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GE COMMUNICATIONS

MAINTENANCE MANUAL

LBI-3546B

25-50 MC

Porta • Mobil

Two-Way FM Radio

GENERAL ELECTRIC

COMMUNICATION PRODUCTS DEPARTMENT
LYNCHBURG, VIRGINIA

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SPECIFICATIONS *

GENERAL

FREQUENCY RANGE	25-50 MC
SIZE (H x W x D)	9-1/8" x 11" x 3-5/8"
WEIGHT (with batteries)	16 pounds
OPERABLE TEMPERATURE RANGE	-30°C (-22°F) to +70°C (+158°F)
BATTERY LIFE	Rechargeable Battery: (Nickel-Cadmium) One 8-hour day Dry Battery: (Alkaline "D" Cells) Five 8-hour days

TRANSMITTER

MINIMUM RF POWER OUTPUT (13.6 VDC Supply) (Dry Battery Supply)	15 Watts (25-42 MC) 12 Watts (42-50 MC) 10 Watts (25-50 MC)
CRYSTAL MULTIPLICATION	8
SPURIOUS & HARMONICS	-53 db
FREQUENCY STABILITY	±.002% (-30°C to +70°C)
MODULATION	±5 KC
AUDIO RESPONSE	Within +1 db and -3 db of a 6 db/octave pre-emphasis from 300 to 3000 cps (1000 cps reference) per EIA standards
AUDIO DISTORTION	Less than 10%
DUTY CYCLE	20% (10% for portable battery life)
MAXIMUM FREQUENCY SEPARATION	0.4%

RECEIVER

SENSITIVITY	
12 db SINAD	0.25 µv
20 db Quieting	0.35 µv
SELECTIVITY (EIA)	-60 db
SPURIOUS RESPONSE	-75 db
MODULATION ACCEPTANCE	±6 KC (Minimum)
INTERMODULATION (EIA)	-55 db
AUDIO CHARACTERISTICS	Within +2 and -8 db of a 6 db/octave de-emphasis curve from 300 to 3000 cps (1000 cps reference) per EIA standards
FREQUENCY STABILITY (First Oscillator)	±.002%
AUDIO OUTPUTS	1.5 watt with less than 10% distortion 10 watts with less than 10% distortion (with optional 10 Watt Amplifier) 3 milliwatts with handset (EC-60-A only)

SPECIFICATIONS * (CONT'D)

AUDIO OUTPUT ACROSS 3.2 OHMS	
Full Rated Power	1.8 volts
1/4 Rated Power	0.9 volts
SQUELCH SENSITIVITY	0.2 μv minimum 2 x SINAD (1.0 μv maximum)
MAXIMUM FREQUENCY SEPARATION	0.5%

POWER SUPPLIES

INPUTS (TYPICAL)

POWER SUPPLY MODEL	VOLTAGE SOURCE	BATTERY DRAIN (AMPS)		
		Rx Standby	Rx Full Audio	Transmit
4EP42A10	Self contained Dry Battery (19B209193-P1)	0.03	0.30	1.2 (at 22.0 VDC)
4EP44A10, A11	Self contained Nickel-Cadmium Battery (19B209138-P3)	0.03	0.30	3.8 (at 12.5 VDC)
4EP47A10*	±13.8 VDC	0.40	0.65	4.5
4EP47A11	-13.8 VDC	0.03	0.30	4.5
4EP48A10	±6.6 VDC	1.0	2.1	13.4 (at 6.5 VDC)
4EP52A10	±36.0 VDC ±24.0 VDC	0.26 0.35	0.44 0.60	2.1 2.9

* If 4EP47A10 is used in negative ground systems, the battery drain is identical to the 4EP47A11.

OUTPUTS (TYPICAL)

POWER SUPPLY MODEL	POWER OUTPUT		
	Rx Standby	Rx Full Audio	Transmit
4EP42A10	0.03 a	0.30 a	1.2 a (at 22.0 VDC)
4EP44A10, A11	0.03 a	0.30 a	24.0 v @ 0.33 a 32.0 v @ 0.80 a
4EP47A10, A11	13.8 v @ 0.03 a	13.8 v @ 0.30 a	24.0 v @ 0.50 a 32.0 v @ 1.0 a
4EP48A10	13.8 v @ 0.03 a	13.8 v @ 0.30 a	24.0 v @ 0.33 a 32.0 v @ 0.80 a
4EP52A10 (±36 VDC input)	14.0 v @ 0.067 a	13.7 v @ 0.35 a	24.0 v @ 0.5 a 32.5 v @ 0.97 a
(±24 VDC input)	14.0 v @ 0.067 a	13.6 v @ 0.34 a	23.8 v @ 0.49 a 32.2 v @ 0.97 a

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

DESCRIPTION

General Electric PORTA-MOBIL Two-Way FM Radios are high performance, fully transistorized transmitter-receiver combinations providing complete two-way communications for portable, mobile and industrial use.

The PORTA-MOBIL is easily hand-carried by the retractable handle, or it can be carried by means of a shoulder strap -- leaving the hands free. An optional protective leather case and back pack are also available.

The PORTA-MOBIL can be mounted in an optional vehicular mounting bracket for use as a mobile unit. The mounting bracket is designed so that the radio can be quickly and easily removed from the vehicle and used as a portable.

The PORTA-MOBIL with Extended Local Control provides a separate weatherproof control unit for mounting in any location convenient to the operator. The control unit contains all operating controls, speaker, microphone and power connections. The control unit is connected to the transmitter-receiver by a 10- or 20-foot cable.

The PORTA-MOBIL is housed in a compact, weatherproof three-section aluminum case that can be quickly disassembled for servicing. All tuning adjustments are easily accessible, and the transmitter and receiver have centralized metering jacks for ease of servicing. For added reliability and reduced maintenance, silicon transistors are utilized throughout the transmitter and receiver.

OPERATION

PUSH-TO-TALK SWITCH

Depressing the push-to-talk button on the microphone removes the battery voltage from the receiver, applies power to the transmitter, and switches the antenna to the transmitter output. Releasing the push-to-talk button makes the receiver operative again.

WARNING

The antenna provided with the PORTA-MOBIL is fully insulated for the protection of the operator. Touching an uninsulated antenna while the transmitter is keyed may result in an electrical shock or RF burn.

VOLUME AND SQUELCH

The VOLUME and SQUELCH controls must be adjusted at the start of operations. The VOLUME control raises or lowers the level of sound heard from the loudspeaker. The SQUELCH control adjusts the signal level required to unmute the receiver.

AUDIO OUTPUT SWITCH (EC-60-A)

An Audio Output Switch (S702) mounted on the system frame permits the audio output level to be set for either one-watt output (HI) for noisy locations, or for 100-milliwatt output (LO) in quieter locations. Operating with the switch in the LO position reduces the battery drain and increases battery life.

MAINTENANCE

PREVENTIVE MAINTENANCE

To insure high operating efficiency and to prevent mechanical and electrical failures from interrupting system operations, routine checks should be made of all mechanical and electrical parts at regular intervals. This preventive maintenance should include the maintenance checks listed below.

MAINTENANCE CHECK	INTERVAL	
	1 Month	As Required
DRY BATTERY SUPPLY - In low usage applications where the dry batteries may last for several months, the batteries should be checked periodically to see if they are leaking electrolyte. If the unit is to be stored for over thirty days, the dry batteries should be removed from the power supply and stored separately in a cool, dry place.	X	
RECHARGEABLE BATTERY SUPPLY - If the rechargeable battery is to be stored for several months or more, the battery should be completely discharged and then fully recharged at regular intervals.	X	
MECHANICAL INSPECTION - Whenever the unit is used in a mobile application, it is subject to constant shock and vibration. Check the unit for loose plugs, nuts, screws and parts to make sure that nothing is working loose.	X	
RELAY CONTACTS - Remove the plug-in relay and examine the contacts. If the contacts are burned or pitted, replace with new relay.		X
ANTENNA - Check to see that the antenna is screwed in tightly. If the antenna should work loose, a loss of radiation or an intermittent signal may result.		X
FREQUENCY CHECK - Check transmitter frequency and deviation as required by FCC. Normally, these checks are made when the unit is first put into operation, after the first six months, and once a year thereafter.		X

TEST PROCEDURES

Whenever difficult servicing problems occur (such as when the receiver is operating -- but not operating properly), the serviceman should refer to the Test Procedures for the transmitter or receiver. These tests enable the serviceman to compare the actual performance of the transmitter or receiver against the specifications the unit met when shipped from the factory. When the unit is not operating properly, the tests help the serviceman to quickly isolate the defective stage.

Transmitter tests include the following checks:

- Power output
- Tone deviation (for Channel Guard Units)
- Voice deviation

Receiver tests include the following checks:

- Audio output
- 12-db SINAD (sensitivity)
- Modulation acceptance (IF bandwidth)

Test procedures for the transmitter and for the receiver are located on the back of the applicable Alignment Procedure. For best results, the test procedures should be used in conjunction with the Troubleshooting Procedures as explained in the following section.

TROUBLESHOOTING PROCEDURES

Some of the problems that may be encountered in servicing can be cleared up by means of a close visual inspection for loose connections, and loose or burned components. However, when more difficult problems arise, the serviceman should follow the procedures outlined in this section and shown on the applicable drawings in the TROUBLESHOOTING section.

Transmitter

The Transmitter Troubleshooting Diagram contains three steps for servicing the transmitter. Step 1 lists some "Quick Checks" for symptoms of poor performance, and the suggested corrective action. Step 2 provides typical and minimum voltage readings of the centralized metering jack as well as DC readings at other stages. Step 3 shows AC voltage readings for the audio stages.

After the defective stage has been isolated, the Transmitter Service Sheet can be used to isolate the defective component.

NOTE

If it is ever necessary to remove or replace the 2nd driver transistor (Q6), note that the transistor case is at collector potential and the output is coupled by a connection from the heat sink to a tap on a collector tank coil L13/L17/L18 (See Transmitter Service Sheet). To insure a good RF connection, as well as proper heatsinking, it is necessary to tighten the screws on the heatsink as securely as possible without damaging the screws.

Receiver

Receiver Troubleshooting Diagram contains four steps for servicing the receiver. Step 1 lists some "Quick Checks" for symptoms indicating poor receiver performance, and the suggested corrective action. Step 2A provides one of the most useful service aids for the receiver, the simplified gain-per-stage measurements. Step 2B shows the proper waveforms for the audio and squelch stages. Step 3 provides the gain-per-stage measurements.

Refer to the Receiver Service Sheet to find the defective component after the defective stage has been isolated.

Power Supplies

The first step in servicing the vehicular or rechargeable power supply is to check the fuses. Then refer to the proper Power Supply Troubleshooting Diagram for a list of "Quick Checks" for symptoms indicating poor performance, and the suggested corrective action. It also shows the procedure for measuring the battery voltage under transmit conditions. To check individual components, refer to the Service Sheet for Power Supply.

In the dry battery supply, check the fuses and inspect the relay.

For the Model 4EP52A10 Industrial Power Supply, check fuses, then refer to the "Quick Checks" on the Service Sheet.

CIRCUIT ANALYSIS

TRANSMITTER

General Electric PORTA-MOBIL FM Transmitter Type ET-61-A is a crystal-controlled, frequency-modulated transmitter designed for one- or two-frequency operation within the 25-50 megahertz band. The transmitter consists of the following modules:

- Exciter Board - Audio, oscillator, modulator, multiplier and driver stages (on printed wiring board)
- PA Assembly - Power amplifier and low-pass filter

The range and number of frequencies for each transmitter model is shown in the following chart.

FREQUENCY RANGE	MODEL NUMBER	
	SINGLE-FREQUENCY	TWO-FREQUENCY
Without Channel Guard:		
25-33 MHz	4ET61A10	4ET61A11
33-42 MHz	4ET61A12	4ET61A13
42-50 MHz	4ET61A14	4ET61A15
With Channel Guard:		
25-33 MHz	4ET61A16	4ET61A17
33-42 MHz	4ET61A18	4ET61A19
42-50 MHz	4ET61A20	4ET61A21

The transmitter uses a total of 12 transistors and 6 diodes to provide a minimum power output of 15 watts (25-42 MHz) and 12 watts (42-50 MHz) when used with the high power rechargeable battery supply or vehicular power supplies. A power output of 10 watts is obtained with the dry battery supply. The crystals used fall in a range of 3.125 to 6.25 megahertz, and the crystal frequency is multiplied 8 times.

Centralized metering jack J11 is provided for use with General Electric Test Set Model 4EX3A10, for ease of alignment and maintenance. The Test Set meters the phase modulator, multiplier, driver and PA stages as well as RF power output, B-plus and regulated supply voltages.

POWER INPUTS

The high power rechargeable power supply and the vehicular power supplies provide 24 volts for the doubler, multiplier and driver stages, and 32 volts for the PA stage. The medium power dry battery supply provides 24 volts to the transmitter and PA stage.

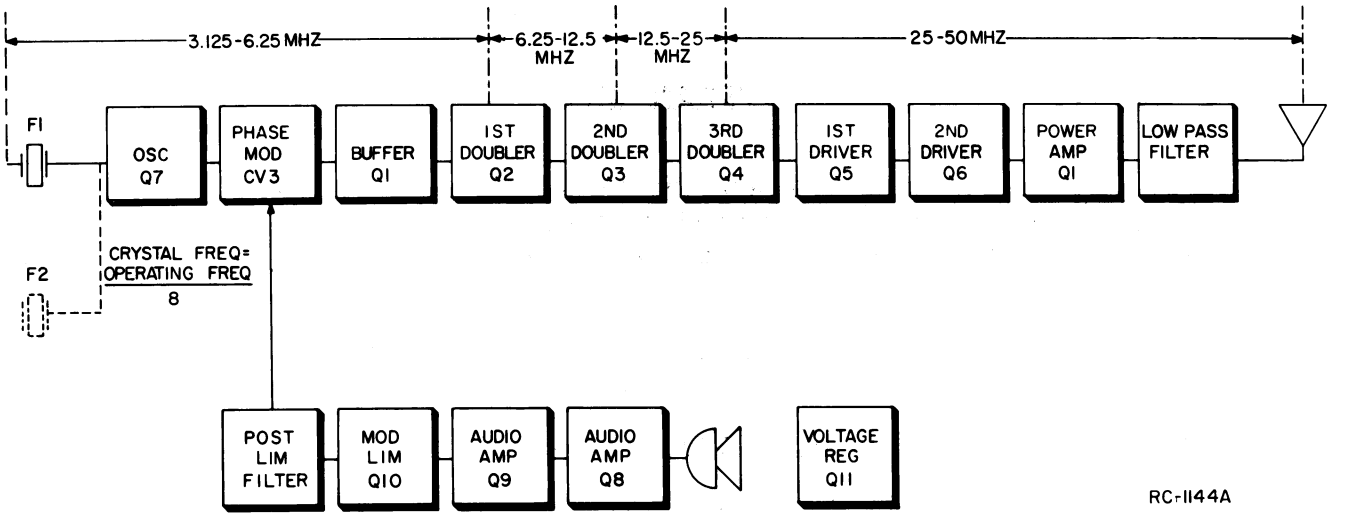


Figure 1 - Transmitter Block Diagram

A regulated 13.5 volts is used for the oscillator, modulator and audio stages.

VOLTAGE REGULATOR

A shunt-type voltage regulator circuit, consisting of regulator transistor Q11, Zener diode CR3 and light bulb RT5, maintains a regulated 13.5-volt supply. The diode establishes a 13.5-volt reference level for the base of Q11. When the voltage starts to rise above this level, the base bias on Q11 increases, causing the transistor to conduct more heavily. This draws more current through the light bulb. With more current flowing, less voltage appears at the output. This keeps the output voltage from going beyond the 13.5-volt reference level.

When the voltage starts to drop below 13-5 volts, the base bias on Q11 decreases, and Q11 conducts less. With less current flowing in the circuit, the voltage increases. This keeps the output voltage at 13.5 volts.

R55 is a metering resistor for centralized metering jack J11.

OSCILLATOR

A crystal-controlled series-tuned Colpitts type oscillator is used in the transmitter. The oscillator provides a frequency stability of .002% without crystal ovens or warmers. Feedback for the oscillator is developed across C8/C9. The oscillator frequency is adjusted by trimmer C5. In the single-frequency transmitter, the regulated 13.5 volts is applied to the oscillator circuit (through J1) only while the transmitter is being keyed. The oscillator output is coupled through impedance step-down capacitors C10/C11 and C12/C13 to phase modulator CV2.

In the two-frequency transmitter, a second oscillator circuit identical to the Frequency 1 oscillator is added except that R7 is replaced by diode CR2, and only a single oscillator transistor is used. For two-frequency operation, the crystals are switched by means of diode biasing.

AUDIO AMPLIFIERS AND LIMITER

The audio section of the transmitter consists of DC-coupled feedback amplifiers Q8, Q9 and Q10. Q10 also acts as a limiter at high audio input levels. Audio from the microphone is fed through an input network (C71, C72, R44 and R45) to the audio stages. The input network, in conjunction with the feedback circuit (a 2.7-megohm resistor in printed circuit board Z1) provides the audio gain and a 6-db/octave pre-emphasis. This circuit design provides a distortion free audio signal when the signal level is below limiting.

NOTE

The audio section of the transmitter is designed to provide a very high average modulation. Therefore, an operator who is an exceptionally loud talker may cause noticeable distortion. In a strong signal area, it may be desirable to reduce speech clipping by increasing the value of R44 to 22,000 ohms.

The output of limiter Q10 is fed to printed circuit board Z2 which provides a 6-db/octave de-emphasis. MODULATION ADJUST potentiometer R48 determines the maximum signal level applied to modulator CV2.

PHASE MODULATOR

Phase modulator CV2 is a voltage-variable capacitor (varactor) operating in series with tuneable coil L1/L2/L3. The modulator operates with a reverse bias of 6.5-volts. CV2 in series with L1 appears as a series-resonant circuit to the RF output of the oscillator. An audio signal applied to the modulator shifts the capacitance of CV2 about the 6.5-volt level. This variation in capacitance causes the output of the circuit to be frequency modulated. The modulator output is coupled through blocking capacitor C18 to the base of buffer Q1.

BUFFERS AND DOUBLERS

Buffer Q1 isolates the modulator from the loading effects of the first doubler and provides some amplification. The buffer also clips off any AM appearing in the modulator output. The buffer output is resistance-coupled to the doubler.

Following the buffer stage are three self-biased, Class C doubler stages (Q2, Q3 and Q4). The doublers multiply the crystal frequency eight times. Voltage-dropping resistors R56, R51 and R52 are for metering the multiplier stages at J11.

DRIVERS

Drivers Q5 and Q6 provide the necessary drive for the power amplifier. DRIVE ADJUST control R39 varies the current through Q5, and is used to set the output of the drivers. The collector tank of Q6 is tuned by C70.

POWER AMPLIFIER ASSEMBLY

The 2nd driver output is link-coupled to the base of power amplifier Q1, located on the PA assembly. Q1 operates as a common-emitter, grounded-collector amplifier. The PA input is tuned to resonance by C1. C6 is the PA output tuning control. PA drive is metered at J11.

RF from the PA is coupled through a low-pass filter consisting of C10/C11/C12, L7/L8/L9, L10/L11/L12, C13/C14/C15 and C16/C17/C18. An RF "sniffer" circuit (CR1 and R2) detects a small portion of the PA output so that the relative power output can be metered at J11. The RF output of the transmitter is fed to the push-to-talk relay in the control unit, and then to the antenna.

RECEIVER

The PORTA-MOBIL Receiver Type ER-43-A is a double-conversion, super-heterodyne receiver designed for use with the General Electric PORTA-MOBIL Two-Way FM Combinations. The receiver operates on fixed frequencies within the 25-50 megahertz band.

The receiver consists of Receiver Board PL-19D402429-G1 and the 1st oscillator board. The frequency ranges and number of frequencies for the receiver and 1st oscillator are shown in the following chart.

RECEIVER MODEL NO.	RECEIVER BOARD	1ST OSCILLATOR BOARD	FREQUENCY RANGE	NUMBER OF FREQUENCIES
4ER43A10	19D402429-G1	4EG19A10	25-33 MHz	One-Frequency
4ER43A11	19D402429-G1	4EG19A11	25-33 MHz	Two-Frequency
4ER43A12	19D402429-G2	4EG19A10	33-42 MHz	One-Frequency
4ER43A13	19D402429-G2	4EG19A11	33-42 MHz	Two-Frequency
4ER43A14	19D402429-G3	4EG19A10	42-50 MHz	One Frequency
4ER43A15	19D402429-G3	4EG19A11	42-50 MHz	Two-Frequency

The audio PA stage and loudspeaker are located in the control unit. The unit is completely transistorized -- utilizing 17 silicon transistors and four diodes. An additional silicon transistor is added for two-frequency operation.

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

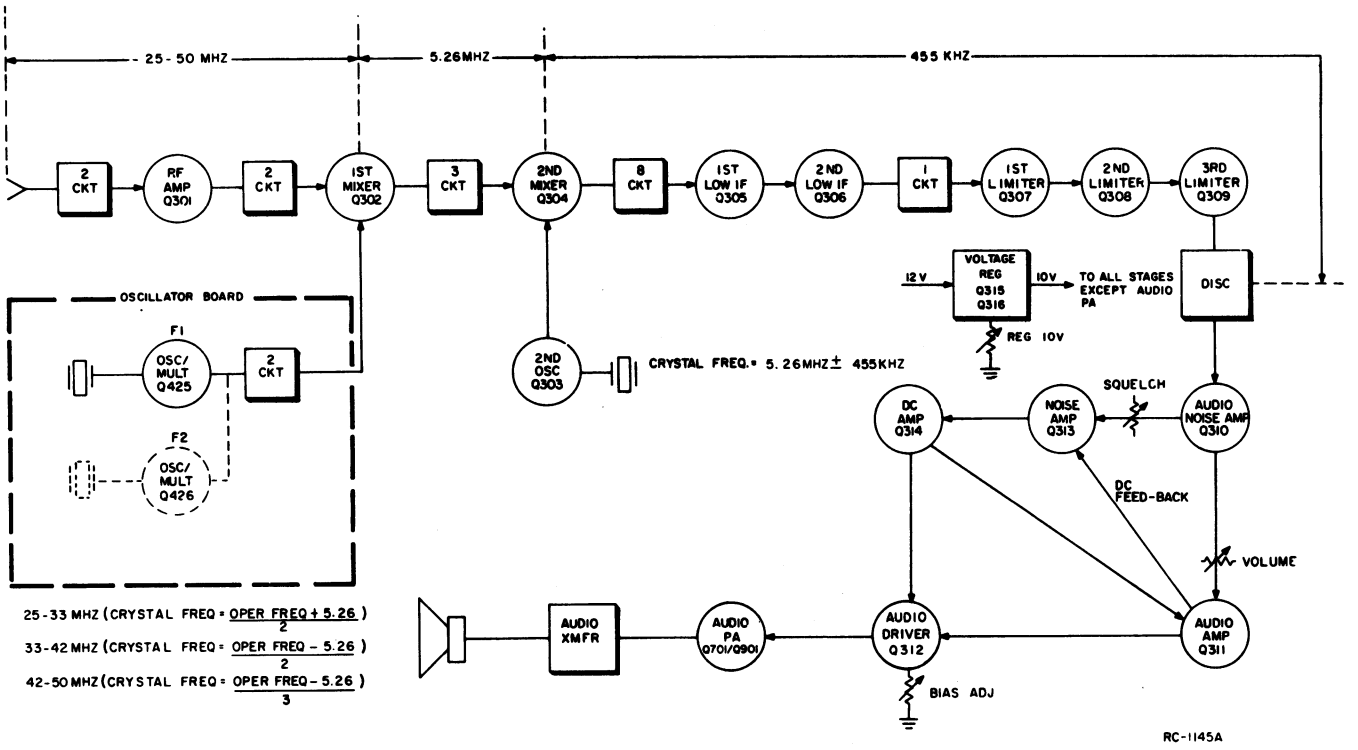


Figure 2 - Receiver Block Diagram

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 tries 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 base less 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.

R373, (10-volt REGULATOR adjustment) 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 through the PTT relay to the base of low noise RF amplifier Q301 through two tuned pre-selector circuits. The output of the RF amplifier is capacity coupled through two tuned circuits to the base of the 1st mixer.

OSCILLATOR/MULTIPLIER

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.

For two-frequency operation, a second oscillator/multiplier stage (Q426) is added. Channels are selected by grounding the emitter of the desired oscillator by means of a two-frequency switch on the control unit.

1ST MIXER

RF signals from the RF amplifier are fed to the base of 1st mixer Q302 along with the oscillator injection frequency. The 5.26 megahertz Hi IF mixer output is fed to a three-coil torroidal Hi IF filter and then fed to the base of 2nd mixer Q303.

2ND OSCILLATOR AND MIXER

Q303 operates as a Pierce oscillator with a crystal frequency of 5.26 MHz ±.455 megahertz.

Hi IF from the 1st mixer is applied to the base of 2nd mixer Q303. This Hi IF is mixed with the 2nd oscillator low (or high side) injection frequency which produces the 455 kilohertz low IF. The main receiver selectivity is provided by the eight-coil Low IF filter following the 2nd mixer.

LO IF AMPLIFIERS

Two RC-coupled Low 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 C359) 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 low IF filter, made up of C375, C376, C377, R343 and R346, removes any 455-kHz signal remaining in the discriminator output.

AUDIO AMPLIFIERS

When the 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 consisting of C379, C380, C381, R348, R350 and R351.

After the de-emphasis network, audio is fed to the base of audio amplifier Q311 through the volume control mounted on the control unit. The VOLUME control sets the amount of drive to the audio stages. An audio driver (Q312) and an audio output stage (Q701 in the EC-60-A control unit or Q901 in the transmitter-receiver top cover when the EC-66-A control unit is used) follow audio amplifier Q311. Audio Bias trimmer R367 sets the bias on Q312 and Q701/Q901, and is adjusted for a 250-millivolt reading at metering jack J312. The output of Q701/Q901 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 filter consists of C388, C389, C396 and L319. 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, and filtered by C393 and C394 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 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 R352 which helps reduce the gain of noise amplifier Q313. The positive feedback causes a quick, positive switching action in the squelch circuit.

POWER SUPPLIES

Two battery, one industrial, and three vehicular power supplies are available for use with PORTA-MOBIL and are interchangeable if proper power cables are used.

The high power rechargeable battery supply Models 4EP44A10, A11 and the medium power dry battery supply Model 4EP42A10 fit into drawn aluminum cans that attach to the bottom of the portable case.

The vehicular power supply models 4EP47A10 (12-volt, ± ground), 4EP47A11 (12-volt, - ground only) 4EP48A10 (6-volt, ± ground) and industrial power supply Model 4EP52A10 (24/36 volt ± ground) fit into an aluminum casting that serves as a heat sink for the power transistors. The casting attaches to the bottom of the case. Power connections are made by a two-wire cable terminated at one end by a three-pin connector which plugs into the power supply. (For Extended Local Control, the power source is connected to the red and brown wires extending out of the control cable when used with 6/12 volt power supplies). The other end of the cable is terminated by ring terminal lugs which connect to the power source.

To obtain optimum power output-to-battery life when changing to the dry battery, the transmitter should be retuned each time power supplies are interchanged.

All power connections to the transmitter and receiver are made through a jack on the power supply case that connects to a plug on the transmitter-receiver section.

MULTIVIBRATOR CIRCUITS (ALL MODELS EXCEPT DRY BATTERY AND INDUSTRIAL)

The receiver operates on 12 volts directly from BT501. Keying the transmitter switches the receiver supply to the multivibrator circuit through RF choke L501.

Two transistors are used in the inductively-coupled multivibrator circuit. The transistors act as switches, with one conducting while the other is off. The multivibrator circuit is essentially a square wave generator, whose output is stepped up by a power transformer, then rectified and filtered to provide two supply voltages for the transmitter; 24 volts for the multiplier and driver stages and 32 volts for the PA stages.

The base bias divider network consists of an incandescent lamp and a resistor. When power is applied to the circuit, the cold filament of DS501 presents a very low resistance. This establishes a heavy forward bias for cold starting. Immediately upon starting, the lamp filament warms up and increases in resistance to provide normal running bias for the transistors. Due to inherent differences in the transistors, one will start conducting before the other and will draw a heavier current through one-half of the primary windings of T501.

Assume that Q501 starts to conduct first, causing a current to flow through one-half of the primary winding. This current flow induces a voltage in all windings of the transformer. A negative voltage is induced in the feedback winding, providing more forward bias to Q501, and causing it to conduct more heavily. The positive voltage appearing at one end of the feedback winding acts to cut off Q502.

The current through the primary winding rapidly saturates the core of the transformer, which stops the magnetic field (flux) from increasing. With no change in the magnetic field, no voltages are induced in the windings. The magnetic field starts to collapse, sending a current through transformer in the opposite direction. This reverses the polarity of the induced voltage in the windings, which cuts off Q501 and provides a

forward bias to Q502, causing it to conduct. The frequency of the multivibrator is approximately 5,000 cycles per second.

BATTERY SUPPLIES

RECHARGEABLE BATTERY SUPPLY

Rechargeable Power Supply Models 4EP44A10 and 11 employ a 12-volt nickel-cadmium battery in conjunction with a multivibrator circuit to supply all voltages for the portable. The power supply will operate the portable unit for one 8-hour day at the rated duty cycle and should be recharged for 16 hours after each day's operation. The battery is considered to be discharged when the battery voltage measures 10 volts with the transmitter keyed.

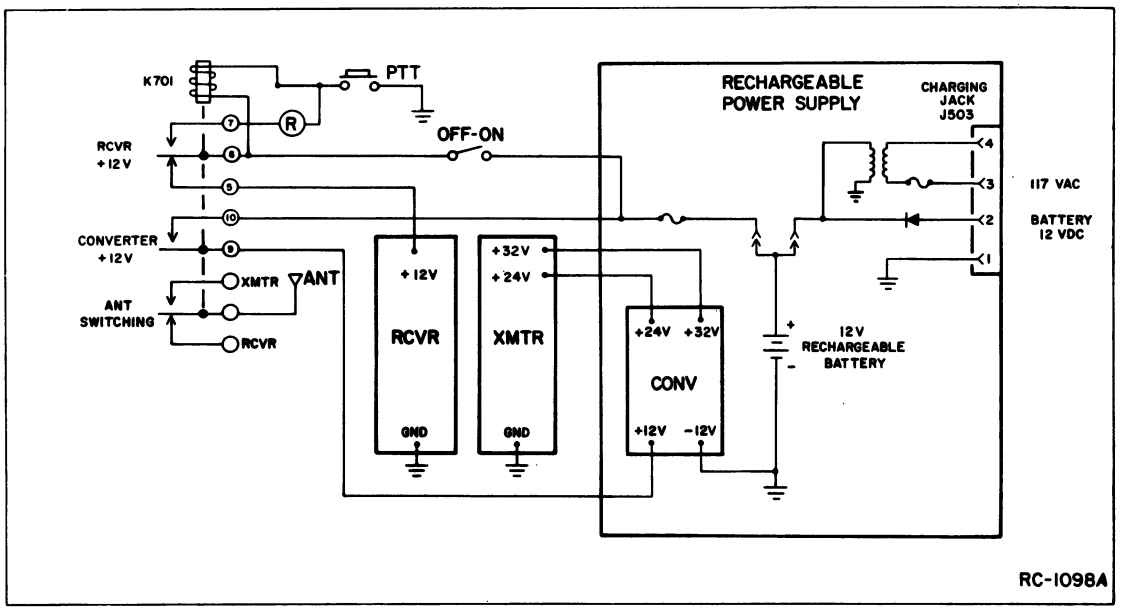


Figure 3 - Antenna Switching and Power Distribution for Rechargeable Battery Supply

CHARGING CIRCUITS

The power supply contains two charging circuits for recharging the nickel-cadmium batteries. One charging circuit operates from a 50/60 Hz, 117-volt AC source; the other from a 12-volt DC vehicular source. The 117-volt charging circuit will recharge the batteries in 16 hours. The 12-volt charging circuit will help maintain the battery charge under average operating conditions, but will not completely recharge the battery. Connections to the charging circuits are made through a recessed five-pin plug (J503) on one end of the power supply case.

117-Volt AC Charger

When the AC charging cable is properly connected, 117 volts is applied across pins 3 and 4 of charging jack J503. This voltage is dropped to approximately 80 volts through a capacitor in series with the black lead in the charging cable, and then fed to step-down transformer T502. The AC voltage developed across the secondary of T502 is rectified by a full-wave, bridge rectifier (CR507 through CR510). The rectified output is coupled to battery BT501 through resistor R504. A five-amp fuse (F502) protects the battery against a short circuit in the unit. A 1/4-amp fuse (F501) protects the transformer primary.

12-Volt DC Charger

The 12-volt DC charger will operate from a negative ground vehicle system only. When the optional DC-charging cable is used, the vehicle battery voltage appears across pin 1 (GND) and pin 2 (HOT) of charging jack J503. The voltage from pin 2 is fed through diode CR511 and then through current limiting resistors R503 and R504 to rechargeable battery BT501. CR511 prevents BT501 from discharging into the vehicle battery and also protects BT501 in the charger is inadvertently connected to a positive ground system.

DRY BATTERY SUPPLY

Dry Battery Power Supply Model 4EP42A10 uses sixteen 1-1/2 volt "D" cells to provide transmitter and receiver supply voltages.

The dry batteries in the power supply are arranged into four sections that are connected to form two 12-volt banks. The first 12-volt bank consists of batteries BT501 through BT508, while the second bank consists of BT509 through TB516. The two banks operate in parallel to provide the 12-volt receiver supply.

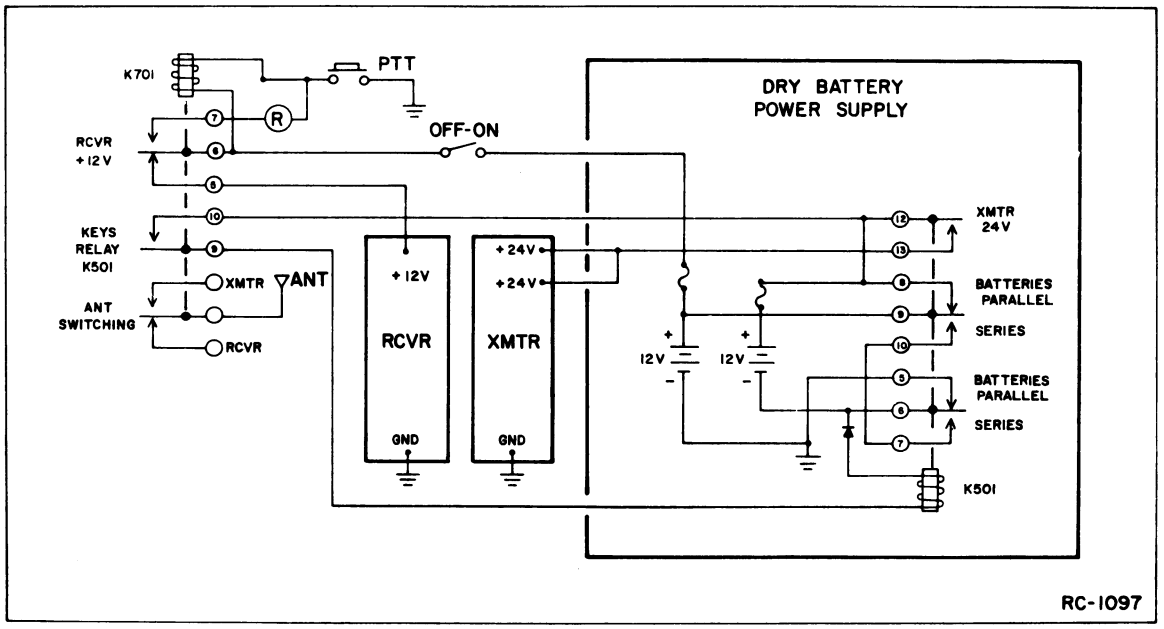


Figure 4 - Antenna Switching and Power Distribution for Dry Battery Supply

Keying the transmitter energizes battery switching relay K501, which connects the two battery banks in series for the 24-volt transmitter and PA supply. When the microphone button is released, the batteries switch back to parallel operation for the receiver supply.

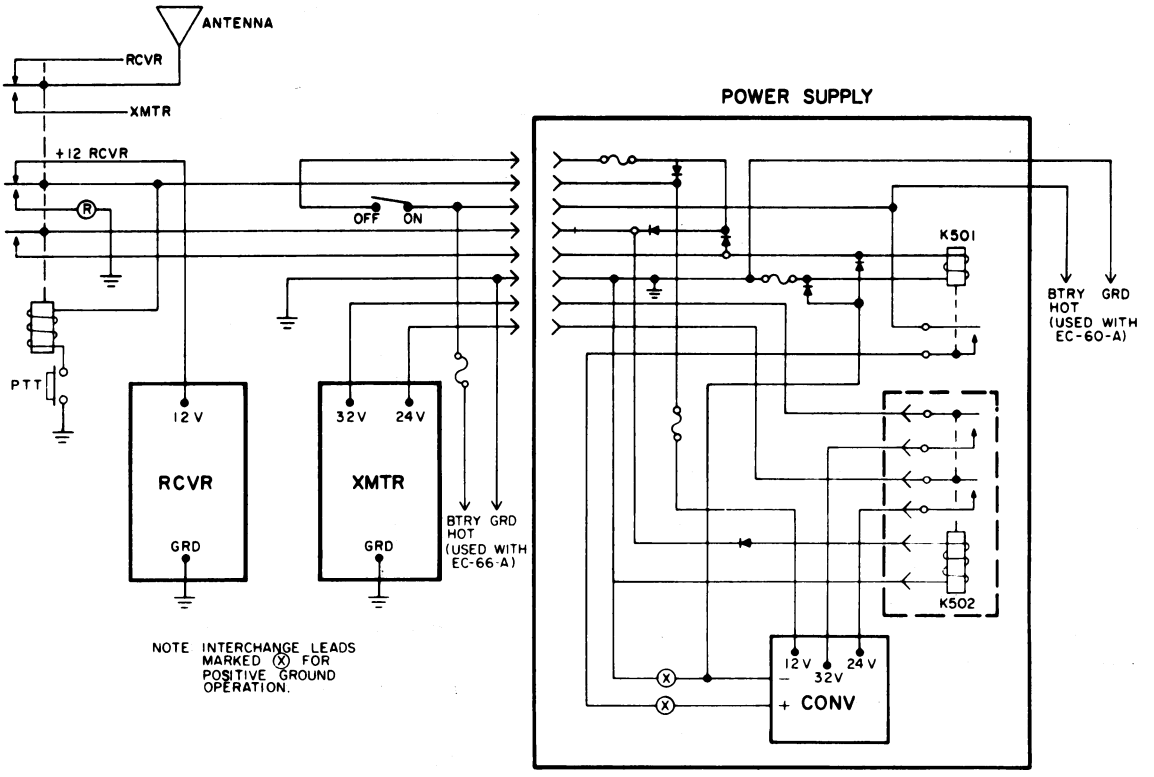
Diode CR501 prevents the transmitter from keying if the batteries are inserted into the power supply incorrectly (polarity reversed). Figure 4 is the antenna switching and power distribution diagram for the dry battery supply.

VEHICULAR POWER SUPPLIES

MODEL 4EP47A10 (12-VOLT, ± GROUND)

For positive ground operation, the pilot relay (K501) is controlled by the ON/OFF switch on the Control Unit and the power supply runs continuously to supply receiver voltage. The PTT (Push-To-Talk) controlled relay in the Control Unit keys a secondary relay (K503) to provide transmitter voltage.

For negative ground operation, the secondary relay is made non-operative and the pilot relay is keyed by the PTT-controlled relay in the Control Unit. Receiver voltage is supplied directly from the vehicle battery.

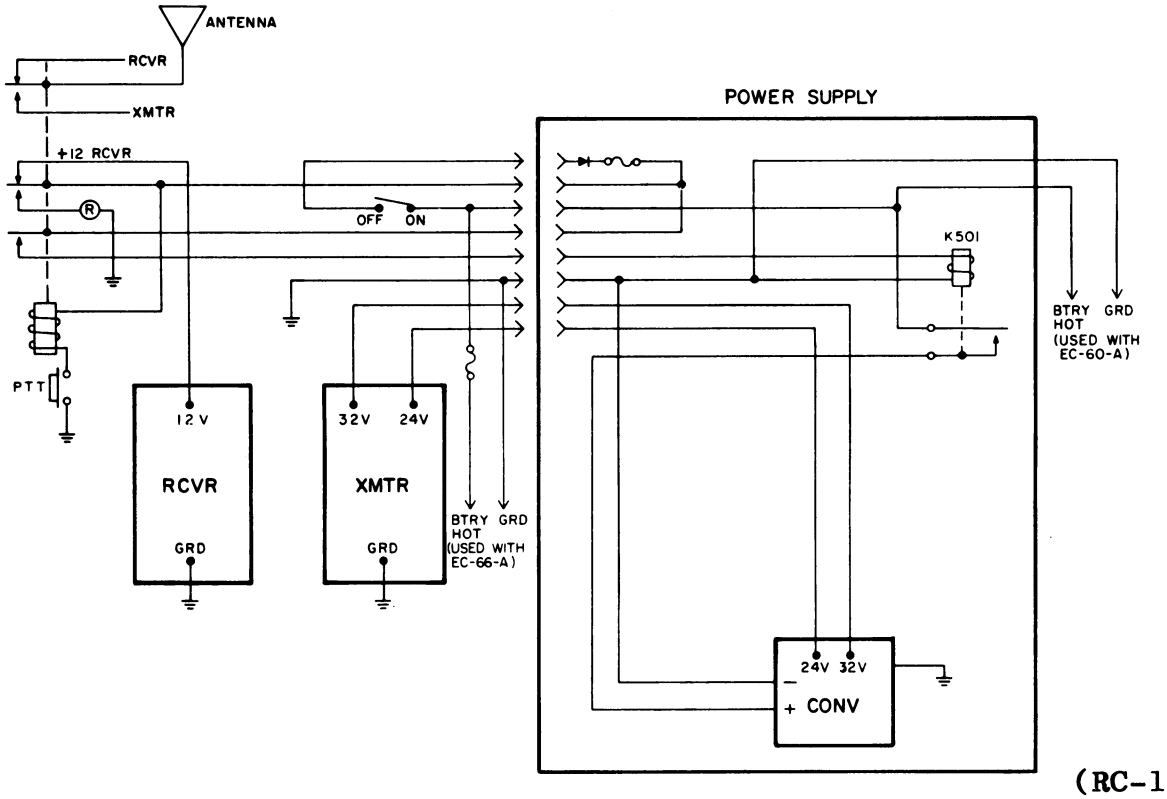


(RC-1224A)

Figure 5 - Antenna Switching and Power Distribution for Model 4EP47A10

MODEL 4EP47A11 (12-VOLT, NEGATIVE GROUND)

This power supply can be used only with negative ground systems. The pilot relay is keyed by the PTT-controlled relay in the Control Unit. Receiver voltage is supplied directly from the vehicle battery.



(RC-1225A)

Figure 6 - Antenna Switching and Power Distribution for Model 4EP47A11

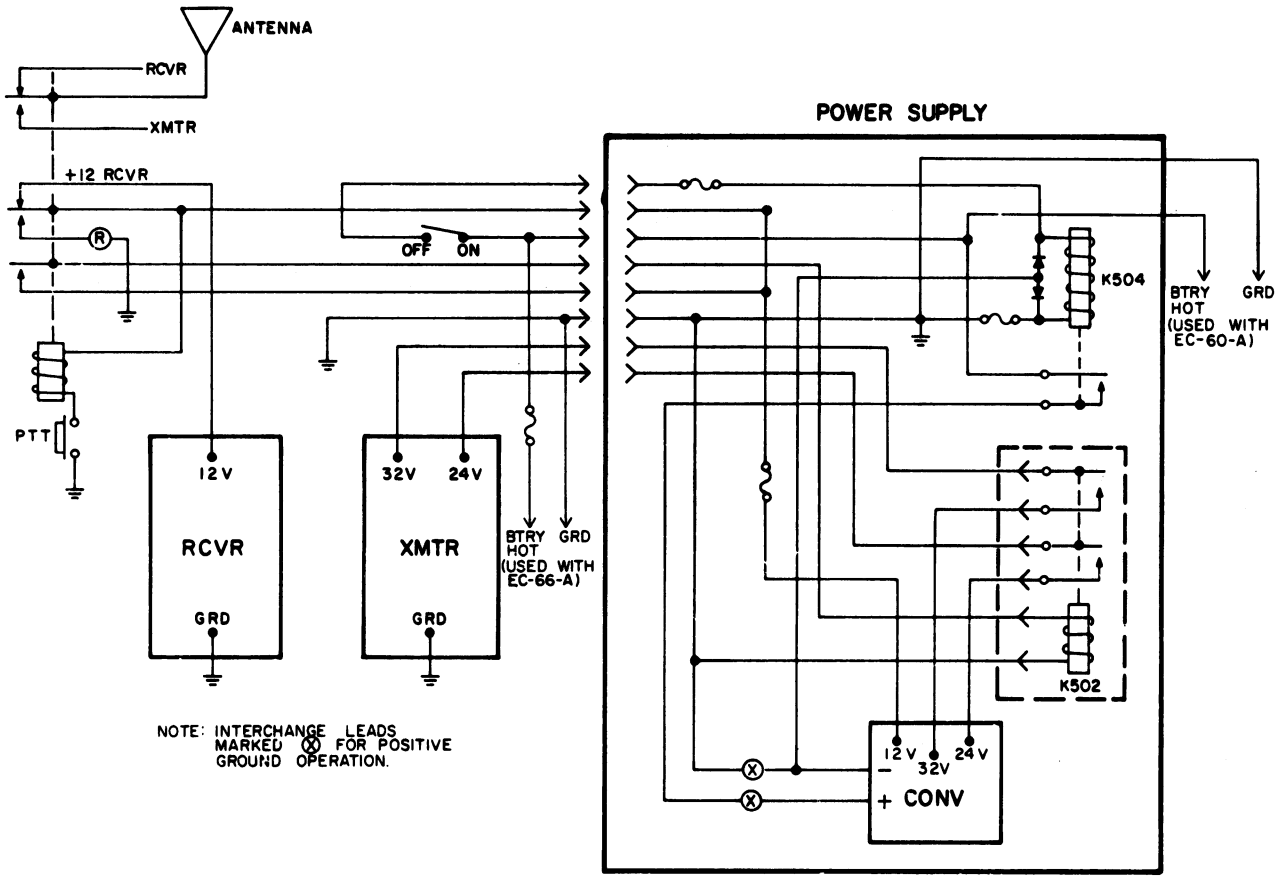
MODEL 4EP48A10 (6-VOLT, ± GROUND)

The pilot relay (K504) is controlled by the ON/OFF switch on the Control Unit for either positive ground or negative ground systems. With the switch ON, the power supply runs continuously as it supplies receiver voltage.

NOTE

Power Supply Models 4EP47A10 and 4EP48A10 are shipped from the factory wired for negative ground vehicle systems. For positive ground systems, make sure that the changes shown on the top cover of the power supply have been made. These changes include:

- For Model 4EP47A10 — Switch S501 to the POSITIVE GROUND position, and reverse the red and green leads at TB6.
- For Model 4EP48A10 — Reverse the red and green leads at TB6.
- For Optional 10-Watt Audio Amplifier 19B205165-G1 — Reverse one pair of black-white and red-white leads at TB2-3 and -4.



(RC-1223A)

Figure 7 - Antenna Switching and Power Distribution for Model 4EP48A10

REGULATOR CIRCUIT

The power supply output is regulated by controlling feedback to the switching transistors. Q503 is controlled by the rectified output from control winding S2, F2 and diode CR501/CR515. The ratio of winding S2, T2, F2 to winding S3, T3, F3 is adjusted to furnish just sufficient breakdown voltage for CR501/CR515 at a minimum input voltage and maximum expected load on the secondary windings. Q503 bias will be moving toward cutoff for all higher input voltages.

When input voltage increases, the voltage appearing across R504 increases, increasing the current through CR501/CR515 and driving Q503 further into cutoff. This results in a decrease in base current to Q501 and Q502 and the excess voltage is dropped across these transistors. The same action occurs if the load on the secondary windings of T501/T502/T503 is decreased. Therefore, for an increase in input voltage or a decrease in output current, the output voltage will remain constant.

R503 forward biases Q503 for "minimum input voltage - maximum output current" conditions. In Model 4EP48A10, an incandescent lamp, DS502, has been substituted for R503 to increase the range of regulation for high primary currents. Potentiometer R504 can be adjusted to compensate for minor variations in Zener® breakdown voltage and Q503 gain. C504 filters the control voltage.

INDUSTRIAL POWER SUPPLY

MODEL 4EP52A10 (24/36 VOLT ± GROUND)

The 4EP52A10 Power Supply is designed for use with industrial vehicles that have 24, 28 or 36 volt electrical systems. It may be used in vehicles with either positive or negative grounded electrical systems or with ungrounded electrical systems.

The power supply consists of an input filter, voltage regulator, voltage protective network and a DC to DC converter. Outputs of 12, 24 and 32 volts are provided for operating the PORTA-MOBIL transmitter and receiver.

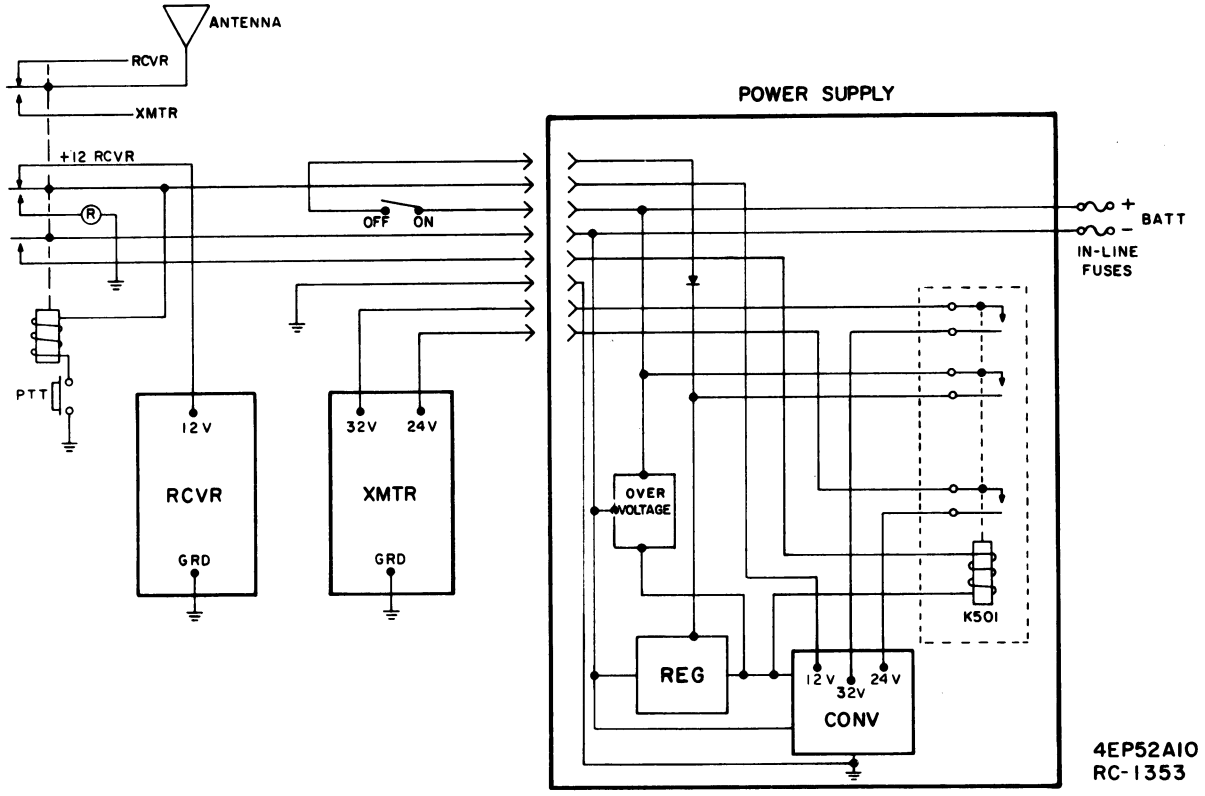


Figure 8 - Antenna Switching and Power Distribution for Model 4EP52A10

Input Filter

An input filter consisting of L501, L502, C501, C502 and C503 attenuate transient voltages which may be present in the vehicle electrical system.

Voltage Regulator

The voltage regulator is a low-loss type which makes use of the principle known as time ratio control (TRC). A simplified diagram to illustrate this principle is shown in Figure 9.

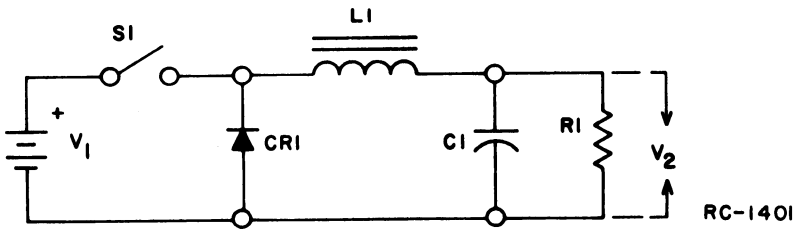


Figure 9 - Simplified TRC Circuit

In this circuit the operation of S1 will cause an output voltage (V_2) to appear across the load. If the switch (S1) is closed indefinitely, the output voltage will equal the input voltage (V_1). If the switch is opened indefinitely, the output voltage will equal zero. The switch must be operated periodically to obtain an output voltage between V_1 and zero. By changing the duty cycle (ON-OFF cycle) of the switch, the output voltage can be closely controlled.

In actual application, S1 is replaced by a transistor switch Q501. Associated timer (relaxation oscillator), driver and error detection circuits automatically regulate the switching rate and ON-OFF duty cycle of Q501 to supply the proper output voltage (approximately 20 volts) to the converter from a wide range of battery voltages.

During power supply operation, relaxation oscillator Q507 supplies a 2500 Hz saw-tooth output to the base of Q502 causing Q502 to conduct. Operation of Q502 causes Q503 to conduct and turn on transistor switch Q501. The period of time that Q502 conducts during each saw-tooth pulse, and the resultant output from the regulator circuit, is determined by error detection circuits of VR501 and Q506 which regulate the base bias of Q502.

When the regulator output voltage increases and the voltage at the tap of R508 exceeds the breakdown voltage of VR501, Q506 will conduct. This decreases the base bias of Q502, causing it to conduct for a shorter period during each saw-tooth pulse. As a result, transistor switch Q501 is on for a shorter portion of each duty cycle and the regulator output will decrease to the desired level.

If the battery voltage drops below the normal setting of the regulator output, VR501 no longer conducts and Q506 is turned off. In this case the bias at the base of Q502 is sufficient to permit Q502 to conduct for the full period of the saw-tooth pulse. This permits transistor switch Q501 to remain on continuously providing maximum output from the regulator.

DC to DC Converter

The regulator output is applied to the emitters of Q504 and Q505 which form a conventional inductively coupled converter with transformer T501. Q504 and Q505 act as switches, with one conducting while the other is off. Due to the inherent differences in the transistors, one will start conducting before the other when power is applied to their emitters.

Assume that Q504 starts to conduct first, causing current to flow through one half of the primary winding of T501. The induced voltage in the feedback winding of T501 is coupled to the base of Q504 further increasing collector current. Regenerative action continues until the primary of T501 is saturated. When saturation is reached, there is no increase of collector current and no voltage is induced in the feedback winding. The magnetic field starts to collapse, sending a current through the transformer in the opposite direction. This reverses the polarity of the induced voltage in the feedback winding which cuts off Q504 and provides a forward bias for Q505 causing it to conduct. The two transistors continue to conduct alternately at a frequency of approximately 2000 hertz.

The secondary windings of T501 provide outputs for the 12, 24, and 32 volt rectifier and filter circuits.

Over Voltage Protective Circuit

The over-voltage circuit protects the converter and transmitter-receiver from damage caused by a regulator failure of improper setting of R508. The surge is applied through an over-voltage circuit (VR502, Q508, and SCR501) and will blow one or both line fuses.

Adjustment of R508 and R513

Potentiometers R508 are pre-set at the factory and should be adjusted only under the following conditions.

1. If Zener diode VR501 is replaced, check for 24 volts at J501-4 with the transmitter keyed. Vary R508 if necessary to obtain this voltage.

2. If Q507 is replaced, check for a 400-microsecond duration sawtooth waveform across C505. Adjust R513 if necessary to obtain this waveform.

CONTROL UNITS

Type EC-60-A or EC-66-A Control Units are used with the PORTA-MOBIL.

Control Unit EC-60-A consists of a cast aluminum control head assembled to the system frame. All operating controls as well as the antenna and microphone jacks, carrying handle, audio output stage, weatherproof speaker and plug-in system relay are mounted on the control

head. The audio output switch (S702) and the eight-pin power connection are mounted on the system frame. The transmitter and receiver printed wiring boards mount within the frame.

Extended Local Control EC-66-A consists of a weatherproof case containing all operating controls, microphone connections and a terminal board for the control cable connections.

The following chart lists the control unit model numbers and options:

MODEL	NO. OF FREQUENCIES	OPTION	MICROPHONE
4EC60A10	One		Military Mike (4EM33B10)
4EC60A11	One	Channel Guard	"
4EC60A12	Two		"
4EC60A13	Two	Channel Guard	"
4EC60A14	One	Selective Calling	"
4EC60A15	Two	Selective Calling	"
4EC60A16	One		Handset (4EM34A10)
4EC60A17	One	Channel Guard	"
4EC60A18	One	Selective Calling	"
4EC60A19	Two		"
4EC60A20	Two	Channel Guard	"
4EC60A21	Two	Selective Calling	"
4EC60A22	One	Accessory Jack	Military Mike (4EM33B10)
4EC60A23	One	Accessory Jack & Channel Guard	"
4EC60A24	Two	Accessory Jack	"
4EC60A25	Two	Accessory Jack & Channel Guard	"
4EC60A26	One	Accessory Jack & Selective Calling	"
4EC60A27	Two	Accessory Jack & Selective Calling	"
4EC66A10	One		Weatherproof Mike (4EM25C10)
4EC66A11	Two		"
4EC66A12	One	Channel Guard or Sel. Call	"
4EC66A13	Two	Channel Guard or Sel. Call	"
4EC66A14	One	Accessory Jack	"
4EC66A15	Two	Accessory Jack	"
4EC66A16	One	Accessory Jack & Channel Guard or Selective Calling	"
4EC66A17	Two	Accessory Jack & Channel Guard or Selective Calling	"

CIRCUIT ANALYSIS

AUDIO OUTPUT SWITCH (EC-60-A only)

The audio output switch (marked HI-LO) permits the selection of two audio output levels. Switching S702 to the HI position shunts biasing resistor R704 in the emitter circuit of audio output transistor Q701. This decrease in bias causes more collector cureent to flow, and allows a one-watt audio output at the speaker. The unit should be operated with the one-watt output in areas having a high ambient noise level.

In low noise areas, S702 should be switched to the LO position. Now, R704 operates in series with R703 to increase the emitter bias and reduce the collector current from 250 milliamps to 50 milliamps. With the VOLUME control all the way to the right, the unit will provide 100-milliwatts audio output, with less than 10% distortion.

10-WATT AUDIO AMPLIFIER 19B205165-G1 (Optional with 6 and 12 Volt Power Supplies and EC-66-A Control Unit)

The 19B205165-G1 Audio Amplifier is located under the transmitter-receiver top mounting cover. To gain access to the amplifier, remove the power supply and the transmitter-receiver wrap-around cover. Then remove the two Phillips screws as indicated on the chassis and hinge open the top cover.

The audio signal from the receiver is coupled through matching transformer T2 to the bases of Class B push-pull transistors Q1 and Q2. Base bias is provided by resistors R2, R3, R4, R5 and RT1. R3 and R4 may be shorted by jumper leads to provide proper bias for the three supply voltages. Thermistor RT1 and resistor R2 form a parallel compensating network which stabilizes the emitter current of Qlaand Q2 under varying temperature conditions. The output taken from the emitters of Q1 and Q2 is fed through impedance matching auto-transformer T1 to speaker LS701.

When the power supply input voltage is changed, the positions of plug pins P1, P2 and P3 on the power amplifier component board must be changed as indicated on the Service Diagram.

10-WATT AUDIO AMPLIFIER 19B205432-G1 (Optional with 24/36 Volt Power Supply and EC-66-A Control Unit)

The 19B205432-G1 Audio Amplifier is located under the transmitter-receiver top mounting cover. To gain access to the amplifier, remove the power supply and the transmitter-receiver wrap-around cover. Then remove the two Phillips screws as indicated on the chassis and hinge open the top cover.

The audio signal from the receiver is coupled through matching transformer T1 to the bases of Class AB push-pull transistors Q1 and Q2. Thermistor RT1 and resistors R3, R4 and R5 stabilize the emitter current of Q1 and Q2 under varying temperature conditions. Base bias for Q2 is provided by the network of R2, R8 and C2. Bias for Q1 is

provided by R1, R7 and C1. Output from the collectors of Q1 and Q2 is coupled through transformer T2 to the control unit speaker.

NOTE

Taps are provided on power amplifier transformer T2 to change amplifier load impedance for 24 or 36 volt operation. The unit is shipped with plug pins P1 and P2 connected to J2 and J4, respectively (36-volt connections). If used with electrical systems of 28 volts or less, connect P1 to J1 and P2 to J3 (24-volt connections).

ACCESSORY JACK OPTION

The Accessory Jack Option provides a weatherproof 9-pin connector (J704) on the Control Unit. Type 90 and Type 99 Decoders will plug directly into this connector and function without speaker muting. The Type 90 Encoder can also be used, but requires an adapter cable (Option 5460) to permit plug-in operation.

COMMUNICATION PRODUCTS DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNCHBURG, VIRGINIA

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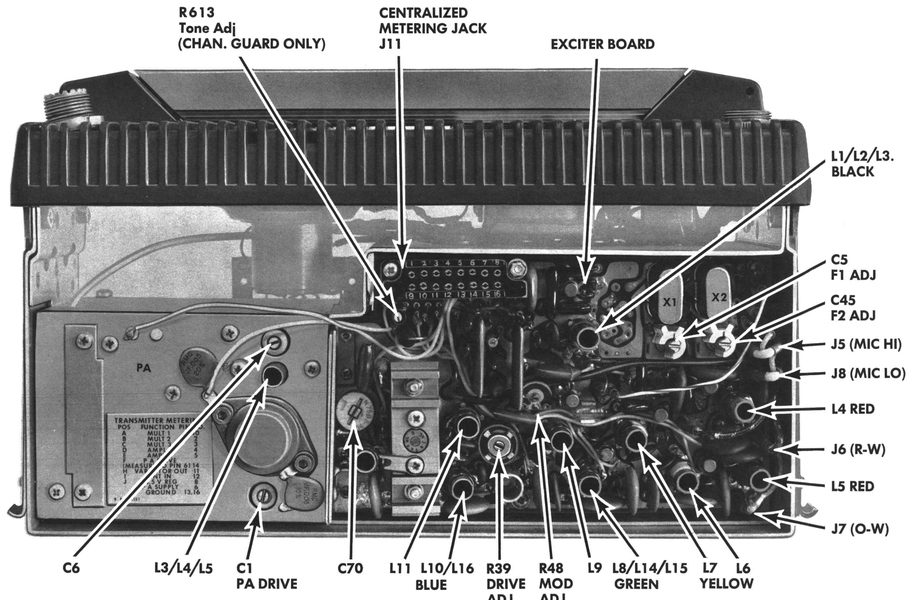
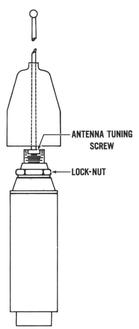




ANTENNA LOADING COIL

MODULATION LEVEL ADJUSTMENT

The MOD ADJUST was adjusted to the proper setting before shipment and should not normally require readjustment. This setting permits approximately 75% modulation for the average voice level. The audio peaks which would cause overmodulation are clipped by the modulation limiter.

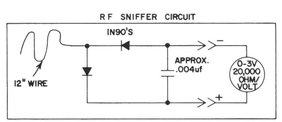
TEST EQUIPMENT

1. An audio oscillator
2. A frequency modulation monitor
3. An output meter or a VTVM

PROCEDURE

1. Connect the audio oscillator and the meter across J5 (Mike High) and J8 (Mike Low) on the transmitter board.
2. Apply a 0.2-volt signal at 1000 cps across J5 and J8.
3. Set MOD ADJUST R48 for a 5-kilocycle swing with the deviation polarity + or - (whichever gives the highest reading) as indicated on the frequency modulation monitor.

RF SNIFFER CIRCUIT



TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

1. General Electric Centralized Metering Test Set Model 4EX3A10, or a 200,000 ohms-per-volt Multimeter.
2. Wattmeter.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Turn DRIVE ADJUST R39 (on Exciter Board) all the way to the right, and then turn it back two-thirds of the way to the left. Set crystal trimmer C5 (and C45 for two-frequency) to mid-capacity.
2. Turn PA DRIVE ADJUST C1 and C6 (on PA Assembly) all the way to the right.
3. Set all slugs in Exciter Board coils to bottom of coil form. Use the first response as slugs are tuned up from bottom of coil.
4. Key the transmitter and check for 32 volts at J6 (24 volts with dry battery supply) and for 24 volts at J7.
5. Connect Test Set Model 4EX3A10 to the Transmitter Centralized Metering Jack J11. If using Multimeter, connect the negative lead to J11-13 (Ground) except for Steps 6 and 8.

NOTE

For units equipped with the rechargeable battery pack, always recharge the battery while aligning the transmitter.

For units with the dry battery pack, insert fresh batteries before aligning the transmitter. (Rated power output with the dry battery pack is 10 watts.)

STEP	METERING POSITION		TUNING CONTROL	METER READING	PROCEDURE
	TEST SET 4EX3A10	Multimeter + at J11			
			EXCITER BOARD		
1.	A MULT-1	Pin 10	L1/L2/L3 and L4	See Procedure	Key the transmitter and tune L1/L2/L3 for maximum meter reading. Then tune L4 for minimum meter reading. For transmitters with Channel Guard, this is a critical adjustment.
2.	B MULT-2	Pin 2	L5, L4 and L6	See Procedure	Key the transmitter and tune L5 and then L4 for maximum meter reading. Then tune L6 for minimum meter reading.
3.	C MULT-3	Pin 3	L7, L6 and L8/L14/L15	See Procedure	Key the transmitter and tune L7 and then L6 for maximum meter reading. Then tune L8/L14/L15 for minimum meter reading.
4.	D AMPL-1	Pin 4	L9, L8/L14/L15 and L10/L16.	See Procedure	Key the transmitter and tune L9 and L8/L14/L15 for maximum meter reading. Then tune L10/L16 for minimum meter reading.
5.	E AMPL-2	Pin 5	L11, L10/L16 and C70	See Procedure	Key the transmitter and tune L11 and L10/L16 for maximum meter reading. Then tune C70 for minimum meter reading.
			PA ASSEMBLIES		
6.	F PA DRIVE	Pin 14 (+) and Pin 6 (-)	C1 (PA DRIVE)	Maximum	Key the transmitter and tune C1 for maximum meter reading.
7.	I ANT IN	Pin 12	C70 (on Exciter Board), C1, C6 and L3/L4/L5	See Procedure	Key the transmitter and tune C70 (on Exciter Board), C1 and C6 for maximum meter reading. Then tune L3/L4/L5 for minimum meter reading. (Use wattmeter for more accurate reading.)
			FINAL ADJUSTMENT		
8.	F PA DRIVE	Pin 14 (+) and Pin 6 (-)	L3/L4/L5 (on PA Assembly)	0.35 v	Key the transmitter and tune L3/L4/L5 to the left until meter reads 0.35 volts positive.
9.	I ANT IN	Pin 12	C6	Maximum	Key the transmitter and tune C6 for maximum meter reading (use wattmeter for more accurate reading).
10.					Let PA/MULT ASSEMBLY cool to room temperature.
11.	F	Pin 14	L3/L4/L5 (on PA Assembly)	0.35 v	Key the transmitter and check reading at position F. If reading exceeds 0.35 volts, turn L3/L4/L5 to the right until reading is 0.35 volts. Then repeat Step 9.
12.					Check output of transmitter. If less than rated power output, increase power output of Exciter Board by turning R39 (DRIVE ADJUST) slightly more to the left. Then repeat Steps 4 thru 12.
			FREQUENCY ADJUSTMENT		
13.					With no modulation, key the transmitter and adjust C5 (and C45 for two-frequency) for correct frequency.
			ANTENNA LOADING (PORTABLE ONLY)		
14.					Replace wattmeter (or 50-ohm load) with antenna.
15.			Antenna Loading Coil	Maximum	Place the unit on a conductive surface such as a metal-topped table or vehicle board. Tune the Antenna Loading Coil for maximum meter-reading on an RF indicator (use a grid dip meter or the RF Sniffer Circuit as shown). Keep the indicator meter as far from antenna as possible. WARNING Do not touch the antenna while keying the transmitter, as this may result in an RF burn.

ALIGNMENT PROCEDURE

25 - 50 MC TRANSMITTER
TYPE ET-61-A

(RC-1138A)

TRANSMITTER TEST PROCEDURES

The Transmitter Test Procedures are designed to assist you in servicing a transmitter that is operating — but not properly. Problems encountered could be low power output, low B plus, tone and voice deviation, defective audio sensitivity and modulator adjust control set too high. By following the sequence of test steps starting with Step 1, the defect can be quickly localized. Once a defect is pin-pointed, refer to the "Service Check" and the additional corrective measures included in the Transmitter Trouble-shooting Procedure RC-1142. Before starting with the Transmitter Test Procedures, be sure the transmitter is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

for test hookup as shown:

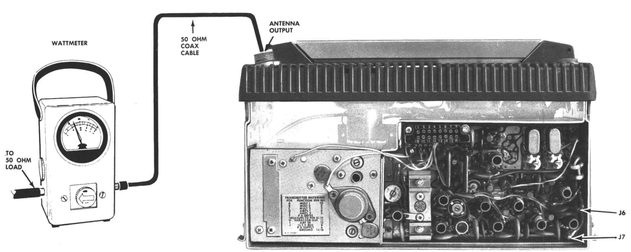
1. Wattmeter similar to:
   Bird #43
   Jones #711N
2. VTVM similar to:
   Triplett #850
   Heath #IM-21
3. Audio Generator similar to:
   Heath #IG-72
4. Deviation Meter (with a .75 KC scale) similar to:
   Measurements #140
   Lampkin #205A
5. Multimeter similar to:
   G-E METERING TEST SET MODEL 4EX3A10 or
   Triplett #631 or equivalent
   20,000 ohms-per-volt voltmeter

STEP 1

POWER MEASUREMENT

TEST PROCEDURE

1. Connect transmitter output to wattmeter as shown below:



TRANSMITTER SIDE

2. Key transmitter and check wattmeter for minimum reading of:
   A. 10 watts (dry battery).
   B. 15 watts (nickel cadmium battery) 25-43 MCS.
   C. 12 watts (nickel cadmium battery) 43-50 MCS.

SERVICE CHECK

Check the following if the above readings are not obtained:

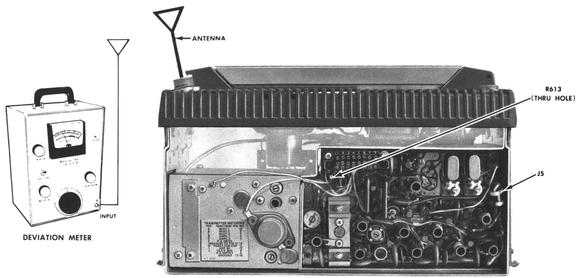
1. Disconnect red wire from J6 (35-V) and orange wire from J7 (24-V) from the Transmitter Exciter Board as shown, and check power supply voltages for:
   A. 24 and 35 volts (nickel cadmium)
   B. 24 and 24 volts (dry battery)
2. Refer to Power Supply Troubleshooting Steps on Troubleshooting Procedure RC-1076, and Step 13 on the Transmitter Alignment Chart.

STEP 2

TONE DEVIATION WITH CHANNEL GUARD

TEST PROCEDURE

1. Setup Deviation Meter and monitor output of transmitter as shown below.



TRANSMITTER SIDE

2. Unplug the MIC HI terminal from J5 on Transmitter Exciter Board.
3. Key transmitter and check for 0.75-KC deviation. If reading is low or high, adjust Tone Deviation Control (R613) for a reading of 0.75 KC.

DEVIATION METER

NOTES:

1. On units supplied with "Tone Squelch," the Phase Modulator Tuning should be peaked carefully to insure proper performance. (Refer to Step 1 in the Transmitter Alignment Chart on reverse side of page).
2. The Tone Deviation Test Procedures should be repeated every time the Tone Frequency is changed.

SERVICE CHECK

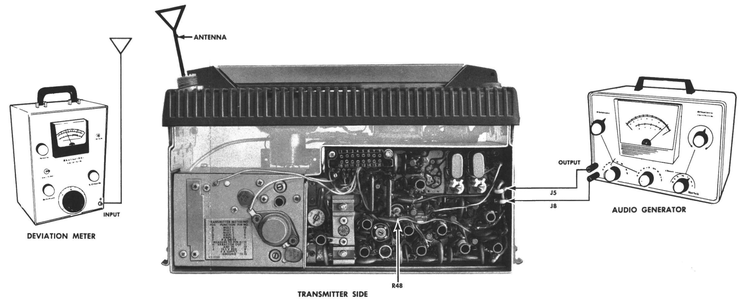
If the 0.75-KC deviation is not obtainable when adjusting R613, replace the Tone Transmitter reed.

STEP 3

VOICE DEVIATION AND SYMMETRY

TEST PROCEDURE

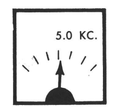
1. Unplug the High and Low Mike leads from the Exciter Board Jacks J5 and J8.
2. Connect test equipment to transmitter as shown below:



TRANSMITTER SIDE

3. Set the generator output to 0.2 VOLTS RMS, and frequency to 1 KC.
4. Key the transmitter and adjust Deviation Meter to carrier frequency.
5. Deviation reading should be ±5.0 KC.
6. Adjust "Modulator Adjust Control" R-48 until deviation reads 5.0 KC on plus (+) or minus (–) deviation, whichever is greater.

DEVIATION METER

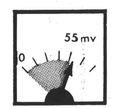


SERVICE CHECK

If the deviation reading plus (+) and minus (–) differs by more than 1 KC, check the following:

1. Recheck Step 1 as shown in the Transmitter Alignment Chart.
2. Check Audio Sensitivity by reducing generator output until deviation falls to 3.3 KC. Voltage should be LESS than 55 millivolts.

METER



TEST PROCEDURES

25 ~ 50 MC TRANSMITTER
TYPE ET-61-A

(RC-1146)

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

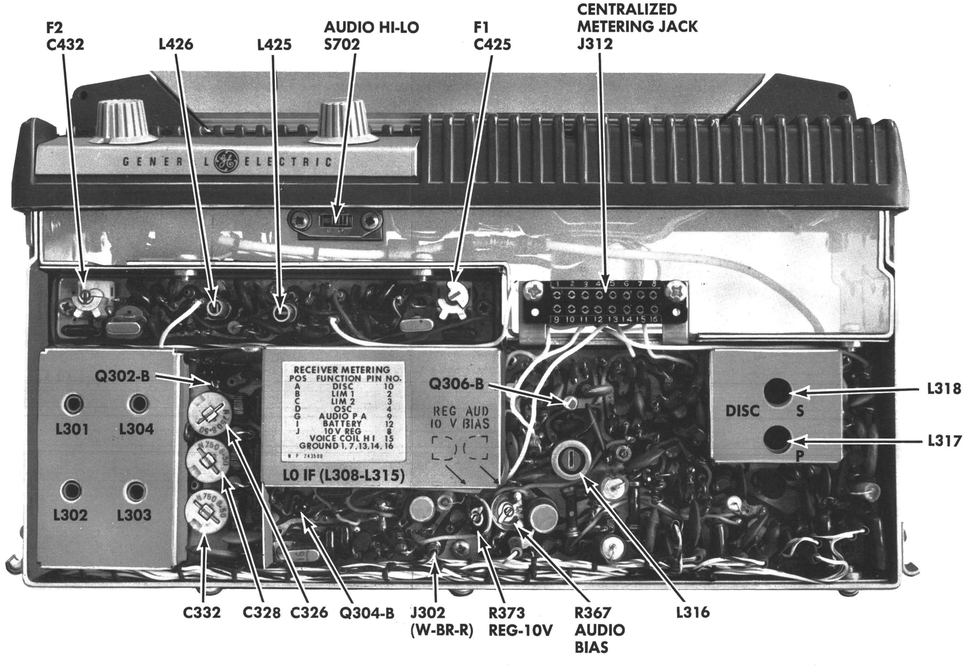
1. G-E Test Set Model 4EX3A10 (or 20,000 ohms-per-volt Multimeter).
2. A 25-50 MC Signal Source. Keep signal level below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set 4EX3A10 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 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" (or 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 MC units and fully out on 42-50 MC 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

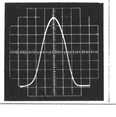
EQUIPMENT REQUIRED

1. G-E Test Set Model 4EX3A10 (or 20,000 ohms-per-volt Multimeter).
2. A 455 KC, a 5.26 MC and a 25-50 MC Signal Source. Couple the 455 KC signal through a small capacitor (approximately 100 pf). Couple the 5.26 MC signal through a .01 pf capacitor. Keep signal levels below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set 4EX3A10 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 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" (or 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 KC 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 KC 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 KC and 465 KC 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 KC signal as above, and tune L316 for maximum meter reading.
			OSCILLATOR AND MULTIPLIER		
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 MC units and fully out on 42-50 MC units.
			HI IF		
6.	C LIM-2	Pin 3	C326, C328 and C332	Maximum	Apply a 5.26 MC signal to the base of Q302 or an on-frequency signal to Antenna Jack J702 (on Control Unit). Tune C326, C328 and C332 for maximum meter reading.
			LOW IF*		
7.	A DISC	Pin 10		Zero	Apply a 5.26 MC 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 KC deviation with 60 cycles per second (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 KC ±1 KC (±0.7 volt reading with meter in Position A), with an EIA modulation acceptance of 56 to 210 KC.
			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 MC RECEIVER
TYPE ER-43-A

(RC-1139C)

RECEIVER TEST PROCEDURES

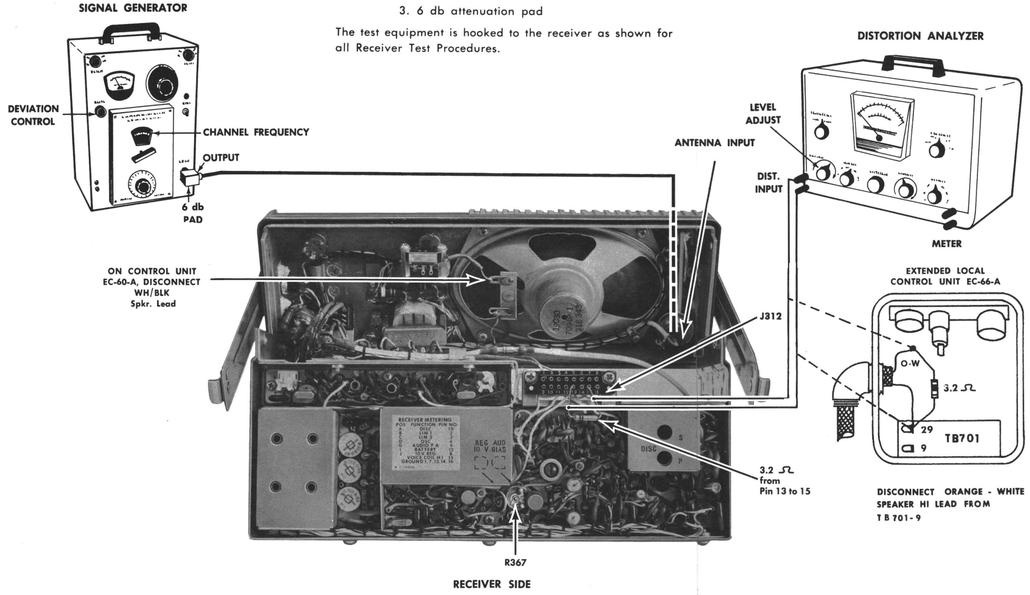
The Receiver Test Procedures are designed to help you to service a receiver that is operating — but not properly. The problems encountered could be low power, poor sensitivity, distortion, limiter not operating properly, and low gain. By following the sequence of test steps starting with Step 1, the 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 RC-1143. 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.



(RC-1147B)

STEP 1

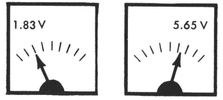
AUDIO POWER OUTPUT AND DISTORTION

TEST PROCEDURE

Measure Audio Power Output as follows:

1. Connect a 1,000-microvolt test signal modulated by 1,000 cycles ±3.3 KC deviation to the antenna jack.
2. Disconnect the Speaker Hi lead from the terminal board. 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); with 10-watt amplifier, set VOLUME Control for 5.65 VRMS.

VOLTMETER SCALE ON DISTORTION ANALYZER



ONE WATT

10-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 Service Sheet 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 KC (typical value is ±9 KC).

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.)

PARTS LIST

25-50 MC TRANSMITTER
MODELS 4ET61A10-21
(PL-19C303610-G1 - G12)

SYMBOL	G-E PART NO.	DESCRIPTION
		EXCITER BOARD ASSEMBLY
		4ET61A10 (PL-19D402440-G1) 1-Freq 25-33 MC 4ET61A11 (PL-19D402440-G2) 2-Freq 25-33 MC 4ET61A12 (PL-19D402440-G3) 1-Freq 33-42 MC 4ET61A13 (PL-19D402440-G4) 2-Freq 33-42 MC 4ET61A14 (PL-19D402440-G5) 1-Freq 42-50 MC 4ET61A15 (PL-19D402440-G6) 2-Freq 42-50 MC 4ET61A16 (PL-19D402440-G7) 1-Freq 25-33 MC 4ET61A17 (PL-19D402440-G8) 2-Freq 25-33 MC 4ET61A18 (PL-19D402440-G9) 1-Freq 33-42 MC 4ET61A19 (PL-19D402440-G10) 2-Freq 33-42 MC 4ET61A20 (PL-19D402440-G11) 1-Freq 42-50 MC 4ET61A21 (PL-19D402440-G12) 2-Freq 42-50 MC
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF. (Used in Models 4ET61A16, 17, 18, 19, 20 and 21 only).
C3*	5496219-P850	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -1500 PPM (Used in Models 4ET61A16, 17, 18, 19, 20 and 21 only).
	5496219-P853	In Models earlier than REV. A: Ceramic Disc: 39 pf ±5%, 500 VDCW, temp coef -1500 PPM. (Used in Models 4ET61A16, 17, 18, 19, 20 and 21 only).
C4	5496219-P44	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM. (Used in Models 4ET61A10, 11, 12, 13, 14 and 15 only).
C5	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 850 v peak; sim to EF Johnson 189-6-5.
C6	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF.
C7	5496219-P50	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef 0 PPM. (Used in Models 4ET61A10, 11, 12, 13, 14 and 15 only).
C8	5496372-P382	Ceramic disc: 1000 pf ±5%, 500 VDCW, temp coef -4700 PPM.
C9	5496372-P474	Ceramic disc: 680 pf ±5%, 500 VDCW, temp coef -5600 PPM.
C10	5491870-P680K	Silver mica: 680 pf ±10%, 300 VDCW; sim to Electro Motive Type DM-15.
C11	5490008-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C12	4029003-P12	Silver mica: .0015 µf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C13	4029003-P10	Silver mica: .0012 µf ±5%, 500 VDCW; sim to Electro Motive Type DM-20.
C14	5494481-P117	Ceramic disc: .004 µf ±20%, 500 VDCW; sim to RMC Type JF.
C15	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF.
C16	5490008-P139	Silver mica: 330 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C17	5490008-P137	Silver mica: 270 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C18	5490008-P135	Silver mica: 220 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C19	5490008-P131	Silver mica: 150 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C20	7491827-P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C21*	5490008-P11	Silver mica: 22 pf ±5%, 500 VDCW; sim to Electro Motive Type DM20.
C22	7491827-P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C23	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C24	5496219-P261	Ceramic disc: 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
C25	5496219-P255	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C26	5496219-P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C27	5494481-P115	Ceramic disc: .003 µf ±20%, 500 VDCW; sim to RMC Type JF.
C28	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF.
C29	5496219-P261	Ceramic disc: 82 pf ±5%, 500 VDCW, temp coef -80 PPM.
C30	5496219-P255	Ceramic disc: 47 pf ±5%, 500 VDCW, temp coef -80 PPM.
C31	5496219-P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C32	5494481-P117	Ceramic disc: .004 µf ±20%, 500 VDCW; sim to RMC Type JF.
C33	5496219-P459	Ceramic disc: 68 pf ±5%, 500 VDCW, temp coef -220 PPM.
C34	5496219-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C35	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C36	5494481-P113	Ceramic disc: .002 µf ±20%, 500 VDCW; sim to RMC Type JF.
C37	5494481-P107	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF.
C38	5496219-P459	Ceramic disc: 68 pf ±5%, 500 VDCW,temp coef -220 PPM.
C39	5496219-P253	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -80 PPM.
C40	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C41	5494481-P117	Ceramic disc: .004 µf ±20%, 500 VDCW; sim to RMC Type JF.
C42	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF. (Used in Models 4ET61A17, 19 and 21 only).
C43*	5496219-P850	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef -1500 PPM. (Used in Models 4ET61A17, 19 and 21 only).
	5496219-P853	In Models earlier than REV. A: Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -1500 PPM. (Used in Models 4ET61A17, 19 and 21 only).
C44	5496219-P44	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef 0 PPM. (Used in Models 4ET61A11, 13 and 15 only).
C45	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 850 v peak; sim to EF Johnson 189-6-5. (Used in Models 4ET61A11, 13, 15, 17, 19 and 21 only).
C46	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF. (Used in Models 4ET61A11, 13, 15, 17, 19 and 21 only).
C47	5496219-P50	Ceramic disc: 30 pf ±5%, 500 VDCW, temp coef 0 PPM. (Used in Models 4ET61A11, 13 and 15 only).
C48 and C49	5494481-P117	Ceramic disc: .004 µf ±20%, 500 VDCW; sim to RMC Type JF.
C50	5496219-P453	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -220 PPM.
C51	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C52	5496219-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C53*	5494481-P111	Ceramic disc: .001 pf ±20%, 500 VDCW; sim to RMC Type JF. In Models earlier than REV.A (4ET61A10-15) or REV. B (4ET61A16-21):
	5494481-P113	Ceramic disc: .002 µf ±20%, 500 VDCW; sim to RMC Type JF.
C54	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF.
C55	5490008-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C56	5496219-P452	Ceramic disc: 36 pf ±5%, 500 VDCW, temp coef -220 PPM.
C57	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C58	5496219-P244	Ceramic disc: 15 pf ±5%, 500 VDCW, temp coef -80 PPM.
C59 and C60	5494481-P117	Ceramic disc: .004 µf ±20%, 500 VDCW; sim to RMC Type JF.
C61	5496219-P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C62	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C63	5496219-P242	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -80 PPM.
C64	5494481-P107	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF.
C65	5490008-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C66	5496219-P251	Ceramic disc: 33 pf ±5%, 500 VDCW, temp coef -80 PPM.
C67	5496219-P247	Ceramic disc: 22 pf ±5%, 500 VDCW, temp coef -80 PPM.
C68	5496219-P242	Ceramic disc: 12 pf ±5%, 500 VDCW, temp coef -80 PPM.
C69	5491189-P106	Mylar®, epoxy-dipped: 0.1 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C70	5490446-P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C71	5491189-P102	Mylar®, epoxy-dipped: .022 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C72	5491189-P101	Mylar®, epoxy-dipped: .01 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C73	5496267-P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague 150D685X0006A2.
C74 and C75	7491827-P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C76	5494481-P113	Ceramic disc: .002 µf ±20%, 500 VDCW; sim to RMC Type JF.
C77	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF.
C78	5490008-P135	Silver mica: 220 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C79	5494481-P117	Ceramic disc: .004 µf ±20%, 500 VDCW; sim to RMC Type JF.
		- - - - - - - - - - RECTIFIERS - - - - - - - - - -
CR1 and CR2	19A115371-P1	Silicon; sim to Type 1N676. (Used in Models 4ET61A11, 13, 15, 17, 19 and 21 only).
CR3	4036887-P10	Silicon, Zener®.
CV1	5495769-P4	Voltage variable, hermetically sealed: 7 pf ±10% at 4 VDC; sim to Pacific Semiconductors Varicap Type V-591. (Used in Models 4ET61A16, 17, 18, 19, 20 and 21 only).
CV2	5495769-P13	Voltage variable, hermetically sealed: 100 pf ±20% at 4 VDC; sim to Pacific Semiconductors Varicap Type V-100.
CV3	5495769-P4	Voltage variable, hermetically sealed: 7 pf ±10% at 4 VDC; sim to Pacific Semiconductors Varicap Type V-591. (Used in Models 4ET61A17, 19 and 21 only).
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 thru J10	4033513-P4	Pin, contact: sim to Bead Chain L93-3.
J11	19B209125-P2	Connector: 18 contacts, Lexan® body, 5 amps at 1000 VDC.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	PL-19B204773-G1	Coil Assembly. Includes:
	5491798-P8	Tuning slug.
L2	PL-19B204773-G2	Coil Assembly. Includes:
	5491798-P8	Tuning slug.
L3	PL-19B204773-G3	Coil Assembly. Includes:
	5491798-P8	Tuning slug.

CONNECTION TABLE		
FROM	TO	WIRE
H38	H39	WHITE
+ H19	H22	WHITE
H18	H24	RG196 U CONDUCTOR
H5	H22	WHITE
H6	H16	WHITE
H7	H15	WHITE
H8	H14	WHITE
H10	H9	WHITE
H36	H25	WHITE
H27	H17	WHITE
H13	H12	WHITE
H4	E10 ON PA	BROWN
H1	J11-5	RED
H11	J11-8	GREEN
H42	H26	WHITE
H28	H29	RG196 U SHIELD
H30	J11-10	BUS (UNINSULATED)
H31	J11-2	BUS (UNINSULATED)
H32	J11-3	BUS (UNINSULATED)
H33	J11-4	BUS (UNINSULATED)
H34	J11-6	YELLOW
H35	J11-14	BROWN
■ H40	H41	WHITE
◖ H41	H46	BUS (UNINSULATED)
▲ H43	H20	WHITE
✱ H44	H45	BUS (UNINSULATED)
+ H45	H47	BUS (UNINSULATED)
⊙ J1	J9	WHITE
J11-12	E7-2 ON FL2	WHITE
J11-13	J11-16	BUS (UNINSULATED)
J11-16	H48	BUS (UNINSULATED)

▲ IN 4ET61A11, A13, A15, A17, A19, & A21.
◖ IN 4ET61A11, A13, & A15.
✱ IN 4ET61A10, A11, A12, A13, A14, & A15.
■ IN 4ET61A17, A19, & A21.
+ IN 4ET61A16, A17, A18, A19, A20, & A21.
⊙ IN 4ET61A10, A12, A14, A16, A18, & A20.

RESISTANCE READINGS

ALL READINGS ARE TYPICAL READINGS MEASURED FROM TRANSISTOR PINS TO J11-13 (GND) WITH A 20,000 OHM-PER-VOLT METER, AND WITH THE TRANSMITTER UNKEYED. + OR − SIGNS SHOW METER PROBE GROUNDED. USE THE SCALE AS SHOWN BELOW:

FOR READINGS OF:	USE METER SCALE:
1-50Ω	X 1
51-500Ω	X 10
501-50K	X 1,000
51K-∞	X 100,000

TRANSISTOR	EMITTER		BASE		COLLECTOR	
	+	−	+	−	+	−
EXCITER						
Q1	0	0	50K	3K	8K	7K
Q2	220Ω	260Ω	11K	3.4K	2.8K	4.8K
Q3	140Ω	325Ω	110Ω	100Ω	2.3K	6K
Q4	11Ω	220Ω (1)	0	0	2.2K	5.25K
Q5	6Ω	10Ω (2)	0	0	2.2K	5.0K
Q6	4.6Ω	5Ω (3)	2.8Ω	2.8Ω	2.2K	5.0K
Q7	1.0K	1.0K	18K	4.4K	2.3K	5.0K
Q8	620Ω	620Ω	14K	3.6K	15K	3.0K
Q9	0	0	15K	3.0K	19K	3.0K
Q10	0	0	19K	3.0K	16K	22K
Q11	0	0	1.0K	1.0K	2.1K	5.0K
PA						
Q1	0	0	0	0	2.2K	∞

NOTES: (1) 325Ω FOR 25-33 MC UNITS
(2) 33Ω FOR 25-33 MC UNITS
(3) 7.5Ω FOR 42-50 MC UNITS

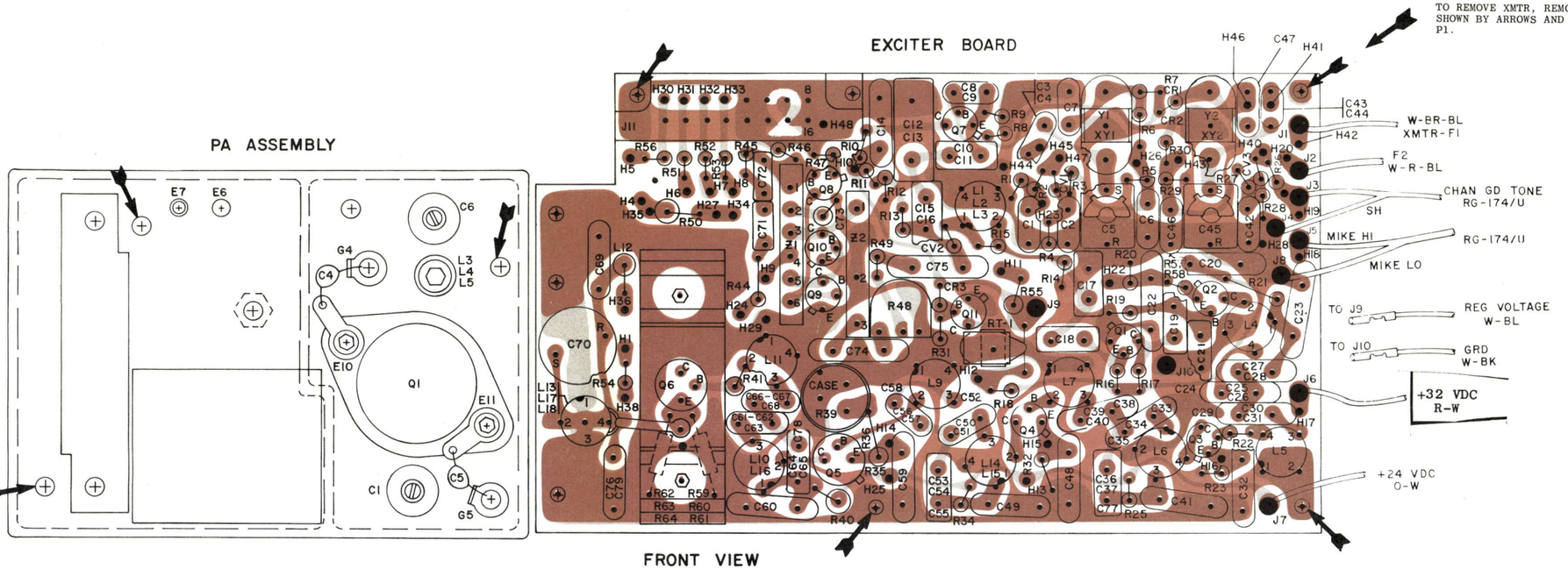
SERVICE SHEET

25 - 50 MC TRANSMITTER
TYPE ET-61-A

(RC-1140B, Sheet 1)

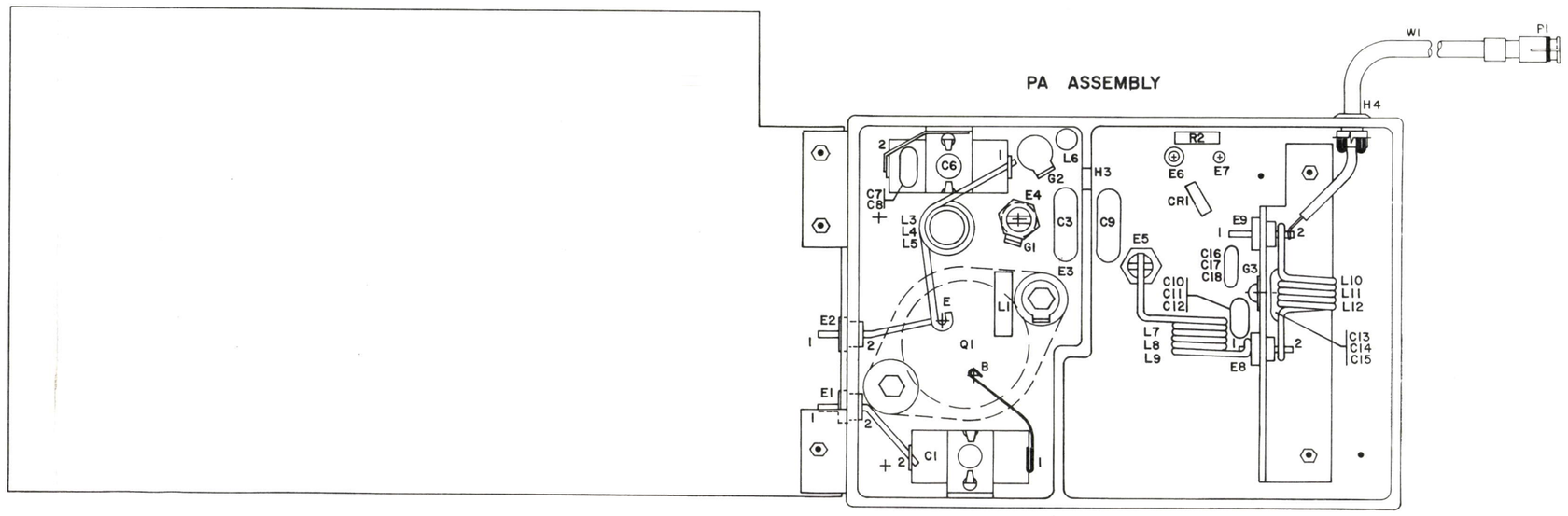
PA ASSEMBLY

EXCITER BOARD



FRONT VIEW

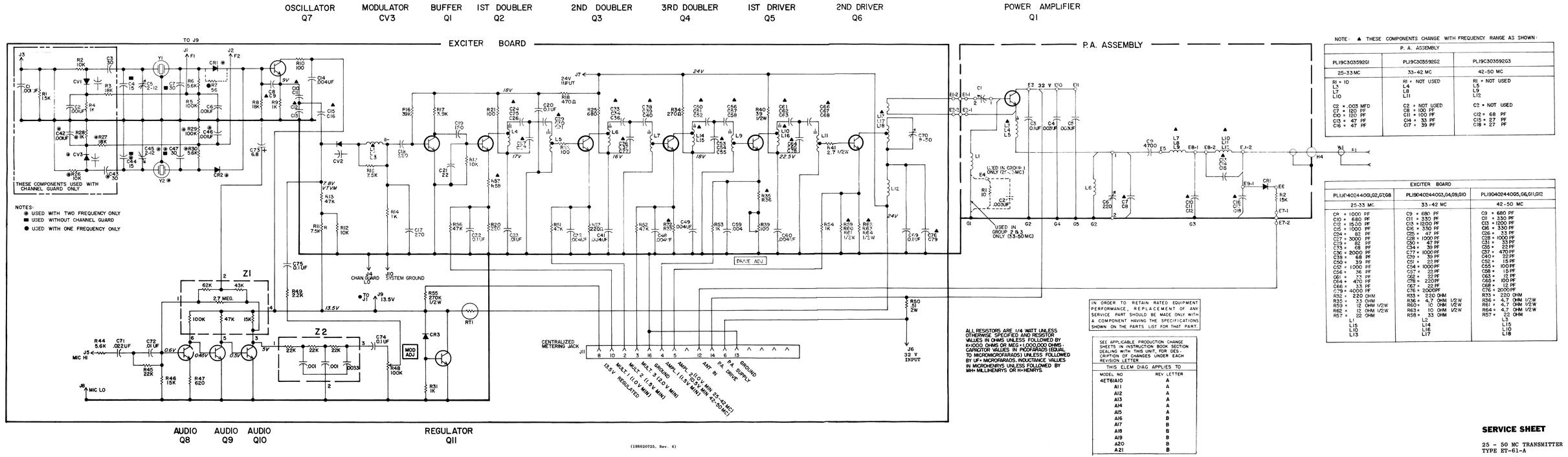
EXCITER BOARD



BACK VIEW

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

(19D402561, Rev. 1)
(19C303596, Sh. 1, Rev. 2)
(19C303596, Sh. 2, Rev. 2)



(198620725, Rev. 6)

NOTE: ▲ THESE COMPONENTS CHANGE WITH FREQUENCY RANGE AS SHOWN

P. A. ASSEMBLY		
PLI9C303592G1	PLI9C303592G2	PLI9C303592G3
25-33 MC	33-42 MC	42-50 MC
R1 = 10 L5 L7 L10	R1 = NOT USED L4 L8 L11	R1 = NOT USED L5 L9 L12
C2 = .003 MFD C7 = 120 PF C10 = 120 PF C13 = 47 PF C16 = 47 PF	C2 = NOT USED C8 = 100 PF C11 = 100 PF C14 = 33 PF C17 = 39 PF	C2 = NOT USED C12 = 68 PF C15 = 27 PF C18 = 27 PF

EXCITER BOARD		
PLI3N4024400,62,67,68	PLI9D4024403,64,69,G10	PLI9D4024405,66,6I,6I2
25-33 MC.	33-42 MC	42-50 MC
C9 = 1000 PF C10 = 680 PF C12 = 1500 PF C15 = 1000 PF C21 = 82 PF C27 = 3000 PF C33 = 68 PF C35 = 39 PF C36 = 2000 PF C38 = 68 PF C39 = 39 PF C40 = 1000 PF C56 = 36 PF C61 = 75 PF C64 = 470 PF C66 = 3.3 PF C79 = 4000 PF R52 = 220 OHM R55 = 33 OHM R59 = 12 OHM 1/2W R62 = 12 OHM 1/2W R57 = 22 OHM L1 L15 L10 L13	C9 = 680 PF C11 = 330 PF C13 = 1200 PF C16 = 330 PF C25 = 47 PF C28 = 1000 PF C31 = 47 PF C34 = 39 PF C37 = 1000 PF C39 = 39 PF C51 = 22 PF C54 = 1000 PF C57 = 22 PF C62 = 22 PF C78 = 220 PF C67 = 22 PF C76 = 2000PF R53 = 220 OHM R56 = 4.7 OHM 1/2W R60 = 10 OHM 1/2W R63 = 10 OHM 1/2W R58 = 33 OHM L2 L14 L16 L17	C9 = 680 PF C11 = 330 PF C13 = 1200 PF C16 = 330 PF C26 = 33 PF C29 = 1000 PF C31 = 33 PF C35 = 22 PF C37 = 470 PF C40 = 22 PF C52 = 15 PF C55 = 100 PF C58 = 15 PF C63 = 15 PF C65 = 100 PF C68 = 12 PF C76 = 2000 PF R53 = 220 OHM R56 = 4.7 OHM 1/2W R61 = 4.7 OHM 1/2W R64 = 4.7 OHM 1/2W R57 = 22 OHM L3 L15 L10 L18

ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN MICROFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

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

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
4ET6IAI0	A
AI1	A
AI2	A
AI3	A
AI4	A
AI5	A
AI6	B
AI7	B
AI8	B
AI9	B
A20	B
A21	B

SERVICE SHEET

25 - 50 MC TRANSMITTER
TYPE ET-61-A

(RC-1140B, Sheet 2)

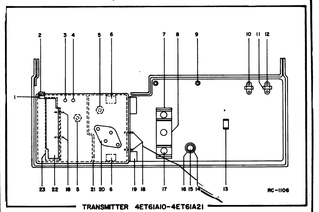
SYMBOL	G-E PART NO	DESCRIPTION
		---------- INDUCTORS(Cont'd) ------
L4	PL-19A121493-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L5	PL-19A121495-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L6	PL-19A121503-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L7	PL-19A121492-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L8	PL-19A121734-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L9	PL-19A121482-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L10	PL-19A121474-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L11	PL-19A121470-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
R41	7147161-P5	Fixed composition: 2.7 ohms ±10%, 1/2 w.
L12	7488079-P42	Choke, RF: 8.2 µh ±10%, 1150 ma max, 0.25 ohm max; sim to Jeffers 4422-3.
L13	PL-19B204777-G1	Coil Assembly.
L14	PL-19A121489-G1	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L15	PL-19A121488-G2	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L16	PL-19A121474-G2	Coil Assembly. Includes:
	5491798-P3	Tuning slug.
L17	PL-19B204777-G2	Coil Assembly.
L18	PL-19B204777-G3	Coil Assembly.
		---------- TRANSISTORS ----------
Q1	19C300114-P1	Silicon, NPN; sim to Type 2N706.
Q2 and Q3	19A115315-P1	Silicon, NPN; sim to Type 2N708.
Q4	19A115262-P2	Silicon, NPN.
Q5	19A115294-P2	Silicon, NPN.
Q6	19A115304-P1	Silicon, NPN.
Q7	19C300114-P1	Silicon, NPN; sim to Type 2N706.
Q8 thru Q10	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q11	19C300114-P1	Silicon, NPN; sim to Type 2N706.
		---------- RESISTORS ----------
R1	3R152-P472K	Fixed composition: 4700 ohms ±10%, 1/4 w. (Used in Models 4ET01A16, 17, 18, 19, 20 and 21 only).
R2	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w. (Used in Models 4ET01A16, 17, 18, 19, 20 and 21 only).
R3	3R152-P183K	Fixed composition: 18,000 ohms ±10%, 1/4 w. (Used in Models 4ET01A16, 17, 18, 19, 20 and 21 only).
R4	3R152-P103K	Fixed composition: 1000 ohms ±10%, 1/4 w. (Used in Models 4ET01A16, 17, 18, 19, 20 and 21 only).
R5	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w.
R6	3R152-P562K	Fixed composition: 5600 ohms ±10%, 1/4 w.
R7	3R152-P560K	Fixed composition: 56 ohms ±10%, 1/4 w.
R8	3R152-P183K	Fixed composition: 18,000 ohms ±10%, 1/4 w.
R9	3R152-P102K	Fixed composition: 1000 ohms ±10%. 1/4 w.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- RESISTORS(Cont'd) ------
R10	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w.
R11	3R152-P753J	Fixed composition: 7500 ohms ±5%, 1/4 w.
R12	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R13	3R152-P473K	Fixed composition: 47,000 ohms ±10%, 1/4 w.
R14	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.
R15	3R152-P753J	Fixed composition: 7500 ohms ±5%, 1/4 w.
R16	3R152-P393K	Fixed composition: 39,000 ohms ±10%, 1/4 w.
R17	3R152-P392K	Fixed composition: 3900 ohms ±10%, 1/4 w.
R18	3R152-P471K	Fixed composition: 470 ohms ±10%, 1/4 w.
R19	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R20	3R152-P221K	Fixed composition: 220 ohms ±10%, 1/4 w.
R21 and R22	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w.
R23*	3R152-P221K	Fixed composition: 220 ohms ±10%, 1/4 w. In Models earlier than REV. A (4ET01A16-15) or REV. B (4ET01A16-21).
	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R25	3R152-P681J	Fixed composition: 680 ohms ±5%, 1/4 w.
R26	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w. (Used in Models 4ET01A17, 19 and 21 only).
R27	3R152-P183K	Fixed composition: 18,000 ohms ±10%, 1/4 w. (Used in Models 4ET01A17, 19 and 21 only).
R28	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w. (Used in Models 4ET01A17, 19 and 21 only).
R29	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w. (Used in Models 4ET01A11, 13, 15, 17, 19 and 21 only).
R30	3R152-P562K	Fixed composition: 5600 ohms ±10%, 1/4 w. (Used in Models 4ET01A11, 13, 15, 17, 19 and 21 only).
R31	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.
R32*	3R152-P221K	Fixed composition: 220 ohms ±10%, 1/4 w. In Models earlier than REV. A (4ET01A10-15) or REV. B (4ET01A16-21).
	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R33	3R152-P221K	Fixed composition: 220 ohms ±10%, 1/4 w.
R34	3R152-P271K	Fixed composition: 270 ohms ±10%, 1/4 w.
R35	3R152-P330K	Fixed composition: 33 ohms ±10%, 1/4 w.
R36	7147161-P12	Fixed composition: 4.7 ohms ±10%, 1/2 w.
R39	5492251-P2	Variable, composition: 100 ohms ±20%, 0.25 w, linear taper; sim to Allen-Bradley Type "F".
R40	3R77-P390K	Fixed composition: 39 ohms ±10%, 1/2 w.
R44	3R152-P562K	Fixed composition: 5600 ohms ±10%, 1/4 w.
R45	3R152-P223K	Fixed composition: 22,000 ohms ±10%, 1/4 w.
R46	3R152-P153K	Fixed composition: 15,000 ohms ±10%, 1/4 w.
R47	3R152-P621J	Fixed composition: 620 ohms ±5%, 1/4 w.
R48	19B201969-P9	Variable, carbon film: 0.1 megohm ±20%, 0.1 w, linear taper; sim to Centralab Series A.
R49	3R152-P222K	Fixed composition: 2200 ohms ±10%, 1/4 w.
R50	19B209022-P8	Wirewound, phenolic body: 0.51 ohm ±5%, 2 w; sim to IRC Type BWH.
R51 and R52	3R152-P473K	Fixed composition: 47,000 ohms ±10%, 1/4 w.
R53 and R54	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.
R55	3R77-P274J	Fixed composition: 0.27 megohm ±5%, 1/2 w.
R56	3R152-P473K	Fixed composition: 47,000 ohms ±10%, 1/4 w.
R57	3R152-P220K	Fixed composition: 22 ohms ±10%, 1/4 w.
R58	3R152-P330K	Fixed composition: 33 ohms ±10%, 1/4 w.
R59	3R77-P120K	Fixed composition: 12 ohms ±10%, 1/2 w.
R60	3R77-P100K	Fixed composition: 10 ohms ±10%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- RESISTORS(Cont'd) ------
R61	7147161-P12	Fixed composition: 4.7 ohms ±10%, 1/2 w.
R62	3R77-P120K	Fixed composition: 12 ohms ±10%, 1/2 w.
R63	3R77-P100K	Fixed composition: 10 ohms ±10%, 1/2 w.
R64	7147161-P12	Fixed composition: 4.7 ohms ±10%, 1/2 w.
		---------- THERMISTORS ----------
RT1	4034664-P1	Lamp, incandescent: 28 v, .04 amp. G-E Type 2148.
		---------- SOCKETS ----------
XY1		Refer to Mechanical Parts (RC-1106).
XY2		Refer to Mechanical Parts (RC-1106). (Used in Models 4ET01A11, 13, 15, 17, 19 and 21 only).
		---------- CRYSTALS ----------
		When reordering give G-E Part Number and specify exact frequency needed.
		Crystal Frequency = (OF ÷ 8).
Y1	19B206275-P1	Quartz: astiresonant, freq range 3125-6750 KC.
Y2	19B2006275-P1	Quartz: astiresonant, freq range 3125-6750 KC. (Used in Models 4ET01A11, 13, 15, 17, 19 and 21 only).
		---------- SUBASSEMBLIES ----------
Z1	19B209118-P1	Resistor Assembly. 1/2 w max.
Z2	19B209117-P1	High Pass-Low Pass Filter Assembly. 0.4 w max per filter.
		POWER AMPLIFIER ASSEMBLY
		4ET01A10, 11, 16, 17 (PL-19C303592-G1) 25-33 MC 4ET01A12, 13, 18, 19 (PL-19C303592-G2) 33-42 MC 4ET01A14, 15, 20, 21 (PL-19C303592-G3) 42-50 MC
		---------- CAPACITORS ----------
C1	19A115282-P3	Variable, mica (compression trimmer): approx 37-235 pf, 150 VDCW, ceramic washer; sim to Elmenco Type 42.
C2	5494481-P15	Ceramic disc: .003 µf ±20%, 500 VDCW; sim to RMC Type JF.
C3	5491189-P6	Mylars, epoxy-dipped: 0.1 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C4 and C5	5494481-P15	Ceramic disc: .003 µf ±20%, 500 VDCW; sim to RMC Type JF.
C6	19A115282-P3	Variable, mica (compression trimmer): approx 37-235 pf, 150 VDCW, ceramic washer; sim to Elmenco Type 42.
C7	7489162-P129	Silver mica: 120 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C8	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C9	7147203-P124	Silver mica: 4700 pf ±10%, 300 VDCW; sim to Electro Motive Type DM-20.
C10	7489162-P129	Silver mica: 120 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C11	7489162-P127	Silver mica: 100 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C12	7489162-P123	Silver mica: 68 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C13	7489162-P119	Silver mica: 47 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C14	7489162-P115	Silver mica: 33 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C15	7489162-P113	Silver mica: 27 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C16	7489162-P119	Silver mica: 47 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C17	789162-P117	Silver mica: 39 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.
C18	7489162-P113	Silver mica: 27 pf ±10%, 500 VDCW; sim to Electro Motive Type DM-15.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- RECTIFIERS ----------
CR1	5494922-P2	Silicon; sim to Type 1N456.
		---------- TERMINALS ----------
E1 and E2		Refer to Mechanical Parts (RC-1106).
E4 thru E9		Refer to Mechanical Parts (RC-1106).
		---------- INDUCTORS ----------
L1	7488079-P10	Choke, RF: 3.3 µh ±10%, 1350 ma max, 0.15 ohm max; sim to Jeffers 4421-1.
L3	PL-19B204771-G1	Coil Assembly.
L4	PL-19B204771-G2	Coil Assembly.
L5	PL-19B204771-G3	Coil Assembly.
L6	7488079-P2	Choke, RF: 0.22 µh ±20%, 2800 ma max, .04 ohm max; sim to Jeffers 4411-2.
L7	19A121497-P1	Coil.
L8	19A121497-P2	Coil.
L9	19A121497-P3	Coil.
L10	19A121498-P1	Coil.
L11	19A121498-P2	Coil.
L12	19A121498-P3	Coil.
		---------- TRANSISTORS ----------
Q1	19A115269-P1	Silicon, NPN.
		---------- RESISTORS ----------
R1	3R152-P100K	Fixed composition: 10 ohms ±10%, 1/4 w.
R2	3R152-P153K	Fixed composition: 15,000 ohms ±10%, 1/4 w.
		---------- CABLES ----------
W1		CABLE ASSEMBLY PL-19A121172-G1
		---------- PLUGS ----------
P1	5496078-P1	Push-on: Teflons; sim to FXR 27-1.
		---------- MISCELANEOUS ----------
	19B209044-P13	Cable, RF: 7 inches; sim to Amphenol 421-105.
		MECHANICAL PARTS (SEE RC-1106)
1	4033084-P2	Crimp ring: sim to Burndy, "Burndy Hyring" YOC112.
2	N330P1508F22	Eyelet.
3	4034512-P1	Terminal, feed-thru, insulated: brass, Teflons, 750 vrms at sea level, 5.5 amps continuous; sim to Sealectro FT-3M-32-TUR. (E7)
4	4034512-P3	Terminal, feed-thru, insulated: brass, Teflons, 750 vrms at sea level, 5.5 amps continuous; sim to Sealectro E37-MM-10-TUR. (E6)
5	7143206-P1	Terminal, standoff. (E4 and E5)
6	19A121152-P1	Support: approx 1/2 x 8/16 x 7/16 inches. (Used with C1 and C6).
7	19A121192-P1	Heat sink: approx 2 x 5/8 inches. (Used with Q6)
8	19A121140-P1	Heat sink: approx 7/8 x 5/8 x 1/4 inches. (Used with Q5).
9	19A121533-P1	Spacer, tubular. (Used with J11).
10	4039307-P1	Socket. (Part of XY1 and XY2).
11	4033089-P1	Clip. (Part of XY1 and XY2).
12	4033751-P1	Contact: sim to Methode 752 V(PB). (Part of XY1 and XY2).

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS(Cont'd)
13	4035711-P4	Clip, spring tension: sim to Augat Brothers 6007-8-CT. (Used with RT1).
14	19A121252-P1	Heat sink. (Used with Q5).
15	4036555-P1	Insulator, washer: nylon. (Used with Q5).
16	4029006-P3	Compression ring: sim to Tinnerman C5426-014-24. (Used with Q5).
17	19A121258-P1	Spacer. (Used with Q6).
18	4029309-P1	Terminal, feed-thru: Teflons; sim to Sealectro FT-3M-27. (E1, E2, E8 and E9).
19	19A121258-P1	Support: approx 2-1/2 x 1 x 5/16 inches.
20	4029974-P1	Insulator. (Used with Q1).
21	19B204775-P2	Casting: approx 3-13/16 x 2-11/16 x 13/16 inches.
22	19A121500-P1	Plate: approx 2-3/8 x 1/2 x 1/16 inches.
23	19A121499-P1	Angle: approx 2-3/8 x 11/16 x 1/16 inches. (Used with L7, L8, L9, L10, L11 and L12).



TRANSMITTER 4ET61A0-4ET61A21

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 - (Models 4ET01A16-21 only)
To improve ease of tuning on transmitters with Channel Guard. Changed C3 and C43.

REV. A - (Models 4ET61A10-15 only)
REV. B - (Models 4ET61A16-21 only)
To prevent detuning of transmitter when assembled in case. Changed C53, R23, R32 and added C21.

PARTS LIST

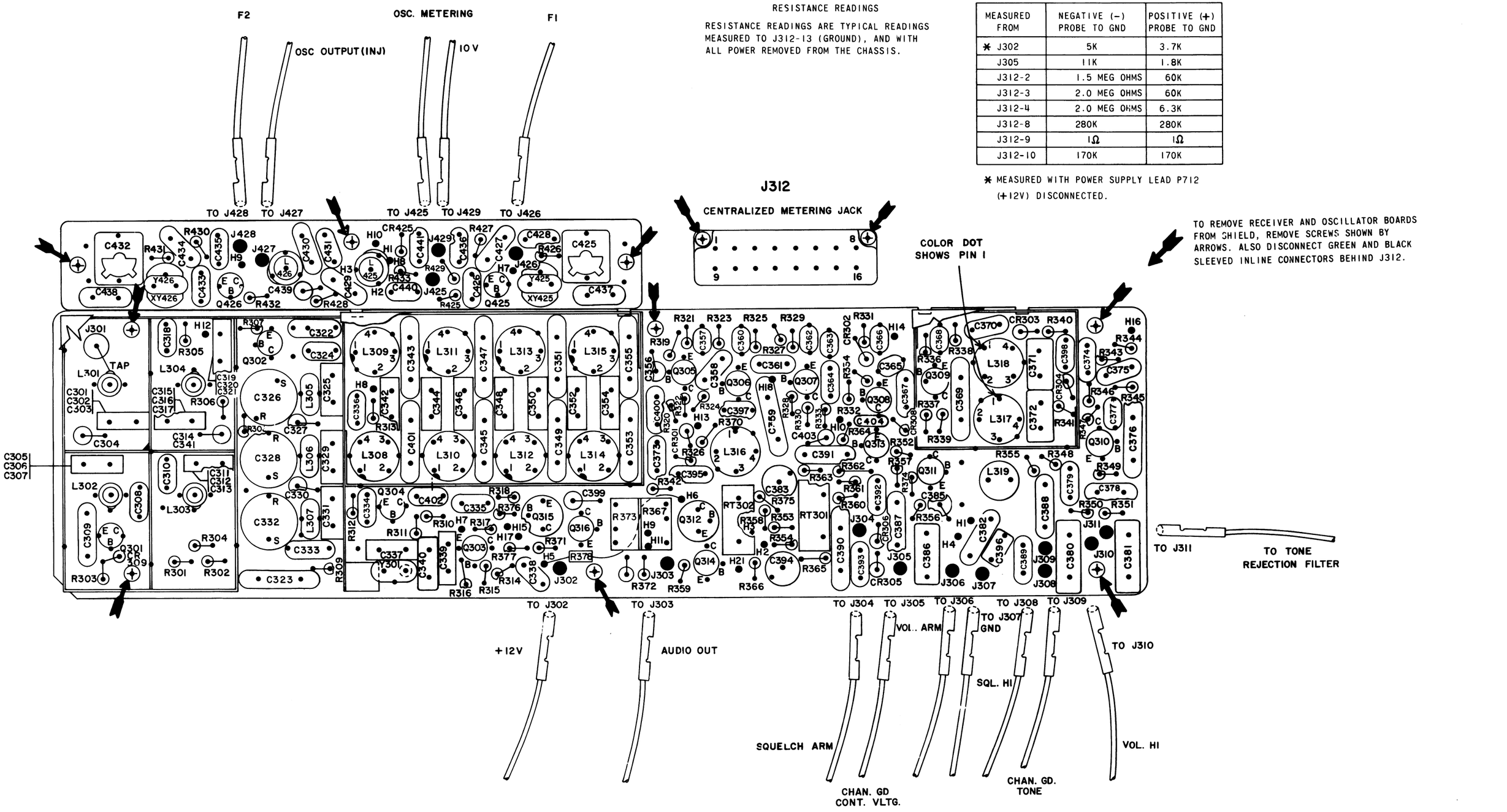
25—50 MC
RECEIVER MODELS 4ER43A10—15

Receiver Board 19D402429-G1, Rev. F
Receiver Boards 19D402429-G2 & 3, Rev. E
Oscillator Boards 4EG19A10 & 11

SYMBOL	G-E PART NO.	DESCRIPTION
		RECEIVER BOARDS
		25-33 MC Board 19D402429-G1 (Used in 4ER43A10 & 11)
		33-42 MC Board 19D402429-G2 (Used in 4ER43A12 & 13)
		42-50 MC Board 19D402429-G3 (Used in 4ER43A14 & 15)
		- - - - - - - - - - CAPACITORS - - - - - - - - -
C301	5490008-P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A10 and 4ER43A11 only).
C302	5490008-P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A12 and 4ER43A13 only).
C303	5490008-P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A14 and 4ER43A15 only).
C304	7130348-P4	Molded: 2.2 pf ±0.11 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C305	5490008-P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A10 and 4ER43A11 only).
C306	5490008-P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A12 and 4ER43A13 only).
C307	5490008-P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A14 and 4ER43A15 only).
C308	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C309	5494481-P115	Ceramic disc: .003 µf ±20%, 500 VDCW; sim to RMC Type JF.
C310	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C311	5490008-P24	Silver mica: 75 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A10 and 4ER43A11 only).
C312	5490008-P19	Silver mica: 47 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A12 and 4ER43A13 only).
C313	5490008-P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A14 and 4ER43A15 only).
C314	7130348-P3	Molded: 1 pf ±.05 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32. (Used in Models 4ER43A10, 11, 12 and 13 only).
C315	5490008-P21	Silver mica: 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A10 and 4ER43A11 only).
C316	5490008-P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A12 and 4ER43A13 only).
C317	5490008-P11	Silver mica: 22 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A14 and 4ER43A15 only).
C318	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C319*	5490008-P21	Silver mica, dipped phen: radial leads, 56 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A10 and 4ER43A11 only).
	5490008-P27	In Models earlier than Rev. B: Silver mica: 100 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C320	5490008-P17	Silver mica: 39 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A12 and 4ER43A13 only).
C321	5490008-P13	Silver mica: 27 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Models 4ER43A14 and 4ER43A15 only).
C322	5494481-P115	Ceramic disc: .003 µf ±20%, 500 VDCW; sim to RMC Type JF.
C323	7491827-P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C324	7491827-P2	- - - - - - - - - - CAPACITORS(Cont'd) - - - - - - Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C325	5490008-P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C326	5490446-P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C327	7130348-P1	Molded: 0.47 pf ±.047 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C328	5490446-P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C329	5490008-P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C330	7130348-P1	Molded: 0.47 pf ±.047 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32.
C331	5490008-P29	Silver mica: 120 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C332	5490446-P1	Variable, ceramic: approx 8-50 pf, 350 VDCW, temp coef -750 PPM; sim to Erie Style 557-36.
C333	5494481-P115	Ceramic disc: .003 µf ±20%, 500 VDCW; sim to RMC Type JF.
C334*	5491189-P101	Polyester: .01 µf ±20%, 50 VDCW. On Receiver Board 19D402429-G1 before Rev. E or on Receiver Board 19D402429-G2, 3 before Rev. D
	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C335 and C336	5492638-P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C337	5490008-P33	Silver mica: 180 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C338*	5491189-P101	Polyester: .01 µf ±20%, 50 VDCW. On Receiver Board 19D402429-G1 before Rev. E or on Receiver Board 19D402429-G2, 3 before Rev. D
	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C339 and C340	5490008-P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C341	7130348-P9	Molded: 0.22 pf ±.022 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JM-5/32. (Used in Models 4ER43A14 and 4ER43A15 only).
C342	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C343	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C344	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C345	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C346	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C347	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C348	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C349	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C350	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C351	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C352	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C353	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C354	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C355	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C356	7491930-P3	Mylar® dielectric: .0047 µf ±20%, 100 VDCW; sim to G-E Type 61F.
C357	5492638-P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C358	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF.
C359	5496219-P367	Ceramic disc: 150 pf ±5%, 500 VDCW, temp coef -150 PPM.
C360	5492638-P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C361	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF.
C362	5492638-P101	- - - - - - - - - - CAPACITORS(Cont'd) - - - - - Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C363	7491393-P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague 1219C4.
C364	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF.
C365	5492638-P101	Ceramic disc: 0.1 µf +100% -0%, 3 VDCW; sim to Sprague 54C23.
C366	7491393-P1	Ceramic disc: .001 µf +100% -0%, 500 VDCW; sim to Sprague 1219C4.
C367	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF.
C368*	19B209243-P1	Polyester dielectric: radial leads, .01 uf ±20%, 40 VDCW; sim to Amperex C280AA/P10K.
		On Receiver Board 19D402429-G1 before Rev. D or on Receiver Board 19D402429-G2, 3 before Rev. C:
	7491827-P2	Ceramic disc: .01 uf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C369	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C370	5492638-P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C371 and C372	5490008-P37	Silver mica: 270 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C373	5492638-P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C374 and C375	5494481-P111	Ceramic disc: .001 µf ±20%, 500 VDCW; sim to RMC Type JF.
C376	5492638-P108	Ceramic disc: 0.22 µf +80% -20%, 12 VDCW; sim to Sprague 44C70.
C377	5494481-P107	Ceramic disc: 470 pf ±20%, 500 VDCW; sim to RMC Type JF.
C378	7491930-P8	Mylar® dielectric: .047 µf ±20%, 100 VDCW; sim to G-E Type 61F.
C379*	5492638-P8	Fixed ceramic disc: 0.22 uf +80% -20%, 12 VDCW; sim to Sprague 44C70.
	5492638-P107	In Models earlier than Rev. A: Ceramic disc: 0.1 uf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C380*	19B209243-P8	Polyester dielectric: radial leads, 0.15 uf ±20%, 40 VDCW; sim to Amperex C280AA/P150K.
	5491189-P106	In Models earlier than Rev. A: Mylar , epoxy-dipped: 0.1 uf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C381	5491189-P106	Mylar , epoxy-dipped: 0.1 uf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C382	5492638-P108	Ceramic disc: 0.22 µf +80% -20%, 12 VDCW; sim to Sprague 44C70.
C383	5495670-P3	Electrolytic tubular: 5 µf +75% -10%, 6 VDCW; sim to Sprague 30D125A1.
C384*	5494481-P114	Ceramic disc: .002 uf ±10%, 500 VDCW; sim to RMC Type JF. (Deleted by Rev. A.)
C385	5496267-P2	Tantalum, dry solid: 47 µf ±20%, 6 VDCW; sim to Sprague 150D476X0006B2.
C386*	19B209243-P5	Polyester dielectric: radial leads, .047 uf ±20%, 40 VDCW; sim to Amperex C280AA/P47K.
	5491189-P105	In Models earlier than Rev. A: Mylar , epoxy-dipped: .068 uf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C387	5492638-P108	Ceramic disc: 0.22 µf +80% -20%, 12 VDCW; sim to Sprague 44C70.
C388	5494481-P116	Ceramic disc: .003 µf ±10%, 500 VDCW; sim to RMC Type JF.
C389	5494481-P112	Ceramic disc: .001 µf ±10%, 500 VDCW; sim to RMC Type JF.
C390	7491827-P5	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C391	5492638-P108	Ceramic disc: 0.22 µf +80% -20%, 12 VDCW; sim to Sprague 44C70.
C392*	19B209243-P1	Polyester dielectric: radial leads, .01 uf ±20%, 40 VDCW; sim to Amperex C280AA/P10K.
		On Receiver Board 19D402429-G1 before Rev. D or on Receiver Board 19D402429-G2, 3 before Rev. C:
	7491827-P2	Ceramic disc: .01 uf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C393	5492638-P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C394	5495670-P13	Electrolytic tubular: 2 µf +75% -10%, 25 VDCW; sim to Sprague 30D176A1.
C395	5492638-P107	Ceramic disc: 0.1 µf +80% -20%, 12 VDCW; sim to Sprague 20C202.
C396	5491189-P301	Mylar®, epoxy-dipped: .01 µf ±5%, 50 VDCW; sim to Good-All Type 601PE.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

(Cont' on Sheet 2)



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

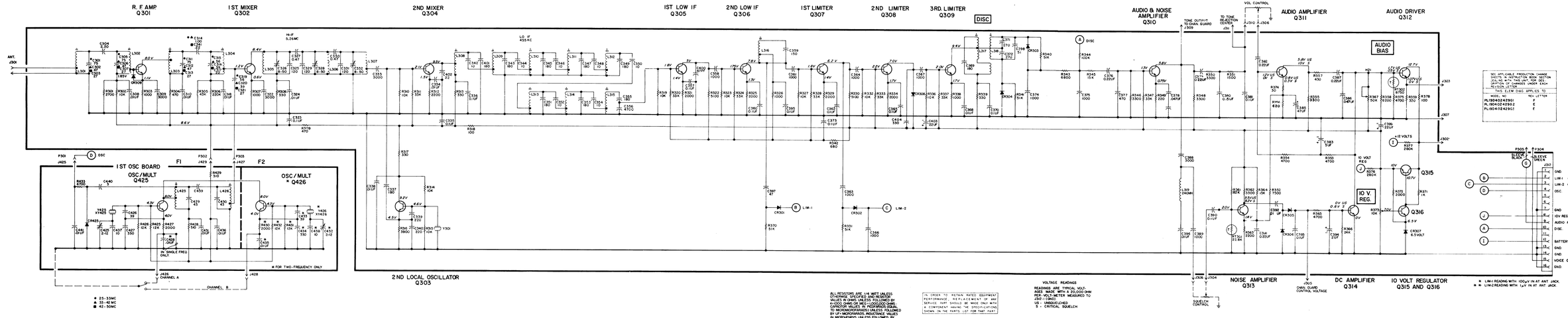
* MEASURED WITH POWER SUPPLY LEAD P712 (+12V) DISCONNECTED.

SERVICE SHEET

25-50 MC RECEIVER MODELS 4ER43A10-15
RECEIVER BOARD 19D402429-G1, REV. F
RECEIVER BOARD 19D402429-G2 & 3, REV. E
OSCILLATOR BOARDS 4EG19A10 & 11

(RC-1141D, Sheet 1)

(19D402549, Rev. 5)



(198620718, Rev. 12)

SERVICE SHEET

25-50 MC RECEIVER MODELS 4ER43A10-15
RECEIVER BOARD 19D402429-G1, REV. F
RECEIVER BOARD 19D402429-G2 & 3, REV. E
OSCILLATOR BOARDS 4EG19A10 & 11

(RC-1141D, Sheet 2)

(Cont'd from Sheet 1)

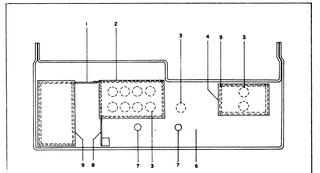
SYMBOL	G-E PART NO	DESCRIPTION
		---------- CAPACITORS(Cont'd) ----------
C397	5496203-P117	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -330 PPM.
C398	5496219-P656	Ceramic disc: 51 pf ±5%, 500 VDCW, temp coef -470 PPM.
C399	5496267-P10	Tantalum, dry solid: 22 µf ±20%, 15 VDCW; sim to Sprague 150D226X0015B2.
C400	5496219-P817	Ceramic disc: 47 pf ±10%, 500 VDCW, temp coef -1500 PPM.
C401	5496219-P369	Ceramic disc: 180 pf ±5%, 500 VDCW, temp coef -150 PPM.
C402	5490008-P11	Silver mica: 22 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C403	5496267-P10	Tantalum, dry solid: 22 µf ±20%, 15 VDCW; sim to Sprague 150D226X0015B2.
C404*	7489162-P139	Silver mica, rectangular, dipped phenolic base: 330 pf ±10%, 500 VDCW; sim to Electro Motive Mfg Co Type DM-15. (Added by Rev. C to Receiver Board 19D402429-G1 and by Rev. B to 19D402429-G2 & -G3.)
		---------- RECTIFIERS ----------
CR301 and CR302	7777146-P3	Germanium; sim to Type 1N90.
CR303 and CR304	19A115250-P1	Silicon.
CR305 and CR306	7777146-P3	Germanium; sim to Type 1N90.
CR307	4036887-P6	Silicon, Zeners.
CR308	4036887-P3	Silicon, Zeners.
CR309*	4038642-P1	Germanium. (Added to Receiver Board 19D402429-G1 by Rev. D and to 19D402429-G2 and -G3 by Rev. C.)
		---------- JACKS AND RECEPTACLES ----------
J301	5496078-P3	Receptacle, push-on: Teflon; sim to FXR 27-3.
J302 thru J311	4033513-P4	Pin, contact: sim to Bead Chain L83-3.
J312	19B209125-P2	Connector: 18 contacts, Lexans, 5 amps at 1000 VDC.
		---------- INDUCTORS ----------
L301	PL-19C303583-G3	Coil Assembly. Includes:
	19B200497-P2	Tuning slug.
L302	PL-19C303583-G4	Coil Assembly. Includes:
	19B200497-P2	Tuning slug.
L303	PL-19C303583-G2	Coil Assembly. Includes:
	19B200497-P2	Tuning slug.
L304	PL-19C303583-G1	Coil Assembly. Includes:
	19B200497-P2	Tuning slug.
L305 and L306	PL-19B204932-G1	Coil Assembly.
L307	PL-19B204932-G2	Coil Assembly.
L308 thru L310	PL-19C303062-G6	Coil Assembly. Includes:
	4038368-P1	Tuning slug.
L317	PL-19C303062-G4	Coil Assembly. Includes:
	4038368-P1	Tuning slug.
L318	PL-19C303062-G5	Coil Assembly. Includes:
	4038368-P1	Tuning slug.
L319	5491736-P2	Inductor: 240 mh ±10% ind at 0.5 v, 270 ohms max DC res; sim to Aladdin 33-161.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- PLUGS ----------
P301 thru P303	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P304 and P305	7147199-P1	Connector: 1 male contact; sim to Winchester Electronics 21A03.
		---------- TRANSISTORS ----------
Q301 and Q302	19A115342-P1	Silicon, NPN.
Q303	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q304	19A115245-P1	Silicon, NPN.
Q305 thru Q311	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q312	19A115300-P2	Silicon, NPN; sim to Type 2N3053.
Q313 and Q314	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q315	19A115300-P2	Silicon, NPN; sim to Type 2N3053.
Q316	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
		---------- RESISTORS ----------
R301	3R152-P273J	Fixed composition: 2700 ohms ±5%, 1/4 w.
R302	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R303	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.
R304	3R152-P471K	Fixed composition: 470 ohms ±10%, 1/4 w.
R305	3R152-P224K	Fixed composition: 0.22 megohm ±10%, 1/4 w.
R306	3R152-P433K	Fixed composition: 43,000 ohms ±10%, 1/4 w.
R307	3R152-P102J	Fixed composition: 1000 ohms ±5%, 1/4 w.
R308	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R309	3R152-P471K	Fixed composition: 470 ohms ±10%, 1/4 w.
R310	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R311	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R312	3R152-P222K	Fixed composition: 2200 ohms ±10%, 1/4 w.
R313	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R314 and R315	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R316	3R152-P399K	Fixed composition: 3900 ohms ±10%, 1/4 w.
R317	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R318	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w.
R319	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R320	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R321	3R152-P202K	Fixed composition: 2000 ohms ±10%, 1/4 w.
R322	3R152-P512J	Fixed composition: 5100 ohms ±5%, 1/4 w.
R323	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R324	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R325	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R326	3R152-P102K	Fixed composition: 1000 ohms ±10%, 1/4 w.
R327	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R328	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R329	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R330	3R152-P512J	Fixed composition: 5100 ohms ±5%, 1/4 w.
R331	3R152-P513J	Fixed composition: 51,000 ohms ±5%, 1/4 w.
R332	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R333	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R334	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R336	3R152-P103K	Fixed composition: 10,000 ohms ±10%, 1/4 w.
R337	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R338	3R152-P102J	Fixed composition: 1000 ohms ±5%, 1/4 w.
R339	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R340 and R341	3R152-P513K	Fixed composition: 51,000 ohms ±10%, 1/4 w.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- RESISTORS(Cont'd) ----------
R342	3R152-P681K	Fixed composition: 680 ohms ±10%, 1/4 w.
R343	3R152-P682K	Fixed composition: 6800 ohms ±10%, 1/4 w.
R344	3R152-P104K	Fixed composition: 0.1 megohm ±10%, 1/4 w.
R345	3R152-P153K	Fixed composition: 15,000 ohms ±10%, 1/4 w.
R346	3R152-P332K	Fixed composition: 3300 ohms ±10%, 1/4 w.
R347	3R152-P333K	Fixed composition: 33,000 ohms ±10%, 1/4 w.
R348	3R152-P332K	Fixed composition: 3300 ohms ±10%, 1/4 w.
R349	3R152-P221K	Fixed composition: 220 ohms ±10%, 1/4 w.
R350	3R152-P332J	Fixed composition: 3300 ohms ±5%, 1/4 w.
R351	3R152-P152J	Fixed composition: 1500 ohms ±5%, 1/4 w.
R352	3R152-P752J	Fixed composition: 7500 ohms ±5%, 1/4 w.
R353 and R354	3R152-P472K	Fixed composition: 4700 ohms ±10%, 1/4 w.
R355*	3R152-P333K	Fixed composition: 3300 ohms ±10%, 1/4 w. In Models earlier than Rev. A*: Fixed composition: 2200 ohms ±10%, 1/4 w.
R356*	3R152-P621J	Fixed composition: 620 ohms ±5%, 1/4 w. In Models earlier than Rev. A:
	3R152-P431J	Fixed composition: 430 ohms ±5%, 1/4 w.
R357	3R152-P431J	Fixed composition: 430 ohms ±5%, 1/4 w.
R358	3R152-P622J	Fixed composition: 6200 ohms ±5%, 1/4 w.
R359	3R152-P331K	Fixed composition: 330 ohms ±10%, 1/4 w.
R360*	3R152-P104J	Fixed composition: 0.1 megohm ±5%, 1/4 w. (Deleted from Receiver Board 19D402429-G1 by Rev. D and from 19D402429-G2 and -G3 by Rev. C.)
R361*	3R152-P823J	Fixed composition: 82,000 ohms ±5%, 1/4 w. On Receiver Board 19D402429-G1 before Rev. D or on Receiver Board 19D402429-G2, 3 before Rev. C:
	3R152-P753J	Fixed composition: 75,000 ohms ±5%, 1/4 w.
R362	3R152-P332J	Fixed composition: 3300 ohms ±5%, 1/4 w.
R363	3R152-P222J	Fixed composition: 2200 ohms ±5%, 1/4 w.
R364	3R152-P153J	Fixed composition: 15,000 ohms ±5%, 1/4 w.
R365	3R152-P472K	Fixed composition: 4700 ohms ±10%, 1/4 w.
R366	3R152-P243J	Fixed composition: 24,000 ohms ±5%, 1/4 w.
R367	PL-19B204808-G1	Resistor Assembly. Includes resistor, variable, carbon film: 50,000 ohms ±20%, 0.1 w, linear taper.
R370	3R152-P513J	Fixed composition: 51,000 ohms ±5%, 1/4 w.
R371	3R152-P103J	Fixed composition: 1000 ohms ±5%, 1/4 w.
R372	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R373	PL-19B204808-G2	Resistor Assembly. Includes resistor, variable, carbon film: 10,000 ohms ±20%, 0.1 w, linear taper.
R374	3R152-P300K	Fixed composition: 30 ohms ±10%, 1/4 w.
R375	3R152-P472J	Fixed composition: 4700 ohms ±5%, 1/4 w.
R376 and R377	5485948-P444	Deposited carbon: 0.28 megohm ±1%, 1/2 w; sim to Texas Inst CEL/ERL.
R378*	3R152-P101K	Fixed composition: 100 ohms ±10%, 1/4 w. (Added by Rev. F to 19D402429-G1 and by Rev. E to 19D402429-G2 & G3)
		---------- THERMISTORS ----------
RT301	5490828-P29	Rod: 22,800 ohms ±5% res at 25°C, 1 w max input at 40°C; sim to Globar 723B-1.
RT302	5490828-P28	Rod: 8750 ohms ±5% res at 25°C, 1 w max input at 40°C; sim to Globar 723F-2.
		---------- CRYSTALS ----------
Y301	19B206356-P1	Quartz: antiresonant, frequency 4805.00 KC.
		OSCILLATOR BOARDS
		1-Freq Board Model 4EG19A10 (19C303591-G1) 2-Freq Board Model 4EG19A11 (19C303591-G2)
		---------- CAPACITORS ----------
C425	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 850 v peak; sim to EF Johnson 189-6-5. (Used in Model 4EG19A11 only).
C426	5496218-P653	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -470 PPM.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- CAPACITORS(Cont'd) ----------
C427	5490008-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C428	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C429 and C430	5496218-P54	Ceramic disc: 43 pf ±5%, 500 VDCW, temp coef 0 PPM.
C431	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C432	5491271-P106	Variable, subminiature: approx 1.98-12.4 pf, 850 v peak; sim to EF Johnson 189-6-5. (Used in Model 4EG19A11 only).
C433	5496218-P653	Ceramic disc: 39 pf ±5%, 500 VDCW, temp coef -470 PPM. (Used in Model 4EG19A11 only).
C434	5490008-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Model 4EG19A11 only).
C435	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180. (Used in Model 4EG19A11 only).
C436	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
C437	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C438	5490008-P6	Silver mica: 10 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15. (Used in Model 4EG19A11 only).
C439	7130348-P3	Molded: 1 pf ±.05 pf, 500 VDCW, temp coef approx 0 PPM; sim to Jeffers Type JE-5-7J2.
C440	5496218-P34	Ceramic disc: 3 pf ±0.25 pf, 500 VDCW, temp coef 0 PPM.
C441	7491827-P2	Ceramic disc: .01 µf +80% -30%, 50 VDCW; sim to Sprague 19C180.
		---------- RECTIFIERS ----------
CR425	7777146-P3	Germanium; sim to Type 1N90.
		---------- JACKS AND RECEPTACLES ----------
J425 thru J429	4033513-P4	Pin, contact: sim to Bead Chain L83-3.
		---------- INDUCTORS ----------
L425	PL-19B204752-G2	Coil Assembly. Includes:
	7160519-P1	Tuning slug.
L426	PL-19B204752-G1	Coil Assembly. Includes:
	7160519-P1	Tuning slug.
		---------- TRANSISTORS ----------
Q425	19A115245-P1	Silicon, NPN.
Q426	19A115245-P1	Silicon, NPN. (Used in Model 4EG19A11 only).
		---------- RESISTORS ----------
R425 and R426	3R152-P123J	Fixed composition: 12,000 ohms ±5%, 1/4 w.
R427	3R152-P202J	Fixed composition: 2000 ohms ±5%, 1/4 w.
R428 and R429	3R152-P511J	Fixed composition: 510 ohms ±5%, 1/4 w.
R430	3R152-P203J	Fixed composition: 2000 ohms ±5%, 1/4 w. (Used in Model 4EG19A11 only).
R431 and R432	3R152-P123J	Fixed composition: 12,000 ohms ±5%, 1/4 w. (Used in Model 4EG19A11 only).
R433	3R152-P472J	Fixed composition: 4700 ohms ±5%, 1/4 w.
		---------- SOCKETS ----------
XY425	5490277-P1	Transistor: 4 contacts, low-loss mica-filled phenolic; sim to Elco 3303.
XY426	5490277-P1	Transistor: 4 contacts, low-loss mica-filled phenolic; sim to Elco 3303. (Used in Model 4EG19A11 only).

SYMBOL	G-E PART NO	DESCRIPTION
		---------- CRYSTALS ----------
		When reordering give G-E Part Number and specify exact frequency needed.
		25-33 MC Crystal Frequency = (OF -5.26 MC) ÷ 2.
		33-42 MC Crystal Frequency = (OF -5.26 MC) ÷ 2.
		42-50 MC Crystal Frequency = (OF -5.26 MC) ÷ 3.
Y425	19B206357-P1	Quartz: antiresonant, freq range 12-19 MCS.
Y426	19B206357-P2	Quartz: antiresonant, freq range 12-19 MCS. (Used in Model 4EG19A11 only).
		MECHANICAL PARTS (See RC-1105)
1	PL-19B204596-G1	Shield Assembly. approx 2-1/2 x 1-1/2 x 1-1/2 inches.
2	19B204491-P1	Cover: approx 2-3/4 x 1-1/2 x 1/4 inches. (Used with L308 thru L315).
3	PL-4038844-G1	Shield Assembly. approx 1/2 x 1/2 inches, (Used with L308 thru L318).
4	19B204442-P1	Cover: approx 1-1/2 x 1-1/4 x 1/4 inches.
5	PL-19B204612-G1	Shield Assembly. approx 1-1/2 x 1-1/4 x 3/4 inches. (Used with L317 and L318).
6	PL-19B204493-G1	Shield Assembly. approx 9-3/4 x 2-3/4 x 1 inches.
7	4036555-P1	Insulator, washer: nylon. (Used with Q312 and Q315).
8	PL-19B204599-G1	Shield Assembly. approx 3-5/8 x 1-1/2 x 3/4 inches. (Used with L308 thru L315).
9	1nB204604-P1	Cover: approx 2-1/2 x 1-1/2 x 1/4 inches.



RECEIVER 4ER43A10-4ER43A15

PRODUCTION CHANGES

Refer to the PARTS LIST for descriptions of parts affected by these revisions.

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

To improve audio response. C379, C380, C386, R355 and R356 were changed. C364 was deleted.

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

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

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

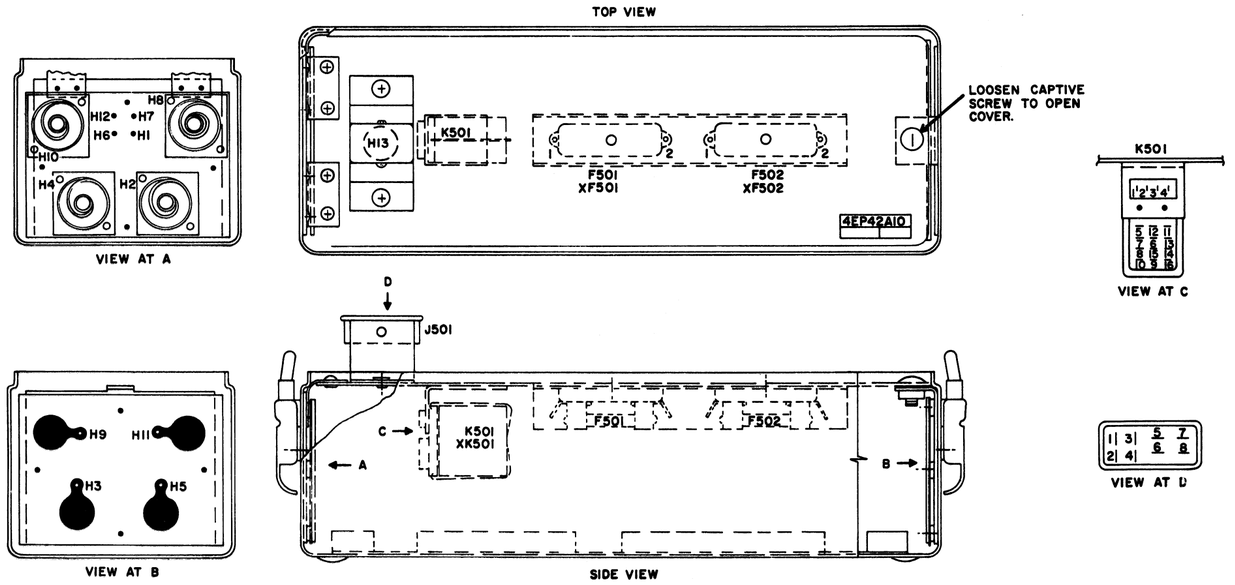
To improve squelch operation at temperature extremes and to protect transistor Q301 from very strong signals. CR309 was added across the emitter and base of Q301. R360 was deleted. C368, C392 and R361 were changed.

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

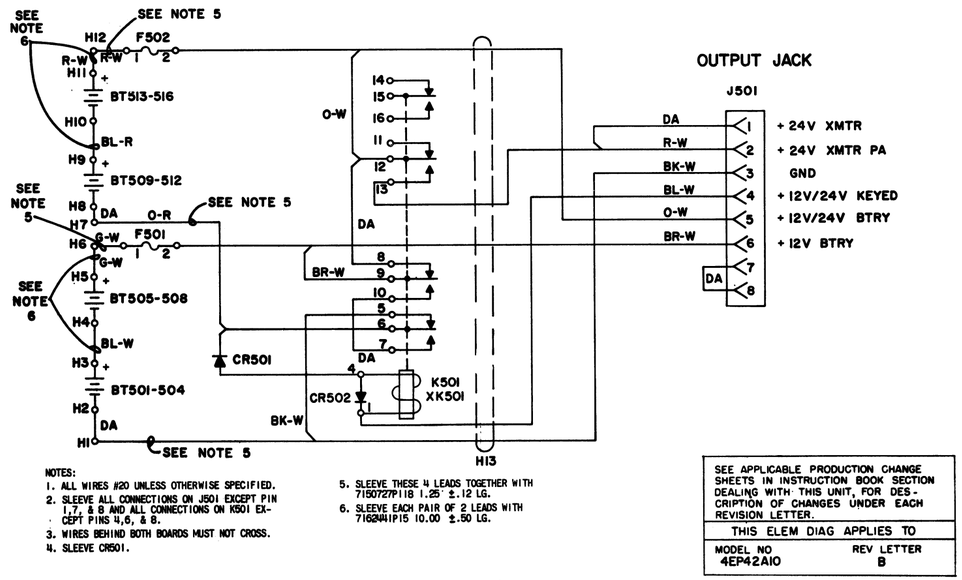
To improve temperature stability at temperature extremes. Changed C234 and C338.

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

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



(19C303698, Rev. 0)



(19B204794, Rev. 4)

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
4EP42A10	B

SERVICE SHEET

DRY BATTERY POWER SUPPLY
MODEL 4EP42A10

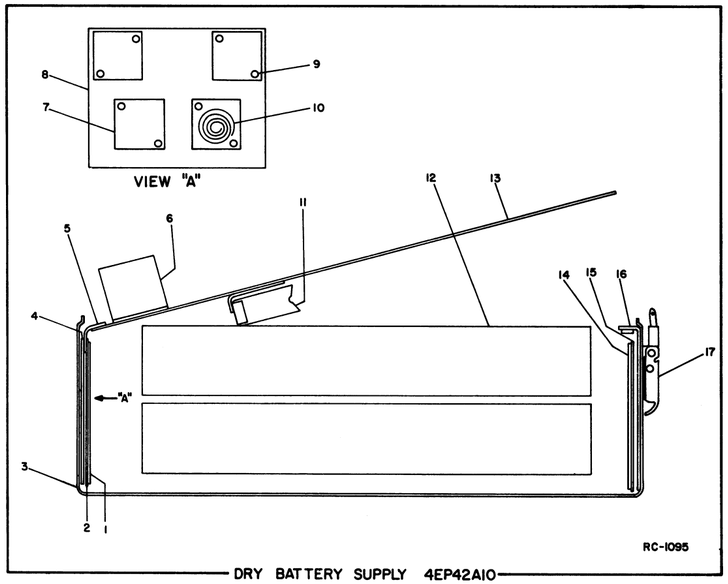
RC-1101C

PARTS LIST

DRY BATTERY POWER SUPPLY
MODEL 4EP42A10
(PL-19C303563-G1)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - - BATTERIES - - - - - - - - - -
BT501 thru BT516	19B209193-P1	Dry alkaline: 1.5 v, "D" size cell.
		- - - - - - - - - - RECTIFIERS - - - - - - - - -
CR501	5495920-P1	Germanium; sim to Type 1N91.
CR502	4037822-P1	Silicon. Added by REV. B.
		- - - - - - - - - - - FUSES - - - - - - - - - - -
F501 and F502	1R16-P4	Quick blowing, cartridge: 1.5 amps at 250 v; sim to Littelfuse 31201.5 or Bussmann AGC-1-1/2.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J501	19A121226-P1	Connector: 8 terminals, phenolic; sim to HB Jones 261-32-02-000.
		- - - - - - - - - - - RELAYS - - - - - - - - - - -
K501*	19C307010-P5	Relay: Armature, 12 VDC nominal, 130 ohms, ±10% coil res, 4 form C contacts; sim to Allied Control T154-X-413.
	19C300957-P2	In Models earlier than REV. A: Miniature, plug-in: 12 VDC, 185 ohms ±10%, 4 form C contacts; sim to Allied Control T154-X-316.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XF501 and XF502	7141008-P1	Holder, fuse: molded plastic base, 5 amps at 125 v, with clip; sim to Littelfuse E-357001.
XK501	5491595-P5	Relay: 16-contacts, nylon, ground spring; sim to Allied Control 30054-2.
		MECHANICAL PARTS
		(See RC-1095)
1	PL-19B204715-G1	Board Assembly: (Includes items 7, 8, 9 and 10).
2	19A121632-P2	Insulator: 3 x 2.44 x .01 inches.
3	PL-19B204716-G1	Can Assembly: 10.25 x 3.62 x 2.96 inches.
4	PL-19A121582-G1	Support Assembly: 3 x 2.44 x .05 inches.
5	19A121633-P1	Hinge: 0.84 x 0.68 x .05 inches, nylon.
6	PL-19A121181-G1	Support Assembly: 2.14 x 1 x .032 inches. (Used with J501).
7	19A121407-P1	Contact: 1 x 1 x .016 inches. (Part of Board Assembly, PL-19B204715-G1).
8	19B204714-P1	Board: 3.24 x 2.35 x .062 inches. (Part of Board Assembly, PL-19B204715-G1).
9	N330P904F22	Eyelet: 0.125 x 0.155 x .091 inches. (Part of Board Assembly, PL-19B204715-G1).
10	19A121408-P1	Spring, conical: 0.9 x 0.437 x 0.4 inches. (Part of Board Assembly, PL-19B204715-G1).
11	5491595-P9	Spring: retainer: 1.358 x 1.142 x 0.787 inches, wire; sim to Allied Control 30040-2. (Used with K501).
12	19A121630-P1	Tube: 8 x 1.343 x .02 inches. (Used with BT501 thru BT516).
13	PL-19B204711-G1	Cover Assembly: 9.65 x 3.14 x .064 inches.
14	19C303647-P1	Board, printed: 3 x 2.35 x .0625 inches.
15	19A121632-P1	Insulator: 3 x 2.44 x .01 inches, fiber.
16	PL-19A121583-G1	Support Assembly: 2.52 x 3 x .05 inches.
17	4029994-P2	Catch, pull-down: 2.526 x 1.125 x 0.406 inches, chrome plated steel; sim to Nielsen SC-B-83314.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



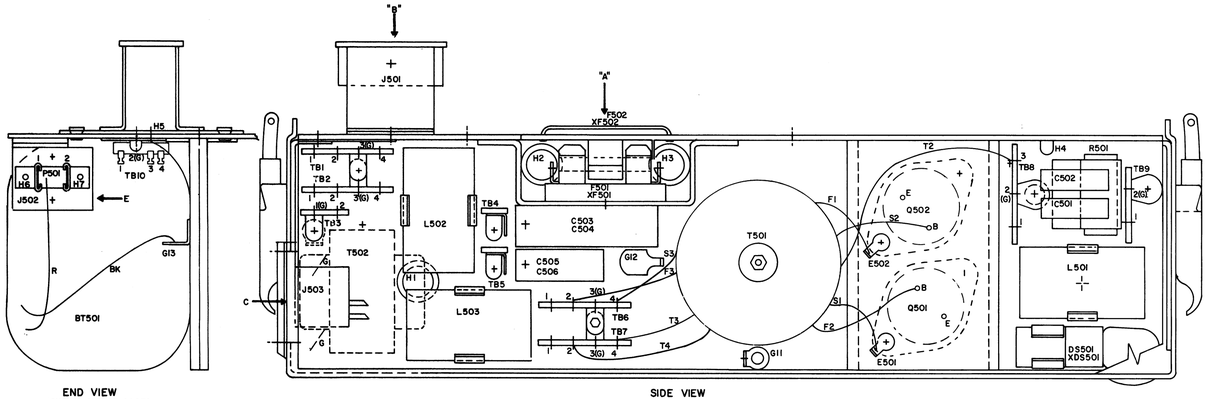
DRY BATTERY SUPPLY 4EP42A10

PRODUCTION CHANGES

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

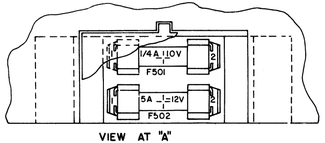
REV. A - To extend life of dry battery. Changed K501.

REV. B - To provide relay arc suppression. Added CR502.



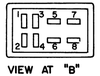
END VIEW
(SHOWN OUT OF CASE)

SIDE VIEW
(SHOWN IN CASE)

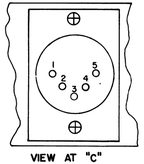


VIEW AT "A"

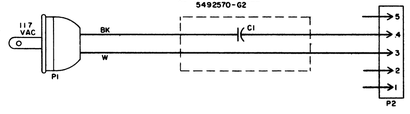
TYP NUMBERING FOR
TB4 & TB5



VIEW AT "B"
J501

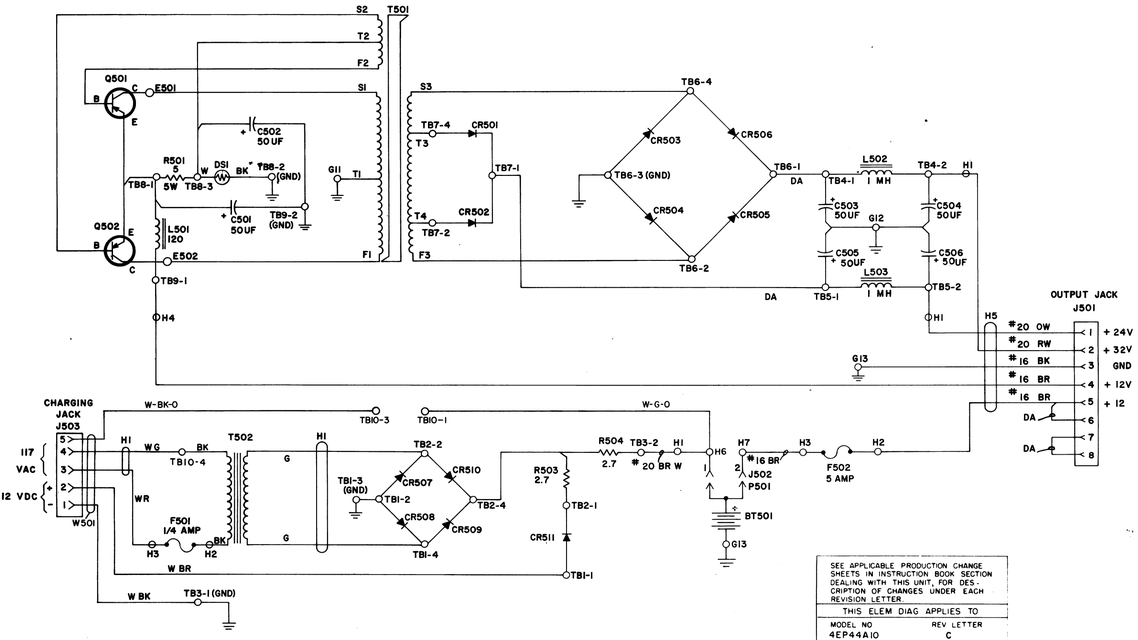


VIEW AT "C"
J503



(B-5492570, Sh. 2, Rev. 1)

(19D402508, Rev. 4)



ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H= HENRYS.

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

(19D402282, Rev. 10)

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
4EP44A10	C
4EP44A11	B

SERVICE SHEET

RECHARGEABLE POWER SUPPLY
MODEL 4EP44A10, REV. C
MODEL 4EP44A11, REV. B

(RC-1074F)

PARTS LIST

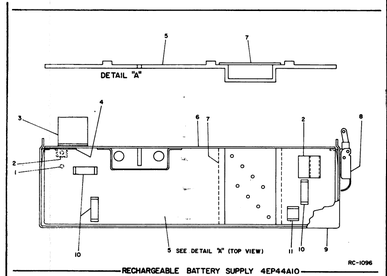
RECHARGEABLE BATTERY POWER SUPPLY
MODELS 4EP44A10, A11
(PL-19D402278-G1)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - - BATTERIES - - - - - - - - - -
BT501 *	19E209138-P3	Storage, nickel-cadmium: 12.5 v (nominal).
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501 and C502	7489483-P17	Electrolytic tubular: 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D1864A1.
C503*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Model 4EP44A11 REV. A and earlier:
	7489483-P25	Electrolytic: 50 µf +75% -10%, 50 VDCW.
C504*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Model 4EP44A11 REV. A and earlier:
	7489483-P25	Electrolytic: 50 µf +75% -10%, 50 VDCW.
C505*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Models 4EP44A11 REV. A and earlier:
	7489483-P11	Electrolytic: 20 µf +75% -10%, 50 VDCW.
C506*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Model 4EP44A11 REV. A and earlier:
	5496267-P20	Tantalum, dry solid: 47 µf ±20%, 35 VDCW.
		- - - - - - - - - - RECTIFIERS - - - - - - - - - -
CR501 thru CR511	4037822-P1	Silicon.
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS501	19C307037-P6	Lamp, incandescent: sim to G-E 1819.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J501	19A121226-P1	Connector: 8 terminals, phenolic; sim to HB Jones 261-32-02-060.
J502	PL-19A121209-G1	Connector Assembly. Includes 0.94 x 0.75 inch board.
J503*	4034405-P6	Connector, polarized: 5 pins; sim to Cannon XLR-5-32.
	4034405-P2	In Models earlier than Rev. C: Connector, polarized: 4 pins; sim to Cannon XLR-4-32.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501	7143944-P2	Choke, RF: 120 µh ±10%, .064 ohm max DC res.
L502 and L503	19B209166-P1	Choke: 1 mh ind ±10% at 1000 cps, 0.5 ohm max DC res, 50 v peak surge, 50 v DC operating.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P501	19B209137-P2	Terminal set, quick disconnect: 2 tabs; sim to Thomas and Betts 121504. (Part of BT501).
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501 and Q502	19A115293-P1	Germanium, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R501	5493035-P1	Wirewound: 5 ohms ±5%, 5 w; sim to Tru-Ohm X-60.
R502*	5493035-P9	Wirewound: 300 ohms ±5%, 5 w; sim to Tru-Ohm X60. Deleted by REV. C.
R503 and R504	7147161-P5	Fixed composition: 2.7 ohms ±10%, 1/2 w.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T501*	PL-19B204478-G1	Transformer Assembly.
T502	19B209153-P1	Power, step-down: Pri: 115 VRMS at 50/60 cps, Sec: 13.5 ±0.5 VRMS, 400 MADC.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7487424-P5	Phenolic: 3 terminals.
TB2	7487424-P6	Phenolic: 3 terminals.
TB3	7487424-P2	Phenolic: 1 terminal.
TB4 and TB5	7487424-P16	Phenolic: 2 terminals.
TB6	7487424-P5	Phenolic: 3 terminals.
TB7	7487424-P6	Phenolic: 3 terminals.
TB8	7775500-P7	Phenolic: 3 terminals.
TB9	7775500-P4	Phenolic: 2 terminals.
TB10*	7487424-P5	Phenolic: 3 terminals, In Model 4EP44A11 earlier than REV. A:
	7487424-P16	Phenolic: 2 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W501	19A121227-P1	5.75 inches long. No. F24 wire.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS501	4032220-P1	Lamp: miniature bayonet base, 6" leads; sim to Drake N517.
XF501	PL-19A121163-G1	Fuseholder Assembly. Includes: 4 spring clips, phenolic insulator.
XF502		FUSEHOLDER ASSEMBLY PL-19B204644-G1
		- - - - - - - - - - FUSES - - - - - - - - - -
F501	19A115327-P1	Cartridge: 1/4 amp at 250 v; sim to Littelfuse 362.250.
F502	19A115327-P2	Cartridge: 5 amps at 125 v; sim to Littelfuse 382005.
		ACCESSORIES
	PL-5492570-G2	A-C Charging Cable Assembly. Consists of the following:
C1	7489159-P16	Capacitor, metallized plastic: 4.0µf ±20%, 200 VDCW; sim to Sprague 118P40502S4.
P1	4034403-P1	Plug, power: spring contacts: sim to G-E 4304-3.
P2	4034405-P5	Connector, polarized: 5-contacts; sim to Cannon XLR-5-11C.
	7160478-P1	Cable: 2 conductors, No. 20-wire; sim to Birnbach 789.
	PL-5492570-G1	In Models 4EP44A10 earlier than REV. C: A-C Charging Cable Assembly. Consists of the following:
	4034403-P1	Plug, power: spring contacts; sim to G-E 4304-3.
	4034405-P1	Connector, polarized: 4 contacts; sim to Cannon XLR-4-11C.
	7160478-P1	Cable: 2 conductors, No. 20 wire; sim to Birnbach 789.
	PL-19B204993-G2	D-C Trickle-Charge Cable Assembly. Consists of the following:
	19A115513-P1	Plug: 12-volt cigarette lighter adaptor.
	4034405-P5	Connector, polarized: 5-contacts; sim to Cannon XLR-5-11C.
	7160478-P1	Cable: 2 conductors, No. 20 wire; sim to Birnbach 789.
	PL-19B204993-G1	In Models 4EP44A10 earlier than REV. C: D-C Trickle-Charge Cable Assembly. Consists of the following:
	19A115513-P1	D-C Trickle-Charge Cable Assembly.
	4034405-P1	Connector, polarized: 4 contacts; sim to Cannon XLR-4-11C.
	7160478-P1	Connector, polarized: 4 contacts; sim to Cannon XLR-4-11C.

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS
		(SEE RC-1096)
1	7140624-P5	Spacer: 0.156 x 0.1875 x .035 inches. (Used with J502).
2	4038930-P1	Clip: 0.8 x 0.34 x 0.2 inches. (Used with RD501 and RD502).
3	PL-19A121181-G1	Support Assembly: 1 x 2.14 x .032 inches. (Used with J501).
4	19A121225-P1	Insulator: 1.12 x 0.6 x .015 inches, fiber. (Located by TB1).
5	19D402274-P1	Casting: 9.96 x 0.775 x 2.63 inches.
6	PL-19A121166-G1	Plate Assembly: 3.34 x 9.96 x .064 inches.
7	19A121162-P1	Plate: 2.6 x 2.27 x .031 inches. (Used with Q501 and Q502).
8	4029994-P2	Catch, pull-down: 2.526 x 1.125 x 0.406 inches, chrome plated steel; sim to Nielsen SC-B-83314.
9	PL-19C303444-G1	Can Assembly: 10.25 x 3.62 x .05 inches. Model 4EP44A10 only.
	PL-19C303444-G2	Can Assembly: 10.25 x 3.62 x .05 inches. Model 4EP44A11 only.
10	7118719-P4	Clip, mounting: 0.844 x 0.594 x 0.344 inches; sim to Prestole E-50005-038. (Used with L501 thru L503).
11	4032248-P1	Clip: 0.5 x 0.375 x .014 inches, steel; sim to Augat Bros 8125-1A. (Used with XDS501).



RECHARGEABLE BATTERY SUPPLY 4EP44A10

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.

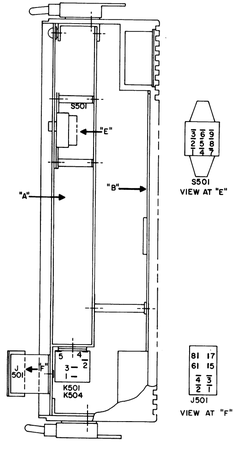
REV. A - Model 4EP44A10 only
To permit rechargeable battery BT501 to be ordered separately.

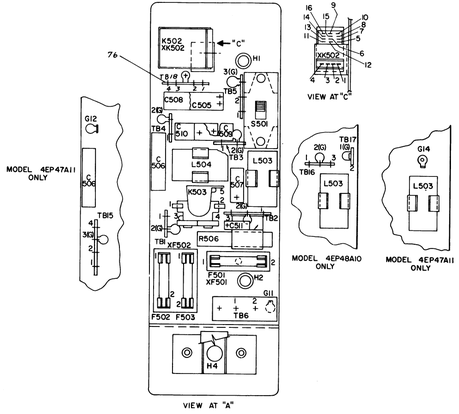
REV. B - Model 4EP44A10 only
To adjust output voltage for optimum performance and reliability. Changed turns ratio on power transformer T501, and changed output voltage at J501-2 from 35 volts to 32 volts.

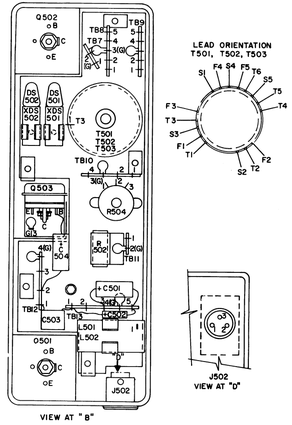
REV. C - Model 4EP44A10 only
To lower ambient temperature of power supply while charging. Deleted RS02, changed J503 from 4-pin to 5-pin jack, and changed AC Charging Cable and DC Trickle-Charge Cable.

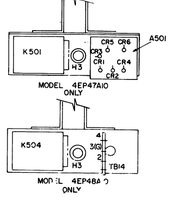
REV. A - Model 4EP44A11 only
To facilitate installation of optional Charger Kit. Changed TB10.

REV. B - Model 4EP44A11 only
To improve filtering at low temperatures. Changed C503, C504, C505 and C506.









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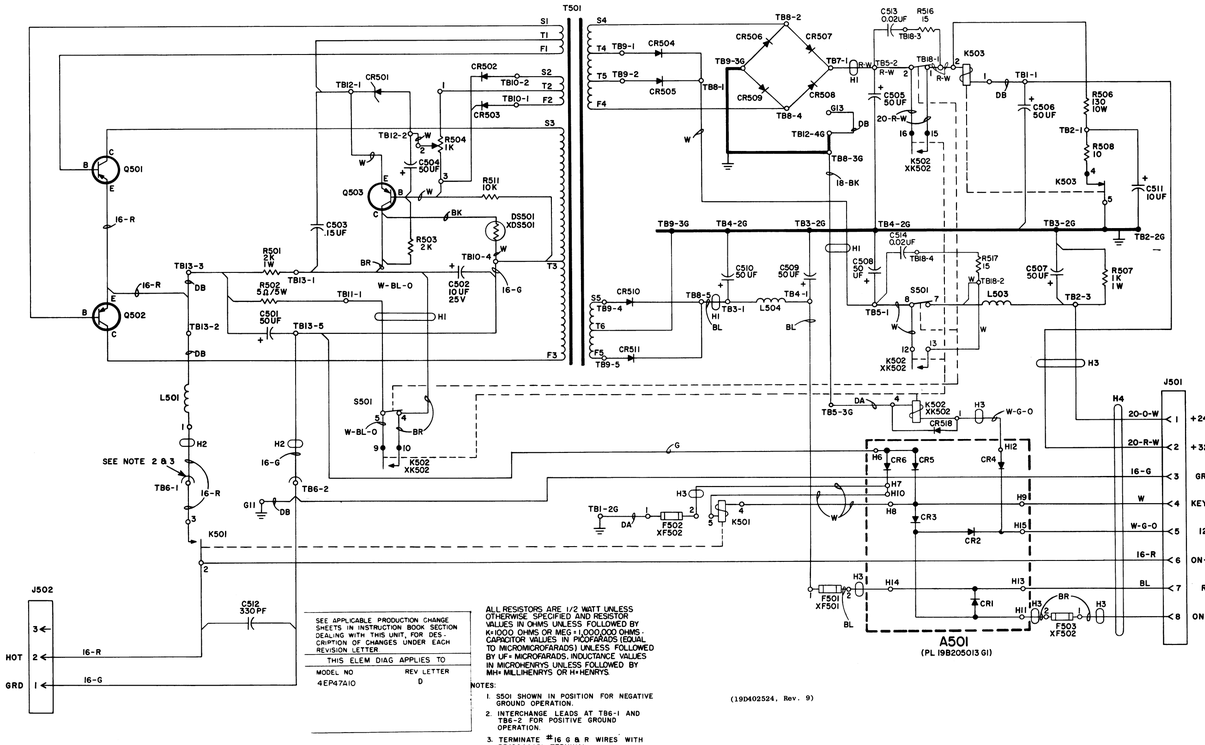


(19D402524, Rev. 9)

SERVICE SHEET

12-VOLT, ± GROUND
POWER SUPPLY MODEL 4EP47A10
PORTA.MOBIL

(RC-1239B)

PARTS LIST

12 VOLT POWER SUPPLY
MODEL 4EP47A10
(PL-19D402519-G1)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - SUBASSEMBLIES - - - - - - - - -
A501		COMPONENT BOARD ASSEMBLY PL-19B205013-G1
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR5	4037822-P1	Silicon.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C502	7489483-P7	Tubular, hermetically sealed, electrolytic: axial leads, 10 µf +75% -10%, 25 VDCW; sim to Sprague 30D182A1.
C503	5491189-P7	Mylar* dielectric, dipped epoxy: radial leads, 0.15 µf ±20%, 50 VDCW; sim to Good-All Type 601P6.
C504	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C505*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. C and earlier:
	19B209283-P1	Electrolytic: 50 µf +75%, 65 VDCW.
C506*	19A115680-P6	Electrolytic: 50 µf +150% - 10%, 25 VDCW; sim to Mallory Type TT. In Rev. C and earlier:
	7489483-P25	Electrolytic: 50 µf +75% -10%, 50 VDCW; sim to Sprague 30D200A1.
C507*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. C and earlier,
	5496267-P20	Tantalum, dry solid: 47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C508*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. C and earlier:
	19B209283-P1	Electrolytic: 50 µf +75% -10%, 65 VDCW.
C509 and C510	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C511	7489483-P27	Tubular, hermetically sealed, electrolytic: axial leads, 10 µf +75% -10%, 150 VDCW; sim to Sprague 30D218A1.
C512	7489162-P39	Silver mica, dipped phen: radial leads, 330 pf 25%, 500 VDCW; sim to Electro Motive Type DM-15.
C513* and C514	7774750-P15	Ceramic disc: 0.02 µf +100% -0%, 500 VDCW. Added by Rev. C.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR501*	4036887-P12	Silicon, Zener. In Models earlier than REV. A:
	5496365-P3	Silicon, Zener.
CR502 and CR503	5494922-P6	Silicon: sim to Type 1N462.
CR504 thru CR511	4037822-P1	Silicon.
CR518*	4037822-P1	Silicon. Added by REV. B.
		- - - - - - - -INDICATING DEVICES- - - - - - - -
DS501	19C307037-P6	Lamp, incandescent: miniature, 28 v ±.01 v; sim to G-E 1819.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - FUSES - - - - - - - - - -
F501 thru F503	1R16-P2	Cartridge, quick blowing: 3/4 amp at 250 v; sim to Littelfuse 312.750 or Bussmann AGC-3/4.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J501	19A121226-P1	Connector, phen: 8 female contacts rated at 10 amps at 730 VRMS; sim to HB Jones 261-32-08-000 (modified).
J502	4034405-P4	Connector, polarized: 3 male pins rated at 15 amps at 133 VRMS; sim to Cannon XLR-3-32.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K501	19B209240-P2	Armature, open: 12 VDC nominal, 2 w max operating, 100 ohms ±10% coil res, 1 form C contact rated at 15 amps at 115 VAC; sim to Magnecraft W88-150.
K502	5491595-P26	Armature: 12 VDC nominal, 1.5 w max operating, 185 ohms ±15% coil res, 4 form C contacts rated at 0.18 ma at 300 VDC; sim to Allied Control T154-2-260.
K503	19B209249-P1	Armature, open: 1 amp nominal, 1.1 w max operating, 0.5 ohm ±20% coil res, 1 form C contact rated at 1 amp at 28 VDC or 115 VAC; sim to HSN X9559KT.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501	7143944-P2	Choke, RF: 120 µh ±10%, .064 ohm DC res max.
L503 and L504	19B209166-P1	Reactor: 0.9 mh min, 0.5 ohm DC res max, 50 v peak, 50 VDC operating.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q501 thru Q503	5490810-P1	Germanium, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R501	3R78-P202K	Fixed composition: 2000 ohms ±10%, 1 w.
R502	5493035-P1	Wirewound: 5 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R503	3R77-P202K	Fixed composition: 2000 ohms ±10%, 1/2 w.
R504	19B209244-P1	Variable, wirewound: 1000 ohms ±20%, 2 w, linear taper; sim to CTS ML37463.
R506	5493035-P15	Wirewound: 130 ohms ±5%, 10 w; sim to Tru-Ohm Type X-62.
R507	3R78-P102K	Fixed composition: 1000 ohms ±10%, 1 w.
R508	3R78-P100K	Fixed composition: 10 ohms ±10%, 1 w.
R511	3R77-P1^^K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R516* and R517	3R77-P150K	Fixed composition: 15 ohms ±10%, 1/2 w. Added by Rev. C.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S501	19B209261-P1	Slide: 3 PDT, 3 amps at 125 VAC or 1 amp at 125 VDC; sim to Continental Wirt SW-369.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T501	PL-19B205009-G1	Transformer.
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500-P1	Phen: 2 terminals.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - TERMINAL BOARDS(Cont'd) - - - - -
TB2	7775500-P7	Phen: 3 terminals.
TB3 and TB4	7775500-P1	Phen: 2 terminals.
TB5	7775500-P2	Phen: 3 terminals.
TB6	7117710-P2	Phen: 2 terminals; sim to Cinch 1781.
TB7	7487424-P1	Miniature, phen: 1 terminal.
TB8 and TB9	7487424-P7	Miniature, phen: 4 terminals.
TB10	7775500-P10	Phen: 4 terminals.
TB11	7487424-P1	Miniature, phen: 1 terminal.
TB12	7775500-P3	Phen: 4 terminals.
TB13	7775500-P9	Phen: 5 terminals.
TB18*	7487424-P7	Miniature, phen: 4 terminals. Added by Rev. C.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS501	4032220-P1	Lampholder, miniature: sim to Drake N517.
XF501	7141008-P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
XF502	19A115164-P2	Fuseholder, phen: 30 amps max; sim to Littelfuse 350284.
XK502	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		MECHANICAL PARTS (SEE RC-1234)
1	PL-19A121823-G1	Support: approx 9-3/4 x 3-1/4 x 1-1/8 inches.
2	19A121830-P1	Plate: approx 2-1/8 x 3/4 x 1/32 inches thick. (Used with S501).
3	7142162-P100	Spacer: approx 13/16 inch long. (Used with S501).
4	7114719-P4	Clip: sim to Prestole E-50003-038. (Used with L501, 503, 504).
5	4038930-P1	Clip. (Used with R502, 506).
6	19B205010-P1	Cover: approx 8-3/8 x 3-3/8 x 1/16 inches thick.
7	PL-19A121181-G1	Support: approx 2-1/8 x 1 x 1/32 inches thick. (Used with J501).
8	4035656-P14	Standoff: approx 5/16 inch long. (Used with A501)
9	19A121822-P1	Cover: approx 1-1/2 x 1-1/2 x 1/16 inches thick. (Used with Q501, 502).
10	4034214-P1	Mica washer: for 7/32 inch screw. (Used with Q501-503).
11	N40SP9C13	Split washer: for 3/8 inch screw. (Used with Q501-503).
12	4032596-P1	Nut: 10-32. (Used with Q501-503).
13	4036835-P1	Terminal: sim to Shakeproof 2118-10-01-2520N. (Used with Q501-503).
14	4034225-P1	Flat washer: approx 1/2 inch dia. (Used with Q501-503).
15	19A121168-P1	Washer: approx 2 inches dia. (Used with T501).
16	19A115316-P1	Cup washer: approx 9/16 inch dia; sim to Zierick 220. (Used with T501).
17	7147194-P11	Bushing: approx 1/8 x 1/4 inch dia. (Used with Q501-503).
18	4031291-P1	Insulator. (Used with Q501-503).
19	7142162-P99	Spacer: approx 1-5/16 inches long.
20	19D402428-P1	Casting: approx 10-1/4 x 3-5/8 x 3 inches.

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS(Cont'd)
21	19A121825-P1	Support.
22	PL-19B205007-G1	Plate.
23	7140578-P2	Speed nut: sim to Tinnerman C1691-017-67.
24	19A121821-P1	Support. (Used with Q503).
25	PL-19B205011-G1	Support.
26	4029994-P13	Pull-down catch: sim to Nielsen Hardware SC-B-83314-2.

PRODUCTION CHANGES

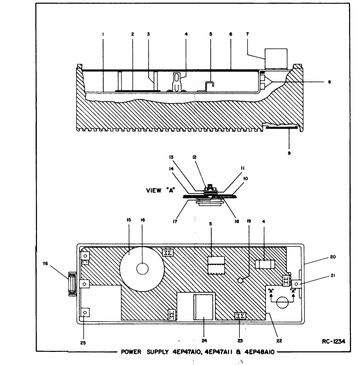
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A - To incorporate a more readily available component. Changed CR501.

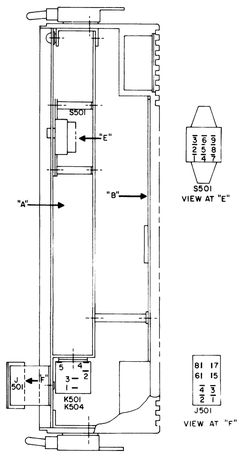
REV. B - To provide relay arc suppression. Added CR518.

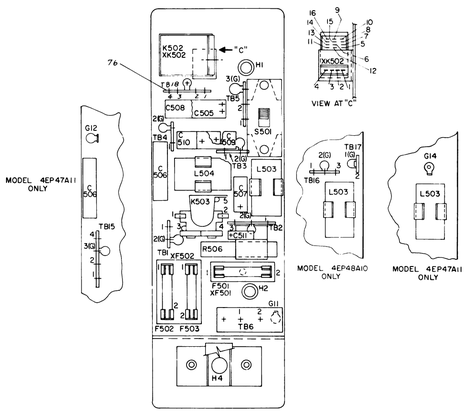
REV. C - To provide arc suppression for K502 contacts. Added C513, C514, R516, R517, and TB18.

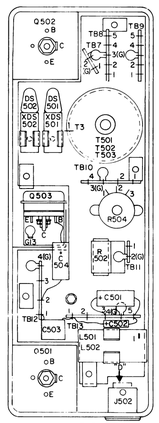
REV. D - To improve filtering at low temperatures. Changed C505, C506, C507, and C508.

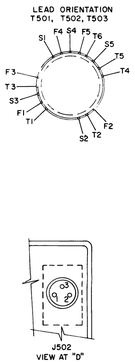


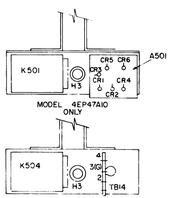
POWER SUPPLY 4EP47A10, 4EP47A11 & 4EP48A10











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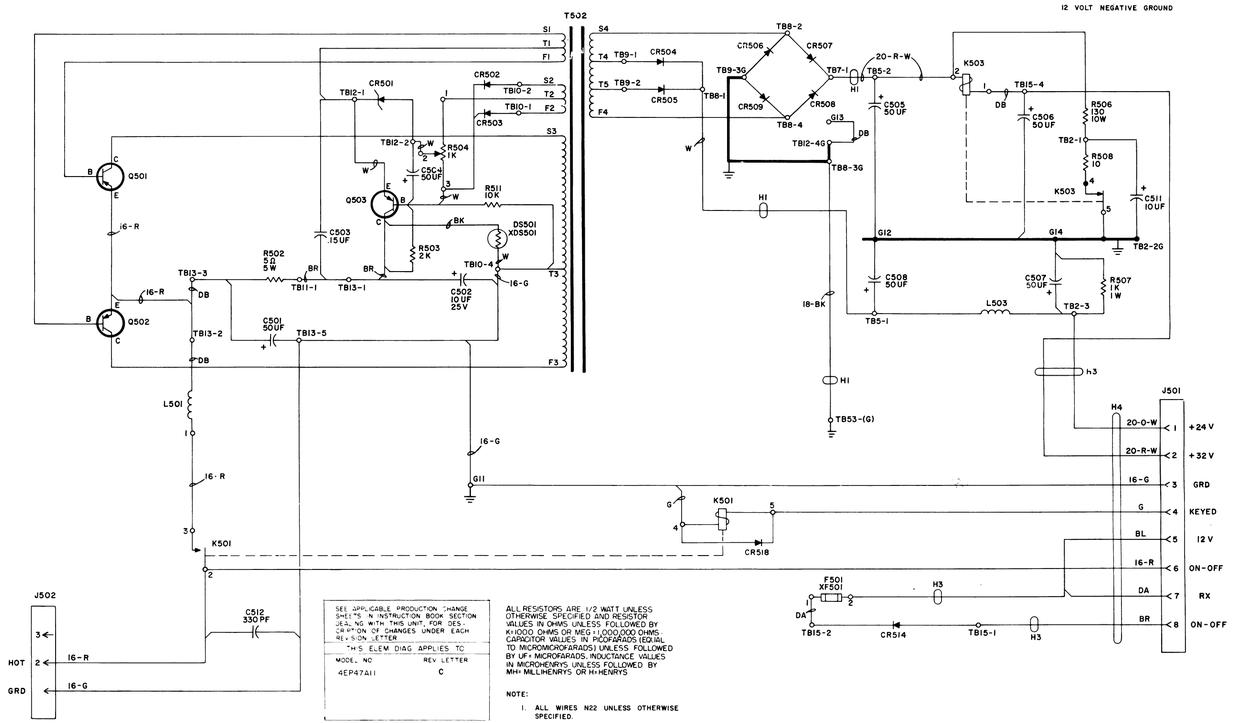


(19D402526, Rev. 6)

SERVICE SHEET

12-VOLT, NEGATIVE GROUND POWER SUPPLY MODEL 4EP47A11

(RC-1238C)

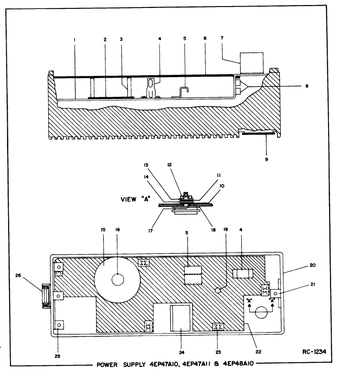
PARTS LIST

12 VOLT POWER SUPPLY
MODEL 4EP47A11
(PL-19D402519-G2)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - - -
C501	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1
C502	7489483-P7	Tubular, hermetically sealed, electrolytic: axial leads, 10 µf +75% -10%, 25 VDCW; sim to Sprague 30D182A1.
C503	5491189-P7	Mylar dielectric, dipped epoxy: radial leads, 0.15 µf ±20%, 50 VDCW; sim to Good-All Type 601PE.
C504	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C505*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
	19B209283-P1	In Rev. B and earlier: Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 65 VDCW.
C506*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
	7489483-P25	In Rev. B and earlier: Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 50 VDCW; sim to Sprague 30D206A1
C507*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
	5496267-P20	In Rev. B and earlier: Tubular, hermetically sealed, tantalum, dry solid: axial leads, 47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C508*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
	19B209283-P1	In Rev. B and earlier: Tubular, hermetically sealed, electrolytic: axial leads, 50 µf +75% -10%, 65 VDCW.
C511	7489483-P27	Tubular, hermetically sealed, electrolytic: axial leads, 10 µf +75% -10%, 150 VDCW; sim to Sprague 30D218A1.
C512	7489162-P39	Silver mica, dipped phen: radial leads, 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR501*	4036887-P12	Silicon, Zener.
	5496365-P3	In Models earlier than REV. A: Silicon, Zener.
CR502 and CR503	5494922-P6	Silicon: sim to Type 1N462.
CR504 thru CR509	4037822-P1	Silicon.
CR514	4037822-P1	Silicon.
CR518	4037822-P1	Silicon.
		- - - - - - - -INDICATING DEVICES - - - - - - - -
DS501	19C307037-P6	Lamp, incandescent: miniature, 28 v ±.01 v; sim to G-E 1819.
		- - - - - - - - - - FUSES - - - - - - - - - - - -
F501	1816-P2	Cartridge, quick blowing: 3/4 amp at 250 v; sim to Littelfuse 312.750 or Bussmann AGC-3/4.
		- - - - - - -JACKS AND RECEPTACLES - - - - - - - -
J501	19A121226-P1	Connector, phen: 8 female contacts rated at 10 amps at 720 VRMS; sim to HB Jones 261-32-08-000 (modified).
J502	4034405-P4	Connector, polarized: 3 male pins rated at 15 amps at 133 VRMS; sim to Cannon XLR-3-32.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - - RELAYS - - - - - - - - - - -
K501	19B209240-P2	Armature, open: 12 VDC nominal, 2 w max operating, 100 ohms ±10% coil res, 1 form C contact rated at 15 amps at 115 VAC; sim to Magnecraft W88-150.
K503	19B209249-P1	Armature, open: 1 amp nominal, 1.1 w max operating, 0.5 ohm ±20% coil res, 1 form C contact rated at 1 amp at 28 VDC or 115 VAC; sim to RBM X9559KT.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501	7143944-P2	Choke, RF: 120 µh ±10%, .064 ohm DC res max.
L503	19B209166-P1	Reactor: 0.9 mh min, 0.5 ohm DC res max, 50 v peak, 50 VDC operating.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501 thru Q503	5490810-P1	Germanium, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R502	5493035-P1	Wirewound: 5 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R503	3R77-P202K	Fixed composition: 2000 ohms ±10%, 1/2 w.
R504	19B209244-P1	Variable, wirewound: 1000 ohms ±20%, 2 w, linear taper; sim to CTS BL37463.
R506	5493035-P15	Wirewound: 130 ohms ±5%, 10 w; sim to Tru-Ohm Type X-62.
R507	3R78-P102K	Fixed composition: 1000 ohms ±10%, 1 w.
R508	3R78-P100K	Fixed composition: 10 ohms ±10%, 1 w.
R511	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T502	PL-19B205009-G2	Transformer.
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB2	7775500-P7	Phen: 3 terminals.
TB5	7775500-P2	Phen: 3 terminals.
TB7	7487424-P1	Miniature, phen: 1 terminal.
TB8 and TB9	7487424-P7	Miniature, phen: 4 terminals.
TB10	7775500-P10	Phen: 4 terminals.
TB11	7487424-P1	Miniature, phen: 1 terminal.
TB12	7775500-P3	Phen: 4 terminals.
TB13	7775500-P9	Phen: 5 terminals.
TB15	7775500-P10	Phen: 4 terminals.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS501	4032220-P1	Lampholder, miniature: sim to Drake N517.
XF501	7141008-P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS
		(SEE RC-1234)
1	PL-19A121823-G1	Support: approx 9-3/4 x 3-1/4 x 1-1/8 inches.
2	19A121830-P1	(Not used).
3	7142162-P100	(Not used).
4	7116719-P4	Clip: sim to Prestole E-50005-038. (Used with L501, 503).
5	4038930-P1	Clip. (Used with R502, 506).
6	19B205010-P1	Cover: approx 8-3/8 x 3-3/8 x 1/16 inches thick.
7	PL-19A121181-G1	Support: approx 2-1/8 x 1 x 1/32 inches thick. (Used with J501).
8	4035656-P14	(Not used).
9	19A121822-P1	Cover: approx 1-1/2 x 1-1/2 x 1/16 inches thick. (Used with Q501, 502).
10	4034214-P1	Mica washer: for 7/32 inch screw. (Used with Q501-503).
11	N405P9C13	Split washer: for 3/8 inch screw. (Used with Q501-503).
12	4032596-P1	Nut: 10-32. (Used with Q501-503).
13	4036835-P1	Terminal: sim to Shakeproof 2118-10-01-2520N. (Used with Q501-503).
14	4034225-P1	Flat washer: approx 1/2 inch dia. (Used with Q501-503).
15	19A121168-P1	Washer: approx 2 inches dia. (Used with T501).
16	19A115316-P1	Cup washer: approx 9/16 inch dia; sim to Zierick 220. (Used with T501).
17	7147194-P11	Bushing: approx 1/8 x 1/4 inch dia. (Used with Q501-503).
18	4031291-P1	Insulator. (Used with Q501-503).
19	7142162-P99	Spacer: approx 1-5/16 inches long.
20	19D402428-P1	Casting: approx 10-1/4 x 3-5/8 x 3 inches.
21	19A121825-P1	Support.
22	PL-19B205007-G1	Plate.
23	7140578-P2	Speed nut: sim to Tinnerman C1691-017-67.
24	19A121821-P1	Support. (Used with Q503).
25	PL-19B205011-G1	Support.
26	4029994-P13	Pull-down catch: sim to Nielsen Hardware SC-B-83314-2.



PRODUCTION CHANGES

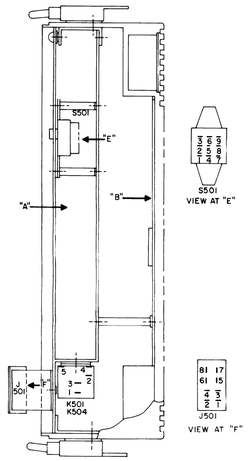
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

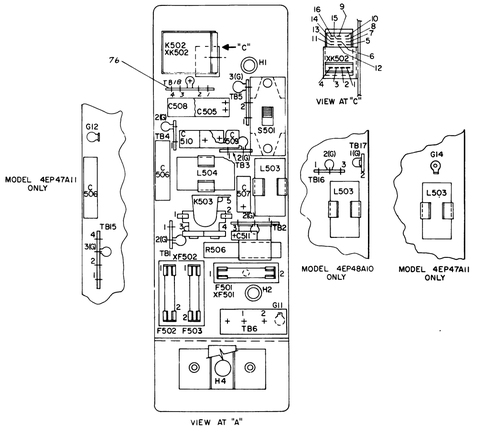
REV. A - To incorporate a more readily available component. Changed CR501.

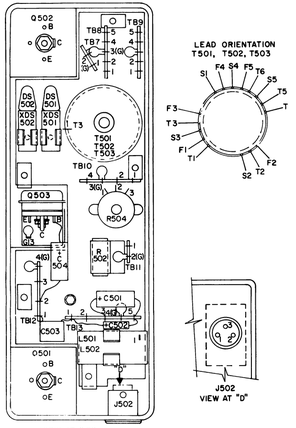
REV. B - To provide relay arc suppression. Added CR518.

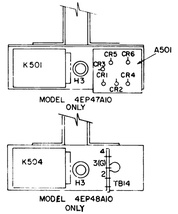
REV. C - To improve filtering at low temperatures. Changed C505, C506, C507 and C508.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

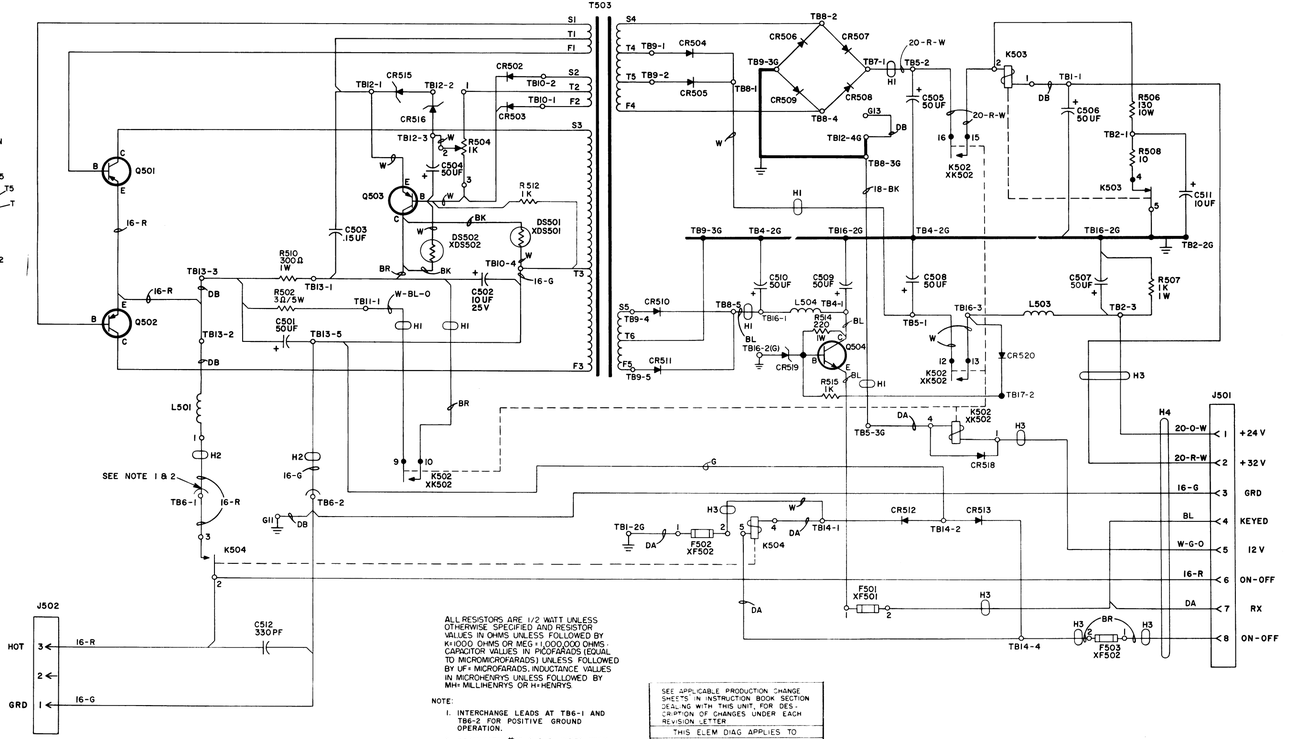








(19D402610, Rev. 2)



ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS.

NOTE:

1. INTERCHANGE LEADS AT TB6-1 AND TB6-2 FOR POSITIVE GROUND OPERATION.
2. TERMINATE #16 G B R WIRES WITH BS4904444PI TERMINAL.
3. ALL WIRES N22 UNLESS OTHERWISE SPECIFIED.

SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
4EP48A10	E

(19D402525, Rev. 9)

SERVICE SHEET

6-VOLT, ± GROUND
POWER SUPPLY MODEL 4EP48A10

(RC-1240C)

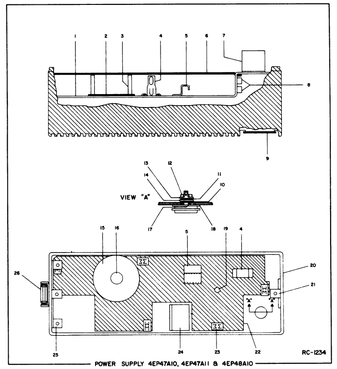
PARTS LIST

6-VOLT POWER SUPPLY
MODEL 4EP48A10
(PL-19D402519-G3)
REV E

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - CAPACITORS - - - - - - - - -
C501	7489483-P17	Electrolytic: 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C502	7489483-P7	Electrolytic: 10 µf +75% -10%, 25 VDCW; sim to Sprague 30D182A1.
C503	5491189-P7	Polyester: 0.15 µf ±20%, 50 VDCW.
C504	7489483-P17	Electrolytic: 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C505*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. D and earlier:
	19B209283-P1	Electrolytic: 50 µf +75% -10%, 65 VDCW.
C506*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. D and earlier:
	7489483-P25	Electrolytic: 50 µf +75% -10%, 50 VDCW; sim to Sprague 30D200A1.
C507*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. D and earlier:
	5496267-P20	Tantalum, dry solid: 47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C508*	19A115680-P6	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT. In Rev. D and earlier:
	19B209283-P1	Electrolytic: 50 µf +75% -10%, 65 VDCW.
C509 and C510	7489483-P17	Electrolytic: 50 µf +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
C511	7489483-P27	Electrolytic: 10 µf +75% -10%, 150 VDCW; sim to Sprague 30D218A1.
C512	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR502 and CR503	5494922-P6	Silicon; sim to Type 1N462.
CR504 thru CR513	4037822-P1	Silicon.
CR515 and CR516	4036887-P5	Silicon, Zener.
CR517*	4037822-P1	Silicon. (Added by Rev. A). (Deleted by Rev C).
CR518*	4037822-P1	Silicon. (Added by Rev. B).
CR519*	19A115528-P6	Silicon, Zener. (Added by Rev. C).
CR520*	4037822-P1	Silicon. (Added by Rev. D).
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS501	19C307037-P6	Lamp, incandescent: 28 v; sim to G-E 1819.
DS502	19C307037-P5	Lamp, incandescent: 28 v; sim to G-E 1829.
		- - - - - - - - - - FUSES - - - - - - - - - - -
F501 thru F503	1816-P2	Quick blowing: 3/4 amp at 250 v; sim to Littelfuse 312.750 or Bussman AGC-3/4.
		- - - - - - JACKS AND RECEPTACLES - - - - - - - -
J501	19A121226-P1	Receptacle, phen: 8 female contacts; sim to HB Jones 261-32-08-000 (modified).
J502	4034405-P4	Receptacle, polarized: 3 male pins; sim to Cannon XLR-3-32.
		- - - - - - - - - - RELAYS - - - - - - - - - - -
K502	5491595-P26	Armature: 12 VDC nominal, 1.5 w max operating, 185 ohms ±10% coil res, 4 form C contacts; sim to Allied Control T134-X-260.
K503	19B209249-P1	Armature, open: 1 amp nominal, 1.1 w max operating, 0.3 ohm ±20% coil res, 1 form C contact; sim to RBM X9559KT.
K504	19B209240-P1	Armature, open: 6 VDC nominal, 2 w max operating, 25 ohms ±10% coil res, 1 form C contact; sim to Magnecraft 88X-149.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L502	19A115392-P1	Choke, RF: 50 µh ±10%, .02 ohm DC res max.
L503 and L504	19B209166-P1	Reactor: 0.9 mh min, 0.5 ohm DC res max, 50 VDC operating.
		- - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501 thru Q503	5490810-P1	Germanium, PNP.
Q504*	19A115527-P1	Silicon, NPN. (Added by Rev C).
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R502*	5493035-P6	Wirewound: 3 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60. In Models of Rev B or earlier:
	5493035-P1	Wirewound: 5 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R504	19B209244-P1	Variable, wirewound: 1000 ohms ±20%, 2 w; sim to CTS Type 117.
R506	5493035-P15	Wirewound: 130 ohms ±5%, 10 w; sim to Tru-Ohm Type X-62.
R507	3R78-P102K	Fixed composition: 1000 ohms ±10%, 1 w.
R508	3R78-P100K	Fixed composition: 10 ohms ±10%, 1 w.
R510	3R78-P301K	Fixed composition: 300 ohms ±10%, 1 w.
R512	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R513*	5493035-P17	Wirewound: 63 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60. (Added by Rev A). (Deleted by Rev C).
R514*	3R78-P221J	Fixed composition: 220 ohms ±5%, 1 w. (Added by Rev C).
R515*	3R77-P102J	Fixed composition: 1000 ohms ±5%, 1/2 w. (Added by Rev C).
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T503*	PL-19B205009-G4	Transformer. In Models of Rev B or earlier:
	PL-19B205009-G3	Transformer.
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500-P1	Phen: 2 terminals.
TB2	7775500-P7	Phen: 3 terminals.
TB4	7775500-P1	Phen: 2 terminals.
TB5	7775500-P2	Phen: 3 terminals.
TB6	7117710-P2	Phen: 2 terminals; sim to Cinch 1781.
TB7	7487424-P1	Miniature, phen: 1 terminal.
TB8 and TB9	7487424-P7	Miniature, phen: 4 terminals.
TB10	7775500-P10	Phen: 4 terminals.
TB11	7487424-P1	Miniature, phen: 1 terminal.
TB12	7775500-P3	Phen: 4 terminals.
TB13	7775500-P9	Phen: 5 terminals.
TB16*	7775500-P16	Phen: 6 terminals. (Added by Rev C).
TB17*	7775500-P6	Phen: 4 terminals. (Added by Rev A). (Deleted by Rev C).
		- - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS501 and XDS502	4032220-P1	Lampholder: sim to Drake N517.
XF501	7141008-P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
XF502	19A115164-P2	Fuseholder, phen: 30 amps max; sim to Littelfuse 350284.
XK502	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2.

SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS (SEE RC-1234)
1	PL-19A121823-G1	Support.
2	19A121830-P1	(Not used).
3	7142162-P100	(Not used).
4	7118719-P4	Clip: sim to Prestole E-50005-038. (Used with L503, 504).
5	4038930-P1	Clip. (Used with R502, 506).
6	19B205010-P1	Cover.
7	PL-19A121181-G1	Support. (Used with J501).
8	4035656-P14	(Not used).
9	19A121822-P1	Cover. (Used with Q501, 502).
10	4034214-P1	Mica washer: for 7/32 inch screw. (Used with Q501-503).
11	N405P9C13	Split washer: for 3/8 inch screw. (Used with Q501-503).
12	4032596-P1	Nut: 10-32. (Used with Q501-503).
13	4036835-P1	Terminal: sim to Shakeproof 2118-10-01-2520N. (Used with Q501-503).
14	4034225-P1	Flat washer: approx 1/2 inch dia. (Used with Q501-503).
15	19A121168-P1	Washer: approx 2 inches dia. (Used with T501).
16	19A115316-P1	Cup washer: approx 9/16 inch dia; sim to Zierick 220. (Used with T501).
17	7147194-P11	Bushing: approx 1/8 x 1/4 inch dia. (Used with Q501-503).
18	4031291-P1	Insulator. (Used with Q501-503).
19	7142162-P99	Spacer: approx 1-5/16 inches long.
20	19D402428-P1	Casting.
21	19A121825-P1	Support.
22	PL-19B205007-G1	Plate.
23	7140578-P2	Speed nut: sim to Tinnerman C1691-017-67.
24	19A121821-P1	Support. (Used with Q503).
25	PL-19B205011-G1	Support.
26	4029994-P3	Pull-down catch: sim to Nielsen Hardware SC-B-83314-2.



POWER SUPPLY 4EP47A10, 4EP47A11 & 4EP48A10

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 - To improve performance of tone squelch. Added CR517, R513 and TB17.

REV. B - To provide relay arc suppression. Added CR518.

REV. C - To provide a more stable 12-volt supply for both transmit and receive conditions. Added CR519, Q504, R514, and R515; changed R502 and T503; and deleted CR517 and R513.

REV. D - To isolate transmitter from 12 volt supply during receive operation. Added CR520.

REV. E - To improve filtering at low temperatures - Changed C505, C506, C507 and C508.

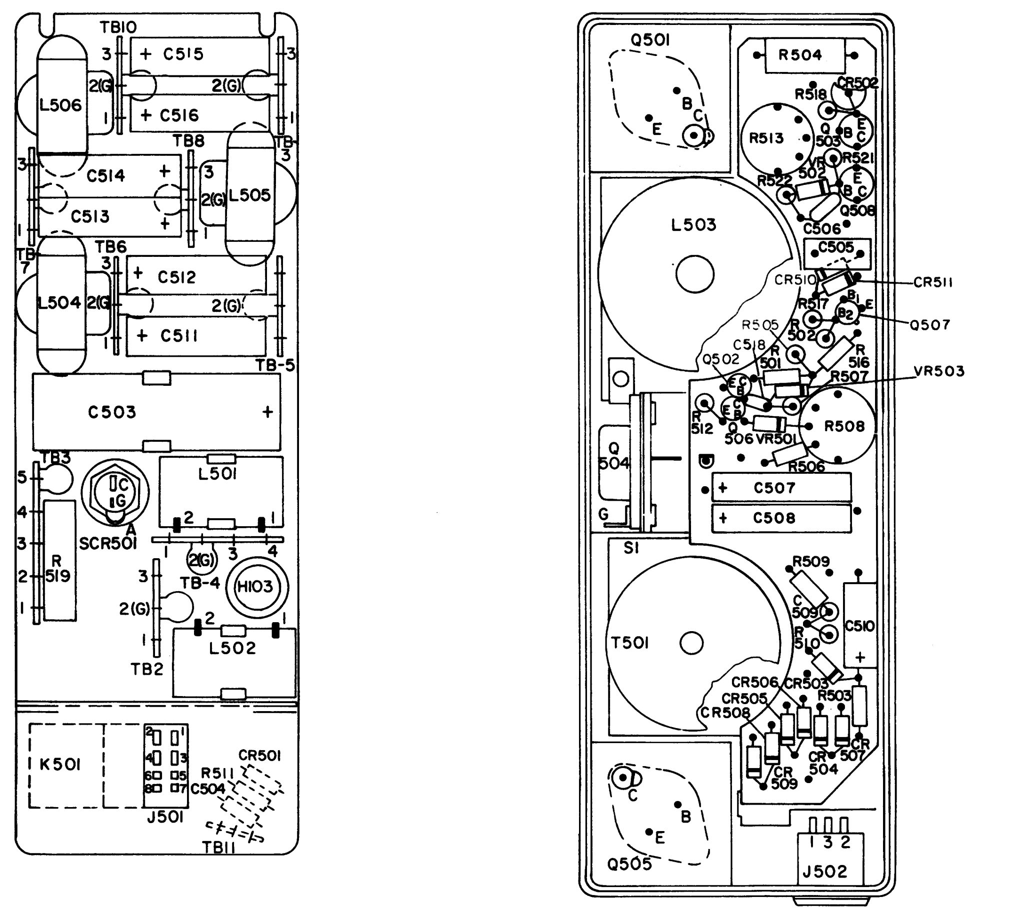
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

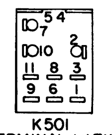
TROUBLESHOOTING PROCEDURES

SYMPTOM	CHECK FOR THE FOLLOWING
No power supply output.	1. Open fuse (if replaced fuse blows instantly, check Q501 through Q505, Q508, SCR501, and R502 for shorts).
	2. Correct polarity input.
	3. Open CR501.
	4. Shorted filter capacitors C503, C504, C511, C512, C513, and C514.
Output voltages low.	Shorted VR501.
Output voltages high.	Open SCR501, Q508, or VR502.
No +12 volts at J501-7. Other voltages OK.	Open L506, CR508, or CR509.
No +32 volts at J501-2. Other voltages OK.	Open L504, CR504, or CR507.
No +24 volts at J501-1. Other voltages OK.	Open L505, CR505, or CR506.

NOTE - After replacing a defective Q501, check CR503, R503, and CR502 for opens and check for approximately 3-volts across C510.

OUTLINE DIAGRAM

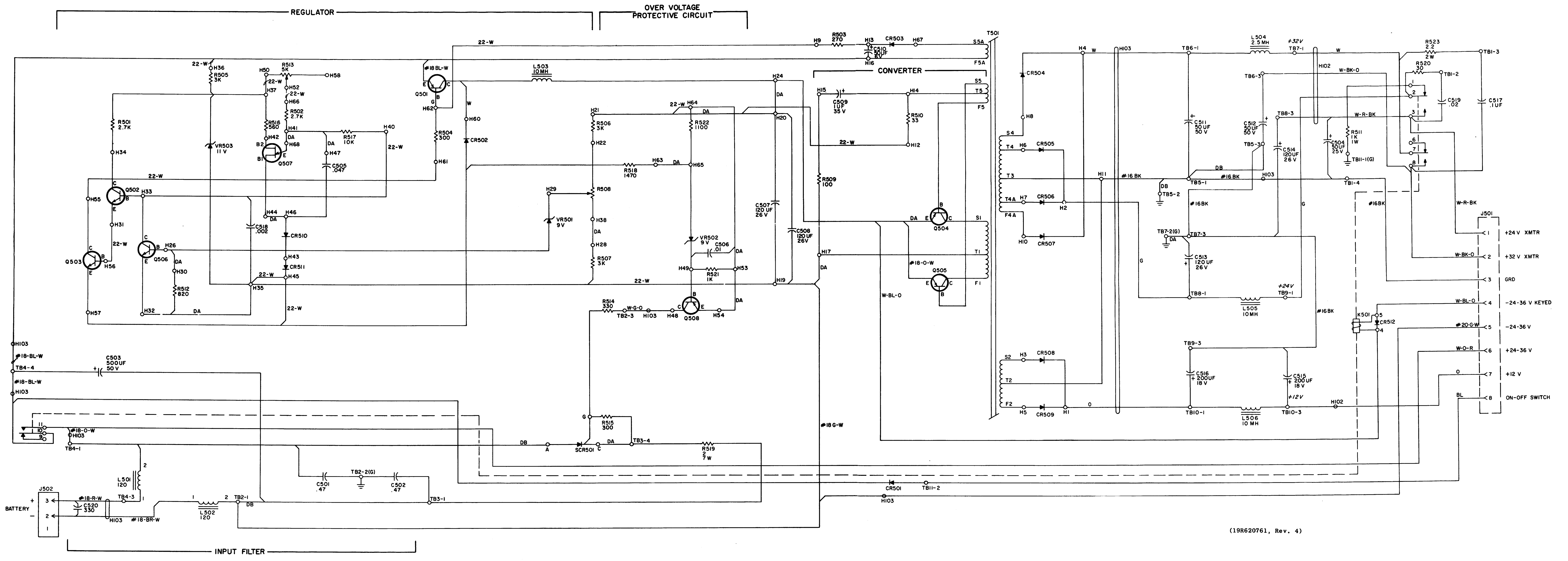




K501 TERMINAL VIEW

(19C311119, Rev. 0)

SCHEMATIC DIAGRAM



(19B620761, Rev. 4)

NOTES:
1. ALL WIRES N22 UNLESS OTHERWISE SPECIFIED.
2. 22-W IS TEFLON WIRE 19A115463P10.
3. PERMISSIBLE TO USE SLEEVING 4038593P5 ON BUS WIRE JUMPERS.

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF=MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH=MILLIHENRYS OR H=HENRYS.

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

ADJUSTMENT

Potentiometers R508 and R513 are pre-set at the factory and should be adjusted only under the following conditions.

1. If Zener diode VR501 is replaced, check for 24 volts at J501-4 with the transmitted keyed. Vary R508 if necessary to obtain this voltage.

2. If Q507 is replaced, check for a 400-microsecond duration sawtooth waveform across C505. Adjust R513 if necessary to obtain this waveform.

SERVICE SHEET

POWER SUPPLY
24/36 VOLT, ± GROUND
MODEL 4EP52A10

(RC-1364A)

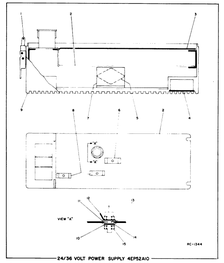
PARTS LIST

24/36 VOLT POWER SUPPLY
MODEL 4EP52A10
(PL-19D402673-G1)

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501 and C502	19A115028-P19	Polyester: 0.47 µf ±20%, 100 VDCW.
C503	5493132-P9	Electrolytic: 500 µf +100% -10%, 50 VDCW; sim to Sprague 44D.
C504	19A115680-P4	Electrolytic: 50 µf +150% -10%, 25 VDCW; sim to Mallory Type TT.
C505	19A115028-P411	Polyester: .047 µf ±5%, 200 VDCW.
C506	19B209243-P1	Polyester: .01 µf ±20%, 40 VDCW.
C507 and C508	19A115680-P9	Electrolytic: 120 µf +150% -10%, 20 VDCW; sim to Mallory Type TT.
C509	5496267-P17	Tantalum, dry solid: 1 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C510	7489483-P4	Electrolytic: 50 µf +75% -10%, 6 VDCW; sim to Sprague 30D133AA1.
C511 and C512	19A115680-P6	Electrolytic: 50 µf +150% -10%, 50 VDCW; sim to Mallory Type TT.
C513 and C514	19A115680-P9	Electrolytic: 120 µf +150% -10%, 20 VDCW; sim to Mallory Type TT.
C515 and C516	19A115680-P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C517	7161189-P2	Ceramic disc: 0.1 µf +80% -30%, 50 VDCW; sim to Sprague 36C172.
C518	5494481-P13	Ceramic disc: 2000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C519	7774750-P15	Ceramic disc: .02 µf +100% -0%, 500 VDCW.
C520	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR501	4037822-P1	Silicon.
CR502	19A115557-P1	Silicon.
CR503 thru CR512	4037822-P1	Silicon.
SCR501	19A115747-P1	Silicon controlled.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J501	19A121226-P1	Connector, phen: 8 female contacts; sim to HH Jones 261-32-08-000 (modified).
J502	4034405-P4	Receptacle: 3 male pins; sim to Cannon Electric XLR-3-32.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K501	19B209240-P6	Armature, open: 20 VDC nominal, 400 ohms ±10% coil res, 3 form C contacts; sim to Magnecraft 88A-202.

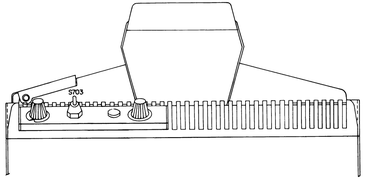
SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L501 and L502	7143944-P2	Choke, RF: 120 µh ±10%, .064 ohm DC res max.
L503	PL-19B206285-G1	Choke. 10 mh.
L504	19A115686-P1	Reactor: 2.5 mh min, 0.5 ohm DC res max, 20 VDC operating.
L505	19A115743-P1	Reactor: 10 mh min, 1.2 ohms DC res max, 24 VDC oprting.
L506	19A115686-P1	Reactor: 2.5 mh min, 0.5 ohm DC res max, 20 VDC operating.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501	19A115531-P1	Germanium, PNP; sim to Type 2N1073B.
Q502	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q503	19A115300-P1	Silicon, NPN; sim to Type 2N3053.
Q504 and Q505	19A115561-P1	Germanium, PNP.
Q506	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
Q507	19A115364-P1	Silicon; sim to Type 2N2646.
Q508	19A115562-P1	Silicon, PNP.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R501 and R502	3R77-P272K	Fixed composition: 2700 ohms ±10%, 1/2 w.
R503	3R77-P271K	Fixed composition: 270 ohms ±10%, 1/2 w.
R504	5493035-P9	Wirewound: 300 ohms ±5%, 5 w; sim to Tru-Ohm Type X-60.
R505	3R77-P302K	Fixed composition: 3000 ohms ±10%, 1/2 w.
R506 and R507	3R77-P302J	Fixed composition: 3000 ohms ±5%, 1/2 w.
R508	19A115681-P1	Variable, wirewound: 1000 ohms ±20%, 3 w; sim to CTS Series 115.
R509	3R77-P101K	Fixed composition: 100 ohms ±10%, 1/2 w.
R510	3R77-P330J	Fixed composition: 33 ohms ±5%, 1/2 w.
R511	3R78-P102K	Fixed composition: 1000 ohms ±10%, 1 w.
R512	3R77-P821K	Fixed composition: 820 ohms ±10%, 1/2 w.
R513	19A115681-P2	Variable, wirewound: 5000 ohms ±20%, 3 w; sim to CTS Series 115.
R514	3R77-P331J	Fixed composition: 330 ohms ±5%, 1/2 w.
R515	3R77-P301J	Fixed composition: 300 ohms ±5%, 1/2 w.
R516	3R77-P561K	Fixed composition: 560 ohms ±10%, 1/2 w.
R517	3R77-P103K	Fixed composition: 10,000 ohms ±10%, 1/2 w.
R518	5493948-P217	Deposited carbon: 1470 ohms ±1%, 1/2 w; sim to Texas Instrument Type CDI/ZBR.
R519	5493035-P23	Wirewound: 2 ohms ±5%, 7 w; sim to Tru-Ohm Type X-61.
R520	3R77-P300J	Fixed composition: 30 ohms ±5%, 1/2 w.
R521	3R77-P102K	Fixed composition: 1000 ohms ±10%, 1/2 w.
R522	5493948-P205	Deposited carbon: 1100 ohms ±1%, 1/2 w; sim to Texas Instrument Type CDI/ZBR.
R523	19B209022-P123	Wirewound: 2.2 ohms ±10%, 2 w; sim to IRC Type BWH.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T501	PL-19B205428-G1	Transformer.

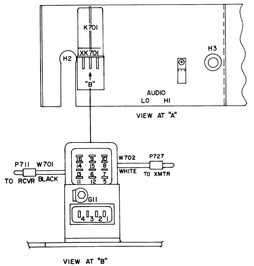
SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - TERMINAL BOARDS - - - - - - - -
TB1	7775500-P3	Phen: 4 terminals.
TB2	7775500-P7	Phen: 3 terminals.
TB3	7775500-P55	Phen: 5 terminals.
TB4	7775500-P8	Phen: 4 terminals.
TB5 thru TB10	7775500-P7	Phen: 3 terminals.
TB11	7775500-P4	Phen: 2 terminals.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR501 and VR502	4036887-P7	Silicon, Zener.
VR503	4036887-P8	Silicon, Zener.
		MECHANICAL PARTS
		(SEE RC-1344)
1	4029994-P3	Pull-down catch: sim to Nielsen Hardware SC-B-83314-2.
2	19B205413-P1	Chassis.
3	19B205010-P1	Cover.
4	19A121822-P1	Cover. (Used with Q501, 505).
5	4029974-P1	Transistor insulator. (Used with Q501, 504, 505).
6	7118719-P5	Clip: sim to Prestole E-50007-038. (Holds C503).
7	19A122279-P1	Heat sink. (Used with Q504).
8	7118719-P4	Clip: sim to Prestole E-50005-038. (Holds L501-502).
9	19D402428-P1	Casting.
10	3404P25C13	Lockwasher. (For 1/4 screw).
11	19A115276-P2	Insulated washer: mica.
12	4033714-P2	Terminal: sim to Zierick 110.
13	19A115275-P2	Insulated washer: Teflon-.
14	3403P11C13	Flatwasher. (For 1/4 screw).
15	8210P20C13	Nut: 1/4 - 28.

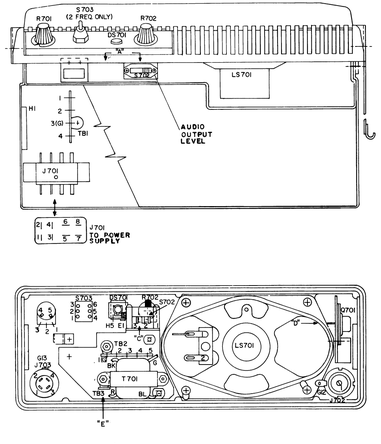


24/36 VOLT POWER SUPPLY 4EP52A10

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.







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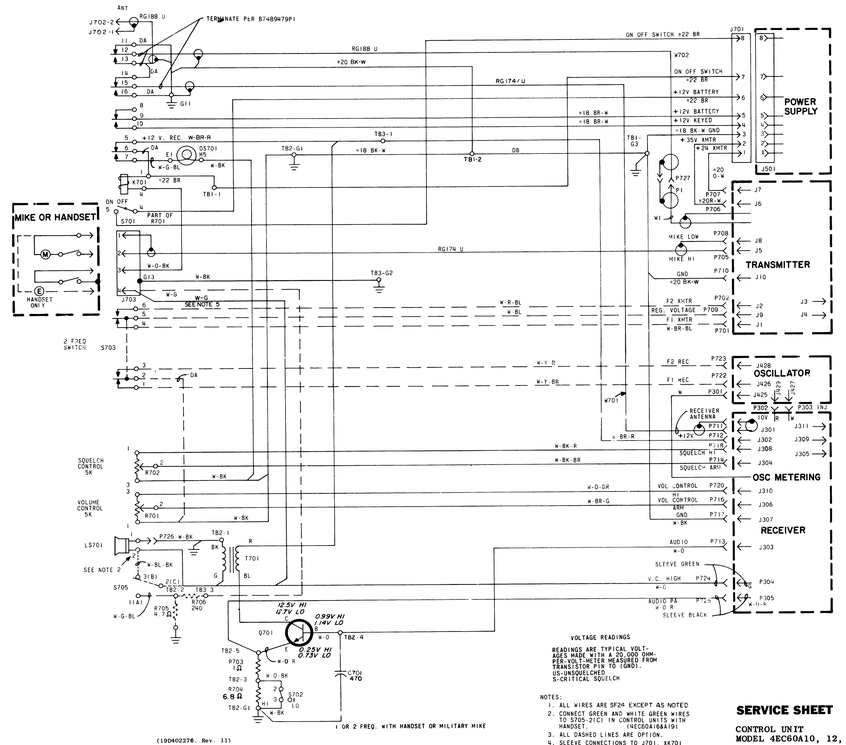


(190402276, Rev. 11)

SERVICE SHEET

CONTROL UNIT
MODEL 4EC60A10, 12, 16 & 19

(RC-1075E)

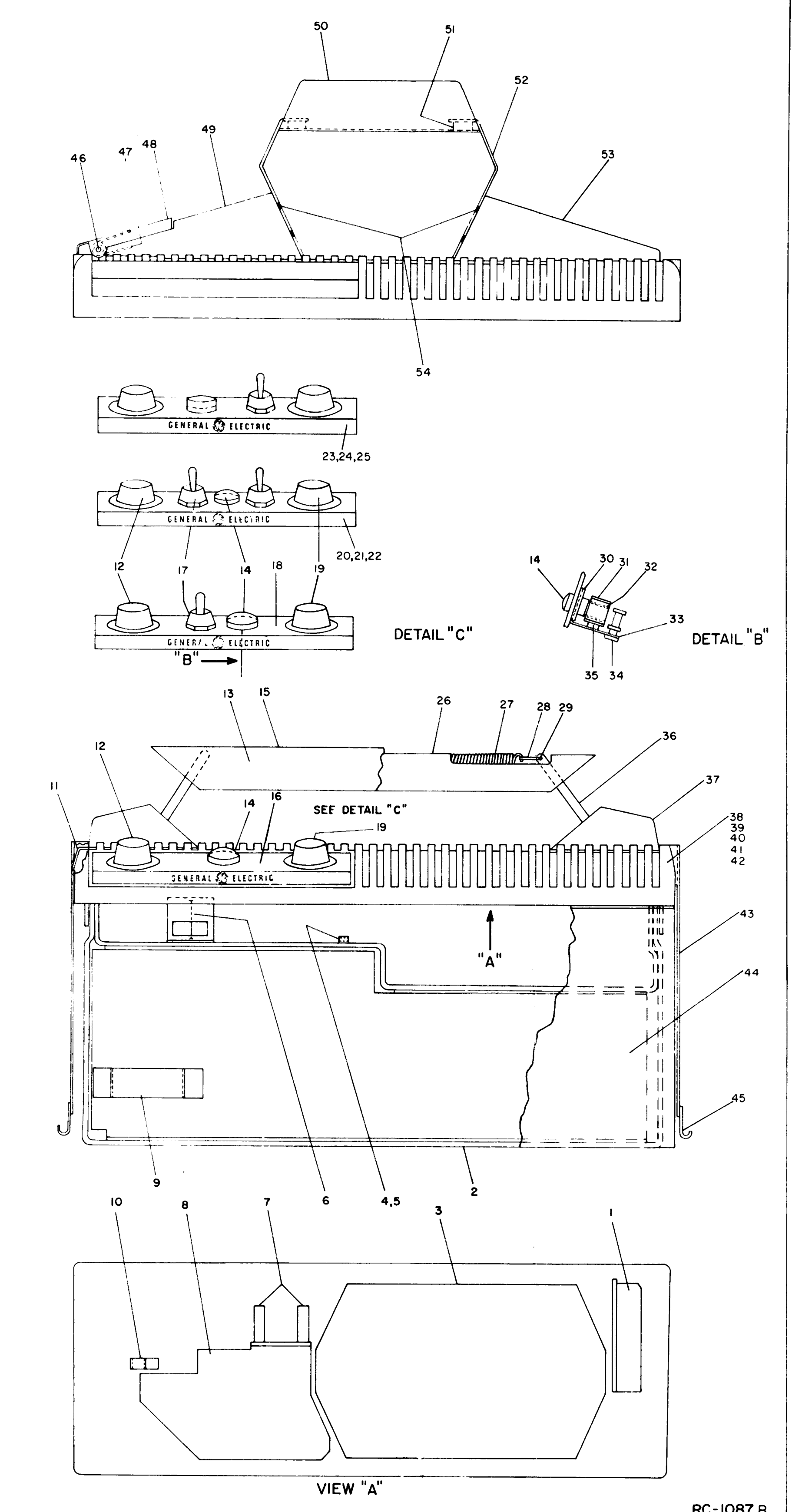
PARTS LIST

CONTROL UNIT

MODEL 4EC60A10 PL-19D402279-G1 (Single Frequency)
MODEL 4EC60A12 PL-19D402279-G3 (Two Frequency)
MODEL 4EC60A16 PL-19D402279-G7 (Single Frequency)
MODEL 4EC60A19 PL-19D402279-G10 (Two Frequency)

SYMBOL	G-E PART NO.	DESCRIPTION
C701*	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW. Added by Rev. B.
		- - - - - - - - - INDICATING DEVICES - - - - - - - -
DS701	4034664-P1	Lamp, incandescent: 28 v, .04 amp; sim to G-E 2148.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J701	7473192-P31	Connector: 8 terminals, phenolic; sim to HB Jones 261-31-02-000.
J702	5493632-P2	Connector, coaxial: sim to FXR 33975.
J703	19B209201-P1	Connector: 4 contacts; sim to Switchcraft 3C-1088.
		- - - - - - - - - - - - RELAYS - - - - - - - - - - -
K701	19C307010-P5	Armature: 12 VDC nominal, 130 ohms res ±10% at 25°C, 4 form C contacts; sim to Allied Control T154-X-413.
		- - - - - - - - - - LOUDSPEAKERS - - - - - - - - - -
LS701	19C307094-P1	Permanent magnet: 5.062 x 3.062 inches, 3.2 ohms ±10% voice coil imp., 3 w input, 325 ±50 cps resonance, paper dust cap; sim to Oaktron S7473.
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P701 and P702	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2. (Used in Models 4EC60A12 and 4EC60A19 only).
P705	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P706 thru P708	4029840-P1	Contact, electrical: taper pin, solder coated brass; sim to Amp 41854.
P709	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P710	4029840-P1	Contact, electrical: taper pin, solder coated brass; sim to Amp 41854.
P712 thru P714	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P716 thru P718	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P720	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P722 and P723	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2. (Used in Models 4EC60A12 and 4EC60A19 only).
P724 and P725	7147199-P2	Connector: 1 female contact; sim to Winchester Electronics 21804.
P726	4036634-P1	Receptacle, pin: sim to Amp 42428-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q701*	19A115527-P1	Silicon, NPN.
		In Models earlier than Rev. A:
	19A115246-P1	Silicon, NPN; sim to Type 2N1701.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R701	19C300097-P10	Resistor/switch: includes Resistor, variable, carbon film, 5000 ohms ±20%, 1/8 w, mod log taper, 180° rotation; (S701) Switch, 2 amps at 125 VAC; sim to Mallory Type MLC.
R702	19C300097-P9	Variable, carbon film: 5000 ohms ±20%, 1/4 w, linear taper, 180° rotation; sim to Mallory Type MLC.
R703	19B209022-P115	Wirewound, phenolic body: 1 ohm ±10%, 2 w; sim to IRC Type BWH.
		- - - - - - - - - - - RESISTORS(Cont'd) - - - - - -
R704	19B209022-P38	Wirewound, phenolic body: 9.1 ohms ±5%, 2 w; sim to IRC Type BWH.
R705	19B209022-P131	Wirewound, phenolic body: 4.7 ohms ±10%, 2 w; sim to IRC Type BWH. (Used in Models 4EC60A16 and 4EC60A19 only).
R706	3R77-P241J	Fixed composition: 240 ohms ±5%, 1/2 w. (Used in Models 4EC60A16 and 4EC60A19 only).
		- - - - - - - - - - - SWITCHES - - - - - - - - - - -
S701		(Part of R701).
S702	19B209040-P1	Slide: DPDT, 0.5 amp at 125 v; sim to Continental Wirt 126.
S703	4036949-P2	Toggle: DPDT, 100 μa at 5 VDC; sim to Arrow-Hart and Hegeman TS-6. (Used in Models 4EC60A12 and 4EC60A19 only).
S705	19B209239-P1	Pushbutton (red): SPDT, 250 ma at 115 VAC or 25 VDC; sim to Switchcraft 923. (Used in Models 4EC60A16 and 4EC60A19 only).
S706	4036949-P1	Toggle: SPDT, 100 μa at 5 VDC; sim to Arrow-Hart and Hegeman TS3. (Used in Models 4EC60A19 only).
		- - - - - - - - - - TRANSFORMERS - - - - - - - - -
T701	19B209079-P1	Audio frequency: freq range 0.3-3 KC, operating 275 MADC, Pri 1: 55 ohms ±10% imp at 1 w, 0.895 ohm ±10% DC res, Sec 1: 3.2 ohms ±10% at 1 w, 0.168 ohm max DC res.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	7775500-P8	Phenolic: 4 brass terminals and mountings.
TB2	7775500-P55	Phenolic: 5 brass terminals and mountings.
TB3	7775500-P44	Phenolic: 2 brass terminals and mountings. (Used in Models 4EC60A10 and 4EC60A12 only).
	7775500-P7	Phenolic: 3 brass terminals and mountings. (Used in Models 4EC60A16 and 4EC60A19 only).
		- - - - - - - - - - - - CABLES - - - - - - - - - - -
W701		CABLE ASSEMBLY PL-19A121176-G1
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P711	5496078-P1	Connector, push-on: Teflon®; sim to FRX 27-1.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044-P11	Cable, RF: 5.75 inches long. Type RG-174/U.
W702		CABLE ASSEMBLY PL-19A121176-G2
		- - - - - - - - - - - - PLUGS - - - - - - - - - - -
P727	5496078-P2	Connector, push-on: Teflon®; sim to FXR 27-2.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044-P13	Cable, RF: 4 inches long. Type RG-188/U.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XK701	5491595-P5	Relay, nylon: 16 contacts; sim to Allied Control 30054-2.
		DC CHARGING CABLE ASSEMBLY PL-19B204993-G1
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7160478-P1	Cable: 2 conductor, 50 inches; sim to Birnbach 789.
	4034405-P1	Plug, general purpose: 4 contacts, polarized, 10 amps at 133 VRMS; sim to Cannon XLR-4-11C.
	19A115513-P1	Connector, cigarette lighter: 12 VDC; sim to Cole-Hersse 1624.
		POWER SUPPLY EXTENSION CABLE ASSEMBLY PL-19B204289-G1
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7473192-P19	Socket, phenolic: 8 terminals, cable clamp in cap; sim to HB Jones 261-32-08-030.
	7473192-P26	Plug, phenolic: 8 terminals, cable clamp in cap; sim to HB Jones 261-31-08-030.
	7162441-P23	Tubing, flexible, plastic: 3 feet long.
		AUTO GUTTER MOUNT ANTENNA MODEL 4EY20A10 (High Band)
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303620-P1	Antenna Assembly. Includes: plastic ball tip; 19.5 ±0.25 inch stainless steel whip; socket; insulators; adapter; RG-58A/U cable; PL-259 plug; clip; 2-set screws; rubber pad; sim to Antenna Specialists ASP157.
	19C303620-P2	Replacement Whip Assembly. Includes: plastic ball tip; 19.5 ±0.25 inch stainless steel whip; socket; insulators; sim to Antenna Specialists 19A904-1.
		MICROPHONE MODEL 4EM33A10 (19B209199-P1)
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch: moisture proof. Shure Brothers 90A1008.
		Spring: switch. Shure Brothers 44A159.
		Cable and Plug Assembly. Includes: 3 conductor tinsel cable with shield, neoprene jacket, extended length 5 feet, molded on weather-proof 4-pin plug. Shure Brothers 90A1007.
		Button, switch: red plastic. Shure Brothers 65A617A.
		Cartridge, transmitter: controlled magnetic. Shure Brothers 99T556.
		Case Front and Nameplate: plastic. Shure Brothers 90A999.
		Case Back and Mounting Button: plastic. Shure Brothers 90A1000.
		HANDSET MODEL 4EM34A10 (19B209198-P1)
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Cartridge, transmitter: controlled magnetic. Shure Brothers 99A86.
		Cartridge, receiver: 3 w max power. Shure Brothers 99A562.
		Switch: with mounting plate. Shure Brothers 90A925.
		Cable and Plug Assembly. Includes: 4 conductor tinsel coiled cord, neoprene jacket, extended length approx 5 feet, molded on weather proof 4-pin plug. Shure Brothers 90A1030.
		Handle Assembly. phenolic, weather proof construction. Shure Brothers 90A971.
		Cap, transmitter: phenolic. Shure Brothers 65A197A.
		Cap, receiver: phenolic. Shure Brothers 65A199A.
		PORTABLE ANTENNA MODELS 4EY18A10-13 (Low Band)
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	PL-19C303707-G1	25-31 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 48.25 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-431GE.
	PL-19C303707-G2	31-36 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 48.25 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-A431GE.
	PL-19C303707-G3	36-42 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 38 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-B431GE.
	PL-19C303707-G4	42-50 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 38 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-C431GE.
		PORTABLE ANTENNA MODEL 4EY19A10 (High Band)
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303658-P1	Antenna Assembly. Includes: 6-32 set screw; aluminum ball; 22.05 inch stainless steel rod; sleeving; spring; cap, O-ring; plug; sim to Antenna Specialists ASP-405GE.
		MECHANICAL PARTS (SEE RC-1087)
1	19A121154-P1	Support: 1.91 x 0.9 x 0.46 inches. (Used with Q701).
2	PL-19B204532-G1	Chassis Assembly: 9.74 x 4.3 x 3 inches.
3	19B204527-P1	Diaphragm: 5.06 x 3.06 inches.
4	7763541-P3	Clip: 0.781 x 0.375 x .02 inches.
5		(Used with Channel Guard and Selective Calling only).
6	5491595-P9	Spring, retainer: 1.358 x 1.142 x 0.787 inches, wire; sim to Allied Control 30040-2. (Used with K701).
7	7142162-P98	Spacer: 0.625 x 0.187 x .035 inches. (Used with R702).
8	PL-19A121174-G1	Chassis Assembly: 3.25 x 2.07 x 1.15 inches.
9	19A121178-P1	Support: 1.88 x 0.6 x 0.5 inches. (Used with J701).
10	19A121199-P1	Clip: 0.781 x 0.375 x 0.188 inches.
11	19A121215-P1	Spring: 1.78 x 0.52 x 0.73 inches. (Used in Models 4EC60A10 and 4EC60A12 only).
12	PL-19B204639-G2	Knob Assembly: 0.825 x 0.45 x 0.438 inches.
13	PL-19C303537-G1	Handle Assembly: (Includes items 15, 22, 27, 28, 29 and 36). (Used in Models 4EC60A10 and 4EC60A12 only).
14	19B204949-P1	Jewel: 0.312 x 0.25 x 0.25 inches, red plastic; sim to Rohm and Haas 2444 Plexiglas.
15	19B204492-P1	Extrusion: 7.525 x 0.604 x 0.75 inches. (Part of Handle Assembly, PL-19C303537-G1).
16	NP243498	Nameplate: 4.31 x 0.986 x 0.325 inches, etched aluminum. (Used in Models 4EC60A10 and 4EC60A16 only).
17	5490135-P3	Boot, dust and moisture seal: 0.375 x 0.266 x .062 inches, silicon rubber; sim to APM-Hexseal N-5032-B. (Used in Models 4EC60A12 and 4EC60A19 only).
18	NP243497	Nameplate: 4.31 x 0.986 x 0.325 inches, etched aluminum. (Used in Models 4EC60A12 and 4EC60A19 only).
		MECHANICAL PARTS(Cont'd)
19	PL-19B204639-G1	Knob Assembly: 0.825 x 0.45 x 0.438 inches. ~~(Used with R702).~~
20		(Used in Model 4EC60A20 only).
21		(Used in Model 4EC60A15 only).
22		(Used in Model 4EC60A21 only).
23		(Used in Model 4EC60A14 only).
24		(Used in Model 4EC60A17 only).
25		(Used in Model 4EC60A18 only).
26	19C303538-P1	Handle: 7.39 x 0.72 x 0.610 inches. (Part of Handle Assembly, PL-19C303537-G1).
27	19A121363-P1	Spring: 2 x .031 inches. (Part of Handle Assembly, PL-19C303537-G1).
28	19A121173-P1	Retainer: 0.45 x 0.5 x 0.13 inches. (Part of Handle Assembly, PL-19C303537-G1).
29	N533P1308	Pin, dowel: 0.5 x 0.135 x .028 inches. (Part of Handle Assembly, PL-19C303537-G1).
30	4031053-P6	Nut, speed: 0.562 x 0.25 x .017 inches; sim to Tinnerman C120046017-67.
31	4035711-P4	Clip, spring tension: 0.319 x 0.257 x 0.187 inches; sim to Augat Brothers 6007-8-CT.
32	7150727-P116	Sleeving, insulation: 30 inches long, 0.198 inch inside diameter.
33	19A121730-P1	Bracket: 0.65 x 0.44 x 0.5 inches.
34	4034512-P3	Terminal, feed-thru, insulated: 0.31 x .03 x .06 inches; sim to Sealectro RST-MM-10-TUR.
35	7142162-P96	Spacer: .08 x 0.187 x .035 inches.
36	PL-19A121343-G1	Support Assembly: 2.39 x 0.25 x .085 inches; (Part of Handle Assembly, PL-19C303537-G1).
37	19C303427-P1	Casting: 1.75 x 0.75 x 0.96 x 0.75 inches. (Used in Models 4EC60A10 and 4EC60A12 only).
38	19C303457-P3	Casting: 10.264 x 3.649 x 1.462 inches. (Used in Model 4EC60A12 only).
39	19C303457-P1	Casting: 10.264 x 3.649 x 1.462 inches. (Used in Model 4EC60A10 only).
40	19C303457-P2	Casting: 10.264 x 3.649 x 1.462 inches. (Used in Model 4EC60A16 only).
41	19C303457-P4	Casting: 10.264 x 3.649 x 1.462 inches. (Used in Model 4EC60A19 only).
42		(Used in Models 4EC60A15, 20 and 21 only).
43	PL-19A121169-G1	Support Assembly: 5.29 x 1.2 x 1 inches;
44	PL-19B204501-G1	Case Assembly: 10.15 x 4.67 x 3.52 inches.
45	4029994-P1	Strike: 0.625 x 0.38 inches, chrome plated steel.
46	N509P1912C	Pin, dowel: 0.75 x 0.199 x 0.182 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
47	19A121741-P1	Spring: 1 x 1 x 0.3 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
48	19B204963-P1	Lever: 1.5 x 0.85 x 0.3 x 0.64 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
49	19C303679-P1	Casting: 3.44 x 1.25 x 1.9 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
50	19B204964-P1	Handle: 3.26 x 1.34 x 0.5 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
51	19A121742-P1	Spacer: 0.5 x 0.128 x 0.188 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
52	19B204965-P1	Spring: 1.75 x 0.66 x 0.64 x 0.75 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
53	19C303679-P2	Casting: 3.44 x 1.25 x 1.9 inches. (Used in Models 4EC60A16 and 4EC60A19 only).
54	N648P9004	Screw: Cap (Used for mounting handle).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



CONTROL UNIT - TYPE EC-60-A

RC-1087B

PRODUCTION CHANGES

(Refer to Parts List for description of parts affected by these revisions.)

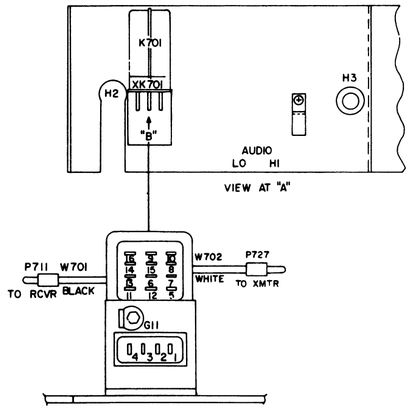
REV. A - To incorporate an improved output transistor. Changed Q701 and R704.

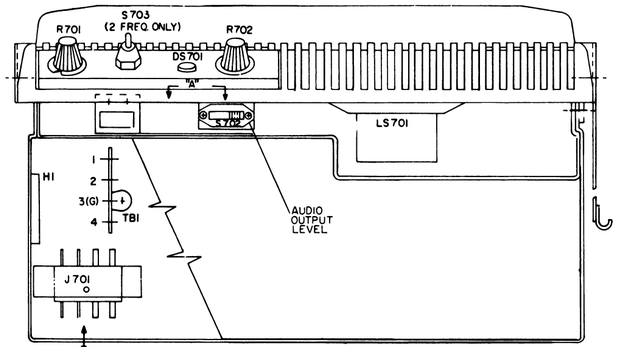
REV. B - To reduce high frequency gain of audio transistor. Added C701.

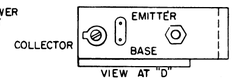
REV. C - (Models 4EC60A10 & 12 only)
To provide audio to microphone jack. Added white-green wire bet between LS701-2 and J703-4.

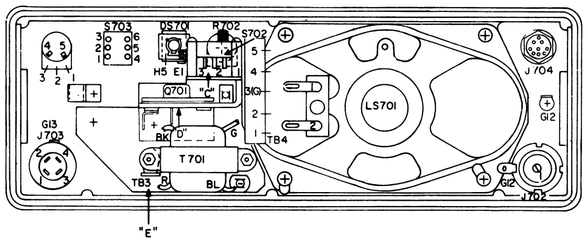
SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

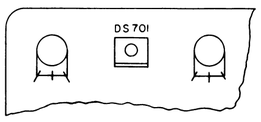
THIS ELEM DIAG APPLIES TO	
MODEL NO	REV LETTER
4EC60A22 & 24	A





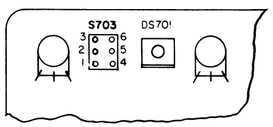






1 FREQ

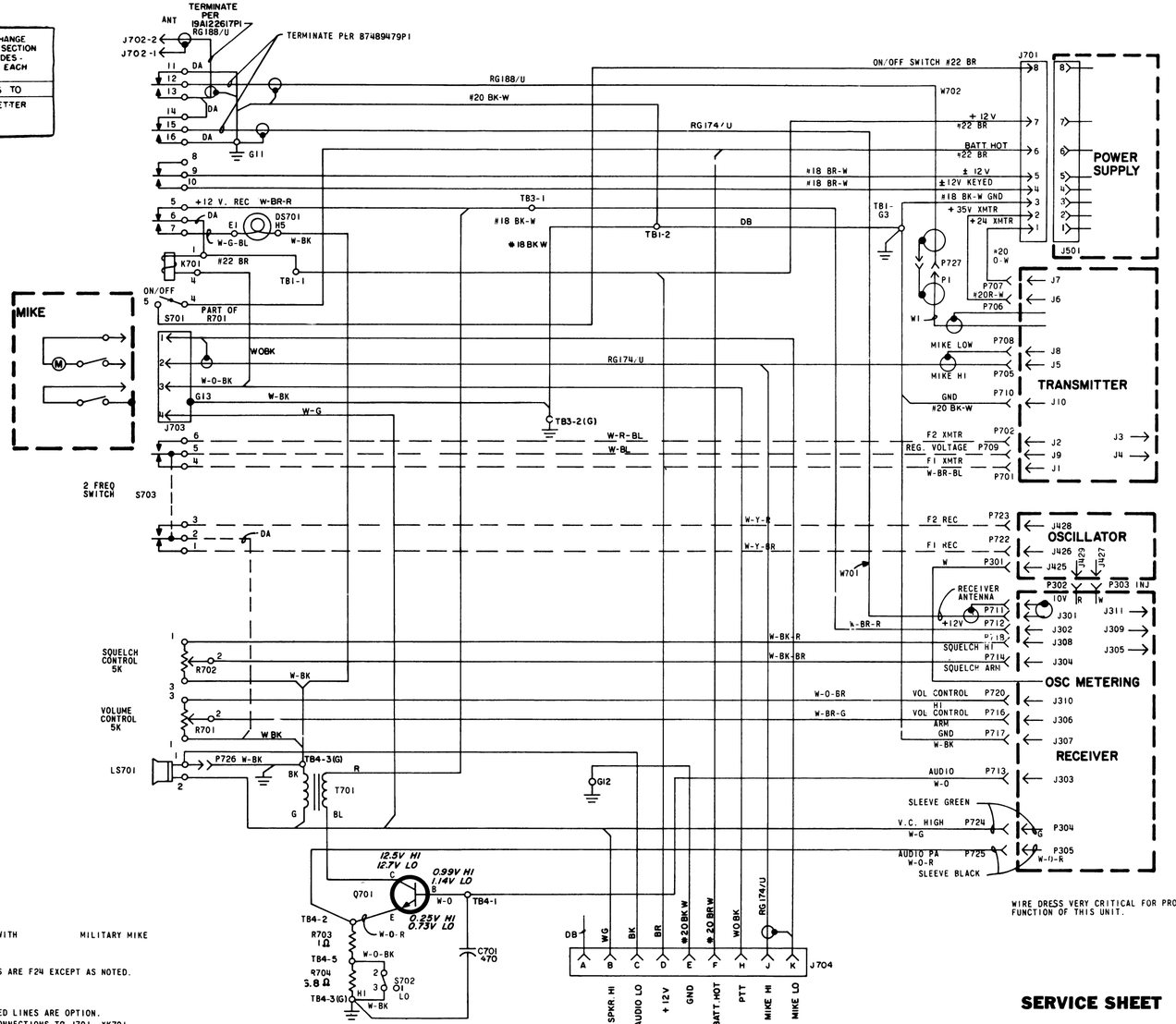
MODEL 4EC60A22



2 FREQ

MODEL 4EC60A24

(19D402791, Rev. 0)



WIRE DRESS VERY CRITICAL FOR PROPER FUNCTION OF THIS UNIT.

1 OR 2 FREQ. WITH MILITARY MIKE

NOTES:
1. ALL WIRES ARE F2W EXCEPT AS NOTED.

3. ALL DASHED LINES ARE OPTION.
4. SLEEVE CONNECTIONS TO J701, XK701 AND P701-P726.

(19D402724, Rev. 2)

SERVICE SHEET

CONTROL UNIT WITH ACCESSORY JACK OPTION
MODELS 4EC60A22 & 24

(RC-1367A)

PARTS LIST

CONTROL UNIT

MODEL 4EC60A22 PL-19D402279-G13 (Single Frequency)
MODEL 4EC60A24 PL-19D402279-G15 (Two Frequency)

SYMBOL	G-E PART NO.	DESCRIPTION
C701	5494481-P7	Ceramic disc: 470 pf ±20%, 500 VDCW.
		- - - - - - - INDICATING DEVICES- - - - - - - -
DS701	4034664-P1	Lamp, incandescent: 28 v .04 amp; sim to G-E 2148.
		- - - - - - -JACKS AND RECEPTACLES- - - - - - -
J701	7473192-P31	Connector: 8 terminals, phenolic; sim to HB Jones 261-31-02-000.
J702	5493632-P3	Connector, coaxial: sim to FXR 33975.
J703	19B209201-P1	Connector: 4 contacts; sim to Switchcraft 3C-1088.
J704	7489183-P5	Connector: 9 contacts (Accessory Jack Option).
		- - - - - - - - - - RELAYS- - - - - - - - - - -
K701	19C307010-P5	Armature: 12 VDC nominal, 130 ohms res ±10% at 25°C, 4 form C contacts; sim to Allied Control T154-X-413.
		- - - - - - - - -LOUDSPEAKERS- - - - - - - - - -
LS701	19C307094-P1	Permanent magnet: 5.062 x 3.062 inches, 3.2 ohms ±10%, voice coil imp., 3 w input, 325 ±50 cps resonance, paper dust cap; sim to Oaktron S7473.
		- - - - - - - - - - -PLUGS- - - - - - - - - - - -
P701 and P702	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2. (Used in Model 4EC60A24 only).
P705	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P706 thru P708	4029840-P1	Contact, electrical: taper pin, solder coated brass; sim to Amp 41854.
P709	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P710	4029840-P1	Contact, electrical: taper pin, solder coated brass; sim to Amp 41854.
P712 thru P714	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P716 thru P718	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P720	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2.
P722 and P723	4029840-P2	Contact, electrical: taper pin, solder coated brass; sim to Amp 42827-2. (Used in Model 4EC60A24 only).
P724 and P725	7147199-P2	Connector: 1 female contact; sim to Winchester Electronics 21804.
P726	4036634-P1	Receptacle, pin: sim to Amp 42428-2.
		- - - - - - - - - TRANSISTORS- - - - - - - - -
Q701	19A115527-P1	Silicon, NPN.
		- - - - - - - - - -RESISTORS- - - - - - - - - -
R701	19C300097-P10	Resistor/switch: includes Resistor, variable, carbon film, 5000 ohms ±20%, 1/8 w, mod log taper, 180° rotation; (S701) Switch, 2 amps at 125 VAC; sim to Mallory Type MLC.
R702	19C300097-P9	Variable, carbon film: 5000 ohms ±20%, 1/4 w, linear taper, 180° rotation; sim to Mallory Type MLC.
R703	19B209022-P115	Wirewound, phenolic body: 1 ohm ±10%, 2 w; sim to IRC Type BWH.
R704	19B209022-P135	Wirewound, phenolic body: 6.8 ohms ±5%, 2 w; sim to IRC Type BWH.

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - - - - - -SWITCHES- - - - - - - - - -
S701		(Part of R701).
S702	19B209040-P1	Slide: DPDT, 0.5 amp at 125 v; sim to Continental wirt 126.
S703	4036949-P2	Toggle: DPDT, 100 µa at 5 VDC; sim to Arrow-Hart and Hegeman TS-6. (Used in Model 4EC60A24 only).
		- - - - - - - - -TRANSFORMERS- - - - - - - - -
T701	19B209079-P1	Audio frequency: freq range 0.3-3 KC, operating 275 MADC, Pri 1: 55 ohms ±10% imp at 1 w, 0.895 ohms ±10% DC res, Sec 1: 3.2 ohms ±10% at 1 w, 0.168 ohm max DC res.
		- - - - - - - - TERMINAL BOARDS- - - - - - - - -
TB1	7775500-P8	Phenolic: 4 brass terminals and mountings.
TB3	7775500-P44	Phenolic: 2 brass terminals and mountings.
TB4	7775500-P11	Phenolic: 5 brass terminals and mountings.
W701		CABLE ASSEMBLY PL-19A121176-G1
		- - - - - - - - - - -PLUGS- - - - - - - - - - - -
P711	5496078-P1	Connector, push-on: Teflon®; sim to FRX 27-1.
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	19B209044-P11	Cable, RF: 5.75 inches long. Type RG-174/U.
W702		CABLE ASSEMBLY PL-19A121176-G2
		- - - - - - - - - - -PLUGS- - - - - - - - - - - -
P727	5496078-P2	Connector, push-on: Teflon®; sim to FXR 27-2.
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	19B209044-P13	Cable, RF: 4 inches long. Type RG-188/U.
		- - - - - - - - - - SOCKETS- - - - - - - - - -
XK701	5491595-P5	Relay, nylon: 16 contacts; sim to Allied Control 30054-2.
		DC CHARGING CABLE ASSEMBLY PL-19B204993-G1
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	7160478-P1	Cable: 2 conductor, 50 inches; sim to Birnbach 789.
	4034405-P1	Plug, general purpose: 4 contacts, polarized, 10 amps at 133 VRMS; sim to Cannon XLR-4-11C.
	19A115513-P1	Connector, cigarette lighter: 12 VDC; sim to Cole-Hersse 1624.
		POWER SUPPLY EXTENSION CABLE ASSEMBLY PL-19B204289-G1
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	7473192-P19	Socket, phenolic: 8 terminals, cable clamp in cap; sim to HB Jones 261-32-08-030.
	7473192-P26	Plug, phenolic: 8 terminals, cable clamp in cap; sim to HB Jones 261-31-08-030.
	7162441-P23	Tubing, flexible, plastic: 3 feet long.
		AUTO GUTTER MOUNT ANTENNA MODEL 4EY20A10 (High Band)
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	19C303620-P1	Antenna Assembly. Includes: plastic ball tip; 19.5 ±0.25 inch stainless steel whip; socket; insulators; adapter; RG-58A/U cable; PL-259 plug; clip; 2-set screws; rubber pad; sim to Antenna Specialists ASP157.

SYMBOL	G-E PART NO	DESCRIPTION
	19C303620-P2	- - - - - - -MISCELLANEOUS(Cont'd)- - - - - - - Replacement Whip Assembly. Includes: plastic ball tip; 19.5 ±0.25 inch stainless steel whip; socket; insulators; sim to Antenna specialists 19A904-1.
		MICROPHONE MODEL 4EM33B10 (19B209199-P2)
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
		Switch: moisture proof. Shure Brothers RP33.
		Cable and plug: approx 5 feet. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP31.
		Shield. Shure Brothers RP36.
		MICROPHONE MODEL 4EM33C10 (19B209306-P1)
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
		Switch. Shure Brothers RP33.
		Cable and plug: approx 5 feet. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic.
		Shield. Shure Brothers RP36.
		PORTABLE ANTENNA MODELS 4EY18A10-13 (Low Band)
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	PL-19C303707-G1	25-31 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 48.25 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-431GE.
	PL-19C303707-G2	31-36 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 48.25 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-A431GE.
	PL-19C303707-G3	36-42 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 38 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-B431GE.
	PL-19C303707-G4	42-50 MC Antenna Assembly. Includes: 0.25 inch dia aluminum ball, 38 inch stainless steel rod, tuning screw and locknut, rubber O-ring weather seal; sim to Antenna Specialists ASP-C431GE.
		PORTABLE ANTENNA MODEL 4EY19A10 (High Band)
		- - - - - - - - -MISCELLANEOUS- - - - - - - - -
	19C303658-P1	Antenna Assembly. Includes: 6-32 set screw; aluminum ball; 22.05 inch stainless steel rod; sleeving; spring; cap, O-ring; plug; sim to Antenna Specialists ASP-405GE.
		MECHANICAL PARTS (SEE RC-1397)
1	PL-19B204532-G1	Chassis Assembly: 9.74 x 4.3 x 3 inches.
2	19B204527-P1	Diaphragm: 5.06 x 3.06 inches.
3	7763541-P3	Clip: 0.781 x 0.375 x .02 inches.
4		(Used with Channel Guard and Selective Calling only).

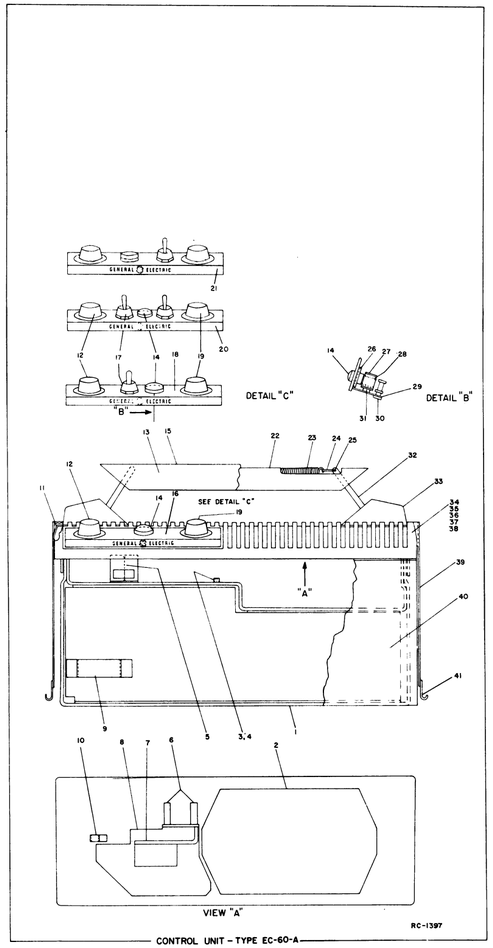
SYMBOL	G-E PART NO	DESCRIPTION
		MECHANICAL PARTS(Cont'd)
5	5491595-P9	Spring, retainer: 1.358 x 1.142 x 0.787 inches, wire; sim to Allied Control 30040-2. (Used with K701).
6	7142162-P98	Spacer: 0.625 x 0.187 x .035 inches. (Used with R702).
7	19B205490-P1	Heat Sink: (Used with Q701).
8	PL-19A121174-G2	Chassis Assembly: 3.25 x 2.07 x 1.15 inches.
9	19A121178-P1	Support: 1.88 x 0.6 x 0.5 inches. (Used with J701).
10	19A121199-P1	Clip: 0.781 x 0.375 x 0.188 inches.
11	19A121215-P1	Spring: 1.78 x 0.52 x 0.73 inches.
12	PL-19B204639-G2	Knob Assembly: 0.825 x 0.45 x 0.438 inches.
13	PL-19C303537-G1	Handle Assembly: (Includes items 15, 22, 23, 24, 25 and 32).
14	19B204949-P1	Jewel: 0.312 x 0.25 x 0.25 inches, red plastic; sim to Rohm and Haas 2444 Plexiglas.
15	19B204492-P1	Extrusion: 7.525 x 0.604 x 0.75 inches. (Part of Handle Assembly, PL-19C303537-G1).
16	NP243498	Nameplate: 4.31 x 0.986 x 0.325 inches, etched aluminum. (Used in Model 4EC60A22 only).
17	5490135-P3	Boot, dust and moisture seal: 0.375 x 0.266 x .062 inches, silicon rubber; sim to APM-Hexseal N-5032-B. (Used in Model 4EC60A24 only).
18	NP243497	Nameplate: 4.31 x 0.986 x 0.325 inches, etched aluminum. (Used in Model 4EC60A24 only).
19	PL-19B204639-G1	Knob Assembly: 0.825 x 0.45 x 0.438 inches. (Used with R702).
20		(Used in Model 4EC60A27 only).
21		(Used in Model 4EC60A26 only).
22	19C303538-P1	Handle: 7.39 x 0.72 x 0.610 inches. (Part of Handle Assembly, PL-19C303537-G1).
23	19A121363-P1	Spring: 2 x .031 inches. (Part of Handle Assembly, PL-19C303537-G1).
24	19A121173-P1	Retainer: 0.45 x 0.5 x 0.13 inches. (Part of Handle Assembly PL-19C303537-G1).
25	NS33P1308	Pin, dowel: 0.5 x 0.135 x .028 inches. (Part of Handle Assembly, PL-19C303537-G1).
26	4031053-P6	Nut, speed: 0.562 x 0.25 x .017 inches; sim to Tinnerman C120046017-67.
27	4035711-P4	Clip, spring tension: 0.319 x 0.257 x 0.187 inches; sim to Augat Brothers 6007-8-CT.
28	7150727-P116	Sleeving, insulation: 30 inches long, 0.198 inch inside diameter.
29	19A121730-P1	Bracket: 0.65 x 0.44 x 0.5 inches.
30	4034512-P3	Terminal, feed-thru, insulated: 0.31 x .03 x .06 inches; sim to Sealectro RST-MM-10-TUR.
31	7142162-P96	Spacer: .08 x 0.187 x .035 inches.
32	PL-19A121343-G1	Support Assembly: 2.39 x 0.25 x .085 inches; (Part of Handle Assembly, PL-19C303537-G1).
33	19C303427-P1	Casting: 1.75 x 0.75 x 0.96 x 0.75 inches.
34	19C303457-P7	Casting: 10.264 x 3.649 x 1.462 inches. (Used in Model 4EC60A22 only).
35	19C303457-P9	Casting: 10.264 x 3.649 x 1.462 inches. (Used in Model 4EC60A24 only).
36		(Used in Model 4EC60A23 only).
37		(Used in Models 4EC60A25 and 26 only).
38		(Used in Model 4EC60A27 only).
39	PL-19A121169-G1	Support Assembly: 5.29 x 1.2 x 1 inches;
40	PL-19B204501-G1	Case Assembly: 10.15 x 4.67 x 3.52 inches.
41	4029994-P1	Strike: 0.625 x 0.38 inches, chrome plated steel.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PRODUCTION CHANGES

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

REV. A - To provide audio to microphone jack. Added white-green wire between LS701-2 and J703-4.



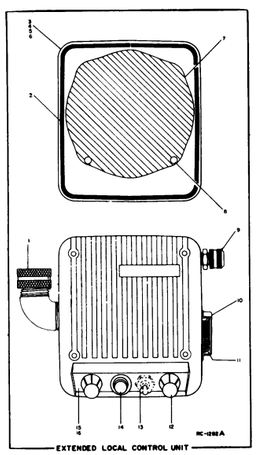
CONTROL UNIT - TYPE EC-60-A

PARTS LIST

CONTROL UNIT MODEL 4EC66A10 (PL-19D402603-G1) Single Frequency
CONTROL UNIT MODEL 4EC66A11 (PL-19D402603-G2) Two Frequency
CONTROL UNIT MODEL 4EC66A14 (PL-19D402603-G5) Single Frequency with Accessory Jack Option
CONTROL UNIT MODEL 4EC66A15 (PL-19D402603-G6) Two Frequency with Accessory Jack Option

TRANSMITTER-RECEIVER TOP PANEL PL-19D402599-G1
AND
ASSOCIATED ASSEMBLIES

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS701	19C307037-P4	Lamp, incandescent: 14 v ±.01 v; sim to G-E 1815.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J701	7489183-P5	Connector: 9 contacts. (Used in Models 4EC66A14 and 15).
		- - - - - - - - - LOUDSPEAKERS - - - - - - - - -
LS701	5491260-P7	Permanent magnet, 5-inch: 3.2 ohms ±10% voice coil imp, 15 w max operating, 385 cps ±15% resonance, paper dust cap; sim to Jensen Model P5-VAS12761.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R701	19B209256-P2	Resistor/switch: includes Resistor, variable, 5000 ohms ±20%, 0.25 w; Switch (S701), rotary, SPST, 15 amps at 10 v; sim to CTS Series 45.
R702	19B209256-P1	Variable, carbon film: 5000 ohms ±20%, 0.5 w; sim to CTS Series 45.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701		(Part of R701).
S702	5491899-P6	Toggle: DPDT, 3 amps at 250 v; sim to Cutler-Hammer 8363K7. (Used in Model 4EC66A11).
		- - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB701	PL-19B205152-G1	Terminal board: 25 contacts.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS701	7141855-P15	Lamp: sim to Dialight 95-410-975 (modified).
		MECHANICAL PARTS (SEE RC-1282)
1	19A122065-P1	Bushing: 3/4-14; sim to Pyle-National DB-1191690 (modified).
2	4032574-P2	Gasket, cover, neoprene.
3	19D402601-P1	Casting. (Used in Model 4EC66A10).
4	19D402601-P2	Casting. (Used in Model 4EC66A11).
5	19D402601-P5	Casting. (Used in Model 4EC66A14).
6	19D402601-P6	Casting. (Used in Model 4EC66A15).
7	19B205162-P1	Diaphram: approx 2-3/8 inches dia.
8	19A121990-P1	Spacer: 3/4 inch hex. (Used with TB701).
9	19A122066-P1	Bushing: 1/4-18; sim to Pyle-National DB-4416 (modified).
10	4031457-P1	Support. (Used with microphone).
11	4031458-P1	Spring. (Used with microphone).
12	PL-4039182-G1	Knob. (Used with R701,702).
13	5490135-P4	Boot; sim to APM-Hexseal N-1030-B. (Used with S702 in Model 4EC66A11).
14	19A115040-P9	Lens, panel light: red lens; sim to Dialight 81-331. (Used with DS701).
15	NP248843	Nameplate. (Used in Models 4EC66A11 and 15).
16	NP248844	Nameplate. (Used in Models 4EC66A10 and 14).



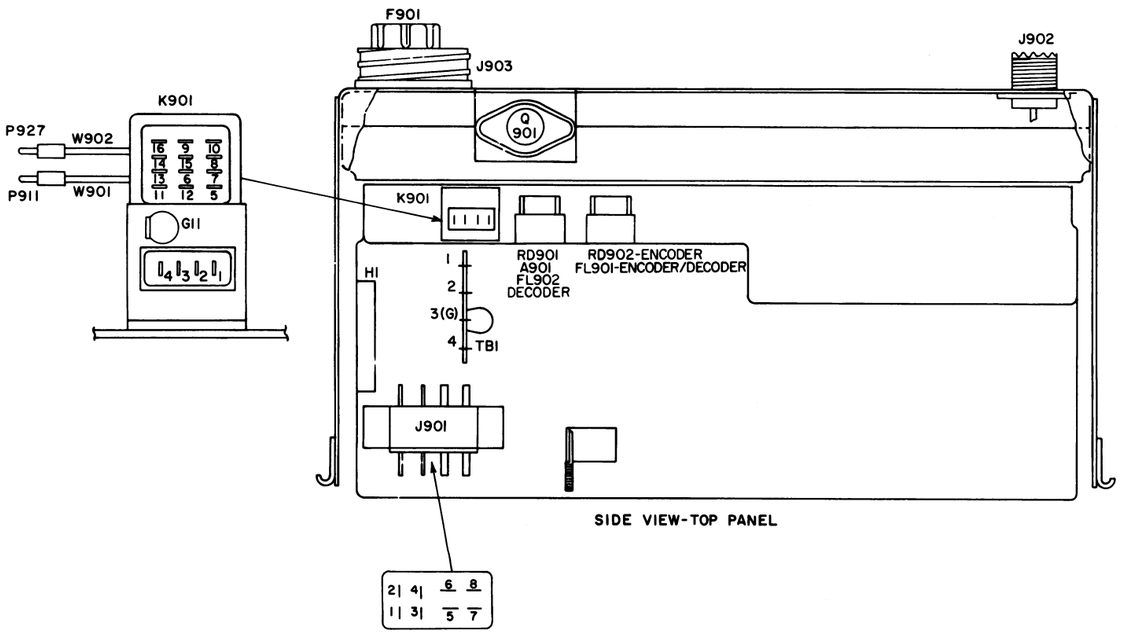
EXTENDED LOCAL CONTROL UNIT

SYMBOL	G-E PART NO	DESCRIPTION
		TRANSMITTER-RECEIVER TOP PANEL PL-19D402599-G1 REV. A
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C901	7489162-P39	Silver mica: 330 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C902	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - - - FUSES - - - - - - - - - -
F901	7102673-P2	Quick blowing: 15 amps at 32 v; sim to Littelfuse 311015 or Bussmann AGC-15.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J901	7473192-P31	Connector, phen: 8 terminals; sim to HB Jones 261-31-08-000.
J902	2R22-P3	Receptacle, panel, coaxial. Signal Corps SO-239 or sim to Amphenol 83-1R.
J903	19B200010-P2	Receptacle: 23 contacts; sim to Cannon Electric NK-L23-32S.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K901*	19C307010-P5	Armature: 12 VDC nominal, 1300 ohms ±10% coil res, 4 form C contacts; sim to Allied Control T154-16274. In earlier than Rev. A:
	19C307010-P5	Armature: 12 VDC nominal, 130 ohms ±10% coil res, 4 form C contacts; sim to Allied Control T154-X-413.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P901 and P902	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P905	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P906 thru P908	4029840-P1	Contact, electrical: sim to AMP 41854.
P909	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P910	4029840-P1	Contact, electrical: sim to AMP 41854.
P912 thru P914	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P916 thru P918	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P920	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P922 and P923	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P924 and P925	7147199-P2	Connector: female contact; sim to Winchester Electronics 21804.
P926	4029840-P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q901	19A115527-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R901	19B209022-P115	Wirewound: 1 ohm ±10%, 2 w; sim to IRC Type BWH.
R902	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T901	19B209079-P1	Audio frequency: 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 - - - - - - - - -
TB1	7775500-P8	Phen: 4 terminals.
TB2	7775500-P11	Phen: 5 terminals.
TB3	7775500-P7	Phen: 3 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -

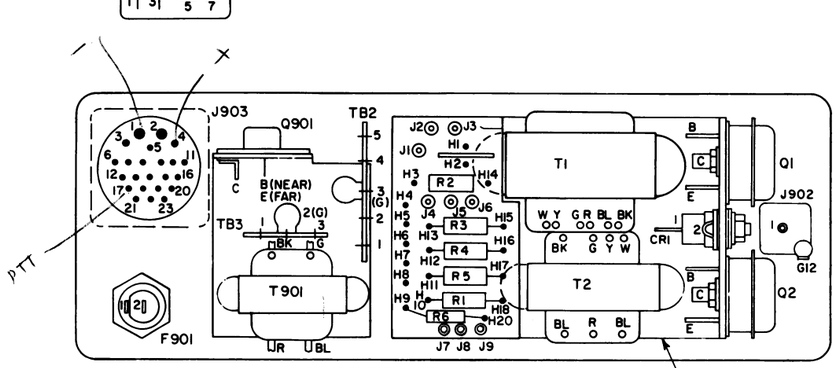
SYMBOL	G-E PART NO	DESCRIPTION
W901		CABLE ASSEMBLY PL-19A121176-G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P911	5496078-P1	Push-on, coaxial: Teflon®; sim to FXR 27-1.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044-P11	Cable, RF: approx 6 inches; sim to Amphenol 21-598.
W902		CABLE ASSEMBLY PL-19A121176-G2
		- - - - - - - - - - PLUGS - - - - - - - - - -
P927	5496078-P2	Jack, coaxial: Teflone®; sim to FXR 27-2.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044-P13	Cable, RF: approx 4 inches; sim to Amphenol 421-105.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XF901	19B209265-P3	Fuseholder: 15 amps at 250 v; sim to Littelfuse 342006.
XK901	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		MECHANICAL PARTS
	PL-19B205129-G1	Cover. (Mounts J902, 903).
	19B205127-P1	Support: approx 5-1/4 x 1 inches. (Mounts locking latch).
	4029994-P1	Catch, pull-down. (Mates with catch on power supply to keep unit intact).
	4037158-P7	Channel, rubber: approx 1-3/8 inches; sim to Atlantic India Rubber X661. (Located above J901).
	4032574-P2	Gasket, cover, neoprene: approx 27-3/4 inches.
	PL-19A121981-G1	Chassis. (Mounts T901, TB2, 3).
	7763541-P5	Clip, cable. (Located between F901 and J903).
	19A121178-P1	Support. (Used with J901).
	5491595-P9	Clip, relay: sim to Allied Control 30040-2. (Used with K901).
	7763541-P3	Clip, cable. (Located by XK901).
	PL-19B204532-G1	Chassis.
	19A122071-P1	Grommet: approx 1-1/4 inches. (Located by K901).
		- - - - - - - ASSOCIATED ASSEMBLIES - - - - - - -
	PL-19A122010-G2	Control Mounting Kit.
		132-174 MHZ ANTENNA MODEL 4EY12A13 (5490969-P13) (HIGH BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Antenna: includes 20-inch stainless steel whip, whip socket, antenna cable, cable adapter, PL-259 plug; sim to Antenna Specialists ASPD201GE or Danbury-Knudsen Type PA-25.
	5490969-P4	Whip: 20-inch stainless steel.
	5490969-P5	Socket, whip.
	5490969-P6	Whip and whip socket: 20-inch stainless steel whip, whip socket.
		Cable, antenna: approx 15 feet. Type RG-58/U. (Used with G-E Dwg 2R22-P1 and G-E Dwg 7105381-P1).
	7105381-P1	Adapter, cable: 1 x 7/16 inches dia. Type UG-175/U. (Used with G-E Dwg 2R22-P1 and Type RG-58/U cable).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with G-E Dwg 7105381-P1 and Type RG-58/U cable).

(Cont'd on back of Sheet 2)

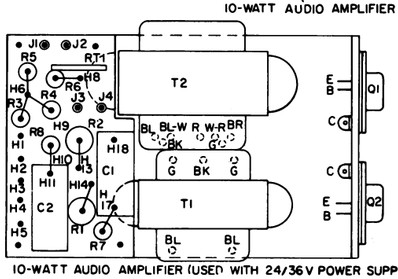
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



SIDE VIEW-TOP PANEL

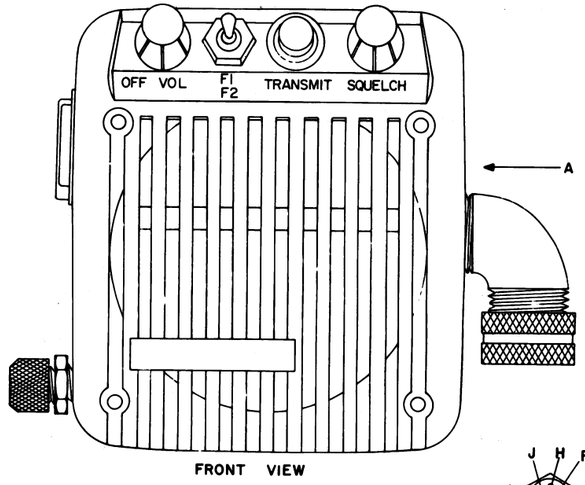


COMPONENT VIEW-TOP COVER PANEL

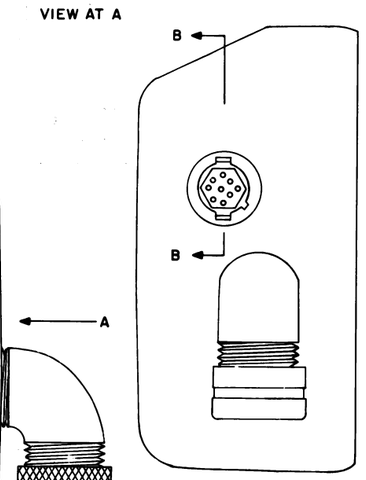


10-WATT AUDIO AMPLIFIER (USED WITH 24/36 V POWER SUPPLY)

10-WATT AUDIO AMPLIFIER (USED WITH 6/12 V POWER SUPPLY)

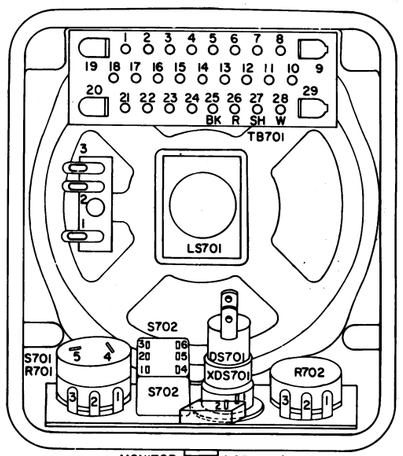


FRONT VIEW



SECTION B-B

NOTES:
1. S703 USED ONLY IN MODELS 4EC66A12,13.
2. S702 USED ONLY IN MODELS 4EC66A11,13.
3. J701 USED ONLY IN MODELS 4EC66A14-17.



BACK VIEW

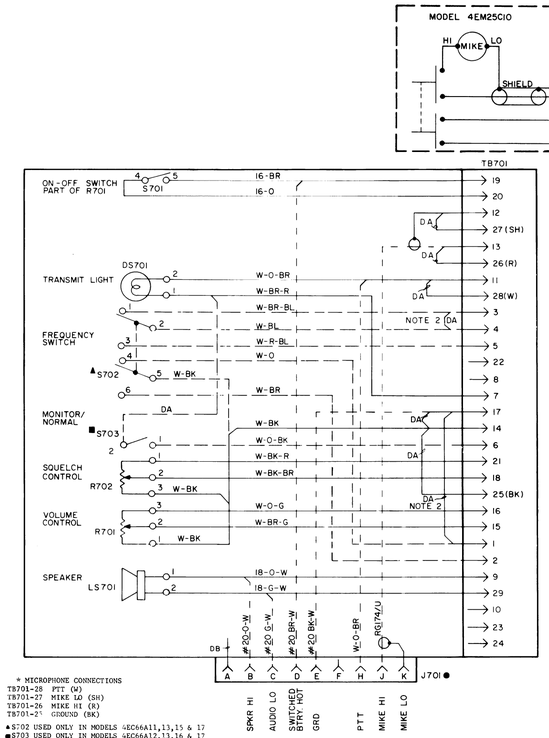
EXTENDED LOCAL CONTROL UNIT

SERVICE SHEET

EXTENDED LOCAL CONTROL UNIT
MODELS 4EC66A10,11,14 & 15
AND TRANSMITTER-RECEIVER TOP PANEL
PL-19D402599-G1 (Used with 6/12 Volt
Power Supply)

(RC-1263D, Sheet 1)

EXTENDED LOCAL CONTROL UNIT



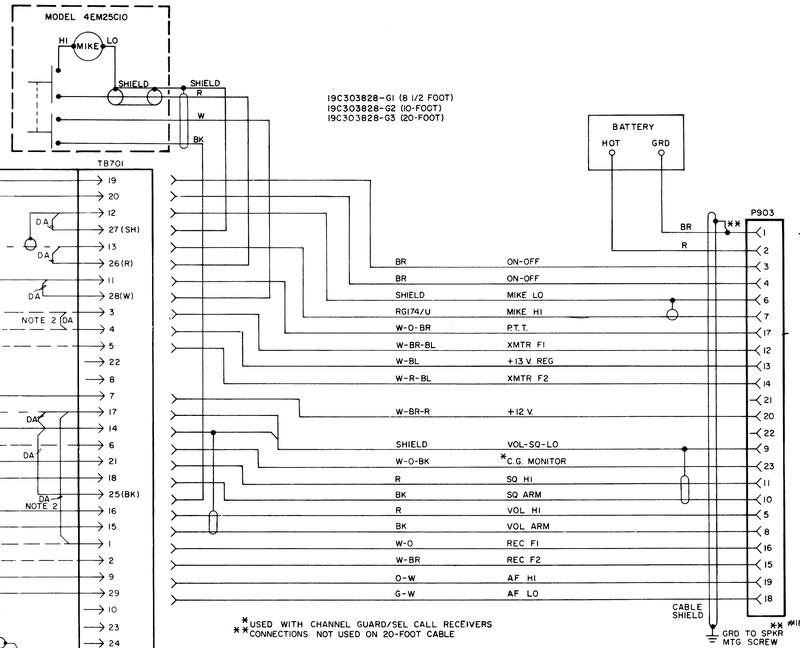
* MICROPHONE CONNECTIONS
TB701-28 PTT (W)
TB701-27 MIKE LO (SH)
TB701-26 MIKE HI (R)
TB701-27 GROUND (BK)

▲S702 USED ONLY IN MODELS 4EC66A11,13,15 & 17
●S703 USED ONLY IN MODELS 4EC66A12,13,16 & 17
J701 USED ONLY IN MODELS 4EC66A14, 15, 16, 17.

NOTES:
1. ALL WIRES SF24 UNLESS OTHERWISE SPECIFIED.
2. DELETE IN MODELS 4EC66A11,13,15 &17

(19C303826, Rev. 4)

EXTENDED LOCAL CONTROL CABLE



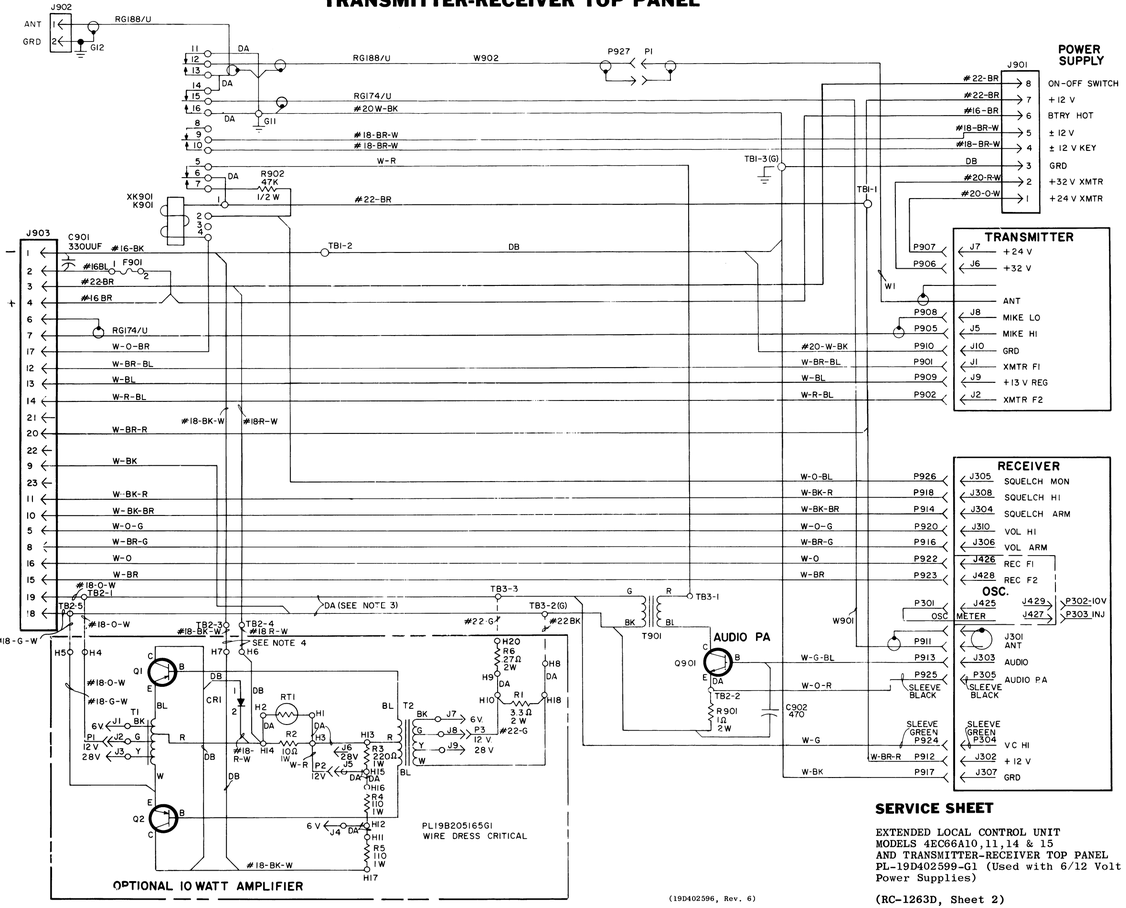
*USED WITH CHANNEL GUARD/SEL CALL RECEIVERS
**CONNECTIONS NOT USED ON 20-FOOT CABLE

RC-1262

NOTES:
1. ALL WIRES ARE SF24 EXCEPT AS NOTED.
2. ALL DASHED LINES ARE OPTION.
3. DELETE WIRES BETWEEN TB2-1 & TB3-3, ALSO BETWEEN TB2-5 & TB3-2. WHEN USING 10 WATT AMPLIFIER.
4. FOR POSITIVE GROUND CHANGE WIRE FROM H6 TO TB2-3 & WIRE FROM H7 TO TB2-4
5. FOR 10 WATT AMPLIFIER OPTION WHEN USING 6 OR 28 VOLTS CHANGE P1, P2 & P3 TO APPROPRIATE JACK.
6. FOR SINGLE FREQUENCY UNITS REMOVE JUMPER BETWEEN J1 & J9 ON TRANSMITTER.

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

TRANSMITTER-RECEIVER TOP PANEL



(19D402596, Rev. 6)

SERVICE SHEET

EXTENDED LOCAL CONTROL UNIT
MODELS 4EC66A10,11,14 & 15
AND TRANSMITTER-RECEIVER TOP PANEL
PL-19D402599-G1 (Used with 6/12 Volt Power Supplies)

(RC-1263D, Sheet 2)

(Cont'd from back of Sheet 1)

SYMBOL	G-E PART NO	DESCRIPTION
		25-54 MHZ ANTENNAS MODELS 4KY18A10-15 (LOW BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303707-P1	Model 4KY18A10, 25-29 MHz Antenna. Includes 48-1/4 inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-431-GE.
	19C303707-P2	Model 4KY18A11, 29-33 MHz Antenna. Includes 48-1/4 inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-A431-GE.
	19C303707-P3	Model 4KY18A12, 33-36 MHz Antenna. Includes 48-1/4 inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-B431-GE.
	19C303707-P4	Model 4KY18A13, 36-42 MHz Antenna. Includes 38-inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-C431-GE.
	19C303707-P5	Model 4KY18A14, 42-48 MHz Antenna. Includes 38-inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-D431-GE.
	19C303707-P6	Model 4KY18A15, 48-54 MHz Antenna. Includes 38-inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-E431-GE.
	2R22-P2	Adapter, UHF: right angle. Signal Corps M-359; sim to Amphenol 83-1AP. (Used in Models 4KY18A10-15).
		25-50 MHZ ANTENNA (LOW BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7491074-P1	Antenna: includes 96-1/2 inch stainless steel rod; sim to Antenna Specialists ASPA5BGE.
	7102930-P3	Adapter, antenna: 2-5/16 inches. (Used with G-E Dwg 7491074-P1).
	PL-4033101-G1	Antenna package: includes base, adapter spring, cable and plug.
	PL-7472880-G5	Antenna base. (Used in PL-4033101-G1).
	PL-7476632-G4	Adapter spring. (Used in PL-4033101-G1).
	5492239-P1	Cable, antenna: includes Type RG-58/U cable approx 15 feet, PL-259 plug, terminal; sim to Antenna Specialists 15A43. (Used in PL-4033101-G1).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with G-E Dwg 5492239-P1 in PL-4033101-G1).
	4KY9A1	Coil, loading: 25-33 megacycles; sim to Antenna Specialists ASPA87.
	PL-19A121577-G1	Antenna hook kit.
	7134724-P1	Antenna hook. (Used in PL-19A121577-G1).
		132-174 MHZ ANTENNA MODEL 4KY19A10 (HIGH BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303658-P1	Antenna. Includes 22-inch stainless steel rod, sleeving, spring, cap and O-ring; sim to Antenna Specialists ASP-405-GE.
		25-50, 132-174 MHZ ANTENNA MODEL 4KT20A10
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303620-P1	Antenna. Includes 19-1/2 inch stainless steel whip, socket, insulators, adapter, RG-58A/U cable, PL-259 plug, clip; sim to Antenna Specialists ASP-157.
	19C303620-P2	Replacement whip. Includes 19-1/2 inch stainless steel whip, socket, insulators; sim to Antenna Specialists 19A904-1.

SYMBOL	G-E PART NO	DESCRIPTION
		MICROPHONE MODEL 4EM25C10
1		Cable clamp. Shure Brothers RP21. (Includes parts 3 and 8).
2		Switch. Shure Brothers RP26.
3		Case (back) and mounting button: plastic. Shure Brothers RP21. (Includes parts 1 and 8).
4		Switch button: red plastic. Shure Brothers RP25.
5		Spring. Shure Brothers RP16. (Includes miscellaneous hardware).
6		Shield. Shure Brothers RP23.
7		Cartridge, magnetic controlled.
8		Case (front): plastic. Shure Brothers RP21. (Includes parts 1 and 3).
9		Cable: approx 6 feet.
		MICROPHONE MODEL 4EM33B10 (19B209199-P2)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch: moisture proof. Shure Brothers RP33.
		Cable and plug: approx 5 feet. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP31.
		Shield. Shure Brothers RP36.
		MICROPHONE MODEL 4EM33C10 (19B209306-P1)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch. Shure Brothers RP33.
		Cable and plug: approx 80 inches. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP94.
		Shield. Shure Brothers RP36.
		MICROPHONE MODEL 4EM33D10 (19B209199-P3)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch: moisture proof. Shure Brothers RP33.
		Cable and plug: approx 80 inches. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP31.
		Shield. Shure Brothers RP36.
		HANDSET MODEL 4EM34A10 (19B209198-P1)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Cartridge, transmitter: controlled magnetic. Shure Brothers RP13.
		Cartridge, receiver: 3 watt max power. Shure Brothers RP41.
		Switch. Shure Brothers RP81.
		Cable and plug: approx 5 feet. Shure Brothers RP47.
		Handle, transmitter cap, receiver cap: phen, weather proof. Shure Brothers RP49.

SYMBOL	G-E PART NO	DESCRIPTION
		POWER CONTROL CABLE PL-19C303828-G2
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A115067-P1	Cable, 2-conductor: approx 10 feet; sim to Belden 31713.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric ME-L23-23C-3/4.
		POWER CONTROL CABLE PL-19C303828-G3
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A115067-P3	Cable, 2-conductor: approx 23 feet; sim to Belden 7721.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric ME-L23-23C-3/4.
		DC TRICKLE CHARGE CABLE PL-19B204993-G2
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7160478-P1	Cable: 2-conductors: approx 50 inches; sim to Birnbach 789.
	4034405-P5	Plug: 5 sockets; sim to Cannon Electric XLR-5-11C.
	19A115513-P1	Connector, cigarette lighter: 12 VDC; sim to Cole-Hersee 1024.
		AC CHARGING CABLE PL-5492570-G2
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
C1	7489159-P16	Capacitor, metallized plastic: 4 µf ±20%, 200 VDCW; sim to Sprague 118P40502S4.
	4034403-P1	Plug: sim to G-E 4304-3.
	7160478-P1	Cable, 2-conductor: approx 87 inches; sim to Birnbach 789.
	4034405-P5	Plug: 5 sockets: sim to Cannon Electric XLR-5-11C.
		POWER SUPPLY EXTENSION CABLE PL-19B204289-G1
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7473192-P19	Receptacle: 8 terminals; sim to HB Jones 261-32-08-030.
	7473192-P26	Plug: 8 terminals; sim to HB Jones 291-31-08-030.
	7162441-P23	Sleeving, electrical: approx 7/16 inch dia.

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.

10-WATT POWER AMPLIFIER 19B205165-G1

REV. A - To improve audio response. Changed R1 and added R6 on 10-Watt Audio Amplifier.

TRANSMITTER-RECEIVER TOP PANEL 19D402599-G1

REV. A - To incorporate an improved relay. Changed K901.

PARTS LIST

10-WATT POWER AMPLIFIER
PL-19B205165-G1
REV A

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115617-P1	Silicon.
		- - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J9	4033513-P4	Contact, electrical: sim to Bead Chain L93.3.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 thru P3	4029840-P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1 and Q2	5490810-P1	Germanium, PNP.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1*	19B209022-P27	Wirewound, phen: 3.3 ohms ±5%, 2 w; sim to IRC Type BWH.
	19B209022-P137	In Models earlier than Rev A: Wirewound: 8.2 ohms ±10%, 2 w; sim to IRC BWH.
R2	3R78-P100J	Composition: 10 ohms ±5%, 1 w.
R3	3R78-P221J	Composition: 220 ohms ±5%, 1 w.
R4 and R5	3R78-P111J	Composition: 110 ohms ±5%, 1 w.
R6*	19B209022-P1	Wirewound: 0.27 ohms ±5%, 2 w; sim to IRC Type BWH. (Added by REV A).
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT1	19C300048-P3	Disc: 1 ohm ±10% res at 25°C.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T1	19B209218-P1	Audio freq: 0.3-3 kHz freq range nominal, 0.3 ohm DC res max.
T2	19B209218-P1	Audio freq: 0.3-3 kHz freq range nominal, Pri: 0.17 ohm DC res max. Sec: 5.5 ohms DC res max.
		MECHANICAL PARTS
		(SEE RC-1280)
1	4031291-P1	Insulator, disc.
2	PL-19B205142-G1	Chassis.
3	4034225-P1	Flat washer: approx 1/2 inch dia. (For 10-32 screw).
4	4032596-P1	Nut: 10-32.
5	4036835-P1	Terminal, solder: sim to Shakeproof 2118-10-01-2520N.
6	19A115221-P3	Washer, mica: approx 9/16 inch dia.
7	4034215-P1	Bushing.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PARTS LIST

CONTROL UNIT
MODEL 4EC66A10 (PL-19D402603-G1) (1 Frequency)
MODEL 4EC66A11 (PL-19D402603-G2) (2 Frequency)
MODEL 4EC66A14 (PL-19D402603-G5) (1 Frequency with ACCESSORY JACK OPTION)
MODEL 4EC66A15 (PL-19D402603-G6) (2 Frequency with ACCESSORY JACK OPTION)
TRANSMITTER-RECEIVER TOP PANEL PL-19D402599-G4
AND
ASSOCIATED ASSEMBLIES

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - INDICATING DEVICES - - - - - - - - -
DS701	19C307037-P4	Lamp, incandescent: 14 v; sim to G-E 1815.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J701	7489183-P5	Connector: 9 contacts; sim to Winchester M9S-LRN. (Used in Models 4EC66A14, 15).
		- - - - - - - - - - LOUDSPEAKERS - - - - - - - - - -
LS701	5491260-P7	Permanent magnet, 5-inch: 3.2 ohms ±10% voice coil imp, 15 w max operating, 385 cps ±15% resonance, paper dust cap; sim to Jensen Model P5-VAS12761.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R701	19B209256-P2	Resistor/switch: includes Resistor, variable, 5000 ohms ±20%, 0.25 w; Switch (S701), rotary, SPST, 15 amps at 10 v; sim to CTS Series 45.
R702	19B209256-P1	Variable, carbon film: 5000 ohms ±20%, 0.5 w; sim to CTS Series 45.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S701		(Part of R701).
S702	5491899-P6	Toggle: DPDT, 3 amps at 250 v; sim to Cutler-Hammer 8363K7. (Used in Model 4EC66A11, 15).
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB701	PL-19B205152-G1	Terminal board: 25 contacts.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS701	7141855-P15	Lamp: sim to Dialight 95-410-975 (modified).
		MECHANICAL PARTS
		(SEE RC-1282A)
1	19A122065-P1	Bushing: 3/4-14; sim to Pyle-National DB-1191690 (modified).
2	4032574-P2	Gasket, cover, neoprene.
3	19D402601-P1	Casting. (Used in Model 4EC66A10).
4	19D402601-P2	Casting. (Used in Model 4EC66A11).
5	19D402601-P5	Casting. (Used in Model 4EC66A14).
6	19D402601-P6	Casting. (Used in Model 4EC66A15).
7	19B205162-P1	Diaphragm: approx 2-3/8 inches dia.
8	19A121990-P1	Spacer: 3/4 inch hex. (Used with TB701).
9	19A122066-P1	Bushing: 1/4-18; sim to Pyle-National DB-44516 (modified).
10	4031457-P1	Support. (Used with microphone).
11	4031458-P1	Spring. (Used with microphone).
12	PL-4039182-G1	Knob. (Used with R701, 702).
13	5490135-P4	Boot: 15/32-32; sim to APM-Hexseal N-1030-B. (Used with S702 in Models 4EC66A11, 15).
14	19A115040-P9	Lens, panel light: red lens; sim to Dialight 81-331. (Used with DS701).
15	NP248843	Nameplate. (Used in Models 4EC66A11, 15).
16	NP248844	Nameplate. (Used in Models 4EC66A10, 14).

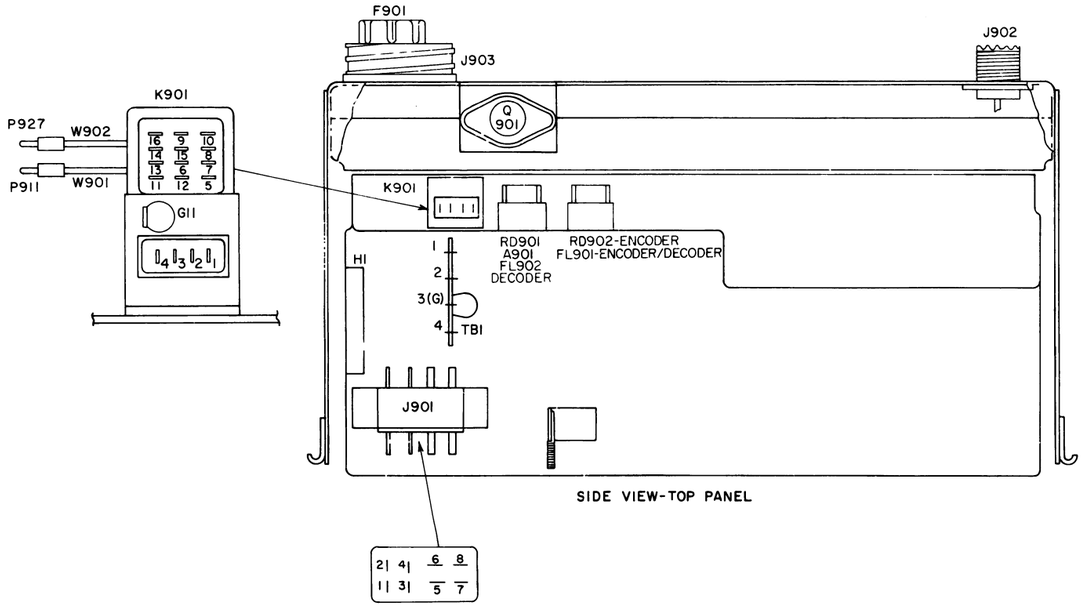
EXTENDED LOCAL CONTROL UNIT

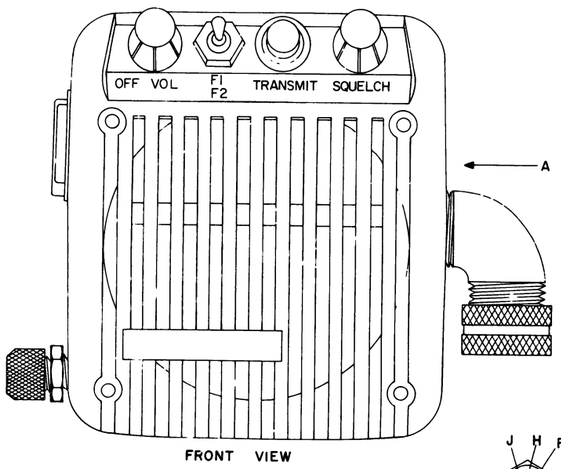
SYMBOL	G-E PART NO	DESCRIPTION
		TRANSMITTER-RECEIVER TOP PANEL PL-19D402599-G4 REV. A
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C902	5494481-P7	Ceramic disc: 470 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J901	7473192-P31	Connector, phen: 8 terminals; sim to HB Jones 261-31-08-000.
J902	2R22-P3	Receptacle, panel, coaxial. Signal Corps SO-239 or sim to Amphenol 83-1R.
J903	19B200010-P2	Receptacle: 23 contacts; sim to Cannon Electric NK-L23-32S.
		- - - - - - - - - - - RELAYS - - - - - - - - - - -
K901*	19C307010-P15	Armature: 12 VDC nominal 130 ohms ±10% coil res, 4 form C contacts; sim to Allied Control T154-16274. In earlier than Rev. A:
	19C307010-P5	Armature: 12 VDC nominal, 130 ohms ±10% coil res, 4 form C contacts; sim to Allied Control T154-X-413.
		- - - - - - - - - - - PLUGS - - - - - - - - - - -
P901 and P902	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P905	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P906 thru P908	4029840-P1	Contact, electrical: sim to AMP 41854.
P909	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P910	4029840-P1	Contact, electrical: sim to AMP 41854.
P912 thru P914	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P916 thru P918	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P920	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P922 and P923	4029840-P2	Contact, electrical: sim to AMP 42827-2.
P924 and P925	7147199-P2	Connector: female contact; sim to Winchester Electronics 21804.
P926	4029840-P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q901	19A115527-P1	Silicon, NPN.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R901	19B209022-P115	Wirewound: 1 ohm ±10%, 2 w; sim to IRC Type BWH.
R902	3R77-P473K	Composition: 47,000 ohms ±10%, 1/2 w.
		- - - - - - - - - TRANSFORMERS - - - - - - - - -
T901	19B209079-P1	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 - - - - - - - - -
TB1	7775500-P8	Phen: 4 terminals.
TB2	7775500-P11	Phen: 5 terminals.
TB3	7775500-P7	Phen: 3 terminals.
		- - - - - - - - - - CABLES - - - - - - - - - -
W901		CABLE PL-19A121176-G1
		- - - - - - - - - - PLUGS - - - - - - - - - -
P911	5496078-P1	Push-on, coaxial: Teflon®; sim to FXR 27-1.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044-P11	Cable, RF: approx 6 inches; sim to Amphenol 21-598.

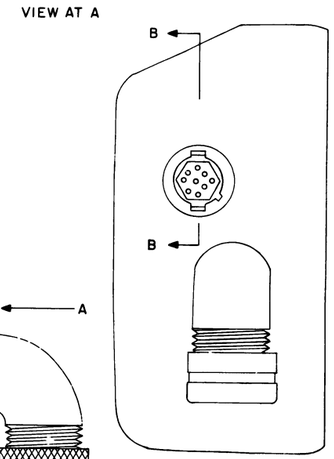
SYMBOL	G-E PART NO	DESCRIPTION
W902		CABLE PL-19A121176-G2
		- - - - - - - - - - PLUGS - - - - - - - - - -
P927	5496078-P2	Jack, coaxial: Teflon®; sim to FXR 27-2.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19B209044-P13	Cable, RF: approx 4 inches; sim to Amphenol 421-105.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XK901	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		MECHANICAL PARTS
	PL-19B205129-G2	Cover. (Mounts J902, 903).
	19B205127-P1	Support: approx 5-1/4 x 1 inches. (Mounts locking latch).
	4029994-P1	Catch, pull-down. (Mates with catch on power supply to keep unit intact).
	4037158-P7	Channel, rubber: approx 1-3/8 inches; sim to Atlantic India Rubber X661. (Located above J901).
	4032574-P2	Gasket, cover, neoprene: approx 27-3/4 inches.
	PL-19A121981-G1	Chassis. (Mounts T901, TB2, 3).
	7763541-P5	Clip, cable. (Located by J903).
	19A121178-P1	Support. (Used with J901).
	5491595-P9	Clip, relay: sim to Allied Control 30040-2. (Used with K901).
	7763541-P3	Clip, cable. (Located by XK901).
	PL-19B204532-G1	Chassis.
	19A122071-P1	Grommet: approx 1-1/4 inches. (Located by K901).
		- - - - - - - ASSOCIATED ASSEMBLIES - - - - - - -
	PL-19A122010-G2	Control Mounting Kit.
		132-174 MHZ ANTENNA MODEL 4EY12A13 (5490969-P13) (HIGH BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Antenna: includes 20-inch stainless steel whip, whip socket, antenna cable, cable adapter, PL-259 plug; sim to Antenna Specialists ASPD201GE or Danbury-Knudsen Type PA-25.
	5490969-P4	Whip: 20-inch stainless steel.
	5490969-P5	Socket, whip.
	5490969-P6	Whip and whip socket: 20-inch stainless steel whip, whip socket.
		Cable, antenna: approx 15 feet. Type RG-58/U. (Used with G-E Dwg 2R22-P1 and G-E Dwg 7105381-P1).
	7105381-P1	Adapter, cable: 1 x 7/16 inches dia. Type UG-175/U. (Used with G-E Dwg 2R22-P1 and Type RG-58/U cable).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with G-E Dwg 7105381-P1 and Type RG-58/U cable).
		25-54 MHZ ANTENNAS MODELS 4EY18A10-15 (LOW BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303707-P1	Model 4EY18A10, 25-29 MHz Antenna. Includes 48-1/4 inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-431-GE.
	19C303707-P2	Model 4EY18A11, 29-33 MHz Antenna. Includes 48-1/4 inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-A431-GE.

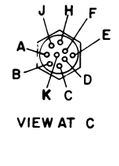
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

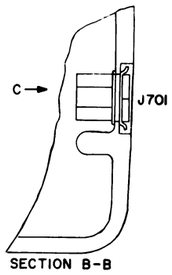
(Cont'd on back of sheet 2)



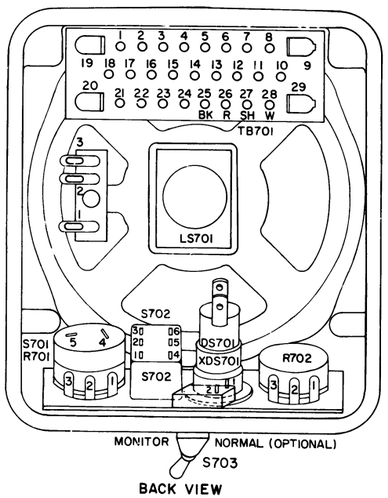






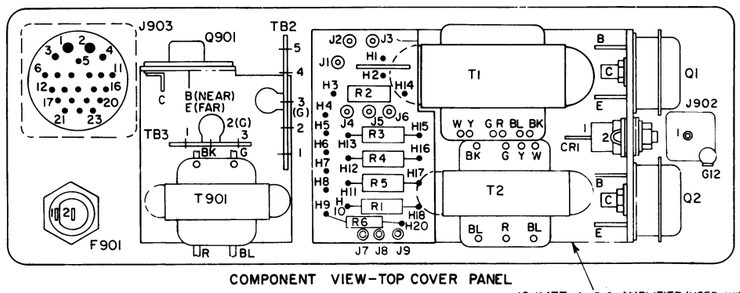


NOTES:
1. S703 USED ONLY IN MODELS 4EC66A12,13.
2. S702 USED ONLY IN MODELS 4EC66A11,13.
3. J701 USED ONLY IN MODELS 4EC66A14-17.



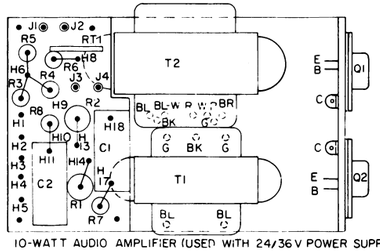
BACK VIEW

EXTENDED LOCAL CONTROL UNIT



COMPONENT VIEW-TOP COVER PANEL

10-WATT AUDIO AMPLIFIER (USED WITH 6/12 V POWER SUPPLY)



10-WATT AUDIO AMPLIFIER (USED WITH 24/36 V POWER SUPPLY)

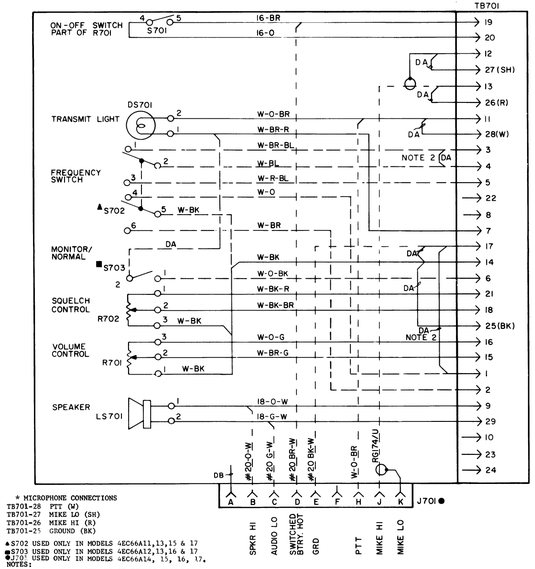
SERVICE SHEET

EXTENDED LOCAL CONTROL UNIT
MODELS 4EC66A10,11,14 & 15 AND
TRANSMITTER-RECEIVER TOP PANEL
PL-19D402599-G4 (Used with 24/36 Volt
Power Supply)

(RC-1365B, Sheet 1)

(19D402695, Rev. 5)

EXTENDED LOCAL CONTROL UNIT

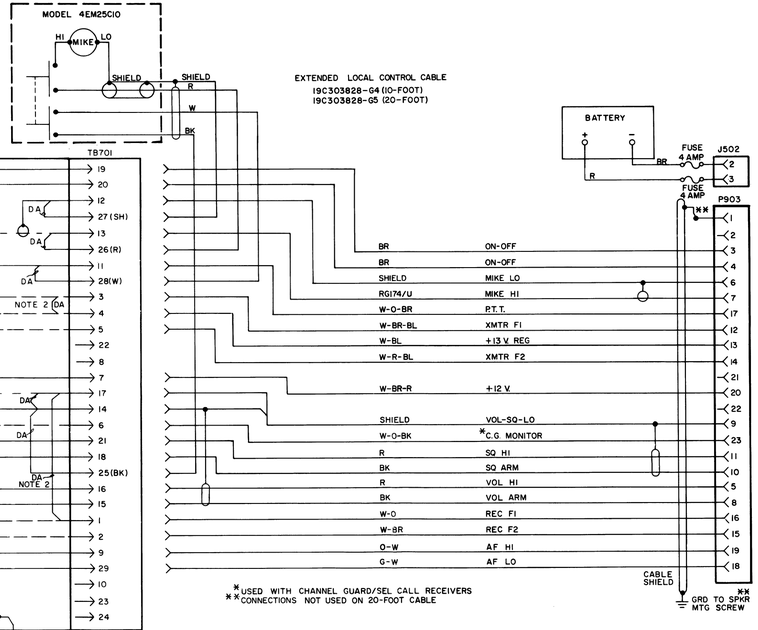


* MICROPHONE CONNECTIONS
TB701-28 PTT (W)
TB701-27 MIKE LO (SH)
TB701-26 MIKE HI (R)
TB701-25 GROUND (BK)

▲S702 USED ONLY IN MODELS 4EC66A11,13,15 & 17
■S703 USED ONLY IN MODELS 4EC66A12,13,16 & 17
●J701 USED ONLY IN MODELS 4EC66A14, 15, 16, 17.
NOTES:
1. ALL WIRES SF24 UNLESS OTHERWISE SPECIFIED.
2. DELETE IN MODELS 4EC66A11,13,15 &17

(19C303826, Rev. 4)

EXTENDED LOCAL CONTROL CABLE



* USED WITH CHANNEL GUARD/SEL CALL RECEIVERS
** CONNECTIONS NOT USED ON 20-FOOT CABLE

RC-1366A

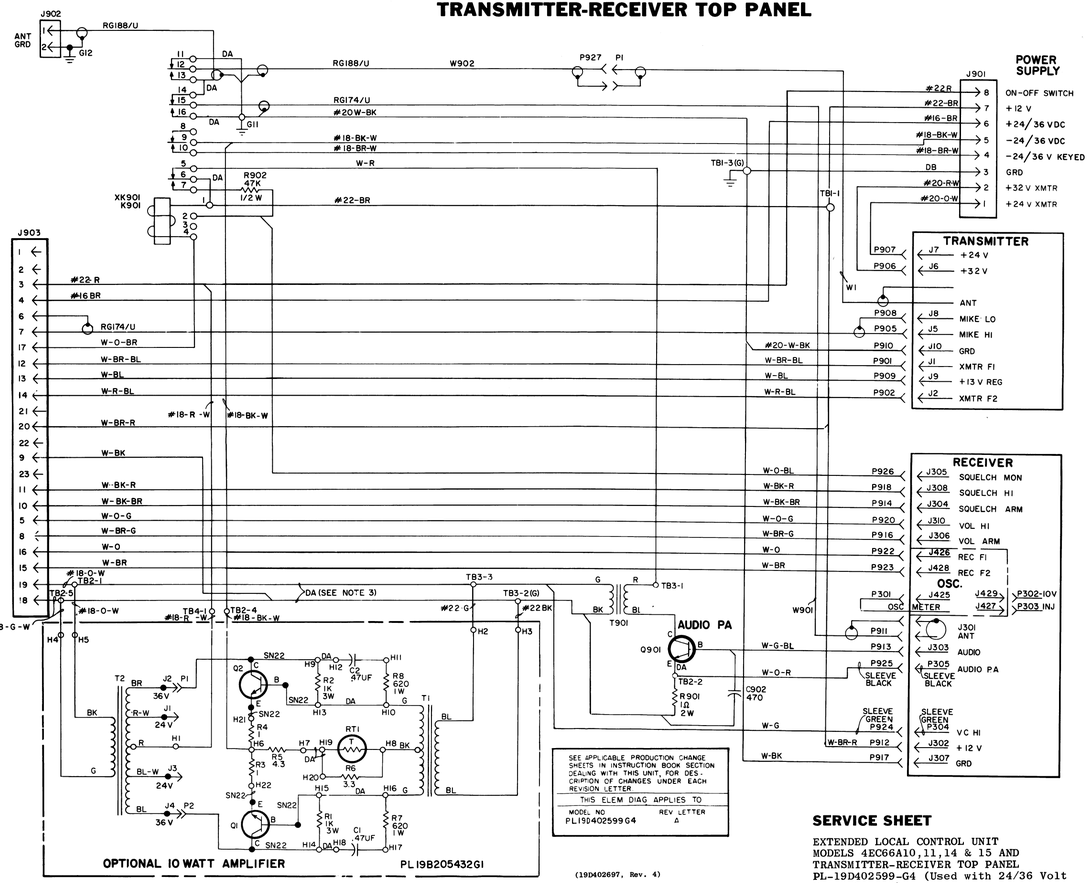
NOTES:
1. ALL WIRES ARE F-24 EXCEPT AS NOTED.
2. ALL DASHED LINES ARE OPTION.
3. DELETE WIRES BETWEEN TB2-1 & TB3-3. ALSO BETWEEN TB2-5 & TB3-2 WHEN USING 10 WATT AMPLIFIER.
4. FOR 10 WATT AMPLIFIER OPTION WHEN USING 24 OR 36 VOLTS CHANGE P1 & P2 TO APPROPRIATE JACK.
5. FOR SINGLE FREQUENCY UNITS REMOVE JUMPER BETWEEN J1 & J9 ON TRANSMITTER

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

ONE OR TWO FREQ.

WIRE DRESS CRITICAL

TRANSMITTER-RECEIVER TOP PANEL



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
PLI9D402599G4	A

(19D402697, Rev. 4)

SERVICE SHEET

EXTENDED LOCAL CONTROL UNIT
MODELS 4EC66A10,11,14 & 15 AND
TRANSMITTER-RECEIVER TOP PANEL
PL-19D402599-G4 (Used with 24/36 Volt Power Supply)

(RC-1365B, Sheet 2)

SYMBOL	G-E PART NO	DESCRIPTION
	19C303707-P3	Model 4RT18A12, 33-36 MHz Antenna. Includes 48-1/4 inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-D431-GE.
	19C303707-P4	Model 4RT18A13, 36-42 MHz Antenna. Includes 38-inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-D431-GE.
	19C303707-P5	Model 4RT18A14, 42-48 MHz Antenna. Includes 38-inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-D431-GE.
	19C303707-P6	Model 4RT18A15, 48-54 MHz Antenna. Includes 38-inch stainless steel rod, tuning screw, rubber O-ring weather seal; sim to Antenna Specialists ASP-D431-GE.
	2R22-P2	Adapter, UHF: right angle. Signal Corps M-359; sim to Amphenol 83-1AP. (Used in Models 4RT18A10-15).
		25-50 MHZ ANTENNA (LOW BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7491074-P1	Antenna: includes 96-1/2 inch stainless steel rod; sim to Antenna Specialists ASPA38GE.
	7102930-P3	Adapter, antenna: 3-5/16 inches. (Used with G-E Dwg 7491074-P1).
	PL-4033101-G1	Antenna package: includes base, adapter spring, cable and plug.
	PL-7472880-G5	Antenna base. (Used in PL-4033101-G1).
	PL-7476632-G4	Adapter spring. (Used in PL-4033101-G1).
	5492239-P1	Cable, antenna: includes Type RG-58/U cable approx 15 feet, PL-259 plug, terminal; sim to Antenna Specialists 15A43. (Used in PL-4033101-G1).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with G-E Dwg 5492239-P1 in PL-4033101-G1).
	4KY9A1	Coil, loading: 25-33 megacycles; sim to Antenna Specialists ASPA87.
	PL-19A121577-G1	Antenna hook kit.
	7134724-P1	Antenna hook. (Used in PL-19A121577-G1).
		132-174 MHZ ANTENNA MODEL 4RT19A10 (HIGH BAND)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303658-P1	Antenna. Includes 22-inch stainless steel rod, sleeving, spring, cap and O-ring; sim to Antenna Specialists ASP-405-GE.
		25-50, 132-174 MHZ ANTENNA MODEL 4RY30A10
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19C303620-P1	Antenna. Includes 19-1/2 inch stainless steel whip, socket, insulatorz, adapter, RG-58A/U cable, PL-259 plug, clip; sim to Antenna Specialists ASP-157.
	19C303620-P2	Replacement whip. Includes 19-1/2 inch stainless steel whip, socket, insulators; sim to Antenna Specialists 19A904-1.
		MICROPHONE MODEL 4EM25C10
1		Cable clamp. Shure Brothers RP21. (Includes parts 3 and 8).
2		Switch. Shure Brothers RP26.
3		Case (back) and mounting button: plastic. Shure Brothers RP21. (Includes parts 1 and 8).
4		Switch button: red plastic. Shure Brothers RP25.
5		Spring. Shure Brothers RP16. (Includes miscellaneous hardware).
6		Shield. Shure Brothers RP23.
7		Cartridge, magnetic controlled.
8		Case (front): plastic. Shure Brothers RP21. (Includes parts 1 and 3).
9		Cable: approx 6 feet.

SYMBOL	G-E PART NO	DESCRIPTION
		MICROPHONE MODEL 4EM33B10 (19B209199-P2)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch: moisture proof. Shure Brothers RP33.
		Cable and plug: approx 5 feet. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP31.
		Shield. Shure Brothers RP36.
		MICROPHONE MODEL 4EM33C10 (19B209306-P1)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch. Shure Brothers RP33.
		Cable and plug: approx 5 feet. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic.
		Shield. Shure Brothers RP36.
		MICROPHONE MODEL 4EM33D10 (19B209199-P3)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Switch: moisture proof. Shure Brothers RP33.
		Cable and plug: approx 80 inches. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP34.
		Cartridge, magnetic controlled. Shure Brothers RP32.
		Case, mounting button and nameplate: plastic Shure Brothers RP31.
		Shield. Shure Brothers RP36.
		HANDSET MODEL 4EM34A10 (19B209198-P1)
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
		Cartridge, transmitter: controlled magnetic. Shure Brothers RP13.
		Cartridge, receiver: 3 watt max power. Shure Brothers RP41.
		Switch. Shure Brothers RP81.
		Cable and plug: approx 5 feet. Shure Brothers RP47.
		Handle, transmitter cap, receiver cap: phen, weather proof. Shure Brothers RP49.
		POWER CONTROL CABLE PL-19C303828-G4
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A115067-P1	Cable, 2-conductor: approx 10 feet; sim to Belden 31713.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric MK-L23-23C-3/4.
		POWER CONTROL CABLE PL-19C303828-G5
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A115067-P3	Cable, 2-conductor: approx 23 feet; sim to Belden 7721.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric MK-L23-23C-3/4.

SYMBOL	G-E PART NO	DESCRIPTION
		DC TRICKLE CHARGE CABLE PL-19B204993-G2
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7160478-P1	Cable: 2-conductors: approx 50 inches; sim to Birnbach 789.
	4034405-P5	Plug: 5 sockets; sim to Cannon Electric XLR-5-11C.
	19A115513-P1	Connector, cigarette lighter: 12 VDC; sim to Cole-Hersnee 1624.
		POWER CABLE PL-19B205422-G1
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A115067-P1	Cable, 2 conductor: approx 10 feet; sim to Belden 31713.
	19A115776-P2	Phenolic: sim to Bussmann Type HHJ.
	1R16-P7	Cartridge, quick blowing: 4 amps at 250 v; sim to Littlefuse 312004 or Bussmann MTH-4.
	4034405-P3	Plug: 3 sockets; sim to Cannon Electric XLR-3-11C.
		POWER CABLE PL-19B205422-G2
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A115067-P1	Cable, 2-conductor: approx 23 feet; sim to Belden 31713.
	19A115776-P2	Phenolic: sim to Bussmann Type HHJ.
	1R16-P7	Cartridge, quick blowing: 4 amps at 250 v; sim to Littlefuse 312004 or Bussmann MTH-4.
	4034405-P3	Plug: 3 sockets; sim to Cannon Electric XLR-3-11C.
		AC CHARGING CABLE PL-5492570-G2
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
C1	7489159-P16	Capacitor, metallized plastic: 4 µf ±20%, 200 VDCW; sim to Sprague 118P40502S4.
	4034403-P1	Plug: sim to G-E 4304-3.
	7160478-P1	Cable, 2-conductor: approx 87 inches; sim to Birnbach 789.
	4034405-P5	Plug: 5 sockets: sim to Cannon Electric XLR-5-11C.
		POWER SUPPLY EXTENSION CABLE PL-19B204289-G1
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7473192-P19	Receptacle: 8 terminals; sim to HB Jones 261-32-08-030.
	7473192-P26	Plug: 8 terminals; sim to HB Jones 261-31-08-030.
	7162441-P23	Sleeving, electrical: approx 7/16 inch dia.

LBI-3633B

PARTS LIST

10 WATT AUDIO AMPLIFIER
PL-19B205432-G1

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	19A115028-P19	Polyester: 0.47 µf ±20%, 100 VDCW.
		- - - - - - - - - - PLUGS - - - - - - - - - -
P1 and P2	4029840-P2	Contact, electrical: sim to AMP 42827-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115622-P1	Silicon, NPN; sim to Type 2N3441.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1 and R2	19A115736-P1	Metal film: 1000 ohms ±10%, 3 w; sim to Corning Glass Type LP1-3.
R3 and R4	19B209022-P115	Wirewound: 1 ohm ±10%, 2 w; sim to IRC Type BWH.
R5	19B209022-P30	Wirewound: 4.3 ohms ±5%, 2 w; sim to IRC Type BWH.
R6	19B209022-P127	Wirewound: 3.3 ohms ±10%, 2 w; sim to IRC Type BWH.
R7 and R8	3R78-P621J	Composition: 620 ohms ±5%, 1 w.
		- - - - - - - - - - THERMISTORS - - - - - - - - - -
RT1	19C300048-P3	Disc: 1 ohm.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T1	19B209355-P1	Audio freq: 0.3-3 kHz freq range, Pri: 3.6 ohms ±10% imp, 0.2 ohm DC res, Sec: 75 ohms imp, 3.5 ohms ±15% DC res.
T2	19B209354-P1	Audio freq: 0.3-3 kHz freq range, Pri: 120 ohms ±10% imp, 5.4 ohms ±15% DC res, Sec: 3.5 ohms imp, 0.3 ohm DC res.
		MODIFICATION KIT PL-19A122384-G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496267-P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B209022-P127	Wirewound: 3.3 ohms ±10%, 2 w; sim to IRC Type BWH.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

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.

TRANSMITTER-RECEIVER TOP PANEL 19D402599-G1

REV. A - To incorporate an improved relay. Changed K901.

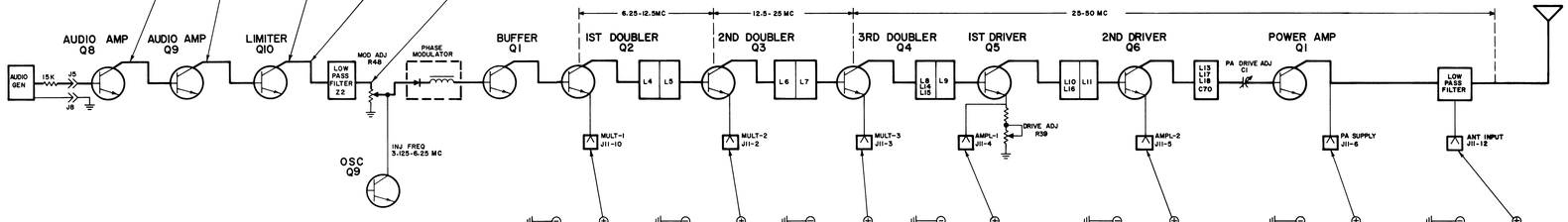
STEP 1—QUICK CHECKS

SYMPTOM	PROCEDURE
Before making any other checks, measure for approximately 24 VDC on heat sink of Q6. Then check for 35 volts with rechargeable battery supply & 24 volts with dry battery supply on collector of Q1 in PA Assembly. Also check for orange glow on RT7.	
A. NO MULT. 1 READING, BULB RT1 AT FULL BRIGHTNESS	Check for short on 13.5-volt line.
	Check for defective regulator transistor Q11.
B. NO MULT. 1 READING, BULB RT1 OUT	Check bulb RT1 & Zener diode CR6.
C. NO MULT. 1 READING, BULB RT1 NORMAL	Check for 13.5 volts on J1 or J2.
	Check tuning of L1/L2/L3.
NO MODULATION	Check setting of Med. Adj. R48 (Refer to Transmitter Alignment Procedure).
	Check mike & mike cable.
	Check voltages on Q8, Q9 & Q10.
LOW OR NO POWER OUTPUT	Check metering jack readings on all stages.
	Check relay RF contacts.
	Check Transmitter alignment.

STEP 2—CHECK AUDIO STAGES

EQUIPMENT REQUIRED
- HIGH IMPEDANCE AC-DC-VTVM
- AUDIO GENERATOR
- 15,000 Ω RESISTOR (SHOWN BELOW)

V-DC	V-DC	V-DC	AC-VTVM	AC-VTVM
WITH THE TRANSMITTER KEYED, READING AT COLLECTOR OF Q8 SHOULD BE APPROX. 0.45 VDC	WITH THE TRANSMITTER KEYED, READING AT COLLECTOR OF Q9 SHOULD BE APPROX. 0.5 VDC	WITH THE TRANSMITTER KEYED, READING AT COLLECTOR OF Q10 SHOULD BE APPROX. 5.0 VDC	ADJUST AUDIO GENERATOR FOR AN OUTPUT OF 400 MILLIVOLTS AT 1 KC.	WITH THE TRANSMITTER KEYED, READING AT MOD ADJUST (R51) SHOULD BE APPROX. 2.1 VAC
			WITH THE TRANSMITTER KEYED, READING AT COLLECTOR OF Q10 SHOULD BE APPROX. 4 VAC	



STEP 3—CHECK TYPICAL VOLTAGES

EQUIPMENT REQUIRED
- 20,000 OHM-PER-VOLT DC METER

V-DC	V-DC	V-DC	V-DC	V-DC	V-DC	V-DC
WITH TRANSMITTER KEYED, READING AT J11-10 (MULT-1) SHOULD BE APPROX 1.0 VDC	WITH TRANSMITTER KEYED, READING AT J11-2 (MULT-2) SHOULD BE APPROX 1.5 VDC	WITH TRANSMITTER KEYED, READING AT J11-3 (MULT-3) SHOULD BE APPROX 2.0 VDC	SET R39 FULLY COUNTERCLOCKWISE. WITH TRANSMITTER KEYED, READING AT J11-4 (AMPL-4) SHOULD BE APPROX 1.5 VDC	WITH TRANSMITTER KEYED, READING AT J11-5 (AMPL-2) SHOULD BE APPROX 1.0 VDC MIN. (25-42 MC) 0.5 VDC (42-50 MC)	WITH TRANSMITTER KEYED, READING AT J11-6 (PA SUPPLY) SHOULD BE APPROX 0.35 VDC	WITH TRANSMITTER KEYED READING AT J11-11 (VARACTOR) SHOULD BE APPROX 5.0 VDC

TROUBLESHOOTING PROCEDURE

25 - 50 MC TRANSMITTER
TYPE ET-61-A

(RC-1142B)

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. Make resistance reading of 12-volt supply. Reading from J302 to ground (with power supply lead disconnected) should be 5.5 K ohms with negative meter probe to ground, or 4 K ohms with positive meter lead to ground.
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, cable and relay. 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 Service Sheet). 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 Service Sheet).
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.

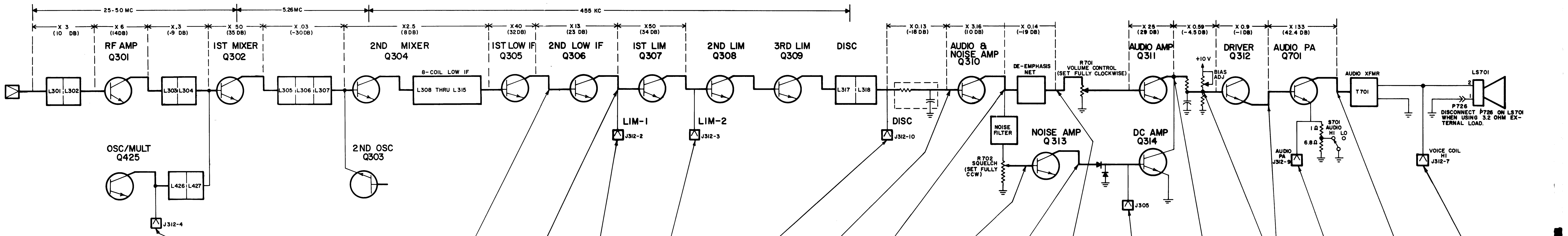
PROCEDURE

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.

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

4. CHECK RESULTS WITH TYPICAL GAINS SHOWN ON DIAGRAM.
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 J301 MAINTAIN SETTING AT DISCRIMINATOR ZERO					1 MICROVOLT UNMODULATED	1 MICROVOLT UNMODULATED	STANDARD SIGNAL-(1 MILLIVOLT AT RCVR FREQ, MODULATED BY 1KC WITH 3.3KC DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	NO SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
PROCEDURE			INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%												SET AUDIO SWITCH S701 TO HI POSITION		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 0.28 VDC MULTMTR 0.35 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	.09 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

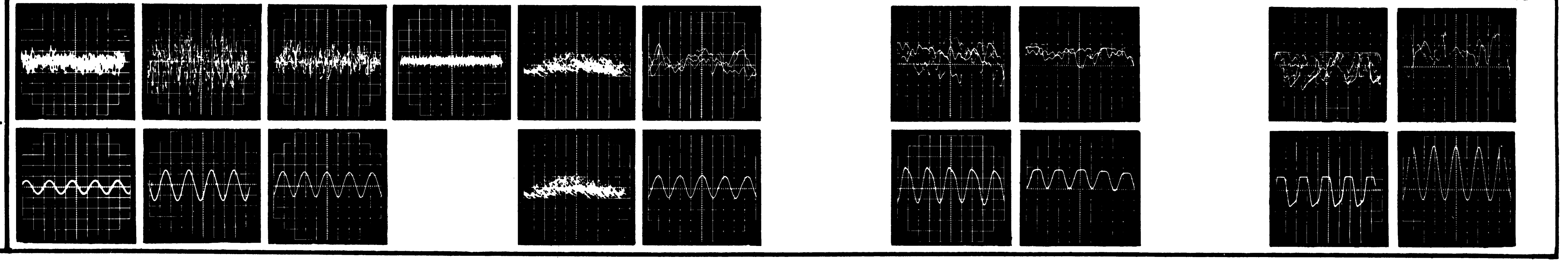
EQUIPMENT REQUIRED:

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

SCOPE SETTING													
SCOPE SETTING	HORIZONTAL	0.5 MS/DIV (APPROX 200 CPS)	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	2 MS/DIV (500CPS)	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 MILLIVOLTS/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 1KC WITH 3.3 KC DEVIATION)



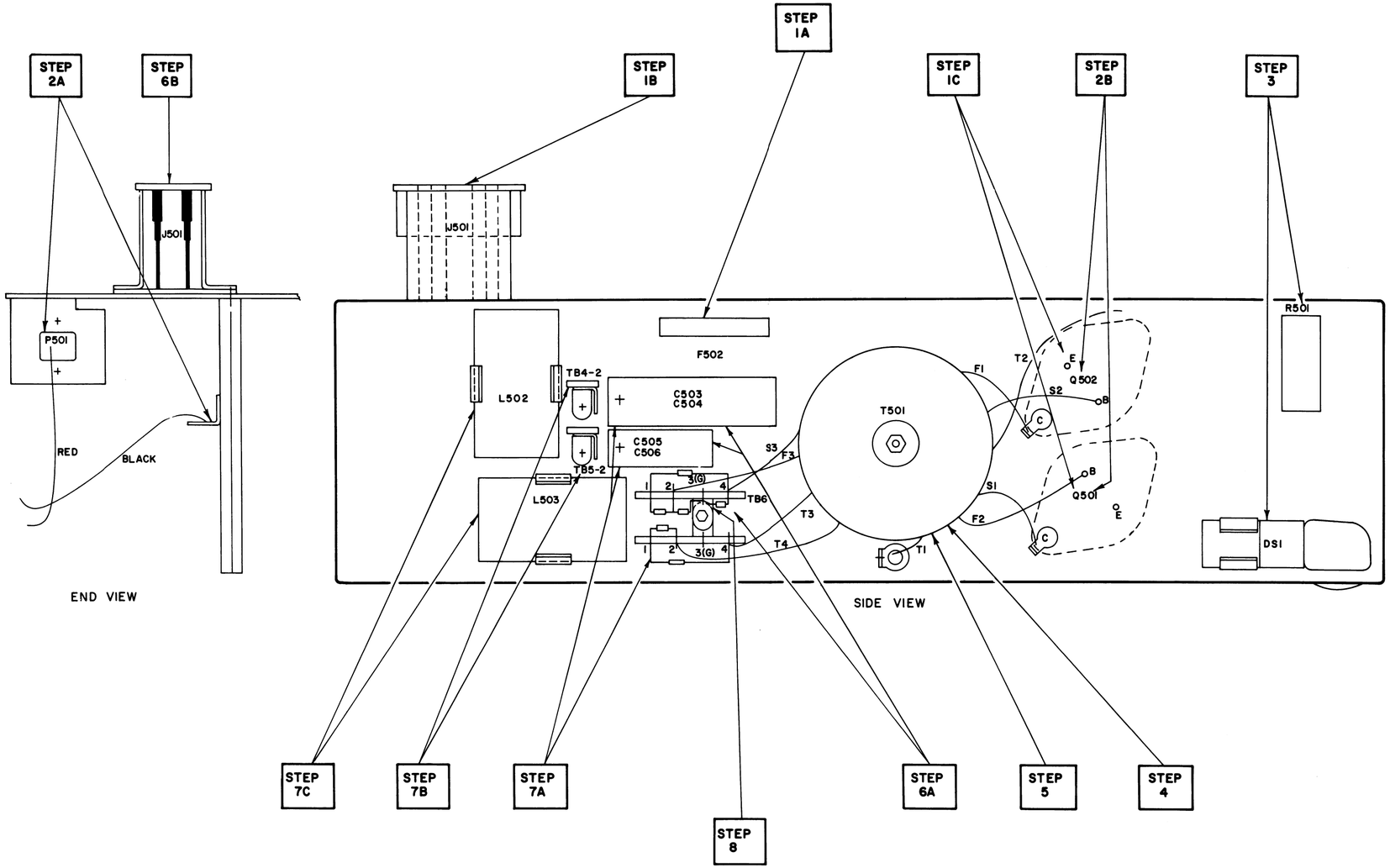
TROUBLESHOOTING PROCEDURE

25 - 50 MC RECEIVER
TYPE ER-43-A

(RC-1143B)

QUICK CHECKS

MULTIVIBRATOR CIRCUIT	
SYMPTOM	PROCEDURE
POWER SUPPLY WON'T START	1. Check the following: A. F502 (5 amps) fuse. If fuse is blown-- B. Check for short in wiring to J501-4 and J501-5 to ground. C. Check for collector-to-emitter short in Q501 and Q502.
	2. Check the following voltages: A. Supply voltage (12 VDC) by measuring from P501 (red lead) to ground (black lead). Do not key transmitter. B. Measure collector-to-emitter voltage of transistors with transmitter keyed. Readings should be approximately equal to supply voltage.
	3. Check starting network R501 and DS1 for opens or shorts.
	4. Make continuity check of primary and feedback circuits (see Power Supply Service Sheet).
	5. Check for shorted turns or shorts between windings of T501. To check, disconnect all secondary windings of T501 from their loads. Next, key the transmitter. If unit starts, go to STEP 6. If unit does not start, T501 is probably defective.
	6. Check for excessive load in secondary. A. Check for shorted capacitors or diodes. B. Check connections from J501 to transmitter board (see Control Unit Service Sheet).
OUTPUT VOLTAGES BELOW NORMAL WITH SUPPLY VOLTAGE NORMAL	7. Check for excessive load. A. Check for shorts or opens in diodes and capacitors in secondary of T501. B. Normal Load: (1) ET-61-A & ET-62-A -- Normal load on high B+ is approximately 800 milliamps (TB4-2). Normal load on low B+ is approximately 300 milliamps (TB5-2). (2) ET-77-A & ET-78-A -- Normal load on B+ is approximately 360 milliamps (TB5-2). C. Check continuity L502 and L503.
HIGH VOLTAGE (37 v) MUCH LOWER THAN NORMAL, AND LOW VOLTAGE (24 v) NEGATIVE WITH RESPECT TO GROUND.	8. Check for open ground to diode bridge (TB6-3), and check ground connections to TB6-3.



TROUBLESHOOTING PROCEDURE

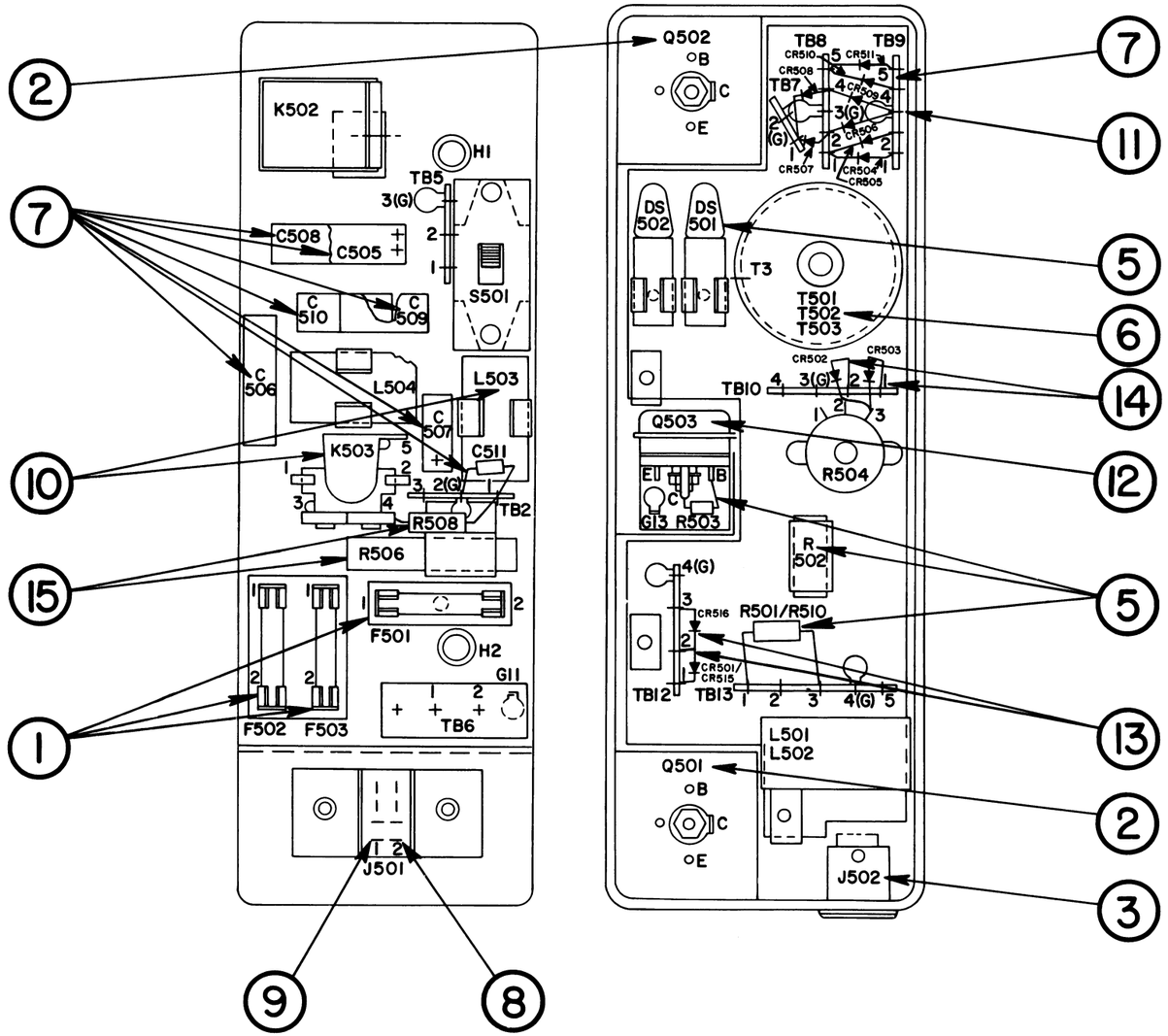
RECHARGEABLE POWER SUPPLY
MODEL 4EP44A10 & A11
PORTA.MOBIL

(RC-1078C)

QUICK CHECKS

MULTIVIBRATOR CIRCUIT	
SYMPTOM	CHECK THE FOLLOWING: (Circled number refers to component location on diagram)
Power Supply does not start	All fuses (1)
	Q501 and Q502 for collector-to-emitter short (2)
	Input voltage to power supply, J502-1-2 (J502-1-3 on 4EP48A10) (3)
	Transistor collector-to-emitter voltage. Readings should be approximately equal to supply voltage (2)
	R501/R510, R502, R503, and DS501 for opens or shorts (5)
	Continuity of transformer primary and secondaries. (See Power Supply Service Sheet) (6)
	Transformer for shorted turns or shorts between windings (disconnect loads from secondary windings before checking) (6)
	Turn unit ON, if unit does not start, transformer is probably defective (6)
	If unit starts, check the following:
	Excessive load in secondary
	Shorted capacitors or diodes in secondary of transformer (7)
	Connections from J502 to transformer board (see Service Sheet) (3)
Output voltages below normal with input supply voltage normal	Shorts or opens in diodes and capacitors in transformer secondary (7)
	Normal high B+ load: (ET-61-A and ET-62-A): 4EP47A10-11 - 32 volts @ 1 amp at J501-2 (8) 4EP48A10 - 32 volts @ 800 ma at J501-2 (8)
	Normal low B+ load: (ET-61-A and ET-62-A): 4EP47A10-11 - 24 volts @ 0.5 amp at J501-1 (9) 4EP48A10 - 24 volts @ 330 ma at J501-1 (9) Normal B+ load (ET-77-A and ET-78-A) 4EP47A10-11 & 4EP48A10 24 volts @ 360 ma at J501-1 (9)
	Continuity of K503 winding and L503 (10)
High voltage (32 v) much lower than normal, and low voltage (24 v) negative with respect to ground	TB9-3 for open ground to diode bridge and other wires connected to ground at TB9-3 (11)
Output voltages below normal	DS501/R503 for open circuit (5)
	Q503 for open collector-emitter circuit (12)
	CR501/CR515 and CR516 for shorts (13)
	CR502 and CR503 for open (14)
Output voltages above normal	DS501/R503 for shorts (5)
	Q503 for collector-emitter short (12)
	CR501/CR515 and CR516 for open (13)
	CR502 and CR503 for open and short (14)
	R506 and R508 for open and short (15)

NOTE -- 4EP47A10 and 4EP48A10
If K502 chatters when transmitter is keyed, check for a short to ground in one of the B+ circuits.



TROUBLESHOOTING PROCEDURE

POWER SUPPLY
MODELS 4EP47A10, 11 & 4EP48A10

(RC-1237A)