MOBILE RADIO

MAINTENANCE MANUAL

MONITOR RECEIVERS TYPE ER-51-A & ER-52-A

(Note: The UHF Monitor Receiver Type ER-53-A is covered in LBI-4039)

SPECIFICATIONS *	25—50 MHz	132—174 MHz
Receiver Type	ER-51-A	ER-52-A
Channel Spacing	20 kHz (Narrow Band)	30 kHz (Narrow Band)
Sensitivity 12-dB SINAD 20-dB Quieting	 0.25 μV 0.35 μV	 0.3 μV 0.5 μV
Selectivity (EIA Two-Signal Method)	-60 dB	-80 dB
Spurious Response	-75 dB	-65 dB
Intermodulation (EIA)	-55 dB	-55 dB
First Oscillator Stability	±.002% (-30°C to +60°C, +25°C reference)	±.001% (-30°C to +60°C, +25°C reference)
Modulation Acceptance	±6 kHz	±7 kHz
Squelch Sensitivity	0.15 μV minimum 1.0 μV maximum	0.2 μV minimum 1.0 μV maximum

Frequency Response	Within +2 dB and -8 dB of a 6 dB/octave de-emphasis curve from 300 to 3000 Hz (1000 Hz reference) per EIA standards
Operable Temperature Range	-30°C to +60°C (-22°F to +140°F)
Audio Output	1.5 watts at less than 10% distortion
Power Input	20 watts at 117 VAC ±10%, 50/60 Hz
Maximum Frequency Separation	0.4%

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

ER-51-A & ER-52-A

GENERAL ELECTRIC

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ILLUSTRATIONS

WARNING

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

EQUIPMENT INDEX

EQUIPMENT	MODEL OR TYPE NUMBER
25-50 MHz Receiver	ER-51-A
132-174 MHz Receiver	ER-52-A
Front Panel	19D402678-G1
Chassis	19C311011-G1
Top Cover	19A122161-G2
Standby Battery Supply	19B205435-G2
Channel Guard Decoder	4EK15A10
Bottom Cover (Support)	19B205283-G2

OPTIONAL EQUIPMENT

Type 99 Tone Decoder Boards A1403 & A1404 (One thru four boards, Options 4203 thru 4206)	19D413100-G1
Type 90 Tone Decoder Board A1701 (One thru four boards, Options 4207 thru 4210)	19C303730-G1
Audible Alarm, Option 4211 Buzzer and Second Relay	7136597-G2
Antenna Adaptor Cable, Option 4212	19A122312-G1
Carrier Operated Relay, Option 7610	19C303533-G2
132-174 MHz Indoor Antenna Option 4213 (Includes Connector M2R22-P2)	4EY19C10
Improved Intermodulation Modification, Option 5495	19A127250-G1

COMBINATION NOMENCLATURE

1st Digit	2nd Digit	3rd Digit	4th Digit	5th Digit	6th Digit	7th Digit	8th & 9th Digit
N Monitor Rcvr	**S** Standard	**O** Standard	**4** 20 kHz Channels	**M** 117-VAC	**A** 1-Freq.	**S** Standard	**11** 25-33 MHz
	D Type 99 Decoder	**2** Two reeds Type 99	**6** 30 kHz Channels	**N** 117-VAC and Stby Battery	**D** 2-Freq.	**U** Channel Guard	**22** 33-42 MHz
	T Type 90 Decoder	**4** Four reeds Type 99					**33** 42-50 MHz
							55 132-150.8 MHz
							66 150.8-174 MHz

Figure 1 - Combination Nomenclature Chart

DESCRIPTION

General Electric Monitor Receivers are attractively styled, high performance FM receivers designed for operation in the 25—50 and 132—174 megahertz range. The receivers are fully transistorized -- utilizing silicon transistors for added reliability. The compact design of the units permits them to be easily mounted on a desk, shelf or table with room left over for books, papers, etc.

Optional decoder boards are available for use with the receiver so that the unit will operate in a two-way radio system employing Channel Guard, Type 90 and Type 99 Encoders.

The receiver normally operates from a 117 volt AC, 50/60 Hz source. An optional chassis-mounted standby battery supply is available to power the receiver for up to seven hours in the event of power failure. The receiver may also be operated from an external 12-volt battery if desired.

Combination numbers for the receiver are shown in the Combination Nomenclature Chart (Figure 1.)

OPERATION

RECEIVER

Operating controls for the Monitor Receiver include the VOLUME and SQUELCH controls located on the front panel, and an OFF-ON switch located at the rear of the unit.

Turn the receiver on by sliding the OFF-ON switch to the ON position. The green power-on light will glow when the power is on. Then turn the SQUELCH control all the way to the right. If the receiver is equipped with Channel Guard, Type 90 or Type 99 Tone Decoders, disable the decoder circuitry by placing the RESET-MONITOR switch in the MONITOR position. Always return the MONITOR switch to the center position after making all adjustments.

Adjust the VOLUME control until the hissing sound is easily heard but not annoyingly loud. Next, turn the SQUELCH control slowly to the left until the hissing sound just fades out.

In two-frequency receivers, select the proper frequency (F1 or F2). The receiver is now ready to monitor two-way radios in the system.

CHANNEL GUARD

The operating control for the Channel Guard Decoder consists of a RESET-MONITOR switch located on the front panel. The decoder keeps all signals on the channel locked out of the Monitor Receiver except those that are continuously tone coded for positive identification by the decoder.

When a signal that is modulated by the proper tone code is received, the receiver audio circuits operate. Placing the RESET-MONITOR switch in the MONITOR position disables the Channel Guard Decoder, and permits all calls on the channel to be heard.

TYPE 90 & TYPE 99 TONE DECODERS

Operating controls for the Type 90 and Type 99 Tone Decoders include a RESET-MONITOR switch and an amber Call light located on the front panel.

When a properly tone-coded signal is received, the Call lamp lights and the message is heard in the speaker. After the message is completed, momentarily placing the RESET-MONITOR switch in the RESET position re-activates the decoder circuitry.

Placing the switch in the MONITOR position disables the decoder circuitry and permits all calls on the channel to be heard. Always return the RESET-MONITOR switch to the center position after monitoring the channel so that the receiver will operate normally.

CIRCUIT ANALYSIS

RECEIVER

Receiver Types ER-51-A (25-50 MHz) and ER-52-A (132-174 MHz) are double conversion, superheterodyne receivers designed for operation with the General Electric Monitor Receiver.

Each receiver consists of a receiver board and a 1st oscillator board. The frequency ranges and number of frequencies for the receivers are shown in the following chart.

RECEIVER TYPE NO.	RECEIVER BOARD	1ST OSCILLATOR BOARD	FREQUENCY RANGE	NUMBER OF FREQUENCIES
ER-51-A	19D402429-G1	4EG19A10	25-33 MHz	One Frequency
	19D402429-G1	4EG19A11	25-33 MHz	Two Frequency
	19D402429-G2	4EG19A10	33-42 MHz	One Frequency
	19D402429-G2	4EG19A11	33-42 MHz	Two Frequency
	19D402429-G3	4EG19A10	42-50 MHz	One Frequency
	19D402429-G3	4EG19A11	42-50 MHz	Two Frequency
ER-52-A	19D402257-G1	4EG20A10	132-150.8 MHz	One Frequency
	19D402257-G1	4EG20A11	132-150.8 MHz	Two Frequency
	19D402257-G1	4EG20A12	150.8-174 MHz	One Frequency
	19D402257-G1	4EG20A13	150.8-174 MHz	Two Frequency

The audio PA stage is mounted on the main chassis, and the loud-speaker is mounted on the front panel. The unit is completely transistorized -- utilizing 17 silicon transistors, seven silicon diodes and two zener diodes. An additional transistor is added for two-frequency operation.

A centralized metering jack (J312) is provided for use with General Electric Test Set TM11 or TM12 (Model 4EX3A10) for aligning and servicing the receiver. The Test Set meters the limiter stages, oscillator, supply voltages, voice coil, PA and discriminator stages.

VOLTAGE REGULATOR

The receiver operates on a regulated 10 volts provided by Q315 and Q316 in a series regulator circuit.

When the input voltage at J311 starts to rise, the output voltage at the emitter of Q315 also tries to rise. This changes the base-emitter bias on Q316, causing it to conduct more heavily. When Q316 conducts, there is less base bias on Q315 and, therefore, less base current flows through the transistor. With less base current flowing, the voltage drop across Q315 is larger and less voltage appears at the output.

When the input voltage starts to drop, Q316 conducts less, increasing the forward bias on Q315. The increased forward bias decreases the voltage drop across Q315, and more voltage appears at the output. Regulation will stop if the input value drops below 11 volts.

The 10-volt REGULATOR adjustment (R372/R373) is set for a 10-volt reading at centralized metering jack J312 when aligning the receiver.

RF AMPLIFIER

RF signals from the antenna are fed to the base of low noise RF amplifier Q301 through two tuned pre-selector circuits. The output of the RF amplifier is coupled through two tuned circuits to the base of the 1st mixer.

OSCILLATOR/MULTIPLIER

In 25-50 MHz receivers, Q425 is a Colpitts oscillator operating in the 12 to 19 megahertz range. Trimmer capacitor C425 permits the oscillator frequency to be shifted slightly for setting the receiver on the system operating frequency.

For 25 to 33 megahertz operation, collector coil L425 is tuned to two times the crystal frequency with high-side injection. For 33 to 42 megahertz operation, L425 is tuned to two times the crystal frequency with low-side injection. For 42 to 50 megahertz operation, L425 is tuned to three times the crystal frequency with low-side injection.

In 132-174 MHz receivers, Q425 is a third mode oscillator that operates in the 49 to 54 megahertz region. The crystal is connected in the oscillator feedback path to permit oscillation only at the crystal frequency. L425, C425, C426 and C428 make up the mode selective resonant circuit. Adjustable coil L425 permits the oscillator frequency to be shifted slightly for setting the receiver on the system operating frequency. The collector tank of A425 is tuned to three times the crystal frequency.

For two-frequency operation, a second oscillator/multiplier stage is added. Channels are selected by grounding the emitter of the desired oscillator by means of a two-frequency switch on the front panel.

1ST MIXER

RF signals from the RF amplifier are fed to the base of 1st Mixer Q302 along with the oscillator injection frequency. The Hi IF mixer output is fed to a three-coil torroidal Hi IF filter and then fed to the base of 2nd mixer Q304.

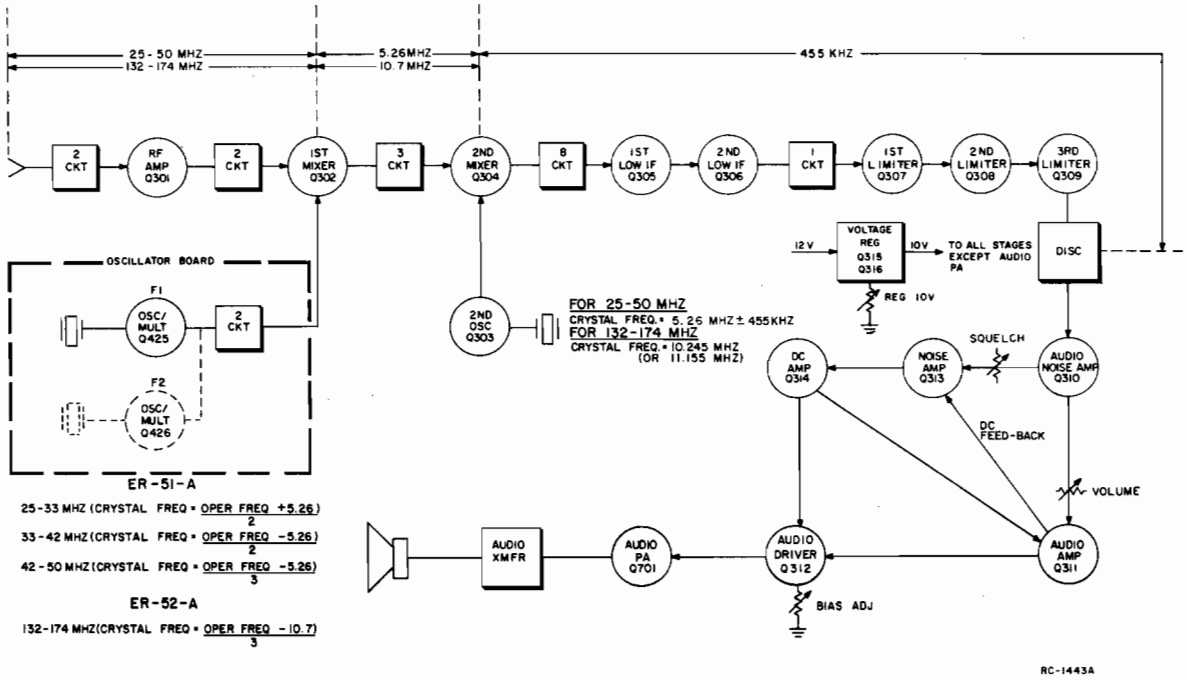


Figure 2 - Receiver Block Diagram

2ND OSCILLATOR AND MIXER

Q303 operates as a Pierce oscillator with a crystal frequency of 3.26 megahertz ±455 kHz for low band or 10.245 (or 11.155) megahertz for high band.

Hi IF from the 1st mixer is applied to the base of 2nd mixer Q304. This Hi IF is mixed with the 2nd oscillator low side (or high side) injection frequency which produces the 455-kilohertz Lo IF. The main receiver selectivity is provided by the eight-coil Lo IF filter following the 2nd mixer.

LO IF AMPLIFIERS

Two RC-coupled Lo IF amplifiers (Q305 and Q306) are used to amplify the signal going to the limiter stages. The amplifier output is coupled to the 1st limiter through a 455-kHz filter (L316 and C348), which reduces the noise bandwidth of the IF string.

LIMITERS

Following the Low IF amplifiers are three RC-coupled limiter stages, Q307, Q308 and Q309, which operate as over-driven amplifiers. Zener diode CR308 provides additional limiting. The 1st and 2nd limiter stages are metered at the centralized metering jack (J312) through metering diodes CR301 and CR302.

DISCRIMINATOR

The limiter output is applied to the Foster-Seely type discriminator, where the audio voltages are recovered from the 455-kHz Lo IF. A Lo IF filter removes any 455-kHz signal remaining in the discriminator output.

AUDIO AMPLIFIERS

When audio is present in the incoming signal, it is fed to the base of audio-noise amplifier Q310. Following Q310 is an audio de-emphasis network.

After the de-emphasis network, audio is fed to the base of audio amplifier Q311 through the volume control mounted on the front panel. The VOLUME control sets the amount of drive to the audio stages. An audio driver (Q312) and an audio PA output stage (Q701) follow audio amplifier Q311. Audio Bias trimmer R366/R367 sets the bias on Q312 and Q701, and is adjusted for a 250-millivolt reading at metering jack J312. The output of Q701 drives the loudspeaker.

SQUELCH

Noise from audio-noise amplifier Q310 is used to operate the squelch circuit. When no carrier is present in the receiver, this noise is coupled through a noise filter (which attenuates any audio frequencies) to the base of noise amplifier Q313. The noise level fed to the noise amplifier is set by the SQUELCH control, located on the

control unit. The output of noise amplifier Q313 is rectified by diodes CR305 and CR306, to produce a positive DC voltage. This DC voltage turns on the DC amplifier (Q314), causing it to conduct. When conducting, the collector voltage of the DC amplifier drops to ground potential, which removes the bias on the audio stages and turns them off.

When audio amplifier Q311 is being turned off, its emitter potential decreases. This results in a positive DC feedback through R351/R352 to the emitter of noise amplifier Q313 which causes an increase in the gain. As the gain of Q313 increases, the positive DC voltage to the DC amplifier increases, turning the audio stages off quickly.

When the receiver is quieted by a signal, less noise is present in the circuit and DC amplifier Q314 stays off. The audio stages are allowed to conduct and audio is heard from the speaker. With audio amplifier Q311 conducting, positive voltage appears across R351/R352 which helps reduce the gain of noise amplifier Q313. The positive feedback causes a quick, positive switching action in the squelch circuit.

POWER SUPPLY

The Monitor Receiver has a self-contained power supply designed to operate from a 117-volt AC, 50/60 Hz source. The power supply consists of a full-wave rectifier (CR701 and CR702) for rectifying the AC voltage developed across the secondary of step-down transformer T701. The primary of T701 is protected by a 1/4-amp slow-blow fuse (F701).

The output of the rectifiers is filtered by C701, L701 and C702 to provide +12 volts DC for operating the receiver, audio PA stage and the tone options.

The power-on indicator light is operated by an unfiltered +12 volts.

OPTIONS

CHANNEL GUARD DECODER

The Channel Guard decoder is designed to eliminate all calls that are not tone coded for the Channel Guard frequency. Normally, all signals are locked out except those from transmitters that are continuously tone-coded for positive identification by the receiver. Placing the Monitor switch S704 in the MONITOR position, instantly disables the Channel Guard circuit and the receiver operates on noise squelch only. For complete operating and maintenence information, refer to the Maintenance Manual for the decoder LBI-3802.

TYPE 90 AND TYPE 99 DECODERS

A maximum of four tone decoder boards with single relays or two decoder boards with two relays can be used with the Monitor Receiver.

The basic decoder board is supplied with one output relay. When a signal modulated by a pulse tone (Type 90) or sequential tone (Type 99) is received from the receiver discriminator, the relay locks up and the Call light turns on, and the message is heard in the speaker. Placing the RESET-MONITOR switch (S703) in the RESET position unlocks the relay and cuts off the Call light. If desired, one set of relay contacts can be used to activate an external alarm. An optional second relay and buzzer is available for use with the tone decoders. A description of the option is contained in the following section. For complete, operating and maintenance information concerning the Type 90 Tone Decoder refer to LBI-3684 or for Type 99 Tone Decoder refer to LBI-3839.

AUDIBLE ALARM

An Audible Alarm, consisting of a buzzer and second relay, can be used with the Type 90 and Type 99 Decoders. The relay plugs into the socket provided on the decoder board, and the buzzer mounts on the under side of the chassis as shown on the chassis Outline Diagram.

When the Audible Alarm option is used, the output relay can be connected for timed operation (3 to 5 seconds). The second relay operates locked to the RESET switch. The buzzer operates from the timed relay.

STANDBY BATTERY SUPPLY

The Standby Battery Supply is available for providing up to seven hours of operation in the event of power failure. The Battery Supply mounts on the chassis of the Monitor Receiver, and consists of a voltage-regulated taper charging circuit, a change-over relay and two rechargeable nickel-cadmium batteries. A maximum of two Type 90 or Type 99 Tone Decoders can be mounted on the Monitor Receiver chassis when the Standby Battery Supply is used.

Turning OFF-ON switch S701 to the ON position applies 117 VAC to the primary of stepdown transformer T1, and +12 volts to energize relay K1. The AC voltage developed across the secondary of T1 is rectified by the full-wave rectifier CR1 and CR2 and filtered by R1, R2 and C1. R1 and R2 also serve as charging current limiting resistors when the two batteries, BT1 and BT2, are in a discharged condition.

Dropping resistor R4, provides the negative bias to turn on Q1. Zener diode VR1

provides a voltage reference for the regulator.

When the input voltage at H7 rises, the output voltage at the emitter of Q1 also tends to rise. This causes a change in the base-emitter bias on Q2 making it conduct more heavily. When Q2 conducts, there is less base bias on Q1, and less base current. With less base current, the voltage drop across Q1 is larger, and the output voltage remains constant.

When the input voltage starts to drop, the output voltage also tends to drop, causing Q2 to conduct less. This increases the forward bias of Q1 and reduces the voltage drop across the transistor so that the output voltage remains constant. R5, R6 and R7 form an adjustable voltage divider so that potentiometer R6 can be adjusted for a 16.65-volt output. R3 provides bias current for VR1. The output is metered between H5 (+) and H4 (-) with the batteries disconnected.

If the batteries BT1 and BT2 are in a discharged condition, the charging current will be at a maximum since the regulator is supplying a constant voltage. The charging current will decrease as the batteries become fully charged until finally the batteries are receiving only a trickle charge.

In the event of a power failure, the relay is de-energized and the battery output is applied through K1-11 to operate the receiver. Diode CR2 prevents the pilot light (DS701) from lighting. Resistor R2 is switched in series with the emitter resistor of the audio PA stage (Q701), which reduces the audio output to approximately 150 milliwatts. When fully charged, the batteries will operate the receiver for approximately seven hours on a 10% receive, 90% squelched duty cycle.

CARRIER OPERATED RELAY

The Carrier Operated Relay assembly provides four form C contacts for controlling external circuits whenever a carrier is applied to the receiver.

When a carrier unsquelches the receiver, a positive voltage (approximately 2 volts) from the base of the receiver audio amplifier transistor turns on Q1 in the carrier operated relay circuit. Current flow in the collector circuit of Q1 forward biases Q2, causing it to conduct and energize relay K1. Voltage "spikes" produced across K1 (when K1 deenergizes) are absorbed by diode CR1 to prevent damage to transistors Q1 & Q2.

IMPROVED INTERMODULATION

The Improved Intermodulation modification is available for use with 132-174 MHz receivers to provide a 60 dB intermodulation response (EIA) with some loss in receive sensitivity. The modification consists of replacing the RF Amplifier circuit in the receiver front end with trimmer C2351 (see Figure 3).

Trimmer C2351 permits tuning the receiver to trade off sensitivity for improved intermodulation protection. The trimmer can be tuned for a 20 dB quieting sensitivity of 0.8 to 1.5 microvolts (0.6 to 1.2 microvolts for 12 dB SINAD). Instructions for adjusting C2351 are contained on the Receiver Alignment Procedure (see Table of Contents).

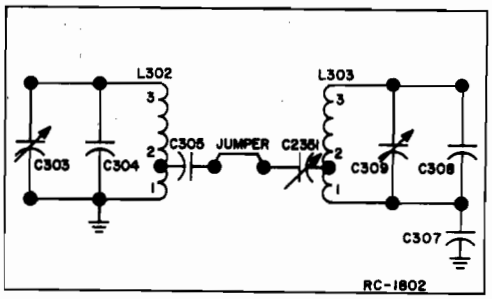


Figure 3
Improved Intermodulation Modification

ADJUSTMENT

RECEIVER

After the Monitor Receiver has been installed, the receiver should be set on the system operating frequency, and the antenna transformer matched to the antenna. Refer to the Front End Alignment on the RECEIVER ALIGNMENT PROCEDURE as listed in the Table of Contents.

DECODERS

No adjustments are required on the Channel Guard, Type 90 or Type 99 Decoders.

STANDBY BATTERY SUPPLY

Potentiometer R6 is adjusted and secured with a sealant at the factory to prevent tampering. However, if either VR1 or Q2 is replaced, it is recommended that R6 be replaced to facilitate adjustment. If it becomes necessary to adjust R6 and no replacement part is available, the sealant may be loosened by heating the metal ring on R6 with a soldering iron while making

the adjustment. This procedure requires a DC-VTVM that is accurate to ±.02 volts.

> **CAUTION**
>
> Failure to set the output voltage with R6 to 16.65 volts ±.02 volts may result in an insufficient charge or damage to the batteries.

SET R6 AS FOLLOWS:

1. Disconnect BT1 and BT2.
2. Connect the positive meter lead to the positive charging terminal (H5) and the negative meter lead to the negative charging terminal (H4) on the standby battery supply board.
3. Turn on switch S701 and adjust R6 for a voltage reading of 16.65 volts.
4. Turn off switch S701 and secure R6 with cement (Loctite R404 or equivalent).

MAINTENANCE

TEST AND TROUBLESHOOTING PROCEDURES

Whenever difficult servicing problems occur, the test procedure for the receiver can be used by the serviceman to compare actual performance of the unit against the specifications met by the unit when shipped from the factory. The Test Procedure is described on the back of the Receiver Alignment Procedure.

In addition, a Receiver Troubleshooting Procedure is available. (Refer to the Table of Contents). For best results, the test procedure should be used in conjunction with the troubleshooting procedure.

Refer to the applicable Maintenance Manual for servicing the Type 90 or Type 99 Tone Decoders.

DISASSEMBLY

To gain access to the Monitor Receiver for servicing, loosen the two captive knurled screws in the back of the unit and lift off the top cover.

> **NOTE**
>
> If it should become necessary to replace the audio PA transistor (Q701), make sure that there is a thin layer of silicon grease on each side of the insulator before remounting the transistor.

FRONT END ALIGNMENT

These instructions are for tuning the oscillator and RF stages of the receiver and may be used when changing the receiver crystal or frequency. When necessary to realign the entire receiver, refer to the COMPLETE RECEIVER ALIGNMENT.

EQUIPMENT REQUIRED

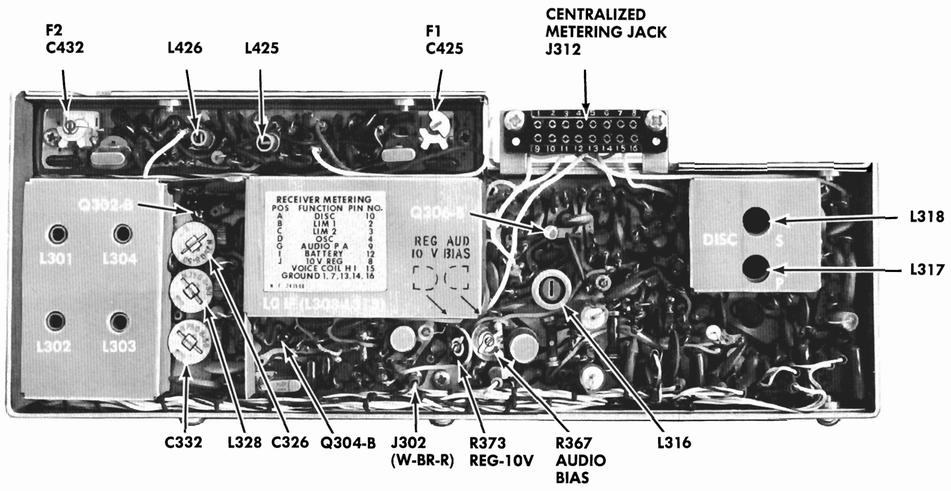
1. G-E Test Set Model TM11 or TM12 (or 20,000 ohms-per-volt Multimeter).
2. A 25-50 mHz Signal Source. Keep signal level below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set to the receiver centralized metering jack J312. Set Meter Polarity Switch on + and Meter Sensitivity Switch to 1. If using Multimeter, connect the negative lead to J312-13 (ground).
2. Switch Test Set to Position "I" (for measure at J302 with Multimeter). Reading should be at least 12 volts.
3. Switch to Position "J" (for measure across R373 with Multimeter) and adjust Voltage Regulation Potentiometer R372 for a reading of 10 volts.
4. Turn SQUELCH control fully clockwise and VOLUME control to minimum. Switch to Position "G" (for measure at J312-9 with Multimeter) and adjust Audio Bias Potentiometer R367 to a reading of 0.25 volt.

ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	METERING POSITION Multimeter + at J312	TUNING CONTROL	METER READING	PROCEDURE
1.	D OSC	Pin 4	C425 (and C432 for two-frequency), L425 and L426	See Procedure	Tune C425 (and C432 for two-frequency) and L425 for maximum meter reading. Then tune L426 for minimum meter reading. NOTE Start tuning procedure with the slugs fully in on 25-42 mHz units and fully out on 42-50 mHz units.
2.	C LIM-2	Pin 3	L301 thru L304	Maximum	Apply an on-frequency signal to Antenna Jack and tune L301 through L304 for maximum meter reading.
3.			L301 and L302	See Procedure	While receiving a weak on-frequency signal at the Antenna, tune L301 and L302 for maximum quieting.
4.	A DISC	Pin 10	C425 (and C432 for two-frequency)	Zero	Apply an on-frequency signal to Antenna Jack and tune C425 (and C432 for two-frequency) for zero discriminator reading.



COMPLETE RECEIVER ALIGNMENT

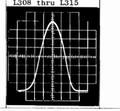
EQUIPMENT REQUIRED

1. G-E Test Set Model TM11 or TM12 (or 20,000 ohms-per-volt Multimeter).
2. A 455 kHz, a 5.26 mHz and a 25-50 mHz Signal Source. Couple the 455 kHz signal through a small capacitor (approximately 100 pf). Couple the 5.26 mHz signal through a .01 µf capacitor. Keep signal levels below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set to the receiver centralized metering jack J312. Set Meter Polarity Switch on + and Meter Sensitivity Switch to TEST 1. If using Multimeter, connect the negative lead to J312-13 (ground).
2. Switch Test Set to Position "I" (for measure at J302 with Multimeter). Reading should be at least 12 volts.
3. Switch to Position "J" (for measure across R373 with Multimeter) and adjust Voltage Regulation Potentiometer R373 for a reading of 10 volts.
4. Turn SQUELCH control fully clockwise and VOLUME control to minimum. Switch to Position "G" (for measure at J312-9 with Multimeter) and adjust Audio Bias Potentiometer R367 for a reading of 0.25 volt.

ALIGNMENT PROCEDURE

STEP	METERING POSITION TEST SET 4EX3A10	METERING POSITION MULTIMETER + at J312	TUNING CONTROL	METER READING	PROCEDURE
			DISCRIMINATOR		
1.	C LIM-2	Pin 3		0.3 volt (1.1 v with Multimeter)	Apply a 455 kHz signal to the base of Q306 and adjust signal level for 0.3 volt meter reading (to saturate limiters).
2.	A DISC	Pin 10	L318	Zero	Apply a 455 kHz signal as above and adjust L318 (disc secondary) for zero meter reading.
3.	A DISC	Pin 10	L317 & L318	0.65 v (1.6 v with Multimeter)	Alternately apply a 445 kHz and 465 kHz signal while adjusting L317 and L318 for readings of at least 0.65 volt. Both readings should be within 10%.
4.	B LIM-1	Pin 2	L316	Maximum	Apply a 455 kHz signal as above, and tune L316 for maximum meter reading.
5.	D OSC	Pin 4	C425 (and C432 for two frequency) L425 and L426	See Procedure	Tune C425 (and C432 for two-frequency) and L425 for maximum meter reading. Then tune L426 for minimum meter reading. NOTE Start tuning procedure with the slugs fully in on 25-42 mHz units and fully out on 42-50 mHz units.
			HI IF		
6.	C LIM-2	Pin 3	C326, C328 and C332	Maximum	Apply a 5.26 signal to the base of Q302 or an on-frequency signal to Antenna Jack J701. Turn C326, C328 and C332 for maximum meter reading.
			LOW IF*		
7.	A DISC	Pin 10		Zero	Apply a 5.26 mHz signal to the base of Q304. Adjust the signal generator for discriminator zero.
8.	C LIM-2	Pin 3	L308 thru L315	Maximum	Apply signal as above. Peak L308 through L315 for maximum meter reading, keeping signal below saturation.
9.			L308 thru L315 		Connect oscilloscope to Pin 2 and Pin 13 (Ground) to centralized metering jack J312. Modulate signal generator with at least ±30 kHz deviation with 60 Hertz (or less). Tune L308 through L315 for filter pattern as shown, keeping signal level below saturation. The above filter alignment should result in the center of the bandpass at 455 kHz ±1 kHz (50.7 volt reading with meter in Position A), with a EIA modulation acceptance of ±6 to ±10 kHz.
			RF		
10.	C LIM-2	Pin 3	L301 thru L304	Maximum	Apply an on-frequency signal to Antenna Jack and tune L301 through L304 for maximum meter reading.
11.			L301 and L302	See Procedure	While receiving a weak on-frequency signal at the Antenna, tune L301 and L302 for maximum quieting.
			FREQUENCY ADJUSTMENT		
12.	A DISC	Pin 10	C425 (and C432 for two-frequency)	Zero	Apply an on-frequency signal to Antenna Jack and tune C425 (and C432 for two-frequency) for zero discriminator reading. NOTE For proper frequency control of the receiver, it is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90°F.

* NOTE — Low IF coils L308 through L315 have been set at the factory and will normally require no further adjustment. Do NOT realign the filter unless there is positive evidence of a defective filter. For location of IF coils, refer to the Receiver Service Sheet.

ALIGNMENT PROCEDURE

25—50 MHz RECEIVER
TYPE ER-51-A

RECEIVER TEST PROCEDURES

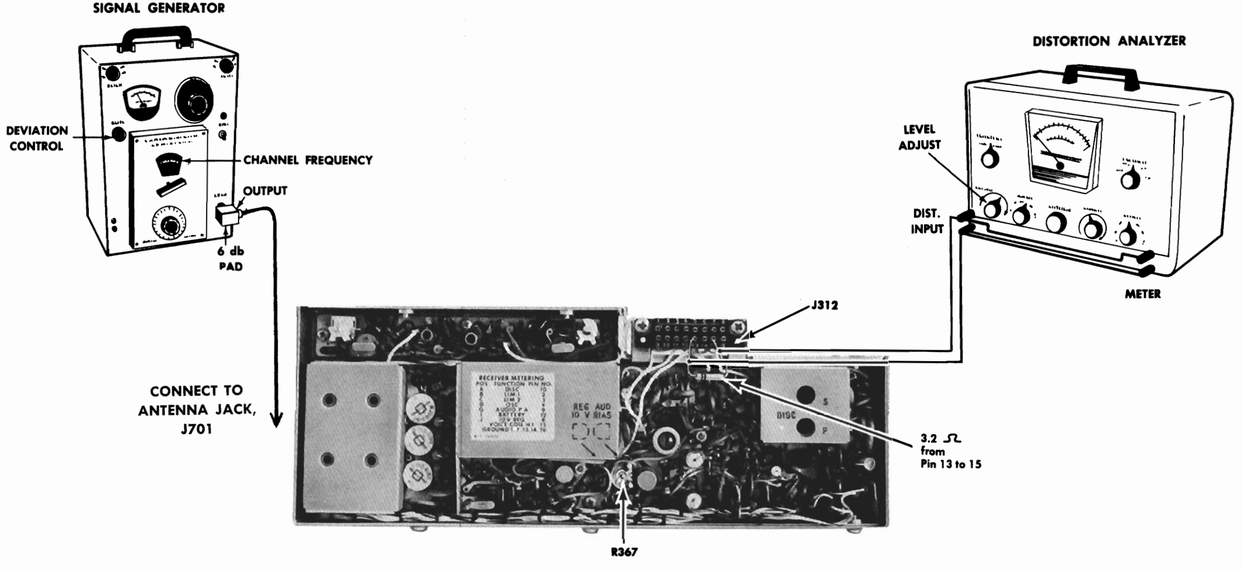
The Receiver Test Procedures are designed to help you to service a receiver that is operating — but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the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

TEST EQUIPMENT REQUIRED

for test hookup shown:

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

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



STEP 1

AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

1. Connect a 1,000-microvolt test signal modulated by 1,000 Hertz ±3.0 kHz deviation to the antenna jack.
2. Disconnect the W-BL-O Speaker Hi lead from LS 701-2. Hook up a 3.2 ohm load resistor from Speaker Hi to ground as shown.
3. Connect Distortion Analyzer input across the 3.2-ohm resistor.
4. For standard receivers set VOLUME Control for one-watt output (1.79 VRMS).

VOLTMETER SCALE ON DISTORTION ANALYZER

ONE WATT

5. Make distortion measurements according to manufacturer's instructions. Reading should be less than 10% (5% is typical).

SERVICE CHECK

If the distortion is more than 10%, or maximum audio output is less than one watt, make the following checks:

1. Battery and regulator voltage—low voltage will cause distortion. (Refer to the Receiver Schematic Diagram for voltages.)
2. Audio Bias Adjust (R367)—low current will cause distortion.
3. Audio Gain (Refer to Step 2A and 2B of Receiver Troubleshooting Procedure.
4. Discriminator Alignment (Refer to Receiver Alignment on reverse side of page).

STEP 2

USABLE SENSITIVITY (12 db SINAD)

TEST PROCEDURE

Measure sensitivity of the receiver modulated at the standard test modulation as follows:

1. Be sure Test Step 1 checks out properly.
2. Reduce the Signal Generator output from setting in TEST STEP 1.
3. Adjust Distortion Analyzer LEVEL control for a +2 db reading.
4. Set CONTROL for LEVEL to DISTORTION reading. Repeat Steps 1, 2, and 3 until difference in reading is 12 db (+2 db to −10 db).
5. The 12-db difference (Signal plus Noise And Distortion to noise plus distortion ratio) is the "usable" sensitivity level. Reading should be less than 0.3 microvolts with audio output at least ½ watt (1.25 volts RMS across the 3.2-ohm receiver load).

VOLTMETER SCALE ON DISTORTION ANALYZER

SERVICE CHECK

If the sensitivity level is more than 0.3 microvolts, make the following checks:

1. Alignment of RF stages (Refer to RF Alignment in Receiver Alignment on reverse side of page).
2. Gain measurements as shown on the Receiver Troubleshooting Procedure.

STEP 3

MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

TEST PROCEDURE

1. Be sure TEST STEPS 1 and 2 check out properly.
2. Set Signal Generator output for twice the microvolt reading obtained in TEST STEP 2 - 4.
3. Increase Signal Generator frequency deviation.
4. Adjust LEVEL Control for +2 db.

DB SCALE ON DISTORTION ANALYZER

5. Set CONTROL for LEVEL to DISTORTION reading. Repeat Steps 3, 4, and 5 until difference between readings becomes 12 db from +2 db to −10 db).

LEVEL DISTORTION ON DISTORTION ANALYZER

6. Deviation control reading for the 12-db difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than +6 kHz (typical value is +9 kHz).

SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, check the following:

1. Make gain measurements as shown on the Receiver Troubleshooting Procedure.
2. Voltage reading of 2nd Limiter (Q308) should read 0.4 volts RMS with a one-microvolt input signal on Test Set Meter or 0.9 volts with voltmeter.(Measure at J312-3).
3. DO NOT RE-ALIGN factory adjusted filters (L308 through L315), unless positive evidence of a defective filter is ascertained. (Refer to Filter Alignment on the Receiver Alignment Procedure.)

FRONT END ALIGNMENT

These instructions are for tuning the oscillator and RF stages of the receiver and may be used when changing the receiver crystal or frequency. When necessary to realign the entire receiver, refer to the COMPLETE RECEIVER ALIGNMENT.

EQUIPMENT REQUIRED

1. G-E Test Set TM11 or TM12 (or 20,000 ohms-per-volt Multimeter).
2. A 130-174 mHz Signal Source. Keep signal level below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set to the receiver centralized metering jack J312. Set Meter Polarity Switch on + and Meter Sensitivity Switch to 1. If using Multimeter, connect the negative lead to J312-13 (ground).
2. Switch Test Set to Position "I" (or measure at J302 with Multimeter). Reading should be at least 12 volts.
3. Switch to Position "J" (or measure across R372 with Multimeter) and adjust Voltage Regulation Potentiometer R372 for a reading of 10 volts.
4. Turn SQUELCH control fully clockwise and VOLUME control to minimum. Switch to Position "G" (or measure at J312-9 with Multimeter) and adjust PA Bias Potentiometer R366 for a reading of 0.25 volt.

ALIGNMENT PROCEDURE

STEP	METERING POSITION 4EX3A10	METERING POSITION Multimeter + at J312	TUNING CONTROL	METER READING	PROCEDURE
1.	D OSC	Pin 4	L425 (& L428 for two-frequency) and L426 for maximum meter reading. Then tune L427 for minimum reading.	See Procedure	Tune L425 (L428 for two-frequency) and L426 for maximum meter reading. Then tune L427 for minimum reading.
2.	C LIM-2	Pin 3	C302, C303 C309 & C310	Maximum	Apply an on-frequency signal to J301 and tune C302, C303, C309 and C310 for maximum meter reading.
3.			C302 & C303	See Procedure	While receiving a weak on-frequency signal at the Antenna, tune C302 and C303 for maximum quieting.
4.	A DISC	Pin 10	L425 & L428 (two-frequency only)	Zero	Apply an on-frequency signal to J701 and tune L425 (and L428 for two-frequency) for zero discriminator reading.

IMPROVED INTERMOD ADJUSTMENT

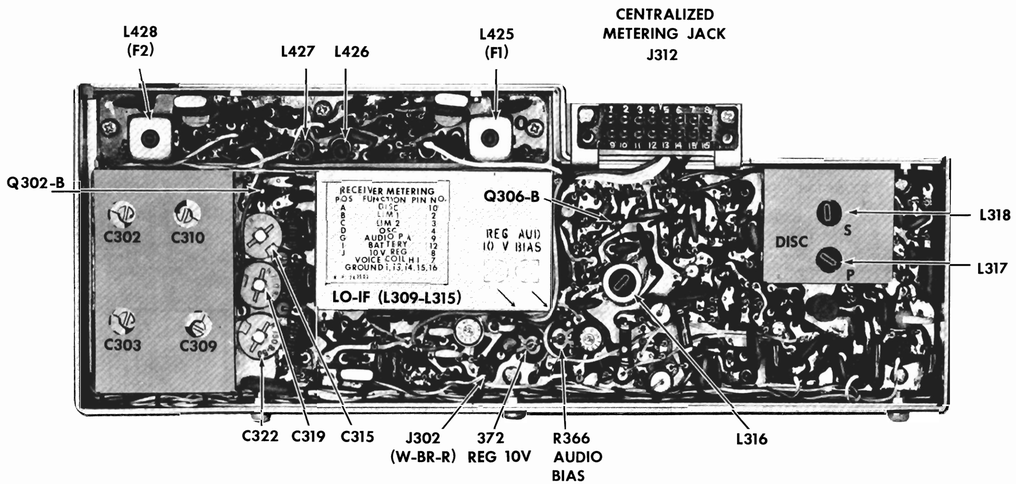
These instructions are for tuning the RF stages of a receiver that is equipped with the Improved Intermod Option. The receiver can be tuned for best sensitivity, or tuned to trade off sensitivity for improved intermodulation protection.

To Tune For Maximum Sensitivity:

1. Switch the GE Test Set to Position "C" (LIM-2).
2. Apply a weak, on-frequency signal to the antenna jack and adjust C2351 for maximum meter reading. Then adjust C2302, C303, C309 and C310 for maximum meter reading. The 20 dB quieting sensitivity should be less than 0.8 microvolt.

To Trade Off Sensitivity For Improved Intermod Protection:

1. Switch the GE Test Set to Position "C" (LIM-2).
2. Apply a weak, on-frequency signal to the antenna jack and adjust C2351 towards minimum capacity in small steps. Adjust C302, C303, C309 and C310 for maximum meter reading each time C2351 is adjusted. Repeat this step until the desired sensitivity is obtained. The sensitivity can be adjusted for 0.8 to 1.5 microvolts.



COMPLETE RECEIVER ALIGNMENT

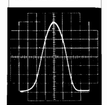
EQUIPMENT REQUIRED

1. G-E Type Set TM11 or TM12 (or 20,000 ohms-per-volt Multimeter).
2. A 455 kHz, 10.7 mHz and 130-174 mHz Signal Source. Couple the 455 kHz signal through a small capacitor (approximately 100 pf). Couple the 10.7 mHz signal through a .01 µf capacitor for Hi IF, and through a 100 pf capacitor for Low IF adjustment. Keep signal levels below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set to the receiver centralized metering jack J312. Set Meter Polarity Switch on + and Meter Sensitivity Switch to TEST 1. If using Multimeter, connect the negative lead to J312-13 (ground).
2. Switch Test Set to Position "I" (or measure at J302 with Multimeter). Reading should be at least 12 volts.
3. Switch to Position "J" (or measure across R372 with Multimeter) and adjust Voltage Regulation Potentiometer R372 for a reading of 10 volts.
4. Turn SQUELCH Control fully clockwise and VOLUME control to minimum. Switch to Positive "G" (or measure at J312-9 with Multimeter) and adjust PA Bias Potentiometer R366 for a reading of 0.25 volt.

ALIGNMENT PROCEDURE

STEP	METERING POSITION TEST SET 4EX3A10	METERING POSITION MULTIMETER + at J312	TUNING CONTROL	METER READING	PROCEDURE
			DISCRIMINATOR		
1.	C LIM-2	Pin 3		0.3 volt (1.1 v with Multimeter)	Apply a 455 kHz signal to the base of Q306 and adjust signal level for 0.3 volt meter reading (to saturate limiters).
2.	A DISC	Pin 10	L318	Zero	Apply a 455 kHz signal as above and adjust L318 (disc secondary) for zero meter reading.
3.	A DISC	Pin 10	L317 & L318	0.65 v (1.6 v with Multimeter)	Alternately apply a 445 kHz and 465 kHz signal while adjusting L317 and L318 for readings of at least 0.65 volt. Both readings should be within 10%.
4.	B LIM-1	Pin 2	L316	Maximum	Apply a 455 kHz signal as above, and tune L316 for maximum meter reading.
			OSCILLATOR AND MULTIPLIER		
5.	D OSC	Pin 4	L425 (and L428 for two-frequency), L426 and L427.	See Procedure	Tune L425 (L428 for two-frequency) and L426 for maximum meter reading. Then tune L427 for minimum reading.
			HI IF		
6.	C LIM-2	Pin 3	C315, C319 and	Maximum	Apply a 10.7 kHz signal to the base of Q302 or an on-frequency signal to Antenna Jack J701. Tune C315, C319 and C322 for maximum meter reading.
			LOW IF*		
7.	A DISC	Pin 10		Zero	Apply a 10.7 mHz signal to the base of Q304. Adjust the signal generator for discriminator zero.
8.	C LIM-2	Pin 3	L308 thru L315	Maximum	Apply signal as above. Peak L308 through L315 for maximum meter reading, keeping signal below saturation.
9.			L308 thru L315 		Connect oscilloscope to Pin 2 and Pin 13 (Ground) of centralized metering jack J312. Modulate signal generator with at least ±30 kHz deviation with 60 Hertz (or less). Tune L308 through L315 for filter pattern as shown, keeping signal level below saturation. The above filter alignment should result in the center of the bandpass at 455 kHz ±1 kHz (0.7 volt reading with meter in Position A), with an EIA modulation acceptance of ±6 to ±10 kHz.
			RF		
10.	C LIM-2	Pin 3	C302, C303 C309 and C310	Maximum	Apply an on-frequency signal to J701 and tune C302, C303, C309 and C310 for maximum meter reading.
11.			C302 and C303	See Procedure	While receiving a weak on-frequency signal at the Antenna, tune C302 and C303 for maximum quieting.
			FREQUENCY ADJUSTMENT		
12.	A DISC	Pin 10	L425 (and L428 for two-frequency)	Zero	Apply an on-frequency signal to J701 and tune L425 (and L428 for two-frequency) for zero discriminator reading. NOTE For proper frequency control of the receiver, it is recommended that all frequency adjustments be made when the equipment is at a temperature of approximately 75°F. In no case should frequency adjustments be made when the equipment is outside the temperature range of 50° to 90°F.

* NOTE — Low IF coils L308 through L315 have been set at the factory and will normally require no further adjustment. Do NOT realign the filter unless there is positive evidence of a defective filter. For location of IF coils, refer to the Receiver Service Sheet.

ALIGNMENT PROCEDURE

132—174 MHz RECEIVER
TYPE ER-52-A

RECEIVER TEST PROCEDURES

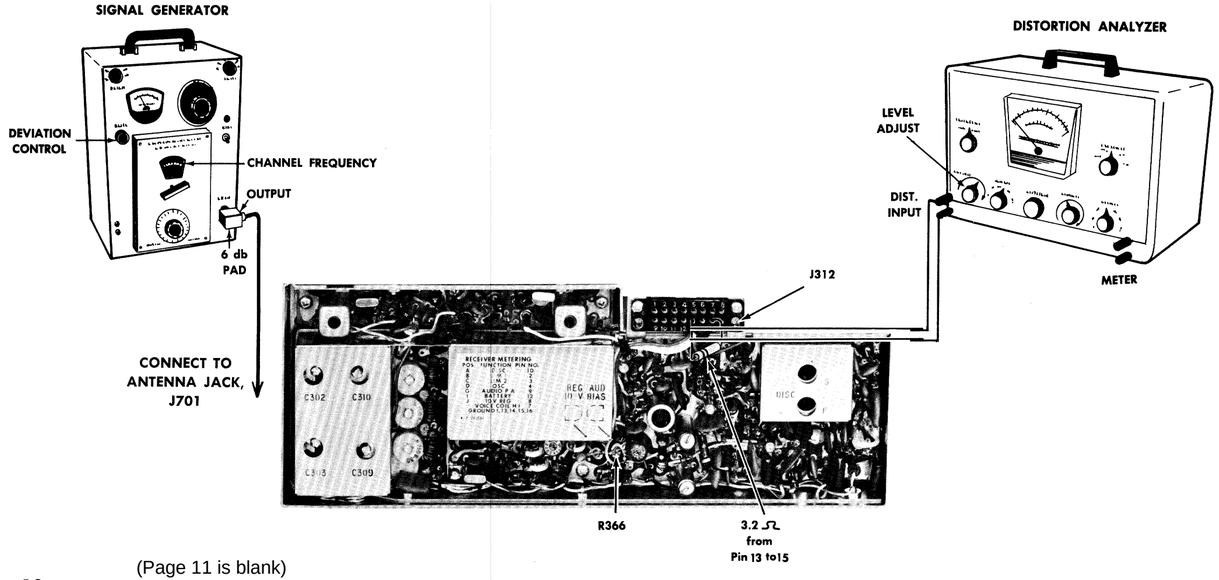
The Receiver Test Procedures are designed to help you to service a receiver that is operating — but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the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

TEST EQUIPMENT REQUIRED

for test hookup shown:

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

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



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STEP 1

AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

1. Connect a 1,000-microvolt test signal modulated by 1,000 Hertz ±3.0 kHz deviation to the antenna jack.
2. Disconnect the W-BL-O Speaker Hi lead from LS 701-2. Hook up a 3.2 ohm load resistor from Speaker Hi to ground as shown.
3. Connect Distortion Analyzer input across the 3.2-ohm resistor.
4. For standard receivers set VOLUME Control for one-watt output (1.79 VRMS).

VOLTMETER SCALE ON DISTORTION ANALYZER

ONE WATT

5. Make distortion measurements according to manufacturer's instructions. Reading should be less than 10% (5% is typical).

SERVICE CHECK

If the distortion is more than 10%, or maximum audio output is less than one watt, make the following checks:

1. Battery and regulator voltage—low voltage will cause distortion. (Refer to Receiver Schematic Diagram for voltages.)
2. Audio Bias Adjust (R366)—low current will cause distortion.
3. Audio Gain (Refer to Step 2A and 2B of Receiver Troubleshooting Procedure .
4. Discriminator Alignment (Refer to Receiver Alignment on reverse side of page).

STEP 2

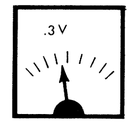
USABLE SENSITIVITY (12 db SINAD)

TEST PROCEDURE

Measure sensitivity of the receiver modulated at the standard test modulation as follows:

1. Be sure Test Step 1 checks out properly.
2. Reduce the Signal Generator output from setting in TEST STEP 1.
3. Adjust Distortion Analyzer LEVEL control for a +2 db reading.
4. Set CONTROL for LEVEL to DISTORTION reading. Repeat Steps 1, 2, and 3 until difference in reading is 12 db (+2 db to –10 db).
5. The 12-db difference (Signal plus Noise And Distortion to noise plus distortion ratio) is the "usable" sensitivity level. Reading should be less than 0.3 microvolts with audio output at least ½ watt (1.25 volts RMS across the 3.2-ohm receiver load).

VOLTMETER SCALE ON DISTORTION ANALYZER



SERVICE CHECK

If the sensitivity level is more than 0.3 microvolts, make the following checks:

1. Alignment of RF stages (Refer to RF Alignment in Receiver Alignment on reverse side of page).
2. Gain measurements as shown on the Receiver Troubleshooting Procedure .

STEP 3

MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

TEST PROCEDURE

1. Be sure TEST STEPS 1 and 2 check out properly.
2. Set Signal Generator output for twice the microvolt reading obtained in TEST STEP 2 - 4.
3. Increase Signal Generator frequency deviation.
4. Adjust LEVEL Control for +2 db.

DB SCALE ON DISTORTION ANALYZER

5. Set CONTROL for LEVEL to DISTORTION reading. Repeat Steps 3, 4, and 5 until difference between readings becomes 12 db from +2 db to –10 db).

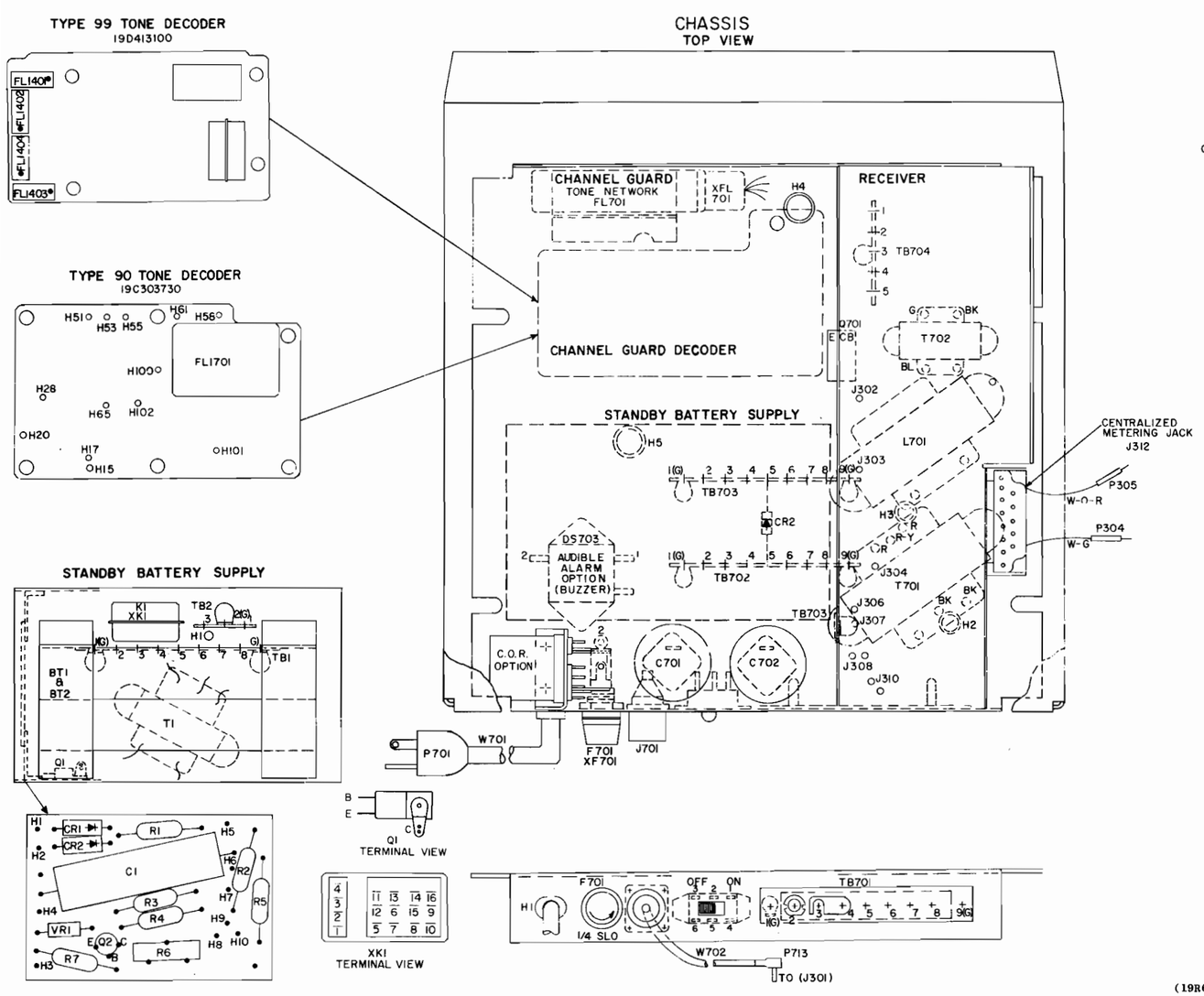
LEVEL DISTORTION ON DISTORTION ANALYZER

6. Deviation control reading for the 12-db difference is the Modulation Acceptance Bandwidth of the receiver. It should be more than ±6 kHz (typical value is ±9 kHz).

SERVICE CHECK

If the Modulation Acceptance Bandwidth test does not indicate the proper width, check the following:

1. Make gain measurements as shown on the Receiver Troubleshooting Procedure .
2. Voltage reading of 2nd Limiter (Q308) should read 0.4 volts RMS with a one-microvolt input signal on Test Set Meter or 0.9 volts with voltmeter.(Measure at J312-3).
3. DO NOT RE-ALIGN factory adjusted filters (L308 through L315), unless positive evidence of a defective filter is ascertained. (Refer to Filter Alignment on the Receiver Alignment Procedure.)

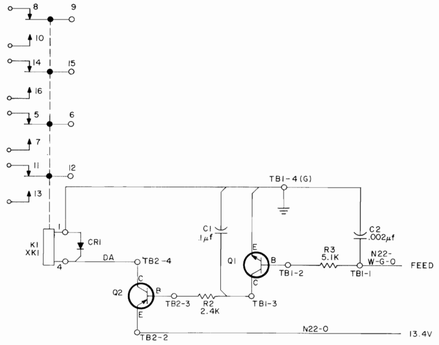


(19R620788, Rev. 8)

OUTLINE DIAGRAMS

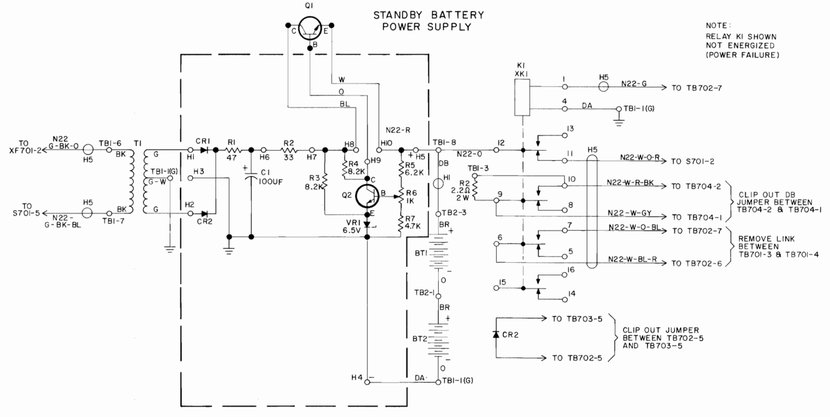
MONITOR RECEIVER CHASSIS AND FRONT PANEL

CARRIER OPERATED RELAY

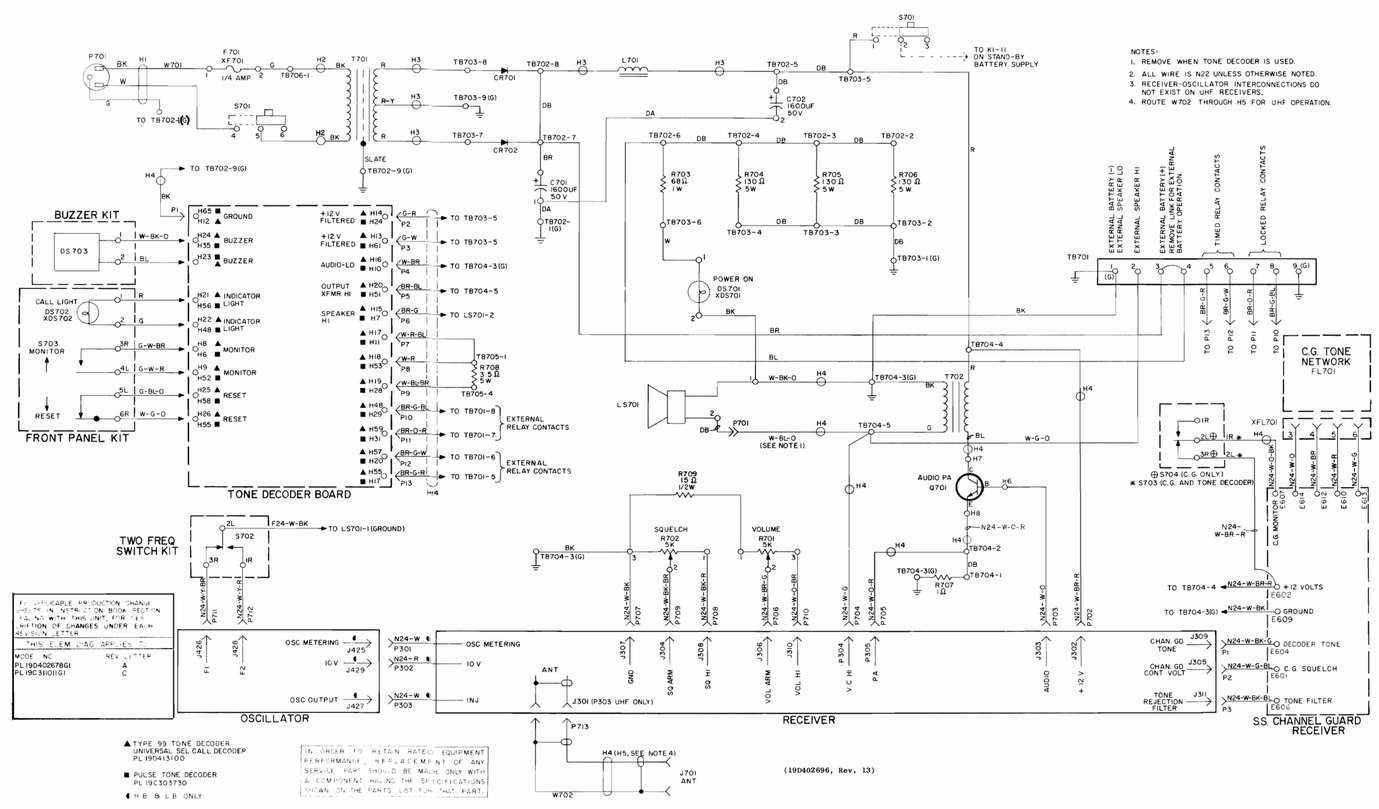


(19C311361, Rev. 4)

STANDBY BATTERY POWER SUPPLY



(19C317160, Rev. 3)



(19D402696, Rev. 13)

(DF-1093)

SCHEMATIC DIAGRAM

MONITOR RECEIVER CHASSIS AND FRONT PANEL

RC-1478F

PARTS LIST

LBI-3754G

MONITOR RECEIVER MAIN CHASSIS 19C311011G1
FRONT PANEL ASSEMBLY 19D402678G1

SYMBOL	GE PART NO.	DESCRIPTION
		MAIN CHASSIS ASSEMBLY 19C311011G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C701 and C702	7476442P20	Electrolytic: 1600 µf +250% -10%, 50 VDCW; sim to PR Mallory WP-068.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR701 and CR702	4037822P1	Silicon.
		- - - - - - - - - - FUSES - - - - - - - - - -
F701	7487942P1	Slow blowing: 1/4 amp at 250 v; sim to Bussmann MDL-1/4.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L701	19A115671P1	Reactor: 0.21 h min, 7.5 ohms DC res max, 20 VDC operating.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701		(Part of W701).
P702 and P703	4029840P2	Contact, electrical: sim to AMP 42827-2.
P704 and P705	7147199P2	Connector: female contact; sim to Winchester Electronics 21804.
P706 thru P710	4029840P2	Contact, electrical: sim to AMP 42827-2.
P713		(Part of W702).
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q701*	19A116118P1	Silicon, NPN.
		Earlier than REV B:
	19A115527P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R703	3B78P680K	Composition: 68 ohms ±10%, 1 w.
R704 thru R706	5493035P22	Wirewound: 130 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R707	19B209022P115	Wirewound: 1 ohm ±10%, 2 w; sim to IRC Type BWH.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701	7145098P1	Slide: DPDT, 0.75 amp at 125 VAC or 0.5 amp at 125 VDC; sim to Stackpole SS-150.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T701	19B209074P1	Power, step-down: single phase, Pri: 117 v, 50/60 Hertz, Sec 1: 850 ma at 13.8 VDC.
T702	19B209079P1	Audio freq: 0.3-3 KHz freq range, Pri: 55 ohms ±10% imp, 0.895 ohm ±10% DC res, Sec: 3.2 ohms imp, 0.168 ohm DC res.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB701	7117710P7	Phen: 7 terminals; sim to Cinch 1770
TB702 and TB703	7775500P119	Phen: 9 terminals.
TB704	7775500P11	Phen: 5 terminals.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SYMBOL	GE PART NO.	DESCRIPTION
TB706	7775500P44	Phen: 2 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W701*	19A116740P2	Power: approx 8 feet long, 2 poles, 3 wire grounding; sim to Belden 17239.
		In REV B and earlier:
	4036441P1	Power: approx 6 feet long, with 2-contact plug (P701); sim to GE 2071-1.
W702		CABLE 19A122691G1
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J701	4029493P1	Receptacle, coaxial: sim to Amphenol 83-79 or Equiv. Military SO-239A.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P713	5496078P6	Right angle: coaxial; sim to FXR 27-6.
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044P11	RF: approx 15 inches long; sim to Amphenol 21-598.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XF701	19B209005P1	Fuseholder, post type, phen: 15 amps at 250 v; sim to Littelfuse 342012.
		FRONT PANEL ASSEMBLY 19D402678G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS701	19C307037P19	Lamp, incandescent: 14 v; sim to GE 756.
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS701	19B209101P1	Permanent magnet, 5-inch: 2-1/4 w operating, paper dust cap; sim to Cletron X10271.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P701	4036634P1	Contact, electrical; sim to AMP 42428-2.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R701	5496870P11	Variable, carbon film: 5000 ohms ±20%, 0.25 w; sim to Mallory LC(5K).
R702	5496870P15	Variable, carbon film: 5000 ohms ±20%, 0.5 w; sim to Mallory LC(5K).
R709	3R77P150K	Composition: 15 ohms ±10%, 1/2 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS701	19B209342P1	Lampholder: sim to Leecraft 7-04-1.
		FRONT PANEL KIT 19A122311G1
DS702	19C307037P19	Lamp, incandescent: 14 v; sim to GE 756.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S703	19B209139P5	Lever: 3 amps at 120 VAC, Position up: 1 form B contact, momentary, Position down: 1 form A, 1 form B contacts, locking; sim to Switchcraft 28000 (Pt. 205-1007).
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS702	19B209342P1	Lampholder: sim to Leecraft 7-04.
		EXTERNAL ALARM KIT 19A122312G1
		- - - - - - - INDICATING DEVICES - - - - - - -
DS703	19B200788P3	Buzzer: 12 VDC or 12-16 VAC nominal, 200 ma DC operating; sim to Line Electric BD-1. (Used with second relay, GE Dwg 19C300957P2).

SYMBOL	GE PART NO.	DESCRIPTION
		2 FREQUENCY SWITCH KIT 19A122310G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P711 and P712	4029840P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S702	19B209139P4	Lever: 3 amps at 120 VAC, Position down: 1 form C contact, locking; sim to Switchcraft 28203L.
		HARDWARE KIT (CHANNEL GUARD) 19A122322G1
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S704	19A122310G2	Channel Guard Monitor. Includes:
	19B209139P4	Lever: 3 amps at 120 VAC, Position down: 1 form C contact, locking; sim to Switchcraft 28203L.
		CABLE ASSEMBLY 19B205451G1 (TYPE 99 TONE DECODER) 19B205451G2 (TYPE 90 TONE DECODER)
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 thru P13	4036634P1	Contact, electrical: sim to AMP 42428-2.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R708	5493035P10	Wirewound: 3.5 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB705	7775500P8	Phen: 4 terminals.
		CABLE ASSEMBLY 19B205450G1 (CHANNEL GUARD) 19B205450G2 (CHANNEL GUARD AND TONE DECODER)
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 thru P3	4029840P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XFL701	7768887P17	Tube, phen: 7 pins; sim to Elco 04-710-02.
		BATTERY KIT 19A122315G2 (Used with 19B205435G2).
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR2	4037822P1	Silicon.
		STAND-BY POWER SUPPLY 19B205435G2 (Used with 19A122315G2)
		- - - - - - - - - - BATTERIES - - - - - - - - - -
BT1 and BT2	19B201887P2	Storage, nickel-cadmium: 6 v min; sim to GE 41B001AAQ1.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	5491595P14	Armature: 1.5 w operating, 520 ohms ±15% coil res, 4 form C contacts; sim to Allied Control T154-X-131.
		- - - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A116118P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2	19B209022P123	Wirewound: 2.2 ohms ±10%, 2 w; sim to IRC Type BWH.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19B209017P1	Power: single phase, Pri: 117 v, 50/60 Hz, Sec 1: 25/25 v.
		- - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500P119	Phen: 9 terminals.
TB2	7775500P7	Phen: 3 terminals.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XK1	5491595P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		STAND-BY POWER SUPPLY BOARD 19B216567G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A115680P12	Electrolytic: 100 µf +150% -10%, 30 VDCW; sim to Mallory Type TT.
		- - - - - - - - DIODES AND RECTIFIERS - - - - -
CR1 and CR2	4037822P1	Silicon.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q2	19A115362P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P470J	Composition: 47 ohms ±5%, 1/2 w.
R2	3R77P330J	Composition: 33 ohms ±5%, 1/2 w.
R3 and R4	3R77P822J	Composition: 8200 ohms ±5%, 1/2 w.
R5	3R77P622J	Composition: 6200 ohms ±5%, 1/2 w.
R6	19B209358P103	Variable, carbon film: approx 25 to 1000 ohms ±10%, 0.2 w; sim to CTS Type X-201.
R7	3R77P472J	Composition: 4700 ohms ±5%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - -
VR1	4036887P6	Silicon, Zener.
		CARRIER OPERATED RELAY 19C303533G2
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C2	7774750P6	Ceramic disc: .002 µf +100% -0%, 500 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	5494922P1	Silicon; sim to Type 1N456.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	5491595P14	Armature: 1.5 w max operating, 520 ohms ±15% coil res, 4 form C contacts rated at 0.5 amp at 12 VDC; sim to Allied Control T154-X-131.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q2	19A115706P1	Silicon, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R2	3R77P242J	Composition: 2400 ohms ±5%, 1/2 w.
R3	3R77P512J	Composition: 5100 ohms ±5%, 1/2 w.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1, and TB2	7775500P6	Phen: 4 terminals.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XK1	5491595P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		IMPROVED INTERMODULATION 19A127250G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C2351	5491271P103	Variable, sub-miniature: approx 1.7-8.3 pf, 750 v peak; sim to EF Johnson 189.
		- - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A122161G2	Top cover.
	19A116768P8	Bushing, strain relief: cable; sim to Heyco SR-5P-4. (Used with W701 in 19C311011G1).
	19B205512G1	Casting. (Used in 19D402678G1).
	19C303769P1	Grille. (Used in 19D402678G1).
	N529P16D	Button plug: approx 15/32 inch dia. (Used in 19D402678G1).
	19A122240P1	Support. (Used with XDS701 in 19D402678G1).
	4037559P9	Bumper, rubber. (Used in 19D402678G1).
	19C307038P6	Nut, push-on. (Holds jewel in 19D402678G1).
	19B204349P3	Jewel: amber. (Used in 19D402678G1).
	19A122210P1	Lens, green. (Used with XDS702 in 19D402678G1).
	4034668P1	(Not Used).
	19A115679P1	Knob, push-on: black. (Used with R702, 703 in 19D402678G1).
	N248990	Nameplate. (Used in 19D402678G1).
	4036634P1	Contact, electrical. (Used in 19A122311G1).
	5491595P9	Retainer, spring. (Used with K1 in 19B205435G2).

PRODUCTION CHANGES

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

REV. A - (19C311011-G1 only)
To change antenna connector from phono to UHF Type.
Changed W702.

REV. A - (19D402678-G1 only)
To make minimum volume level consistent with requirements of tone decoders and to change the ground circuit for indicator lamp DS701.
Changed R709 and XDS701.

REV. B - (19C311011-G1 only)
To incorporate a different audio transistor. Changed Q701.

REV. C - To incorporate a 3-wire power cable. Changed W701.

PARTS LIST

LBI-3758C

25 - 50 MHz
RECEIVER TYPE ER-51-A

RECEIVER BOARD 19D402429G1 THRU G3
OSCILLATOR BOARD 4EG19A10 AND 4EGA19A11

SYMBOL	GE PART NO.	DESCRIPTION
		RECEIVER BOARDS 25-33 MHz Board 19D402429G1 33-42 MHz Board 19D402429G2 42-50 MHz Board 19D402429G3
		- - - - - - - - - CAPACITORS - - - - - - - - -
C301	5490008P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C302	5490008P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C303	5490008P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C304	7130348P4	Molded: 2.2 pf ±0.11 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C305	5490008P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C306	5490008P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C307	5490008P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C308	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C309	5494481P115	Ceramic disc: 3000 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C310	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C311	5490008P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C312	5490008P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C313	5490008P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C314	7130348P3	Molded, phen: 1 pf ±.05 pf, 500 VDCW, temp coef 0 PPM; sim to Jeffers Type JM-5/32.
C315	5490008P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C316	5490008P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C317	5490008P11	Silver mica: 22 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C318	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C319	5490008P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C320	5490008P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C321	5490008P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C322	5494481P115	Ceramic disc: 3000 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C323	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C324	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C325*	5491870P140J	Mica: 140 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15. Earlier than REV H in G1; Earlier than REV G in G2, G3;
	5490008P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C326	5490446P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C327	7130348P1	Molded: 0.47 pf ±.047 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C328	5490446P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C329*	5491870P140J	Mica: 140 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15. Earlier than REV H in G1: Earlier than REV G in G2, G3:
	5490008P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C330	7130348P1	Molded: 0.47 pf ±.047 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C331*	5491870P140J	Mica: 140 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15. Earlier than REV H in G1: Earlier than REV G in G2, G3:
	5490008P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C332	5490446P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C333	5494481P115	Ceramic disc: 3000 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C334*	19A116080P1	Polyester: .01 µf ±20%, 50 VDCW. In G1 REV D and earlier: In G2 and G3 REV C and earlier:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C335 and C336	19A116080P107	Polyester: 0.1 µf ±20%, 50 VDCW.
C337	5490008P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C338*	19A116080P1	Polyester: .01 µf ±20%, 50 VDCW. In G1 REV D and earlier: In G2 and G3 REV C and earlier:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C339 and C340	5490008P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C341	7130348P9	Molded: 0.22 pf ±.022 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C342	5496219P41	Ceramic disc: 10 pf ±5%, 500 VDCW, temp coef 0 PPM.
C343	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C344	5496219P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C345	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C346	5496219P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C347	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C348	5496219P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C349	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C350	5496219P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C351	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C352	5496219P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C353	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C354	5496219P41	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C355*	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C356*	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	7491930P3	Polyester: .0047 µf ±20%, 100 VDCW; sim to GE Type 61F.
C357*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW. Earlier than REV H in G1: Earlier than REV G in G2, G3:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague Type 54C23.
C358	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF.
C359	5496219P367	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -150 PPM.
C360*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW. Earlier than REV H in G1: Earlier than REV G in G2, G3:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague Type 54C23.
C361	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C362*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW. Earlier than REV H in G1: Earlier than REV G in G2, G3:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague Type 54C23.
C363	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague Type 1219C4.
C364	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C365*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW. Earlier than REV H in G1: Earlier than REV G in G2, G3:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague Type 54C23.
C366	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague Type 1219C4.
C367	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C368*	19A116080P1	Polyester: .01 µf ±20%, 50 VDCW. In G1 REV C or earlier: In G2 and G3 REV B or earlier:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C369	19A116656P180J1	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C370	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C371 and C372	5490008P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C373	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C374 and C375	5494481P111	Ceramic disc: 1000 pf ±20%, 500 VDCW; sim to RMC Type JF.
C376	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C377*	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV G in G1: Earlier than REV F in G2, G3:
	5494481P107	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF Discap.
C378	19A116080P5	Polyester: .047 µf ±20%, 50 VDCW.
C379*	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW. Earlier than REV A:
	5492638P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.

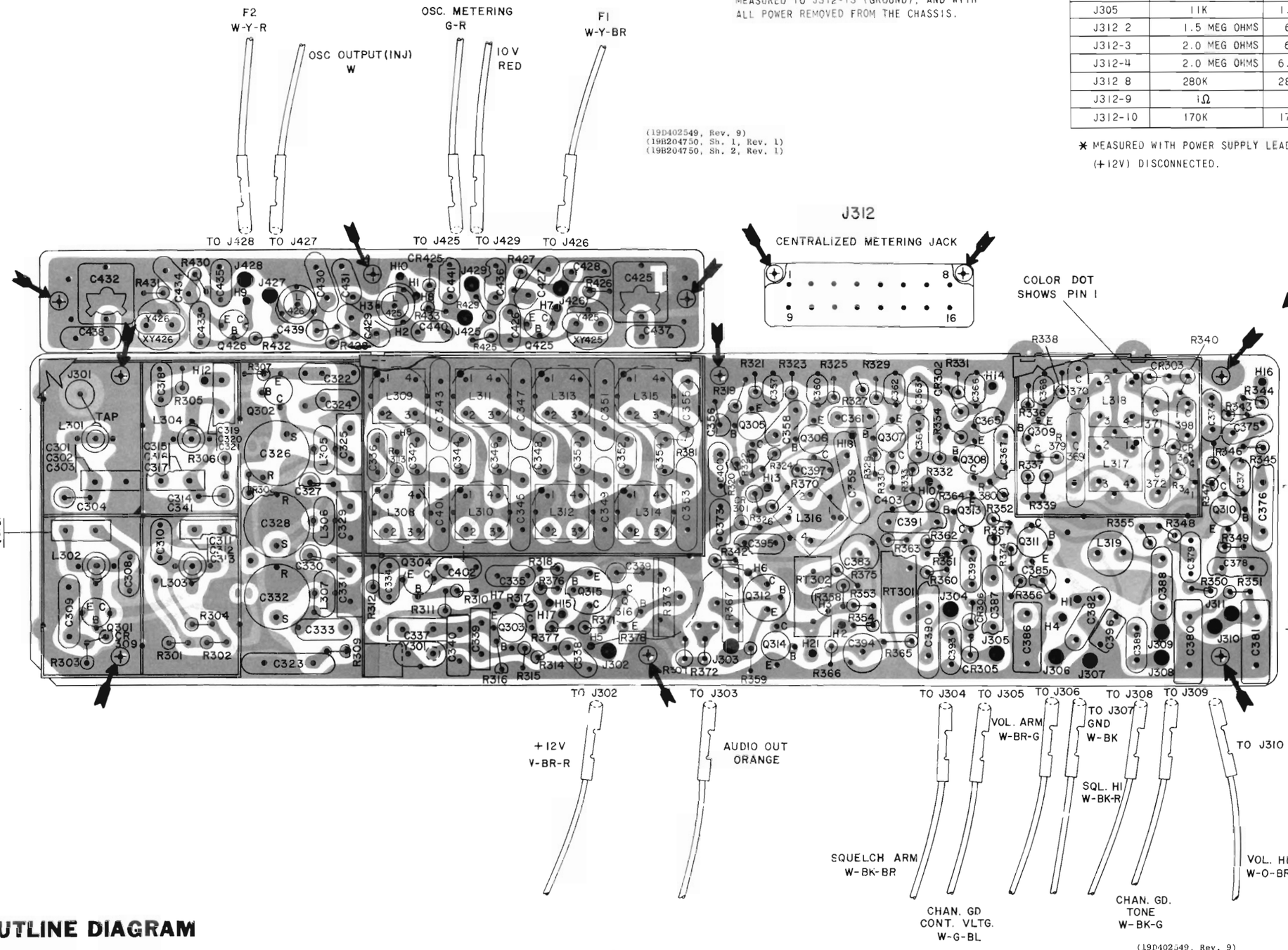
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

RESISTANCE READINGS

RESISTANCE READINGS ARE TYPICAL READINGS MEASURED TO J312-13 (GROUND), AND WITH ALL POWER REMOVED FROM THE CHASSIS.

MEASURED FROM	NEGATIVE (-) PROBE TO GND	POSITIVE (+) PROBE TO GND
* J302	5K	3.7K
J305	11K	1.8K
J312 2	1.5 MEG OHMS	60K
J312-3	2.0 MEG OHMS	60K
J312-4	2.0 MEG OHMS	6.3K
J312 8	280K	280K
J312-9	1Ω	1Ω
J312-10	170K	170K

* MEASURED WITH POWER SUPPLY LEAD P712 (+12V) DISCONNECTED.

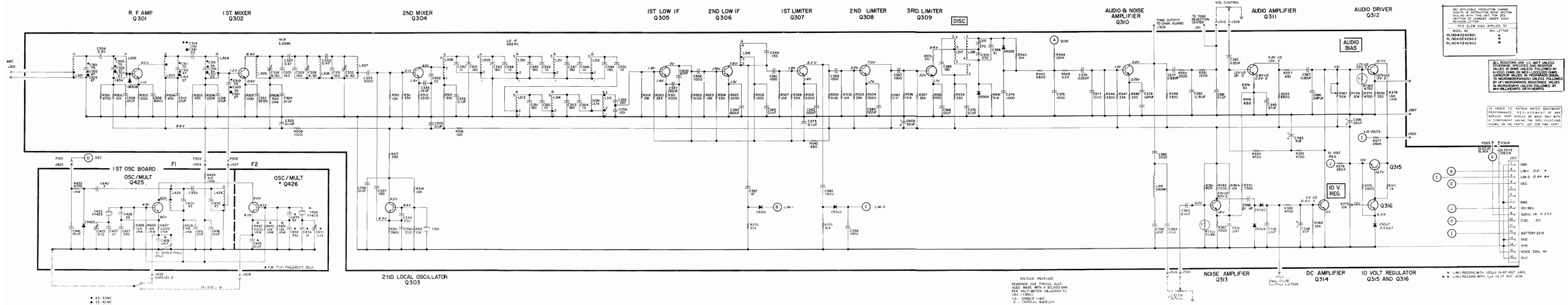


(19D402549, Rev. 9)
(19B204750, Sh. 1, Rev. 1)
(19B204750, Sh. 2, Rev. 1)

(19D402549, Rev. 9)
(19C303581, Sh. 1, Rev. 8)
(19C303581, Sh. 2, Rev. 8)

OUTLINE DIAGRAM

25—50 MHz RECEIVER
TYPE ER-51-A



SCHEMATIC DIAGRAM

25—50 MHz RECEIVER TYPE ER-51-A

19R620718, Rev. 21

SYMBOL	GE PART NO.	DESCRIPTION
C380*	19A116080P8	Polyester: 0.15 µf ±20%, 50 VDCW.
		Earlier than REV A:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C381	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C382	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C383	5495670P9	Electrolytic: 5 µf +75% -10%, 6 VDCW; sim to Sprague 30D125A1.
C384*	5494481P114	Ceramic disc: 2000 pf ±10%, 500 VDCW; sim to RMC Type JF. Deleted by REV A.
C385	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C386*	19A116080P5	Polyester: .047 µf ±20%, 50 VDCW.
		Earlier than REV A:
	5491189P105	Polyester: .068 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C387	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C388	5494481P116	Ceramic disc: 3000 pf ±10%, 500 VDCW; sim to RMC Type JF Discap.
C389	5494481P112	Ceramic disc: 1000 pf ±10%, 500 VDCW; sim to RMC Type JF.
C390	7491827P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague Type 36C172.
C391*	19A116080P105	Polyester: 0.047 µf ±10%, 50 VDCW.
		In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C392*	19A116080P1	Polyester: .01 µf ±20%, 50 VDCW.
		In G1 REV C or earlier: In G2 and G3 REV B or earlier:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C393	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C394	5495670P13	Electrolytic: 2 µf +75% -10%, 25 VDCW; sim to Sprague Type 30D176A1.
C395	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C396	19A116080P201	Polyester: .01 µf ±5%, 50 VDCW.
C397	5496203P117	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -5300 PPM.
C398	5496219P656	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -470 PPM.
C399	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C400	5496219P817	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -1500 PPM.
C401	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C402	5490008P11	Silver mica: 22 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C403	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C404*	7489162P179	Silver mica: 330 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15. Added in G1 by REV C. Deleted in G1 by REV K. Added in G2 and G3 by REV B. Deleted in G2, G3 by REV J.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR301 and CR302	7777146P3	Germanium; sim to Type 1N90.
CR303 and CR304	19A115250P1	Silicon.
CR305 and CR306	7777146P3	Germanium; sim to Type 1N90.
CR307	4036887P6	Silicon, Zener.
CR308*	4036887P3	Silicon, Zener. Deleted in G1 by REV K. Deleted in G2, G3 by REV J.

SYMBOL	GE PART NO.	DESCRIPTION
CR309*	4038642P1	Germanium. Added in G1 by REV D. Added in G2 and G3 by REV C.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J301	5496076P3	Receptacle, push-on: sim to FIR 27-3.
J302 thru J311	4033513P4	Pin, contact: sim to Bead Chain L93-3.
J312	19B205689G2	Connector: 18 contacts.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L301	19C303583G3	Coil. Includes tuning slug 19B200497P2.
L302	19C303583G4	Coil. Includes tuning slug 19B200497P2.
L303	19C303583G2	Coil. Includes tuning slug 19B200497P2.
L304	19C303583G1	Coil. Includes tuning slug 19B200497P2.
L305 and L306	19B200493G2	Coil. Includes tuning slug 19B200497P2.
L307	19B204932G1	Coil Assembly.
L308* thru L315*	19A115711P1	Transformer, freq: 455 KHz; sim to Automatic Mfg EX12670.
		Earlier than REV J in G1: Earlier than REV H in G2, G3:
	19C303062G6	Coil. Includes tuning slug 19B200497P2.
L316*	19A115711P2	Transformer, freq: 455 KHz; sim to Automatic Mfg EX12671.
		Earlier than REV J in G1: Earlier than REV H in G2, G3:
	19C303062G6	Coil. Includes tuning slug 19B200497P2.
L317*	19A115711P6	Transformer, freq: 455 KHz; sim to TOKO PEFCN-14733-CK12.
		Earlier than REV J in G1: Earlier than REV H in G2, G3:
	19C303062G4	Coil. Includes tuning slug 19B200497P2.
L318*	19A115711P7	Transformer, freq: 455 KHz; sim to TOKO PEFCN-14734-BBL2.
		Earlier than REV J in G1: Earlier than REV H in G2, G3:
	19A116755P1	Silicon, NPN; sim to Type 2N3904.
L319	5491736P2	Inductor: 240 nh ±10% ind at 0.5 v, 270 ohms max DC res; sim to Aladdin 33-161.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P301 thru P303	4029840P2	Contact, electrical: sim to Amp 42827-2.
P304 and P305	7147199P1	Connector: 1 male contact; sim to Winchester Electronics 21803.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q301 and Q302	19A115342P1	Silicon, NPN.
Q303	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q304	19A115342P1	Silicon, NPN.
Q305* and Q306*	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q307 thru Q309	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q310* and Q311*	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		In 19D402429G1 of REV M and earlier: In 19D402429G2, G3 of REV L and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.

SYMBOL	GE PART NO.	DESCRIPTION
Q312	19A115300P4	Silicon, NPN; sim to Type 2N3053.
Q313*	19A116774P1	Silicon, NPN; sim to Type 2N5210.
		In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q314*	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		In 19D402429G1 of REV M and earlier: In 19D402429G2, G3 of REV L and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q315	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q316*	19A116755P1	Silicon, NPN; sim to Type 2N3947.
		In 19D402429G1 of REV M and earlier: In 19D402429G2, G3 of REV L and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R301	3R77P272J	Composition: 2700 ohms ±5%, 1/2 w.
R302	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R303	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R304	3R77P471K	Composition: 470 ohms ±10%, 1/2 w.
R305	3R77P433J	Composition: 43,000 ohms ±5%, 1/2 w.
R306	3R77P224K	Composition: 0.22 megohm ±10%, 1/2 w.
R307	3R77P102J	Composition: 1000 ohms ±5%, 1/2 w.
R308	3R152P331K	Composition: 330 ohms ±10%, 1/4 w.
R309*	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
		In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	3R77P471K	Composition: 470 ohms ±10%, 1/2 w.
R310	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R311	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R312	3R77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R313	3R77P331K	Composition: 330 ohms ±10%, 1/2 w.
R314 and R315	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R316	3R77P392K	Composition: 3900 ohms ±10%, 1/2 w.
R317	3R77P331K	Composition: 330 ohms ±10%, 1/2 w.
R318	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R319	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R320	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R321	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R322	3R77P512J	Composition: 5100 ohms ±5%, 1/2 w.
R323	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R324	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R325	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R326	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R327	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R328	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R329	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R330	3R77P512J	Composition: 5100 ohms ±5%, 1/2 w.
R331	3R77P513J	Composition: 51,000 ohms ±5%, 1/2 w.
R332	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R333	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R334	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R336	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R337	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R338	3R77P102J	Composition: 1000 ohms ±5%, 1/2 w.

SYMBOL	GE PART NO.	DESCRIPTION
R339	3R77P331K	Composition: 330 ohms ±10%, 1/2 w.
R340 and R341	3R77P513J	Composition: 51,000 ohms ±5%, 1/2 w.
R342	3R152P681K	Composition: 680 ohms ±10%, 1/4 w.
R343	3R77P682K	Composition: 6800 ohms ±10%, 1/2 w.
R344	3R77P104K	Composition: 0.1 megohm ±10%, 1/2 w.
R345*	3R77P622J	Composition: 6200 ohms ±5%, 1/2 w.
		In 19D402429G1 of REV L and earlier: In 19D402429G2, G3 of REV K and earlier:
	3R77P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R346	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
R347	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R348	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
R349	3R77P221K	Composition: 220 ohms ±10%, 1/2 w.
R350	3R77P332J	Composition: 3300 ohms ±5%, 1/2 w.
R351	3R77P152J	Composition: 1500 ohms ±5%, 1/2 w.
R352	3R77P752J	Composition: 7500 ohms ±5%, 1/2 w.
R353 and R354	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R355*	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
		In Models earlier than REV A:
	3R77P222K	Composition: 2200 ohms ±10%, 1/2 w.
R356*	3R77P621J	Composition: 620 ohms ±5%, 1/2 w.
		In Models earlier than REV A:
	3R77P431J	Composition: 430 ohms ±5%, 1/2 w.
R357	3R77P431J	Composition: 430 ohms ±5%, 1/2 w.
R358*	3R77P303J	Composition: 30,000 ohms ±5%, 1/2 w.
		In 19D402429G1 of REV M and earlier: In 19D402429G2, G3 of REV L and earlier:
	3R77P622J	Composition: 6200 ohms ±5%, 1/2 w.
R359	3R77P331K	Composition: 330 ohms ±10%, 1/2 w.
R360*	3R152P104J	Composition: 0.1 megohm ±5%, 1/4 w. Deleted from G1 by REV D. Deleted from G2 and G3 by REV C.
R361*	3R77P822J	Composition: 82,000 ohms ±5%, 1/2 w.
		In G1 REV C or earlier: In G2 and G3 REV B or earlier:
	3R152P753J	Composition: 75,000 ohms ±5%, 1/4 w.
R362	3R77P332J	Composition: 3300 ohms ±5%, 1/2 w.
R363	3R77P222J	Composition: 2200 ohms ±5%, 1/2 w.
R364	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R365	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R366	3R77P243J	Composition: 24,000 ohms ±5%, 1/2 w.
R367*	19B209358P108	Variable, carbon film: approx 100 to 50,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
		Earlier than REV J in G1: Earlier than REV H in G2, G3:
	19B204808G1	Resistor Assembly. Includes resistor, variable, carbon film: 50,000 ohms ±20%, 0.1 w.
R370	3R77P513J	Composition: 51,000 ohms ±5%, 1/2 w.
R371	3R77P102J	Composition: 1000 ohms ±5%, 1/2 w.
R372	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R373*	19B209358P106	Variable, carbon film: approx 75 to 10,000 ohms ±20%, 0.25 w; sim to CTS Type X-201.
		Earlier than REV J in G1: Earlier than REV H in G2, G3:
	19B204808G2	Resistor Assembly. Includes resistor, variable, carbon film: 10,000 ohms ±20%, 0.1 w.
R374	3R77P306J	Composition: 30 ohms ±5%, 1/2 w.

SYMBOL	GE PART NO.	DESCRIPTION
R375	3R77P472J	Composition: 4700 ohms ±5%, 1/2 w.
R376 and R377	5495948P444	Deposited carbon: 0.28 megohm ±1%, 1/2 w; sim to Texas Inst CD1/2MR.
R378*	3R152P101K	Composition: 100 ohms ±10%, 1/4 w. Added in G1 by REV F. Added in G2 and G3 by REV E.
R379*	3R152P511J	Composition: 510 ohms ±5%, 1/4 w. Added in G1 by REV L. Added in G2, G3 by REV K.
R380*	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w. Added in G1 by REV K. Added in G2, G3 by REV J.
R381*	3R152P472K	Composition: 4700 ohms ±10%, 1/4 w. Added to 19D402429G1 by REV M. Added to 19D402429G2, G3 by REV L.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT301	5490828P29	Rod: 22,800 ohms ±5% res at 25°C, 1 w max input at 40°C; sim to Global 723B-1.
RT302	5490828P28	Rod: 8750 ohms ±5% res at 25°C, 1 w max input at 40°C; sim to Global 723F-2.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
Y301	19B200356P1	Quartz: antiresonant, frequency 4805.00 KHz.
		OSCILLATOR BOARDS 1-Freq Board Model 4EG19A10 (19C303591G1) 2-Freq Board Model 4EG19A11 (19C303591G2)
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C425	5491271P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C426	5496218P653	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -470 PPM.
C427	5490008P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C428	7491827P2	Ceramic disc: .01 pf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C429 and C430	5496218P54	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef 0 PPM.
C431	7491827P2	Ceramic disc: .01 pf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C432	5491271P106	Variable, subminiature: approx 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C433	5496218P653	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -470 PPM.
C434	5490008P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C435 and C436	7491827P2	Ceramic disc: .01 pf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C437 and C438	5490008P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C439	7130348P3	Molded: 1 pf ±.05 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C440	5496218P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C441	7491827P2	Ceramic disc: .01 pf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR425	7777146P3	Germanium; sim to Type 1N90.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J425 thru J429	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L425	19B204752G2	Coil. Includes tuning slug 7160519P1.
L426	19B204752G1	Coil. Includes tuning slug 7160519P1.

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q425 and Q426	19A115245P1	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R425 and R426	3R152P123J	Composition: 12,000 ohms ±5%, 1/4 w.
R427	3R152P202J	Composition: 2000 ohms ±5%, 1/4 w.
R428 and R429	3R152P511J	Composition: 510 ohms ±5%, 1/4 w.
R430	3R152P203J	Composition: 2000 ohms ±5%, 1/4 w.
R431 and R432	3R152P123J	Composition: 12,000 ohms ±5%, 1/4 w.
R433	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XY425 and XY426	5490277P1	Transistor: 4 contacts, low-loss mica-filled phenolic; sim to Elco 3303.
		- - - - - - - - - - CRYSTALS - - - - - - - - - -
		NOTE: When reordering give GE Part Number and specify exact frequency needed.
		25-33 MHz Crystal Frequency = (OF +5.2E MHz) ÷ 2.
		33-42 MHz Crystal Frequency = (OF -5.2E MHz) ÷ 2.
		42-50 MHz Crystal Frequency = (OF -5.2E MHz) ÷ 3.
Y425 and Y426	19B206357P1	Quartz: antiresonant, freq range 12-19 MHz.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	4036555P1	Insulator, washer: nylon. (Used with Q312 and Q315).

PRODUCTION CHANGES

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

REV. A - (25-50 MHz Receiver Boards 19D402429-G1, 2 and 3)

To improve audio response. C379, C380 C386, R355 and R356 were changed. C384 was deleted.

REV. B - (25-33 MHz Receiver Board 19D402429-G1 Only)

To improve tuning of front end and oscillator circuits. C319 was changed.

REV. C - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. B - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. B - (42-50 MHz Receiver Board 19D402429-G3 Only)

To reduce squelch clipping at high signal levels. C404 was added from the top of CR308 to the top of R364.

REV. D - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. C - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. C - (42-50 MHz Receiver Board 19D402429-G3 Only)

To improve squelch operation temperature extremes and to protect transistor Q301 from very strong signals. CE399 was added across the emitter and base of Q301. R360 was deleted. C368, C392 and R361 were changed.

REV. E - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. D - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. D - (42-50 MHz Receiver Board 19D402429-G3 Only)

To improve temperature stability at temperature extremes. Changed C334 and C338.

REV. F - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. E - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. E - (42-50 MHz Receiver Board 19D402429-G3 Only)

To minimize the affects of line voltage transients on receiver operation. Added R378.

REV. G - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. F - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. F - (42-50 MHz Receiver Board 19D402429-G3 Only)

To eliminate 455 kHz from the squelch circuit and lower maximum squelch opening level. Changed C377.

REV. H - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. G - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. G - (42-50 MHz Receiver Board 19D402429-G3 Only)

To improve temperature compensation of high IF circuits. Changed C325, C329; and Changed C331.

To utilize improved bypass capacitors in low IF. Changed C357, C360, C362, and C365.

REV. J - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. H - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. H - (42-50 MHz Receiver Board 19D402429-G3 Only)

To facilitate manufacturing and procurement of parts. Changed L308-L318, R367 and R373.

REV. K - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. J - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. J - (42-50 MHz Receiver Board 19D402429-G3 Only)

To prevent squelch lock-up at high signal levels. Deleted C404. Changed CR308.

REV. L - (25-33 MHz Receiver Board 19D402429-G1 Only)
REV. K - (33-42 MHz Receiver Board 19D402429-G2 Only)
REV. K - (42-50 MHz Receiver Board 19D402429-G3 Only)

To improve discriminator idling and tuning. Added F379.

REV. M - (25-33 MHz Receiver Board 19D402424-G1 only)
REV. L - (33-42 MHz Receiver Board 19D402429-G2 only)
REV. L - (42-50 MHz Receiver Board 19D402429-G3 only)

To improve discriminator "idling", to increase maximum squelch opening level, and to increase squelch clopping at 3000 Hz. Changed R309, R345, C355, C356, C391, Q305, Q306, and Q313. Added R381.

REV. N - (25-33 MHz Receiver Board 19D402429-G1 only)
REV. M - (33-42 MHz Receiver Board 19D402429-G2 only)
REV. M - (42-50 MHz Receiver Board 19D402429-G3 only)

To incorporate new transistors. Changed Q303, Q307, Q308, Q309, Q310, Q311, Q314, and Q316. Changed R358.

PARTS LIST

LBI-3759D

132-174 MHz RECEIVER - TYPE ER-52-A
132-174 MHz FIRST OSCILLATOR - MODELS 4EG20A10-13

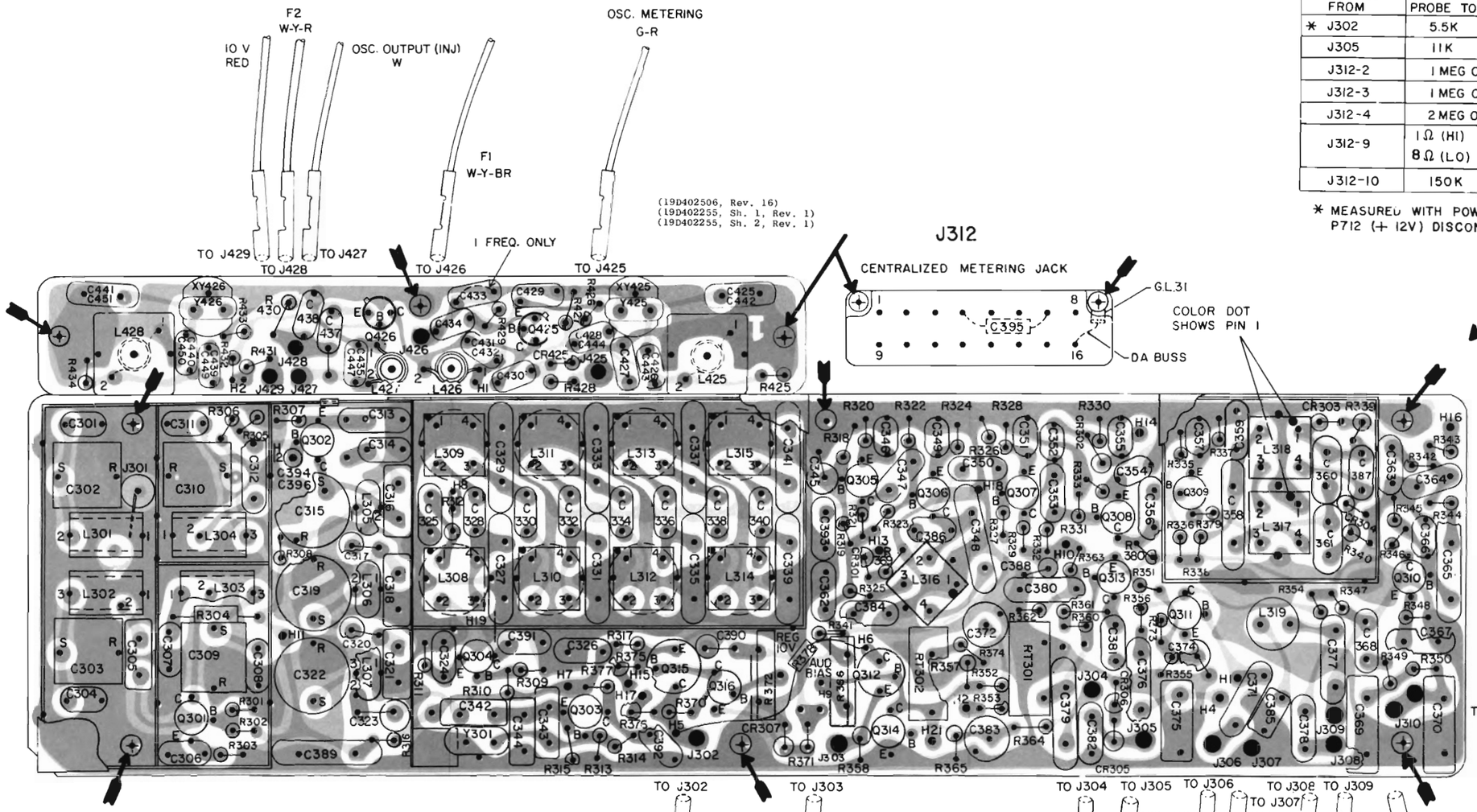
SYMBOL	GE PART NO.	DESCRIPTION
		RECEIVER ASSEMBLY 19D402257G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C301	19A116656P5J8	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C302 and C303	5491271P106	Variable, subminiature: 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C304	19A116656P5J8	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C305	5490008P131	Silver mica: 150 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C306*	19A116655P20	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		Earlier than REV E:
	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague Type 1219C4.
C307	7491827P102	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C308	19A116656P5J8	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C309 and C310	5491271P106	Variable, subminiature: 2.1-12.7 pf, 750 v peak; sim to EF Johnson 189.
C311	19A116656P5J8	Ceramic disc: 5 pf ±0.5 pf, 500 VDCW, temp coef -80 PPM.
C312	7491393P2	Ceramic disc: .01 µf +100% -0%, 500 VDCW; sim to Sprague Type 1219C4.
C313*	5494481P114	Ceramic disc: 2000 pf, 1000 VDCW; sim to RMC Type JF Discap.
		Earlier than REV H:
	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
		Earlier than REV E:
	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague Type 1219C4.
C314	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C315	5490446P1	Variable, ceramic: 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie 557-36.
C316	5490008P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C317	7130348P1	Molded, phen: 0.47 pf ±.047 pf, 500 VDCW, temp coef 0 PPM; sim to Jeffers Type JM-5/32.
C318	5490008P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C319	5490446P1	Variable, ceramic: 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie 557-36.
C320	7130348P1	Molded, phen: 0.47 pf ±.047 pf, 500 VDCW, temp coef 0 PPM; sim to Jeffers Type JM-5/32.
C321	5490008P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C322	5490446P1	Variable, ceramic: 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie 557-36.
C323	7491930P4	Polyester: .0068 µf ±20%, 100 VDCW; sim to GE Type 61F.
C324*	19A116080P1	Polyester: .01 µf ±20%, 50 VDCW.
		Earlier than REV F:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague Type 19C180.
C325 and C326	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C327	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C328*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C329	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C330*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C331	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C332*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C333	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C334*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C335	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C336*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C337	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C338*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C339	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C340*	5496219P43	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef 0 PPM.
		In REV N and earlier:
	5496219P42	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef 0 PPM.
C341	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C342	5496219P50	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef 0 PPM.
C343	5490008P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C344	5490008P23	Silver mica: 68 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C345	7491930P3	Polyester: .0047 µf ±20%, 100 VDCW; sim to GE Type 61F.
C346*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW.
		Earlier than REV K:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C347	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF.
C348	5496219P367	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -150 PPM.
C349*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW.
		Earlier than REV K:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C350	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF.
C351*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW.
		Earlier than REV K:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C352	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague 1219C4.
C353	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF.
C354*	19A116080P3	Polyester: 0.022 µf ±20%, 50 VDCW.
		Earlier than REV K:
	5492638P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C355	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague 1219C4.
C356	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF.
C357*	19A116080P1	Polyester: .01 µf ±20%, 50 VDCW.
		Earlier than REV E:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C358	5496219P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C359	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C360 and C361	5490008P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C362	19A116080P107	Polyester: 0.1 µf ±10%, 50 VDCW.
C363 and C364	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF.
C365	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C366*	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF.
		Earlier than REV J:
	5494481P107	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF.
C367	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C368*	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
		Earlier than REV C:
	5492638P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C369*	19A116080P8	Polyester: 0.15 µf ±20%, 50 VDCW.
		Earlier than REV C:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C370	19A116080P7	Polyester: 0.1 µf ±20%, 50 VDCW.
C371	19A116080P109	Polyester: 0.22 µf ±10%, 50 VDCW.
C372	5495670P3	Electrolytic: 5 µf +75% -10%, 6 VDCW; sim to Sprague Type 30D.
C373*	5494481P114	Ceramic disc: 2000 pf ±10%, 1000 VDCW; sim to RMC Type JF. Deleted by REV C.
C374	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C375*	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
		Earlier than REV C:
	19B209243P6	Polyester: .068 µf ±20%, 50 VDCW.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

(DF-1093)

MEASURED FROM	NEGATIVE (-) PROBE TO GND	POSITIVE (+) PROBE TO GND
* J302	5.5K	4K
J305	11K	1.8K
J312-2	1 MEG OHM	60K
J312-3	1 MEG OHM	60K
J312-4	2 MEG OHMS	6.8K
J312-9	1Ω (HI) 8Ω (LO)	1Ω (HI) 8Ω (LO)
J312-10	150K	150K

* MEASURED WITH POWER SUPPLY LEAD P712 (+ 12V) DISCONNECTED.

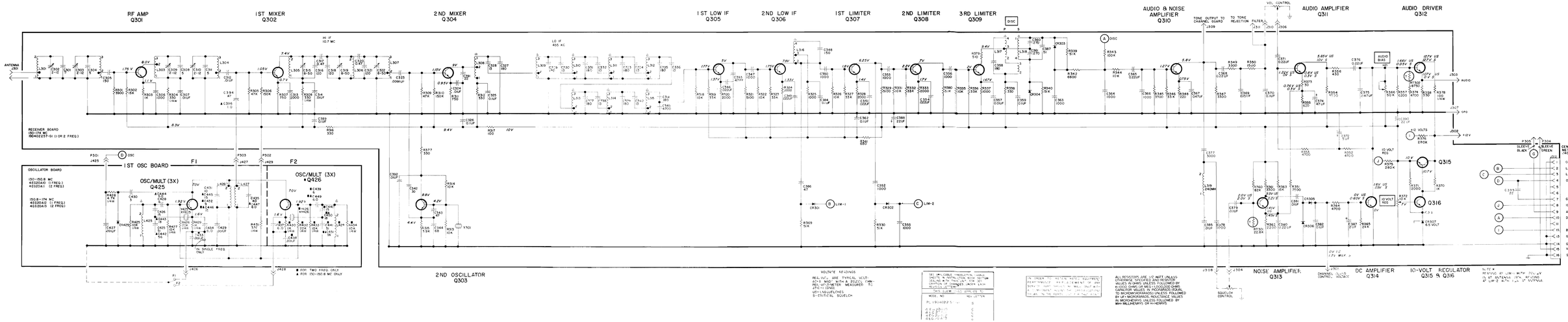


RESISTANCE READINGS

RESISTANCE READINGS ARE TYPICAL READINGS MEASURED TO J312-13 (GROUND), AND WITH ALL POWER REMOVED FROM THE CHASSIS.

OUTLINE DIAGRAM

132—174 MHz RECEIVER
TYPE ER-52-A



SCHEMATIC DIAGRAM

132—174 MHz RECEIVER TYPE ER-52-A

19R620717, Rev. 31

SYMBOL	GE PART NO.	DESCRIPTION
C376	19A116040P109	Polyester: 0.22 µf ±10%, 50 VDCW,
C377	5494481P116	Ceramic disc: 3000 pf ±10%, 1000 VDCW; sim to RMC Type JF,
C378	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF,
C379	7491827P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C112,
C380	19A116040P109	Polyester: 0.22 µf ±10%, 50 VDCW,
C381*	19A116040P21	Polyester: 0.01 µf ±20%, 50 VDCW,
		Earlier than REV E:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 36C100,
C382	19A116040P107	Polyester: 0.1 µf ±10%, 50 VDCW,
C383	5495670P13	Electrolytic: 2 µf +75% -10%, 25 VDCW; sim to Sprague 30D,
C384	19A116040P107	Polyester: 0.1 µf ±10%, 50 VDCW,
C385	19A116040P201	Polyester: 0.01 µf ±5%, 50 VDCW,
C386	5496203P117	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -1300 PPM,
C387	5496219P636	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -470 PPM,
C388	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D,
C389	19A116040P7	Polyester: 0.1 µf ±20%, 50 VDCW,
C390	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D,
C391	5490003P11	Silver mica: 22 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15,
C392*	19A116040P	Polyester: .01 µf ±20%, 50 VDCW,
		Earlier than REV F:
	7491827P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 36C100,
C393	5496219P617	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -150 PPM,
C394*	7133048P1	Molded, phen: 0.47 pf ±.042 pf, 500 VDCW, temp coef 0 PPM, Added by REV B,
C395*	7489162P111	Mica: 22 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15, Added by REV B,
C396*	7133048P5	Molded, phen: 1 pf ±.05%, 500 VDCW, temp coef 0 PPM, Added by REV B,
C397*	7489162P139	Silver mica: 330 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15, Added by REV D, Deleted by REV E,
		- - - - - - - - DIODES AND RECTIFIERS - - - - -
CR301 and CR302	4038036P1	Germanium,
CR303 and CR304	19A115250P1	Silicon,
CR305 and CR306	4038036P1	Germanium,
CR307	4038687P6	Silicon, Zener,
CR308*	4038687P3	Silicon, Zener, Deleted by REV M,
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - -
J301	5496078P3	Receptacle, coaxial: sim to FXR 22-3,
J302 thru J311	6033513P4	Contact, electrical: sim to Bead Chain 193-3,
J312	19B205698G2	Connector: 18 contacts,
		- - - - - - - - - - INDUCTORS - - - - - - - - -
L301	19B204402G4	Coil Assembly,
L302	19B204402G3	Coil Assembly,

SYMBOL	GE PART NO.	DESCRIPTION
L303*	19B204402G3	Coil Assembly,
		In Models earlier than REV E:
L304	19B204402G2	Coil Assembly,
L305 and L306	19B204402G1	Coil Assembly,
L307	19B204403G1	Coil Assembly,
L308* thru L315*	19A115711P1	Transformer, freq: 455 KHz; sim to Automatic Mfg EX12670,
		Earlier than REV L:
	19C303062G6	Coil Assembly, Includes tuning slug 403R368P21,
L316*	19A115711P2	Transformer, freq: 455 KHz; sim to Automatic Mfg EX12671,
		Earlier than REV L:
	19C303062G6	Coil Assembly, Includes tuning slug 403R368P21,
L317*	19A115311P6	Transformer, freq: 455 KHz; sim to TOKO PEFCS-14733-CX12,
		Earlier than REV L:
	19C303062G4	Coil Assembly, Includes tuning slug 403R368P21,
L318*	19A115311P2	Transformer, freq: 455 KHz; sim to TOKO PEFCS-14734-BK12,
		Earlier than REV L:
	19C303062G5	Coil Assembly, Includes tuning slug 403R368P21,
L319	5491739P2	Inductor: 240 mh ±10% ind at 0.5 ma, 270 ohms max DC res; sim to Aladdin 33-161,
		- - - - - - - - - - PLUGS - - - - - - - - - -
P301 thru P303	4029940P2	Contact, electrical: sim to Amp 42827-2,
P304 thru P305	7174199P1	Connector: 1 male contact; sim to Winchester Electronics 21803,
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q301 and Q302	19A115342P1	Silicon, NPN,
Q303	19A115889P1	Silicon, NPN; sim to Type 2N2712,
Q304	19A115342P1	Silicon, NPN,
Q305* and Q306*	19A116774P1	Silicon, NPN; sim to Type 2N5210,
		In REV R and earlier:
	19A115889P1	Silicon, NPN; sim to Type 2N2712,
Q307 thru Q309	19A115889P1	Silicon, NPN; sim to Type 2N2712,
Q310*	19A116774P1	Silicon, NPN; sim to Type 2N5210,
		In REV R and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712,
Q311*	19A116755P1	Silicon, NPN; sim to Type 2N3947,
		In REV R and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712,
Q312	19A115300P4	Silicon, NPN; sim to Type 2N3053,
Q313*	19A116774P1	Silicon, NPN; sim to Type 2N5210,
		In REV N and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712,
Q314*	19A116774P1	Silicon, NPN; sim to Type 2N5210,
		In REV R and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712,
Q315	19A115300P2	Silicon, NPN; sim to Type 2N3053,
Q316*	19A116755P1	Silicon, NPN; sim to Type 2N3947,
		In REV R and earlier:
	19A115123P1	Silicon, NPN; sim to Type 2N2712,

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R301	3R7IP392K	Composition: 3900 ohms ±10%, 1/2 w,
R302	3R7IP153K	Composition: 15,000 ohms ±10%, 1/2 w,
R303	3R7IP102K	Composition: 1000 ohms ±10%, 1/2 w,
R304	3R152P331K	Composition: 330 ohms ±10%, 1/2 w,
R305	3R7IP473K	Composition: 47,000 ohms ±10%, 1/2 w,
R306	3R7IP154K	Composition: 0.15 megohm ±10%, 1/2 w,
R307	3R7IP751J	Composition: 750 ohms ±5%, 1/2 w,
R308	3R152P331K	Composition: 330 ohms ±10%, 1/4 w,
R309	3R7IP473K	Composition: 47,000 ohms ±10%, 1/2 w,
R310	3R7IP154K	Composition: 0.15 megohm ±10%, 1/2 w,
R311	3R7IP751J	Composition: 750 ohms ±5%, 1/2 w,
R312	3R7IP331K	Composition: 330 ohms ±10%, 1/2 w,
R313 and R314	3R7IP103K	Composition: 10,000 ohms ±10%, 1/2 w,
R315	3R7IP392K	Composition: 3900 ohms ±10%, 1/2 w,
R316	3R7IP331K	Composition: 330 ohms ±10%, 1/2 w,
R317	3R7IP101K	Composition: 100 ohms ±10%, 1/2 w,
R318	3R7IP103K	Composition: 10,000 ohms ±10%, 1/2 w,
R319	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R320	3R7IP202J	Composition: 2000 ohms ±5%, 1/2 w,
R321	3R7IP513J	Composition: 5100 ohms ±5%, 1/2 w,
R322	3R7IP103K	Composition: 10,000 ohms ±10%, 1/2 w,
R323	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R324	3R7IP202J	Composition: 2000 ohms ±5%, 1/2 w,
R325	3R7IP102K	Composition: 1000 ohms ±10%, 1/2 w,
R326	3R7IP103K	Composition: 10,000 ohms ±10%, 1/2 w,
R327	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R328	3R7IP202J	Composition: 2000 ohms ±5%, 1/2 w,
R329	3R7IP512J	Composition: 5100 ohms ±5%, 1/2 w,
R330	3R7IP513J	Composition: 51,000 ohms ±5%, 1/2 w,
R331	3R7IP103K	Composition: 10,000 ohms ±10%, 1/2 w,
R332	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R333	3R7IP202J	Composition: 2000 ohms ±5%, 1/2 w,
R335	3R7IP103K	Composition: 10,000 ohms ±10%, 1/2 w,
R336	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R337	3R7IP102J	Composition: 1000 ohms ±5%, 1/2 w,
R338	3R7IP331K	Composition: 330 ohms ±10%, 1/2 w,
R339 and R340	3R7IP513J	Composition: 51,000 ohms ±5%, 1/2 w,
R341	3R152P681K	Composition: 680 ohms ±10%, 1/4 w,
R342	3R7IP682K	Composition: 6800 ohms ±10%, 1/2 w,
R343	3R7IP104K	Composition: 0.1 megohm ±10%, 1/2 w,
R344*	3R7IP103J	Composition: 10,000 ohms ±5%, 1/2 w,
		In REV R and earlier:
	3R7IP333K	Composition: 15,000 ohms ±10%, 1/2 w,
	3R7IP332K	Composition: 3300 ohms ±10%, 1/2 w,
	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R345	3R7IP332K	Composition: 3300 ohms ±10%, 1/2 w,
R346	3R7IP333K	Composition: 33,000 ohms ±10%, 1/2 w,
R347	3R7IP332K	Composition: 3300 ohms ±10%, 1/2 w,
R348	3R7IP221K	Composition: 220 ohms ±10%, 1/2 w,
R349	3R7IP332J	Composition: 3300 ohms ±5%, 1/2 w,
R350	3R7IP152J	Composition: 1500 ohms ±5%, 1/2 w,
R351	3R7IP752J	Composition: 7500 ohms ±5%, 1/2 w,

SYMBOL	GE PART NO.	DESCRIPTION
R352 and R353	3R72P472K	Composition: 4700 ohms ±10%, 1/2 w,
R354*	3R7IP332K	Composition: 3300 ohms ±10%, 1/4 w,
		In Models earlier than REV C:
	3R152P222K	Composition: 2200 ohms ±10%, 1/4 w,
R355*	3R7IP621J	Composition: 620 ohms ±5%, 1/2 w,
		In Models earlier than REV C:
	3R152P431J	Composition: 430 ohms ±5%, 1/4 w,
R356	3R7IP431J	Composition: 430 ohms ±5%, 1/2 w,
R357	3R7IP622J	Composition: 6200 ohms ±5%, 1/2 w,
R358	3R7IP331K	Composition: 330 ohms ±10%, 1/2 w,
R359*	3R152P104J	Composition: 0.1 megohm ±5%, 1/4 w, Deleted by REV E,
R360*	3R7IP823J	Composition: 82,000 ohms ±5%, 1/2 w,
		In Models earlier than REV D:
	3R152P753J	Composition: 75,000 ohms ±5%, 1/4 w,
R361	3R7IP332J	Composition: 3300 ohms ±5%, 1/2 w,
R362	3R7IP222J	Composition: 2200 ohms ±5%, 1/2 w,
R363	3R7IP153J	Composition: 15,000 ohms ±5%, 1/2 w,
R364	3R7IP472K	Composition: 4700 ohms ±10%, 1/2 w,
R365	3R7IP243J	Composition: 2400 ohms ±5%, 1/2 w,
R366*	19B209358P108	Variable, carbon film: approx 100 to 50,000 ohms ±10%, 0.25 w; sim to CTS Type X-201,
		Earlier than REV L:
	19B204804G2	Resistor Assembly, Includes resistor, variable, carbon film: 50,000 ohms ±20%, 0.1 w,
R369	3R7IP513J	Composition: 51,000 ohms ±5%, 1/2 w,
R370	3R7IP103J	Composition: 1000 ohms ±5%, 1/2 w,
R371	3R7IP202J	Composition: 2000 ohms ±5%, 1/2 w,
R372*	19B209358P106	Variable, carbon film: approx 75 to 10,000 ohms ±10%, 0.25 w; sim to CTS Type X-201,
		Earlier than REV L:
	19B204804G2	Resistor Assembly, Includes resistor, variable, carbon film: .01 megohm ±20%, 0.1 w,
R373	3R7IP300J	Composition: 30 ohms ±5%, 1/2 w,
R374	3R7IP472J	Composition: 4700 ohms ±5%, 1/2 w,
R375 and R376	19A116278P444	Metal film: 0.28 megohm ±2%, 1/2 w,
R377	3R7IP331K	Composition: 330 ohms ±10%, 1/2 w,
R378	3R152P101K	Composition: 100 ohms ±10%, 1/4 w,
R379*	3R152P511J	Composition: 510 ohms ±5%, 1/4 w, Added by by REV N,
R380*	3R152P512J	Composition: 5100 ohms ±5%, 1/4 w, Added by REV N, Deleted by REV S,
R381*	3R152P472J	Composition: 4700 ohms ±5%, 1/4 w, Added by REV N, Deleted by REV S,
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT301	5490828P09	Rod: 0.228 megohm ±5% res at 25°C, 1 w max input at 40°C; sim to Global 223B-1,
RT302	5490828P28	Rod: R350 ohms ±5% res at 25°C, 1 w max input at 40°C; sim to Global 223F-2,
		- - - - - - - - - CRYSTALS - - - - - - - - -
Y301	19A110215G1	Quartz: anti-resonant, freq 10245 KHz,

FIRST OSCILLATOR ASSEMBLY
MODELS 4EQ20A1010

19D402259G3 - Single Freq	132-150.8 MHz
19D402259G4 - Two Freq	132-150.8 MHz
19D402259G1 - Single Freq	150.8-174 MHz
19D402259G2 - Two Freq	150.8-174 MHz

		- - - - - - - - - CAPACITORS - - - - - - - - -
C425	5496219P56	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef 0 PPM,

SYMBOL	GE PART NO.	DESCRIPTION
C426	5496219P344	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM,
C427	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague 121HC4,
C428	5496219P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
C429*	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Dicap,
		In Models earlier than REV B and earlier:
	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague Type 121HC4,
C430	5496219P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
C431	5496219P241	Ceramic disc: 10 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
C432	5496219P240	Ceramic disc: 9 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
C433*	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Dicap,
		In Models earlier than REV B and earlier:
	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague Type 121HC4,
C434*	5496219P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
		In Models earlier than REV B and earlier:
	5496219P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
C435*	5496219P235	Ceramic disc: 4 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
		In Models earlier than REV A:
	5496219P236	Ceramic disc: 5 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
C436*	7133048P1	Molded, phen: 0.47 pf ±.042 pf, 500 VDCW, temp coef 0 PPM; sim to Jeffers Type JM-5/32, Deleted by REV A,
C437*	5496219P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
		In Models of REV B and earlier:
	5496219P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
C438*	5494481P112	Ceramic disc: 1000 pf ±10%, 1000 VDCW; sim to RMC Type JF Dicap,
		In Models of REV B and earlier:
	7491393P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague 121HC4,
C439	5496219P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
C440	5496219P244	Ceramic disc: 13 pf ±5%, 500 VDCW, temp coef -80 PPM,
C441	5496219P56	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef 0 PPM,
C442	5496219P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM,
C443	5496219P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM,
C444*	5496219P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
		In Models of REV B and earlier:
	5496219P39	Ceramic disc: 8 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
C445 and C446	5496219P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM,
C447*	5496219P237	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
		In Models earlier than REV A:
	5496219P238	Ceramic disc: 7 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
C448*	7133048P3	Molded, phen: 1 pf ±.05 pf, 500 VDCW, temp coef 0 PPM; sim to Jeffers Type JM-5/32, Deleted by REV A,

SYMBOL	GE PART NO.	DESCRIPTION
C449*	5496219P37	Ceramic disc: 6 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM,
		In Models of REV B and earlier:
	5496219P39	Ceramic disc: 8 pf ±0.25 pf, 500 VDCW, temp coef -80 PPM,
C450	5496219P245	Ceramic disc: 18 pf ±5%, 500 VDCW, temp coef -80 PPM,
C451	5496219P257	Ceramic disc: 56 pf ±5%, 500 VDCW, temp coef -80 PPM,
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR425	4038036P1	Germanium,
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J425 thru J429	6033513P4	Contact, electrical: sim to Bead Chain 193-3,
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L425	19A121086G1	Coil Assembly, Includes tuning slug 19B200419P2,
L426	19A121084G1	Coil Assembly, Includes tuning slug 19B200419P2,
L427	19A121083G1	Coil Assembly, Includes tuning slug 19B200419P2,
L428	19A121085G1	Coil Assembly, Includes tuning slug 19B200419P2,
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q425* and Q426*	19A115925P1	Silicon, NPN,
		In Models earlier than REV B:
	19A115342P1	Silicon, NPN,
		- - - - - - - - - RESISTORS - - - - - - - - -
R425	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w,
R426	3R152P203J	Composition: 20,000 ohms ±10%, 1/4 w,
R427	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w,
R428	3R152P472K	Composition: 4700 ohms ±10%, 1/4 w,
R429 and R430	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w,
R431	3R152P331K	Composition: 330 ohms ±10%, 1/4 w,
R432	3R152P203J	Composition: 20,000 ohms ±5%, 1/4 w,
R433 and R434	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w,
		- - - - - - - - - SOCKETS - - - - - - - - -
XY425 and XY426	5490277P1	Transistor: 4 contact, low-loss mica-filled phenolic; sim to Elco 3303,
		- - - - - - - - - CRYSTALS - - - - - - - - -
Y425 and Y426	19B200221P1	NOTE: When reordering give GE Part Number and specify exact freq needed, Crystal Freq = (OF ÷10.7 MHz) ÷ 3, Quartz: freq range 39 to 62 MHz,

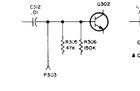
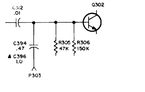
PRODUCTION CHANGES

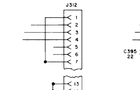
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

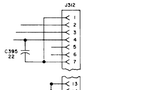
REV. A (19D402257-G1 only) - To match voice coil hi and ground of J312 to G-E Test Set 4EX2410. Moved VOICE COIL HI from J312-7 to J312-15. Moved GND from J312-15 to J312-7.

REV. B (19D402257-G1 only) - To improve systems spurious. Added C394, C395, C396, ground lug under mounting screw of J312, and jumper between lug and J312-16.

Elementary Diagram Changes

Was	Changed to
	

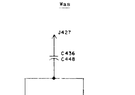




REV. C (19D402257-G1 only) - To improve rudio response characteristics. Changed C368, C369, C375, R354 and R355. Deleted C373 from collector to base of Q313.

REV. A (4EQ20A10-13 only) - To improve systems spurious. Deleted C436 and C448, and changed C435 and C447.

Elementary Diagram Changes

Was	Changed to
	

REV. D (19D402257-G1 only) - To reduce squelch clipping at high signal levels. Added C397.

REV. E (19D402257-G1 only) - To prevent squelch changes with temperature and to reduce gain of RF Amplifier. Changed C306, C313, C357, C381, L303 and R360. Deleted R359.

REV. F (19D402257-G1 only) - To improve temperature stability. Changed C324 and C392.

REV. G (19D402257-G1 only) - To minimize the affect of line voltage transients on receiver operation. Added R378.

REV. H (19D402257-G1) - To improve 1st Mixer stability. Changed C312.

REV. J (19D402257-G1) - To eliminate 450 kHz from the squelch circuit and lower maximum squelch opening level.

REV. K (19D402257-G1) - To provide improved bypass capacitors for the 5 volt regulator circuit. Changed C346, C349, C351 and C354.

REV. L (19D402257-G1) - To facilitate manufacturing and procurement of parts. Changed L308-L318, R366, and R372.

REV. M (19D402257-G1) - To prevent squelch lock-up at high signal levels. Deleted C397. Changed CR308.

REV. N (19D402257-G1) - To improve discriminator idling and tuning. Added R379.

REV. P (19D402257-G1) - To increase maximum squelch opening level. Changed the following:

C328	C336	Q310
C329	C338	Q313
C332	C340	
C334		

REV. R (19D402257-G1) - To improve squelch clipping. Added R381,

REV. S (19D402257-G1) - To improve squelch clipping and to improve squelch resistors. Changed Q305, Q306, Q311, D314 and Q316 and changed R344. Deleted R381.

STEP 1 — QUICK CHECKS

SYMPTOM	PROCEDURE
NO SUPPLY VOLTAGE	Check power connections and continuity of supply leads, and check fuse in power supply. If fuse is blown, check receiver for short circuits.
NO REGULATED 10 VOLTS	Check the 12-volt supply. Then check regulator Q315 and regulator circuit. Resistance reading of 10-volt supply from the emitter of Q315 to ground should be 2 K ohms.
LOW 2ND LIM READING	Check supply voltages and then check oscillator reading at J312-4 as shown in STEP 2A. Make SIMPLIFIED VTVM GAIN CHECKS from 2nd Mixer through 2nd Limiter stages as shown in STEP 2A.
LOW OSCILLATOR READING	Check alignment of Oscillator (Refer to Front End Alignment Procedure). Check voltage and resistance reading of Oscillator Q425. Check crystal Y425.
LOW RECEIVER SENSITIVITY	Check Front End Alignment (Refer to Receiver Alignment Procedure). Check antenna connections Check voltage and resistance readings of RF Amp and 1st and 2nd Mixers. Make SIMPLIFIED GAIN CHECKS (STEP 2A).
LOW AUDIO	Check Audio PA (Q701) output current at J312-9. If reading is low-- a. Check BIAS ADJ for 0.25 VDC at J312-9 (STEP 2A). b. Check Q701. Make SIMPLIFIED GAIN and WAVEFORM CHECKS (STEPS 2A and 2B) of Audio and Squelch stages. Check unsquelched voltage readings in Audio section (Refer to Receiver Schematic Diagram). Check voltage and resistance readings on Channel Guard receiver.
IMPROPER SQUELCH OPERATION	Make GAIN and WAVEFORM CHECKS (STEPS 2A and 2B) of Audio and Squelch stages. Check voltage and resistance readings of Squelch circuit (Refer to Receiver Schematic Diagram).
DISCRIMINATOR IDLING TOO FAR OFF ZERO	See if discriminator zero is in the center of IF bandpass.

STEP 3- GAIN-PER-STAGE 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.

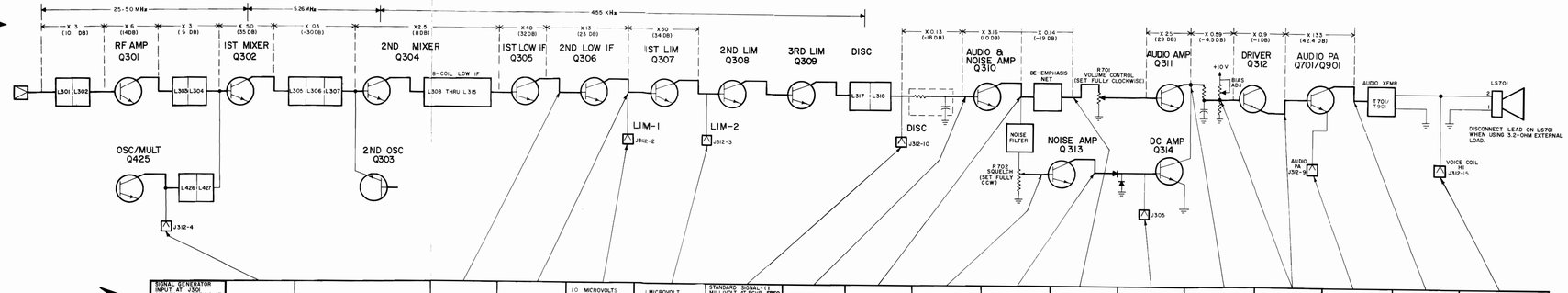
PROCEDURE

1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, BASE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING MEASURED AND TAKE VOLTAGE READING (E_1).
2. MOVE PROBE TO INPUT OF FOLLOWING STAGE (1ST MIXER M). REPEAK FIRST RESONANT CIRCUIT THEN PEAK CIRCUIT BEING MEASURED AND TAKE READING (E_2).
3. CONVERT READINGS (BY SUBTRACTING E_1 FROM E_2 ON THE DB SCALE OF RF VOLTMETER, OR) BY MEANS OF THE FOLLOWING FORMULA.

   AMP FACTOR $\frac{E_2}{E_1}$

4. CHECK RESULTS WITH TYPICAL GAINS SHOWN ON DIAGRAM BELOW.
5. USE PROCEDURE LISTED ABOVE TO FIND GAIN OF EACH STAGE.

M NOTE: REMOVE CRYSTAL OR SHORT OUT OSC. BASE BEFORE MEASURING MIXER STAGES TO ELIMINATE INJECTION VOLTAGE.



STEP 2A- SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

1. VTVM-AC&DC
2. SIGNAL GENERATOR (MEASUREMENTS M560 EQUIV.)

PRELIMINARY STEPS:

1. SET VOLUME CONTROL FULLY CLOCKWISE.
2. SET SQUELCH CONTROL FULLY COUNTERCLOCKWISE.
3. RECEIVER SHOULD BE PROPERLY ALIGNED.

SIGNAL GENERATOR INPUT AT J301 MAINTAIN SETTING AT DISCRIMINATOR ZERO			INCREASE SIGNAL GENERATOR OUTPUT UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT UNTIL VTVM READING DECREASES BY 5%	.10 MICROVOLTS UNMODULATED	.1 MICROVOLT UNMODULATED	STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1 kHz WITH 3.3 kHz DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	NO SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
PROCEDURE																	SET AUDIO SWITCH S701 TO HI POSITION (NOT USED WITH EC-664A)		AFTER CHECKING WAVEFORMS ADJUST VOLUME CONTROL FOR RATED 1 WATT OUTPUT ACROSS 3.2 Ω LOAD.
READING	0.28 VDC EX-3-A 0.16 VDC MULTMTR 0.2 VDC		GENERATOR OUTPUT SHOULD BE APPROX 350 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 10 MICROVOLTS	0.64 VDC EX-3-A 0.22 VDC MULTMTR 0.55 VDC	1.7 VDC EX-3-A 0.48 VDC MULTMTR 0.78 VDC	0.65 VAC	0.1 VAC	0.85 VAC	0.15 VAC	0.95 VAC	0.9 VAC	1.25 VDC	1.5 VAC	0.7 VAC	0.25 VDC EX-3-A 0.25 VDC MULTMTR 0.25 VDC	13 VAC	1.8 VAC

STEP 2B-AUDIO & SQUELCH WAVEFORMS

EQUIPMENT REQUIRED:

1. OSCILLOSCOPE
2. SIGNAL GENERATOR (MEASUREMENTS M560 OR EQUIVALENT)

SCOPE SETTING													
HORIZONTAL	0.5 MS/DIV (APPROX 200 Hz)	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	2 MS/DIV (500 Hz)	0.5 MS/DIV		0.5 MS/DIV	0.5 MS/DIV		0.5 MS/DIV	0.5 MS/DIV
VERTICAL	1 VOLT/DIV	100 MILLIVOLTS/DIV	1 VOLT/DIV	100 MILLIVOLTS/DIV	1 VOLT/DIV	100 MILLIVOLTS/DIV		1 VOLT/DIV	1 VOLT/DIV		10 VOLTS/DIV	1 VOLT/DIV
PEAK-TO-PEAK VOLTAGE	1.6 V P-P	0.3 V P-P	2.1 V P-P	0.4 V P-P	2.5 V P-P	0.24 V P-P		3.1 V P-P	1.8 V P-P		26 V P-P	5 V P-P

NOISE WAVE FORM

STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1 kHz WITH 3.3 kHz DEVIATION)

STEP 1 – QUICK CHECKS

SYMPTOM	PROCEDURE
NO SUPPLY VOLTAGE	Check power connections and continuity of supply leads, and check fuse in power supply. If fuse is blown, check receiver for short circuits.
NO REGULATED 10 VOLTS	Check the 12-volt supply. Then check regulator Q315 and regulator circuit. Resistance reading of 10-volt supply from the emitter of Q315 to ground should be 2 K ohms.
LOW 2ND LIM READING	Check supply voltages and then check oscillator reading at J312-4 as shown in STEP 2A. Make SIMPLIFIED VTVM GAIN CHECKS from 2nd Mixer through 2nd Limiter stages as shown in STEP 2A.
LOW OSCILLATOR READING	Check alignment of Oscillator (Refer to Front End Alignment Procedure). Check voltage and resistance reading of Oscillator Q425. Check crystal Y425. (substitution method)
LOW RECEIVER SENSITIVITY	Check Front End Alignment (Refer to Receiver Alignment Procedure). Check antenna connections. Check voltage and resistance readings of RF Amp and 1st and 2nd Mixers. Make SIMPLIFIED GAIN CHECKS (STEP 2A).
LOW AUDIO	Check Audio PA (Q701) output current at J312-9. If reading is low-- a. Check BIAS ADJ for 0.25 VDC at J312-9 (STEP 2A). b. Check Q701. Make SIMPLIFIED GAIN and WAVEFORM CHECKS (STEPS 2A and 2B) of Audio and Squelch stages. Check unsquelched voltage readings in Audio section (Refer to Receiver Schematic Diagram). Check voltage and resistance readings on Channel Guard receiver.
IMPROPER SQUELCH OPERATION	Make GAIN and WAVEFORM CHECKS (STEPS 2A and 2B) of Audio and Squelch stages. Check voltage and resistance readings of Squelch circuit (Refer to Receiver Schematic Diagram).
DISCRIMINATOR IDLING TOO FAR OFF ZERO	See if discriminator zero is in the center of IF bandpass.

STEP 3- GAIN-PER-STAGE 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.

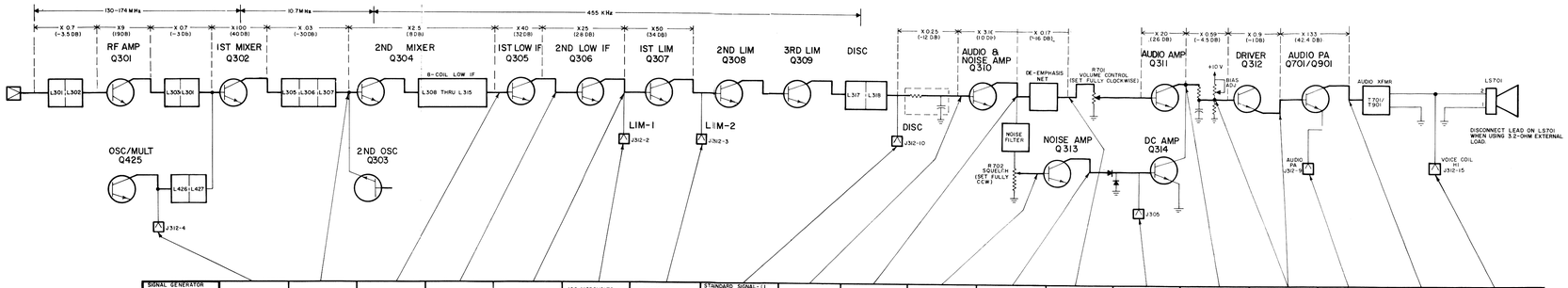
PROCEDURE

1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, BASE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING MEASURED AND TAKE VOLTAGE READING (E_1).
2. MOVE PROBE TO INPUT OF FOLLOWING STAGE (1ST MIXER) & REPEAK FIRST RESONANT CIRCUIT THEN PEAK CIRCUIT BEING MEASURED AND TAKE READING (E_2).
3. CONVERT READINGS (BY SUBTRACTING E_1 FROM E_2 ON THE DB SCALE OF RF VOLTMETER, OR) BY MEANS OF THE FOLLOWING FORMULA.

   AMP FACTOR $\frac{E_2}{E_1}$

4. CHECK RESULTS WITH TYPICAL GAINS SHOWN ON DIAGRAM BELOW.
5. USE PROCEDURE LISTED ABOVE TO FIND GAIN OF EACH STAGE.

※ NOTE: REMOVE CRYSTAL OR SHORT OUT OSC. BASE BEFORE MEASURING MIXER STAGES TO ELIMINATE INJECTION VOLTAGE.



STEP 2A- SIMPLIFIED VTVM GAIN CHECKS

EQUIPMENT REQUIRED:

1. VTVM-AC&DC
2. SIGNAL GENERATOR (MEASUREMENTS M560 EQUIV.)

PRELIMINARY STEPS:

1. SET VOLUME CONTROL FULLY CLOCKWISE.
2. SET SQUELCH CONTROL FULLY COUNTERCLOCKWISE.
3. RECEIVER SHOULD BE PROPERLY ALIGNED.

SIGNAL GENERATOR INPUT AT J312. MAINTAIN SETTING AT DISCRIMINATOR ZERO		UNMODULATED	UNMODULATED	UNMODULATED	UNMODULATED	100 MICROVOLTS UNMODULATED	1 MICROVOLT UNMODULATED	STANDARD SIGNAL: 1 MILLIVOLT AT RCVR FREQ MODULATED BY 1KHz WITH 3.3 KHz DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
PROCEDURE		INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL 20 DB QUIETING INCREASE BY 10 %	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL 20 DB QUIETING INCREASE BY 5 %	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL 20 DB QUIETING INCREASE BY 5 %	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL 20 DB QUIETING INCREASE BY 5 %											SET AUDIO SWITCH S701 TO HI POSITION (NOT USED WITH EC-96-A1)		AFTER CHECKING WAVEFORMS ADJUST R702 VOLUME FOR RATED AUDIO OUTPUT ACROSS 3.2 Ω LOAD.
READING	0.2 VDC EX-3-A 0.08 VDC MULTMTR 0.12 VDC	GENERATOR OUTPUT SHOULD BE APPROX 6 MILLIVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 700 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 600 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 10 MICROVOLTS	1.5 VDC EX-3-A 0.35 VDC MULTMTR 0.75 VDC	1.1 VDC EX-3-A 0.44 VDC MULTMTR 0.9 VDC	0.50 VAC	0.1 VAC	0.70 VAC	0.06 VAC	1 VAC	.085 VAC	0.8 VDC	1.2 VAC	0.7 VAC	0.25 VDC EX-3-A 0.25 VDC MULTMTR 0.25 VDC	13 VAC	1.8 VAC

STEP 2B-AUDIO & SQUELCH WAVEFORMS

EQUIPMENT REQUIRED:

1. OSCILLOSCOPE
2. SIGNAL GENERATOR (MEASUREMENTS M560 OR EQUIVALENT)

SCOPE SETTING	HORIZONTAL	0.5 MS/DIV (APPROX 300 Hz)	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	2 MS/DIV (500 Hz)	0.5 MS/DIV		0.5 MS/DIV	0.5 MS/DIV		0.5 MS/DIV	0.5 MS/DIV
	VERTICAL	VOLT/DIV	100 MILLIVOLTS/DIV	1 VOLT/DIV	100 MILLIVOLTS/DIV	1 VOLT/DIV	100 MILLIVOLTS/DIV		1 VOLT/DIV	1 VOLT/DIV		10 VOLTS/DIV	1 VOLT/DIV
PEAK-TO-PEAK VOLTAGE		.6 V P-P	0.3 V P-P	2.1 V P-P	0.4 V P-P	2.5 V P-P	0.24 V P-P		3.1 V P-P	1.8 V P-P		26 V P-P	5 V P-P
NOISE WAVE FORM													
STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1 KHz WITH 3.3 KHz DEVIATION)													

TROUBLESHOOTING PROCEDURE

132—174 MHz RECEIVER
TYPE ER-52-A

END OF DOCUMENT