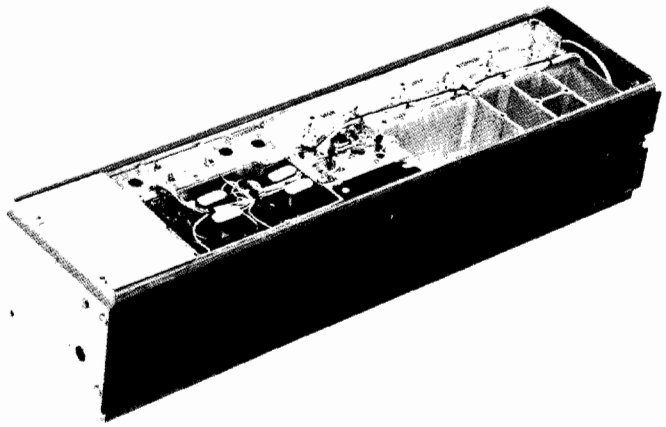
MOBILE RADIO

# MASTR Progress Line

## 132—174 MHZ RECEIVER MODELS 4ER41C10—21, 34—45 & 4ER41E10—21, 34—45 (Includes Options 7341—7344)



Maintenance Manual LBI-3867K

ER-41-C & E

## SPECIFICATIONS *

| | ER-41-C & E | |
|---|---|---|
| FCC Filing Designation | | |
| Frequency Range | 132—174 MHz | |
| Audio Output | 5 watts at less than 5% distortion | |
| Sensitivity | Standard Receivers | Ultra-High Sensitivity Receivers |
| 12-dB SINAD (EIA Method) | 0.35 μV | 0.175 μV |
| 20-dB Quieting Method | 0.5 μV | 0.25 μV |
| Selectivity | | |
| EIA Two-Signal Method | -90 dB (adjacent channel, 30 kHz channels) | |
| 20-dB Quieting Method | -100 dB at ±15 kHz | |
| Spurious Response | | |
| Standard Receiver | -100 dB | |
| UHS Receiver | -94 dB | |
| First Oscillator Stability | | |
| Type ER-41-C | ±.0005% (-30°C to +60°C) | |
| Type ER-41-E | ±.0002% (-30°C to +60°C) | |
| Modulation Acceptance | ±7 kHz (narrow-band) | |
| Squelch Sensitivity | | |
| Critical Squelch | | |
| Standard Receiver | 0.2 μV | |
| UHS Receiver | 0.1 μV | |
| Maximum Squelch | Greater than 20-dB quieting (less than 1.5 μV) | |
| Intermodulation (EIA) | | |
| Standard Receiver | -80 dB | |
| UHS Receiver | -75 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.

# TABLE OF CONTENTS

SPECIFICATIONS ..... Cover

DESCRIPTION ..... 1

CIRCUIT ANALYSIS ..... 1

- RF Preamplifier ..... 1
- Helical Resonators ..... 2
- Standard Oscillator/Multiplier Board ..... 2
- Oscillator/Multiplier Board with ICOM (Options 7341-7344) ..... 2
- 2nd Multiplier ..... 3
- 1st Mixer ..... 3
- High IF Amplifier and Crystal Filter ..... 3
- 2nd Oscillator, 2nd Mixer and 1st IF Amplifier ..... 3
- 2nd Lo IF Amplifier and Limiters ..... 3
- Discriminator ..... 3
- Audio-Noise Amplifier ..... 3
- Audio Amplifiers ..... 3
- Squelch ..... 4
- Channel Guard ..... 4

MAINTENANCE ..... 5

- Disassembly ..... 5
- ICOM Adjustment ..... 6
- Alignment Procedure ..... 7
- Test Procedures ..... 8
  - Audio Power Output and Distortion ..... 8
  - Usable Sensitivity (12-dB SINAD) ..... 8
  - Modulation Acceptance Bandwidth ..... 8
- Receiver Troubleshooting ..... 9

OUTLINE DIAGRAM ..... 10

SCHEMATIC DIAGRAM ..... 12&13

PARTS LIST ..... 11&14

PRODUCTION CHANGES ..... 15

## ILLUSTRATIONS

Figure 1 Block Diagram ..... 1
Figure 2 FET Nomenclature ..... 2
Figure 3 Removing Top Cover ..... 5
Figure 4 Removing Bottom Cover ..... 5
Figure 5 Coaxial Cable and Test Loop ..... 6
Figure 6 ICOM Frequency Connection Curve ..... 6
Figure 7 Test Setup for 20-Hz Double-Trace Sweep Alignment ..... 7
Figure 8 Detector Probe for Sweep Alignment ..... 7

**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 Types ER-41-C and ER-41-E are double conversion, superheterodyne FM receivers designed for operation on the 132-174 megahertz band. The Type ER-41-C receivers contain a standard crystal oscillator board with a frequency stability of ±0.0005%. The Type ER-41-E receivers contain an optional 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 receiver is of single-unit construction and is completely housed in an aluminum casting for maximum shielding and rigidity. The top compartment of the casting contains the RF, oscillator, converter, and 1st amplifier stages. The bottom portion of the casting contains the IF audio and squelch board, and the optional Channel Guard encode-decode board.

## CIRCUIT ANALYSIS

The MASTR Progress Line Receiver is completely transistorized, using silicon transistors throughout 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 PREAMPLIFIER (A321)

RF Preamplifier A321 is used only in ultra-high sensitivity (UHS) receivers and consists of RF Amplifier Q12.

The preamplifier uses a dual gate MOS FET as the active device. The MOS FET may be considered a semiconductor current path (or channel) whose resistance is varied by a voltage applied between the "gate" and "source" terminals.

RF from the antenna is coupled through C1 to Gate 1 terminal of MOS FET Q12. Q12 operates as a grounded-gate amplifier.

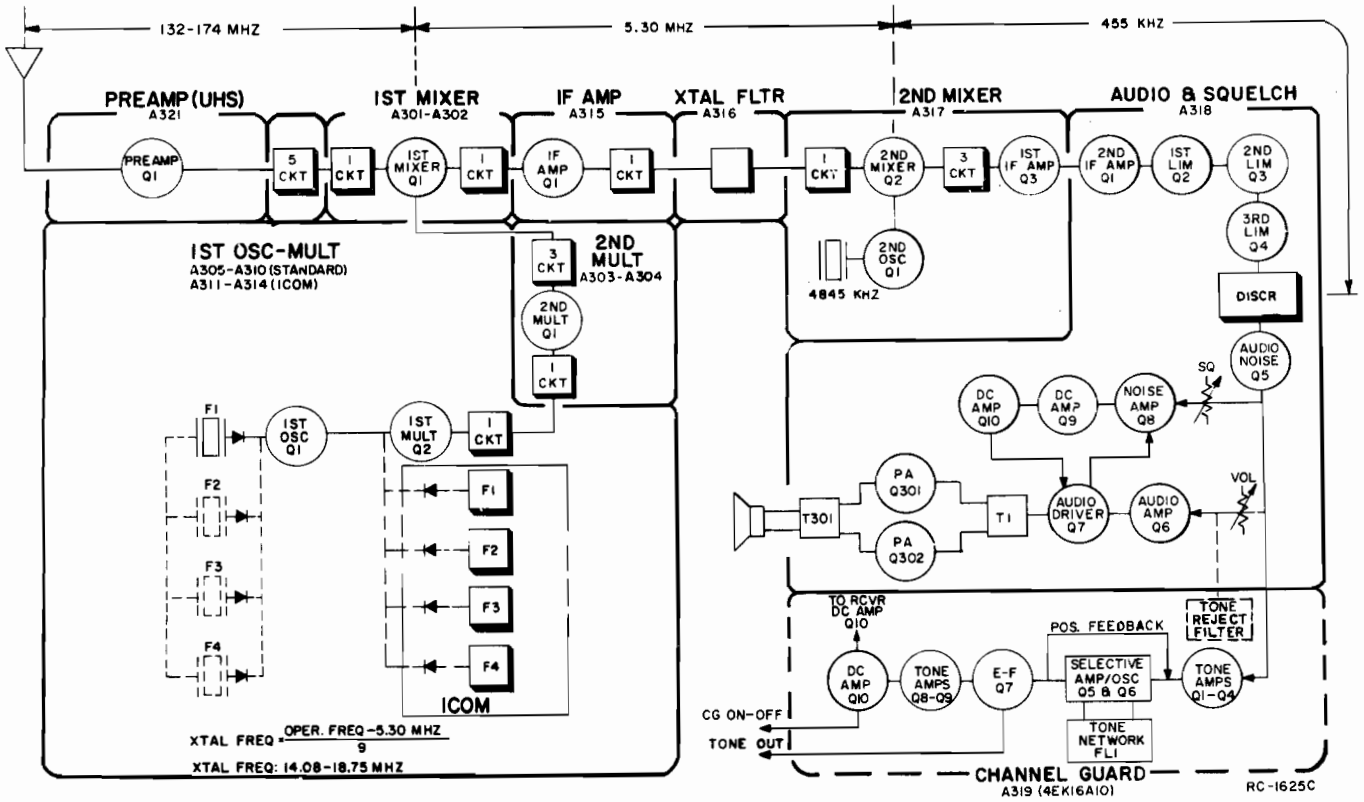



Figure 1 - Receiver Block Diagram

This method of operation provides a low impedance input to the amplifier. The amplified output is taken from the "drain" terminal and coupled through C6 to the input of five helical resonators.

HELICAL RESONATORS

In standard receivers, five helical resonators (L301/L302 through L309/L310) provide the RF selectivity in the front end. RF cable W441 connects the RF signal from the antenna to a tap on L301/L302. In UHS receivers, the five helical resonators provide additional RF selectivity of the signal from the amplifier.

The tap on L301/L302 is positioned to provide the proper impedance match to the antenna or preamplifier. The output of the helical resonators is coupled through C3 to the 1st Mixer Assembly.

STANDARD OSCILLATOR/MULTIPLIER (A305-A310)

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

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

The output of the 1st multiplier (tripler Q2) is transformer-coupled (T1/T2) to the 2nd multiplier assembly. The 1st multiplier tank is tuned to three times the crystal frequency, and is metered at centralized metering jack J442-4 through metering network CR5, R16, R5 and C33.

OSCILLATOR/MULTIPLIER BOARD WITH ICOM (Options 7341 - 7344)

Oscillator/Multiplier Boards A311 thru A314 use ICOM Module Model 4EG26A11. See the chart below:

| OSCILLATOR BOARD | OPTION NUMBER | NUMBER OF FREQUENCIES |
|---|---|---|
| A311 | 7341 | 1 |
| A312 | 7342 | 2 |
| A313 | 7343 | 3 |
| A314 | 7344 | 4 |

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 1st multiplier Q2.

The output of the 1st multiplier (tripler Q2) is transformer-coupled (T1/T2) to the 2nd multiplier assembly. The 1st multiplier tank is tuned to three times the crystal frequency, and is metered at centralized metering jack J442-4 through metering network CR5, R16, R5 and C33.

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.

2ND MULTIPLIER (A303/A304)

The 1st multiplier output is transformer-coupled through A303-T1/T2 to the base of 2nd multiplier A303-Q1. Following the 2nd multiplier are two resonant L-C circuits and a helical resonator tuned to nine times the crystal frequency. The output is taken from a tap on L311/L312 and applied to the 1st mixer.

1ST MIXER (A301/A302)

The 1st mixer uses a Field-Effect Transistor (FET) as the active device. (Fig. 2).

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

In mixer A301/A302, RF from the helical resonators is applied to the gate of Q1, and injection voltage from the 2nd multiplier is applied to the source. The mixer output is taken from the drain with the output tuned to the 5.3 MHz high IF frequency.

The FET has voltage-controlled characteristics, and may be compared to a vacuum tube in operation (see Figure 2B).

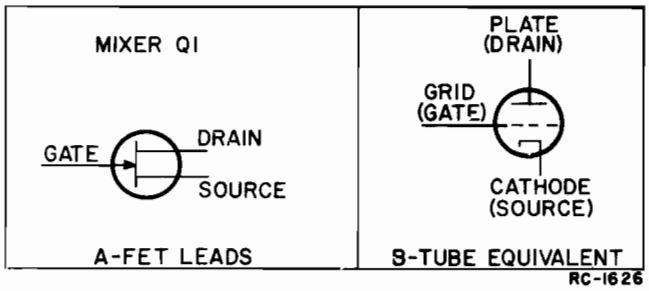



Figure 2 - FET Nomenclature

HI IF AMPLIFIER (A315) and CRYSTAL FILTER (A316)

A series-resonant circuit (A301-L3 and A315-C1) couples the mixer output to the emitter of the high IF amplifier A315-Q1. The transistor is connected as a grounded-base amplifier which provides a low impedance for the mixer input. The amplifier output is coupled through a transformer T1 to the crystal filter.

The highly selective crystal filter (A316) provides the major selectivity for the receiver. The output of the filter is coupled through impedance-matching transformer A317-T1 to the base of the 2nd mixer.

2ND OSCILLATOR, 2ND MIXER AND 1ST LO IF AMPLIFIER (A317)

A317-Q2 operates in a Colpitts oscillator circuit, with feedback supplied through C4. The oscillator low-side injection voltage (4845 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 Q317-Q3. The output of A317-Q3 is R-C coupled to the base of the 2nd low IF amplifier.

2ND LO IF AMPLIFIER AND LIMITERS (A318)

Additional amplification of the low IF signal going to the limiter stages is provided by 2nd low IF amplifier A318-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 (A316-Q2, -Q3 and -Q4). The 1st limiter is metered at J442-3 through metering network C20, CR4 and R26.

DISCRIMINATOR (A318)

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 (A318)

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 control, SQUELCH control, and Channel Guard input. The stage also provides power gain.

AUDIO AMPLIFIERS (A318)

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

Q301 and Q302 operate as a push-pull, Class AB audio PA stage. The PA output is coupled through audio transformer T301 to the loudspeaker. The yellow and white tertiary windings of T301 supply balanced feedback to the collector of Q7 to minimize distortion.

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 Q301 and Q302 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 (A318)

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-fence" 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.

CHANNEL GUARD

Channel Guard Board Model 4EK16A10 is a fully transistorized encoder-decoder for use in the MASTR Professional Series mobile and station combinations. The tone frequencies are controlled by plug-in tone networks that are made with precision components for excellent stability and reliability. The tone frequencies range from 71.9 to 203.5 Hz.

Encoder (A319)

Keying the transmitter removes the receiver mute +10 Volts, and forward biases feedback control diode CR5, causing it to conduct. When conducting, the diode shunts R39 which reduces the impedance of the positive feedback loop (R39, R35 and C19). This provides the necessary gain to the base of Q5 to permit oscillation.

The encoder tone is provided by selective amp-oscillator transistors Q5 and Q6 which oscillate at a frequency determined by the tone network. Negative feedback applied through the tone network to the base of Q5 prevents any gain in the stage except at the desired encode frequency.

Starting network R45, C21, C22 and CR6 provide an extremely fast starting time for the encoder tone. Keying the transmitter removes the receiver mute +10 Volts, causing a pulse to be applied to the base of Q6 to quickly start the oscillator. Thermistor-resistor combination R32 and RT1 provides temperature compensation for the oscillator output. Limiter diodes CR3 and CR4 keep the tone amplitude constant.

Emitter-follower Q7 follows the oscillator circuit. The encoder tone is taken from the emitter of Q7 and applied to an active low-pass filter (G101) on the transmitter.

Decoder (A319)

The decoder function is designed to eliminate all calls that are not tone coded for the Channel Guard frequency. As long as the CHANNEL GUARD-OFF switch on the control unit is left in the CHANNEL GUARD position, all signals are locked out except those from transmitters that are continuously tone coded for positive identification by the receiver.

Placing the CHANNEL GUARD-OFF switch in the OFF position instantly disables the Channel Guard operation so that all calls on the channel can be heard. When the hookswitch option is used, lifting the microphone from its hanger disables the Channel Guard Circuit.

Audio, tone and noise are taken from the emitter of the receiver audio-noise amplifier A318-Q5 and is fed through A319-J1 to four tone amplifier and bandpass filter circuits. The filters remove the audio and high-frequency noise from the signal, and the tone amplifiers provide sufficient gain to insure clipping by limiter diodes CR1 and CR2. The clipping action eliminates variation in the squelch performance due to changes in tone deviation. The signal is then applied to selective amplifiers Q5 and Q6 which amplify only the tone determined by the tone network.

The output of the selective amplifier is applied through emitter-follower Q7 to the high gain, broad-band tone amplifiers Q8 and Q9. The output of Q9 is rectified by detector diodes CR7 and CR8, and the resulting negative DC voltage controls the squelch gate. Q8 is normally biased for low gain. When the tone is detected by CR7 and CR8, feedback is provided through R54 to quickly change the bias on Q8 for full gain. This ensures a more positive "unsquelching" action.

Squelch gate diode CR9 is normally forward biased by a positive DC voltage (approximately 1.5 volts) fed through R58. The forward bias causes CR9 to conduct, feeding a DC voltage to the base of DC amplifier A318-Q10 in the receiver. This removes the bias on the receiver audio stages and holds them off.

When the proper tone is applied to the decoder, the negative DC voltage from the detector diodes back-biases squelch gate diode CR9 and cuts off the positive bias to the receiver DC amplifier A318-Q10. However, the receiver noise squelch circuit continues to operate until a carrier quiets the receiver.

Placing the CHANNEL GUARD - OFF switch in the OFF position (or removing the microphone from its hookswitch) removes the ground to the base of the decoder DC switch (Q10), causing it to conduct. This back-biases squelch control diode CR9 and cuts off the positive bias to the receiver DC amplifier (A318-Q10). The receiver noise squelch circuit continues to operate until a carrier quiets the receiver.

A tone rejection filter connected in parallel with A318-J2 (in the receiver bypasses any incoming tone to ground. This attenuates the tone level reaching the receiver audio circuits. The filter is composed of C26, C27, C28, C29, L1 and R59.

An optional tone reject filter (A320) that is identical to the filter described above is available for use in two-way radios with transmitter Channel Guard only.

## 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 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 front 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.





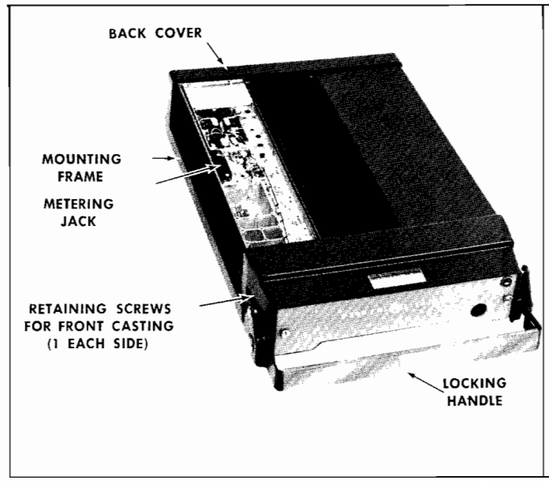



Figure 3 - Removing Top Cover

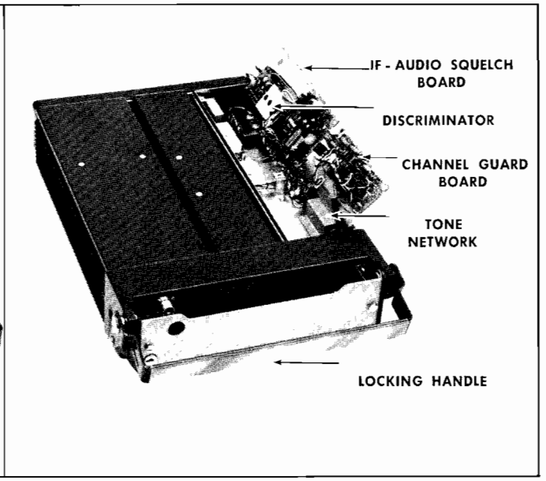
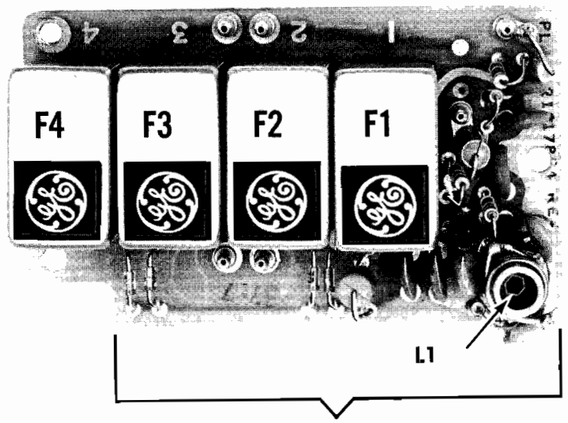



Figure 4 - Removing Bottom Cover




1ST OSC MULT. (ER-41-E)

## ICOM FREQUENCY ADJUSTMENT

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 42 to 56.25 MHz frequency range. The counter should have an accuracy of 0.4 part-per million (PPM).
2. Coaxial cable with test loop as described in Figure 15.
3. Mercury thermometer.

PROCEDURE:

1. Check ICOM temperature by taping the mercury thermometer to the side of the ICOM.
2. Connect the coaxial cable tc the frequency counter. Then place the 4-turn test loop over L1 on the 1st OSC/MULT board.
3. If the ICOM temperature is 80°F (±4°F) or 26.5°C (±2°C), the frequency indication on the counter should be 3 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 3 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 L1 should be 3 times the ICOM frequency ± the correction factor. Adjust the ICOM trimmer (if required) to obtain this frequency.

EXAMPLE

| | | |
|---|---|---|
| ICOM Frequency | - | 16.948,148 MHz |
| ICOM Color Dot | - | Green |
| Ambient Temperature | - | 35°C (95°F) |
| Correction Factor | - | -1.15 PPM |

Multiply ICOM Frequency by 3; (16.948,148 MHz x 3 = 50.844,444 MHz)

Multiply preceding figure by correction factor; (50.844 MHz x -1.15 PPM = -58.47 hertz (or -58 hertz)

Set the frequency measured at L1 for 50.844,386 MHz;

```
50.844,444
-       58
----------
50.844,386
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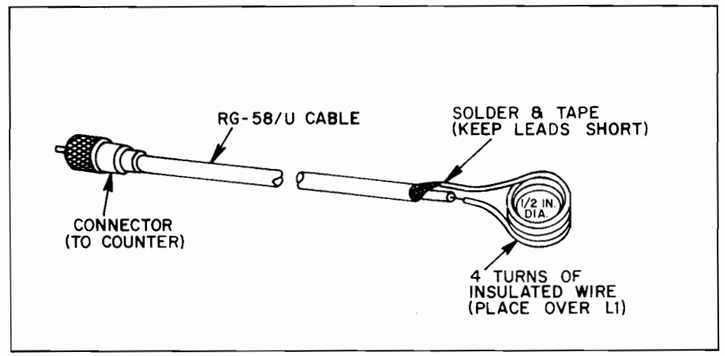



Figure 5 - Coaxial Cable and Test Loop

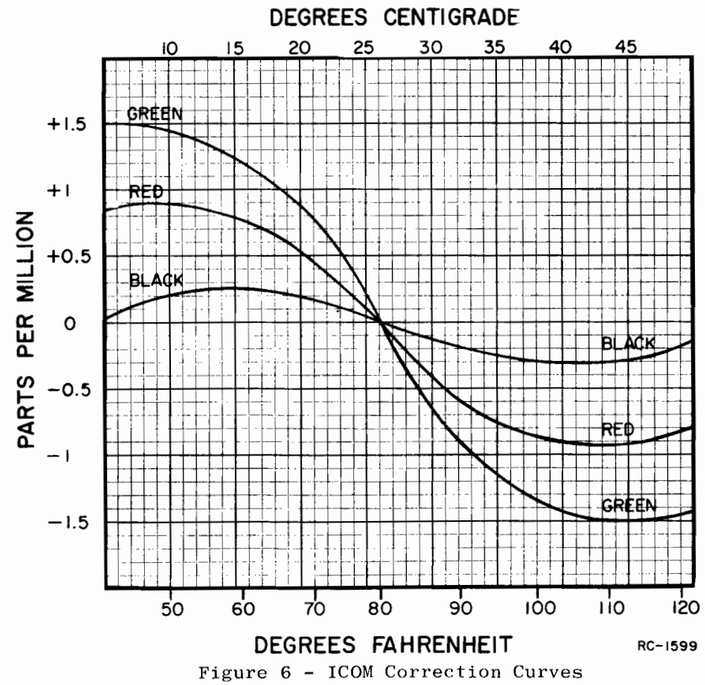



Figure 6 - ICOM Correction Curves

## ADJUSTMENT PROCEDURE

ICOM ADJUSTMENT
MODELS 4ER41E10-45

## FRONT END ALIGNMENT

EQUIPMENT REQUIRED

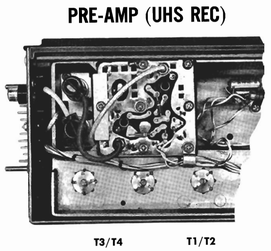
1. GE Test Set Model 4EX3A10, 4EX8K10, 11, station test meter panel or 20,000 ohms-per-Volt multimeter.
2. A 132-174 MHz signal source. Connect a one-inch piece of insulated wire no larger than 0.065 inch to generator output probe.

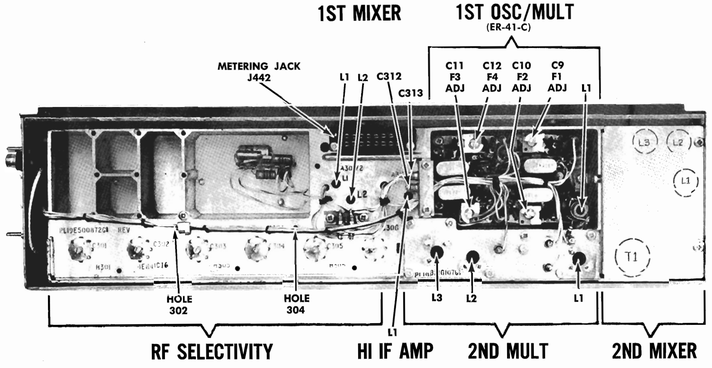
PRELIMINARY CHECKS AND ADJUSTMENTS

1. Connect Test Set to receiver centralized metering jack J442 and set meter sensitivity switch to the TEST 1 or 1-Volt position.
2. With Test Set in position J, check for regulated +10 Volts. If using Multimeter, measure from C312 to C313.
3. If using Multimeter, connect the positive lead to J442-16 (ground).
4. Disable the Channel Guard.

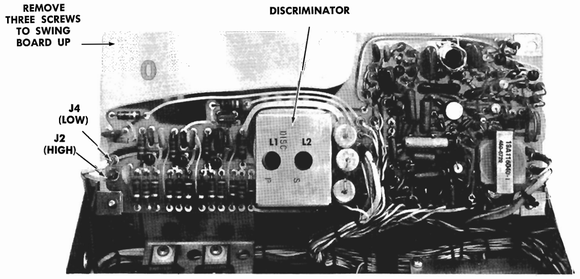
ALIGNMENT PROCEDURE

| STEP | METERING POSITION: GE Test Set or Meter Panel | METERING POSITION: Multimeter – at J442 | TUNING CONTROL | METER READING | PROCEDURE |
|---|---|---|---|---|---|
| | | OSCILLATOR AND MULTIPLIERS | | | |
| 1. | B (MULT-1) | Pin 4 | L1 (on 1st OSC/MULT) and L1 (on 2nd MULT) | See Procedure | Tune L1 (1st OSC/MULT) for maximum meter reading. Then tune L1 (2nd MULT) for minimum meter reading. |
| 2. | E (MULT-2) | Pin 5 | L1 (on 1st OSC/MULT) and L1, L2 and L3 (on 2nd MULT) | See Procedure | Tune L1 (1st OSC/MULT) and L1 and L2 (2nd MULT) for maximum meter reading. Then tune L3 (2nd MULT) for minimum meter reading. |
| 3. | A (DISC) | Pin 10 | | Zero | Apply an on-frequency signal into Hole 305. Adjust the signal generator for discriminator zero. |
| 4. | B (2nd IF AMP) | Pin 2 | L2 and L3 (on 2nd MULT) and C306 (on RF selectivity) | Maximum | Apply an on-frequency signal as above. Tune L2, L3 and C306 for maximum meter reading, keeping signal below saturation. |
| | | FREQUENCY ADJUSTMENT | | | |
| 5. | 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 and C12 as required.<br>— NOTE —<br>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



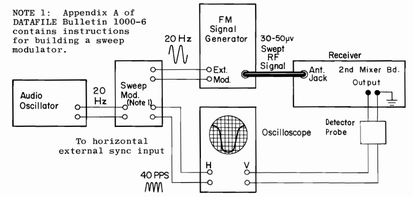




Figure 7 - Test Setup for 20-Hz Double-Trace Sweep Alignment

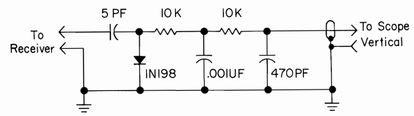



Figure 8 - Detector Probe for Sweep Alignment

## COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Models 4EX3A10, 4EX8K10, or -11, station test meter panel, or 20,000 ohms-per-Volt multimeter.
2. A 450 to 460 MHz source (GE Test Set Model 4EX7A10), and 132-174 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 (A305-A310 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 200 kHz, align the unit on channel F1. If the frequency spacing is greater than 200 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 C312 to C313.
5. If using Multimeter, connect the positive lead to J442-16 (ground).
6. Disable the Channel Guard.

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, MULTIPLIERS & 1ST MIXER | | |
| 3. | D (MULT-1) | Pin 4 | L1 (on 1st OSC/MULT) and L1 (on 2nd MULT) | See Procedure | Tune L1 (1st OSC/MULT) for maximum meter reading. Then tune L1 (on 2nd MULT) for minimum meter reading. |
| 4. | E (MULT-2) | Pin 5 | L1 (on 1st OSC/MULT) and L1, L2 and L3 (on 2nd MULT) | See Procedure | Tune L1 (1st OSC/MULT) for L1 and L2 (2nd MULT) for maximum meter reading. Then tune L3 (2nd MULT) for minimum meter reading. |
| 5. | A (DISC) | Pin 10 | | Zero | Apply an on-frequency signal into Hole 305. Adjust the signal generator for discriminator zero. |
| 6. | B (2nd IF AMP) | Pin 2 | L2 and L3 (on 2nd MULT) and C306 (on RF SELECTIVITY) | Maximum | Apply an on-frequency signal as above. Tune L2, L3 and C306 for maximum meter reading, keeping signal below saturation. |
| 7. | B (2nd IF AMP) | Pin 2 | L2 and L1 (on 1st MIXER A301/A302) | Maximum | Apply an on-frequency signal into Hole 304, and tune L2 and L1 for maximum meter reading, keeping signal below saturation. |
| | | | RF SELECTIVITY | | |
| 8. | B (2nd IF AMP) | Pin 2 | C305, C304, C303 and C302 | Maximum | Apply an on-frequency signal is the Hole shown below, keeping the signal below saturation. Tune C302 through C305 for maximum meter reading as shown below:<br>Insert Generator Probe In: — Tune<br>1. Hole 304 — C305<br>2. Hole 303 — C304<br>3. Hole 302 — C303<br>4. Hole 301 — C302 |
| | | | 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 9, 10, and 11.<br>— NOTE —<br>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. | | |
| 9. | B (2nd IF AMP) | Pin 2 | L3, L2, L1, T1 (2nd Mixer) and L1 (HI IF AMP) | Maximum | Apply on-frequency, unmodulated signal and tune L3, L2, L1, T1 (2nd mixer) and L1 (HI IF AMP) for maximum meter reading, keeping signal below saturation. |
| 10. | | | L3, L2, L1, T1 (2nd Mixer) and L1 (HI IF AMP) | | Connect scope, signal generator, and detector as shown in Figure 7. Set signal generator level for 30-50 µv and modulate with 10 kHz at 20 Hz. With detector at the collector of Q3 (2nd Mixer board output), tune 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 between ±7 and 9 kHz. |
| | | | FREQUENCY ADJUSTMENT | | |
| 12. | 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.<br>— NOTE —<br>For proper frequency control of the receiver, it is recommended that all frequency adjustments be made with the equipment 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. |

# TEST PROCEDURES

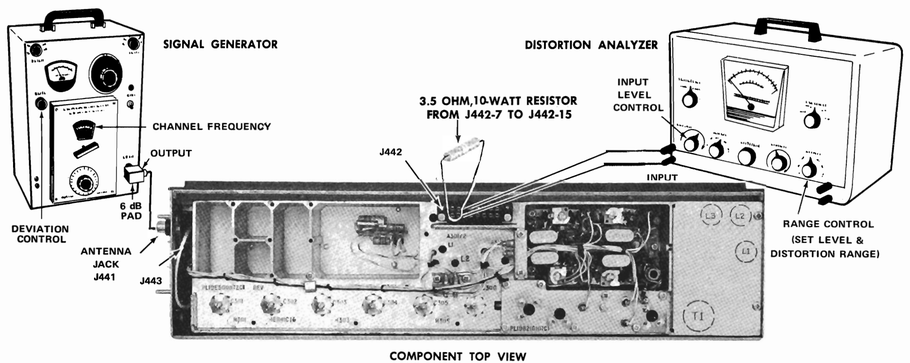
These Test Procedures are designed to help you to service a receiver that is operating---but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the defect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

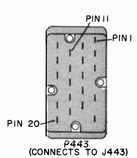
## TEST EQUIPMENT REQUIRED

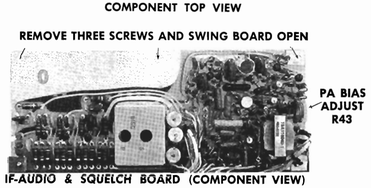
- Distortion Analyzer similar to: Heath IM-12
- Signal Generator similar to: Measurements M-560
- 6-dB attenuation pad, and 3.5-ohm, 10-watt resistor

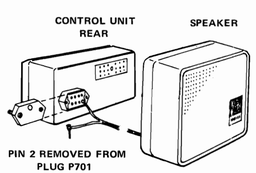
## PRELIMINARY ADJUSTMENTS

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 ±3.3 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 3.3-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 BANDWITH (IF BANDWITH)

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 ±7 kHz (but less than ±9 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 1-QUICKCHECKS

## 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 µv unmodulated input |
|---|---|---|
| A<br>Disc idling | Less than<br>±.05 VDC | |
| B<br>2nd IF | .05 VDC | 0.2 VDC |
| C<br>1st Lim | 0.6 VDC | 0.8 VDC |
| D<br>Mult 1 | 0.7 VDC | |
| E<br>Mult 2 | 1 VDC | |
| J<br>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.<br>• 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).<br>• Check voltage and resistance readings of 1st Oscillator/Multiplier Q1/Q2.<br>• Check crystal Y1. |
| LOW RECEIVER SENSITIVITY | • Check Front End Alignment (Refer to Receiver Alignment Procedure).<br>• Check antenna connections, cable and relay.<br>• Check 1st and 2nd Oscillator injection voltage.<br>• Check voltage and resistance readings of 1st Mixer, HI IF Amp and 2nd Mixer.<br>• Make SIMPLIFIED GAIN CHECKS (STEP 2A). |
| LOW AUDIO | • Check Audio PA (Q301 & Q302) voltage readings on schematic diagram.<br>• Make simplified gain and waveform checks of audio and squelch stages (Steps 2A and 2B).<br>• Make unsquelched voltage readings in Audio section (Refer to Receiver Schematic Diagram).<br>• Check voltage and resistance readings on Channel Guard board. |
| HIGH DISTORTION AT LOW AUDIO LEVELS (50 MW) | • Set PA bias adjust R43 as specified under Service.<br>• Checks in STEP 1 of TEST PROCEDURES. |
| IMPROPER SQUELCH OPERATION | • Check voltage and resistance readings of Squelch circuit (Refer to Receiver Schematic Diagram).<br>• 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:**

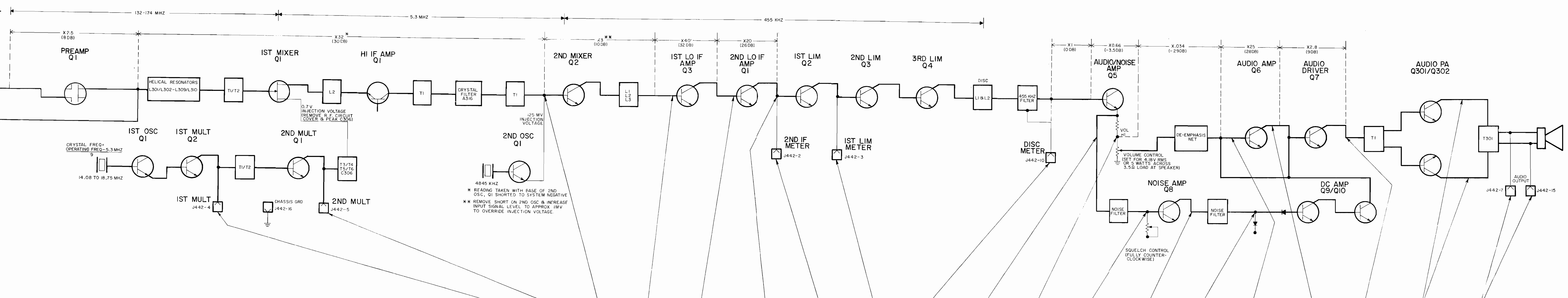
1. RF Voltmeter (Similiar to Boonton Model 91-CA or Millivac Type MV-18 C).
2. Signal on receiver frequency (below saturation). Correct frequency can be determined by zeroing the discriminator. Use 1,000 Hertz signal with 3.3 kHz deviation for audio stage.

**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:

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

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 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 and 2nd MULT which reference chassis ground).

| 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 RCVR 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 | STANDARD SIGNAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PROCEDURE | | | INCREASE GENERATOR OUTPUT UNTIL VTVM READING ON 1.5 V SCALE DECREASES 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 BETWEEN J442-7 AND J442-15 WITH SPEAKER DISCONNECTED. |
| READING | 5 VDC<br>GE TEST SET<br>(POS. D. 0.7V) | 2.5 VDC<br>GE TEST SET<br>(POS E. 1V) | 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<br>GE TEST SET<br>(POS B 0.3V) | -2 VDC<br>GE TEST SET<br>(POS. C. 0.6V) | 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 |

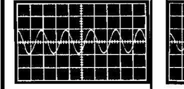
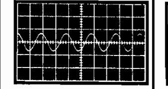
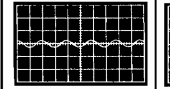
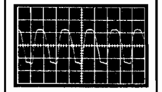
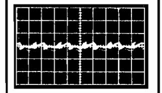
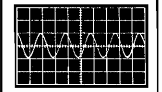
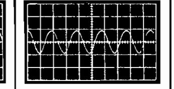
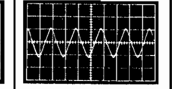
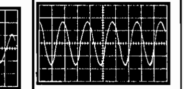
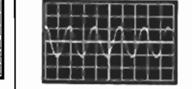
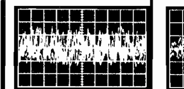
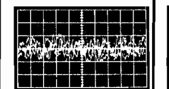
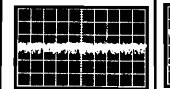
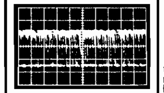
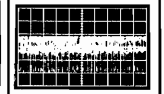
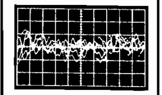
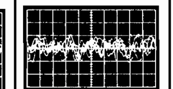
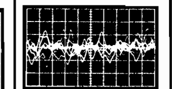
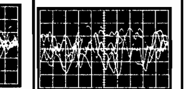
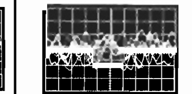
# STEP 2B-AUDIO & SQUELCH WAVEFORMS →

**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 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |
| | 2 V P-P | 1.4 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 | 30 V P-P | 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-1633C

**TROUBLE SHOOTING PROCEDURE**

132—174 MHz MASTR RECEIVER
MODELS 4ER41C10-45 & 4ER41E10-45

## OUTLINE DIAGRAM

132—174 MHz MASTR RECEIVER
MODELS 4ER41C10-45 & 4ER41E10-45

## PARTS LIST

LBI-3877K

132-174 MHz RECEIVER
MODELS 4ER41C10-21, 34-45
MODELS 4ER41E10,11,14-17,20,21
34,35,38-41,44,45

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| A301 and A302 | | FIRST MIXER<br>A301 19B216077G1 132-150.8 MHz<br>A302 19B216077G2 150.8-174 MHz |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C4 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C5* | 5494481P112 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | Earlier than REV A: |
| | 5491189P1 | Polyester: .01 µf ±20%, 50 VDCW. |
| C6* | 5490446P2 | Variable, ceramic: approx 5 to 25 pf, 350 VDCW, temp coef 0 PPM; sim to Erie Style 557-36. Deleted by REV D. |
| C7* | 7489162P35 | Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| | | In Models of REV C and earlier: |
| | 5496218P254 | Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C8 | 5496203P149 | Ceramic disc: 220 pf ±10%, 500 VDCW, temp coef -3300 PPM. |
| C9 | 5491601P130 | Phen: 3.3 pf ±5%, 500 VDCW. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L2* | 19B216576G1 | Coil. |
| | | In Models of REV C and earlier: |
| | 19A127115G1 | Coil. |
| L3 | 7488079P6 | Choke, RF: 1 µh ±10%, 0.3 ohm DC res max; sim to Jeffers 4411-8K. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1 | 19A115953P1 | N Type, field effect. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P242J | Composition: 2400 ohms ±5%, 1/4 w. |
| R2 | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| R3* | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. Deleted by REV D. |
| R4 | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| R5* | 3R77P331K | Composition: 330 ohms ±10%, 1/2 w. Added by REV G. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B216100G1<br>T2 19B216100G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 5496218P235 | Ceramic disc: 4.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C2* | 5496218P234 | Ceramic disc: 3.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| | | In REV G and earlier: |
| | 5491238P12 | Ceramic disc: 2 pf ±0.25 pf, 500 VDCW, temp coef -80 ±120 PPM. |
| C3 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19B216100P6 | Coil. |
| R6* | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. Added to G1 by REV H, Added to G2 by REV J. |
| | 5493185P5 | Tuning slug. |

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| A303* and A304* | | SECOND MULTIPLIER<br>A303 19B219908G1 132-150.8 MHz<br>A304 19B219908G2 150.8-174 MHz<br>(Added to 19E500872G1 by REV N)<br>(Added to 19E500872G2 by REV P) |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 5491601P107 | Phenolic: 0.27 pf ±5%, 500 VDCW. |
| C4 | 5496203P134 | Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -3300 PPM. |
| C5 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C6 | 19B209243P105 | Polyester: 0.047 µf ±10%, 50 VDCW. |
| C7 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C8 | 19B209243P105 | Polyester: 0.047 µf ±10%, 50 VDCW. |
| C9 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C14 | 5491601P16 | Phenolic: 0.62 pf ±10%, 500 VDCW. |
| C15 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C17 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR1 | 19A115250P1 | Silicon. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L4 | 19B209420P111 | Coil, RF: 0.68 µh ±10%, 0.54 ohms DC res max; sim to Jeffers 4426-4. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1 | 19A115440P1 | Silicon, NPN. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. |
| R2 | 3R152P104K | Composition: 0.10 megohm ±10%, 1/4 w. |
| R3 | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B216097G3<br>T2 19B216097G4 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 5491601P107 | Phenolic: 0.27 pf ±5%, 500 VDCW. |
| C2 | 5496218P255 | Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C3 | 5496218P252 | Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C4 | 5496203P134 | Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -3300 PPM. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19B216097P6 | Coil. |
| | 5491798P5 | Tuning slug. |
| T3 and T4 | | COIL ASSEMBLY<br>T3 19B216106G3<br>T4 19B216106G4 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C9 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C10 | 5496218P241 | Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C11 | 5496218P238 | Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR1 | 19A115250P1 | Silicon. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L2 | 19B216106P6 | Coil. |
| | 5491798P5 | Tuning slug. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| T5 and T6 | | COIL ASSEMBLY<br>T5 19B216102G1<br>T6 19B216102G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C12 | 5496218P241 | Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C13 | 5496218P239 | Ceramic disc: 8.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C16 | 5496218P770 | Ceramic disc: 200 pf ±5%, 500 VDCW, temp coef -750 PPM. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L3 | 19B216102P6 | Coil. |
| | 5491798P5 | Tuning slug. |
| | | In 19E500872G1 REV M and earlier:<br>In 19E500872G2 REV N and earlier: |
| A303* and A304* | | SECOND MULTIPLIER<br>A303 19B216107G1 132-150.8 MHz<br>A304 19B216107G2 150.8-174 MHz |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C5 | 5493392P7 | Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C. |
| C6 | 19B209243P105 | Polyester: 0.047 µf ±10%, 50 VDCW. |
| C7 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C8 | 19B209243P105 | Polyester: 0.047 µf ±10%, 50 VDCW. |
| C14 | 5491601P16 | Phenolic: 0.62 pf ±10%, 500 VDCW. |
| C15 | 5493392P7 | Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C. |
| C17 and C18 | 5493392P7 | Ceramic, feed-thru: 1000 pf +100%-0%, 500 VDCW; sim to Allen Bradley Type FA5C. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L4* | 19B209420P111 | Coil, RF: 0.68 µh ±10%, 0.54 ohms DC res max; sim to Jeffers 4426-4. Added to 19E500872G1 by REV L. Added to 19E500872G2 by REV M. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1* | 19A115440P1 | Silicon, NPN. |
| | | In 19E500872G1 of REV K and earlier:<br>In 19E500872G2 of REV L and earlier: |
| | 19A115330P1 | Silicon, NPN. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1* | 3R152P392K | Composition: 3900 ohms ±10%, 1/4 w. Deleted in 19E500872G1 by REV L. Deleted in 19E500872G2 by REV M. |
| R2* | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. Deleted in 19E500872G1 by REV L. Deleted in 19E500872G2 by REV M. |
| R3* | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| | | In 19E500872G1 of REV K and earlier:<br>In 19E500872G2 of REV L and earlier: |
| | 3R152P331K | Composition: 330 ohms ±10%, 1/4 w. |
| R4 | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. |
| R5 | 3R152P104K | Composition: 0.1 megohm ±10%, 1/4 w. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B216097G1<br>T2 19B216097G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 5491601P107 | Phenolic: 0.27 pf ±5%, 500 VDCW. |
| C2 | 5496218P255 | Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C3 | 5496218P252 | Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C4 | 5496203P134 | Ceramic disc: 100 pf ±5%, 500 VDCW, temp coef -3300 PPM. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19B216097P6 | Coil. |
| | 5491798P4 | Tuning slug. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| T3 and T4 | | COIL ASSEMBLY<br>T3 19B216106G1<br>T4 19B216106G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C9 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C10 | 5496218P241 | Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C11 | 5496218P238 | Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR1 | 19A115250P1 | Silicon. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L2 | 19B216106P6 | Coil. |
| | 5491798P5 | Tuning slug. |
| T5 and T6 | | COIL ASSEMBLY<br>T5 19B216102G1<br>T6 19B216102G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C12 | 5496218P241 | Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C13 | 5496218P239 | Ceramic disc: 8.0 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM. |
| C16 | 5496218P770 | Ceramic disc: 200 pf ±5%, 500 VDCW, temp coef -750 PPM. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L3 | 19B216102P6 | Coil. |
| | 5491798P5 | Tuning slug. |
| | | - - - - - - - - TERMINAL BOARDS - - - - - - - |
| TB1 | 7487424P7 | Miniature, phen: 4 terminals. |
| A305 thru A310 | | FIRST OSCILLATOR<br>A305 19B204419G1 132-150.8 MHz 1 FREQ<br>A306 19B204419G4 132-150.8 MHz 2 FREQ<br>A307 19B204419G2 132-150.8 MHz 4 FREQ<br>A308 19B204419G5 150.8-174 MHz 1 FREQ<br>A309 19B204419G3 150.8-174 MHz 2 FREQ<br>A310 19B204419G6 150.8-174 MHz 4 FREQ |
| | | - - - - - - - - - - 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, 750 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 | 19C300685P93 | Ceramic disc: 5 pf ±0.1 pf, 500 VDCW, temp coef 0 PPM. |
| C21 | 5496219P771 | Ceramic disc: 220 pf ±5%, 500 VDCW, temp coef -750 PPM. |
| C23 | 5494481P114 | Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C24 | 5490008P31 | Silver mica: 150 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C25 | 5496219P467 | Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -220 PPM. |
| C26 thru C28 | 5494481P112 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C31 | 5494481P112 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR1 thru CR4 | 19A115603P1 | Silicon. |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - - - |
| J1 thru J6 | 4033513P4 | Contact, electrical: sim to Bead Chain L93-3. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L2 and L3 | 7488079P16 | Choke, RF: 10 µh ±10%, 0.6 ohm 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. |
| R19 | 3R152P360J | Composition: 36 ohms ±5%, 1/4 w. |
| | | - - - - - - - - - THERMISTORS - - - - - - - - - |
| RT1 thru RT4 | 19B209284P5 | Disc: 43 ohms nominal, color code green. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B204421G1<br>T2 19B204421G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C29 | 5496218P253 | Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C30 | 5496218P250 | Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C32 | 5496218P34 | Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. |
| C33 | 5494481P12 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR5 | 19A115250P1 | Silicon. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19A121093P1 | Coil. Includes tuning slug 5491798P5. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R16 | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. |
| | 5491798P5 | Tuning slug. |
| | | - - - - - - - - - - SOCKETS - - - - - - - - - |
| XY1 thru XY4 | | Refer to Mechanical Parts (RC-1627). |
| | | - - - - - - - - - - CRYSTALS - - - - - - - - - |
| | | NOTE: When reordering give GE Part No. and specify exact freq needed. |
| | | Crystal freq = (OF -5.30 MHz) ÷ 9. |
| Y1 thru Y4 | 19B206576P4 | Quartz: freq range 14077.777 to 16166.666 KHz, temp range -30°C to +85°C. (132-150.8 MHz) |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| Y1 thru Y4 | 19B206576P5 | Quartz: freq range 16166.667 to 18744.444 KHz, temp range -30°C to +85°C. (150.8-174 MHz) |
| A311 thru A314 | | FIRST OSCILLATOR<br>A311 19B216178G1 132-150.8 MHz 1 FREQ<br>A312 19B216178G2 132-150.8 MHz MULT-FREQ<br>A313 19B216178G3 150.8-174 MHz 1 FREQ<br>A314 19B216178G4 150.8-174 MHz MULT-FREQ |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 thru C6 | 5494481P112 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR1 thru CR4 | 19A115250P1 | Silicon. |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - - - |
| J1 thru J6 | 4033513P4 | Contact, electrical; sim to Bead Chain L93-3. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L2 and L3 | 7488079P16 | Choke, RF: 10 µh ±10%, 0.60 ohms DC res max; sim to Jeffers 4421-7K. |
| L4 | 7488079P8 | Choke, RF: 2.20 µh ±10%, 1 ohm DC res max; sim to Jeffers 4411-12K. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1 | 19A115330P1 | Silicon, NPN. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P272J | Composition: 2700 ohms ±5%, 1/4 w. |
| R2 | 3R152P103J | Composition: 10,000 ohms ±5%, 1/4 w. |
| R3 | 3R152P102J | Composition: 1000 ohms ±5%, 1/4 w. |
| R4 | 3R152P151J | Composition: 150 ohms ±5%, 1/4 w. |
| R5 | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B204421G1<br>T2 19B204421G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C29 | 5496218P253 | Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C30 | 5496218P250 | Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C32 | 5496218P34 | Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. |
| C33 | 5494481P12 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR5 | 19A115250P1 | Silicon. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19A121093P1 | Coil. Includes tuning slug 5491798P5. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R16 | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. |
| | 5491798P5 | Tuning slug. |
| | | - - - - - - - - - - SOCKETS - - - - - - - - - |
| XY1 thru XY4 | 19B216043G1 | Socket assembly. Includes: |
| | 19D413071P1 | Socket cavity. |
| | 19A115834P2 | Electrical contact. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - OSCILLATORS - - - - - - - - - |
| | | NOTE: When reordering, specify ICOM Frequency. |
| | | ICOM Frequency = (OF - 5.3 MHz) ÷ 9. |
| Y1 thru Y4 | 4EG26A11 | Integrated Circuit Oscillator Module (ICOM). |
| | 19D413070P1 | Cap, decorative. |
| A315 | | HIGH IF AMPLIFIER<br>19B216109G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C2* | 5493392P107 | Ceramic, stand-off: 1000 pf +100%-0%, 500 VDCW; sim to Allen-Bradley Type SS5D. |
| | | In Models earlier than REV B: |
| | 5494481P111 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C3 | 5493392P108 | Ceramic, stand-off: 22 pf ±10%, 500 VDCW; sim to Allen Bradley Type SS5D. |
| C7 and C8 | 19A116080P105 | Polyester: 0.047 µf ±10%, 50 VDCW. |
| | | - - - - - - - - - - TERMINALS - - - - - - - - - |
| E1 thru E3 | 4029309P1 | Feed-thru: 750 VRMS max, 5.5 amps; sim to Sealectro FT-SM-27. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L2* | 19A116632P1 | Ferrite Bead. Added to 19E500872G1 by REV K. Added to 19E500872G2 by REV L. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1* | 19A115440P1 | Silicon, NPN. |
| | | In 19E500872G1 REV M and earlier:<br>In 19E500872G2 REV N and earlier: |
| | 19A115666P1 | Silicon, NPN. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P511J | Composition: 510 ohms ±5%, 1/4 w. |
| R2 | 3R152P332K | Composition: 3300 ohms ±10%, 1/4 w. |
| R3 | 3R152P682K | Composition: 6800 ohms ±10%, 1/4 w. |
| R4 | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 | | COIL ASSEMBLY<br>19B216103G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C4 | 5496218P265 | Ceramic disc: 120 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| C5 | 5494481P111 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C6 | 5494481P11 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C9 | 5496218P246 | Ceramic disc: 20 pf ±5%, 500 VDCW, temp coef -80 PPM. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R5 | 3R152P101K | Composition: 100 ohms ±10%, 1/4 w. |
| | 5491798P7 | Tuning slug. |
| A316 | | CRYSTAL FILTER<br>19B204616G3 |
| | | - - - - - - - - - - FILTERS - - - - - - - - - |
| FL5 | 19B206692G1 | Bandpass. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R7 | 3R152P562K | Composition: 5600 ohms ±10%, 1/4 w. |
| R8 | 3R152P103K | Composition: 10,000 ohms ±10%, 1/4 w. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| A317 | | SECOND MIXER<br>19B216119G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C2 | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C3 | 5494481P112 | Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap. |
| C4 and C5 | 5490008P35 | Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C6 | 5490008P9 | Silver mica: 18 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C7 and C8 | 19A116080P5 | Polyester: 0.047 µf ±20%, 50 VDCW. |
| C9 | 5496219P369 | Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C10 | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C11 | 5496219P40 | Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. |
| C12 | 5496219P369 | Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM. |
| C13 | 5496219P40 | Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM. |
| C14 | 19A116656P220J2 | 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 µf ±20%, 50 VDCW. |
| C17 | 19A116080P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - - - |
| J1 | 4033513P4 | Contact, electrical; sim to Bead Chain L93-3. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19C311181G3 | Coil. Includes tuning slug 4038368P1. |
| 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 - - - - - - - - - |
| Q1 | 19A115889P1 | Silicon, NPN. |
| Q2 | 19A115245P1 | Silicon, NPN. |
| Q3 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 and R2 | 3R77P103K | Composition: 10,000 ohms ±10%, 1/2 w. |
| R3 | 3R77P512J | 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 | 3R77P622J | 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. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - |
| T1 | | COIL ASSEMBLY<br>19B216120G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 19C301540P261 | Ceramic disc: 82 pf ±5%, 200 VDCW, temp coef -80 PPM. |
| | 5491798P3 | Tuning slug. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - - CRYSTALS - - - - - - - - - |
| Y1 | 19A110192P3 | Quartz: freq 4845 KHz ±100 Hz at 25°C, temperature range -30°C to +75°C. |
| A318 | | IF AUDIO AND SQUELCH<br>19D413129G1 |
| | | - - - - - - - - - - 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 µf ±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. |
| C16 | 5494481P112 | Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap. |
| C17 | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C18 | 5494481P108 | Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| C19 and C20 | 19A116080P5 | Polyester: 0.047 µf ±20%, 50 VDCW. |
| C21* | 19A116080P3 | Polyester: 0.022 µf ±20%, 50 VDCW. |
| | | Earlier than REV A: |
| | 19B209243P1 | Polyester: 0.01 µf ±20%, 50 VDCW. |
| C22 | 19A116080P108 | Polyester: 0.15 µf ±10%, 50 VDCW. |
| C23 | 19A116080P107 | Polyester: 0.1 µf ±10%, 50 VDCW. |
| C24* | 19B209243P106 | Polyester: .068 µf ±10%, 50 VDCW. Deleted by REV A. |
| C25 | 5496267P6 | Tantalum: 33 µf ±20%, 10 VDCW; sim to Sprague Type 150D. |
| C26* | 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. |
| | | Earlier than REV A: |
| | 19B209243P14 | Polyester: 0.33 µf ±20%, 250 VDCW. |
| 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. |
| C28* | 5496267P229 | Tantalum: 0.68 µf ±10%, 35 VDCW; sim to Sprague Type 150D. Deleted by REV A. |
| C29* | 5496267P17 | Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D. Deleted by REV A. |
| C30 | 19A116080P8 | Polyester: 0.15 µf ±20%, 50 VDCW. |
| C31 | 19A116080P102 | Polyester: 0.015 µf ±10%, 50 VDCW. |

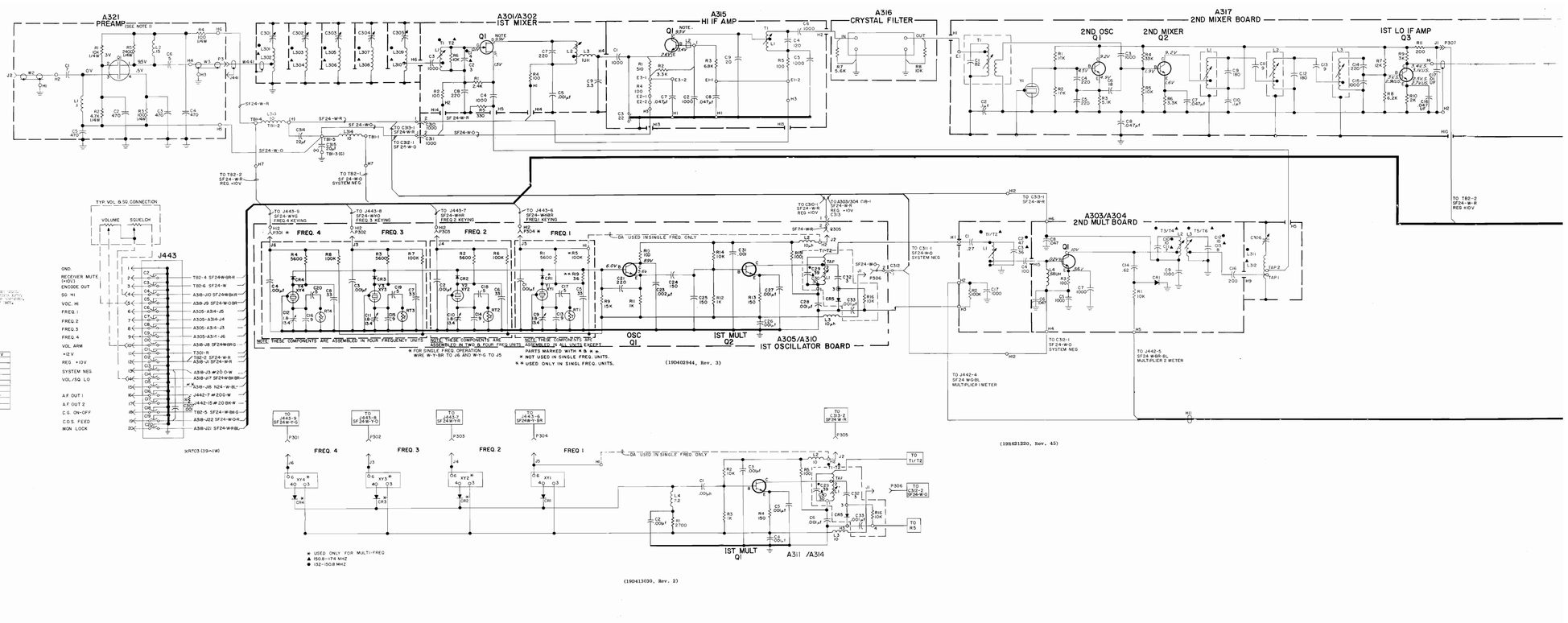
| MODEL NUMBER | FREQ RANGE | NO FREQ | WITH CHAN GD | WITH PREAMP |
|---|---|---|---|---|
| 4ER41C10 | 132-150.8 | 1 | | |
| 4ER41C11 | 150.8-174 | 1 | | |
| 4ER41C12 | 132-150.8 | 2 | | |
| 4ER41C13 | 150.8-174 | 2 | | |
| 4ER41C14 | 132-150.8 | 4 | | |
| 4ER41C15 | 150.8-174 | 4 | | |
| 4ER41C16 | 132-150.8 | 1 | X | |
| 4ER41C17 | 150.8-174 | 1 | X | |
| 4ER41C18 | 132-150.8 | 2 | X | |
| 4ER41C19 | 150.8-174 | 2 | X | |
| 4ER41C20 | 132-150.8 | 4 | X | |
| 4ER41C21 | 150.8-174 | 4 | X | |
| 4ER41C34 | 132-150.8 | 1 | | X |
| 4ER41C35 | 150.8-174 | 1 | | X |
| 4ER41C36 | 132-150.8 | 2 | | X |
| 4ER41C37 | 150.8-174 | 2 | | X |
| 4ER41C38 | 132-150.8 | 4 | | X |
| 4ER41C39 | 150.8-174 | 4 | | X |
| 4ER41C40 | 132-150.8 | 1 | X | X |
| 4ER41C41 | 150.8-174 | 1 | X | X |
| 4ER41C42 | 132-150.8 | 2 | X | X |
| 4ER41C43 | 150.8-174 | 2 | X | X |
| 4ER41C44 | 132-150.8 | 4 | X | X |
| 4ER41C45 | 150.8-174 | 4 | X | X |
| 4ER41E10 | 132-150.8 | 1 | | |
| 4ER41E11 | 150.8-174 | 1 | | |
| 4ER41E14 | 132-150.8 | 4 | | |
| 4ER41E15 | 150.8-174 | 4 | | |
| 4ER41E16 | 132-150.8 | 1 | X | |
| 4ER41E17 | 150.8-174 | 1 | X | |
| 4ER41E20 | 132-150.8 | 4 | X | |
| 4ER41E21 | 150.8-174 | 4 | X | |
| 4ER41E34 | 132-150.8 | 1 | | X |
| 4ER41E35 | 150.8-174 | 1 | | X |
| 4ER41E38 | 132-150.8 | 4 | | X |
| 4ER41E39 | 150.8-174 | 4 | | X |
| 4ER41E40 | 132-150.8 | 1 | X | X |
| 4ER41E41 | 150.8-174 | 1 | X | X |
| 4ER41E44 | 132-150.8 | 4 | X | X |
| 4ER41E45 | 150.8-174 | 4 | X | X |

NOTE 1:

| REVISION LETTER BLOCK | | |
|---|---|---|
| | PL19E500872G1 | H |
| | PL19E500872G2 | R |
| A317 | PL19B216793 | A |
| A318 | PL19D413279G1 | B |
| A319 | 4EA58A10 | C |
| A320 | PL19C3177972 | A |
| A321 | PL19A274796 | A |

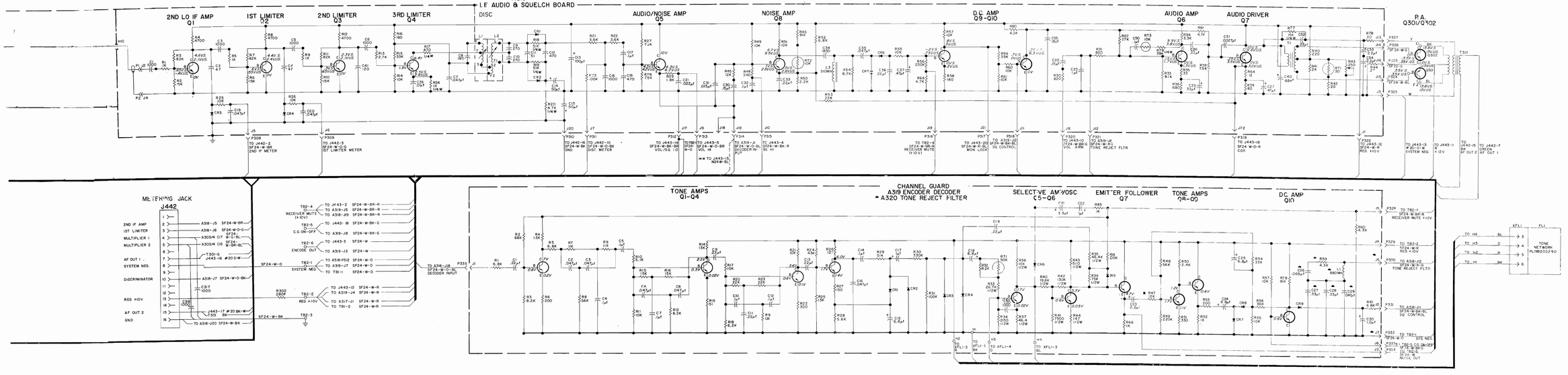
| | | REV |
|---|---|---|
| A311 | PL19B214789G1 | |
| A313 | PL19B216780G2 | |
| A314 | PL19B216780G4 | |

| | | REV |
|---|---|---|
| A305 | PL19B204419G1 | B |
| A306 | PL19B204419G4 | B |
| A307 | PL19B204419G5 | |
| A308 | PL19B204419G6 | |
| A309 | PL19B204419G7 | |
| A310 | PL19B204419G8 | |




## SCHEMATIC DIAGRAM

132—174 MHz RECEIVER
MODELS 4ER41C10-45 & 4ER41E10-45




(19B621220, Rev. 45)

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

ALL RESISTORS ARE 1/8 WATT UNLESS OTHERWISE SPECIFIED AND INDICATED. VALUES IN OHMS UNLESS FOLLOWED BY K=KILOHMS OR M=1,000,000 OHMS. ALL CAPACITORS VALUES IN PICOFARADS (EQUAL 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 ACCEPTIVE 1A4D-BWTH TEST SET MODEL 4EX1ND 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.

NOTE DC VOLTAGES FOR HT M*TER MULTIPLIERS AND IST IF AMPLIFIER TAKEN WITH MODULES REMOVED FROM CASTING AND 10 VOLTS APPLIED TO INPUT LEADS.

● LOW SPLIT 132-150.8 MHz
▲ HIGH SPLIT 150.8-174 MHz
■ VALUE OF R47 IS DETERMINED BY TEST (SEE TEST SPEC RA27-1U2)
◆ THESE ARE ONLY PARTS "PULSED" ON A320
✱ W USED IN 4ER41C01 FOR IMTS BASE STATION ONLY

# SCHEMATIC DIAGRAM

132—174 MHz RECEIVER
MODELS 4ER41C10-45 & 4ER41E10-45

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| C32 | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C33 | 19A116080P9 | Polyester: 0.22 µf ±20%, 50 VDCW. |
| C34 | 4029003P207 | Silver mica: 1830 pf ±2%, 500 VDCW; sim to Electro Motive Type DM-20. |
| C35 | 19A116080P5 | Polyester: 0.047 µf ±20%, 50 VDCW. |
| C36* | 19A116080P9 | Polyester: 0.22 µf ±20%, 50 VDCW. |
| | | In REV B and earlier: |
| | 19B209243P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C37* | 5496267P28 | Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D. |
| | | Earlier than REV A: |
| | 5496267P17 | Tantalum: 1.0 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. |
| | | Earlier than REV A: |
| | 5496267P14 | Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D. |
| 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 A-K: |
| | 5496267P28 | Tantalum: 0.47 µf ±20%, 35 VDCW; sim to Sprague Type 150D. |
| | | Earlier than REV A: |
| | 19B209243P117 | Polyester: 0.22 µf ±10%, 50 VDCW. |
| C41 | 5490008P129 | Silver mica: 120 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15. |
| C42* | 19B209243P4 | Polyester: 0.033 µf ±20%, 50 VDCW. Deleted by REV A. |
| C43* | 5496267P213 | Tantalum: 2.2 µf ±10%, 20 VDCW; sim to Sprague Type 150D. Deleted by REV A. |
| C49* | 5496267P9 | Tantalum: 3.3 µf ±15%, VDCW; sim to Sprague Type 150D. Added by REV A. Deleted by REV C. |
| C50* | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. Added by REV A. |
| C51* | 19A116655P22 | Ceramic disc: 2700 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV. A. |
| C52* | 19A116080P109 | Polyester: 0.22 µf ±10%, 50 VDCW. Added by REV A. |
| C53* and C54* | 5496267P213 | Tantalum: 2.2 µf ±10%, 20 VDCW; sim to Sprague Type 150D. Added by REV A. |
| 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* and CR4* | 19A115250P1 | Silicon. |
| | | In REV F and earlier: |
| | 4038056P1 | Germanium. |
| CR5 and CR6 | 19A115250P1 | Silicon. |
| CR7* | 19A115250P1 | Silicon. Deleted by REV C. |
| CR8* | 19A115250P1 | Silicon. Added by REV A. Deleted by REV C. |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - - |
| J1 thru J22 | 4033513P4 | Contact, electrical: sim to Bead Chain L93-3. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19A115711P6 | Transformer, freq: 455 KHz; sim to TOKO PEFCN-14733-CX12. |
| L2 | 19A115711P7 | Transformer, freq: 455 KHz; sim to TOKO PEFCN-14734-BNL2. |
| L3 | 19A127134G1 | Choke. Includes tuning slug 7486872P7. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - TRANSISTORS - - - - - - - - |
| Q1 thru Q6 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| Q7 | 19A115300P4 | Silicon, NPN; sim to Type 2N3053. |
| Q8 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| Q9 | 19A115362P1 | Silicon, NPN; sim to Type 2N2925. |
| Q10* | 19A116774P1 | Silicon, NPN; sim to Type 2N5210. |
| | | In REV G and earlier: |
| | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R77P102K | 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. |
| R18 and R19 | 3R152P513J | Composition: 51,000 ohms ±5%, 1/4 w. |
| R20 | 3R152P472K | Composition: 4700 ohms ±10%, 1/4 w. |
| R21 and R22 | 3R77P362J | Composition: 3600 ohms ±5%, 1/2 w. |
| R23 | 3R77P104K | Composition: 0.1 megohm ±10%, 1/2 w. |
| R24 | 3R152P102J | Composition: 1000 ohs ±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 REV C and earlier: |
| | 3R77P102J | Composition: 1000 ohms ±5%, 1/2 w. |
| R31 | 3R77P821J | Composition: 820 ohms ±5%, 1/2 w. |
| R32* | 3R77P752J | Composition: 7500 ohms ±5%, 1/2 w. Deleted by REV A. |
| R33* | 3R77P912J | Composition: 9100 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P203J | Composition: 20,000 ohms ±5%, i/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. |
| R37* | 3R77P822J | Composition: 8200 ohms ±5%, 1/2 w. Deleted by REV A. |
| R38* | 3R77P752J | Composition: 7500 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P622J | Composition: 6200 ohms ±5%, 1/2 w. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| R39* | 3R77P820J | Composition: 8200 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P131J | Composition: 130 ohms ±5%, 1/2 w. |
| R40* | 3R77P221J | Composition: 220 ohms ±5%, 1/2 w. |
| | | In REV H and earlier: |
| | 3R77P241J | Composition: 240 ohms ±5%, 1/2 w. |
| R41* | 3R152P240J | Composition: 24 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P300J | Composition: 30 ohms ±5%, 1/2 w. |
| R42* | 3R77P200J | Composition: 20 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P160J | Composition: 16 ohms ±5%, 1/2 w. |
| R43 | 19B209358P101 | Variable, carbon film: approx 25 to 250 ohms ±10%, 0.2 w; sim to CTS Type X-201. |
| R44 | 19B209022P101 | Wirewound: .27 ohms ±10%, 2 w; sim to IRC Type BWH. |
| R45 | 3R77P123J | Composition: 12,000 ohms ±5%, 1/2 w. |
| R46 | 3R77P913J | Composition: 91,000 ohms ±5%, 1/2 w. |
| R48* | 19A116278P249 | Metal film: 3160 ohms ±2%, 1/2 w. |
| | | In REV A: |
| | 3R77P302J | Composition: 3000 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P332J | Composition: 3300 ohms ±5%, 1/2 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 | 3R77P682J | Composition: 6800 ohms ±5%, 1/2 w. |
| R53* | 3R77P223J | Composition: 22,000 ohms ±5%, 1/2 w. |
| | | In REV E and earlier: |
| | 3R77P303J | Composition: 30,000 ohms ±5%, 1/2 w. |
| | | In REV A and B: |
| | 3R77P473J | Composition: 47,000 ohms ±5%, 1/2 w. |
| | | Earlier than REV A: |
| | 3R77P303J | Composition: 30,000 ohms ±5%, 1/2 w. |
| R54 | 3R77P822J | Composition: 8200 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. |
| | | Earlier than REV A: |
| | 3R77P223K | Composition: 22,000 ohms ±10%, 1/2 w. |
| R63* | 3R77P432J | Composition: 4300 ohms ±5%, 1/2 w. Deleted by REV A. |
| R64* | 3R77P120J | Composition: 12 ohms ±5%, 1/2 w. |
| | | In REV B and earlier: |
| | 3R77P180J | Composition: 18 ohms ±5%, 1/2 w. |
| R65* | 3R77P154K | Composition: 0.15 megohm ±10%, 1/2 w. Deleted by REV A. |
| R66 | 3R77P472K | Composition: 4700 ohms ±10%, 1/2 w. |
| R75* | 3R77P473J | Composition: 47,000 ohms ±5%, 1/2 w. Added by REV A. Deleted by REV C. |
| R76* | 3R152P912J | Composition: 9100 ohms ±5%, 1/4 w. Added by REV A. Deleted by REV C. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| R77* | 3R152P153J | Composition: 15,000 ohms ±5%, 1/4 w. |
| | | In REV B: |
| | 3R152P652J | Composition: 5600 ohms ±5%, 1/4 w. Added by REV A. |
| R78* | 3R77P200J | Composition: 20 ohms ±5%, 1/2 w. |
| | | In REV C and earlier: |
| | 3R77P100J | Composition: 10 ohms ±5%, 1/2 w. Added by REV A. |
| R79* | 3R152P393J | Composition: 39,000 ohms ±5%, 1/4 w. Added by REV A. |
| R80* | 3R152P432J | Composition: 4300 ohms ±5%, 1/4 w. Added by REV C. |
| R81* | 3R152P472J | 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. |
| R85* | 3R152P102J | Composition: 1000 ohms ±5%, 1/2 w. Added by REV K. Deleted by REV L. |
| | | - - - - - - - - - - THERMISTORS - - - - - - - - |
| RT1 | 5490828P41 | Thermistor: 30 ohms ±10%, color code black, white; sim to Globar Type B1211H-4. |
| RT2 | 5490828P9 | Thermistor: 10,000 ohms ±10%, color code yellow; sim to Globar Type 551H8. |
| RT3* | 5490828P9 | Thermistor: 10,000 ohms ±10%, color code yellow; sim to Globar Type 551H8. Added by REV. A. |
| | | - - - - - - - - - TRANSFORMERS - - - - - - - - |
| T1 | 19A116040P1 | Audio: 300 to 4000 Hz, Pri: 19.3 ohms ±10% DC res, Sec: 23.5 ohms ±10% DC res. |
| A319 | | ENCODER/DECODER 4EK16A10 19C311797G1 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 19A116080P9 | Polyester: 0.22 µf ±20%, 50 VDCW. |
| C2 and C3 | 19A116080P205 | Polyester: 0.047 µf ±5%, 50 VDCW. |
| C4 | 19A116080P207 | Polyester: 0.1 µf ±5%, 50 VDCW. |
| C5 | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C6 | 19A116080P205 | Polyester: 0.047 µf ±5%, 50 VDCW. |
| C7 | 19A116080P207 | Polyester: 0.1 µf ±5%, 50 VDCW. |
| C8 | 19A116080P205 | Polyester: 0.047 µf ±5%, 50 VDCW. |
| C9 | 19A116080P9 | Polyester: 0.22 µf ±20%, 50 VDCW. |
| C10 | 19A116080P207 | Polyester: 0.1 µf ±5%, 50 VDCW. |
| C11 | 19A116080P109 | Polyester: 0.22 µf ±10%, 50 VDCW. |
| C12 | 19A116080P207 | Polyester: 0.1 µf ±5%, 50 VDCW. |
| C13 | 19A116080P9 | Polyester: 0.22 µf ±20%, 50 VDCW. |
| C14 | 19A116080P7 | Polyester: 0.1 µf ±20%, 50 VDCW. |
| C15 | 5496267P1 | Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D. |
| C16 | 19A116080P5 | Polyester: 0.047 µf ±20%, 50 VDCW. |
| C17 | 5496267P417 | Tantalum: 1.0 µf ±5%, 35 VDCW; sim to Sprague Type 150D. |
| C18 | 5496267P1 | Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D. |
| C19 | 19A116080P109 | Polyester: 0.22 µf ±10%, 50 VDCW. |
| C20 | 5494481P111 | Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C21 | 5496267P9 | Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D. |
| C22 | 5496267P17 | Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D. |
| C23 | 5496267P13 | Tantalum: 2.2 µf ±20%, 20 VDCW; sim to Sprague Type 150D. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| C24 | 5496267P1 | Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D. |
| C25 | 5496267P18 | Tantalum: 6.8 µf ±20%, 35 VDCW; sim to Sprague Type 150D. |
| C26 | 19A116080P206 | Polyester: 0.068 µf ±5%, 50 VDCW. |
| C27 and C28 | 19A116080P210 | Polyester: 0.33 µf ±5%, 50 VDCW. |
| C29* | 19A116080P205 | Polyester: 0.047 µf ±5%, 50 VDCW. |
| | | In REV B and earlier: |
| | 19B209243P107 | Polyester: 0.1 µf ±10%, 50 VDCW. |
| C30 | 5496267P17 | Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - |
| CR1 and CR2 | 19A115250P1 | Silicon. |
| CR3 and CR4 | 5494922P1 | Silicon. |
| CR5 | 19A115250P1 | Silicon. |
| CR6 | 4036887P3 | Silicon, Zener. |
| CR7 thru CR9 | 19A115250P1 | Silicon. |
| | | - - - - - - - - - - - FILTERS - - - - - - - - - - |
| FL1 | | TONE FREQUENCY NETWORK 19B205280 |
| | 19B205280G1 | 71.9 Hz |
| | 19B205280G2 | 77.0 Hz |
| | 19B205280G3 | 82.5 Hz |
| | 19B205280G4 | 88.5 Hz |
| | 19B205280G5 | 94.8 Hz |
| | 19B205280G6 | 100.0 Hz |
| | 19B205280G7 | 103.5 Hz |
| | 19B205280G8 | 107.2 Hz |
| | 19B205280G9 | 110.9 Hz |
| | 19B205280G10 | 114.8 Hz |
| | 19B205280G11 | 118.8 Hz |
| | 19B205280G12 | 123.0 Hz |
| | 19B205280G13 | 127.3 Hz |
| | 19B205280G14 | 131.8 Hz |
| | 19B205280G15 | 136.5 Hz |
| | 19B205280G16 | 141.3 Hz |
| | 19B205280G17 | 146.2 Hz |
| | 19B205280G18 | 151.4 Hz |
| | 19B205280G19 | 156.7 Hz |
| | 19B205280G20 | 162.2 Hz |
| | 19B205280G21 | 167.9 Hz |
| | 19B205280G22 | 173.8 Hz |
| | 19B205280G23 | 179.9 Hz |
| | 19B205280G24 | 186.2 Hz |
| | 19B205280G25 | 192.8 Hz |
| | 19B205280G26 | 203.5 Hz |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - |
| J1 thru J8 | 4033513P4 | Contact, electrical sim to Bead Chain L93-3. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19A115690P1 | Coil, RF: 880 MH ±5%, sim to Artted AC5672. |
| | | - - - - - - - - - TRANSISTORS - - - - - - - - |
| Q1 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| Q2 | 19A115362P1 | Silicon, NPN; sim to Type 2N2925. |
| Q3 and Q4 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| Q5 thru Q8 | 19A115362P1 | Silicon, NPN; sim to Type 2N2925. |
| Q9 and Q10 | 19A115123P1 | Silicon, NPN; sim to Type 2N2712. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R77P682K | Composition: 6800 ohms ±10%, 1/2 w. |
| R2 | 3R77P683J | Composition: 68,000 ohms ±5%, 1/2 w. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| R3 | 3R77P822J | Composition: 8200 ohms ±5%, 1/2 w. |
| R4 | 3R77P152J | Composition: 1500 ohms ±5%, 1/2 w. |
| R5 | 3R77P682K | Composition: 6800 ohms ±10%, 1/2 w. |
| R6 | 3R77P201J | Composition: 200 ohms ±5%, 1/2 w. |
| R7 | 19A116278P305 | Metal film: 11,000 ohms ±2%, 1/2 w. |
| R8* | 3R77P562J | Composition: 5600 ohms ±5%, 1/2 w. |
| | | In REV A: |
| | 3R152P622J | Composition: 6200 ohms ±5%, 1/4 w. |
| | | Earlier than REV A: |
| | 3R152P512J | Composition: 5100 ohms ±5%, 1/4 w. |
| R9 | 19A116278P305 | Metal film: 11,000 ohms ±2%, 1/2 w. |
| R10 | 3R77P512J | Composition: 5100 ohms ±5%, 1/2 w. |
| R11 | 3R77P103J | Composition: 10,000 ohms ±5%, 1/2 w. |
| R12 | 3R77P822J | Composition: 8200 ohms ±5%, 1/2 w. |
| R13 | 3R77P153J | Composition: 15,000 ohms ±5%, 1/2 w. |
| R14 | 3R77P133J | Composition: 13,000 ohms ±5%, 1/2 w. |
| R15 | 3R77P510J | Composition: 51 ohms ±5%, 1/2 w. |
| R16 | 3R77P153J | Composition: 15,000 ohms ±5%, 1/2 w. |
| R17 | 3R77P103J | Composition: 10,000 ohms ±5%, 1/2 w. |
| R18 | 3R77P622J | Composition: 6200 ohms ±5%, 1/2 w. |
| R19 | 3R77P123J | Composition: 12,000 ohms ±5%, 1/2 w. |
| R20 | 3R77P223J | Composition: 22,000 ohms ±5%, 1/2 w. |
| R21 | 3R77P103J | Composition: 10,000 ohms ±5%, 1/2 w. |
| R22 | 3R77P301J | Composition: 300 ohms ±5%, 1/2 w. |
| R23 | 3R77P223J | Composition: 22,000 ohms ±5%, 1/2 w. |
| R24 | 3R77P433J | Composition: 43,000 ohms ±5%, 1/2 w. |
| R25 | 3R77P133J | Composition: 13,000 ohms ±5%, 1/2 w. |
| R26 | 3R77P123J | Composition: 12,000 ohms ±5%, 1/2 w. |
| R27 | 3R77P151J | Composition: 150 ohms ±5%, 1/2 w. |
| R28 | 3R77P562J | Composition: 5600 ohms ±5%, 1/2 w. |
| R29 | 3R77P513J | Composition: 51,000 ohms ±5%, 1/2 w. |
| R30 | 3R77P334J | Composition: 0.33 megohms ±5%, 1/2 w. |
| R31 | 3R77P104J | Composition: 0.1 megohm ±5%, 1/2 w. |
| R32 | 3R77P822J | Composition: 8200 ohms ±5%, 1/2 w. |
| R33 | 19A116278P342 | Metal film: 26,700 ohms ±2%, 1/2 w. |
| R34 | 19A116278P233 | Metal film: 2150 ohms ±2%, 1/2 w. |
| R35 | 19A116278P365 | Metal film: 46,400 ohms ±2%, 1/2 w. |
| R36 | 19A116278P301 | Metal film: 10,000 ohms ±2%, 1/2 w. |
| R37 | 19A116278P65 | Metal film: 46.4 ohms ±2%, 1/2 w. |
| R38 | 3R77P204J | Composition: 0.2 megohm ±5%, 1/2 w. |
| R39 | 19A116278P385 | Metal film: 75,000 ohms ±2%, 1/2 w. |
| R40 | 19A116278P329 | Metal film: 19,000 ohms ±2%, 1/2 w. |
| R41 | 19A116278P285 | Metal film: 7500 ohms ±2%, 1/2 w. |
| R42 | 19A116278P412 | Metal film: 130,000 ohms ±2%, 1/2 w. |
| R43 | 19A116278P269 | Metal film: 5110 ohms ±2%, 1/2 w. |
| R44 | 19A116278P117 | Metal film: 147 ohms ±2%, 1/2 w. |
| R45 and R46 | 3R77P102J | Composition: 1000 ohms ±5%, 1/2 w. |
| | | NOTE<br>The value of Resistor R47 must be obtained from the component, then find corresponding value in parts list for the correct part number. |
| R47A | 3R77P822J | Composition: 8200 ohms ±5%, 1/2 w. |
| R47B | 3R77P912J | Composition: 9100 ohms ±5%, 1/2 w. |
| R47C | 3R77P103J | Composition: 10,000 ohms ±5%, 1/2 w. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| R47D | 3R77P113J | Composition: 11,000 ohms ±5%, 1/2 w. |
| R47E | 3R77P123J | Composition: 12,000 ohms ±5%, 1/2 w. |
| R47F | 3R77P133J | Composition: 13,000 ohms ±5%, 1/2 w. |
| R47G | 3R77P153J | Composition: 15,000 ohms ±5%, 1/2 w. |
| R47H | 3R77P752J | Composition: 7500 ohms ±5%, 1/2 w. |
| R48 | 3R77P563J | Composition: 56,000 ohms ±5%, 1/2 w. |
| R49 | 3R77P224J | Composition: 0.22 megohm ±5%, 1/2 w. |
| R50 | 3R77P242J | Composition: 2400 ohms ±5%, 1/2 w. |
| R51 | 3R77P331J | Composition: 330 ohms ±5%, 1/2 w. |
| R52 | 3R77P102J | Composition: 1000 ohms ±5%, 1/2 w. |
| R53 | 3R77P201J | Composition: 200 ohms ±5%, 1/2 w. |
| R54 | 3R77P333J | Composition: 33,000 ohms ±5%, 1/2 w. |
| R55 | 3R77P103J | Composition: 10,000 ohms ±5%, 1/2 w. |
| R56 | 3R77P363J | Composition: 36,000 ohms ±5%, 1/2 w. |
| R57 | 3R77P103K | Composition: 10,000 ohms ±10%, 1/2 w. |
| R58 | 3R77P913J | Composition: 91,000 ohms ±5%, 1/2 w. |
| R59* | 3R77P182J | Composition: 1800 ohms ±5%, 1/2 w. |
| | | In REV C and earlier: |
| | 3R152P432J | Composition: 4300 ohms ±5%, 1/4 w. |
| R60 | 3R77P432J | Composition: 4300 ohms ±5%, 1/2 w. |
| R61 | 3R77P682K | Composition: 6800 ohms ±10%, 1/2 w. |
| | | - - - - - - - - - THERMISTORS - - - - - - - - - |
| RT1 | 5490828P22 | Thermistor: 50,000 ohms ±10%, color code yellow; sim to Globar Type 763H. |
| | | - - - - - - - - - - - SOCKETS - - - - - - - - - |
| XFL1 | 19A121920G3 | Reed, mica-filled phen: 7 pins rated at 1 amp at 500 VRMS with 4-1/2 inches of cable. |
| A320 | | TONE REJECT FILTER 19C311797G2 |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - |
| C26 | 19A116080P206 | Polyester: 0.068 µf ±5%, 50 VDCW. |
| C27 and C28 | 19A116080P210 | Polyester: 0.33 µf ±5%, 50 VDCW. |
| C29* | 19A116080P205 | Polyester: 0.047 µf ±5%, 50 VDCW. |
| | | Earlier than REV A: |
| | 19B209243P107 | Polyester: 0.1 µf ±10%, 50 VDCW. |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - - - |
| J6 and J7 | 4033513P4 | Contact, electrical; sim to Bead Chain L93-3. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19A115690P1 | Coil, RF: 880 mh ±5%, sim to Artted AC5672. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R59* | 3R77P182J | Composition: 1800 ohms ±5%, 1/2 w. |
| | | In REV A and earlier: |
| | 3R152P432J | Composition: 4300 ohms ±5%, 1/4 w. |
| A321* | | RF PRE AMP 19A127479G1 REV A |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - |
| C1 | 19A116656P7J0 | Ceramic disc: 7 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. |
| C2 thru C5 | 19A116655P14 | Ceramic disc: 470 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| C6 | 19A116656P5J0 | Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef 0 PPM. |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - |
| L1 | 19B209420P101 | Coil, RF: 0.10 µh ±10%, 0.08 ohms DC res max; sim to Jeffers 4416-1. |
| L2 | 19B209420P103 | Coil, RF: 0.15 µh ±10%, 0.10 ohms DC res max; sim to Jeffers 4436-8. |
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - |
| Q1 | 19A116818P1 | N Channel, field effect. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P103J | Composition: 10,000 ohms ±5%, 1/4 w. |
| R2 | 3R152P472J | Composition: 4700 ohms ±5%, 1/4 w. |
| R3 and R4 | 3R152P101J | Composition: 100 ohms ±5%, 1/4 w. |
| R5 | 3R152P242J | Composition: 2400 ohms ±5%, 1/4 w. |
| | | - - - - - - - - - - - CABLES - - - - - - - - - - |
| W2 | 19A129857G1 | 3 inches long. Includes J2. |
| W3 | 19A129856G1 | 5 inches long. Includes P3. |
| A321* and A322* | | RF PRE AMP<br>A321 19A127479G1 132-150.8 MHz<br>A322 19A127479G2 150-8-174 MHz REV A |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - |
| C5 thru C7 | 5494481P107 | Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. |
| C8 and C9 | 19A116080P101 | Polyester: 0.01 µf ±10%, 50 VDCW. |
| | | - - - - - - - - - TRANSISTORS - - - - - - - - |
| Q1 | 19A116154P1 | N Channel, field effect. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P221J | Composition: 220 ohms ±5%, 1/4 w. |
| R2 and R3 | 3R152P220J | Composition: 22 ohms ±5%, 1/4 w. |
| | | - - - - - - - - - TRANSFORMERS - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B216479G1<br>T2 19B216479G2 |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C1 | 5496218P641 | Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| C2* | 5496218P640 | Ceramic disc: 9.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| | | Earlier than REV A: |
| | 5496218P638 | Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| | 5491798P5 | Tuning slug. |
| | | - - - - - - - - - TRANSFORMERS - - - - - - - - |
| T3 and T4 | | COIL ASSEMBLY<br>T3 19B216478G1<br>T4 19B216478G2 |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C3 | 5496218P638 | Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| C4 | 5496218P635 | Ceramic disc: 4.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| | 5491798P5 | Tuning slug. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - TRANSISTORS - - - - - - - - |
| Q1 | 19A116154P1 | N Channel, field effect. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - |
| R1 | 3R152P221J | Composition: 220 ohms ±5%, 1/4 w. |
| R2 and R3 | 3R152P220J | Composition: 22 ohms ±5%, 1/4 w. |
| | | - - - - - - - - - TRANSFORMERS - - - - - - - - |
| T1 and T2 | | COIL ASSEMBLY<br>T1 19B216479G1<br>T2 19B216479G2 |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C1 | 5496218P641 | Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| C2* | 5496218P640 | Ceramic disc: 9.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| | | Earlier than REV A: |
| | 5496218P638 | Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| | 5491798P5 | Tuning slug. |
| | | - - - - - - - - - TRANSFORMERS - - - - - - - - |
| T3 and T4 | | COIL ASSEMBLY<br>T3 19B216478G1<br>T4 19B216478G2 |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - - |
| C3 | 5496218P638 | Ceramic disc: 7.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| C4 | 5496218P635 | Ceramic disc: 4.0 pf ±0.25 pf, 500 VDCW, temp coef -470 PPM. |
| | 5491798P5 | Tuning slug. |
| | | - - - - - - - - - - CABLES - - - - - - - - - - |
| W1 | 5491689P74 | RF. Includes J444 connector. |
| W2 | 19B205634G2 | RF. Includes J2 connector 19B209122P3. |
| W3 | 19A127476G1 | RF. Includes P3 connector. |
| | | CHASSIS AND RF CIRCUIT 19E500872G1 and G2 |
| | | - - - - - - - - - CAPACITORS - - - - - - - - - |
| C301 thru C306 | | (See Mechanical Parts RC-1627) |
| C307 | 7774750P4 | Ceramic disc: .001 µf +100% -0%, 500 VDCW. |
| C310 thru C313 | 19B209135P1 | Ceramic, feed-thru: 1000 pf +150%-0%, 500 VDCW. |
| C314 | 5496267P10 | Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. |
| C315 | 19A115680P3 | Electrolytic: 20 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. |
| C317 and C318 | 5494481P12 | Ceramic disc: .001 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - DIODES AND RECTIFIERS - - - - - - |
| CR1* | 19A116062P2 | Selenium. Added by REV C. Deleted in G1 by REV J, deleted in G2 by REV K. |
| | | - - - - - - - JACKS AND RECEPTACLES - - - - - - |
| J441 | | Connector. (Part of W441). |
| J442 | 19B205689G2 | Connector: 18 contacts. |
| J443 | 19C303426G1 | Connector: 20 pin contacts. |
| J444 | | Connector: (Part of A321/A322-W1). |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - - CABLES - - - - - - - - - - |
| W1 | 5491689P74 | RF. Includes J444 connector. |
| W2 | 19B205634G2 | RF. Includes J2 connector 19B209122P9. |
| W3 | 19A127476G1 | RF. Includes P3 connector. |
| | | CHASSIS AND RF CIRCUIT 19E350872G1 and G2 |
| | | - - - - - - - - - - CAPACITORS - - - - - - - - - - |
| | | (See Mechanical Parts RC-1627) |
| C301 thru C306 | | |
| C307 | 7774750P4 | Ceramic disc; .001 µf +100% -0%, 500 VDCW. |
| C310 thru C313 | 19B209135P1 | Ceramic, feed-thru: 1000 pf +150%-0%, 500 VDCW. |
| C314 | 5496267P10 | Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D. |
| C315 | 19A116580P9 | Electrolytic: 30 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. |
| C317 and C318 | 5494441P12 | Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap. |
| | | - - - - - - - - DIODES AND RECTIFIERS - - - - - - - |
| CR1* | 19A116091P2 | Selenium. Added by REV C. Deleted in G1 by REV J, deleted in G2 by REV K. |
| | | - - - - - - - - JACKS AND RECEPTACLES - - - - - - |
| J441 | | Connector. (Part of W441). |
| J442 | 19B205698G2 | Connector: 18 contacts. |
| J443 | 19C303426G1 | Connector: 20 pin contacts. |
| J444 | | Connector: (Part of A321/A322-W1). |
| | | - - - - - - - - - - INDUCTORS - - - - - - - - - - |
| L301 | 19B216112G4 | Coil. |
| L302 | 19B216112G3 | Coil. |
| L303 | 19B216112G8 | Coil. |
| L304 | 19B216112G7 | Coil. |
| L305 | 19B216112G8 | Coil. |
| L306 | 19B216112G7 | Coil. |
| L307 | 19B216112G8 | Coil. |
| L308 | 19B216112G7 | Coil. |
| L309 | 19B216112G6 | Coil. |
| L310 | 19B216112G5 | Coil. |
| L311 | 19B216112G2 | Coil. |
| L312 | 19B216112G3 | Coil. |
| L313 and L314 | 7488079P16 | Choke, RF; 10 µh ±10%, 0.6 ohm DC res max; sim to Jeffers 4421-7K. |
| | | - - - - - - - - - - PLUGS - - - - - - - - - - |
| P301 thru P313 | 4029846P2 | Contact, electrical; sim to Amp 42827-2. |
| P315 thru P317 | 4029846P2 | Contact, electrical; sim to Amp 42827-2. |
| P319 and P320 | 4029846P2 | Contact, electrical; sim to Amp 42827-2. |
| P322 | 4029846P2 | Contact, electrical; sim to Amp 42827-2. |
| P323 | 4029846P1 | Contact, electrical; sim to Amp 41454. |
| P324 | 4029846P2 | Contact, electrical; sim to Amp 42827-2. |
| P325 | 4029846P1 | Contact, electrical; sim to Amp 41854. |
| P326 | 4029846P2 | Contact, electrical; sim to Amp 42827-2. |
| P327 | 4029846P1 | Contact, electrical; sim to Amp 41854. |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| | | - - - - - - - - - - TRANSISTORS - - - - - - - - - - |
| Q301* and Q302* | 19A116741P1 | Silicon, NPN. |
| | | In 19E350872G1 REV E-L; In 19E350872G2 REV E-M; |
| | 19A116203P2 | Silicon, NPN. |
| | | In REV D and earlier: 19E350872G1 and G2 |
| | 19A115949P1 | Silicon, NPN. |
| | | - - - - - - - - - - RESISTORS - - - - - - - - - - |
| R301 | 2A152P331K | Composition: 330 ohms ±10%, 1/4 w. Deleted by REV G. |
| R302 | 19A116278P444 | Metal film: 0.28 megohm ±2%, 1/2 w. |
| R303 | 3B78P990K | Composition: 39 ohms ±10%, 1 w. |
| | | - - - - - - - - - - TRANSFORMERS - - - - - - - - - - |
| T301 | 19A116041P2 | Audio freq: 300 to 4000 Hz, Pri: 1.00 ohms ±15% DC res, Sec 1: .23 ohm ±10% DC res, Sec 2: 10.0 ohms ±15% DC res. |
| | | - - - - - - - - TERMINAL BOARDS - - - - - - - - |
| TB1 | 7487424P7 | Miniature, phen: 4 terminals. |
| TB2 | 7487424P26 | Miniature, phen: 6 terminals. |
| | | - - - - - - - - - - CABLES - - - - - - - - - - |
| W441 | 19B205634G1 | Coaxial: approx 5 inches long. Includes J441. |
| | | HARNESS ASSEMBLY 19E350872G7 (Includes C307, C317, C318, J442, J443, P301-P304, P307-P313, P315-P317, P319, P320, P322-P327, R302, R303, T301, TB2) |
| | | CHANNEL GUARD MODIFICATION KIT 19A127178G1 (Used with A319) |
| | | - - - - - - - - - - MISCELLANEOUS - - - - - - - - - - |
| | 19B216176G1 | Harness (Encoder/Decoder). Includes: |
| FS1 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| FS2 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| FS3 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| FS26 thru FS35 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| | | CHANNEL GUARD MODIFICATION KIT 19A127178G2 (Used with A320) |
| | | - - - - - - - - - - MISCELLANEOUS - - - - - - - - - - |
| | 19B216177G1 | Harness (Tone Reject Filter). Includes: |
| FS3 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| FS20 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| FS22 | 6029846P2 | Contact, electrical; sim to Amp 42827-2. |
| | | MECHANICAL PARTS (SEE RC-1627) |
| 1 | 19C303395G4 | Bottom cover. (Station) |
| | 19C303385G1 | Bottom cover. (Mobile) |
| 2 | 19C317344P3 | Heat sink. |
| 3 | 19A121322P1 | Support. (Mounts C312 and C313). |
| 4 | 403308P1 | Clip. (Part of XY1-XY4). |
| 5 | 19B200522P9 | Rivet. (Part of XY1-XY4). |

| SYMBOL | GE PART NO. | DESCRIPTION |
|---|---|---|
| 6 | 19A115793P1 | Contact. (Part of XY1-XY4). |
| 7 | 403930?P1 | Crystal socket. (Part of XY1-XY4). |
| 8 | 19B216072P1 | Cover. (Used with A317). |
| 9 | 403435P5 | Can. (Used with T1 on A317). |
| 10 | 19C303389G1 | Chassis. |
| 11 | 403675?G2 | (Not Used). |
| 12 | 403675?G4 | Screw. (Part of C301 thru C306). |
| 13 | 7137964P8 | Nut, stamped: No. 6-32 thread; sim to Palnut YW63005. (Part of C301 thru C306). |
| 14 | 19A121221P1 | Support. (Mounts C310 and C311). |
| 15 | 403689P4 | (Not Used). |
| 16 | 7145451P1 | Cleat. |
| 17 | 19B204583G2 | Hinge. |
| 18 | 19B216737P1 | Support. (Used with Q301 and Q302). |
| 19 | 19A116023P2 | Plate, insulated. (Used with Q301 and Q302). |
| 20 | 19A116022P1 | Insulator, bushing. (Used with Q301 and Q302). |
| 21 | 402885?P6 | Clip, loop. |
| 22 | 19B204583G1 | Hinge. |
| 23 | 19B204583G3 | Hinge. |
| 24 | 19A131076P1 | Guide pin. |
| 25 | 19C303495G3 | Top cover. (Station, except Repeaters and YW). |
| | 19C303076G3 | Top cover. (Station, Repeater and YW only). |
| | 19C303385P2 | Top cover. (Mobile). |
| 26 | 19A121297P1 | Angle. |
| 27 | 7160981P4 | Nut. (Used to secure cover). |
| 28 | 403539?P2 | Button, plug. (Used with A318 thru A320). |
| 29 | 403655?P1 | Insulator disc. (Used with Q7 on A318). |

# PRODUCTION CHANGES

Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the number of the assembly. The revision stamped on the assembly includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - Chassis and RF Assembly 19E500872-G1 & -G2

To incorporate a better high-frequency capacitor. Changed C5 on First Mixer A301/A302.

REV. A - 2nd Mixer A317 (19B216119-G1)

To make receiver compatible with new system. Added C17.

REV. B - Chassis and RF Assembly 19E500872-G1 & -G2

To improve stability. Changed C2 on Hi IF Amp A315.

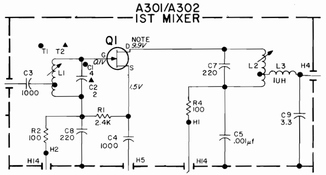
REV. C - Chassis and RF Assembly 19E500872-G1 & -G2

To protect the receiver against positive voltage transients. Added thyrector CR1 between J443-11 and -13.

REV. D - Chassis and RF Assembly 19E500872-G1 & -G2

To improve sensitivity and improve Intermodulation (EIA) performance. Deleted C6 & R3 and changed C7 & L2 on First Mixer A301/A302.

Schematic Diagram Was:



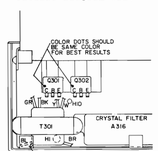

Step 7 of receiver alignment was:

| | | | | | |
|---|---|---|---|---|---|
| 7. | B (2nd IF AMP) | Pin 2 | C6 and L1 (on 1st MIXER A301/A302) | Maximum | Apply an on-frequency signal into Hole 304, and tune C6 and L1 for maximum meter reading, keeping signal below saturation. |

REV. E - Chassis and RF Assembly 19E500872-G1 & -G2

To incorporate new PA transistors. Changed Q301/Q302 and added R303.

Outline Diagram Was:



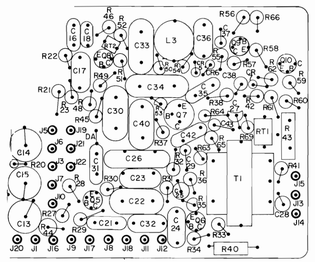



REV. A - IF Audio & Squelch Board A318 (19D413129-G1)

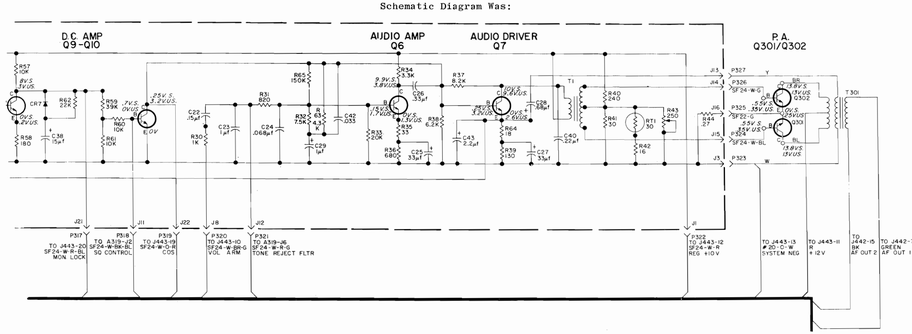
To make IF Audio & Squelch Board compatible with new PA transistors and to improve squelch operation. Added C49-C54, CR8, R75-R79, and RT3. Deleted C24, C28, C29, C42, C43, R32, R37, R63 and R65. Changed C21, C26, C37, C38, C40, R33, R38, R39, R41, R42, R48, R53 and R62.

Outline Diagram Was:

IF-AUDIO & SQUELCH BOARD A318



Schematic Diagram Was:




# PRODUCTION CHANGES

132—174 MHz MASTR RECEIVER
MODELS 4ER41C10-45 & 4ER41E10-45

# PRODUCTION CHANGES

REV. B - Channel Guard Encoder/Decoder A319 (Model 4EK16A10)

To increase stop-band attenuation. Changed R8.

REV. C - Channel Guard Encoder/Decoder A319 (Model 4EK16A10)
REV. A - Tone Reject Filter A320 (19C311797-G2)

To optimize frequency response. Changed C29.

REV. F - Chassis and RF Assembly (19E500872-G1 & G2)

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.

REV. A - RF Pre Amp A322 (19A127479-G2)

To assure band-end tuning at 150.8 MHz. Changed C2.

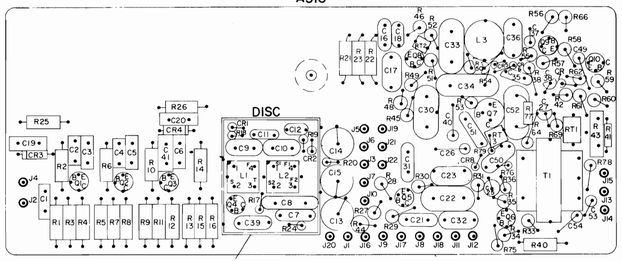
IF Audio & Squelch Board A318 (19D413129-G1)

REV. B - To control more closely the squelch control rotation. Changed R48.

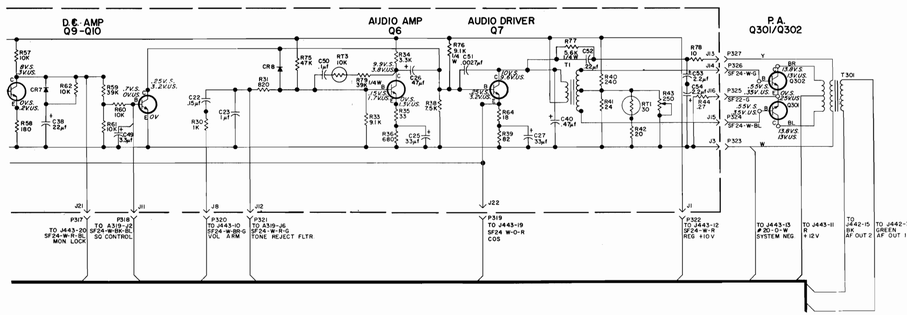
REV. C - To eliminate barely audible squelch switching transients and to reduce receiver squelch tail. Deleted C38, C49, CR7, CR8, R62, R75, and R76. Added C55, R80, R81, and R82. Changed C27, C36, R53, R64, and R77.

Outline Diagram was:

IF-AUDIO & SQUELCH BOARD
A318




Schematic Diagram Was:




REV. D - IF Audio & Squelch Board A318 (19D413129-G1)

To improve receiver frequency response.
Changed R30 and R78.

REV. D - Channel Guard Encoder/Decoder A319 (Model 4EK16A10)
REV. B - Tone Reject Filter A320 (19C311797-G2)

To prevent excessive roll-off at 300 Hertz.
Changed R59.

REV. E - IF Audio & Squelch Board A318 (19D413129-G1)

To compensate for vendor change.
Changed C26.

REV. F - IF Audio & Squelch Board A318 (19D413129-G1)

To improve squelch action.
Changed R53.

REV. G - Chassis and RF Assembly (19E500872-G1 & G2)

To stabilize the 1st mixer. Deleted R301 on the 2nd Multiplier and added R5 to the 1st mixer.

REV. H - Chassis and RF Assembly (19E500872-G2)

To improve tuning of the 1st mixer.
Changed C2.

REV. H - Chassis and RF Assembly (19E500872-G1)

To eliminate oscillations. Added R6.

REV. J - Chassis and RF Assembly (19E500872-G2)

To eliminate oscillations. Added R6.

REV. J - Chassis and RF Assembly (19E500872-G1)

To remove unnecessary protection.
Removed CR1.

REV. K - Chassis and RF Assembly (19E500872-G2)

To remove unnecessary protection.
Removed CR1.

REV. H - IF Audio and Squelch Board A318 (19D413129-G1)

To insure squelch action at -30°C.
Changed Q10.

REV. K - Chassis and RF Assembly (19E500872-G1)

To eliminate oscillation in Hi IF Amplifier.
Added L2 and Ferrite Bead.

REV. L - Chassis and RF Assembly (19E500872-G2)

To eliminate oscillation in Hi IF Amplifier.
Added L2 and Ferrite Bead.

REV. L - Chassis and RF Assembly (19E500872-G1)

To increase injection from multiplier chain.
Deleted R1 and R2. Changed Q1 and R3.
Added L4.

REV. M - Chassis and RF Assembly (19E500872-G2)

To increase injection from multiplier chain.
Deleted R1 and R2. Changed Q1 and R3.
Added L4.

REV. M - Chassis and RF Assembly (19E500872-G1)

To incorporate a new transistor.
Changed Q301 & Q302.

REV. N - To improve design
Changed Q1.

REV. N - Chassis and RF Assembly (19E500872-G2)

To incorporate a new transistor.
Changed Q301 & Q302.

REV. P - To improve design
Changed Q1.

REV. J - IF Audio and Squelch Board A318 (19D413129-G1)

To improve PA bias.
Changed R40

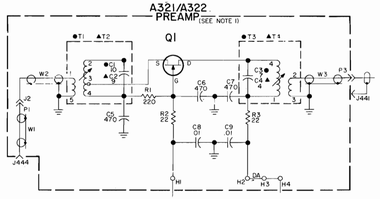
REV. K - To improve stability of audio output with no load.
Added R85

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

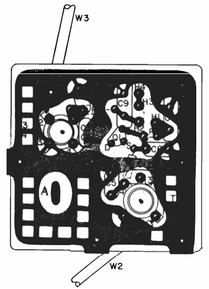
REV. A - RF Pre Amp A321 (19A127479-G1)

To incorporate improved design
Changed UHS Pre Amp Board.

Schematic Diagram was:




Outline Diagram Was:




Alignment Procedure Was:

| METERING POSITION | | TUNING CONTROL | METER READING | PROCEDURE |
|---|---|---|---|---|
| GE Test Set or Meter Panel | Multimeter - at J442 | | | |
| B (2nd IF AMP) | Pin 2 | C301, C302, C303, C304, C305 and C306 (all receivers), and T1/T2 and T3/T4 (UHS receivers | Maximum | Apply an on-frequency signal to the antenna jack. On UHS receivers, tune T1/T2 and T3/T4 (PREAMP) for maximum meter reading. On all receivers, tune C301 through C306 for maximum meter reading. Readjust adjustments for saturation. Then retune C301 through C306 slightly for maximum quieting. |
| B (2nd IF AMP) | Pin 2 | C301, C302, C303, C304, C305, and C306 (on all receivers) and T1/T2 & T3/T4 (UHS Receivers) | Maximum | Apply an on-frequency signal to the antenna jack. On UHS receivers, tune T1/T2 and T3/T4 (PREAMP) for maximum meter reading. On all receivers, tune C301 through C306 for maximum quieting. |

PRODUCTION CHANGES
132—174 MHz MASTR RECEIVER
MODELS 4ER41C10-45 & 4ER41E10-45