required.
3. In multi-frequency receivers where the maximum frequency spacing is less than 500 kHz, align the unit on channel F1. If the frequency spacing is greater than 500 kHz, align the receiver on the center frequency.
4. With Test Set in position J, check for regulated +10 volts. If using Multimeter, measure from C425 to C426.
5. If using Multimeter, connect the positive lead to J442-16 (ground).

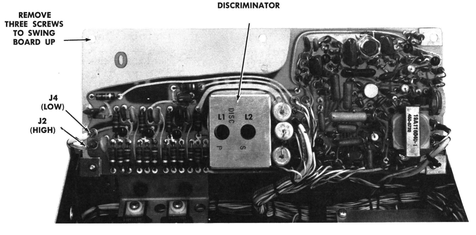
ALIGNMENT PROCEDURE

STEP	METERING POSITION GE Test Set or Meter Panel	METERING POSITION Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			DISCRIMINATOR		
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 reading any closer than 0.05 volt.
			OSCILLATOR AND MULTIPLIERS		
3.	D (MULT-1)	Pin 4	L5 (1st OSC/MULT) and L1 (2nd MULT)	See Procedure	Tune L5 for maximum meter reading. Then tune L1 for minimum meter reading.
4.	G (MULT-1)	Pin 4	L5 (1st OSC/MULT) and L1 and L2 (2nd MULT)	Maximum	Tune L5, L1 and L2 for maximum meter reading. If two peaks occur while tuning L1 and L2, use the peak with the slug nearest the top of the coil.
5.	G (MULT-2)	Pin 4	C423	See Procedure	Adjust C423 for a small dip in meter reading.
6.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal into Hole 411. Adjust the signal generator for discriminator zero.
7.	B (2nd IF AMP)	Pin 2	C423 and C424	Maximum	Apply an on-frequency signal as above. Tune C423 and C424 for maximum meter reading, keeping signal below saturation.
			RF SELECTIVITY		
8.	B (2nd IF AMP)	Pin 2	L3 (1st Mixer)	Maximum	Apply an on-frequency signal in Hole 411 and tune L3 for maximum meter reading. If two peaks occur, use the peak with the slug nearest the bottom of the coil.
9.	B (2nd IF AMP)	Pin 2	C415 thru C418	Maximum	Apply an on-frequency signal in the Hole shown below, keeping the signal below saturation. Tune C415 thru C418 for maximum meter reading as shown below: Insert Generator Probe In: / Peak 1. Hole 411 / C418 thru C417 2. Hole 410 / C415, C416 thru C417
10.	B (2nd IF AMP)	Pin 2	C414 thru C418, L3 (on 1st Mixer) and C410, C411 and C7 (on UHS receivers)	See Procedure	Apply an on-frequency signal to the receiver antenna jack. Tune C410, C411 and C7 on UHS receivers for maximum meter reading. On all receivers, tune C414 for maximum meter reading, and tune C415 thru C418 and L3 for maximum quieting.
			2ND MIXER & HI IF		
The 2nd mixer, and high 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 11, 12 and 13. NOTE Refer to DATAFILE BULLETIN 1000-6 IF Alignment of Two-Way Radio FM Receivers for helpful suggestions on how to determine when IF alignment is required.					
11.	B (2nd IF AMP)	Pin 2	L3, L2, L1, T2 (2nd Mixer) and T1 (HI IF AMP)	Maximum	Apply an on-frequency, unmodulated signal and tune L3, L2, L1, T2 (2nd mixer) and T1 (HI IF AMP) for maximum meter reading, keeping signal below saturation.
12.			L3, L2, L1, T2 (2nd Mixer) and T1 (HI IF AMP) 		Connect scope, signal generator, and detector as shown in Figure 7. Set signal generator level for 20-50 µv and modulate with 20 kHz at 20 Hz. With detector at the collector of Q3 (2nd mixer board output), tune for double trace as shown on scope pattern. NOTE When using an M-560 signal generator, sufficient deviation may be obtained by setting the band switch on a lower scale.
13.	A (DISC)	Pin 10		See Procedure	Check to see that discriminator idling voltage is within 0.1 volt of zero with no signal applied. Check to see that modulation acceptance bandwidth is between ±19 and 23 kHz.
			FREQUENCY ADJUSTMENT		
14.	Refer to the appropriate adjustment procedure for the ICOM or Standard Oscillator.				





IF-AUDIO & SQUELCH



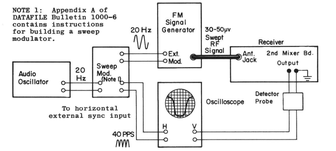


Figure 7 - Test Setup for 20-Hz Double-Trace Sweep Alignment

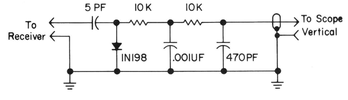


Figure 8 - Detector Probe for Sweep Alignment

FRONT END ALIGNMENT

LBI-4043

EQUIPMENT REQUIRED

1. GE Test Set Model 4EX3A10, 4EX8K11 station test meter panel or 20,000 ohms-per-volt multimeter.
2. A 406-470 MHz signal source. Connedt a one-inch piece of insulated wire no larger than 0.065 inch 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 (or 1-volt position on 4EX8K11).
2. With Test Set in position J, check for regulated +10 volts. If using Multimeter, measure from C425 to C426.
3. If using Multimeter, connect the positive lead to J442-16 (ground).

ALIGNMENT PROCEDURE

STEP	METERING POSITION GE Test Set or Meter Panel	METERING POSITION Multimeter - at J442	TUNING CONTROL	METER READING	PROCEDURE
			OSCILLATOR AND MULTIPLIERS		
1.	D (MULT-1)	Pin 4	L5 (1st OSC/MULT) and L1 (2nd MULT)	See Procedure	Tune L5 for maximum meter reading. Then tune L1 for minimum meter reading.
2.	G (MULT-2)	Pin 4	L5 (1st OSC/MULT) and L1 and L2 (2nd MULT)	Maximum	Tune L5, L1 and L2 for maximum meter reading. If two peaks occur while tuning L1 and L2, use the peak with the slug nearest the top of the coil.
3.	G (MULT-2)	Pin 4	C423	See Procedure	Adjust C423 for a small dip in meter reading.
4.	A (DISC)	Pin 10		Zero	Apply an on-frequency signal into Hole 411. Adjust the signal generator for discriminator zero.
5.	B (2nd IF AMP)	Pin 2	C423 and C424	Maximum	Apply an on-frequency signal as above. Tune C423 and C424 for maximum meter reading, keeping signal below saturation.
			RF SELECTIVITY		
6.	B (2nd IF AMP)	Pin 2	L3, C415-C418	Maximum	Apply an on-frequency signal in Hole 411 and tune L3 and C415 thru C418 for maximum meter reading, keeping the signal below saturation. If two peaks occur when tuning L3, use the peak with the slug nearest the bottom of the coil.
7.	B (2nd IF AMP)	Pin 2	C414 thru C418, L3 (on 1st Mixer) and C410, C411 and C7 (on UHS receivers)	See Procedure	Apply an on-frequency signal to the receiver antenna jack. Tune C410, C411 and C7 on UHS receivers for maximum meter reading. On all receivers, tune C414 for maximum meter reading, and then tune C415 thru C418 and L3 for maximum quieting.
			FREQUENCY ADJUSTMENT		
8.	Refer to the appropriate adjustment procedure for the ICOM or Standard Oscillator.				

ALIGNMENT PROCEDURE

406—470 MHz MASTR RECEIVER
MODELS 4ER42F10-27 & 4ER42H10-27

TEST PROCEDURES

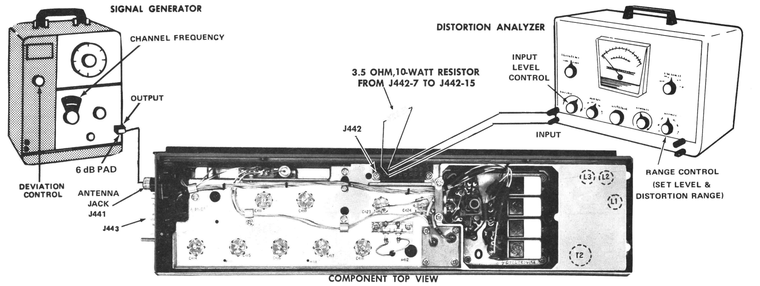
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

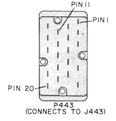
TEST EQUIPMENT REQUIRED

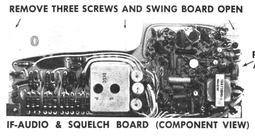
- Distortion Analyzer similar to: Heath IM-12
- Signal Generator similar to: Measurements M-800
- 6-dB attenuation pad, and 3.5-ohm, 10-watt resistor

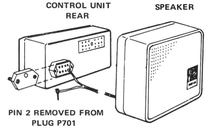
PRELIMINARY ADJUSTMENTS

1. Connect the test equipment to the receiver as shown for all steps of the receiver Test Procedure.
2. Turn the SQUELCH control fully clockwise for all steps of the Test Procedure.
3. Turn on all of the equipment and let it warm up for 20 minutes.









STEP 1
AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

A. Apply a 1,000-microvolt, on-frequency test signal modulated by 1,000 hertz with ±10 kHz deviation to 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.

C. Adjust the VOLUME control for five-watt output (4.18 VRMS using the Distortion Analyzer as a VTVM).

D. Make distortion measurements according to manufacturer's instructions. Reading should be less than 5%. If the receiver sensitivity is to be measured, leave all controls and equipment as they are.

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 milliammeter 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 re-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)

If STEP 1 checks out properly, measure the receiver sensitivity as follows:

A. Apply a 1000-microvolt, on-frequency signal modulated by 1000 Hz with 3.0-KHz deviation to J441.

B. Place the RANGE switch on the Distortion Analyzer in the 200 to 2000-Hz distortion range position (1000-Hz filter in the circuit). Tune the filter for minimum reading or null on the lowest possible scale (100%, 30%, etc.)

C. Place the RANGE switch to the SET LEVEL position (filter out of the circuit) and adjust the input LEVEL control for a +2 dB reading on a mid range (30%).

D. While reducing the signal generator output, switch the RANGE control from SET LEVEL to the distortion range until a 12-dB difference (+2 dB to -10 dB) is obtained between the SET LEVEL and distortion range positions (filter out and filter in).

E. The 12-dB difference (Signal plus Noise and Distortion to noise plus distortion ratio) is the "usable" sensitivity level. The sensitivity should be less than rated 12 dB SINAD specification with an audio output of at least 2.5 watts (2.9 volts RMS across the 3.5-ohm receiver load using the Distortion Analyzer as a VTVM).

F. Leave all controls as they are and all equipment connected if the Modulation Acceptance Bandwidth test is to be performed.

SERVICE CHECK

If the sensitivity level is more than rated 12 dB SINAD, check the alignment of the RF stages as directed in the Alignment Procedure, and make the gain measurements as shown on the Troubleshooting Procedure.

STEP 3
MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

If STEPS 1 and 2 check out properly, measure the bandwidth as follows:

A. Set the Signal Generator output for twice the microvolt reading obtained in the 12-dB SINAD measurement.

B. Set the RANGE control on the Distortion Analyzer in the SET LEVEL position (1000-Hz filter out of the circuit), and adjust the input LEVEL control for a +2 dB reading on the 30% range.

C. While increasing the deviation of the Signal Generator, switch the RANGE control from SET LEVEL to distortion range until a 12-dB difference is obtained between the SET LEVEL and distortion range readings (from +2 dB to -10 dB).

D. The deviation control reading for the 12-dB difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±19 kHz (but less than ±23 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 4EX8K11 in the 1-volt position.

Metering Position	Reading with No Signal in	Reading with 1 μv unmodulated input
A Disc idling	Less than 20.1 VDC	
B 2nd IF	.05 VDC	0.2 VDC
C 1st Lim	0.6 VDC	0.8 VDC
D Mult 1	0.9 VDC	
G Mult 2	0.3 VDC	
J Regulated +10 Volts	10 VDC	

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 & 5 as shown in STEP 2A. • Make SIMPLIFIED VTVM GAIN CHECKS from 2nd Mixer through 1st Limiter stages as shown in STEP 2A.
LOW OSCILLATOR/MULTIPLIER READINGS	• 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 Receiver Alignment Procedure). • Check antenna connections, cable and relay. • Check 1st and 2nd Oscillator injection voltage. • Check voltage readings of RF Amp, 1st Mixer and HI IF Amp. • Make SIMPLIFIED GAIN CHECKS (STEP 2A).
LOW AUDIO	• Check Audio PA (Q410 & Q411) voltage readings on schematic diagram. • Make simplified gain and waveform checks of audio and squelch stages (Steps 2A and 2B). • Make unsquelched voltage readings in Audio section (Refer to Receiver Schematic Diagram).
HIGH DISTORTION AT LOW AUDIO LEVELS (50 MW)	• Set PA bias adjust R43 as specified under Service checks in STEP 1 of TEST PROCEDURES.
IMPROPER SQUELCH OPERATION	• Check voltage readings of Squelch circuit (Refer to Receiver Schematic Diagram). • Make gain and waveform checks of audio and squelch stages (Steps 2A and 2B).
DISCRIMINATOR IDLING TOO FAR OFF ZERO	• See if discriminator zero is in center of IF bandpass.

STEP 3-VOLTAGE RATIO READINGS

EQUIPMENT REQUIRED:

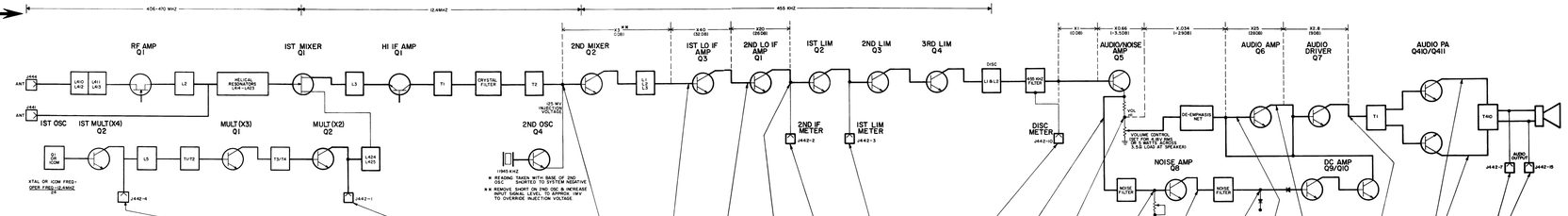
1. RF Voltmeter (Similiar to Boonton Model 91-CA or Millivac Type MV-18 C).
2. Signal on receiver frequency (below saturation). Correct frequency can be determined by zeroing the discriminator. Use 1,000 Hertz signal with 10 KHz deviation for audio stage.

PROCEDURE

1. Apply probes to input of stage and system negative (-10 VDC). Take voltage reading (E_1).
2. Move probes to input of following stage and system negative. Take reading (E_2).
3. Convert readings by means of the following formula:

$$\text{Volatge Ratio} = \frac{E_2}{E_1}$$

4. Check results with typical voltage ratios shown on diagram.



STEP 2A-SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

1. 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.

SIGNAL GENERATOR INPUT TO J442-4 & 5 (UNLESS OTHERWISE INDICATED)			UNMODULATED	UNMODULATED	1 MODULATED	UNMODULATED	1 MICROVOLT UNMODULATED	NO SIGNAL INPUT	STANDARD SIGNAL - 1 MILLIVOLT MODULATED AT 1000 CPS WITH 3 KHZ 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 IS EXACTLY DOUBLE READING AT LEFT	INCREASE SIGNAL GENERATOR OUTPUT FROM 10 TO 1 VTVM READING IS DOUBLED OR DECREASE BY 6 DB	INCREASE SIGNAL GENERATOR OUTPUT FROM 1000 UNTIL VTVM READING IS DOUBLED OR DECREASE BY 6 DB	INCREASE SIGNAL GENERATOR OUTPUT FROM 100 UNTIL VTVM READING IS DOUBLED OR DECREASE BY 6 DB											CONNECT 3.5 OHM 10 WATT RESISTOR ACROSS SPEAKER DISCONNECTED
READING	0.8 VDC	0.25 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 0.5 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. VTVM-AC & DC
2. Signal Generator (measurements M560 or equiv.)

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 (except for 1st MULT which references chassis ground).

SCOPE SETTING	HORIZONTAL	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV
	VERTICAL	1 VOLT/DIV	1 VOLT/DIV	1 VOLT/DIV	2 VOLTS/DIV	0.5 VOLTS/DIV	50 MILLIVOLTS/DIV	1 VOLT/DIV	2 VOLTS/DIV	10 VOLTS/DIV	5 VOLTS/DIV	
PEAK-TO-PEAK VOLTAGE		2 V P-P	0.4 V P-P	1 V P-P (NOISE)	5.7 V P-P (NOISE)	3 V P-P (NOISE)	0.1 V P-P	1.9 V P-P	4 V P-P	20 V P-P	12 V P-P	
STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1KHZ WITH 3.5KHZ DEVIATION (10 KHZ WIDE BAND))												
NOISE WAVE FORM (NO SIGNAL INPUT)												

RC-1828B

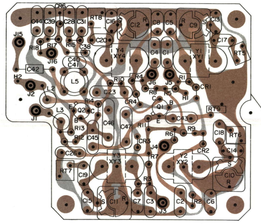
TROUBLESHOOTING PROCEDURE

406—470 MHz RECEIVER
MODELS 4ER42F10-27 & 4ER42H10-27

1ST OSCILLATOR/MULTIPLIER

406-420 MHZ 450-470 MHZ

A415 - 1 FREQ - A418
A416 - 2 FREQ - A419
A417 - 4 FREQ - A420

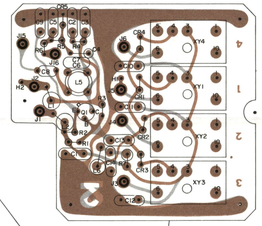


(19B204934, Sh. 1, Rev. 1)
(19B204934, Sh. 2, Rev. 1)

1ST OSCILLATOR/MULTIPLIER (WITH ICOM)

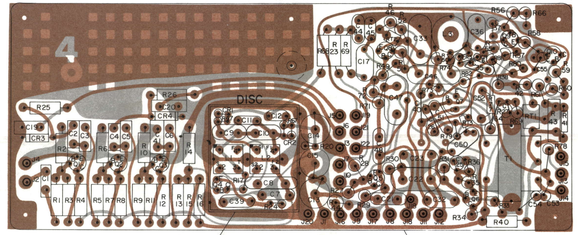
406 - 420 MHZ 450 - 470 MHZ

A432 - 1 FREQ - A434
A433 - 4 FREQ - A435



(19B216041, Sh. 1, Rev. 2)
(19B216041, Sh. 2, Rev. 2)

IF-AUDIO & SQUELCH BOARD A427



(19C311803, Sh. 1, Rev. 4)
(19C311803, Sh. 2, Rev. 6)

TO A426-J4

TO A426-J2

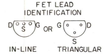
2ND MIXER A425

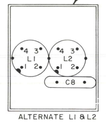
(19B216045, Sh. 1, Rev. 3)
(19B216045, Sh. 2, Rev. 3)

TRANSISTOR LEAD IDENTIFICATION

NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

FET LEAD IDENTIFICATION



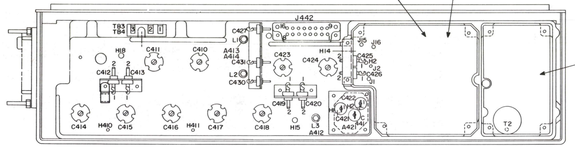


ALTERNATE L1 & L2

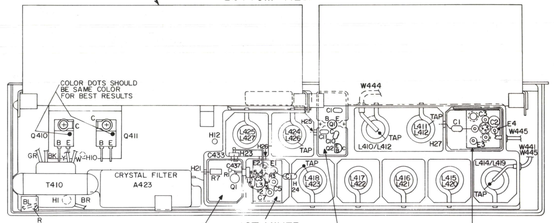
PIN NUMBER MARKING ON SIDE OF COIL CAN OR COLOR DOT IDENTIFIES PIN NUMBER 1 ON DISCRIMINATOR AND 2ND MIXER COILS.

TOP VIEW

CENTRALIZED METERING JACK

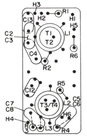


BOTTOM VIEW

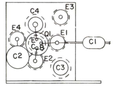


HI IF AMP A430

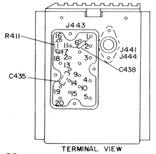
MULT A413/A414



RF AMP A410/A411



IST MIXER A412



TERMINAL VIEW

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

(19B213102, Rev. 10)

OUTLINE DIAGRAM

406—470 MHz RECEIVER
MODELS 4ER42F10-27 & 4ER42H10-27

PARTS LIST

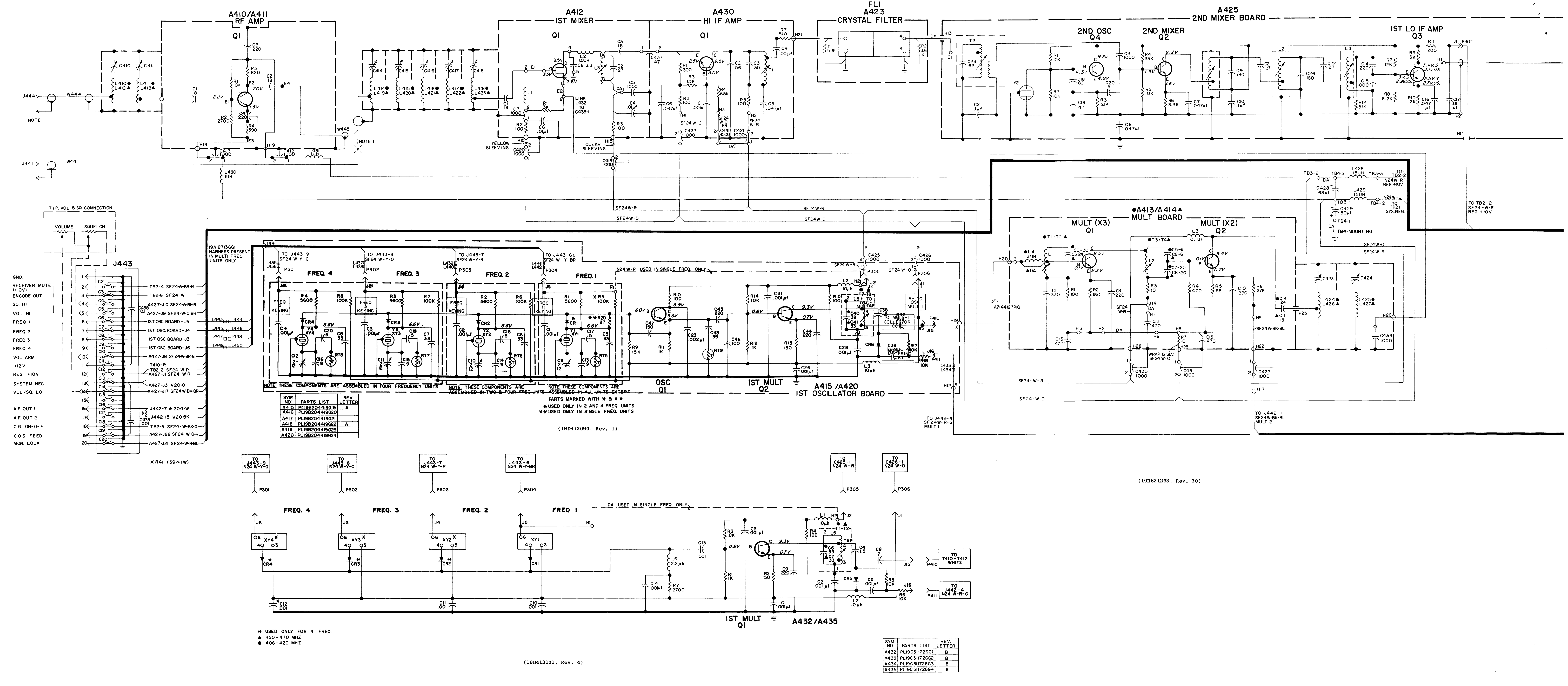
LBI-4049B

406-470 MHz RECEIVERS
4EH42F10-27, 4LH42H10-27

SYMBOL	GE PART NO.	DESCRIPTION
A410* and A411*		RF AMPLIFIER 19C320697G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	5496218P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5493392P105	Ceramic, stand-off: 220 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type 5SD.
C4	5493392P5	Ceramic, feed-thru: 220 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FASC.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 and E2	1982D0055P8	Terminal, feed-thru: sim to Electrical Ind. ABA340W8S.
E3	1982D0055P1	Terminal, feed-thru: sim to Electrical Ind. ABA340-4S-8L.
E4	1982D0055P8	Terminal, feed-thru: sim to Electrical Ind. ABA340W8S.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A116859P1	Silicon, NPN; sim to Type 2N5032.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R2	3R152P272J	Composition: 2700 ohms ±5%, 1/4 w.
R3	3R152P821J	Composition: 820 ohms ±5%, 1/4 w.
R4	3R152P391J	Composition: 390 ohms ±5%, 1/4 w.
		In 19E500881G7 REV G-L; In 19E500881G8 REV G-R.
A410* and A411*		RF AMPLIFIER 19C317950G3
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	5496218P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C3	5493392P5	Ceramic, feed-thru: 220 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FASC.
C4	5493392P107	Ceramic, stand-off: 1000 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type 5SD.
C5	5496218P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C6	19A116080P1	Phenolic: 1.8 pf ±5%, 500 VDCW.
C7	7484389P1	Variable: 1.5-7 pf, temp coef 0 PPM; sim to Erie Style 503.
C8	5491601P122	Phenolic: 1.2 pf ±5%, 500 VDCW.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1	1982D0055P1	Terminal, feed-thru: sim to Electrical Ind. ABA340-4S-8L.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	1982D942OP1	Coil, RF: 0.10 ph ±5%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L2	19A1274299P1	Coil.
L3	19A1274299P2	Coil.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A116154P1	N Channel, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R3	3R152P470K	Composition: 47 ohms ±10%, 1/4 w.
A412		FIRST MIXER ASSEMBLY 19C311974G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496218P312	Ceramic disc: 18 pf ±10%, 500 VDCW, temp coef -150 PPM.
C2		(Part of L3).
C3*	5496218P344	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef +150 PPM.
		In 19E500881G REV L and earlier; In 19E500881G5 REV M and earlier; In 19E500881G6 REV N and earlier; In 19E500881G7 REV G and earlier; In 19E500881G8 REV N and earlier;
C4	5496218P249	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
C4	19A116080P1	Polyester: 0.01 pf ±20%, 50 VDCW.
C5	5493392P107	Ceramic, stand-off: 1000 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type 5SD.
C6	19A116080P1	Polyester: 0.01 pf ±20%, 50 VDCW.
C7	5493392P7	Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FASC.
C8		(Part of L3).
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E1 and E2	1982D0055P8	Terminal, feed-thru: sim to Electrical Ind. ABA340W8S.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19A127430G1	Choke.
L2		(Part of L3).
L3	19B216440G1	Coil assembly, includes:
C2	5496218P269	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef -80 PPM.
L2	19B209420P113	Coil, RF: 1 ph ±10%, 0.74 ohms DC res max; sim to Jeffers 4426-6.
	5491778P8	Tuning slug.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A116154P1	N Channel, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P272J	Composition: 2700 ohms ±5%, 1/4 w.
R2	3R152P181J	Composition: 180 ohms ±5%, 1/4 w.
R3	3R152P100K	Composition: 10 ohms ±10%, 1/4 w.
R4	3R152P471K	Composition: 470 ohms ±10%, 1/4 w.
R5	3R152P68GJ	Composition: 68 ohms ±5%, 1/4 w.
R6	3R152P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R7*	3R152P100K	Composition: 10 ohms ±10%, 1/4 w. Added by REV C.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B216373G1 T2 19B216373G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5496218P350	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -150 PPM.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A116154P1	N Channel, field effect.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P302J	Composition: 3000 ohms ±5%, 1/4 w.
R2 and R3	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
A413 and A414		MULTIPLIER BOARD ASSEMBLY A413 19B216360G1 A414 19B216360G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116655P12	Ceramic disc: 330 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C2		(Part of T1).
C3		(Part of T2).
C4	5496203P149	Ceramic disc: 220 pf ±10%, 500 VDCW, temp coef -3300 PPM.
C5		(Part of T3).
C6		(Part of T4).
C7		(Part of T3).
C8		(Part of T4).
C9*	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Deleted by REV E.
C10	5496203P149	Ceramic disc: 220 pf ±10%, 500 VDCW, temp coef -3300 PPM.
C11	5496218P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM.
C12	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C13	19A116655P13	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C14	5496218P548	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -330 PPM.
C15*	5494481P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV C.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
		(Part of T1 and T2).
L1		(Part of T3 and T4).
L2		
L3	19B209420P1	Coil, RF: 0.10 ph ±5%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
L4		(Part of T1).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115329P1	Silicon, NPN.
Q2	19A115691P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R2	3R152P181J	Composition: 180 ohms ±5%, 1/4 w.
R3	3R152P100K	Composition: 10 ohms ±10%, 1/4 w.
R4	3R152P471K	Composition: 470 ohms ±10%, 1/4 w.
R5	3R152P68GJ	Composition: 68 ohms ±5%, 1/4 w.
R6	3R152P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R7*	3R152P100K	Composition: 10 ohms ±10%, 1/4 w. Added by REV C.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B216373G1 T2 19B216373G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	5496218P350	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -150 PPM.
C3	5496218P248	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B216373P5	Coil.
L4	19B209420P1	Coil, RF: 0.10 ph ±5%, 0.08 ohms DC res max; sim to Jeffers 4416-1.
T3 and T4	5491778P7	Tuning slug.
		COIL ASSEMBLY T3 19B216374G1 T4 19B216374G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C5*	5496218P237	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
		In REV F and earlier:
	5496218P439	Ceramic disc: 8 pf ±0.25 pf, 500 VDCW, temp coef -220 PPM.
C6*	5496218P237	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM.
		In REV G and earlier:
	5496218P436	Ceramic disc: 5 pf ±0.25 pf, 500 VDCW, temp coef -220 PPM.
C7*	5496218P746	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -750 PPM.
		In REV F and earlier:
	5496218P750	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -750 PPM.
C8*	5496218P266	Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -80 PPM.
		In REV G:
	5496218P745	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -750 PPM.
		In REV F and earlier:
	5496218P748	Ceramic disc: 24 pf ±5%, 500 VDCW, temp coef -750 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2	19B216374P5	Coil. (Used with low split).
	19B216374P7	Coil. (Used with High split).
	5491778P7	Tuning slug.
A415 thru A420		FIRST OSCILLATOR ASSEMBLY A415 19B209441G09 A416 19B209441G05 A417 19B209441G21 A418 19B209441G23 A419 19B209441G23 A420 19B209441G24
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C4	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C5 thru C8	5496219P751	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -750 PPM.
C9 thru C12	5491271P106	Variable, subminiature: approx 2.1-12.7 pf, 250 v peak; sim to EF Johnson 189.
C13 thru C16	5496219P40	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C17 thru C20	19C300645P93	Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM.
C23	5494481P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C26	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C28	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C31	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C38	5491001P123	Phenolic: 1.5 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C39	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C42	5491001P130	Phenolic: 3.3 pf ±5%, 500 VDCW; sim to Quality Components Type MC.
C43	5496219P53	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef 0 PPM.
C44	5490008P135	Silver mica: 220 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C45	5490008P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C46	5496219P563	Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -330 PPM.
C47	5496219P767	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -750 PPM.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR6	19A115603P1	Silicon.
CR7	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J6	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J15 and J16	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L2 and L3	7488079P16	Choke, RF: 10 µh ±10% ind at 640 ma, 0.6 ohms DC res; sim to Jeffers 4421-7K.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115330P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 thru R4	3R152P562J	Composition: 5600 ohms ±5%, 1/4 w.
R5 thru R8	3R152P104K	Composition: 0.1 megohm ±10%, 1/4 w.
R9	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
R10	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R11 and R12	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R13	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R14	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R15	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R16	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R17 and R18		
R20	3R152P270K	Composition: 27 ohms ±10%, 1/4 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT5 thru RT8	19B209284P7	Disc: 62 ohms res nominal at 25°C, color code violet.
RT9	19B209284P8	Disc: 945 ohms res nominal at 25°C, color code gray.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T7 and T8		COIL ASSEMBLY T7 19B209450G1 T8 19B209450G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C40	5496218P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C41	5496218P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L5	19A121728P1	Coil. Includes tuning slug 5491778P5.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4		Refer to Mechanical Parts (EC-1823).
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part No. and specify exact freq needed.
		Crystal freq = (OF ÷24.4 MHz) 24
Y1 thru Y4	19B206576P6	Quartz: freq range 15175.000 to 17925.000 KHz, temp range -30°C to +85°C. (405-420 MHz)
A423		CRYSTAL FILTER ASSEMBLY 19B216703G1
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1	19C304094G5	Bandpass, 12.4 MHz.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P103J	Composition: 1000 ohms ±5%, 1/4 w.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P513J	Composition: 5100 ohms ±5%, 1/4 w.
R2	3R152P363J	Composition: 3600 ohms ±5%, 1/4 w.
A425		SECOND MIXER ASSEMBLY 19B216119G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2	19A116080P7	Polyester: 0.1 pf ±20%, 50 VDCW.
C3	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C7 and C8	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
C9	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C10	19A116080P7	Polyester: 0.1 pf ±20%, 50 VDCW.
C14	19A116656P20J2	Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -220 PPM.
C15	7491395P109	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JL.
C16	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
C17	19A116080P01	Polyester: 0.01 pf ±20%, 50 VDCW.
C18	5490008P25	Silver mica: 82 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C19	5490008P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5490008P1	Silver mica: 5 pf ±0.5%, 500 VDCW; sim to Electro Motive Type DM-15.
C21 and C22	5496219P49	Ceramic disc: 27 pf ±5%, 500 VDCW, temp coef 0 PPM.
C23		(Part of Y2).
C26	5496219P368	Ceramic disc: 160 pf ±5%, 500 VDCW, temp coef -150 PPM.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19C311181G3	Coil assembly.
L2 and L3	19A115711P1	Transformer, freq: 455 KHz; sim to Automatic Mfg EX12670.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029840P2	Contact, electrical: sim to Amp 42827-2.
P2	4029840P1	Contact, electrical: sim to Amp 41854.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2	19A115245P1	Silicon, NPN.
Q3	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q4	19A115245P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R3	3R77P513J	Composition: 5100 ohms ±5%, 1/2 w.
R4	3R152P333K	Composition: 33,000 ohms ±10%, 1/4 w.
R5	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R6	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
R7	3R77P123K	Composition: 12,000 ohms ±10%, 1/2 w.
R8	3R77P62J	Composition: 6200 ohms ±5%, 1/2 w.
R9	3R77P302J	Composition: 3000 ohms ±5%, 1/2 w.
R10	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R11	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
R12	3R77P513J	Composition: 51,000 ohms ±5%, 1/2 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T2		COIL ASSEMBLY 19B216120G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C23	5496218P258	Ceramic disc: 62 pf ±5%, 500 VDCW, temp coef -80 PPM.
	5491778P3	Tuning slug.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y2	19A110398P1	Quartz: freq 11945.00 KHz, temp range -30°C to +75°C.
A427		IF AUDIO AND SQUELCH BOARD 19D413120G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C2	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C3	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C4	5496219P717	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -750 PPM.
C5 and C6	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
C8	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C9 and C10	5490008P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C11	5496219P656	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef +470 PPM.
C12	5494481P108	Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C13	19A115680P107	Electrolytic: 100 µf +150% -10%, 15 VDCW; sim to Mallory Type TT.
C14 and C15	19A115680P104	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C17	19A116080P7	Polyester: 0.1 pf ±20%, 50 VDCW.
C19 and C20	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
C21	19A116080P3	Polyester: 0.01 pf ±20%, 50 VDCW.
C22	19A116080P108	Polyester: 0.15 µf ±10%, 50 VDCW.
C23	19A116080P107	Polyester: 0.1 pf ±10%, 50 VDCW.
C25	5496267P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C26*	19A116080P110	Polyester: 0.33 µf ±10%, 50 VDCW.
		In REV D-L:
	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
		In REV D and earlier:
	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C27*	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
		In REV B and earlier:
	5496267P6	Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C32	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C33	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C35	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C36	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C37	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C38*	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Deleted by REV C.
C39	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C40*	5496267P29	Tantalum: 0.68 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
		In REV J and earlier:
	5496267P28	Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C41	5490008P129	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C44	5494481P124	Ceramic disc: 1500 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C45	5490008P27	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C46	4029003P108	Silver Mica: 1000 pf ± 10%, 500 VDCW; sim to Electro Motive Type DM-20.
C47	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C48	19A116080P1	Polyester: 0.01 µf ±20%, 50 VDCW.
C49*	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D. Deleted by REV C.
C50	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C51	19A116655P22	Ceramic disc: 2700 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C52	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C53 and C54	5496267P213	Tantalum: 2.2 µf ±10%, 20 VDCW; sim to Sprague Type 150D.
C55*	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D. Added by REV C.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 and CR2	19A115250P1	Silicon.
CR3* thru CR4*	19A115250P1	Silicon.
		In REV E and earlier:
	4038056P1	Germanium.

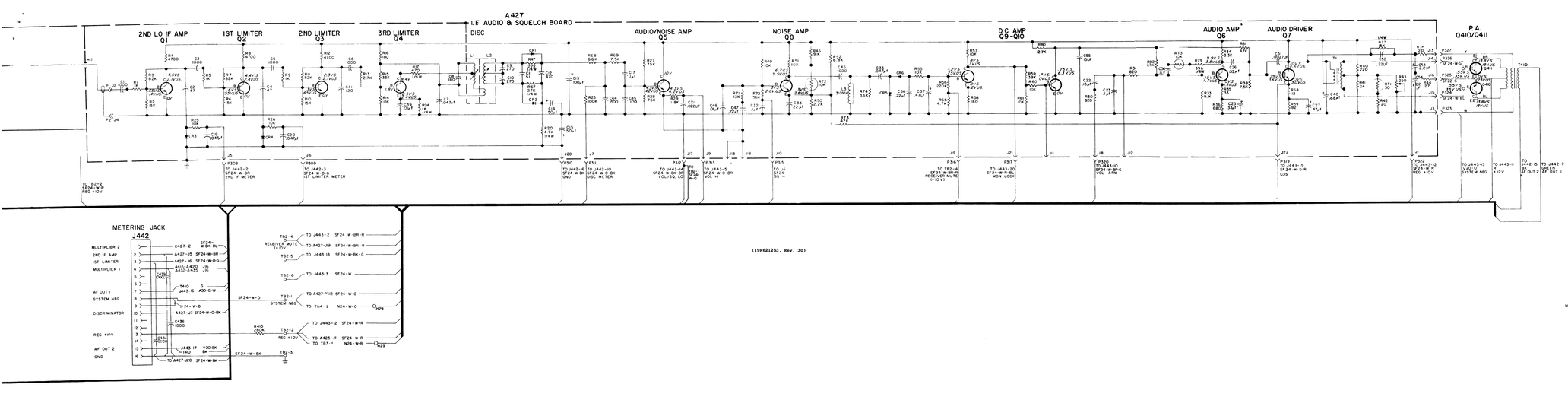
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

MODELS WITH DISCRETE CIRCUIT OSCILLATOR	MODELS WITH ICOM OSCILLATOR	NO. OF FREQS.	FREQ RANGE 406-420=LO 450-470=HI	U H S RECEIVER A410/A411 PRESENT
4ER42F10	4ER42H10	1	LO	
4ER42F11	4ER42H11	1	HI	
4ER42F12		2	LO	
4ER42F13		2	HI	
4ER42F14	4ER42H14	4	LO	
4ER42F15	4ER42H15	4	HI	
4ER42F22	4ER42H22	1	LO	X
4ER42F23	4ER42H23	1	HI	X
4ER42F24		2	LO	X
4ER42F25		2	HI	X
4ER42F26	4ER42H26	4	LO	X
4ER42F27	4ER42H27	4	HI	X



SCHEMATIC DIAGRAM

406—470 MHz RECEIVER
MODELS 4ER42F10-27 & 4ER42H10-27



NOTE
1. W444 AND W445 PRESENT ONLY IN U.H.S. RECEIVER.
W441 PRESENT ONLY IN NON-U.H.S. RECEIVER.
2. CHANGES TO THIS DIAGRAM MAY AFFECT DIAGRAMS 19R602536, 19R602530,19R621327, 19R621328

	REV
PL19E500868G5	L1
PL19E500869G5	N
PL19E500869G1	N
PL19E500869G8	P
A425 PL19B216135G3	A
A427 PL19D413169G5	M

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED. RESISTOR VALUES IN OHMS (AKΩ) FOLLOWED BY K=1000 OHMS, OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN MICROFARADS (EQUAL TO PICOFARADS IF LESS THAN 1). FOLLOWED BY µF=MICROFARADS, MMF=PICOFARADS IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS

VOLTAGE READINGS

VOLTAGE READINGS ARE TYPICAL READINGS MEASURED TO SYSTEM NEGATIVE (J442-9)WITH TEST SET MODEL 4EX340 OR A 20,000 OHM-PER-VOLT METER.

I= NO SIGNAL, N.M.=N.M=SQUELCH CONTROL FULLY COUNTERCLOCKWISE (MAXIMUM SQUELCH) US=SQUELCH CONTROL FULLY CLOCKWISE WITH A ONE MILLIVOLT, MODULATED SIGNAL (UNSQUELCHED) AND 5 WATT AUDIO OUTPUT.

NOTE
TO CHECK FOR PROPER OPERATION OF 1ST MIXER A402, MEASURE CURRENT +10V CIRCUIT (W-R LEAD). CURRENT WITH FIRST OSC. XTAL REMOVED, SHOULD BE 0.0 TO 0.8 MA. CURRENT WITH FIRST OSC. OPERATING PROPERLY, SHOULD BE 12 TO 16 MA.

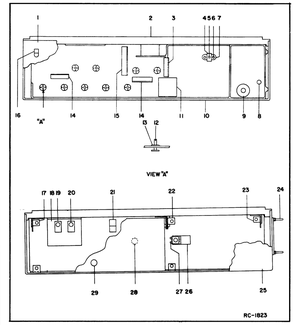
●LOW SPLIT 406-420 MHZ
▲HIGH SPLIT 450-470 MHZ
■ LEAVE TO BE TERMINATED AS SHORT AS POSSIBLE.

SCHEMATIC DIAGRAM

406—470 MHz RECEIVER
MODELS 4ER42F10-27 & 4ER42H10-27

(Cont'd from page 11) (LBI-4044)

SYMBOL	GE PART NO.	DESCRIPTION
CB5 and CB6	19A115250P1	Silicon.
CB7* and CB8*	19A115250P1	Silicon. Deleted by REV C.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J22	4033513P4	Contact, electrical; sim to Bead Chain LB3-3.
		- - - - - - - - - INDUCTORS - - - - - - - - -
L1	19A115711P6	Transformer, freq: 455 KHz; sim to TOKO PEFCH-14733-CE12.
L2	19A115711P7	Transformer, freq: 455 KHz; sim to TOKO PEFCH-14734-EHL2.
L3	19A127134G1	Choke.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 thru Q4	19A115123P1	Silicon, NPN.
Q5	19A115888P5	Silicon, NPN.
Q6	19A115123P1	Silicon, NPN.
Q7*	19A115300P4	Silicon, NPN.
Q8	19A115123P1	Silicon, NPN.
Q9	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q10*	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		In KEY F and earlier:
	19A115123P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P103K	Composition: 1000 ohms ±10%, 1/2 w.
R2	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R3	3R77P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R4	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R5	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R6	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R7	3R77P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R8	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R9	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R10	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R11	3R77P823K	Composition: 82,000 ohms ±10%, 1/2 w.
R12	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R13	3R77P272K	Composition: 2700 ohms ±10%, 1/2 w.
R14	3R77P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R15	3R77P333J	Composition: 33,000 ohms ±5%, 1/2 w.
R16	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R17	3R152P471J	Composition: 470 ohms ±5%, 1/4 w.
R20	3R152P472K	Composition: 4700 ohms ±10%, 1/4 w.
R23	3R77P104K	Composition: 0.10 megohm ±10%, 1/2 w.
R24	3R152P102J	Composition: 1000 ohms ±5%, 1/4 w.
R25 and R26	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R27 and R28	3R77P753J	Composition: 75,000 ohms ±5%, 1/2 w.
R29	3R77P182J	Composition: 1800 ohms ±5%, 1/2 w.
R30*	3R77P821J	Composition: 820 ohms ±5%, 1/2 w.
		In KEY C and earlier:
	3R77P103J	Composition: 1000 ohms ±5%, 1/2 w.
		In KEY D and earlier:
R31	3R77P821J	Composition: 820 ohms ±5%, 1/2 w.
R33	3R77P912J	Composition: 9100 ohms ±5%, 1/2 w.
R34	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
R35	3R77P330K	Composition: 33 ohms ±10%, 1/2 w.
R36	3R77P681J	Composition: 680 ohms ±5%, 1/2 w.
R38	3R77P752J	Composition: 7500 ohms ±5%, 1/2 w.
R39	3R77P620J	Composition: 6200 ohms ±5%, 1/2 w.
R40*	3R77P221J	Composition: 220 ohms ±5%, 1/2 w.
		In KEY G and earlier:
	3R77P241J	Composition: 240 ohms ±5%, 1/2 w.
R41	3R152P240J	Composition: 24 ohms ±5%, 1/4 w.
R42	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
R43	19B209358P101	Variable; carbon film: approx 20 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R44	19B209032P101	Wirewound: 0.27 ohms ±10%, 2 w; sim to IRC Type BWH.
R46	3R77P913J	Composition: 91,000 ohms ±5%, 1/2 w.
R47	3R152273K	Composition: 27,000 ohms ±10%, 1/4 w.
R49	3R77P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R50	3R77P222J	Composition: 2200 ohms ±5%, 1/2 w.
R51	3R77P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R52	3R77P683J	Composition: 6800 ohms ±5%, 1/2 w.
R55	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R56	3R77P224J	Composition: 0.22 megohm ±5%, 1/2 w.
R57	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R58	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R59	3R77P393K	Composition: 39,000 ohms ±10%, 1/2 w.
R60 and R61	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R62*	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w. Deleted by REV C.
R64*	3R77P120J	Composition: 12 ohms ±5%, 1/2 w.
		In REV B and earlier:
	3R77P180J	Composition: 18 ohms ±5%, 1/2 w.
R66	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R67	3R152P273K	Composition: 27,000 ohms ±10%, 1/4 w.
R68	3R77P682J	Composition: 6800 ohms ±5%, 1/2 w.
R69	3R77P752J	Composition: 7500 ohms ±5%, 1/2 w.
R71	3R77P133J	Composition: 13,000 ohms ±5%, 1/2 w.
R72	3R77P362J	Composition: 3600 ohms ±5%, 1/2 w.
R73	3R77P473J	Composition: 47,000 ohms ±5%, 1/2 w.
R74	3R77P362J	Composition: 3600 ohms ±5%, 1/2 w.
R75*	3R77P473J	Composition: 47,000 ohms ±5%, 1/2 w. Deleted by REV C.
R76*	3R152P913J	Composition: 9100 ohms ±5%, 1/4 w. Deleted by REV C.
R77*	3R152P153J	Composition: 15,000 ohms ±5%, 1/4 w.
		In REV B and earlier:
	3R152P562J	Composition: 5600 ohms ±5%, 1/4 w.
R78*	3R77P200J	Composition: 20 ohms ±5%, 1/2 w.
		In REV C and earlier:
	3R77P100J	Composition: 10 ohms ±5%, 1/2 w.
R79	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R80*	3R152P273J	Composition: 2700 ohms ±5%, 1/4 w.
		In REV C-K:
	3R152P433J	Composition: 4300 ohms ±5%, 1/4 w. Added by REV C.
R81*	3R152P473J	Composition: 4700 ohms ±5%, 1/4 w. Added by REV C.
R82*	3R77P273J	Composition: 27,000 ohms ±5%, 1/2 w. Added by REV C.
C6		(Part of T1).
C7		(Part of T2).
RT1	5490828P41	Thermistor: 30 ohms ±10%, color code black, white; sim to Global Type BI311-A.
RT2 and RT3	5490828P9	Thermistor: 10,000 ohms ±10%, color code yellow; sim to Global Type 551M-B.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19A116046P1	Audio freq: 300 to 4000 Hz, Pri: 19.2 ohms ±10% DC res, Sec: 23.5 ohms ±10% DC res.
A430		HIGH IF AMPLIFIER 19D835566G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116655P19	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Disc.
C2*	7489162P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		In 19ES00881G5 KEY H and earlier: In 19ES00881G9 KEY J and earlier: In 19ES00881G7 KEY R and earlier: In 19ES00881G8 KEY S and earlier:
	5490008P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C3	5496218P650	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -150 PPM.
C4	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Disc.
C5 and C6	19A116080P5	Polyester: 0.047 pf ±20%, 50 VDCW.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1*	19A115440P1	Silicon, NPN. In 19ES00881G5 KEY K and earlier: In 19ES00881G6 KEY L and earlier: In 19ES00881G7 KEY R and earlier: In 19ES00881G8 KEY L and earlier:
	19A115328P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P303J	Composition: 300 ohms ±5%, 1/4 w.
R2	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R3*	3R152P152J	Composition: 1500 ohms ±5%, 1/4 w. In 19ES00881G5 KEY K and earlier: In 19ES00881G6 KEY L and earlier: In 19ES00881G7 KEY K and earlier: In 19ES00881G8 KEY L and earlier:
	3R152P302J	Composition: 3,000 ohms ±5%, 1/4 w.
R4	3R152P682J	Composition: 6800 ohms ±5%, 1/4 w.
R5	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R7	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19B216372G1	Coil, includes tuning slug 549178P7.
A432 thru A435		OSCILLATOR/MULTIPLIER BOARD A432 19C311726G1 A433 19C311726G2 A434 19C311726G3 A435 19C311726G4
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C3	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Disc.
C4	5491601P123	Phenolic: 1.5 pf ±5%, 500 VDCW.
C5	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Disc.
C6		(Part of T1).
C7		(Part of T2).
C8	5496219P238	Ceramic disc: 7 pf ±5%, 500 VDCW; temp coef -80 PPM.
C9	5490008P135	Silver mica: 220 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C10 thru C14	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Disc.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR5	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J6	4033513P4	Contact, electrical: sim to Bead Chain LB3-3.
J15 and J16	4033513P4	Contact, electrical: sim to Bead Chain LB3-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1 and L2	7488079P16	Choke, RF: 10 µh ±10%, 0.6 ohm DC res max; sim to Jeffers 4421-7K.
L5		(Part of T1 and T2).
L6	7488079P33	Choke, RF: 2.20 uh ±10%, 0.50 ohms DC res max; sim to Jeffers 4412-9K.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1*	19A115440P1	Silicon, NPN. In KEY A and earlier:
	19A115330P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R152P103J	Composition: 1000 ohms ±5%, 1/4 w.
R2	3R152P151J	Composition: 150 ohms ±5%, 1/4 w.
R3	3R152P103J	Composition: 10,000 ohms ±5%, 1/4 w.
R4	3R152P101K	Composition: 100 ohms ±10%, 1/4 w.
R5 and R6	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R7	3R77P272K	Composition: 2700 ohms ±10%, 1/2 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1 and T2		COIL ASSEMBLY T1 19B204950G1 T2 19B204950G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C6	5496218P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C7	5496218P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L5	19A127128P1	Coil.
	5491798P7	Tuning slug.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY1 thru XY4	19B216043G1	Socket.
		- - - - - - - - - - OSCILLATORS - - - - - - - - - -
Y1 thru Y4	4EG26A10	NOTE: When reordering specify ICOM Frequency. ICOM Freq = Operating Freq -12.4 MHz - 24. Integrated Circuit Oscellator Module (ICOM).
	19D413070P1	Cap, decorative.
		CHASSIS AND RF CIRCUIT 19ES00881G5 thru G8
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C410 and C411		Refer to Mechanical Parts (RC-1823).
C412 and C413	5493392P7	Ceramic, feed-thru: 1000 pf ±100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C414 thru C418		Refer to Mechanical Parts (RC-1823).
C419 thru C422	5493392P7	Ceramic, feed-thru: 1000 pf ±100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C423 and C424		Refer to Mechanical Parts (RC-1598).
C425 thru C427	5493392P7	Ceramic, feed-thru: 1000 pf ±100%-0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C428	5496267P11	Tantalum: 68 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C429	19A115680P4	Electrolytic: 50 pf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C430 and C431	5493392P7	Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C432	5493392P107	Ceramic, stand-off: 1000 pf +100%-0%, 500 VDCW; sim to Allen-Bradley Type 585D.
C435 and C436	777475O9P4	Ceramic disc: .001 pf +100% -0%, 500 VDCW.
C437	5493392P3	Ceramic, feed-thru: 47 pf +100% -0%, 500 VDCW; sim to Allen-Bradley Type FA5C.
C438	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C439 and C440	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Disc.
C441*	5493392P7	Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen-Bradley Type FA5C. Added by REV F.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A116062P2	Selenium.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J441		(Part of W441).
J442	19B205689G2	Connector: 18 contacts rated at 5 amps min at 1000 VDC max.
J443	19C303426G1	Connector: 20 pin contacts.
J444		(Part of W444).
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L410	19B204938G8	Coil.
L411	19B204938G15	Coil.
L412	19B204938G8	Coil.
L413	19B204938G16	Coil.
L414	19B204938G11	Coil.
L415 thru L417	19B204936P13	Coil.
L418	19B204938G17	Coil.
L419	19B204938G12	Coil.
L420 thru L422	19B204936P14	Coil.
L423	19B204938G18	Coil.
L424	19B204938G19	Coil.
L425	19B204936P15	Coil.
L426	19B204938G20	Coil.
L427	19B204936P16	Coil.
L428 and L429	7488079P16	Choke, RF: 15 µh ±10%, 1.2 ohms DC res; sim to Jeffers 4421-9K.
L430 and L431	7488079P6	Choke, RF: 1.0 µh ±10%, 0.30 ohms DC res; sim to Jeffers 4411-8K.
L432	19A127433P1	Coil.
L433 thru L434	19A115700P2	Bead, ferrite.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P305 thru P313	4029840P2	Contact, electrical: sim to Amp 42827-2.
P312	4029840P3	Contact, electrical: sim to Amp 42101-2.
P313 thru P322	4029840P2	Contact, electrical: sim to Amp 42827-2.
P323	4029840P1	Contact, electrical: sim to Amp 41854.
P324	4029840P2	Contact, electrical: sim to Amp 42827-2.
P325	4029840P1	Contact, electrical: sim to Amp 41854.
P326	4029840P2	Contact, electrical: sim to Amp 42827-2.
P327	4029840P1	Contact, electrical: sim to Amp 41854.
P328 thru P335	4029840P2	Contact, electrical: sim to Amp 42827-2.
P410 and P411	4029840P2	Contact, electrical: sim to Amp 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q410* and Q411*	19A116741P2	Silicon, NPN. In 19ES00881G5 KEY J and earlier: In 19ES00881G6 KEY K and earlier: In 19ES00881G7 KEY J and earlier: In 19ES00881G8 KEY K and earlier:
	19A116203P2	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R410	19A116278P444	Metal film: 0.28 megohm ±2%, 1/2 w.
R411*	3R76P390K	Composition: 39 ohms ±10%, 1 w. Added by REV H.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T410	19A116041P2	Audio freq: 300 Hz to 4000 Hz, Pri: 1.00 ohm 115% DC res, Sec 1: 0.23 ohm ±10% DC res, Sec 2: 10.5 ohms ±15% DC res.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424P2	Miniature, phen: 1 terminal.
TB2	7487424P26	Miniature, phen: 6 terminals.
TB3	7487424P24	Miniature, phen: 3 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W441	19B205634G3	Coaxial cable: 50 ohm, approx 5 inches long. Includes (J441) 19B209122P3 connector.
W444	19B205634G7	Coaxial cable: 50 ohm, approx 7 inches long. Includes (J444) 19B209122P4 connector.
W445	19A122550G1	RF: 50 ohm imp, approx 4 inches long.
		MULTI-FREQUENCY MODIFICATION KIT 19A127096-G1 and G2
	19A127136G1	Harness assembly.
P301 thru P304	4029840P2	Contact, electrical; sim to Amp 42827-2. (Part of 19A127136G1 Harness assembly).
L435 thru L442	19A115700P2	Bead, ferrite. (Part of 19A127136G1 Harness assembly).
L443 thru L450	19A115700P2	Bead, ferrite.
		MECHANICAL PARTS (SEE RC-1823)
1	19C303396G4	Bottom cover. (Station)
	19C303385G1	Bottom cover. (Mobile)
2	19C317344P3	Heat sink.
3	19A121723P1	Support. (Mounts C425 and C426)
4	403308P1	Clip. (Part of XY1-XY4).
5	19B200525P9	Rivet. (Part of XY1-XY4).
6	19A115795P1	Contact. (Part of XY1-XY4).
7	403930P1	Crystal socket. (Part of XY1-XY4).
8	4035306P40	Fiber washer. (Used with Y2 on A425).
9	403425P5	Can. (Used with T1 on A425).
10	19C303389G1	Chassis.
11	19A121722P1	Plate.
12	403676D4	Screw. (Part of C410, C411, C414-C418, C423 and C424).
13	7117825P1	Washer. (Part of C410, C411, C414-C418, C423 and C424).
14	19A121724P1	Support. (Mounts C419 and C420).
15	19A127372P1	Support. (Mounts C427, C430 and C431).
16	7145451P1	Cable clamp.
17	19B204584G3	Hinge.
18	19B210727P1	Support. (Used with Q410 and Q411).
19	19A116023P2	Plate, insulated. (Used with Q410 and Q411).
20	19A116023P1	Insulator, bushing. (Used with Q410 and Q411).
21	4029851P6	Clip, loop.
22	19B204583G1	Hinge.
23	19B204583G2	Hinge.
24	19A121675P1	Guide pin.
25	19C303495G3	Top cover. (Station, except Repeaters and YW).
	19C303676G2	Top cover. (Station, Repeater and YW only).
	19C303345P2	Top cover. (Mobile).
26	19A121729P2	Angle.
27	7160861P4	Nut, sheet spring. (Used to secure cover).
28	4036555P1	Insulator, disc. (Used with Q7 on A427).
29	403526P72	Button, plug.



RC-1823

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. B - Chassis and RF Circuit 19E500881G5 thru G8

REV. A - 2nd Mixer Board A425, 19D216119G2

REV. B - IF Audio and Squelch Board A427, 19D413129G2

INCORPORATED INTO INITIAL SHIPMENT.

Chassis and RF Circuit 19E500881G5 thru G8

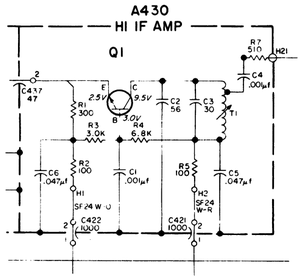
REV. C - To incorporate a new multiplier transistor and decouple the supply voltage. Changed Q1. Added C15 and R7.

REV. D - To eliminate squelch opening thump. Removed the 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.

REV. E - To improve stability of the multiplier boards A413 and A414. Deleted C9.

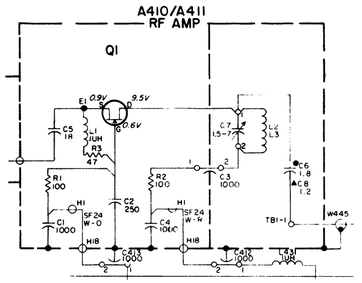
REV. F - To improve sensitivity. Added C411 to Hi IF Amplifier A430.

Schematic Diagram was:



REV. G - To stabilize the R.F. Amplifier and to improve the band-end tuning of the multiplier assembly. Changed the RF amplifier board. Changed C5, C7 and C8 on the Multiplier Assembly.

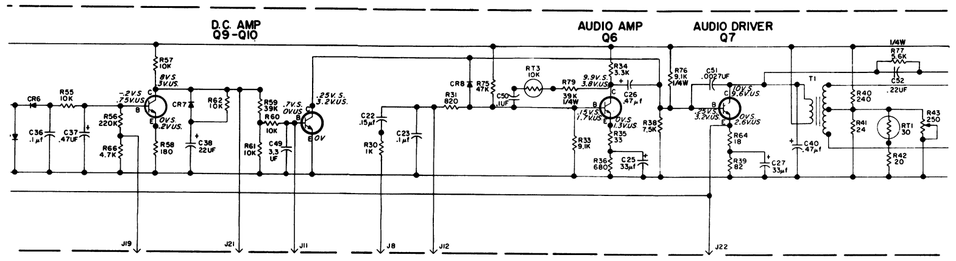
Schematic Diagram was:



IF Audio and Squelch Board A427, 19D413129G2

REV. C - To eliminate barely audible squelch switching transients and to reduce receiver squelch tail. Deleted C38, C49, CR7, CR8, R62, R75 and R76. Added C55, R80, R81 and R82. Changed C27, C36, R53, R64 and R77.

Schematic Diagram was:



REV. D - To improve frequency response. Changed R30 and R78.

REV. E - To compensate for vendor change. Changed C26.

REV. D - To improve frequency response. Changed R30 and R78.

REV. E - To compensate for vendor change. Changed C26.

REV. F - To incorporate silicon diodes. Changed CR3 & CR4.

REV. G - To ensure squelch action at -30°C. Changed Q10.

REV. H - To improve PA bias. Changed R40.

REV. J - To improve stability of audio output with no load. Added R85.

REV. K - To improve frequency response. Deleted R85 and changed C40.

REV. L - To reduce audio distortion. Changed R80.

REV. M - To improve frequency response. Changed C26.

REV. N - To improve stability. Changed Q5.

Chassis and RF Circuit 19E500881G5, G7

REV. H - To improve operation. Deleted CR1.

REV. J - To improve operation of mixer (A412). Changed C2 and added C8.

REV. K - To incorporate new transistors. Changed Q410, Q411.

REV. L - To improve intermodulation performance. Changed R3 and Q1.

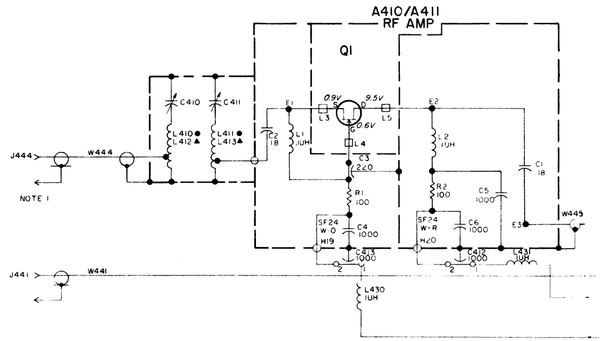
Chassis and RF Circuit 19E500881G5

REV. M - To improve sensitivity. Changed C3.

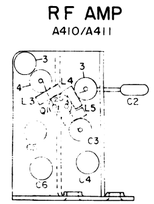
REV. M - Chassis and RF Circuit 19E500881G7
REV. N - Chassis and RF Circuit 19E500881G8

To incorporate a new RF Amplifier Assembly. Changed A410/A411.

Schematic Diagram Was:



Outline Diagram Was:



Chassis and RF Circuit 19E500881G6 and G8

REV. H - To improve band-end tuning in multiplier board A413/A414. Changed C6 and C8.

REV. J - To improve operation. Deleted CR1

REV. K - To improve operation of Mixer (A412) Changed C2 and added C8.

REV. L - To incorporate new transistors. Changed Q410 and Q411.

REV. M - To improve intermodulation performance. Changed R3 and Q1.

REV. M - Chassis and RF Circuit 19E500881G5
REV. N - Chassis and RF Circuit 19E500881G6
REV. N - Chassis and RF Circuit 19E500881G7
REV. P - Chassis and RF Circuit 19E500881G8

To improve sensitivity. Changed C3.

OSCILLATOR/MULTIPLIER BOARD A432 THRU A435 19C311726G1-G4

REV. B - To incorporate a new transistor. Changed Q1.

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-4043

DF-1086

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

PRINTED IN U.S.A.