

Two-Way FM Radio

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EQUIPMENT INDEX

EQUIPMENT	MODEL NUMBER	
	SINGLE-FREQUENCY	TWO-FREQUENCY
FM TRANSMITTER 406-420 MHz 450-470 MHz ICOM Module	4ET88A10 4ET88A11 (1) 4EG25A10	4ET88A10 4ET88A11 (2) 4EG25A10
FM RECEIVER 406-420 MHz 450-470 MHz	4ER53A10 4ER53A11	4ER53A12 4ER53A13
CONTROL UNITS Standard Extended Control	4EC60A10 4EC66A10	4EC60A12 4EC66A11
CONTROL CABLES 10-foot (used with 6 or 12 volt power supplies) 10-foot (used with 24/36 volt power supply) 20-foot (used with 6 or 12 volt power supplies) 20-foot (used with 24/36 volt power supply)	19C303828-G2 19C303838-G4 19C303828-G6 19C303828-G7	
BATTERY POWER SUPPLIES Dry Battery Supply Dry Batteries Rechargeable Battery Supply Rechargeable Battery 3-Rate Charger	4EP42A10 19B209193-P1 4EP65A10 19B209138-P3 4EP60A10	
VEHICULAR POWER SUPPLIES 12-volt DC, $\pm$ ground 12-volt DC, - ground Power Cable 6-volt DC, $\pm$ ground Power Cable	4EP47A10 4EP47A11 19C303640-G3, -G4 4EP48A10 19C303640-G4	
INDUSTRIAL POWER SUPPLY 24/36-volt DC, ground Power Cable	4EP52A10 19B205422, G1 or G2	
TRANSMITTER-RECEIVER CASE	19B204501-G2	
MICROPHONE Standard Weatherproof Handset	4EM33D10 4EM25C10 4EM34A10	
CONTROL UNIT MOUNTING KIT (EC-66-A)	19A122010-G2	
VEHICULAR MOUNTING FRAME Locking Non-locking	19D402520-G2 19D402520-G1	
VEHICULAR MOUNTING KITS Mobile Front Mount Industrial and Extended Control Applications	19A121826-G1 19A121826-G3	
ALIGNMENT TOOLS Hex Slug Type Slotted Screw Type	4033530-G2 4038831-P1	
PORTABLE CARRYING STRAP	19C303632-P1	
PORTABLE ANTENNA 406-420 MHz 450-470 MHz	4EY19C14 4EY19C15	
VEHICULAR ANTENNA	4EY12A13	

OPTIONAL EQUIPMENT

EQUIPMENT	OPTION NUMBER	MODEL NUMBER
DC Trickle Charge Cable	5502	19B204993-G2
Leather Field Jacket	5503	19D402513-P1
Back Pack	5504	19D402600-G1
Rechargeable Battery Power Supply	5426	4EP65A10
Dry Battery Power Supply	5512	4EP42A10
Vehicle Mounting Frame Non-locking Locking	5506 5501 & 5507	19D402520-G1 19D402520-G2
Vehicle Mounting Kit	5506 & 5507	19A121826-G1
Microphone (Noise Cancelling)	5513	4EM33C10
Battery Power Supply (3-ft.)	5505	19B204289-G1
Channel Guard Encoder	5510	4EH16A10
Selective Calling Decoders	5553 thru 5556	4EJ19A10, 11
Antenna (Auto-Gutter Mount)	5982	4EY20A10
Control Cable (20-Foot)	5551	19C303828-G6
Handset	5531 & 5532	4EM34A10
External Battery Charger 117 VAC 3-Rate 117 VAC Timed 234 VAC 3-Rate 234 VAC Timed	5455 5456 5468 5469	4EP60A10 4EP60A11 4EP60A12 4EP60A13
Vehicular Battery Charger 6-Volt Input 12-Volt Input 24-36 Volt Input	5529 5530 5533	4EP53A10 4EP53A11 4EP53A12

SPECIFICATIONS ***GENERAL**

FREQUENCY RANGE	406-420 & 450-470 MHz
SIZE (H x W x L)	9-1/8" x 11" x 3-5/8"
OPERABLE TEMPERATURE RANGE	
Portable	-30°C (-22°F) to +70°C (+158°F)
Mobile & Industrial	-30°C (-22°F) to +65°C (+149°F)
BATTERY LIFE	Rechargeable Battery: One 8-hour day (Nickel - Cadmium)
	Dry Battery: Five 8-Hour days (Alkaline "D" Cells)

TRANSMITTER

MINIMUM RF POWER OUTPUT (13.6 VDC Supply)	7.5 watts
(Dry Battery Supply)	4.5 watts
CRYSTAL MULTIPLICATION	36
SPURIOUS & HARMONICS	At least 53 dB below carrier
FREQUENCY STABILITY	$\pm 0.0002\%$ (-30°C to +70°C)
MODULATION	± 5 kHz
AUDIO RESPONSE	Within +1 dB and -3 dB of a 6 dB/octave pre-emphasis from 300 to 3000 Hz (1000 Hz reference) per EIA standards
AUDIO DISTORTION	Less than 10%
DUTY CYCLE	20% (10% for portable battery life)

RECEIVER

SENSITIVITY	
12 dB SINAD	0.55 μ V
20 dB Quieting	0.7 μ V
SELECTIVITY (EIA Two-Signal Method)	-65 dB (adjacent channel, 25 kHz channels)
SPURIOUS RESPONSE	-60 dB (450-470 MHz) -50 dB (406-420 MHz)
MODULATION ACCEPTANCE	± 9.5 kHz
INTERMODULATION (EIA)	-53 dB
AUDIO CHARACTERISTICS	Within +2 dB and -8 dB of a 6 dB/octave de-emphasis curve from 300 to 3000 Hz (1000 Hz reference) per EIA standards
FREQUENCY STABILITY (First Oscillator)	$\pm 0.0005\%$ (-30°C to +70°C)
FIRST OSCILLATOR MULTIPLICATION FACTOR	9

SPECIFICATIONS* (CONT'D)**AUDIO OUTPUTS**

1.5 watt with less than 10% distortion

10 watts with less than 10% distortion with
optional 10 watt audio amplifier**SQUELCH SENSITIVITY**0.2 μ V minimum0.8 μ V maximum**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)	0.04	0.30	1.2 (at 22.0 VDC)
4EP65A10	Self contained Nickel- Cadmium Battery (19B209138-P3)	0.04	0.30	3.8 (at 12.5 VDC)
4EP47A10*	± 13.8 VDC	0.40	0.65	4.5
4EP47A11	13.8 VDC (Neg. Ground)	0.04	0.30	4.5
4EP48A10	± 6.6 VDC	0.70	1.30	11.5 (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)
4EP65A10	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. An optional lock is available.

The PORTA-MOBIL with Extended Local Control provides a separate weatherproof control unit that can be mounted in any location convenient to the operator. The control 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.

CAUTION

Do not touch an uninsulated antenna or the metal ball on an insulated antenna when transmitting, as contact may result in an RF burn.

VOLUME AND SQUELCH

The VOLUME and SQUELCH controls must be adjusted at the start of operations. The VOLUME control rises 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 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 in the table at the top of page 2.

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)

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, it should be "exercised" at regular intervals. Discharge the battery at a rate of 1 to 4 amps to a level of 10 volts (measured with load connected), then fully recharge the battery.	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 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 the PORTA-MOBIL 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 collector tank coil L11 (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 action. It also shows the procedure for measuring the battery voltage under transmit conditions. To check individual components, refer to the Service Sheet for the applicable 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 Check" on the Service Sheet.

CIRCUIT ANALYSIS

TRANSMITTER

General Electric PORTA-MOBIL FM Transmitter Type ET-88-A is a crystal-controlled, frequency-modulated transmitter designed for one- or two-frequency operation within the 406—420 and 450—470 megahertz bands. The transmitter consists of the following modules:

- Exciter Board - Audio, modulator, multiplier and driver stages (on printed wiring board).
- Integrated Circuit Oscillator Module (ICOM) - Oscillator
- PA Assembly - Power amplifier and tripler and helical filter FL1/FL2.

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

MODEL	FREQ. RANGE	NO. OF FREQUENCIES
4ET88A10	406—420 MHz	One-Frequency (with one ICOM)
4ET88A10	406—420 MHz	Two-Frequency (with two ICOM's)
4ET88A11	450—470 MHz	One-Frequency (with one ICOM)
4ET88A11	450—470 MHz	Two-Frequency (with two ICOM's)

The transmitter uses a total of 11 transistors to provide a minimum power output of 7.5 watts when used with the high power rechargeable battery supply or vehicular power supplies. A power output of 4.5 watts is obtained with the dry battery supply. The frequency of the plug-in ICOM modules range from 11.27 to 11.67 megahertz (406—420 MHz), and 12.5 to 13.05 megahertz (450—470 MHz). The ICOM frequency is multiplied 36 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 supply and

the vehicular power supplies provide 24 volts for the doubler, multiplier and driver stages, and 32 volts B-plus for the PA stage. The medium power dry battery supply provides 22 volts to the transmitter and PA stage.

A regulated 10 volts is used for the ICOM, modulator and audio stages.

VOLTAGE REGULATOR

A shunt-type voltage regulator circuit consisting of regulator transistor Q10, zener diode CR1 and light bulb RT1 maintains a regulated 10-volt supply. The diode establishes a 10-volt reference level for the base of Q10. When the voltage starts to rise above this level, the base bias on Q10 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 10-volt reference level.

When the voltage starts to drop below 10 volts, the base bias on Q10 decreases, and Q10 conducts less. With less current flowing in the circuit, the voltage increases. This keeps the output voltage at 10 volts.

R17 is a metering resistor for centralized metering jack J11.

ICOM MODULE

ICOM module Model 4EG25A10 consists of a crystal-controlled Colpitts oscillator, a voltage regulator, a Channel Guard tone modulator and a buffer output stage. The entire module (including crystal) is enclosed in a dust-proof aluminum can, with the ICOM frequency and the transmitter operating frequency printed on the top. Access to the oscillator trimmer is obtained by prying off the plastic GE decal on the top of the can.

The oscillator frequency is temperature-compensated at both ends of the temperature range to provide instant frequency compensation, with a frequency stability of $\pm 0.0002\%$.

In the single-frequency transmitter, the regulated 10 volts is applied to the ICOM module (through J1) only while the transmitter is being keyed. With the ICOM operating, diode CR2 is forward biased, and the oscillator output is applied through C1 to phase modulator CV1.

In the two-frequency transmitter, a second ICOM module (identical to the F1 ICOM) is added. For two frequency operation,

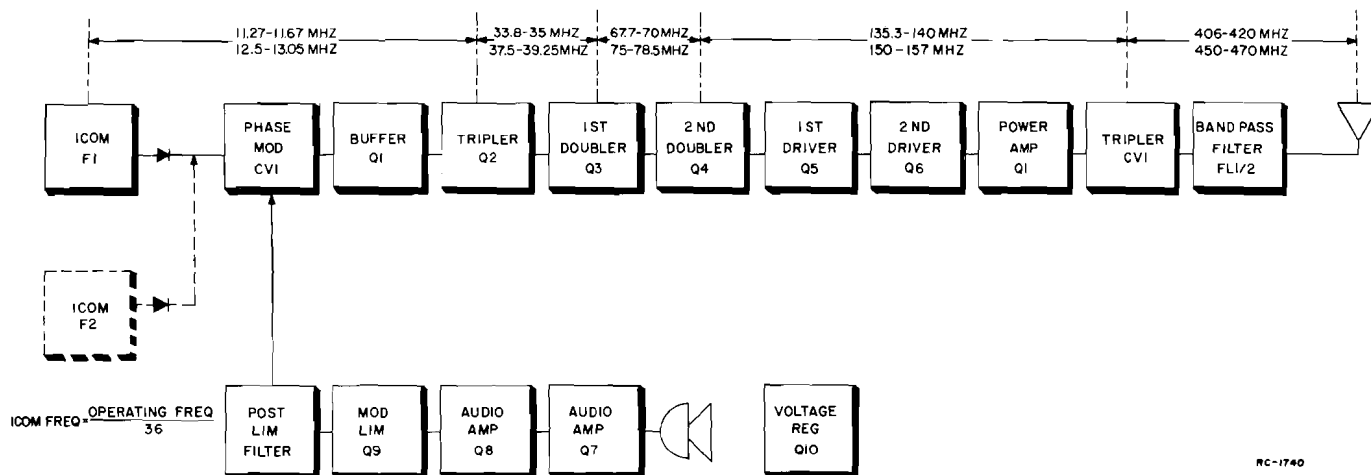


Figure 1 - Transmitter Block Diagram

the regulated 10 volts is switched to the desired ICOM module by a switch on the control unit.

For transmitters equipped with Channel Guard, tone from Encoder is applied to the ICOM through J3 and J4. The oscillator output is frequency modulated by the Channel Guard Tone.

CAUTION

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

AUDIO AMPLIFIERS AND LIMITER

The audio section of the transmitter consists of DC-coupled feedback amplifiers Q7, Q8 and Q9. Q9 also acts as a limiter at high audio input levels. Audio from the microphone is fed through an input network (C23, C24, R11 and R12) 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 R11 to 22,000 ohms.

The output of limiter Q9 is fed to

printed circuit board Z2 which provides a 6-dB/octave de-emphasis. MODULATION ADJUST potentiometer R15 determines the maximum signal level applied to modulator CV1.

PHASE MODULATOR

Phase modulator CV1 is a voltage-variable capacitor (varactor) operating in series with tuneable coil L1. The modulator operates with a reverse bias of 7-1/2 volts. CV1, 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 CV1 about the 7-1/2-volt level. This variation in capacitance causes the output of the circuit to be frequency modulated. The modulator output is coupled through blocking capacitor C7 to the base of buffer Q1.

BUFFER, TRIPLER & DOUBLERS

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

Following the buffer stage are three-self-biased, Class C multiplier stages (tripler Q2 and doublers Q3 & Q4). These circuits multiply the crystal frequency twelve times. Metering resistors R23, R27 and R30 are for metering the multiplier stages at J11.

DRIVERS

Drivers Q5 and Q6 provide the necessary drive for the power amplifier. DRIVE ADJUST control R36 varies the current through Q5, and can be used to reduce the output of the drivers. This current is metered at J11 by reading the voltage developed across metering

resistor R34. The collector tank of Q6 is tuned by C40.

POWER AMPLIFIER/MULTIPLIER ASSEMBLY

The 2nd driver output is coupled through a series tuned LC circuit (inductance provided by lead length) to the base of power amplifier Q1, located on the PA Assembly. Q1 operates as a common-emitter, Class C amplifier. Drive to the PA is adjusted, by C2. C6 is the PA output tuning control. PA drive is metered at J11.

RF from the PA is coupled through a L-section filter (L2 and C6) to a passive tripler. The tripler consists of three tuned circuits--L5 and C11, L6 and C12, L7 and C13, which are coupled together through varactor CV1. The first tuned circuit (L5-C11) is tuned to approximately 135 to 157 megahertz. The second circuit (L6-C12) is tuned to the second harmonic of the input signal, and the third circuit (L7-C13) is tuned to the third harmonic (or operating frequency).

When the PA output is applied to the circuit, varactor CV1 severely distorts the input signal, providing a signal with a large third harmonic content. This third harmonic is fed from the third tuned circuit (L7-C13) to helical filter assembly FL1/FL2.

HELICAL FILTER (FL1/FL2)

The PA/tripler output is rich in undesirable harmonics. Therefore, the output is fed to a helical filter (FL1-450 to 470 MHz, FL2-406 to 420 MHz) to select only the third harmonic from the tripler. The RF output from the helical filter is fed to the antenna through relay K1 in the control unit.

RECEIVER

The PORTA-MOBIL Receiver Type ER-53-A is a double-conversion, superheterodyne receiver designed to operate on fixed frequencies within the 406 to 470 megahertz band. The frequency ranges and number of frequencies for the receiver are shown in the following chart:

RECEIVER MODEL NO.	RECEIVER BOARD	FREQ. RANGE	NO. OF FREQ.
4ER53A10	19D413084-G3	406—420 MHz	One-Freq.
4ER53A11	19D413084-G1	450—470 MHz	One-Freq.
4ER53A12	19D413084-G4	406—420 MHz	Two-Freq.
4ER53A13	19D413084-G2	450—470 MHz	Two-Freq.

The audio PA stage and loudspeaker are located in the control unit. The unit is completely transistorized--utilizing 18 silicon transistors. An additional 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.

10-VOLT REGULATOR

The receiver operates on a regulated 10 volts provided by Q319 and Q320 in a series regulator circuit, except for the oscillator temperature compensating network which operates from a regulated 8-volts.

When the input voltage at J302 rises, the output voltage at the emitter of Q319 tries to rise. This increases the base-emitter bias on Q320, causing it to draw more collector current. This reduces the base bias on Q319 and less base current flows through Q319. With less base current flowing, the voltage drop across Q319 is larger which tends to keep the output voltage constant.

When the input voltage drops, Q320 conducts less, increasing the forward bias on Q319. The increased forward bias decreases the voltage drop across Q319, and tends to keep the output voltage constant. Regulation will stop if the input value drops below 11 volts.

R392 (10-volt REGULATOR adjustment) is set for a 10-volt reading at centralized metering jack J312 when aligning the receiver.

OSCILLATOR/MULTIPLIER

Q303 is a third mode oscillator that operates in the 43 to 45 megahertz region (406—420 MHz) and 47 to 51 megahertz region (450—470 MHz). The crystal is connected in the oscillator feedback path to permit oscillation only at the crystal frequency. L304, C311, C312 and C313 make up the mode selective resonant circuit. Adjustable coil L304 permits the oscillator frequency to be shifted slightly for setting the receiver on the system operating frequency. The collector tank of Q303 is tuned to three times the crystal frequency.

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

BUFFER AMPLIFIER AND MULTIPLIER

The oscillator output is coupled through L306 to the base of Buffer Amplifier Q305. The output of Q305 is coupled through tuned circuit L308 to the anode of multiplier diode CR302. The cathode of CR302 is connected to helical resonator L309/L327 which is tuned to 9 times the oscillator frequency.

1ST MIXER

RF signals from the antenna are fed to the base of 1st Mixer Q301 through two tuned pre-selector circuits. The oscillator injection frequency (operating frequency minus 19 MHz) is also applied to the base of the 1st Mixer. The 19 megahertz Hi IF Mixer output is fed through a tuned circuit to the base of Hi IF Amplifier Q302. Output from Q302 is fed through a Hi IF filter (consisting of three tuned circuits) to the base of 2nd Mixer Q308.

2ND OSCILLATOR AND MIXER

Q307 operates as a Pierce oscillator with a crystal frequency of 18.545 (or 19.455) megahertz.

Hi IF from the 1st mixer is applied to the base of 2nd mixer Q308. This Hi IF is mixed with the 2nd oscillator low side (or high side) injection frequency which produces the 455-kilohertz Lo IF. The main receiver selectivity is provided by the eight-coil Lo IF filter following the 2nd mixer.

LO IF AMPLIFIERS

Two RC-coupled Lo IF amplifiers (Q309 and Q310) are used to amplify the signal going to the limiter stages. The amplifier output is coupled to the 1st limiter through a 455-kHz tuned circuit (L324 and C389) which reduces the noise bandwidth of the IF amplifier.

LIMITERS

Following the Lo IF amplifiers are three RC-coupled limiter stages, Q311, Q312 and Q313, which operate as over-driven amplifiers. Zener diode CR305 provides additional limiting. The 1st and 2nd limiter stages are metered at the centralized metering jack (J312) through metering diodes CR303 and CR304.

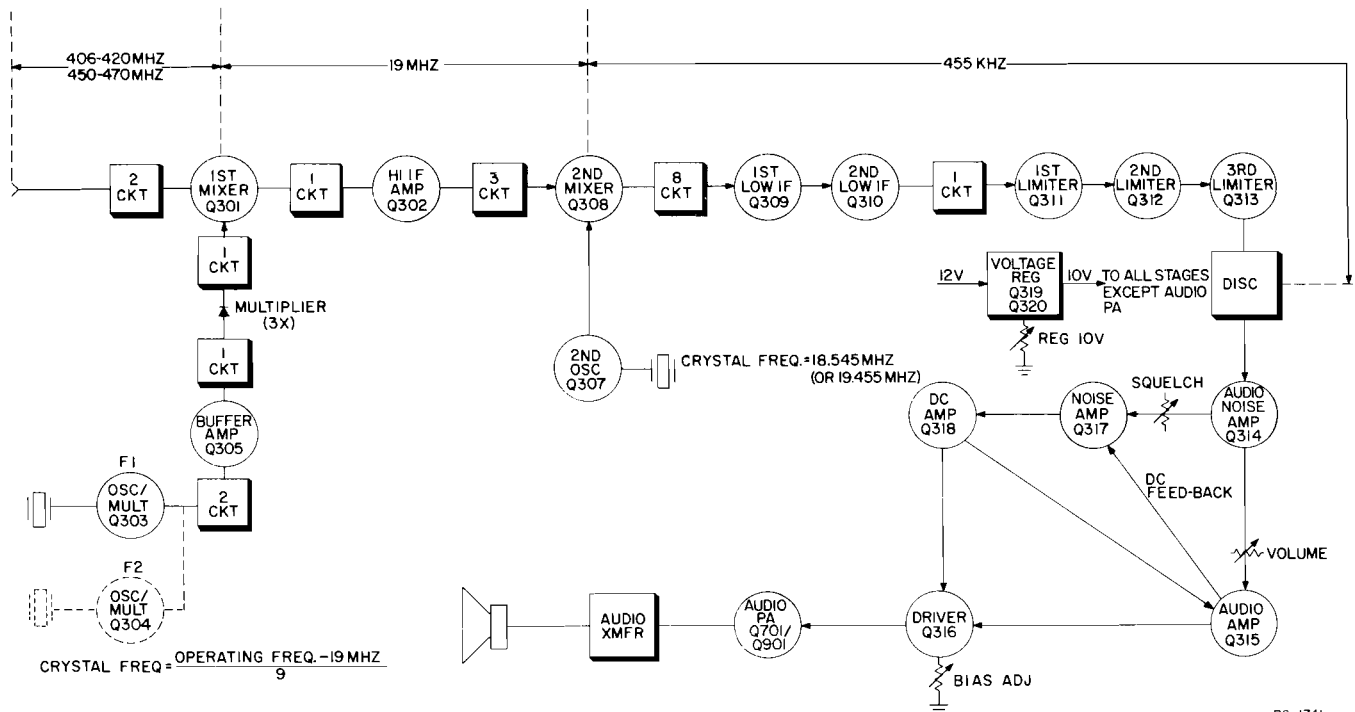
DISCRIMINATOR

The limiter output is applied to the Foster-Seely type discriminator, where the audio voltages are recovered from the 455-kHz Lo IF. A Lo IF filter, made up of C410, C411, C412, R369 and R372, removes any 455-kHz signal remaining in the discriminator output.

AUDIO AMPLIFIERS

When audio is present in the incoming signal, it is fed to the base of audio-noise amplifier Q314. Following Q314 is an audio de-emphasis network consisting of C417, C418, C419, R375, R376 and R377.

After the de-emphasis network, audio is fed to the base of audio amplifier Q315 through the volume control mounted on the control unit. The VOLUME control sets the amount of drive to the audio stages. An audio driver (Q316) and an audio output stage (Q701 in the EC-60-A Control Unit or Q901 in the Transmitter-Receiver top covers when the EC-66-A Control Unit is used) follow



RC-1741

Figure 2 - Receiver Block Diagram

audio amplifier Q315. Audio Bias trimmer R396 sets the bias on Q316 and Q701, 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 Q314 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 300-3000 Hz audio frequencies) to the base of noise amplifier Q317. The noise filter consists of C414, C415, C416 and L323. The noise level fed to the noise amplifier is set by the SQUELCH control, located on the control unit. The output of noise amplifier Q317 is rectified by diodes CR308 and CR309, and filtered by C423 and C424 to produce a positive DC voltage. This DC voltage turns on the DC amplifier (Q318), 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 Q315 is being turned off, its emitter potential decreases. This results in a positive DC feedback through R382 to the emitter of noise amplifier Q317 which causes an increase in the gain. As the gain of Q317 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 Q318 stays off. The audio stages are allowed to conduct and audio is heard from the speaker. With audio amplifier Q315 conducting, positive voltage appears across R382 which helps reduce the gain of noise amplifier Q317. 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 Model 4EP65A10 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, $\pm$ ground), 4EP47A11 (12-volt, - ground only) 4EP48A10 (6-volt, $\pm$ ground) and industrial power supply Model 4EP52A10 (24/36 volt, $\pm$ 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 CIRCUIT - (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.

The 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 the lamp 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 windings, 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)

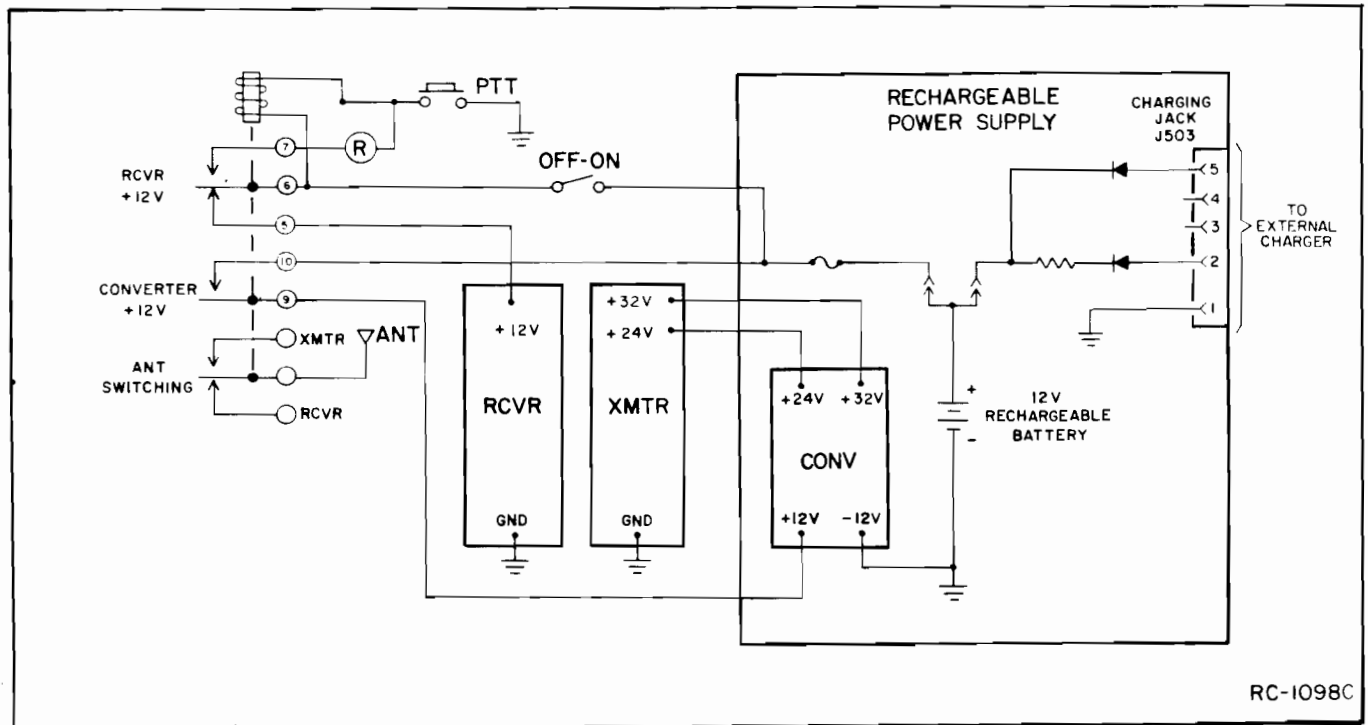


Figure 3 - Antenna Switching and Power Distribution for Rechargeable Battery Supply

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 hertz.

BATTERY SUPPLIES

RECHARGEABLE BATTERY SUPPLY

Rechargeable Power Supply Model 4EP65A10 employs 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. The battery is considered to be discharged when the battery voltage measures 10 volts with the transmitter keyed. Damage to the battery may result if it is discharged below the 10-volt level.

A Three-Rate External Charger Model 4EP60A10 that operates from 117 VAC is provided with the Rechargeable Battery Power Supply. The charger connects to the recessed 5-pin plug (J503) on one end of the power supply. Other charges are available as options for operation on AC or DC as indicated in the Optional Equipment Index. All chargers are capable of delivering 100% recharge to the battery. CR513 prevents possible discharge of the rechargeable battery through a charger that has been turned off but left connected to J503.

In addition, a DC Charging Cable is available for operation from a negative ground vehicle system only. The cable is used to provide a trickle charge to the battery. 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 if the charger cable is inadvertently connected to a positive ground system.

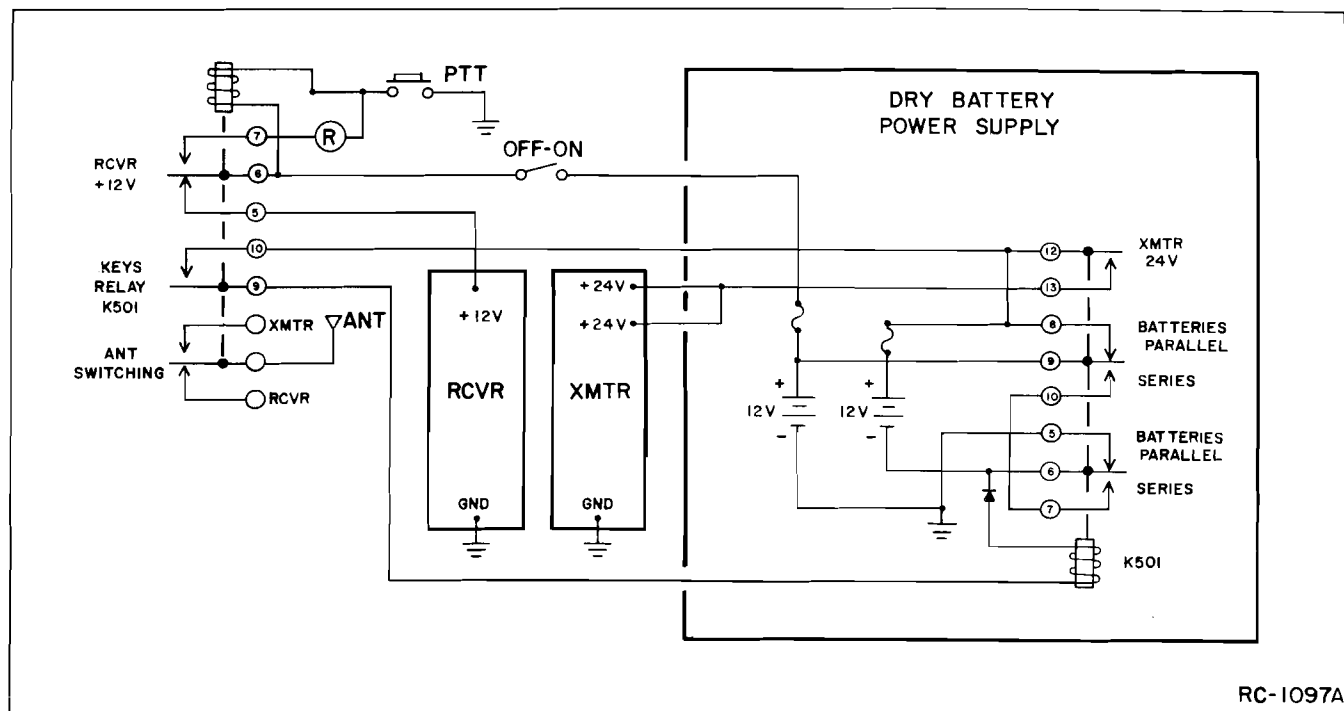


Figure 4 - Antenna Switching and Power Distribution for Dry Battery Supply

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 CT516. The two banks operate in parallel to provide the 12-volt receiver 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 $\pm$ GROUND)

For positive ground operation, the pilot relay (K501) is controlled by the ON/OFF switch on the Control Unit and the power supply run 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.

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.

MODEL 4EP48A10 (6 VOLT $\pm$ 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.

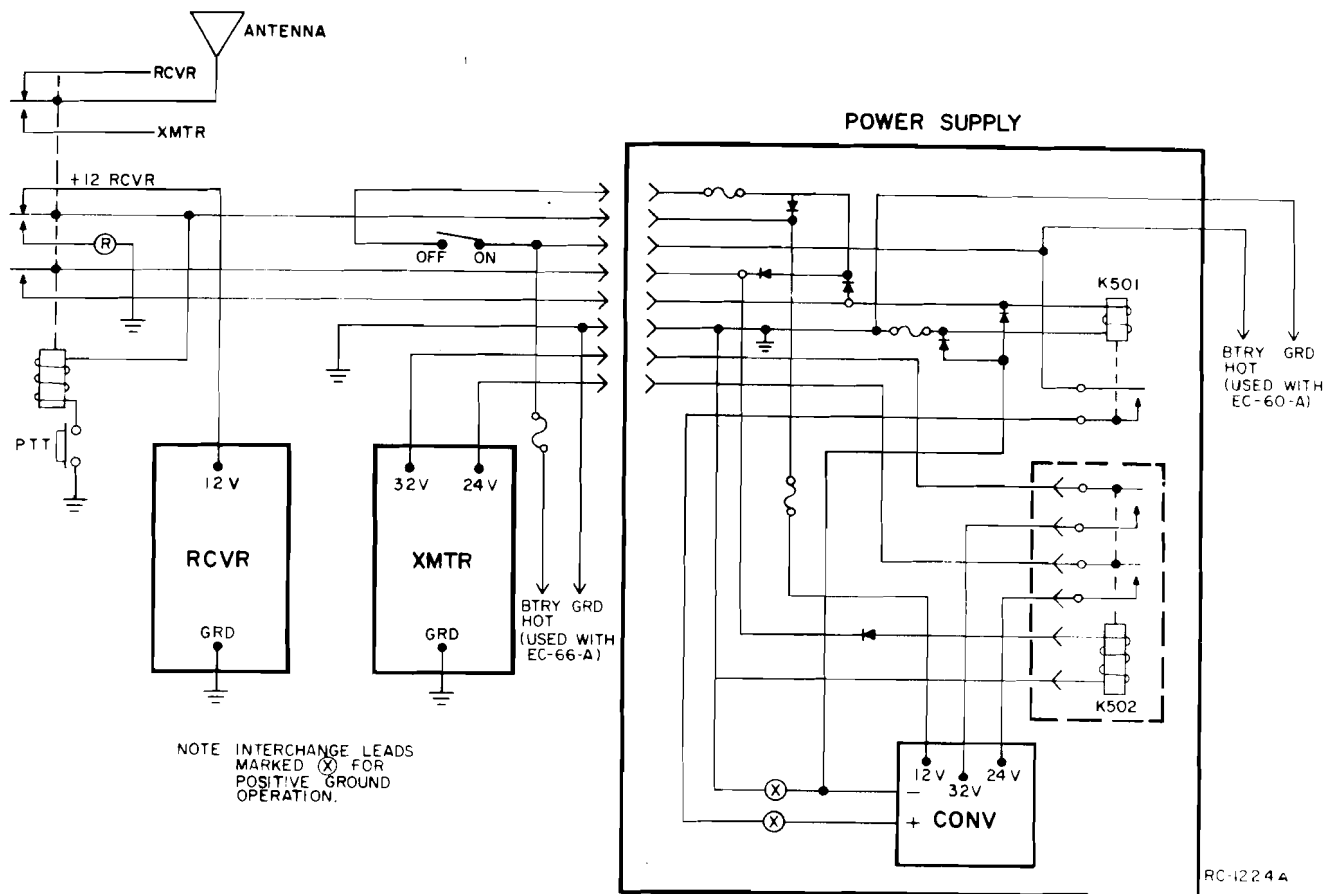


Figure 5 - Antenna Switching and Power Distribution for Model 4EP47A10

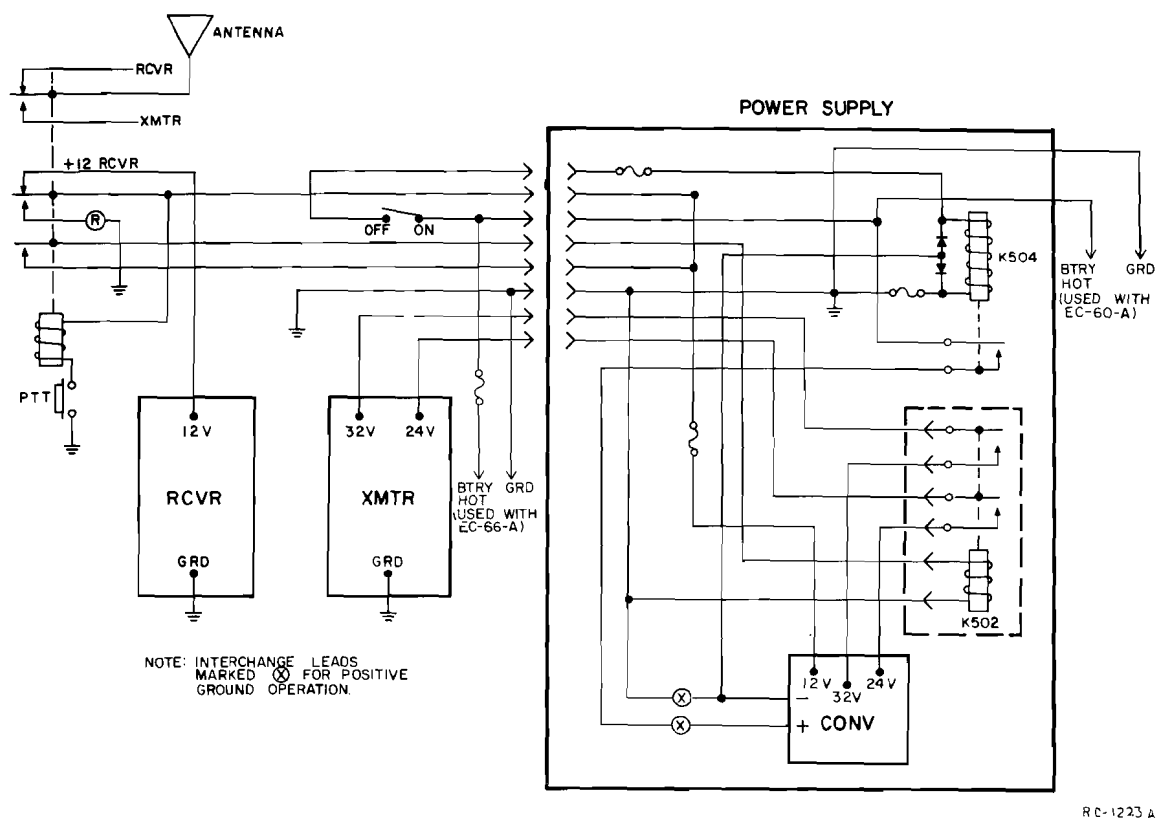


Figure 6 - Antenna Switching and Power Distribution for Model 4EP47A11

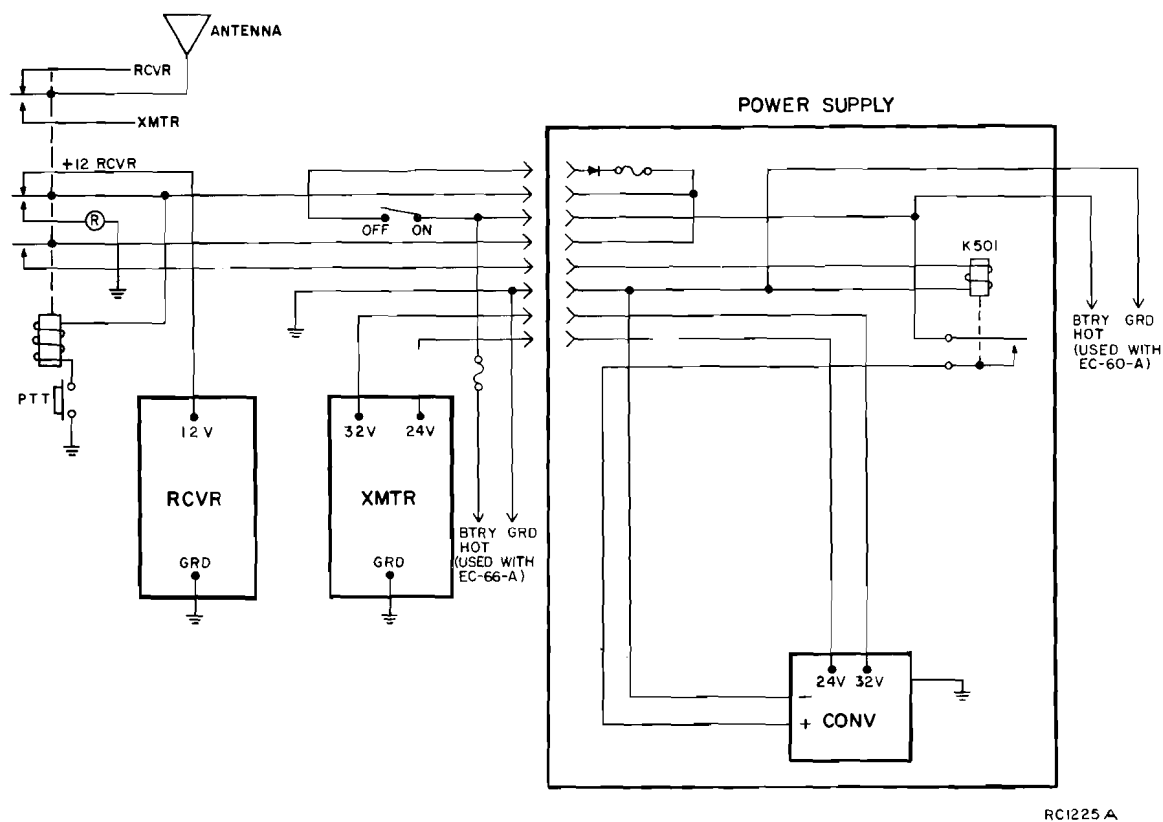


Figure 7 - Antenna Switching and Power Distribution for Model 4EP48A10

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 of all higher input voltages.

When input voltages 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 $\pm$ GROUND)

The 4EP52A10 Power Supply is designed for use with 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.

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.

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.

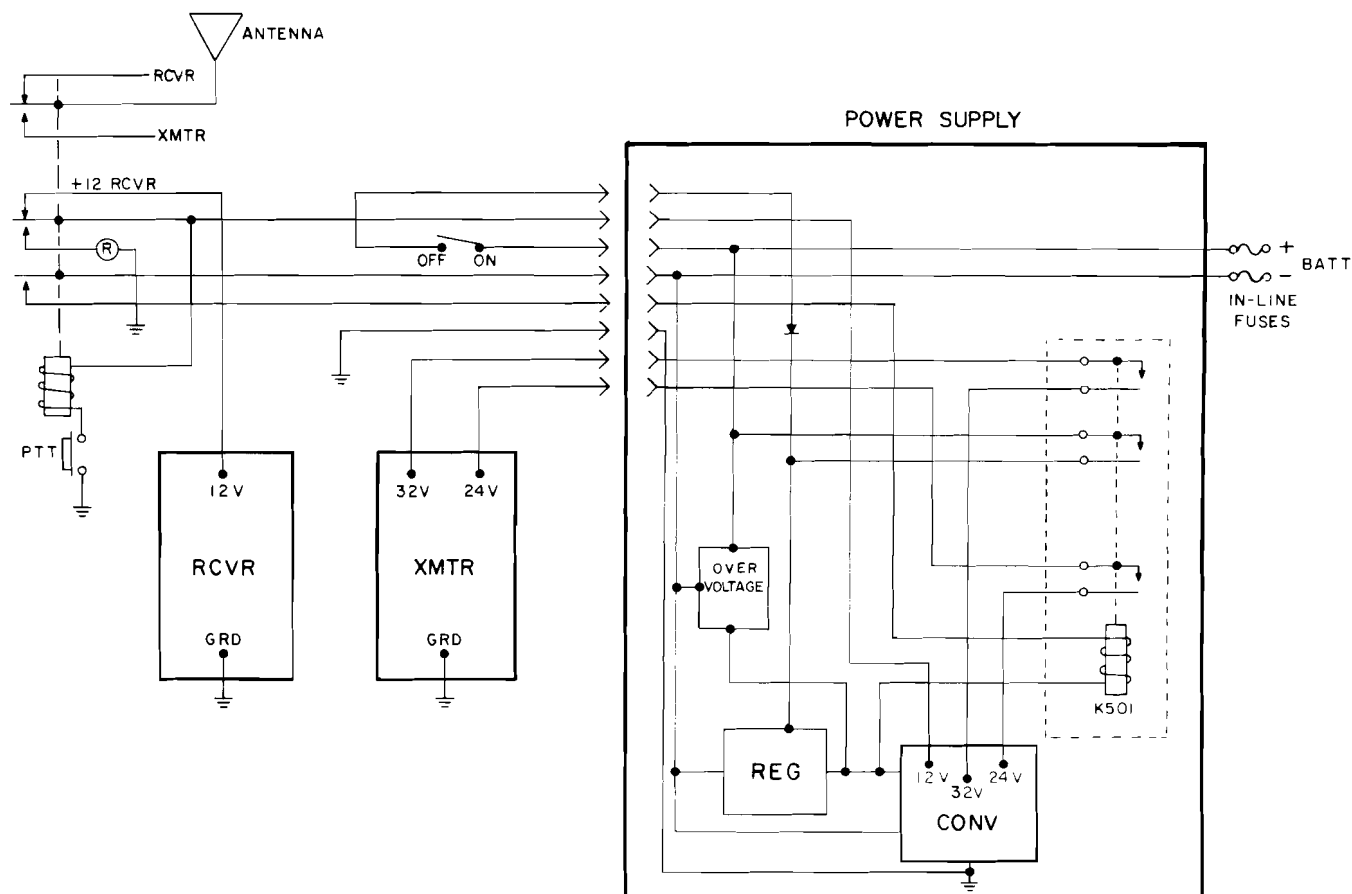
When the regulator output voltage increases and the voltage at the tap of R508 exceeds the breakdown voltage of VR501, Q506 will conduct. This decreases the base bias of Q502, causing it to conduct for a shorter period during each saw-tooth pulse. As a result, transistor switch Q501 is on for a shorter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

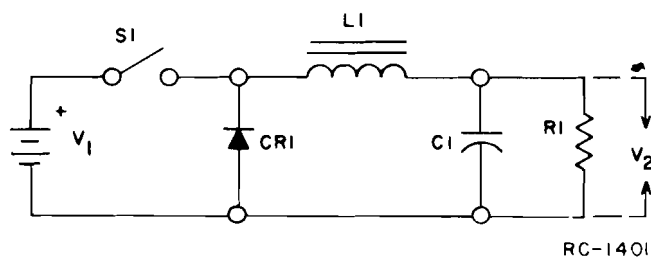


RC-1353

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

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.



RC-1401

Figure 9 - Simplified TRC Circuit

Over Voltage Protective Circuit

The over-voltage circuit protects the converter and transmitter-receiver from damage caused by a regulator failure or 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 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 transmitter keyed. Vary R508 if necessary to obtain this voltage.
2. If Q507 is replaced, check for a 400-microsecond duration saw-tooth waveform across C505. Adjust R513 if necessary to obtain this waveform.

NOTE

If optional 10-watt audio amplifier (for 24/36-volt systems) is used, the external power source must be 24/36 volts as specified on the combination nameplate.

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. Coaxial relay (K1) is used as the antenna switching relay. 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.

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 current 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 Q1 and 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.

NOTE

Speaker LS701 terminals 1 & 2 are above ground and should not be grounded when testing speaker or audio output.

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 transformers 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 Tone 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.

The following chart lists the Control Unit Model numbers and Options:

MODEL	NO. OF FREQS.	OPTION	MICROPHONE
4EC60A10	One		Military Mike (4EM33D10)
4EC60A12	Two		"
4EC60A14	One	Selective Calling	"
4EC60A15	Two	Selective Calling	"
4EC60A16	One		Handset (4EM34A10)
4EC60A18	One	Selective Calling	"
4EC60A19	Two		Handset (4EM34A10)
4EC60A21	Two	Selective Calling	"
4EC60A22	One	Accessory Jack	Military Mike (4EM33D10)
4EC60A24	Two	Accessory Jack	" " "
4EC60A26	One	Accessory Jack & Selective Calling	" " "
4EC60A27	Two	Accessory Jack & Selective Calling	" " "
4EC60A28	One	Channel Guard	Military Mike (4EM33D10)
4EC60A29	Two	Channel Guard	" " "
4EC60A30	One	Accessory Jack & Channel Guard	" " "
4EC60A31	Two	Accessory Jack & Channel Guard	" " "
4EC60A32	One	Channel Guard	Handset (4EM34A10)
4EC60A33	Two	Channel Guard	" "
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	"

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY
LYNCHBURG, VIRGINIA 24502

MODULATION LEVEL ADJUSTMENT

The MOD ADJUST (R15) 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 over-modulation are clipped by the modulation limiter. The limiter instantaneously limits the slope of the audio wave which prevents overmodulation, but preserves the intelligibility of the transmission.

TEST EQUIPMENT

1. An audio oscillator Model 4EX6A10
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. For transmitters without Channel Guard:
 - a. Apply a 0.5 volt signal at 1000 Hz to J5.
 - b. Set MOD ADJUST (R15) for a 4.5-kilohertz swing with the deviation polarity + or - (whichever gives the highest reading) as indicated on the frequency modulation monitor.
3. For transmitters with Channel Guard:
 - a. Set the Tone Adj Control (R613) for 0.75 kHz tone deviation.
 - b. Apply a 0.5 volt signal at 1000 Hz to J5.
 - c. Set MOD ADJUST (R15) for a 4.5-kilohertz swing with the deviation polarity + or - (whichever gives the highest reading) as indicated on the frequency modulation monitor.

PA POWER INPUT

WITH GE TEST SET

For FCC purposes, the PA power input can be determined by measuring the Collector Voltage and the Collector Current indication, and using the following formula:

$$P_i = \frac{\text{Collector Voltage} \times \text{Collector Current Indication}}{0.72}$$

Where:

P_i is the power input in watts.

Collector voltage is measured between J11-13 and J11-6 with external leads of GE Test Set using the 100-volt scale.

Collector current indication is measured with GE Test Set in position F, using the TEST 1 scale (1-volt full scale).

WITH MULTIMETER

$$P_i = \text{Collector voltage} \times \text{Collector Current}$$

Collector voltage is measured between J11-13 and J11-6.

$$\text{Collector Current} = \frac{\text{Voltage (Across R43 on Exciter)}}{4}$$

FREQUENCY ADJUSTMENT

First, check the transmitter frequency to determine if adjustment is required. The frequency should be checked with a frequency meter or counter having an accuracy of 0.4 per-million (PPM), and with the ICOM module at 80°F (±26.5°C (±2°C) when possible. The ICOM temperature can be determined by taping a mercury thermometer to the side of the ICOM.

If an adjustment is required, use one of the following procedures:

If the ICOM is stabilized at 80°F, pry off the GE emblem and adjust the ICOM trimmer for correct transmitter operating frequency.

If the ICOM is not stabilized at 80°F, pry off the GE emblem and check for a color dot on the top of the can. This dot indicates which correction curve to use in setting unit on frequency (see Figure 5). Next, tape a thermometer to the ICOM and check the temperature when the thermometer is stabilized. Then proceed as shown in the following examples:

1. Assume that the ICOM is marked with a green color dot and the temperature reading is 50°F. At that temperature, the green curve shows a correction factor of approximately +1.5 PPM. (At 450 MHz, 1 PPM is 45 Hz. At 470 MHz, 1 PPM is 47 Hz.)
2. With a transmitter operating frequency of 450 MHz, just the ICOM trimmer for a reading of +675 Hz (+450) higher than the licensed operating frequency.
3. If a negative correction factor is obtained (at temperatures above 80°F), adjust the ICOM trimmer for the indicated PPM lower than the operating frequency.

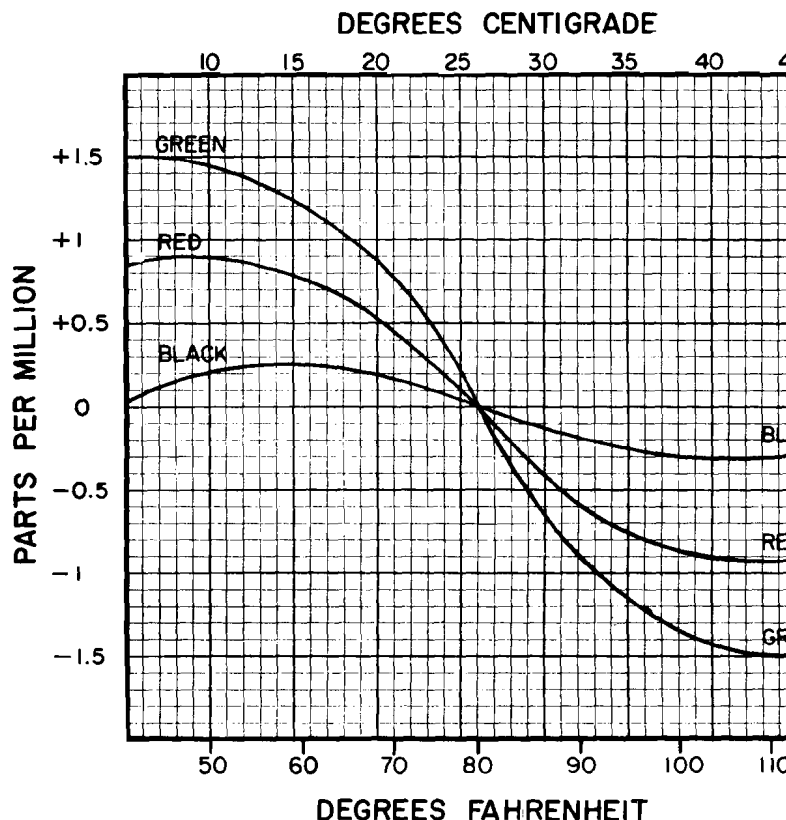


Figure 5 - ICOM Frequency Correction Curves

transmitter frequency to determine if any
 required. The frequency should be checked with
 or counter having an accuracy of 0.4 part-
 and with the ICOM module at 80°F (±4°F) or
 n possible. The ICOM temperature can be de-
 g a mercury thermometer to the side of the

is required, use one of the following pro-
 abilitized at 80°F, pry off the GE emblem and
 trimmer for correct transmitter operating

t stabilized at 80°F, pry off the GE emblem
 color dot on the top of the can. This color
 ch correction curve to use in setting the
 (see Figure 5). Next, tape a thermometer
 check the temperature when the thermometer is
 proceed as shown in the following example:

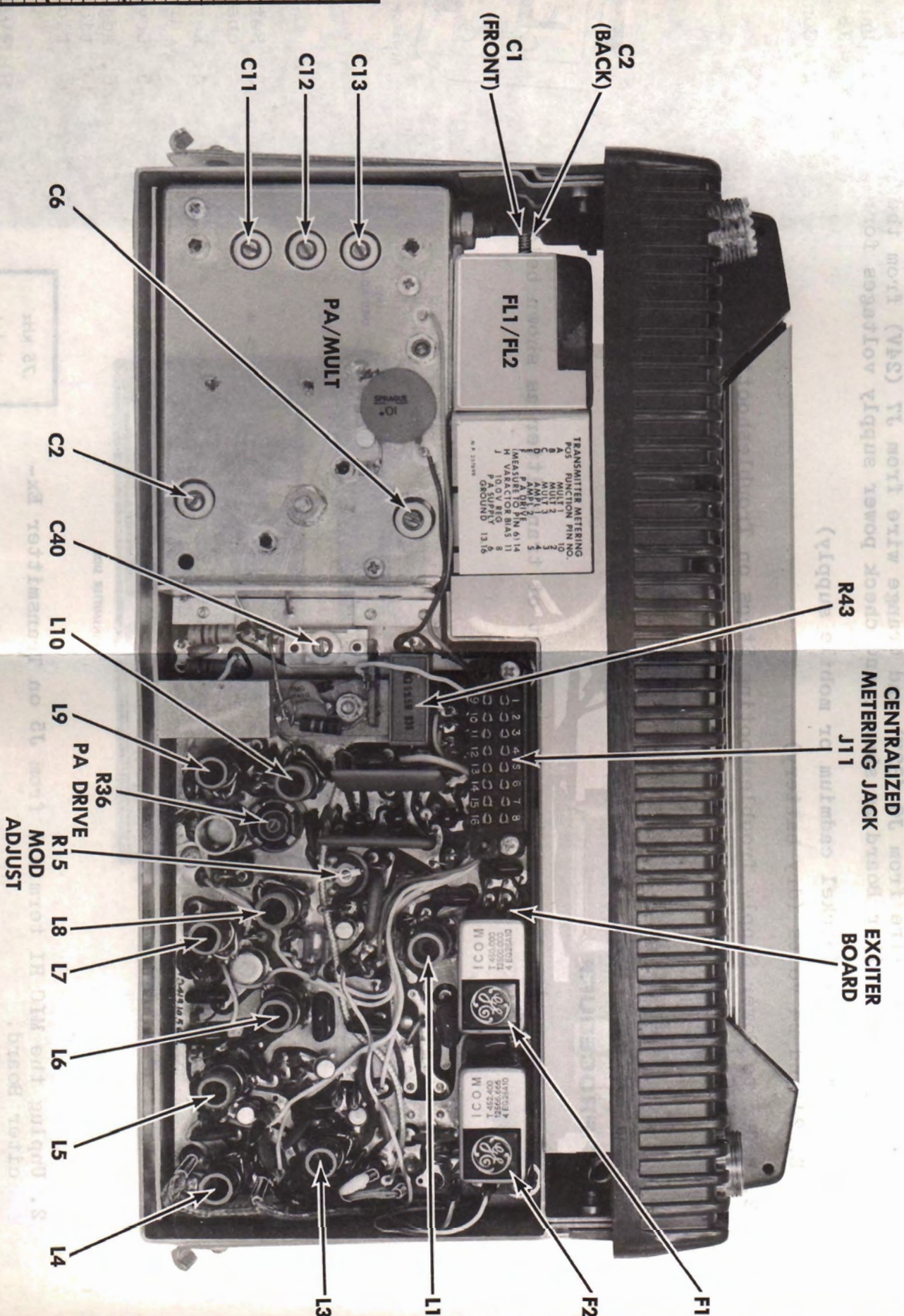
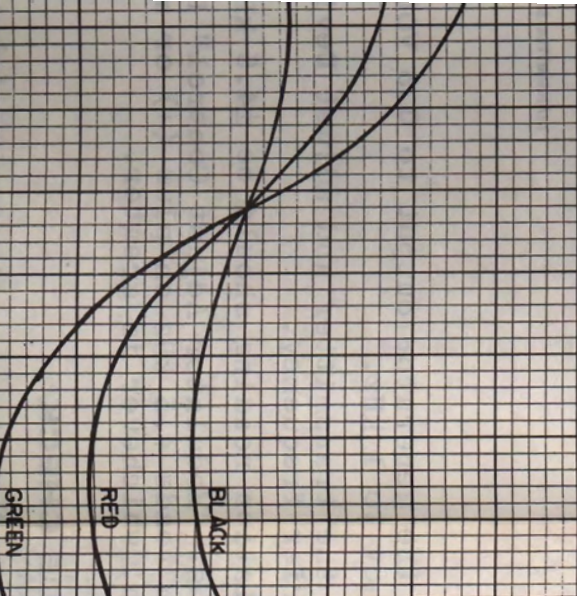
the ICOM is marked with a green color dot
 perature reading is 50°F. At that tempera-
 green curve shows a correction factor of
 ly +1.5 PPM. (At 450 MHz, 1 PPM is 450 Hz.
 1 PPM is 470 Hz.)

mitter operating frequency of 450 MHz, ad-
 ICOM trimmer for a reading of +675 Hz (+1.5 x
 than the licensed operating frequency.

ve correction factor is obtained (at temp-
 above 80°F), adjust the ICOM trimmer for the
 PPM lower than the operating frequency.

DEGREES CENTIGRADE

15 20 25 30 35 40 45



TRANSMITTER ALIGNMENT

EQUIPMENT REQUIRED

General Electric Centralized Metering Test Set Models 4EX3A10 or 4EX8K10,11

A 20,000 ohms-per-volt Multimeter

Wattmeter

PRELIMINARY CHECKS AND ADJUSTMENTS

Turn DRIVE ADJUST R36 (on Exciter Board) fully counterclockwise.

Key the transmitter and check for 32 volts at J6 (or 22 volts with dry battery pack), and for 24 volts at J7 with Multimeter.

Connect Test Set to the Transmitter Centralized Metering Jack J11. If using Multimeter, connect the negative lead to J11-13 (Ground) except for steps 6 and 9.

All adjustments are made with the Transmitter keyed.

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.

METERING POSITION GE TEST SET		Multimeter + at J11	TUNING CONTROL	METER READING	PROCEDURE
EXCITER BOARD					
A MULT-1	Pin 10		L1	Maximum	Tune phase modulator coil L1 for maximum meter reading.
B MULT-2	Pin 2		L4, L3 and L5	See procedure	Tune L4 and then L3 for maximum meter reading. Then tune L5 for minimum meter reading.
C MULT-3	Pin 3		L6, L5, L7, L3 and L4	See procedure	Tune L6 and then L5 for maximum meter reading. Then tune L7 for minimum meter reading. Retune L3 and L4 for maximum meter reading.
D AMPL-1	Pin 4		L8, L7, L9, L5 and L6	See procedure	Tune L8 and then L7 for maximum meter reading. Then tune L9 for minimum meter reading. Retune L5 and L6 for maximum meter reading.
E AMPL-2	Pin 5		L10, L9, L7 and L8	Maximum	Tune L10 and then L9 for maximum meter reading. Retune L7 and L8 for maximum meter reading.
PA/MULTIPLIER ASSEMBLY					
F PA DRIVE	Pin 14 (-) and Pin 6 (+)		C40 (on Exciter), C2, C6, C12 and C13 on PA/MULT.	See procedure	Tune C2 for peak. Change setting of C40 on exciter board and repeak C2. Continue this process to obtain maximum meter reading. Tune C6 on PA for maximum meter reading. Then tune C12 for minimum meter reading and tune C13 for maximum meter reading.
H VAR BIAS	Pin 11		C1 and C2 (on FL1/FL2) and C14 on PA/MULT	Minimum	Tune C1 and C2 for minimum meter reading. Then tune C14 for minimum meter reading. —————NOTE————— If wattmeter is available complete steps 8 and 9. If wattmeter is not available go to step 10.
F PA DRIVE	Pin 14 (-) and Pin 6 (+)		C6, C11, C12, C13 and C14 (on PA/MULT) and C1 and C2 (on FL1/FL2)	See procedure	Adjust C6, C11, C12, C13, C14 (on PA/MULT) and C1 & C2 (on FL1/FL2) for maximum power output on wattmeter. —————NOTE————— The test meter reading should not exceed 0.7 volts during this alignment. If reading is high, it may be reduced by adjusting C11.
F PA DRIVE	Pin 14 (-) and Pin 6 (+)		See procedure	See procedure	Retune PA section per steps 6 thru 8 if necessary to obtain correct power output, while keeping test meter reading below 0.7 volts.
F PA DRIVE	Pin 14 (-) and Pin 6 (+)		See procedure	See procedure	If no wattmeter is available, complete steps 6 & 7 and then set PA current to recommended value of 0.65 volt (as indicated by position F of test meter) with C11.

ALIGNMENT PROCEDURE

406—470 MHz TRANSMITTER
TYPE ET-88-A

(RC-1734A)

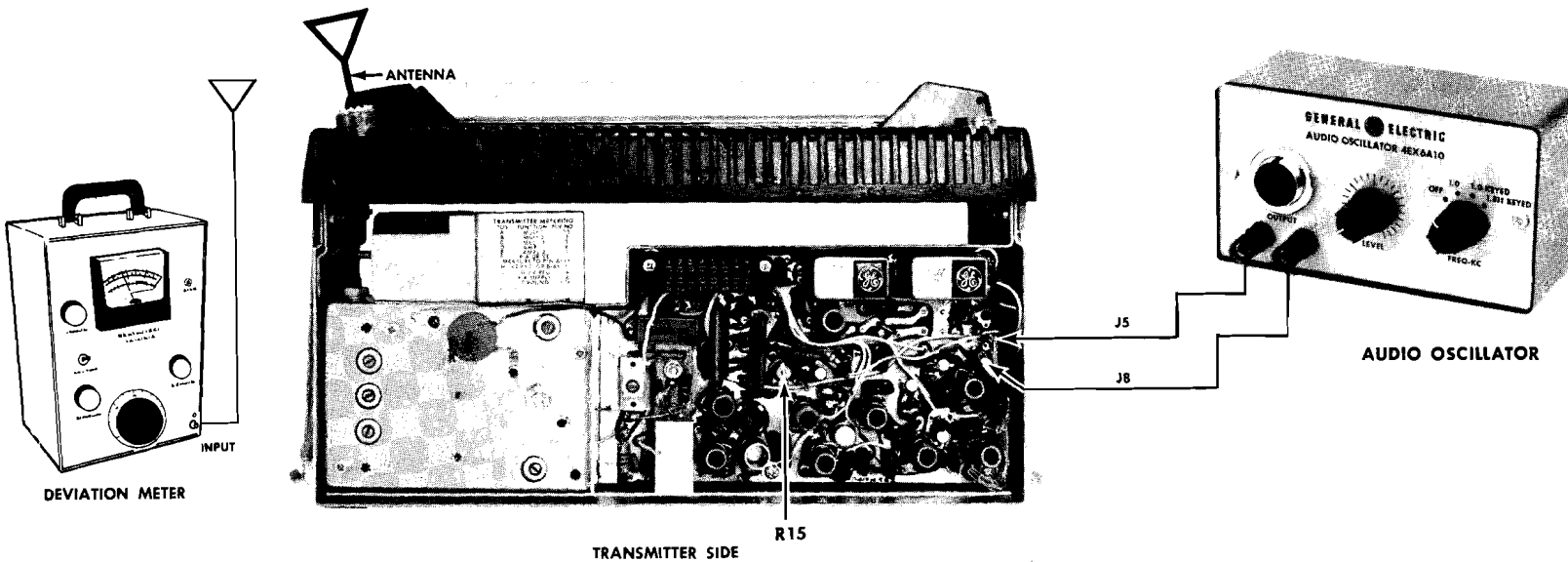
SERVICE CHECK

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

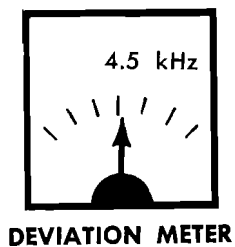
STEP 3

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:



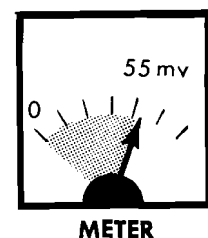
3. Set the generator output to 0.5 VOLTS RMS, and frequency to 1 kHz.
4. Key the transmitter and adjust Deviation Meter to carrier frequency.
5. Deviation reading should be ± 4.5 kHz.
6. Adjust "Modulator Adjust Control" R15 until deviation reads 4.5 kHz on plus (+) or minus (-) deviation, whichever is greater.



SERVICE CHECK

If the deviation reading plus (+) and minus (-) differs by more than 1 kHz, 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 kHz. Voltage should be LESS than 55 millivolts.



2. Key transmitter and check wattmeter for minimum reading of:

- A. 4.5 watts (dry battery)
- B. 7.5 watts (nickel cadmium battery)
- C. 7.5 watts (13.6 volt supply)

SERVICE CHECK

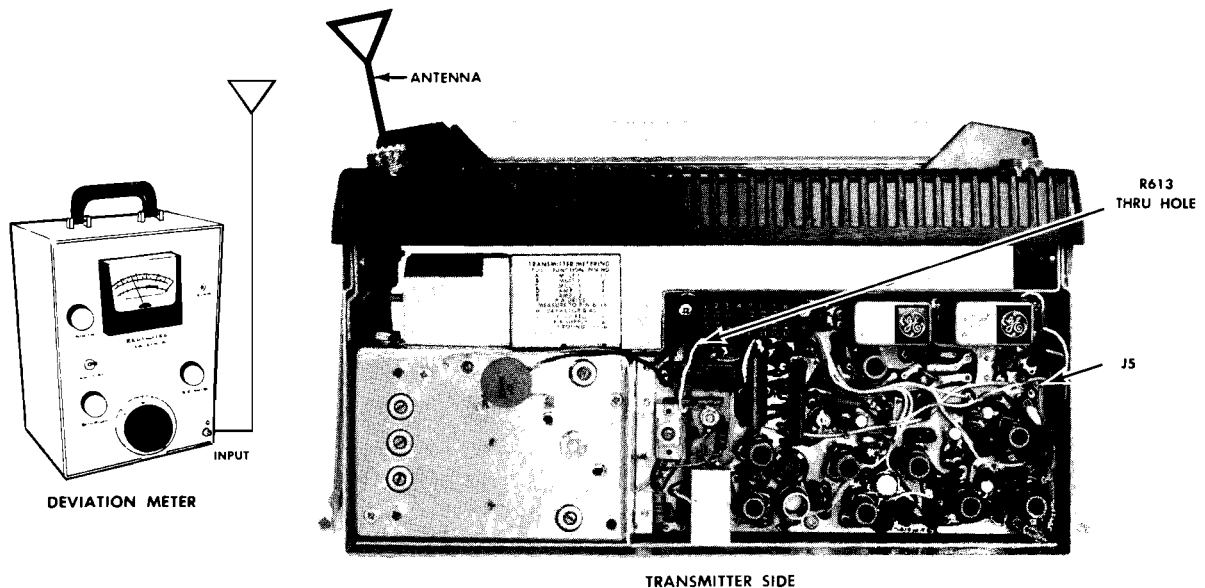
Check the following if the above readings are not obtained:

1. Disconnect red wire from J6 (32V) and orange wire from J7 (24V) from the Transmitter Exciter Board as shown, and check power supply voltages for:
 - A. 24 and 32 V (nickel cadmium or mobile supply)
 - B. 24 and 24 volts (dry battery)
2. Refer to Power Supply Troubleshooting Steps on Troubleshooting Procedure RC-1736.

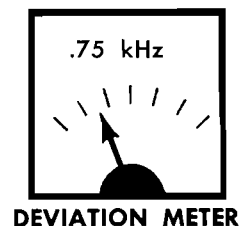
STEP 2

TONE DEVIATION WITH CHANNEL GUARD TEST PROCEDURE

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



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



NOTES:

1. On units supplied with "Tone Squelch," the Phase Modulator Tuning should be peaked carefully to insure proper performance.
2. The Tone Deviation Test Procedures should be repeated every time the Tone Frequency is changed.

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. Before starting with the Transmitter Test Procedures, be sure the transmitter is tuned and aligned to the proper operating frequency.

TEST EQUIPMENT REQUIRED

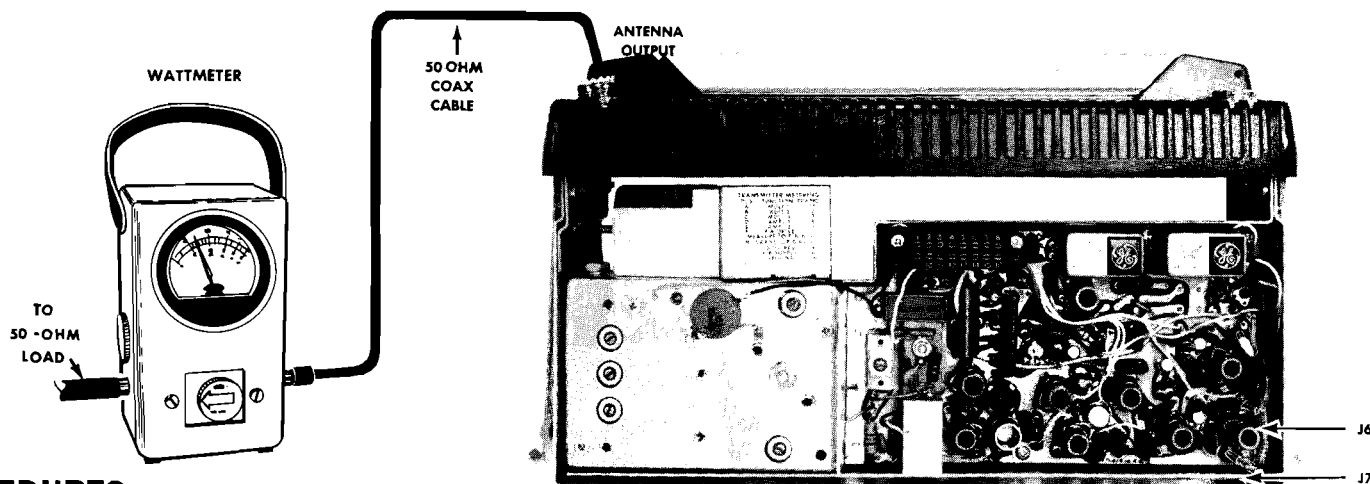
for test hookup as shown:

- | | | |
|--|--|--|
| 1. Wattmeter similar to:
Bird #43
Jones #711N | 2. VTVM similar to:
Triplet #850
Heath #1M-21 | 3. Audio Oscillator similar to:
GE MODEL 4EX6A10 or
Heath #1G-72 |
| 4. Deviation Meter (with a .75 kHz scale) similar to:
Measurements #140
Radio Specialty #1163-50-5 | 5. Multimeter similar to:
GE METERING TEST SET MODEL 4EX3A10 or Model 4EX8K10,11 or
20,000 ohms-per-volt voltmeter | |

STEP 1

POWER MEASUREMENT TEST PROCEDURE

1. Connect transmitter output to wattmeter as shown below:



TEST PROCEDURES

406—470 MHz TRANSMITTER
TYPE ET-88-A

(RC-1762A)

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

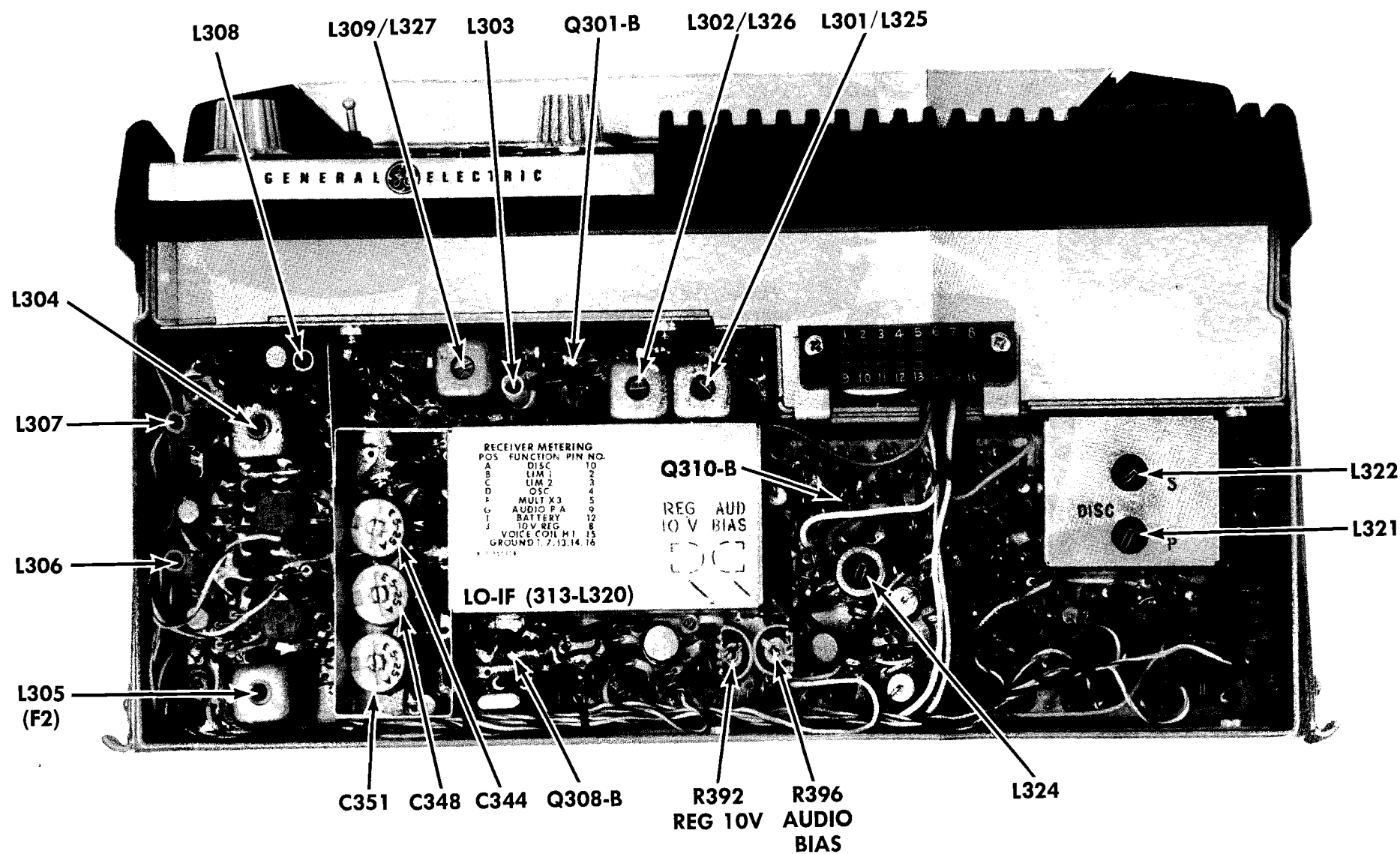
1. GE Test Set Models 4EX3A10, 4EX8K10,11 (or 20,000 ohms-per-volt Multimeter).
2. A 406-470 MHz Signal Source. Keep signal level below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set to the receiver centralized metering jack J312. Set Meter Polarity Switch on + and Meter Sensitivity Switch to 1. If using Multimeter, connect the negative lead to J312-13 (Ground).
2. Switch Test Set to Position "I" (or measure at J302 with Multimeter). Reading should be at least 12 volts.
3. Switch to Position "J" (or measure across R392 with Multimeter) and adjust Voltage Regulation Potentiometer R392 for a reading of 10 volts.
4. Turn SQUELCH control fully clockwise and VOLUME control to minimum. Switch to Position "G" (or measure at J312-9 with Multimeter) and adjust PA Bias Potentiometer R396 for a reading of 0.25 volt.

ALIGNMENT PROCEDURE

STEP	METERING POSITION		TUNING CONTROL	METER READING	PROCEDURE
	GE TEST SET	Multimeter + at J312			
1.	D OSC	pin 4	L304 (& L305 for two-frequency), L306 and L307	See Procedure	Tune L304 (L305 for two-frequency) and L306 for maximum meter reading. Then tune L307 for minimum reading.
2.	C LIM-2	pin 3	L301/L325, L302/L326 and L309/L327	Maximum	Apply an on-frequency signal to P303 and tune L301/L325, L302/L326 & L309/L327 for maximum meter reading.
3.			L301/L325, L302/L326, L309/L327	See Procedure	While receiving a weak on-frequency signal at the Antenna, tune L301/L325, L302/L326 & L309/L327 for maximum quieting.
4.	A DISC	pin 10	L304 & L305 (two-frequency only)	Zero	Apply an on-frequency signal to P303 and tune L304 (and L305 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.					



COMPLETE RECEIVER ALIGNMENT

EQUIPMENT REQUIRED

1. GE Test Set Models 4EX3A10, & 4EX8K10,11 (or 20,000 ohms-per-volt Multimeter).
2. A 455-kHz, 19.0 MHz and 406-470 MHz Signal Source. Couple the 455-kHz signal through a small capacitor (approximately 10 pF). Couple the 19 MHz signal through a .001 μ F capacitor for Hi IF, and through a 100 pF capacitor for Low IF adjustment. Keep signal levels below saturation.

PRELIMINARY CHECKS AND ADJUSTMENTS

1. Plug in the Test Set to the receiver centralized metering jack J312. Set Meter Polarity Switch on + and Meter Sensitivity Switch to TEST 1. If using Multimeter, connect the negative lead to J312-13 (Ground).
2. Switch Test Set to Position "I" (or measure at J302 with Multimeter). Reading should be at least 12 volts.
3. Switch to Position "J" (or measure across R372 with Multimeter) and adjust Voltage Regulation Potentiometer R392 for a reading of 10 volts.
4. Turn SQUELCH control fully clockwise and VOLUME control to minimum. Switch to Position "G" (or measure at J312-9 with Multimeter) and adjust PA Bias Potentiometer R396 for a reading of 0.25 volt.

ALIGNMENT PROCEDURE

STEP	METERING POSITION GE TEST SET	Multimeter + at J312	TUNING CONTROL	METER READING	PROCEDURE
DISCRIMINATOR					
1.	C LIM-2	Pin 3		0.3 V (1.1 V with Multimeter)	Apply a 455-kHz signal to the base of Q310 and adjust signal level for 0.3 volt meter reading (to saturate limiters).
2.	A DISC	Pin 10	L322	Zero	Apply a 455-kHz signal as above and adjust L322 (disc secondary) for zero meter reading.
3.	A DISC	Pin 10	L321 & L322	0.65 V (1.6 V with Multimeter)	Alternately apply a 445-kHz and 465-kHz signal while adjusting L321 and L322 for readings of at least 0.65 volt. Both readings should be within 10%.
4.	B LIM-1	Pin 2	L324	Maximum	Apply a 455-kHz signal as above, and tune L324 for maximum meter reading.
IF ALIGNMENT					
5.	B LIM-1	Pin 2	L313 thru L320	Maximum	Apply a 455 kHz signal to collector of 2nd Mixer Q308. Adjust L313 thru L320 for maximum meter reading keeping signal below limiting.
6.	C LIM-2	Pin 3	C344, C348, C351 & L303	Maximum	Apply a 19 MHz signal to the base of 1st Mixer Q301. Adjust C344, C348, C351 & L303 for maximum meter reading, keeping signal below limiting.
OSCILLATOR & MULTIPLIER ALIGNMENT					
7.	D OSC	Pin 4	L304 (and L305 for two-frequency) & L306	0.2 V to 0.6 V	Insert correct crystal and adjust L304 (L305 for two-frequency) and L306 for maximum meter reading.
8.	D OSC	Pin 4	L307	0.1 V to 0.4 V	Adjust L307 for minimum meter reading.
9.	E MULT	Pin 5	L308 & L307	-0.1 V to -0.6 V	Switch meter to negative and adjust L308 & L307 for maximum meter reading.
10.	E MULT	Pin 5	L309/L327	-0.1 V to -0.6 V	Adjust L309/L327 for dip (dip will be very small).
FREQUENCY ADJUSTMENT					
11.	A DISC	Pin 2	L304 (and L305 for two-frequency)	Zero	Apply an on-frequency signal to P303 (Antenna Jack) and tune L304 (and L305 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.
RF ALIGNMENT					
12.	C LIM-2	Pin 3	L301/L325 and L302/L326	Maximum	With an on-frequency signal applied at P303, adjust L301/L325 and L302/L326 for maximum meter reading, keeping signal below limiting.
13.	C LIM-2	Pin 3	L309/L327	Maximum	Adjust L309/L327 for maximum meter reading with signal below limiting.
FINAL IF & RF ALIGNMENT					
14.			L313 thru L320 & L324		Connect a D-C oscilloscope to pin 2 and pin 13 (Ground) of centralized metering Jack J312. Sweep RF signal generator connected to P303 with saw tooth generator (60 Hz or less) at ± 30 kHz deviation. Connect a 455 kHz marker through 1 pf capacitor to collector of 2nd mixer. Adjust L313 thru L320 and L324 for a symmetrical filter pattern as shown. This alignment should provide a minimum EIA modulation acceptance of ± 9.5 kHz. NOTE On some oscilloscopes, a 100K resistor across the probe will improve the wave shape.
15.			L301/L325, L302/L326, & L309/L327		Connect an audio voltmeter to audio output & adjust volume control for 1 volt RMS. Inject an on-frequency RF signal to P303 at a level to produce 10 dB quieting. Adjust L301/L325, L302/L326 & L309/L327 for maximum quieting.

* NOTE -- Low IF coils L313 through L320 and L324 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.

ALIGNME

406-470 I
MODELS 4E

(RC-1735)

SERVICE CHECK

If the sensitivity level is more than 0.55 microvolts, make the following checks:

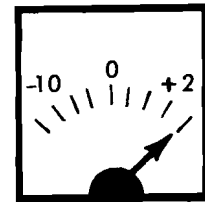
1. Alignment of RF stages (Refer to RF Alignment in Receiver Alignment on reverse side of page).
2. Gain measurements as shown on the Receiver Troubleshooting Procedure (RC-1737).

STEP 3

MODULATION ACCEPTANCE BANDWIDTH (IF BANDWIDTH)

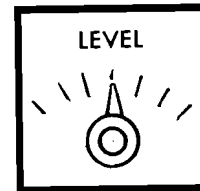
TEST PROCEDURE

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 7.5 kHz (typical value is 9.5 kHz).

SERVICE CHECK

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

1. Make gain measurements as shown on the Receiver Troubleshooting Procedure (RC-1737).
2. Voltage reading of 2nd Limiter (Q312) should read 0.13 volts RMS with a one-microvolt input signal on Test Set Meter or 0.3 volts with voltmeter. (Measure at J312-3).
3. DO NOT RE-ALIGN factory adjusted filters (L313 through L320), unless positive evidence of a defective filter is ascertained. (Refer to Filter Alignment on the Receiver Alignment Procedure.)

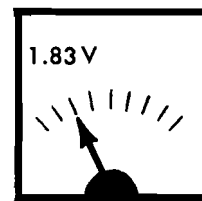
STEP 1

AUDIO POWER OUTPUT AND DISTORTION TEST PROCEDURE

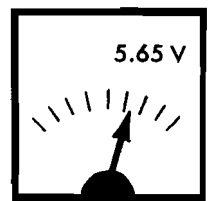
Measure Audio Power Output as follows:

1. Connect a 1,000-microvolt test signal modulated by 1,000 Hertz ± 3.3 kHz deviation to the antenna jack.
2. Disconnect the Speaker Hi lead from the terminal board. Hook up 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 RC-1739 for voltages.)
2. Audio Bias Adjust (R396)--low current will cause distortion.
3. Audio Gain (Refer to Step 2A and 2B of Receiver Troubleshooting Procedure (RC-1737).
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, 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 distortion ratio) is the "usable" sensitivity level. Reading should be less than 0.55 microvolts with audio output at least 1/2 watt (1.25 volts RMS across the 3.2-ohm receiver load).

RECEIVER TEST PROCEDURES

Procedures are designed to receiver that is operating -- problems encountered could sensitivity, distortion, limiter, and low gain. By following steps starting with Step 1, 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-1737. Before starting with the Receiver Test Procedures, be sure the receiver is tuned and aligned to the proper operating frequency.

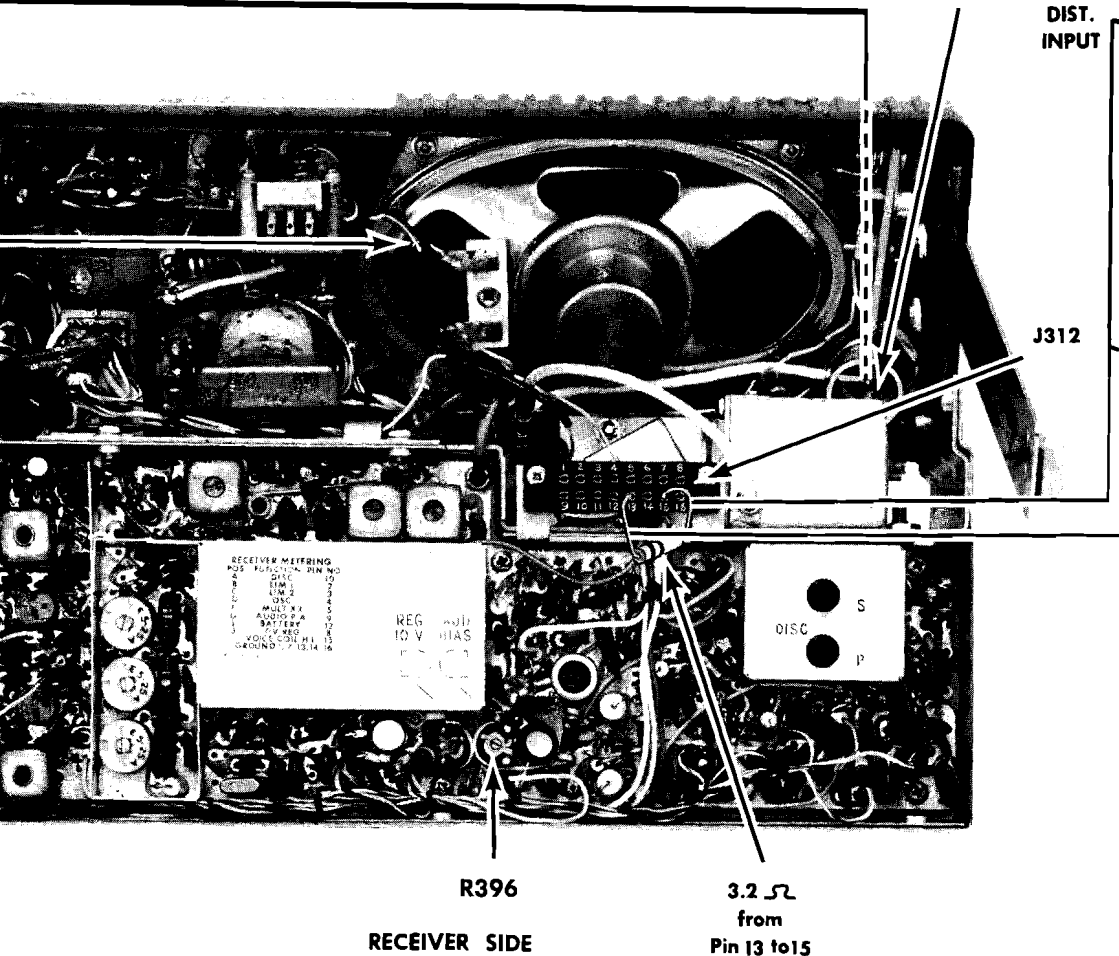
TEST EQUIPMENT REQUIRED

for test hookup shown:

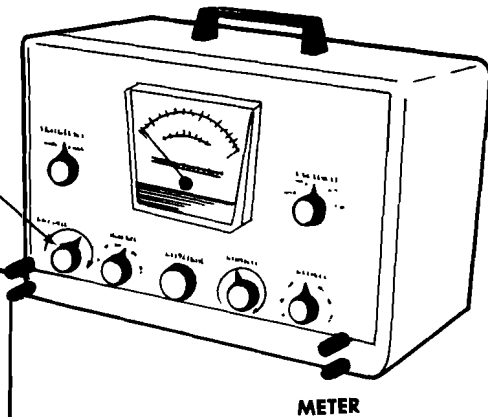
1. Distortion Analyzer similar to: Heath #1M-12
2. Signal Generator similar to: Measurements #M-560
3. 6 dB attenuation pad

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

FREQUENCY

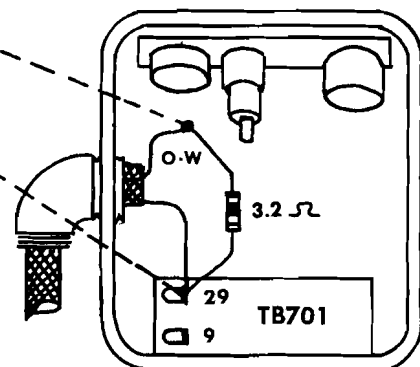


DISTORTION ANALYZER



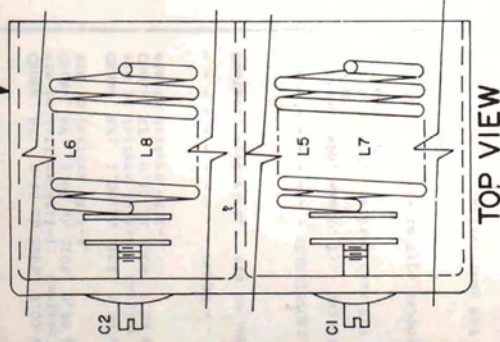
METER

EXTENDED LOCAL CONTROL UNIT EC-66-A



DISCONNECT ORANGE-WHITE SPEAKER HI LEAD FROM TB701-9

EXCITER BOARD

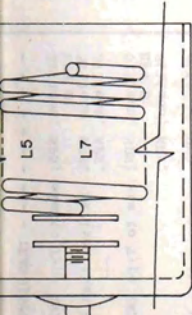


ALL READINGS ARE TYPICAL READINGS MEASURED FROM TRANSISTOR PINS TO J11-13 (GND). WITH A 20,000- Ω PER-VOLT OHMMETER AND SYSTEM POWER SWITCH OFF. READINGS UNDER 1,000 OHMS READ ON X10 SCALE. ALL READINGS ABOVE 1,000 OHMS READ ON X1,000 SCALE. OF METER, FOR -SIGN SHOWS METER IS GROUNDING.

TRANSISTOR SYMBOL	EMITTER		BASE		COLLECTOR	
	+	-	+	-	+	-
Q1	0	0	3.5K	70K	4.5K	4.5K
Q2	100	90	2.6K	4.0K	400	600
Q3	95	55	0	0	700	95
Q4	46	41	0	0	400	53
Q5	7.5	7.5	0	0	400	53
Q6	1.7	1.7	0	0	360	42
Q7	600	600	4.2K	19K	3.5K	20K
Q8	0	0	3.5K	20K	3.5K	20K
Q9	0	0	3.5K	20K	3.5K	20K
Q10	0	0	1K	1K	500	250

SYMBOL #	EMITTER		BASE		COLLECTOR	
	+	-	+	-	+	-
Q1	0	0	10	10	5K	1.75K

The diagram shows two circles. The top circle is labeled 'FLAT' and has a point 'B' on its circumference. The bottom circle is labeled 'B' and has a point 'E' on its circumference. Both circles have a dashed line segment on their right side, indicating a continuation or a specific boundary.



TOP VIEW

RESISTANCE READINGS

ALL READINGS ARE TYPICAL READINGS MEASURED FROM TRANSISTOR PINS TO J11-13 (GND). WITH A 20,000-OHM-PER-VOLT OHMMETER AND SYSTEM POWER SWITCH OFF. READINGS UNDER 1,000 OHMS READ ON X10 SCALE OF METER. ALL READINGS ABOVE 1,000 OHMS READ ON THE X1,000 SCALE OF METER. +OR - SIGN SHOWS METER PROBE GROUNDED.

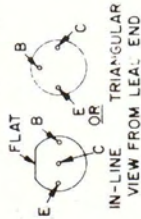
EXCITER BOARD

TRANSISTOR SYMBOL	EMITTER		BASE		COLLECTOR	
	+	-	+	-	+	-
Q1	0	0	3.5K	70K	4.5K	4.5K
Q2	100	90	2.6K	4.0K	400	600
Q3	95	55	0	0	700	55
Q4	46	41	0	0	400	53
Q5	7.5	7.5	0	0	400	53
Q6	1.7	1.7	0	0	360	42
Q7	600	600	4.2K	19K	3.5K	20K
Q8	0	0	3.5K	20K	3.5K	20K
Q9	0	0	3.5K	20K	3.5K	20K
Q10	0	0	1K	1K	500	250

PA ASSEMBLY

SYMBOL #	EMITTER		BASE		COLLECTOR	
	+	-	+	-	+	-
Q1	0	0	10	10	5K	1.75K

LEAD IDENTIFICATION FOR Q1-Q5, Q7-Q10

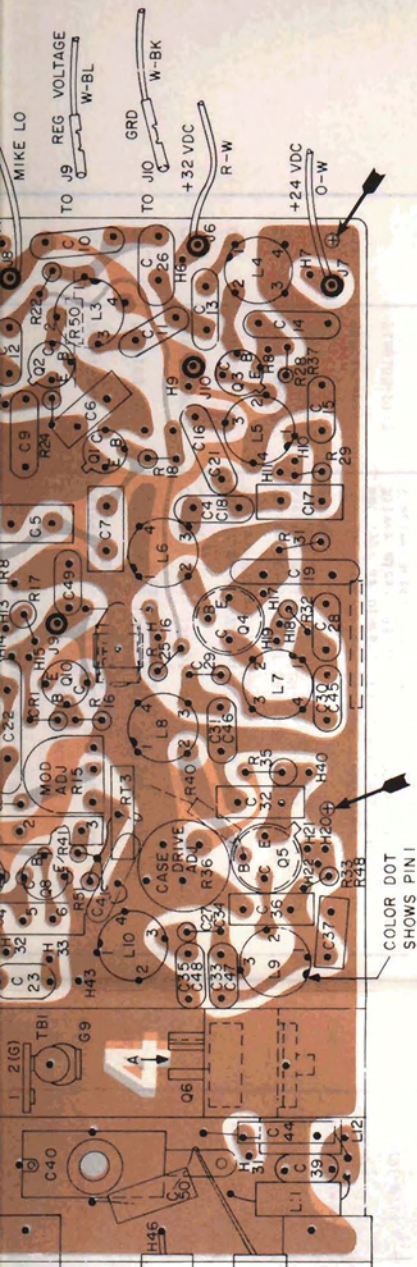
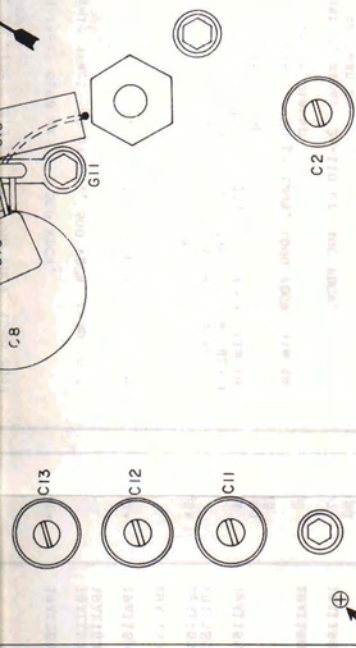


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

SERVICE SHEET

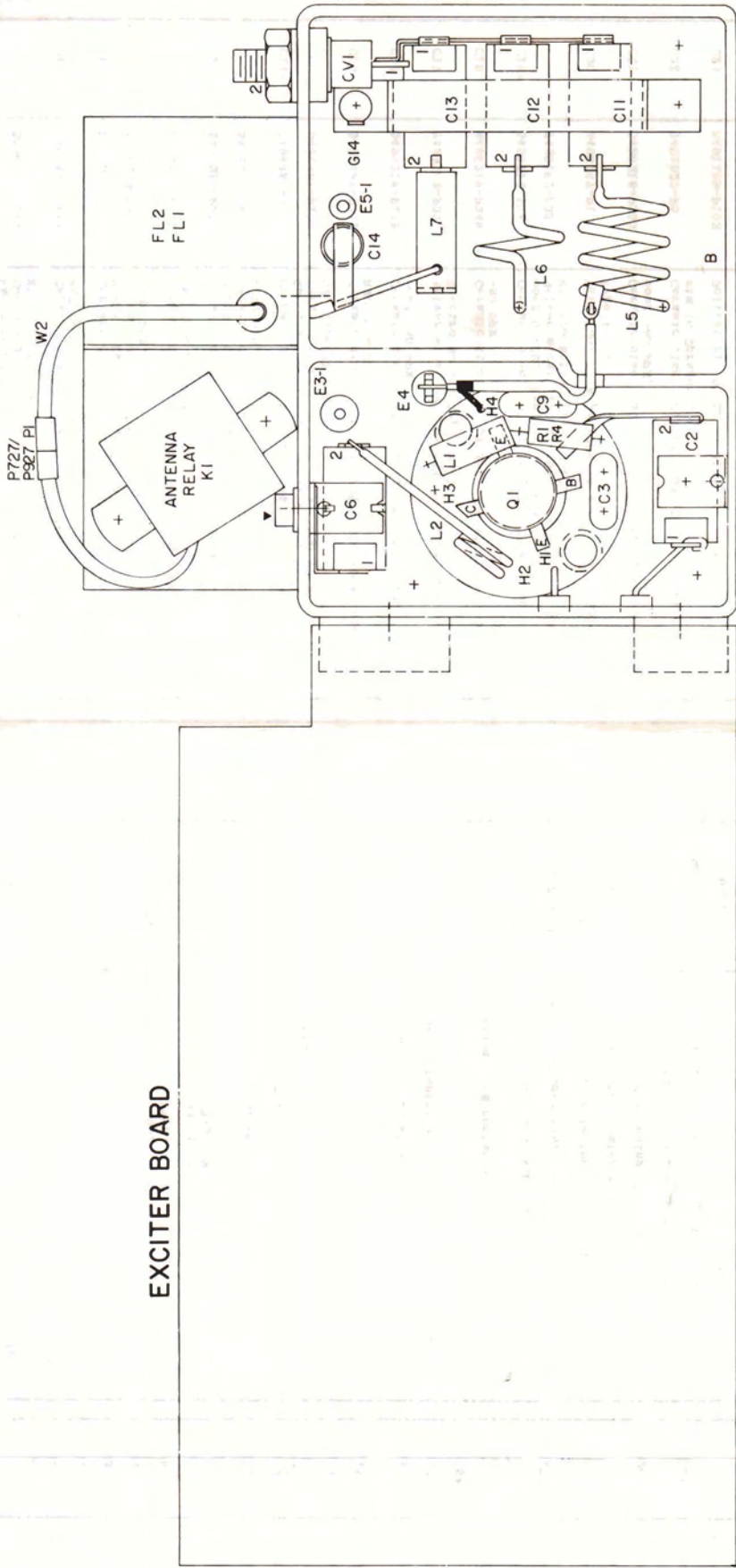
406--420 MHz TRANSMITTER
MODEL 4ET88A10
450--470 MHz TRANSMITTER
MODEL 4ET88A11

(RC-1738A, Sheet 1)



COLOR DOT SHOWS PIN 1

EXCITER BOARD



PARTS LIST

LBI-3963A

406-470 MHz TRANSMITTER
MODEL 4ET88A10 406-420 MHz
MODEL 4ET88A11 450-470 MHz

SYMBOL	G-E PART NO.	DESCRIPTION
		EXCITER BOARD ASSEMBLY 19D413105-G1 450-470 MHz 19D413105-G2 406-420 MHz
		----- CAPACITORS -----
C1	7489162-P31	Silver mica: 150 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C3	7489162-P27	Silver mica: 100 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C4	5496219-P250	Ceramic disc: 30 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C5	7489162-P135	Silver mica: 220 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C6*	7489162-P17 5496219-P10	Silver mica: 39 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15. Earlier than REV A: Ceramic disc: 10 pf $\pm 10\%$, 500 VDCW, temp coef 0 PPM.
C7*	5494481-P111 7489162-P123	Ceramic disc: 1000 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A: Silver mica: 68 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C8*	7489162-P123	Silver mica: 68 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15. Deleted by REV A:
C9*	5494481-P127 5494481-P114	Ceramic disc: 2700 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A: Ceramic disc: .002 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C10	5494481-P114	Ceramic disc: .002 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C11*	5496219-P55 5496219-P455	Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM. Earlier than REV A: Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef -220 PPM.
C12	5494481-P111	Ceramic disc: .001 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C13*	5496219-P55 5496219-P455	Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM. Earlier than REV A: Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef -220 PPM.
C14*	5494481-P129 5494481-P114	Ceramic disc: 3900 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A: Ceramic disc: .002 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C15	5494481-P112	Ceramic disc: .001 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C16	5496218-P248	Ceramic disc: 24 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C17	7489162-P37	Silver mica: 270 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C18	5496219-P249	Ceramic disc: 27 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C19*	5496218-P58 7489162-P33	Ceramic disc: 62 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM. Earlier than REV A: Silver mica: 180 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C20	5496267-P1	Tantalum: 6.8 pf $\pm 20\%$, 6 VDCW; sim to Sprague Type 150D.
C21	5496218-P250	Ceramic disc: 30 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.

SYMBOL	G-E PART NO	DESCRIPTION
C27	5491601-P117	Phenolic: 0.68 pf $\pm 5\%$, 500 VDCW.
C28	5494481-P112	Ceramic disc: .001 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C29	5491601-P103	Phenolic: 0.18 pf $\pm 5\%$, 500 VDCW.
C30	5496219-P237	Ceramic disc: 6.0 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C31	5496219-P240	Ceramic disc: 9.0 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C32	7489162-P35	Silver mica: 220 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C33	5496219-P239	Ceramic disc: 8.0 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C34	5491601-P117	Phenolic: 0.68 pf $\pm 5\%$, 500 VDCW.
C35	5496219-P241	Ceramic disc: 10 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C36	5494481-P107	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C37	5491189-P102	Polyester: 0.022 pf $\pm 20\%$, 50 VDCW.
C38*	7489162-P43 5494481-P7	Silver mica: 470 pf $\pm 5\%$, 300 VDCW; sim to Electro Motive Type DM-15. Earlier than REV E. Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C39	5494481-P107	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C40*	19B209408-P105 19B209408-P6	Variable, mica: 24-110 pf, 400 VDCW. Earlier than A: Variable, mica: 37-140 pf, 400 VDCW.
C41	5494481-P114	Ceramic disc: .002 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C42 and C43	19B209243-P7	Polyester: 0.1 pf $\pm 20\%$, 50 VDCW.
C44*	5496267-P17	Tantalum: 1.0 pf $\pm 20\%$, 35 VDCW; sim to Sprague Type 150D. Added by REV A.
C45	5496219-P240	Ceramic disc: 9.0 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C46 thru C48	5496219-P242	Ceramic disc: 12 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C49	5494481-P111	Ceramic disc: .001 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C50*	7489162-P15	Silver mica: 33 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15. Added by REV A.
		----- DIODES AND RECTIFIERS -----
CR1	4036887-P47	Silicon, Zener.
CR2 and CR3	19A115250-P1	Silicon.
CV1	5495769-P8	Silicon.
		----- JACKS AND RECEPTACLES -----
J1 thru J10	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.
J11	19B205689-G2	Connector: 18 contacts.
		----- INDUCTORS -----
L1	19B216059-G1	Coil. Includes tuning slug 5491798-P4.
L3	19B216060-G1	Coil. Includes tuning slug 5491798-P8.
L4	19B216061-G1	Coil. Includes tuning slug 5491798-P8.
L5	19B216062-G1	Coil. Includes tuning slug 5491798-P8.

SYMBOL	G-E PART NO	DESCRIPTION
L11*	7488079-P1 7488079-P6	Choke, RF: 0.15 pf $\pm 20\%$, 0.03 ohms DC res max; sim to Jeffers 4411-1. Earlier than REV A: Choke, RF: 1.00 pf $\pm 10\%$, 0.30 ohms DC res max; sim to Jeffers 4411-8.
L12*	7488079-P6 7488079-P1	Choke, RF: 1.00 pf $\pm 10\%$, 0.30 ohms DC res max; sim to Jeffers 4411-8. Earlier than REV A: Choke, RF: 0.15 pf $\pm 20\%$, 0.03 ohms DC res max; sim to Jeffers 4411-1.
		----- PLUGS -----
P1 and P2	4029840-P2	Contact, electrical: sim to Amp 42827-2.
		----- TRANSISTORS -----
Q1*	19A115910-P1 19A115330-P1 19A115328-P1	Silicon, NPN; sim to Type 2N3904. Earlier than REV B: Silicon, NPN. Earlier than REV A: Silicon, NPN.
Q2*	19A115910-P1 19A115328-P1	Silicon, NPN; sim to Type 2N3904. Earlier than REV B: Silicon, NPN.
Q3*	19A115330-P1 19A115328-P1	Silicon, NPN. Earlier than REV A: Silicon, NPN.
Q4 and Q5	19A115810-P1	Silicon, NPN; sim to Type 2N3866.
Q6	19A116001-P1	Silicon, NPN; sim to Type 2N3375.
Q7* and Q8*	19A115889-P1 19A115123-P1	Silicon, NPN; sim to Type 2N2712. Earlier than REV C: Silicon, NPN; sim to Type 2N2712.
Q9*	19A115889-P1 19A115123-P1	Silicon, NPN; sim to Type 2N2712. Earlier than REV D: Silicon, NPN; sim to Type 2N2712.
Q10	19A115328-P1	Silicon, NPN.
		----- RESISTORS -----
R1	3R152-P752J	Composition: 7500 ohms $\pm 5\%$, 1/4 w.
R2	3R152-P273K	Composition: 27,000 ohms $\pm 10\%$, 1/4 w.
R3	3R152-P473K	Composition: 47,000 ohms $\pm 10\%$, 1/4 w.
R4	3R152-P103K	Composition: 10,000 ohms $\pm 10\%$, 1/4 w.
R6	3R152-P153K	Composition: 15,000 ohms $\pm 10\%$, 1/4 w.
R8	3R152-P102K	Composition: 1000 ohms $\pm 10\%$, 1/4 w.
R10	3R152-P222K	Composition: 2200 ohms $\pm 10\%$, 1/4 w.
R11	3R152-P562K	Composition: 5600 ohms $\pm 10\%$, 1/4 w.
R12 and R13	3R152-P223K	Composition: 22,000 ohms $\pm 10\%$, 1/4 w.
R14	3R152-P621J	Composition: 620 ohms $\pm 5\%$, 1/4 w.
R15	19B201969-P9	Variable, sub-miniature trimmer: 0.1 megohm $\pm 20\%$, 0.1 w; sim to Centralab Series 4.
R16	3R152-P102K	Composition: 1000 ohms $\pm 10\%$, 1/4 w.
R17	3R77-P274J	Composition: 0.27 megohms $\pm 5\%$, 1/2 w.
R18*	3R152-P184K 3R152-P333K 3R152-P823K	Composition: 0.18 megohms $\pm 10\%$, 1/4 w. Earlier than REV B: Composition: 33,000 ohms $\pm 10\%$, 1/4 w. Earlier than REV A: Composition: 82,000 ohms $\pm 10\%$, 1/4 w.
R19*	3R152-P302J 3R152-P152J 3R152-P362J	Composition: 3000 ohms $\pm 5\%$, 1/4 w. Deleted by REV E. Earlier than REV B: Composition: 1500 ohms $\pm 5\%$, 1/4 w. Earlier than REV A: Composition: 3600 ohms $\pm 5\%$, 1/4 w.
R20*	3R152-P302J	Composition: 3000 ohms $\pm 5\%$, 1/4 w.

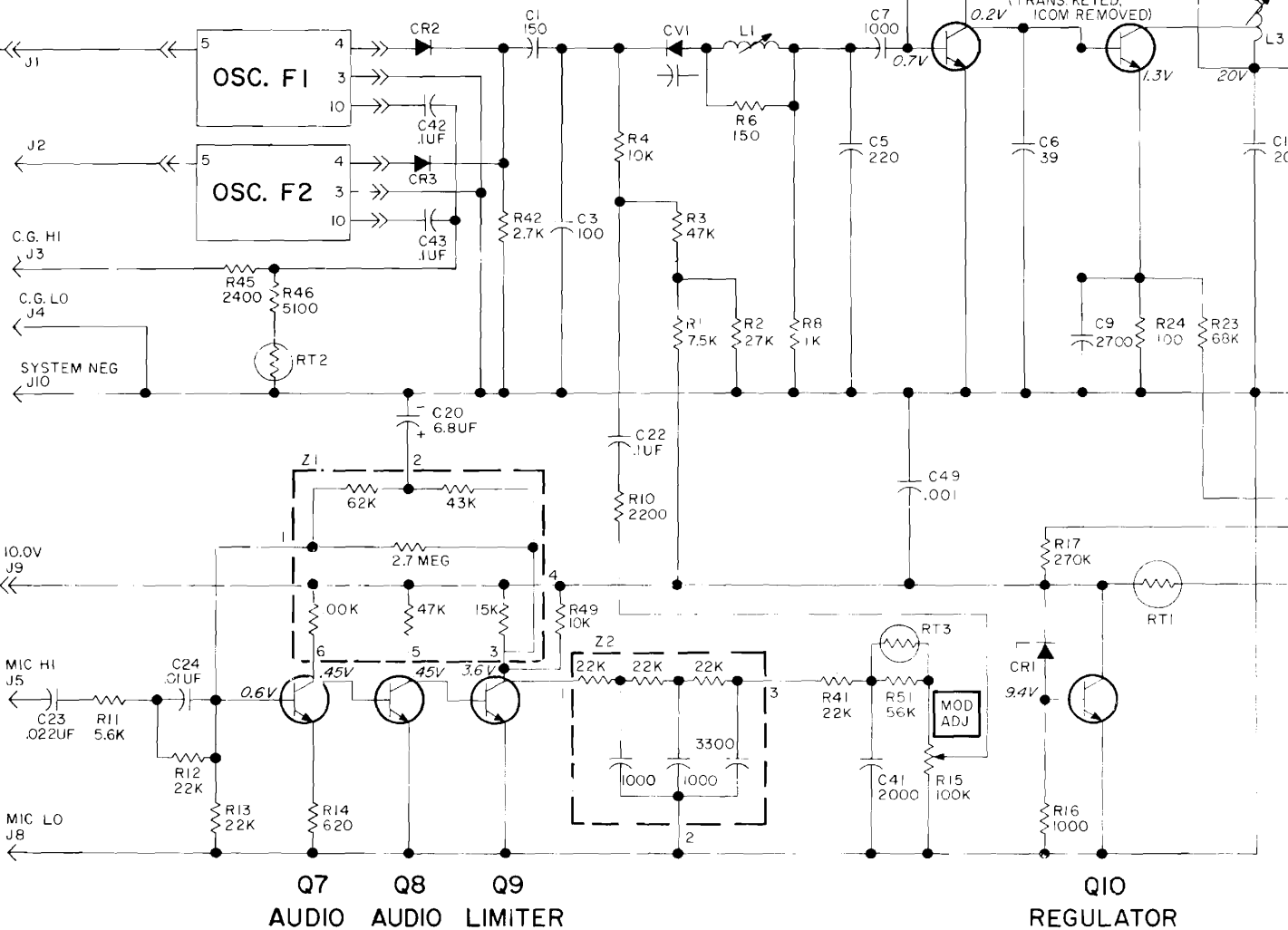
----- CAPACITORS -----								
C1	7489162-P31	Silver mica: 150 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	C34	5491601-P117	Phenolic: 0.68 pf $\pm 5\%$, 500 VDCW.	Q1*	19A115910-P1	Silicon, NPN; sim to Type 2N3904. Earlier than REV B:
C3	7489162-P27	Silver mica: 100 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	C35	5496219-P241	Ceramic disc: 10 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.		19A115330-P1	Silicon, NPN. Earlier than REV A:
C4	5496219-P250	Ceramic disc: 30 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	C36	5494481-P107	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.	Q2*	19A115328-P1	Silicon, NPN.
C5	7489162-P135	Silver mica: 220 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15.	C37	5491189-P102	Polyester: 0.022 μ f $\pm 20\%$, 50 VDCW.		19A115328-P1	Silicon, NPN.
C6*	7489162-P17	Silver mica: 39 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15. Earlier than REV A:	C38*	7489162-P43	Silver mica: 470 pf $\pm 5\%$, 300 VDCW; sim to Electro Motive Type DM-15. Earlier than REV E.	Q3*	19A115330-P1	Silicon, NPN. Earlier than REV A:
	5496219-P10	Ceramic disc: 10 pf $\pm 10\%$, 500 VDCW, temp coef 0 PPM.	C39	5494481-P107	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.		19A115328-P1	Silicon, NPN.
C7*	5494481-P111	Ceramic disc: 1000 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A:	C40*	19B209408-P105	Variable, mica: 24-110 pf, 400 VDCW. Earlier than A:	Q4 and Q5	19A115810-P1	Silicon, NPN; sim to Type 2N3866.
	7489162-P123	Silver mica: 68 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15.		19B209408-P6	Variable, mica: 37-140 pf, 400 VDCW.	Q6	19A116001-P1	Silicon, NPN; sim to Type 2N3375.
C8*	7489162-P123	Silver mica: 68 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15. Deleted by REV A:	C41	5494481-P114	Ceramic disc: .002 μ f $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.	Q7* and Q8*	19A115889-P1	Silicon, NPN; sim to Type 2N2712. Earlier than REV C:
C9*	5494481-P127	Ceramic disc: 2700 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A:	C42 and C43	19B209243-P7	Polyester: 0.1 μ f $\pm 20\%$, 50 VDCW.	Q9*	19A115123-P1	Silicon, NPN; sim to Type 2N2712.
	5494481-P114	Ceramic disc: .002 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.	C44*	5496267-P17	Tantalum: 1.0 μ f $\pm 20\%$, 35 VDCW; sim to Sprague Type 150D. Added by REV A.		19A115889-P1	Silicon, NPN; sim to Type 2N2712. Earlier than REV D:
C10	5494481-P114	Ceramic disc: .002 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.	C45	5496219-P240	Ceramic disc: 9.0 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	Q10	19A115328-P1	Silicon, NPN.
C11*	5496219-P55	Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM. Earlier than REV A:	C46 thru C48	5496219-P242	Ceramic disc: 12 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	R1	3R152-P752J	Composition: 7500 ohms $\pm 5\%$, 1/4 w.
	5496219-P455	Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef -220 PPM.	C49	5494481-P111	Ceramic disc: .001 μ f $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.	R2	3R152-P273K	Composition: 27,000 ohms $\pm 10\%$, 1/4 w.
C12	5494481-P111	Ceramic disc: .001 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.	C50*	7489162-P15	Silver mica: 33 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15. Added by REV A.	R3	3R152-P473K	Composition: 47,000 ohms $\pm 10\%$, 1/4 w.
C13*	5496219-P55	Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM. Earlier than REV A:			----- DIODES AND RECTIFIERS -----	R4	3R152-P103K	Composition: 10,000 ohms $\pm 10\%$, 1/4 w.
	5496219-P455	Ceramic disc: 47 pf $\pm 5\%$, 500 VDCW, temp coef -220 PPM.	CR1	4036887-P47	Silicon, Zener.	R6	3R152-P153K	Composition: 15,000 ohms $\pm 10\%$, 1/4 w.
C14*	5494481-P129	Ceramic disc: 3900 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A:	CR2 and CR3	19A115250-P1	Silicon.	R8	3R152-P102K	Composition: 1000 ohms $\pm 10\%$, 1/4 w.
	5494481-P114	Ceramic disc: .002 μ f $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.	CV1	5495769-P8	Silicon.	R10	3R152-P222K	Composition: 2200 ohms $\pm 10\%$, 1/4 w.
C15	5494481-P112	Ceramic disc: .001 μ f $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.			----- JACKS AND RECEPTACLES -----	R11	3R152-P562K	Composition: 5600 ohms $\pm 10\%$, 1/4 w.
C16	5496218-P248	Ceramic disc: 24 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	J1 thru J10	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.	R12 and R13	3R152-P223K	Composition: 22,000 ohms $\pm 10\%$, 1/4 w.
C17	7489162-P37	Silver mica: 270 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	J11	19B205689-G2	Connector: 18 contacts.	R14	3R152-P621J	Composition: 620 ohms $\pm 5\%$, 1/4 w.
C18	5496219-P249	Ceramic disc: 27 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.			----- INDUCTORS -----	R15	19B201969-P9	Variable, sub-miniature trimmer: 0.1 megohm $\pm 20\%$, 0.1 w; sim to Centralab Series 4.
C19*	5496218-P58	Ceramic disc: 62 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM. Earlier than REV A:	L1	19B216059-G1	Coil. Includes tuning slug 5491798-P4.	R16	3R152-P102K	Composition: 1000 ohms $\pm 10\%$, 1/4 w.
	7489162-P33	Silver mica: 180 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	L3	19B216060-G1	Coil. Includes tuning slug 5491798-P8.	R17	3R77-P274J	Composition: 0.27 megohms $\pm 5\%$, 1/2 w.
C20	5496267-P1	Tantalum: 6.8 μ f $\pm 20\%$, 6 VDCW; sim to Sprague Type 150D.	L4	19B216061-G1	Coil. Includes tuning slug 5491798-P8.	R18*	3R152-P184K	Composition: 0.18 megohms $\pm 10\%$, 1/4 w. Earlier than REV B:
C21	5496218-P250	Ceramic disc: 30 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	L5	19B216062-G1	Coil. Includes tuning slug 5491798-P8.		3R152-P333K	Composition: 33,000 ohms $\pm 10\%$, 1/4 w. Earlier than REV A:
C22	7491827-P5	Ceramic disc: 0.1 μ f $\pm 80\%$ -30%, 50 VDCW; sim to Sprague 36C.	L6	19B216064-G1	Coil. Includes tuning slug 5491798-P8.		3R152-P823K	Composition: 82,000 ohms $\pm 10\%$, 1/4 w.
C23	5491189-P102	Polyester: 0.022 μ f $\pm 20\%$, 50 VDCW.	L7	19B216065-G1	Coil. Includes tuning slug 5491798-P8.	R19*	3R152-P302J	Composition: 3000 ohms $\pm 5\%$, 1/4 w. Deleted by REV E.
C24	5491189-P301	Polyester: 0.01 μ f $\pm 5\%$, 50 VDCW.	L8	19B216067-G1	Coil. Includes tuning slug 5491798-P8.		3R152-P152J	Earlier than REV B:
C26	5494481-P112	Ceramic disc: .001 μ f $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.	L9	19B216068-G1	Coil. Includes tuning slug 5491798-P8.		3R152-P362J	Composition: 1500 ohms $\pm 5\%$, 1/4 w. Earlier than REV A:
			L10	19B216067-G2	Coil. Includes tuning slug 5491798-P8.	R20*	3R152-P392K	Composition: 3900 ohms $\pm 10\%$, 1/4 w. Deleted by REV A.
						R22*	3R152-P511K	Composition: 510 ohms $\pm 10\%$, 1/4 w. Earlier than REV E:
							3R152-P751K	Composition: 750 ohms $\pm 10\%$, 1/4 w. Earlier than REV B:
							3R152-P101K	Composition: 100 ohms $\pm 10\%$, 1/4 w.
						R23	3R152-P683K	Composition: 68,000 ohms $\pm 10\%$, 1/4 w.

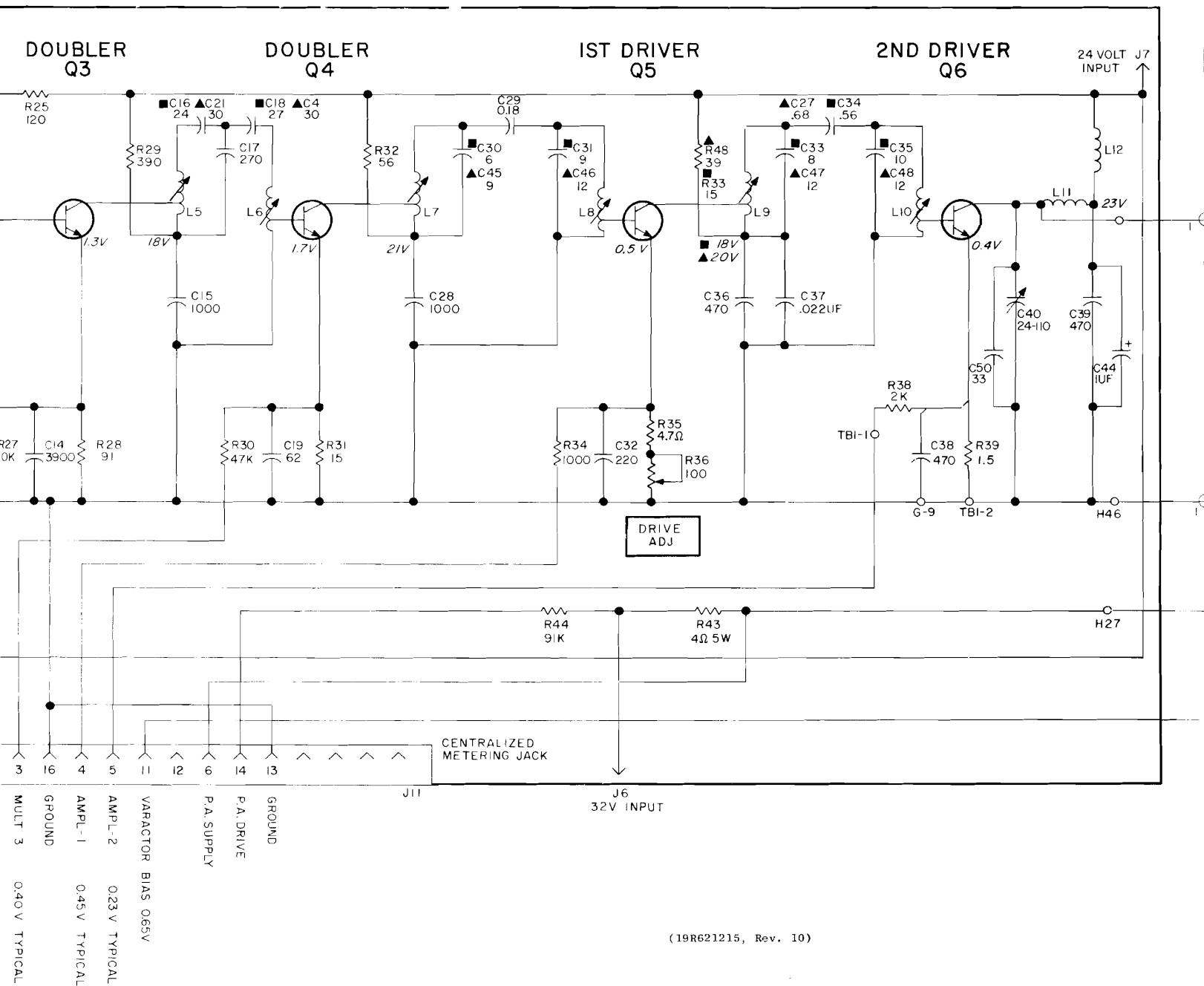
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

EXCITE

BUFFER
Q1

TRIPLER
Q2





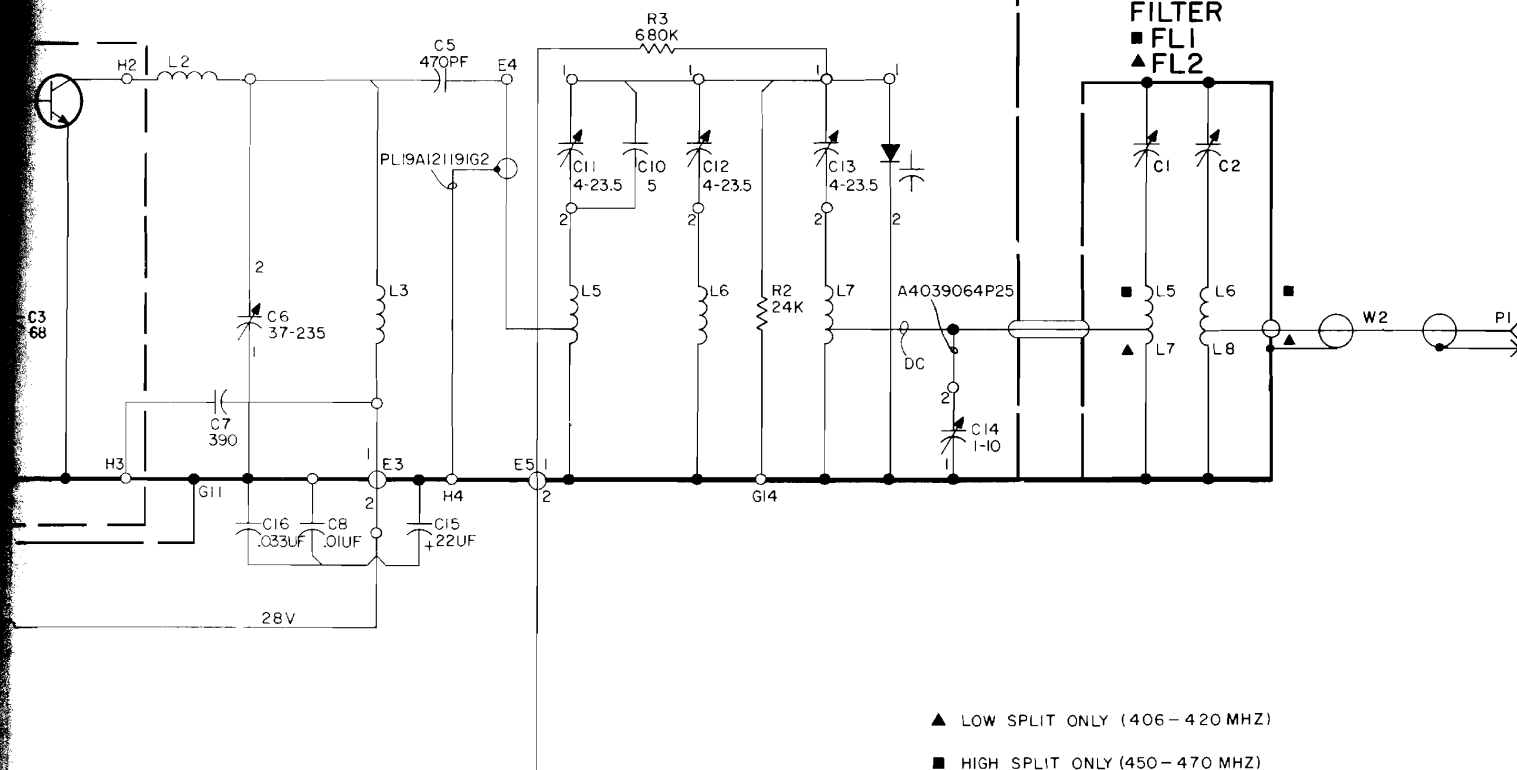
POWER AMP/MULTIPLIER

AMPLIFIER
Q1

TRIPLER
CVI

HELICAL
FILTER

■ FL1
▲ FL2



▲ LOW SPLIT ONLY (406-420 MHZ)

■ HIGH SPLIT ONLY (450-470 MHZ)

● SINGLE FREQ ONLY

1/2 WATT UNLESS
NOTED AND RESISTOR
VALUES FOLLOWED BY
M=1,000,000 OHMS
K=1,000 OHMS
(EQUAL
VALUES) UNLESS FOLLOWED
BY INDUCTANCE VALUES
UNLESS FOLLOWED BY
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 DES-
SCRIPTION OF CHANGES UNDER EACH
REVISION LETTER

THIS ELEM DIAG APPLIES TO

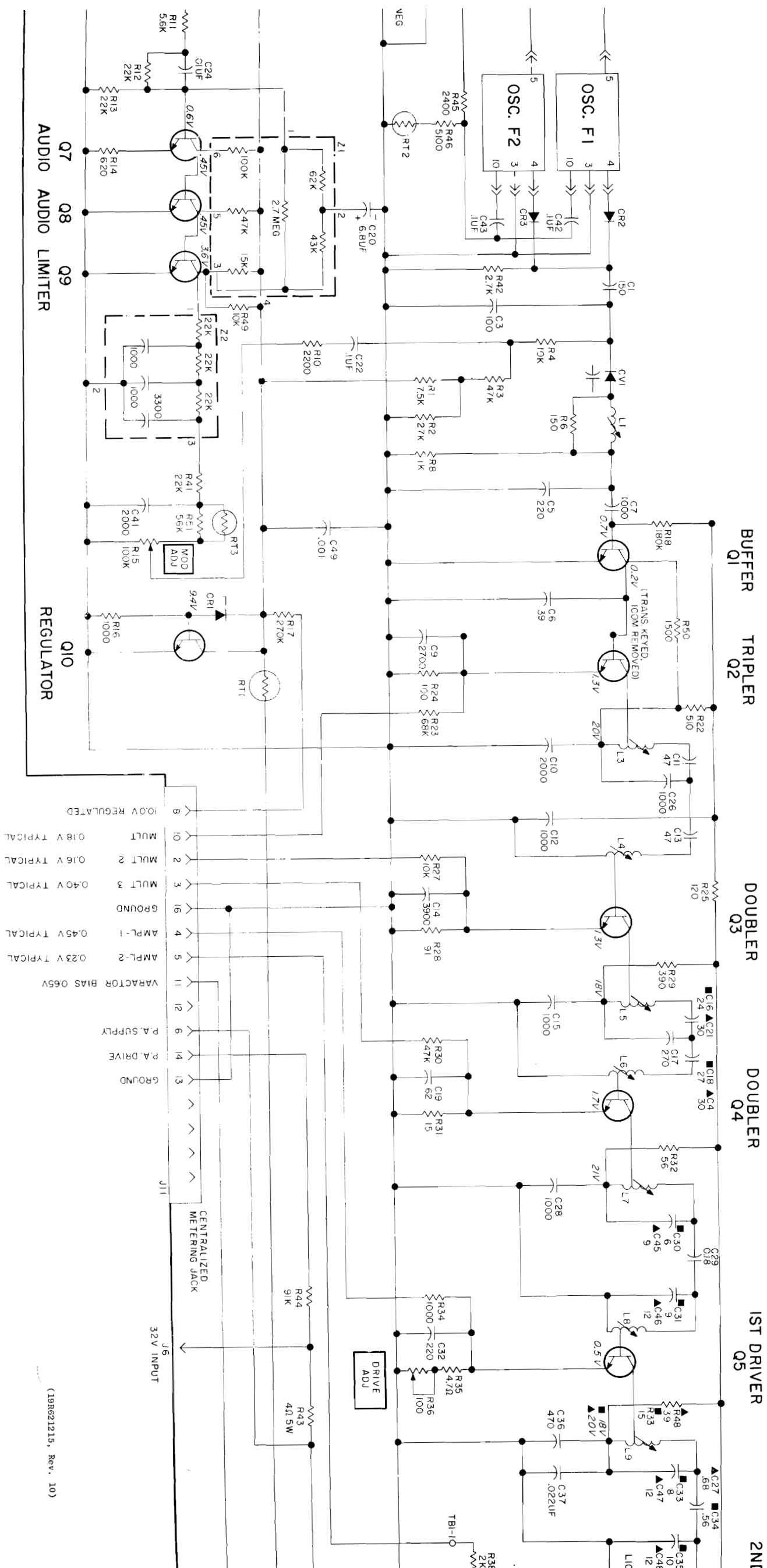
MODEL NO	REV LETTER
4ET88A10	E
4ET88A11	E

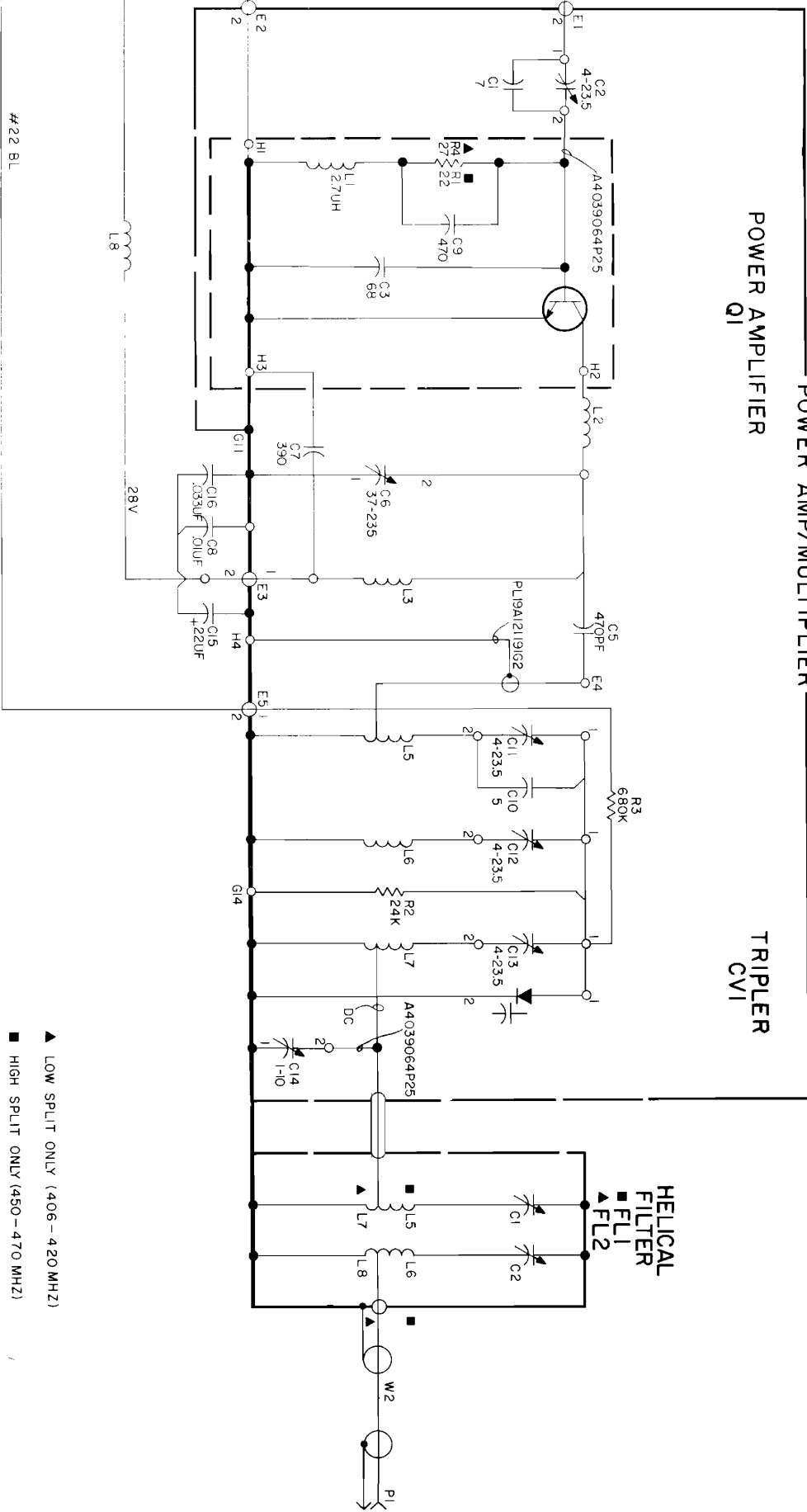
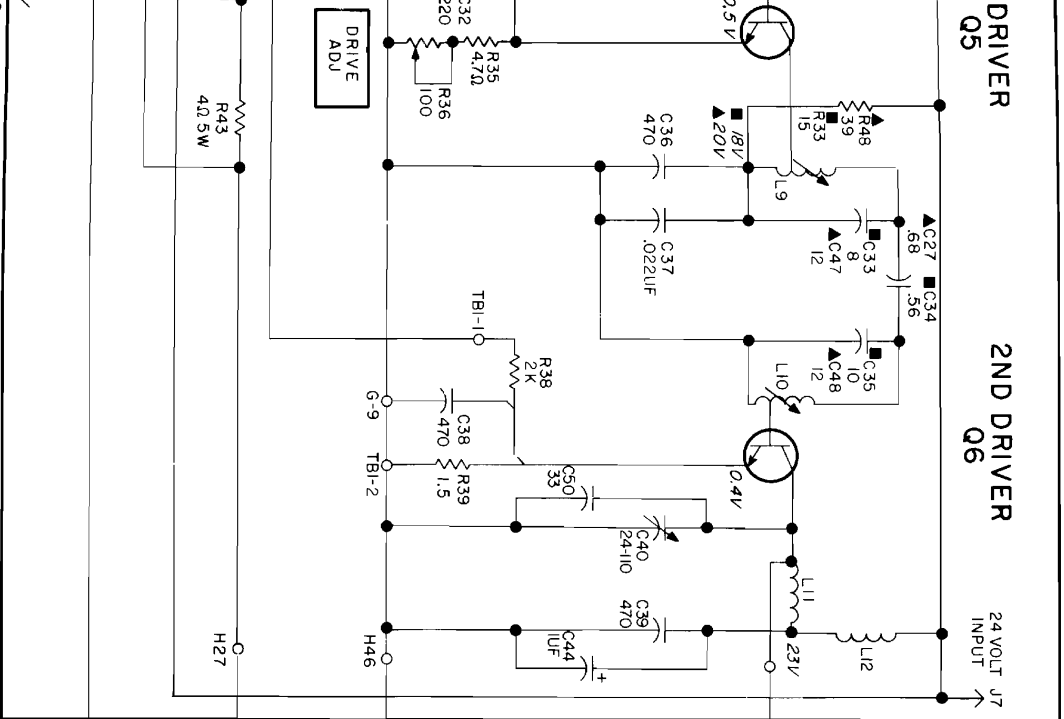
SERVICE SHEET

406-470 MHz TRANSMITTER
MODELS 4ET88A10 & 11

(RC-1738A, Sheet 2)

EXCITER BOARD





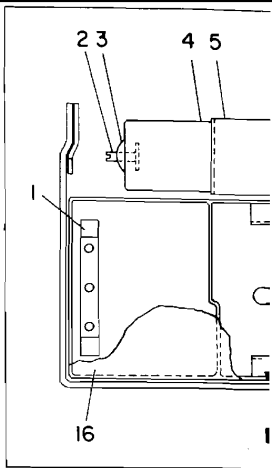
- ▲ LOW SPLIT ONLY (406-420 MHz)
- HIGH SPLIT ONLY (450-470 MHz)
- SINGLE FREQ. ONLY

ALL RESISTORS ARE 1/2 WATT VALUES, UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=KILLOHMS OR M=MEG OHMS AND TWO DIGIT CAPACITOR VALUES IN PICOFARADS, EQUAL TO MICROFARADS UNLESS FOLLOWED BY U= MICROFARADS, INDUCTANCE VALUES IN MILLIHENRYS OR H=HENRYS

SEE INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER.

THIS ELEM DIAG APPLIES TO

SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION
R24*	3R152-P101K	Composition: 100 ohms $\pm 10\%$, 1/4 w. Added to 19D413105-G2 by REV E.	Y1 and Y2	4EG25A10 19D413070-P1	OSCILLATORS When reordering, specify ICOM Frequency. ICOM Frequency = operating frequency $\div 36$. Integrated Circuit Oscillator Module (ICOM). Cap, decorative.	W2	19B216076-G1	----- CABLES ----- Cable Assembly.
R25	3R152-P121K	Composition: 120 ohms $\pm 10\%$, 1/4 w.				FL2		HELICAL FILTER ASSEMBLY 19C303432-G4 (Used in 19D413102-G2 only)
R26*	3R152-P201J	Composition: 200 ohms $\pm 5\%$, 1/4 w. Deleted by REV E.				C1 and C2		----- CAPACITORS ----- Refer to Miscellaneous (RC-1745).
R27*	3R152-P103K	Composition: 10,000 ohms $\pm 10\%$, 1/4 w. Earlier than REV A:						----- INDUCTORS -----
R28*	3R152-P104K	Composition: 0.10 megohms $\pm 10\%$, 1/4 w.	Z1	19B209118-P1	Resistor Assembly. 1/2 w max.	L7 and L8	19B204938-G14	Coil.
	3R152-P100K	Earlier than REV B:	Z2	19B209117-P1	High Pass-Low Pass Filter Assembly. 0.4 w max per filter.	W2	19B216076-G1	----- CABLES ----- Cable Assembly.
	3R152-P910J	Composition: 10 ohms $\pm 10\%$, 1/4 w. Earlier than REV A:			PA/MULTIPLIER ASSEMBLY 19D413102-G1 450-470 MHz 19D413102-G2 406-420 MHz			----- INDUCTORS -----
R29*	3R152-P391K	Composition: 390 ohms $\pm 10\%$, 1/4 w. Earlier than REV C:	C1	7489162-P3	Silver mica: 7 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	L1	7488079-P9	Choke, RF: 2.70 μ h $\pm 10\%$, 1.20 ohms DC res max; sim to Jeffers 4411-13.
	3R152-P560K	Composition: 56 ohms $\pm 10\%$, 1/4 w. Earlier than REV A:	C2	19A115282-P2	Variable, mica: approx 16-141 pf, 150 VDCW; sim to Elmenco Type 42.	L2	19A127240-P1	Coil.
	3R152-P391K	Composition: 390 ohms $\pm 10\%$, 1/4 w.	C3	7489162-P23	Silver mica: 68 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	L3	7488079-P1	Choke, RF: 0.15 μ h $\pm 20\%$, 0.03 ohms DC res max; sim to Jeffers 4411-1.
R30	3R152-P473J	Composition: 47,000 ohms $\pm 5\%$, 1/4 w.	C5	7489162-P43	Silver mica: 470 pf $\pm 5\%$, 300 VDCW; sim to Electro Motive Type DM-15.	L5	19A127100-G1	Coil.
R31*	3R152-P150J	Composition: 15 ohms $\pm 5\%$, 1/4 w. Earlier than REV A:	C6	19A115282-P3	Variable, mica: approx 37-235 pf, 150 VDCW; sim to Elmenco Type 42.	L6	19C311767-P2	Coil.
	3R152-P470K	Composition: 47 ohms $\pm 10\%$, 1/4 w.	C7	7489162-P141	Silver mica: 390 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15.	L7	19A127094-P1	Coil.
R32*	3R77-P560K	Composition: 56 ohms $\pm 10\%$, 1/2 w. Earlier than REV A:	C8*	5494481-P21	Ceramic disc: 10,000 pf $\pm 20\%$, 500 VDCW; sim to RMC Type JF Discap. Earlier than REV A:	L8*	7488079-P67	Choke, RF: 33.0 μ h $\pm 10\%$, 0.56 ohms DC res max; sim to Jeffers 4424-3K. Added by REV A.
	3R77-P470J	Composition: 47 ohms $\pm 5\%$, 1/2 w.	C9	7489162-P43	Ceramic disc: .01 μ f $\pm 100\%$ -0%, 500 VDCW.	Q1	19A116002-P3	----- TRANSISTORS ----- Silicon, NPN.
R33	3R77-P150K	Composition: 15 ohms $\pm 10\%$, 1/2 w.	C10	19B209330-P1	Silver mica: 470 pf $\pm 5\%$, 300 VDCW; sim to Electro Motive Type DM-15.			----- RESISTORS -----
R34	3R152-P102K	Composition: 1000 ohms $\pm 10\%$, 1/4 w.	C11 thru C13	19A115282-P1	Mica: 4 pf $\pm 1/2$ pf, 2000 VDCW; sim to Electro Motive Type DM-20.	R1	3R77-P220J	Composition: 22 ohms $\pm 5\%$, 1/2 w.
R35	7147161-P12	Composition: 4.7 ohms $\pm 10\%$, 1/2 w.	C14	19B209413-P1	Variable, mica: approx 4-23.5 pf, 400 VDCW; sim to Elmenco Type T51212-1.	R2	3R77-P243J	Composition: 24,000 ohms $\pm 5\%$, 1/2 w.
R36	5492251-P2	Variable, composition: 100 ohms $\pm 20\%$, 0.25 w; sim to Allen-Bradley Type F.	C15*	5496267-P19	Variable, glass, piston type: 1-10 pf, 500 VDCW, temp coef 0 PPM.	R3	3R152-P684J	Composition: 0.68 megohms $\pm 5\%$, 1/4 w.
R37*	3R152-P120J	Composition: 150 ohms $\pm 5\%$, 1/4 w. Deleted by REV E.	C16*	19B209243-P104	Tantalum: 22 μ f $\pm 20\%$, 35 VDCW; sim to Sprague Type 150D. Added by REV A.	R4	3R77-P270K	Composition: 27 ohms $\pm 10\%$, 1/2 w.
	3R152-P151J	Earlier than REV A.			Polyester: 0.033 μ f $\pm 10\%$, 50 VDCW. Added by REV A.			SUPPORT ASSEMBLY 19A121537-G2
R38	3R152-P202J	Composition: 150 ohms $\pm 5\%$, 1/4 w.			----- DIODES AND RECTIFIERS -----	C6 thru C8	19A115282-P1	----- CAPACITORS ----- Variable, compression trimmer, mica: approx 4 to 23.5 pf, 400 VDCW; sim to Elmenco Type T51212-1.
R39	7147161-P17	Composition: 2000 ohms $\pm 5\%$, 1/4 w.	CV1	19A115295-P4	Silicon.			MECHANICAL PARTS (SEE RC-1745)
R40*	3R152-P101K	Composition: 100 ohms $\pm 10\%$, 1/4 w. Added by REV A.	E3	4029309-P1	----- TERMINALS -----	1	19A121151-P2	Support. (Used with C6, C7 and C8).
R41	3R152-P223K	Composition: 22,000 ohms $\pm 10\%$, 1/4 w.	E4	19B200535-P4	Terminal, feed-thru: 750 VRMS, 5.5 amps; sim to Sealectro PT-SM-27.	2	4036765-G1	Screw. (Part of C1 and C2).
R42	3R152-P272K	Composition: 2700 ohms $\pm 10\%$, 1/4 w.	E5	4034512-P1	Terminal, feed-thru.	3	7117825-P1	Washer, spring tension. (Part of C1 and C2).
R43	5493035-P32	Wirewound: 4 ohms $\pm 5\%$, 5 w; sim to Tru-Ohm Type X-60.			----- FILTERS -----	4	19C303405-P3	Casting. (Part of C1 and C2).
R44	3R152-P913J	Composition: 91,000 ohms $\pm 5\%$, 1/4 w.	FL1		HELICAL FILTER ASSEMBLY 19C303432-G3 (Used in 19D413102-G1 only)	5	19A127369-G1	Support.
R45	3R152-P242J	Composition: 2400 ohms $\pm 5\%$, 1/4 w.			----- CAPACITORS -----	6	19B216083-P1	Heat sink. (Used with Q6).
R46	3R152-P512J	Composition: 5100 ohms $\pm 5\%$, 1/4 w.			Refer to Miscellaneous (RC-1745).	7	19A121533-P1	Spacer, tubular. (Used with J11).
R47	3R152-P683J	Composition: 68,000 ohms $\pm 5\%$, 1/4 w.			----- INDUCTORS -----	8	4035711-P4	Clip, spring tension. (Used with RT5).
R48	3R77-P390K	Composition: 39 ohms $\pm 10\%$, 1/2 w.	C1 and C2		Coil.	9	4036555-P1	Insulator, washer. (Used with Q4 and Q5).
R49*	3R152-P103K	Composition: 10,000 ohms $\pm 10\%$, 1/4 w. Added by REV D.				10	19A121252-P1	Heat sink. (Used with Q5).
R50*	3R152-P152J	Composition: 1500 ohms $\pm 5\%$, 1/4 w. Added by REV E.				11	4029006-P3	Ring, compression; sim to Tinnerman C5426-014-24.
R51*	3R152-P563K	Composition: 56,000 ohms $\pm 10\%$, 1/4 w. Added by REV E.				12	19A116047-P1	Insulated bushing.
		----- THERMISTORS -----						
RT1	4034664-P1	Lamp, incandescent: 28 v, .04 amp. GE Type 2148.						
RT2	19C300048-P8	Disc: 2500 ohms $\pm 10\%$; sim to GE 4D.						
RT3*	5490828-P23	Thermistor: 3600 ohms $\pm 10\%$, color code black; sim to Global Type 432H-4. Added by REV E.						
		----- TERMINAL BOARDS -----						
TB1	7487424-P1	Miniature, phen: 1 terminal.						
		----- SOCKETS -----						



PRODL

Changes in the equipment to 1 identified by a "Revision Let of the unit. The revision st sions. Refer to the Parts Li revisions.

REV. A - To eliminate tendenc circuitry; and to im

Exciter Board Assemb

Changed C6-C9, C11, R27-R29, R31, R32 &

PA/Multiplier Assemb

Changed C8. Added C

REV. B - To adjust First & Se change in transistor R29, Q1 & Q2.

REV. C - To reduce audio dist Changed Q7 & Q8.

REV. D - To reduce audio dist Changed Q9 and addede

REV. E - To optimize drive le over temperature ran

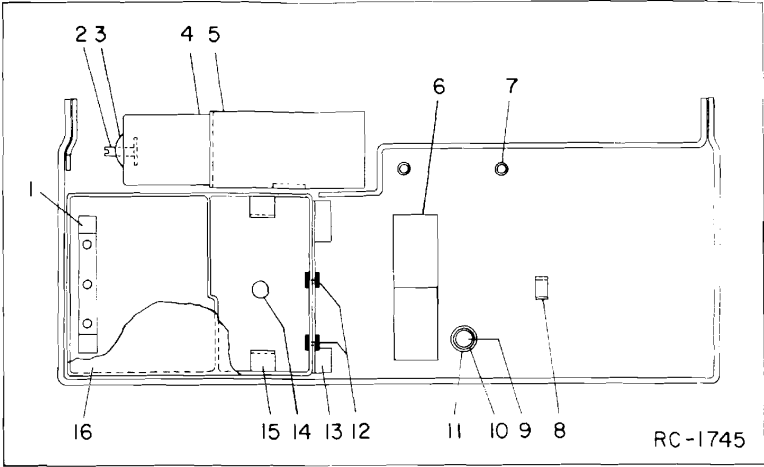
Exciter Board Assemb

Changed C38 and R22.

Exciter Board Assemb

Deleted R26 and R37.

DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION
1/4 w. Added to			OSCILLATORS			----- CABLES -----
1/4 w.			When reordering, specify ICOM Frequency. ICOM Frequency = operating frequency $\div$ 36.	W2	19B216076-G1	Cable Assembly.
1/4 w. Deleted	Y1 and Y2	4EG25A10 19D413070-P1	Integrated Circuit Oscillator Module (ICOM). Cap, decorative.	FL2		HELICAL FILTER ASSEMBLY 19C303432-G4 (Used in 19D413102-G2 only)
$\pm 10\%$, 1/4 w. Earlier			----- NETWORKS -----			----- CAPACITORS -----
$\pm 10\%$, 1/4 w.	Z1	19B209118-P1	Resistor Assembly. 1/2 w max.	C1 and C2		Refer to Miscellaneous (RC-1745).
1/4 w. Added to	Z2	19B209117-P1	High Pass-Low Pass Filter Assembly. 0.4 w max per filter.			----- INDUCTORS -----
1/4 w. Earlier			PA/MULTIPLIER ASSEMBLY 19D413102-G1 450-470 MHz 19D413102-G2 406-420 MHz	L7 and L8	19B204938-G14	Coil.
1/4 w.			----- CAPACITORS -----	W2	19B216076-G1	Cable Assembly.
1/4 w. Earlier	C1	7489162-P3	Silver mica: 7 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.			----- INDUCTORS -----
1/4 w.	C2	19A115282-P2	Variable, mica: approx 16-141 pf, 150 VDCW; sim to Elmenco Type 42.	L1	7488079-P9	Choke, RF: 2.70 μ h $\pm 10\%$, 1.20 ohms DC res max; sim to Jeffers 4411-13.
1/2 w. Earlier	C3	7489162-P23	Silver mica: 68 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	L2	19A127240-P1	Coil.
1/2 w.	C5	7489162-P43	Silver mica: 470 pf $\pm 5\%$, 300 VDCW; sim to Electro Motive Type DM-15.	L3	7488079-P1	Choke, RF: 0.15 μ h $\pm 20\%$, 0.03 ohms DC res max; sim to Jeffers 4411-1.
1/2 w.	C6	19A115282-P3	Variable, mica: approx 37-235 pf, 150 VDCW; sim to Elmenco Type 42.	L5	19A127100-G1	Coil.
1/4 w.	C7	7489162-P141	Silver mica: 390 pf $\pm 10\%$, 500 VDCW; sim to Electro Motive Type DM-15.	L6	19C311767-P2	Coil.
1/2 w.	C8*	5494481-P21	Ceramic disc: 10,000 pf $\pm 20\%$, 500 VDCW; sim to RMC Type JF Discap. Earlier than REV A: Ceramic disc: .01 μ f $\pm 100\%$ -0%, 500 VDCW.	L7	19A127094-P1	Coil.
1/4 w. Deleted	C9	7489162-P43	Silver mica: 470 pf $\pm 5\%$, 300 VDCW; sim to Electro Motive Type DM-15.	L8*	7488079-P67	Choke, RF: 33.0 μ h $\pm 10\%$, 0.56 ohms DC res max; sim to Jeffers 4424-3K. Added by REV A.
1/4 w.	C10	19B209330-P1	Mica: 4 pf $\pm 1/2$ pf, 2000 VDCW; sim to Electro Motive Type DM-20.	Q1	19A116002-P3	Silicon, NPN.
1/4 w.	C11 thru C13	19A115282-P1	Variable, mica: approx 4-23.5 pf, 400 VDCW; sim to Elmenco Type TS1212-1.			----- TRANSISTORS -----
1/4 w.	C14	19B209413-P1	Variable, glass, piston type: 1-10 pf, 500 VDCW, temp coef 0 PPM.	R1	3R77-P220J	Composition: 22 ohms $\pm 5\%$, 1/2 w.
sim to Tru-Ohm	C15*	5496267-P19	Tantalum: 22 μ f $\pm 20\%$, 35 VDCW; sim to Sprague Type 150D. Added by REV A.	R2	3R77-P243J	Composition: 24,000 ohms $\pm 5\%$, 1/2 w.
1/4 w.	C16*	19B209243-P104	Polyester: 0.033 μ f $\pm 10\%$, 50 VDCW. Added by REV A.	R3	3R152-P684J	Composition: 0.68 megohms $\pm 5\%$, 1/4 w.
1/4 w.			----- DIODES AND RECTIFIERS -----	R4	3R77-P270K	Composition: 27 ohms $\pm 10\%$, 1/2 w.
1/4 w.	CV1	19A115295-P4	Silicon.			SUPPORT ASSEMBLY 19A121537-G2
1/2 w.			----- TERMINALS -----			----- CAPACITORS -----
0%, 1/4 w. Added	E3	4029309-P1	Terminal, feed-thru: 750 VRMS, 5.5 amps; sim to Sealelectro FT-SM-27.	C6 thru C8	19A115282-P1	Variable, compression trimmer, mica: approx 4 to 23.5 pf, 400 VDCW; sim to Elmenco Type TS1212-1.
1/4 w. Added by	E4	19B200535-P4	Terminal, feed-thru.			MECHANICAL PARTS
0%, 1/4 w. Added	E5	4034512-P1	Terminal, feed-thru.			(SEE RC-1745)
S -----			----- FILTERS -----	1	19A121151-P2	Support. (Used with C6, C7 and C8).
1/4 amp. GE Type 2148.	FL1		HELICAL FILTER ASSEMBLY 19C303432-G3 (Used in 19D413102-G1 only)	2	4036765-G1	Screw. (Part of C1 and C2).
> GE 4D.			----- CAPACITORS -----	3	7117825-P1	Washer, spring tension. (Part of C1 and C2).
color code black; Added by REV E.			Refer to Miscellaneous (RC-1745).	4	19C303405-P3	Casting. (Part of C1 and C2).
ARDS -----	C1 and C2			5	19A127369-G1	Support.
				6	19B216083-P1	Heat sink. (Used with Q6).
				7	19A121533-P1	Spacer, tubular. (Used with J11).
				8	4035711-P4	Clip, spring tension. (Used with RT5).
				9	4036555-P1	Insulator, washer. (Used with Q4 and Q5).
				10	19A121252-P1	Heat sink. (Used with Q5).



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 eliminate tendency for instability & RF interference to audio circuitry; and to improve performance over temperature range.

Exciter Board Assembly 19D413105-G1 & G2:

Changed C6-C9, C11, C13, C14, C19, C40, L11, L12, Q1, Q3, R18-R20, R27-R29, R31, R32 & R37. Added C44 & R40.

PA/Multiplier Assembly 19D413102-G1 & G2:

Changed C8. Added C15 & C16.

REV. B - To adjust First & Second Multiplier drive levels to compensate for change in transistor parameters. Changed R18, R19, R22, R28, R28, R29, Q1 & Q2.

REV. C - To reduce audio distortion.
Changed Q7 & Q8.

REV. D - To reduce audio distortion and facilitate assembly.
Changed Q9 and added R49.

REV. E - To optimize drive levels and stabilize modulation limiting levels over temperature range.

Exciter Board Assembly 19D413105-G1 & G2:

Changed C38 and R22. Deleted R19. Added R50, R51 and RT3.

Exciter Board Assembly 19D413105-G2:

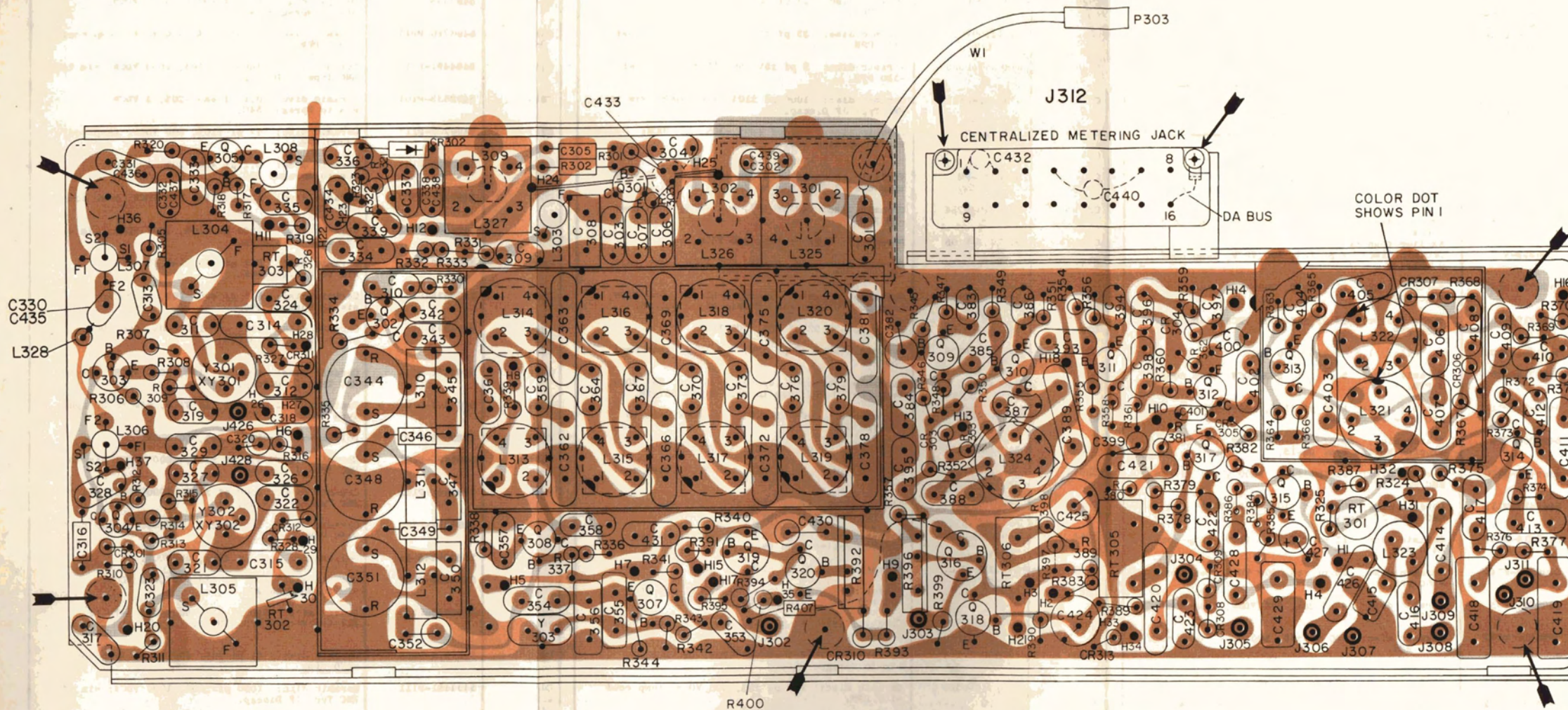
Deleted R26 and R37. Added R24 and R28.

LBI-3962A

MODEL 4ER53A10 19D413084-G3 406-420 MHz 1 FREQ
 MODEL 4ER53A11 19D413084-G1 450-470 MHz 1 FREQ
 MODEL 4ER53A12 19D413084-G4 406-420 MHz 2 FREQ
 MODEL 4ER53A13 19D413084-G2 450-470 MHz 2 FREQ

SYMBOL	G-E PART NO.	DESCRIPTION
		- - - - - CAPACITORS - - - - -
C301	5496219-P36	Ceramic disc: 5 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
C302*	5496219-P38	Ceramic disc: 7 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
	5496219-P39	Earlier than REV A. Ceramic disc: 8 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
C303	5496219-P543	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef -330 PPM.
C304	5496219-P351	Ceramic disc: 33 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.
C305	5491601-P124	Phenolic: 1.8 pf $\pm 5\%$, 500 VDCW.
C306	5496219-P36	Ceramic disc: 5 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
C307	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C308	5490008-P25	Silver mica: 82 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C309	5494481-P110	Ceramic disc: 680 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C310	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C311	5496219-P644	Ceramic disc: 15 pf $\pm 5\%$, 500 VDCW, temp coef -470 PPM.
C312	5496219-P745	Ceramic disc: 18 pf $\pm 5\%$, 500 VDCW, temp coef -750 PPM.
C313	5496219-P35	Ceramic disc: 4 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
C314 and C315	5496219-P767	Ceramic disc: 150 pf $\pm 5\%$, 500 VDCW, temp coef -750 PPM.
C316	5491601-P126	Phenolic: 2.2 pf $\pm 5\%$, 500 VDCW.
C317 and C318	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C319	5496219-P234	Ceramic disc: 3 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C320	5496267-P9	Tantalum: 3.3 μ f $\pm 20\%$, 15 VDCW; sim to Sprague Type 150D.
C321	5496219-P644	Ceramic disc: 15 pf $\pm 5\%$, 500 VDCW, temp coef -470 PPM.
C322	5496219-P745	Ceramic disc: 18 pf $\pm 5\%$, 500 VDCW, temp coef -750 PPM.
C323	5496219-P35	Ceramic disc: 4 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
C324	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C326	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C327	5496219-P34	Ceramic disc: 3 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.
C328	5496219-P237	Ceramic disc: 6 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C329	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C330	5496219-P237	Ceramic disc: 6 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.
C331	5496219-P241	Ceramic disc: 10 pf $\pm 5\%$, 500 VDCW, temp coef

C336	5496219-P643	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef -470 PPM.	C383	5492638-P101	Ceramic disc: 0.1 μ f +80 -20%, 3 VDCW; sim to Sprague 54C.
C337	5496219-P651	Ceramic disc: 33 pf $\pm 5\%$, 500 VDCW, temp coef -470 PPM.	C384	5496219-P817	Ceramic disc: 47 pf $\pm 10\%$, 500 VDCW, temp coef -1500 PPM.
C338	5496219-P536	Ceramic disc: 5 pf $\pm 5\%$, 500 VDCW, temp coef -330 PPM.	C385	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C339	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.	C386	5492638-P101	Ceramic disc: 0.1 μ f +80 -20%, 3 VDCW; sim to Sprague 54C.
C342 and C343	7491827-P2	Ceramic disc: .01 μ f +80% -30%, 50 VDCW; sim to Sprague 19C.	C387	5496203-P117	Ceramic disc: 47 pf $\pm 10\%$, 500 VDCW, temp coef -3300 PPM.
C344	5490446-P2	Variable, ceramic: approx 5-25 pf, 350 VDCW, temp coef 0 PPM; sim to Erie Style 557-36.	C388	5492638-P107	Ceramic disc: 0.1 μ f +80 -20%, 12 VDCW; sim to Sprague 20C.
C345	5496219-P254	Ceramic disc: 43 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	C389	5496219-P367	Ceramic disc: 150 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.
C346	5491601-P105	Phenolic: 0.22 pf $\pm 5\%$, 500 VDCW.	C393	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C347	5496219-P254	Ceramic disc: 43 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	C394	5492638-P101	Ceramic disc: 0.1 μ f +80 -20%, 3 VDCW; sim to Sprague 54C.
C348	5490446-P2	Variable, ceramic: approx 5-25 pf, 350 VDCW, temp coef 0 PPM; sim to Erie Style 557-36.	C395	5492638-P107	Ceramic disc: 0.1 μ f +80 -20%, 12 VDCW; sim to Sprague 20C.
C349	5491601-P105	Phenolic: 0.22 pf $\pm 5\%$, 500 VDCW.	C396 and C397	7491393-P1	Ceramic disc: .001 μ f +100% -0%, 500 VDCW; sim to Sprague 1219C4.
C350	5496219-P254	Ceramic disc: 43 pf $\pm 5\%$, 500 VDCW, temp coef -80 PPM.	C398	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C351	5490446-P2	Variable, ceramic: approx 5-25 pf, 350 VDCW, temp coef 0 PPM; sim to Erie Style 557-36.	C399	5496267-P10	Tantalum: 22 μ f $\pm 20\%$, 15 VDCW; sim to Sprague Type 150D.
C352	7491930-P4	Polyester: .0068 μ f $\pm 20\%$, 100 VDCW; sim to GE Type 61F.	C400	19B209243-P1	Polyester: 0.01 μ f $\pm 20\%$, 50 VDCW.
C353	5491189-P101	Polyester: 0.01 μ f $\pm 20\%$, 50 VDCW.	C401	5494481-P106	Ceramic disc: 330 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C354	5496219-P44	Ceramic disc: 15 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C402	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C355	5490008-P19	Silver mica: 47 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	C403	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.
C356	5490008-P23	Silver mica: 68 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	C404	19B209243-P1	Polyester: 0.01 μ f $\pm 20\%$, 50 VDCW.
C357	5491189-P101	Polyester: 0.01 μ f $\pm 20\%$, 50 VDCW.	C405	5492638-P107	Ceramic disc: 0.1 μ f +80 -20%, 12 VDCW; sim to Sprague 20C.
C358	5490008-P11	Silver mica: 22 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.	C406 and C407	5490008-P37	Silver mica: 270 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C359	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C408	5496219-P656	Ceramic disc: 51 pf $\pm 5\%$, 500 VDCW, temp coef -470 PPM.
C361	5492638-P107	Ceramic disc: 0.1 μ f +80 -20%, 12 VDCW; sim to Sprague 20C.	C409 and C410	5494481-P111	Ceramic disc: 1000 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C362 and C363	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C411	5492638-P108	Ceramic disc: 0.22 μ f +80 -20%, 25 VDCW; sim to Sprague 44C.
C364	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C412	5494481-P107	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
C366	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C413	19B209243-P5	Polyester: 0.047 μ f $\pm 20\%$, 50 VDCW.
C367	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C414	5494481-P116	Ceramic disc: 3000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C369	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C415	5491189-P301	Polyester: 0.01 μ f $\pm 5\%$, 50 VDCW.
C370	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C416	5494481-P112	Ceramic disc: 1000 pf $\pm 10\%$, 1000 VDCW; sim to RMC Type JF Discap.
C372	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C417	5492638-P8	Ceramic disc: 0.22 μ f +80 -20%, 12 VDCW; sim to Sprague 44C.
C373	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C418	19B209243-P8	Polyester: 0.15 μ f $\pm 20\%$, 50 VDCW.
C375	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C419	19B209243-P7	Polyester: 0.1 μ f $\pm 20\%$, 50 VDCW.
C376	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C420	7491827-P5	Ceramic disc: .1 μ f +80% -30%, 50 VDCW; sim to Sprague 29C.
C378	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C421	5492638-P108	Ceramic disc: 0.22 μ f +80 -20%, 12 VDCW; sim to Sprague 44C.
C379	5496219-P43	Ceramic disc: 13 pf $\pm 5\%$, 500 VDCW, temp coef 0 PPM.	C422	19B209243-P1	Polyester: 0.01 μ f $\pm 20\%$, 50 VDCW.
C381	5496219-P369	Ceramic disc: 180 pf $\pm 5\%$, 500 VDCW, temp coef -150 PPM.	C423	5492638-P107	Ceramic disc: 0.1 μ f +80 -20%, 12 VDCW; sim to Sprague 20C.
			C424	5495670-P13	Electrolytic: 2 μ f +75% -10%, 25 VDCW; sim



TO REMOVE RECEIVER BOARD SHIELD REMOVE SCREW DRIVERS. ALSO DISCONNECT AND BLACK SLEEVED INDUCTORS BEHIND J312.

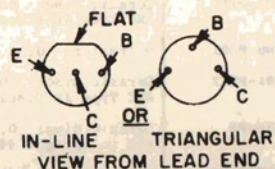
RESISTANCE

RESISTANCE READINGS MEASURED TO J312-10 ALL POWER REMOVED

MEASURED FROM	NEAR PRO
* J302	
J305	
J312-2	
J312-3	
J312-4	
J312-9	1.0
J312-10	8.0

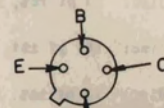
* MEASURED WITH P712 (+ 12V)

LEAD IDENTIFICATION FOR Q301, Q302, Q307-Q320

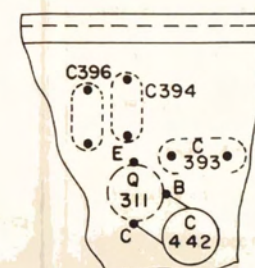


NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION.

LEAD IDENTIFICATION FOR Q303, Q304 & Q305



SHIELD (CLIPPED OFF)



SOLDER SIDE OF PRINTED BOARD (406-420 MHZ ONLY)

CAUTION

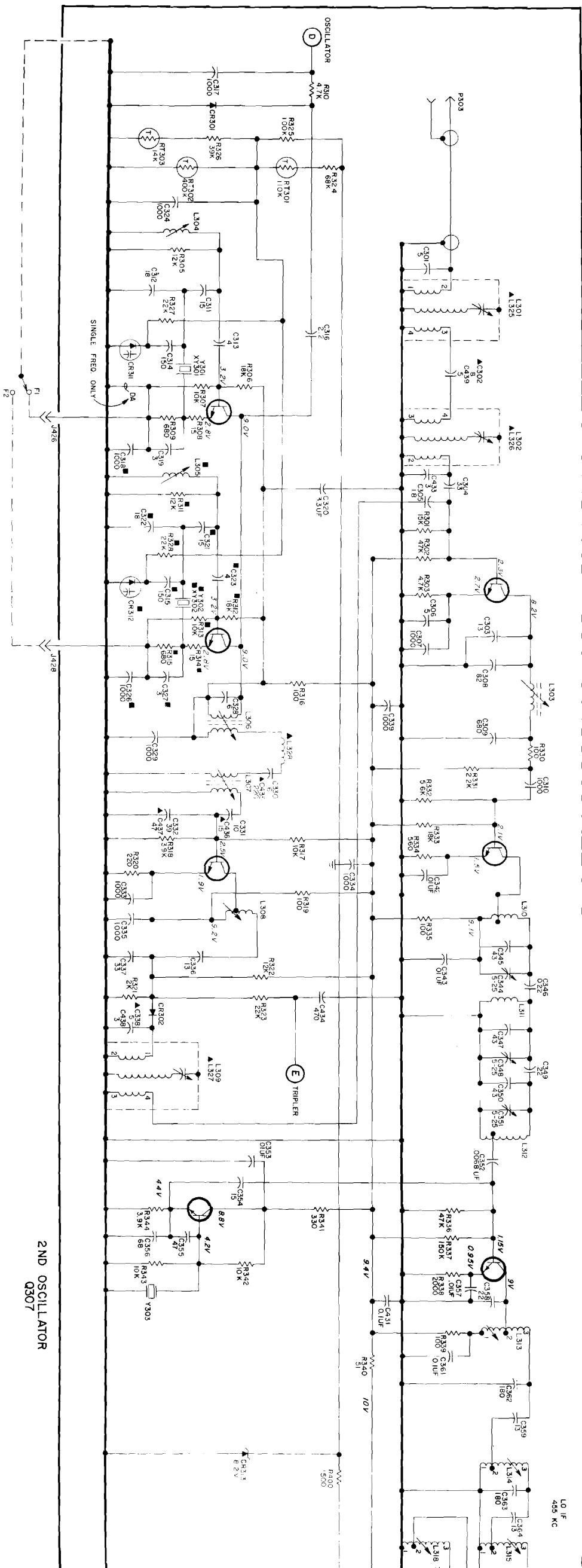
THE RECEIVER PRINTED WIRING IS LOW LOSS MATERIAL THAT REQUIRES WHEN REPLACING COMPONENTS SOLDER IS COMPLETELY MELTED COMPONENT LEAD OUT OF THE PRINTED RUN OFF THE BOARD.

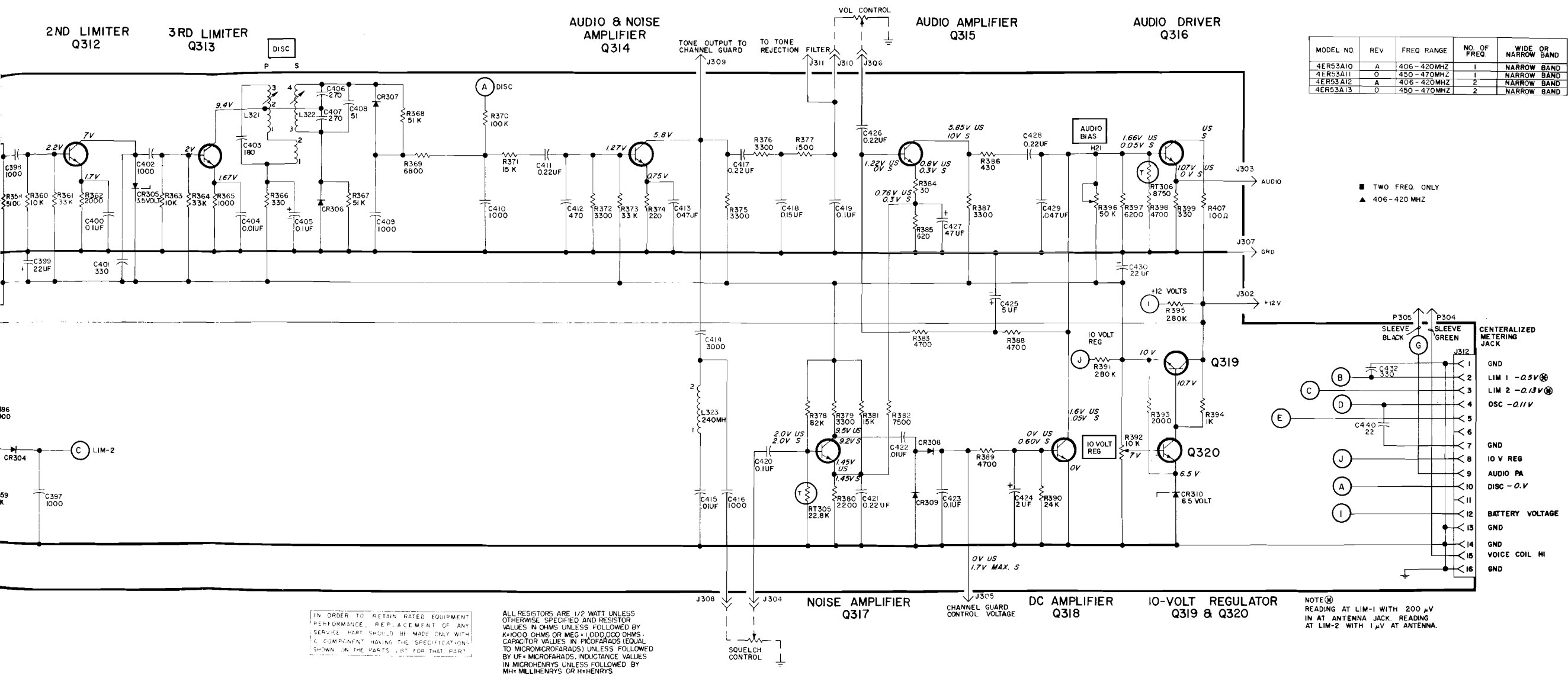
1ST MIXER Q301

HI IF AMP Q302

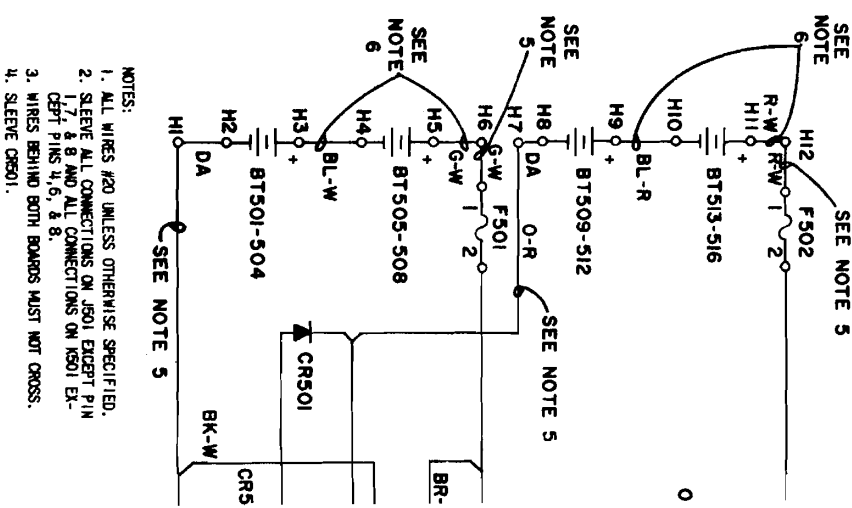
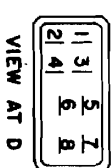
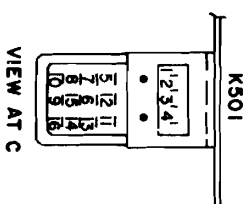
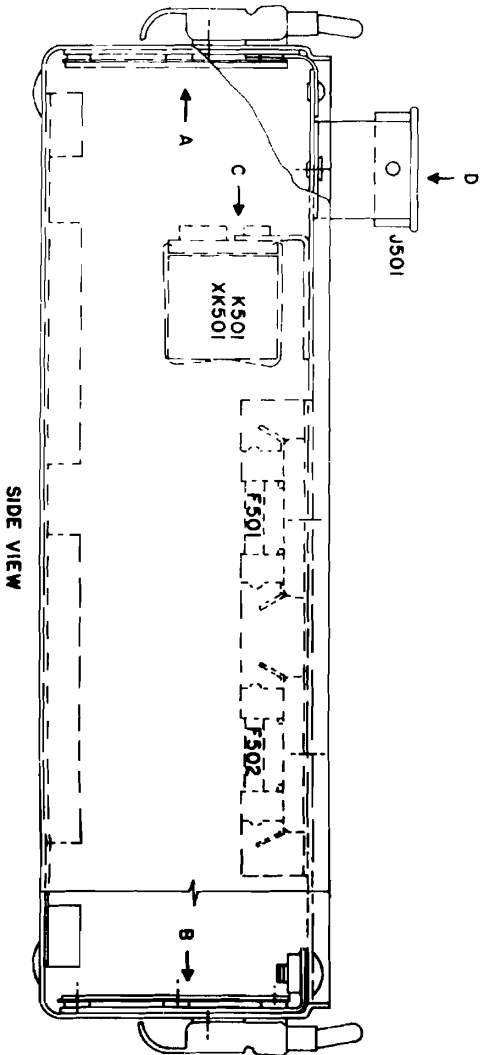
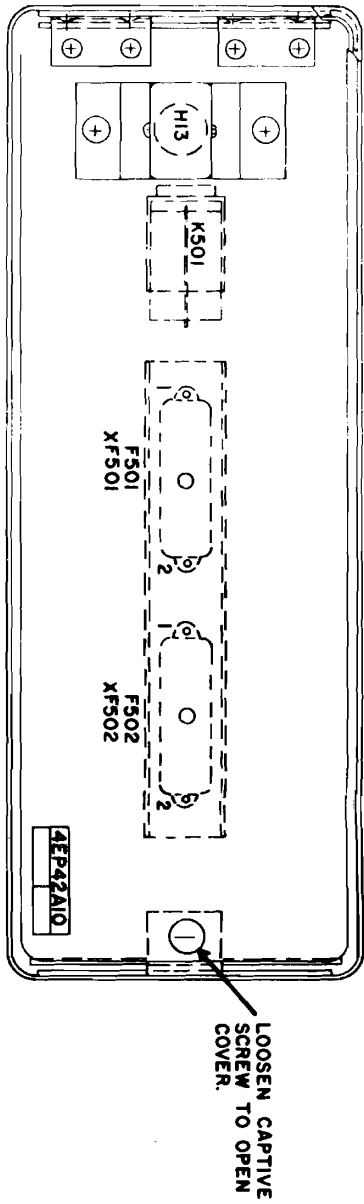
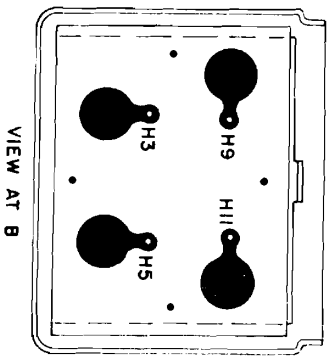
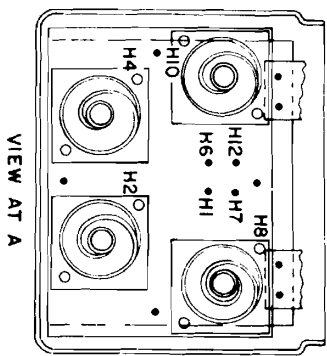
2ND MIXER Q308

LO IF
455 KC





SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	
C426	5492638-P108	Ceramic disc: 0.22 μ f +80 -20%, 12 VDCW; sim to Sprague 44C.	L309	19D413078-G2	Helical resonator.	R322	3R152-P123J	Composition: 12,000 ohms $\pm$ 5%, 1/4 w.	R377	3R152-P152J	Compo
C427	5496267-P2	Tantalum: 47 μ f $\pm$ 20%, 6 VDCW; sim to Sprague Type 150D.	L310	19B205918-G1	Coil. Includes tuning slug 5492660-P5.	R323	3R152-P223K	Composition: 22,000 ohms $\pm$ 5%, 1/4 w.	R378	3R152-P823J	Compo
C428	5492638-P108	Ceramic disc: 0.22 μ f +80 -20%, 12 VDCW; sim to Sprague 44C.	L311	19B205918-G2	Coil. Includes tuning slug 5492660-P5.	R324	3R152-P683J	Composition: 68,000 ohms $\pm$ 5%, 1/4 w.	R379	3R152-P332J	Compo
C429	19B209243-P5	Polyester: 0.047 μ f $\pm$ 20%, 50 VDCW.	L312	19B205918-G1	Coil. Includes tuning slug 5492660-P5.	R325	3R152-P104J	Composition: 0.10 megohms $\pm$ 5%, 1/4 w.	R380	3R152-P222J	Compo
C430	5496267-P10	Tantalum: 22 μ f $\pm$ 20%, 15 VDCW; sim to Sprague Type 150D.	L313 thru L321	19C303062-G6	Coil. Includes tuning slug 4038368-P1.	R326	3R152-P393J	Composition: 39,000 ohms $\pm$ 5%, 1/4 w.	R381	3R152-P153J	Compo
C431	5492638-P107	Ceramic disc: 0.1 μ f +80 -20%, 12 VDCW; sim to Sprague 20C.	L322	19C303062-G5	Coil. Includes tuning slug 4038368-P1.	R327 and R328	3R152-P223K	Composition: 22,000 ohms $\pm$ 10%, 1/4 w.	R382	3R152-P752J	Compo
C432	5494481-P6	Ceramic disc: 330 pf $\pm$ 10%, 1000 VDCW; sim to RMC Type JF Discap.	L323	5491736-P2	Choke: 240 mH $\pm$ 10%, 270 ohms DC res max; sim to Aladdin 33-161.	R330	3R152-P101K	Composition: 100 ohms $\pm$ 10%, 1/4 w.	R383	3R152-P472K	Compo
C433	5496218-P34	Ceramic disc: 3 pf $\pm$ 5%, 500 VDCW, temp coef 0 PPM.	L324	19C303062-G6	Coil. Includes tuning slug 4038368-P1.	R331	3R152-P222K	Composition: 2200 ohms $\pm$ 10%, 1/4 w.	R384	3R152-P300J	Compo
C434	5494481-P108	Ceramic disc: 470 pf $\pm$ 10%, 1000 VDCW; sim to RMC Type JF Discap.	L325 and L326	19D413078-G3	Helical resonator.	R332	3R152-P562K	Composition: 5600 ohms $\pm$ 10%, 1/4 w.	R385	3R152-P621J	Compo
C435*	5494481-P103	Ceramic disc: 220 pf $\pm$ 20%, 1000 VDCW; sim to RMC Type JF Discap. Earlier than REV A.	L327	19D413078-G4	Helical resonator.	R333	3R152-P183K	Composition: 18,000 ohms $\pm$ 10%, 1/4 w.	R386	3R152-P431J	Compo
	5496219-P241	Ceramic disc: 10 pf $\pm$ 5%, 500 VDCW, temp coef -80 PPM.	L328*	7488073-P3	Coil, RF: 0.33 μ h $\pm$ 20%; sim to Jeffers 4411-3M. Added by REV A.	R334	3R152-P561K	Composition: 560 ohms $\pm$ 10%, 1/4 w.	R387	3R152-P332K	Compo
C436	5496219-P244	Ceramic disc: 15 pf $\pm$ 5%, 500 VDCW, temp coef -80 PPM.	P303		----- PLUGS -----	R335	3R152-P101K	Composition: 100 ohms $\pm$ 10%, 1/4 w.	R388 and R389	3R152-P472K	Compo
C437	5490008-P19	Silver mica: 47 pf $\pm$ 5%, 500 VDCW; sim to Electro Motive Type DM-15.	P304 and P305	7147199-P1	(Part of W1). Connector: male contact; sim to Winchester Electronics 21803.	R336	3R152-P473K	Composition: 47,000 ohms $\pm$ 10%, 1/4 w.	R390	3R152-P243J	Compo
C438	5496219-P34	Ceramic disc: 3 pf $\pm$ 5%, 500 VDCW, temp coef 0 PPM.			----- TRANSISTORS -----	R337	3R152-P154K	Composition: 0.15 megohms $\pm$ 10%, 1/4 w.	R391	5495948-P444	Deposited Texas
C439	5496219-P36	Ceramic disc: 5 pf $\pm$ 5%, 500 VDCW, temp coef 0 PPM.	Q301	19A115991-P1	Silicon, NPN.	R338	3R152-P202J	Composition: 2000 ohms $\pm$ 5%, 1/4 w.	R392	19B204808-G2	Variable 0.1 v
C440	7489162-P111	Silver mica: 22 pf $\pm$ 10%, 500 VDCW; sim to Electro Motive Type DM-15.	Q302	19A115925-P1	Silicon, NPN.	R339	3R152-P101K	Composition: 100 ohms $\pm$ 10%, 1/4 w.	R393	3R152-P202J	Compo
C442	5496218-P45	Ceramic disc: 18 pf $\pm$ 5%, 500 VDCW, temp coef 0 PPM.	Q303 thru Q305	19A115666-P1	Silicon, NPN.	R340	3R152-P510J	Composition: 51 ohms $\pm$ 5%, 1/4 w.	R394	3R152-P102J	Compo
		----- DIODES AND RECTIFIERS -----	Q307	19A115889-P1	Silicon, NPN; sim to Type 2N2712.	R341	3R152-P331K	Composition: 330 ohms $\pm$ 10%, 1/4 w.	R395	5495948-P444	Deposited Texas
CR301	7777146-P3	Germanium.	Q308	19A115245-P1	Silicon, NPN.	R342 and R343	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.	R396	19B204808-G1	Variable $\pm$ 20%
CR302	19A121975-P1	Silicon, capacitive.	Q309 thru Q315	19A115889-P1	Silicon, NPN; sim to Type 2N2712.	R344	3R152-P392K	Composition: 3900 ohms $\pm$ 10%, 1/4 w.	R397	3R152-P622J	Compo
CR303 and CR304	4038056-P1	Germanium.	Q316	19A115300-P2	Silicon, NPN; sim to Type 2N3053.	R345	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.	R398	3R152-P472J	Compo
CR305	4036887-P3	Silicon, Zener.	Q317	19A115362-P1	Silicon, NPN; sim to Type 2N2925.	R346	3R152-P333K	Composition: 33,000 ohms $\pm$ 10%, 1/4 w.	R399	3R152-P331K	Compo
CR306 and CR307	19A115250-P1	Silicon.	Q318	19A115889-P1	Silicon, NPN; sim to Type 2N2712.	R347	3R152-P202J	Composition: 2000 ohms $\pm$ 5%, 1/4 w.	R400	3R152-P152K	Compo
CR308 and CR309	4038056-P1	Germanium.	Q319	19A115300-P2	Silicon, NPN; sim to Type 2N3053.	R348	3R152-P512J	Composition: 5100 ohms $\pm$ 5%, 1/4 w.	R407	3R152-P101K	Compo
CR310	4036887-P6	Silicon, Zener.	Q320	19A115889-P1	Silicon, NPN; sim to Type 2N2712.	R349	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.			
CR311 and CR312	19A116034-P1	Silicon, capacitive.			----- RESISTORS -----	R350	3R152-P333K	Composition: 33,000 ohms $\pm$ 10%, 1/4 w.			
CR313	4036887-P40	Silicon, Zener.	R301	3R152-P153K	Composition: 15,000 ohms $\pm$ 10%, 1/4 w.	R351	3R152-P202J	Composition: 2000 ohms $\pm$ 5%, 1/4 w.	RT301	5490828-P43	Therm green
		----- JACKS AND RECEPTACLES -----	R302	3R152-P473K	Composition: 47,000 ohms $\pm$ 10%, 1/4 w.	R352	3R152-P102K	Composition: 1000 ohms $\pm$ 10%, 1/4 w.	RT302	19C300048-P10	Disc:
J302 thru J311	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.	R303	3R152-P472K	Composition: 4700 ohms $\pm$ 10%, 1/4 w.	R353	3R152-P513J	Composition: 51,000 ohms $\pm$ 5%, 1/4 w.	RT303	19C300048-P11	Disc:
J312	19B205689-G2	Connector: 18 contacts.	R305	3R152-P123K	Composition: 12,000 ohms $\pm$ 10%, 1/4 w.	R354	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.	RT305	5490828-P29	Therm orange
J426	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.	R306	3R152-P183K	Composition: 18,000 ohms $\pm$ 10%, 1/4 w.	R355	3R152-P333K	Composition: 33,000 ohms $\pm$ 10%, 1/4 w.	RT306	5490828-P28	Therm yellow
J428	4033513-P4	Contact, electrical: sim to Bead Chain L93-3.	R307	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.	R356	3R152-P202J	Composition: 2000 ohms $\pm$ 5%, 1/4 w.			
		----- INDUCTORS -----	R308	3R152-P150K	Composition: 15 ohms $\pm$ 10%, 1/4 w.	R357	3R152-P681K	Composition: 680 ohms $\pm$ 10%, 1/4 w.	W1		
L301 and L302	19D413078-G1	Helical resonator.	R309	3R152-P681J	Composition: 680 ohms $\pm$ 5%, 1/4 w.	R358	3R152-P512J	Composition: 5100 ohms $\pm$ 5%, 1/4 w.			
			R310	3R152-P472K	Composition: 4700 ohms $\pm$ 10%, 1/4 w.	R359	3R152-P513J	Composition: 51,000 ohms $\pm$ 5%, 1/4 w.			
			R311	3R152-P123K	Composition: 12,000 ohms $\pm$ 10%, 1/4 w.	R360 and R361	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.			
			R312	3R152-P183K	Composition: 18,000 ohms $\pm$ 10%, 1/4 w.	R362	3R152-P202J	Composition: 2000 ohms $\pm$ 5%, 1/4 w.	P303	5496078-P2	Jack:
			R313	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.	R363	3R152-P103K	Composition: 10,000 ohms $\pm$ 10%, 1/4 w.			
			R314	3R152-P150K	Composition: 15 ohms $\pm$ 10%, 1/4 w.	R364	3R152-P333K	Composition: 33,000 ohms $\pm$ 10%, 1/4 w.		N330P1503F22	Eyelet
			R315	3R152-P681J	Composition: 680 ohms $\pm$ 5%, 1/4 w.	R365	3R152-P102J	Composition: 1000 ohms $\pm$ 5%, 1/4 w.		19B209044-P19	Cable
			R316	3R152-P101K	Composition: 100 ohms $\pm$ 10%, 1/4 w.	R366	3R152-P331K	Composition: 330 ohms $\pm$ 10%, 1/4 w.			
						R367 and R368	3R152-P513J	Composition: 51,000 ohms $\pm$ 5%, 1/4 w.	XY301 and XY302	5490277-P1	Transf
						R369	3R152-P682K	Composition: 6800 ohms $\pm$ 10%, 1/4 w.			
						R370	3R152-P104K	Composition: 0.10 megohms $\pm$ 10%, 1/4 w.			
						R371	3R152-P153K	Composition: 15,000 ohms $\pm$ 10%, 1/4 w.			When exact
						R372	3R152-P223K	Composition: 22,000 ohms $\pm$ 10%, 1/4 w.			Cover

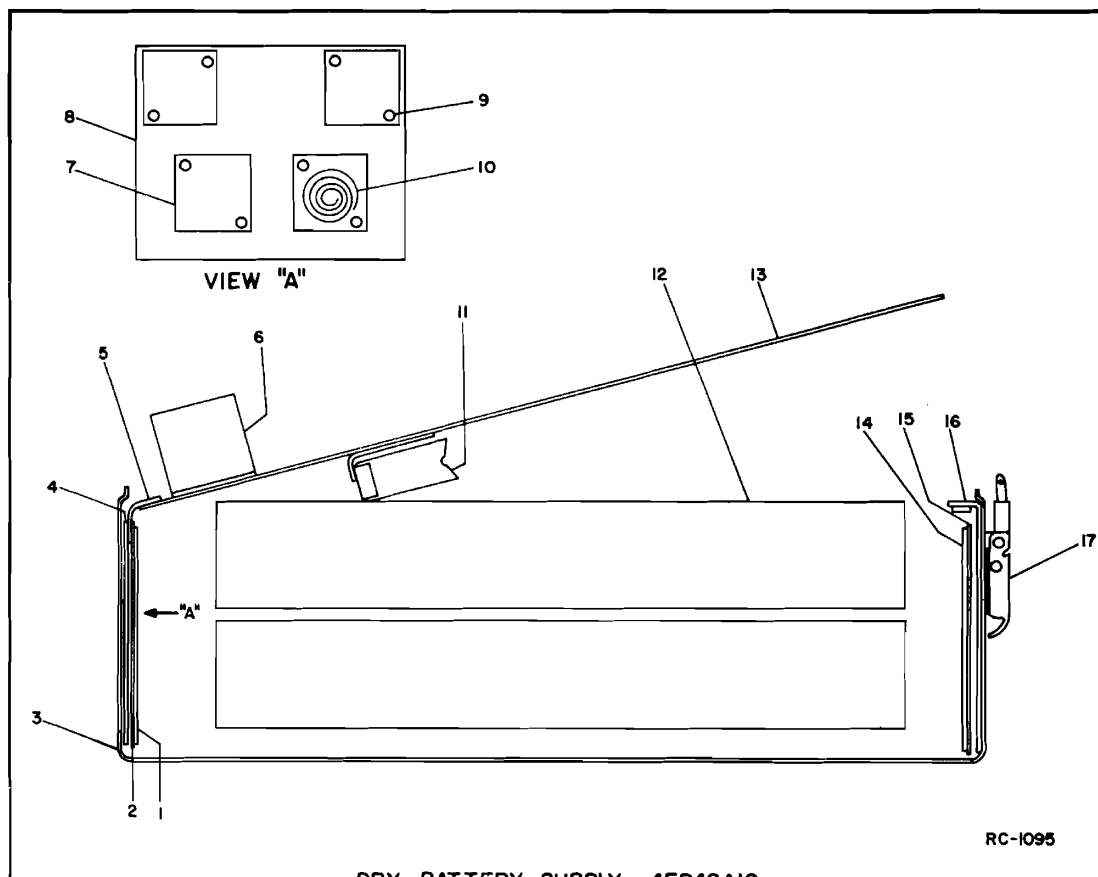


DESCRIPTION

SERIES -----
 size cell.
 FIERS -----
 91.
 3.
 SES -----
 1.5 amps at 250 v; sim
 Bussmann AGC-1-1/2.
 RECEPTACLES -----
 phenolic; sim to
 AYS -----
 nominal, 130 ohms,
 contacts: sim to Allied
 V. A:
 DC, 185 ohms $\pm 10\%$, 4
 Allied Control T154-X-316.

TS -----
 stic base, 5 amps at
 Litteifuse E-357001.
 on, ground spring;
 54-2.
 L PARTS
 -1095)
 s items 7, 8, 9 and 10).
 1 inches.
 62 x 2.96 inches.
 44 x .05 inches.
 inches, nylon.
 1 x .032 inches. (Used
 nches. (Part of
 715-G1).
 2 inches. (Part of
 715-G1).
 .091 inches. (Part of
 715-G1).
 .437 x 0.4 inches.
 PL-19B204715-G1).
 : x 1.142 x 0.787 inches,
 ol 30040-2. (Used with
 ches. (Used with BT501
 .14 x .064 inches.
 x .0625 inches.
 1 inches, fiber.
 3 x .05 inches.
 x 1.125 x 0.406 inches,
 to Nielsen, SC-B-83314.

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.

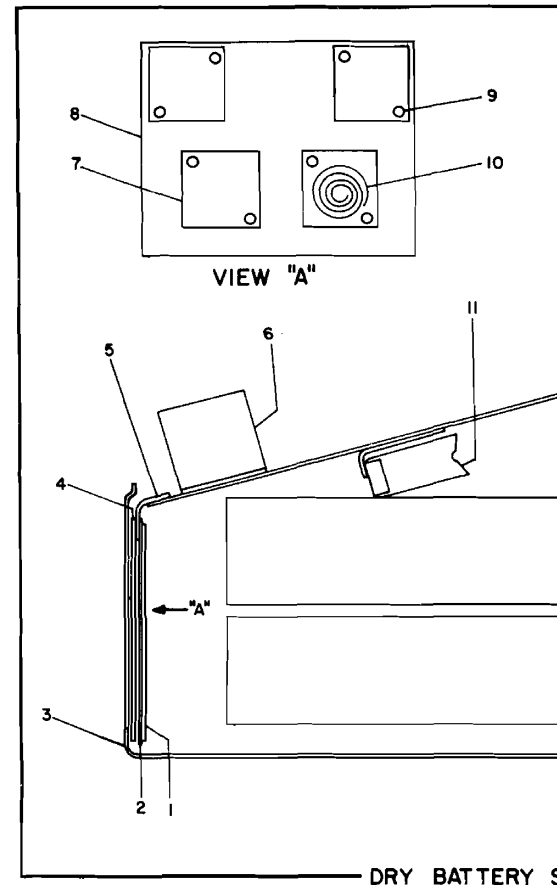
REV. A - To extend life of dry battery. Changed K501.

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

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, $\pm 10\%$ 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 $\pm 10\%$, 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.



DRY BATTERY S

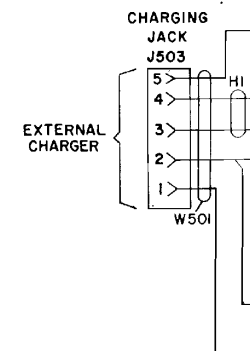
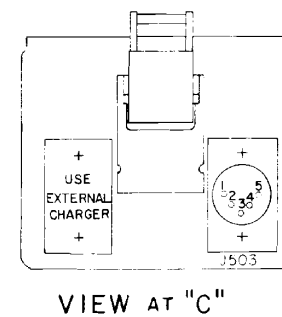
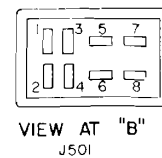
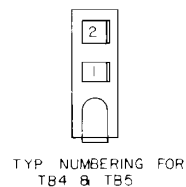
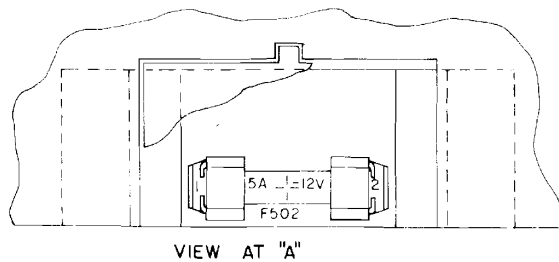
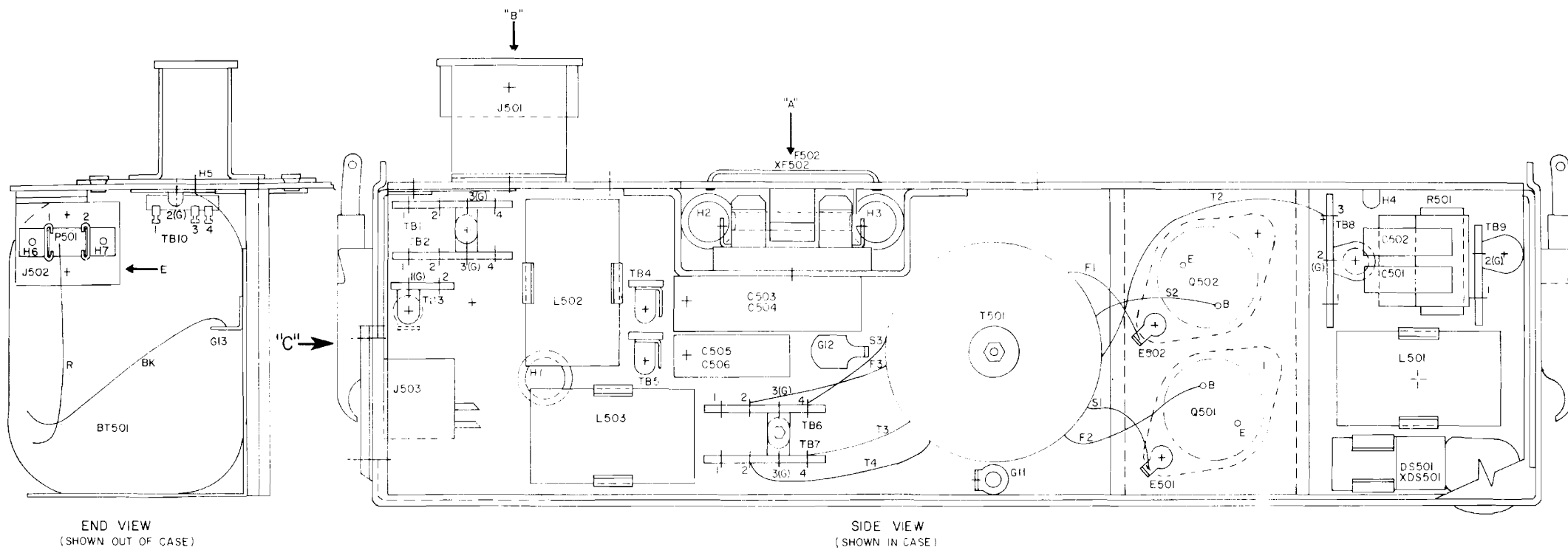
PRODUCTI

Changes in the equipment to improve p identified by a "Revision Letter", wh of the unit. The revision stamped on sions. Refer to the Parts List for d revisions.

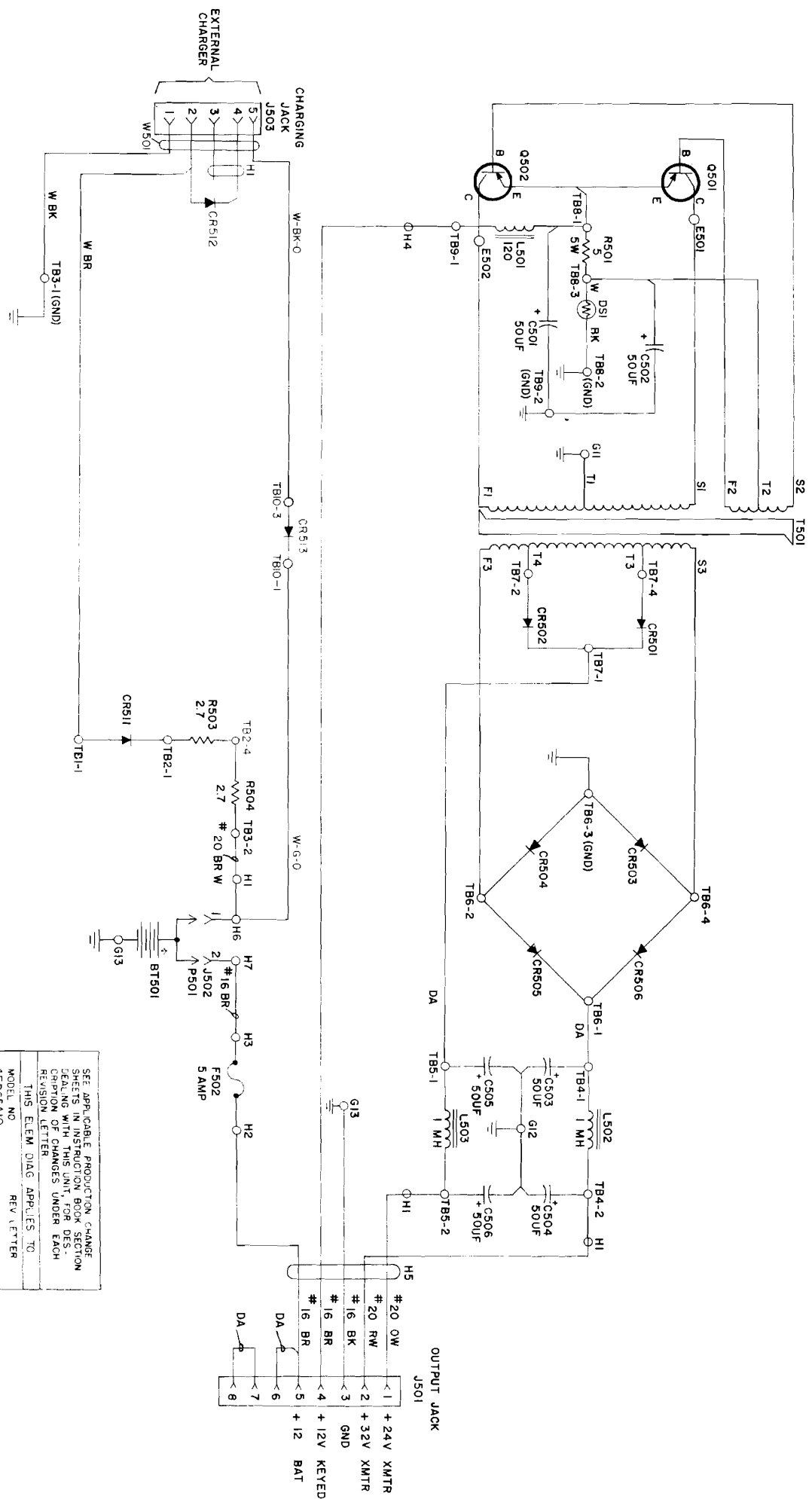
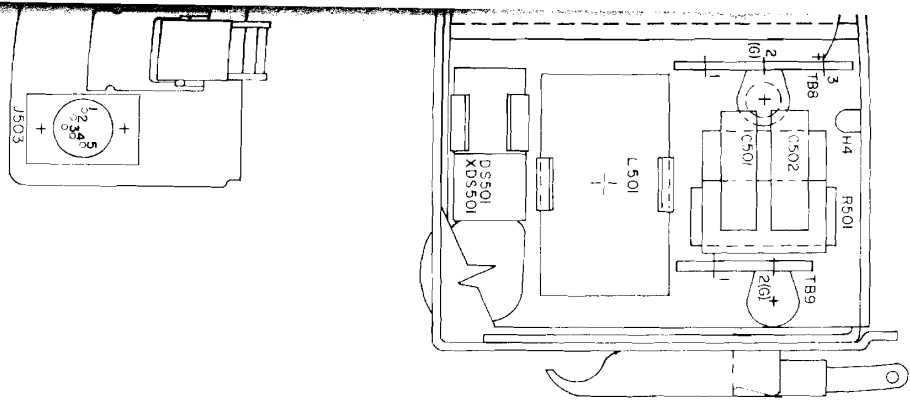
REV. A - To extend life of dry batter

REV. B - To provide relay arc suppres

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



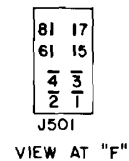
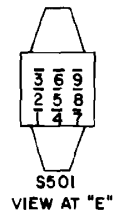
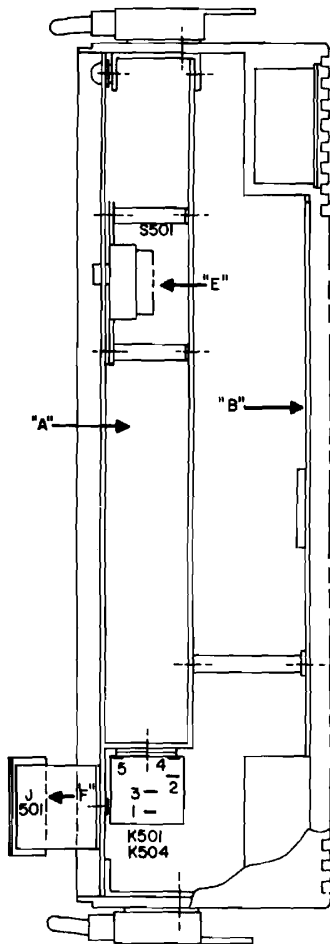
ALL RESISTOR
OTHERWISE S.
VALUES IN OHM
K=1000 OHMS
CAPACITOR VAL
TO MICROMICR
BY UF= MICROI
IN MICROHENS
MH= MILLIHEN



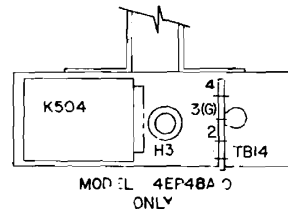
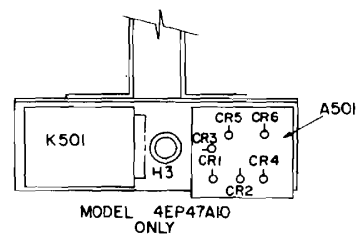
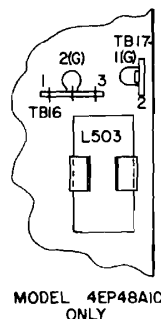
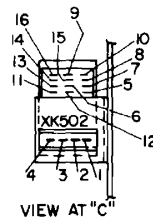
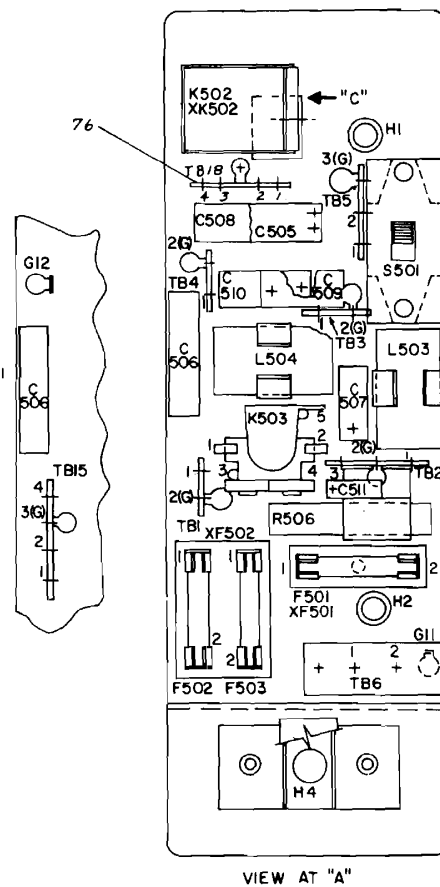
ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE SPECIFIED AND RESISTOR VALUES IN OHMS UNLESS FOLLOWED BY K=1000 OHMS OR MEG=1,000,000 OHMS. CAPACITOR VALUES IN PICOFARADS (EQUAL TO MICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS, INDUCTANCE VALUES IN MICROHENRS UNLESS FOLLOWED BY MH= MILLIHENRS OR H= HENRS

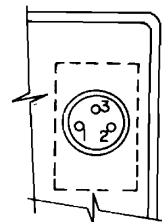
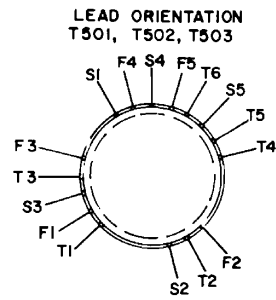
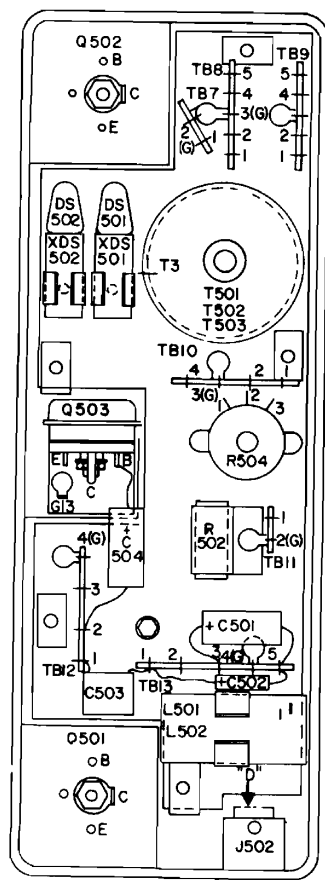
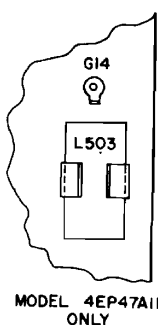
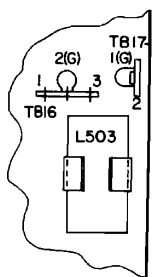
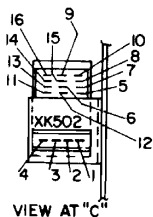
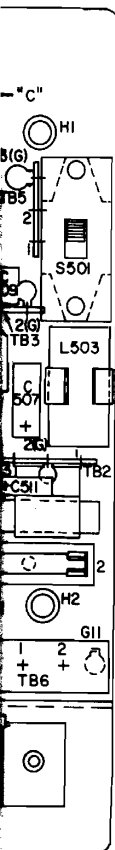
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY PARTS OR COMPONENTS MUST BE DONE WITH THE SAME PARTS AND SPECIFICATIONS SHOWN ON THE PARTS LIST OF THIS UNIT.

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 4EP55A10
REV LETTER

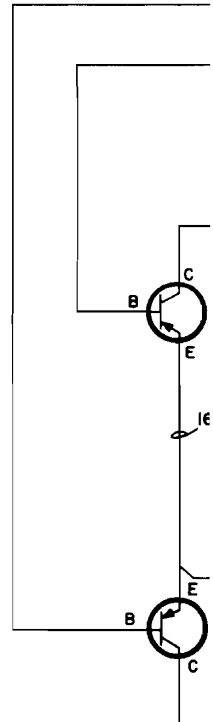


MODEL 4EP47A11
ONLY

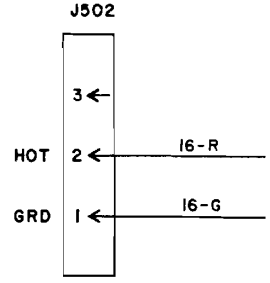
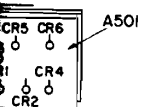


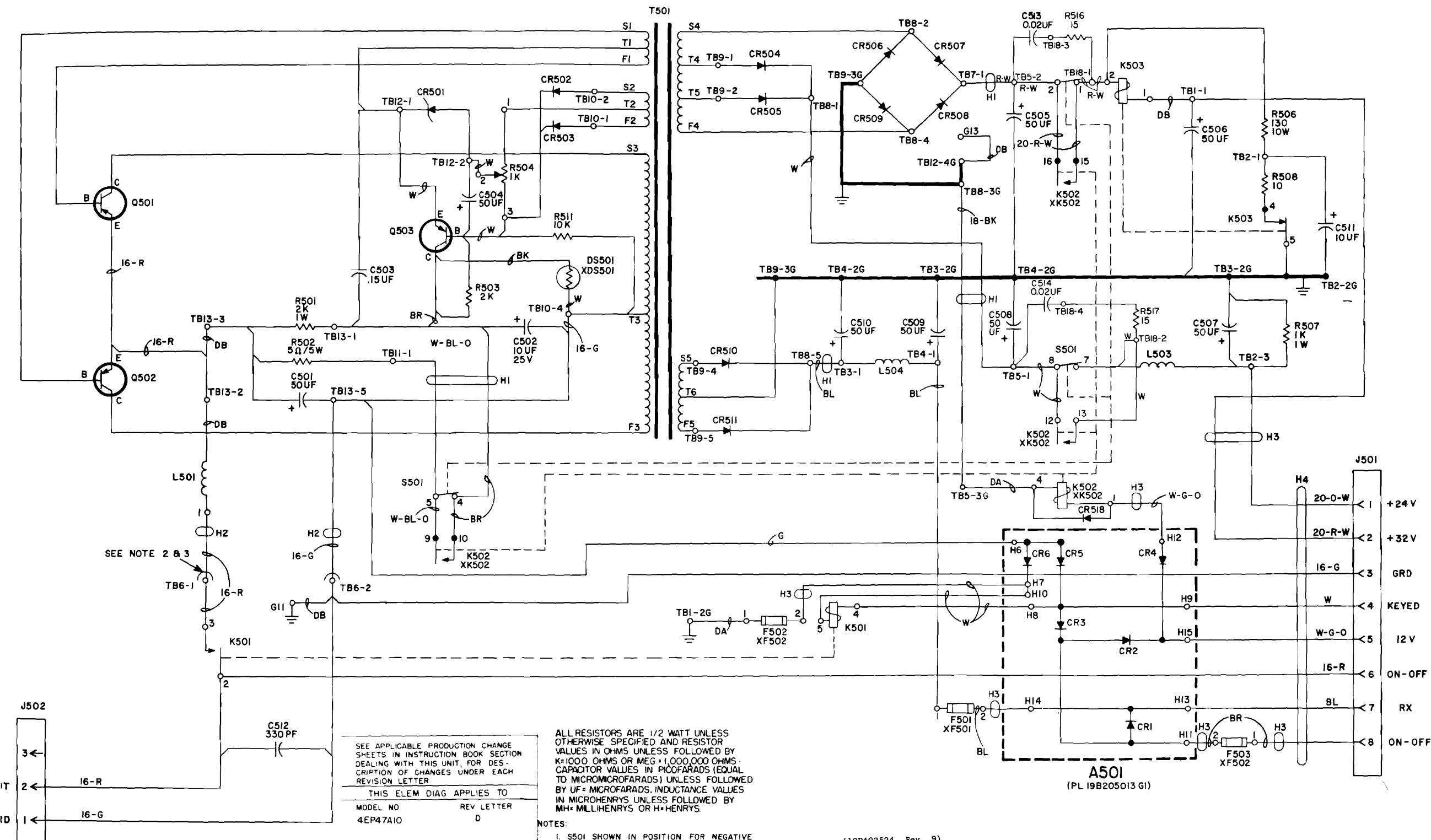


VIEW AT "D"



SEE





PARTS LIST

12 VOLT POWER SUPPLY
MODEL 45947A10
(PL-19D402519-G1)

SYMBOL	G-E PART NO.	DESCRIPTION
AS01		COMPONENT BOARD ASSEMBLY PL-19B205013-G1
CRI thru CR6	4037822-P1	Silicon. ----- DIODES AND RECTIFIERS -----
CS01	7489483-P17	----- CAPACITORS ----- Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
CS02	7489483-P7	Tubular, hermetically sealed, electrolytic: axial leads, 10 μ f +75% -10%, 25 VDCW; sim to Sprague 30D182A1.
CS03	5491189-P7	Mylar [®] dielectric, dipped epoxy: radial leads, 0.15 μ f $\pm$ 20%, 50 VDCW; sim to Good-All Type 601PF.
CS04	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
CS05*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
CS06*	19B209283-P1	In Rev. C and earlier: Electrolytic: 50 μ f +75%, 65 VDCW.
	19A115680-P6	Electrolytic: 50 μ f +150% - 10%, 25 VDCW; sim to Mallory Type TT.
	7489483-P25	In Rev. C and earlier: Electrolytic: 50 μ f +75% -10%, 50 VDCW; sim to Sprague 30D200A1.
CS07*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
	5496267-P20	In Rev. C and earlier: Tantalum, dry solid: 47 μ f $\pm$ 20%, 35 VDCW; sim to Sprague Type 150D.
CS08*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
	19B209283-P1	In Rev. C and earlier: Electrolytic: 50 μ f +75% -10%, 65 VDCW.
CS09 and CS10	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
CS11	7489483-P27	Tubular, hermetically sealed, electrolytic: axial leads, 10 μ f +75% -10%, 150 VDCW; sim to Sprague 30D218A1.
CS12	7489162-P39	Silver mica, dipped phen: radial leads, 330 pF $\pm$ 5%, 500 VDCW; sim to Electro Motive Type DM-15.
CS13* and CS14	7774750-P15	Ceramic disc: 0.02 μ f +100% -0%, 500 VDCW. Added by Rev. C.
CR501*	4036887-P12	----- DIODES AND RECTIFIERS -----

SYMBOL	G-E PART NO.	DESCRIPTION
F501 thru F503	1R16-P2	----- FUSES ----- Cartridge, quick blowing: 3/4 amp at 250 v; sim to Littelfuse 312.750 or Bussmann AGC-3/4.
J501	19A121226-P1	----- JACKS AND RECEPTACLES ----- 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.
K501	19B209240-P2	----- RELAYS ----- Armature, open: 12 VDC nominal, 2 w max operating, 600 ohms $\pm$ 10% coil res, 1 form C contact rated at 15 amps at 115 VAC; sim to Magnecraft M88-150.
K502	5491595-P26	Armature: 12 VDC nominal, 1.5 w max operating, 185 ohms $\pm$ 15% coil res; 4 form C contacts rated at 0.18 ma at 300 VDC; sim to Allied Control TL54-X-260.
K503	19B209249-P1	Armature, open: 1 amp nominal, 1.1 w max operating, 0.5 ohm $\pm$ 0% coil res, 1 form C contact rated at 1 amp at 28 VDC or 115 VAC; sim to RDM X9559KT.
L501	7143944-P2	----- INDUCTORS ----- Choke, RF: 120 μ H $\pm$ 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.
Q501 thru Q503	5490810-P1	----- TRANSISTORS ----- Germanium, PNP.
R501	3R78-P202K	----- RESISTORS ----- Fixed composition: 2000 ohms $\pm$ 10%, 1 w.
R502	5493035-P1	Wirewound: 5 ohms $\pm$ 5%, 5 w; sim to Tru-Ohm Type X-60.
R503	3R77-P202K	Fixed composition: 2000 ohms $\pm$ 10%, 1/2 w.
R504	19B209244-P1	Variable, wirewound: 1000 ohms $\pm$ 20%, 2 w, linear taper; sim to CTS BL37463.
R506	5493035-P15	Wirewound: 130 ohms $\pm$ 5%, 10 w; sim to Tru-Ohm Type X-62.
R507	3R78-P102K	Fixed composition: 1000 ohms $\pm$ 10%, 1 w.
R508	3R78-P100K	Fixed composition: 10 ohms $\pm$ 10%, 1 w.
R511	3R77-P173K	Fixed composition: 10,000 ohms $\pm$ 10%, 1/2 w.
R516* and R517	3R77-P150K	Fixed composition: 15 ohms $\pm$ 10%, 1/2 w. Added by Rev. C.
S501	19B209261-P1	----- SWITCHES ----- Slide: 3 pnt, 3 amps at 125 VAC or 1 amp at 125 VDC; sim to Compco 100-1000.

SYMBOL	G-E PART NO.	DESCRIPTION
TB2	7775500-P7	----- TERMINAL BOARDS(Cont'd) ----- Phen: 3 terminals.
TB3	7775500-P1	Phen: 2 terminals.
TB4		
TB5	7775500-P2	Phen: 3 terminals.
TB6	7117710-P2	Phen: 2 terminals; sim to Cinch 1781.
TB7	7487424-P1	Miniature, phen: 1 terminal.
TB8	7487424-P7	Miniature, phen: 4 terminals.
TB9		
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.
X501	4032220-P1	----- SOCKETS ----- Lampholder, miniature: sim to Drake NS17.
X501	7141008-P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
X502	19A115164-P2	Fuseholder, phen: 30 amps max; sim to Littelfuse 350284.
X502	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		MECHANICAL PARTS
		(SEE NC-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	7118719-P4	Clip: sim to Prestole E-50005-038. (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. (Used with S501).
7	PL-19A121181-G1	Support: approx 2-1/8 x 1 x 1/32 inches thick. (Used with S501).
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	M405P9C13	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 Shakespeare 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).

PL	G-E PART NO	DESCRIPTION
		- - - - - TERMINAL BOARDS(Cont'd) - - - - -
	7775500-P7	Phen: 3 terminals.
	7775500-P1	Phen: 2 terminals.
	7775500-P2	Phen: 3 terminals.
	7117710-P2	Phen: 2 terminals; sim to Cinch 1781.
	7487424-P1	Miniature, phen: 1 terminal.
	7487424-P7	Miniature, phen: 4 terminals.
	7775500-P10	Phen: 4 terminals.
	7487424-P1	Miniature, phen: 1 terminal.
	7775500-P3	Phen: 4 terminals.
	7775500-P9	Phen: 5 terminals.
	7487424-P7	Miniature, phen: 4 terminals. Added by Rev. C.
		- - - - - SOCKETS - - - - -
	4032220-P1	Lampholder, miniature: sim to Drake N517.
	7141008-P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
	19A115164-P2	Fuseholder, phen: 30 amps max; sim to Littelfuse 350284.
	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2
		MECHANICAL PARTS
		(SEE RC-1234)
	PL-19A121823-G1	Support: approx 9-3/4 x 3-1/4 x 1-1/8 inches.
	19A121830-P1	Plate: approx 2-1/8 x 3/4 x 1/32 inches thick. (Used with S501).
	7142162-P100	Spacer: approx 13/16 inch long. (Used with S501).
	7118719-P4	Clip: sim to Prestole E-50005-038. (Used with L501, 503, 504).
	4038930-P1	Clip. (Used with R502, 506).
	19B205010-P1	Cover: approx 8-3/8 x 3-3/8 x 1/16 inches thick.
	PL-19A121181-G1	Support: approx 2-1/8 x 1 x 1/32 inches thick. (Used with J501).
	4035656-P14	Standoff: approx 5/16 inch long. (Used with A501).
	19A121822-P1	Cover: approx 1-1/2 x 1-1/2 x 1/16 inches thick. (Used with Q501, 502).
	4034214-P1	Mica washer: for 7/32 inch screw. (Used with Q501-503).
	N405P9C13	Split washer: for 3/8 inch screw. (Used with Q501-503).
	4032596-P1	Nut: 10-32. (Used with Q501-503).
	4036835-P1	Terminal: sim to Shakeproof 2118-10-01-2520N. (Used with Q501-503).
	4034225-P1	Flat washer: approx 1/2 inch dia. (Used with Q501-503).
	19A121168-P1	Washer: approx 2 inches dia. (Used with T501).
	19A115316-P1	Cup washer: approx 9/16 inch dia; sim to Zierick 220. (Used with T501).
	7147194-P11	Bushing: approx 1/8 x 1/4 inch dia. (Used with Q501-503).
	4031291-P1	Insulator. (Used with Q501-503).
	7142162-P99	Spacer: approx 1-5/16 inches long.
	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.

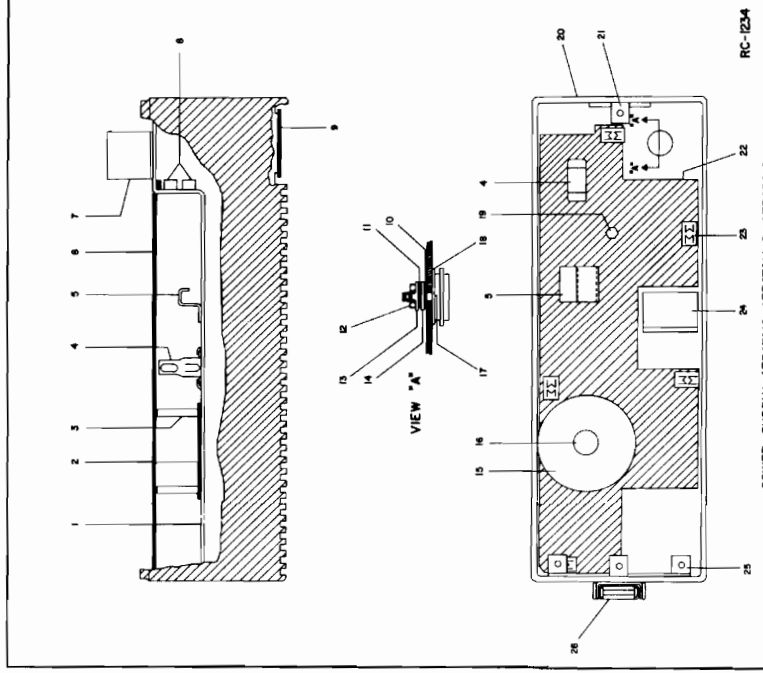
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

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

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

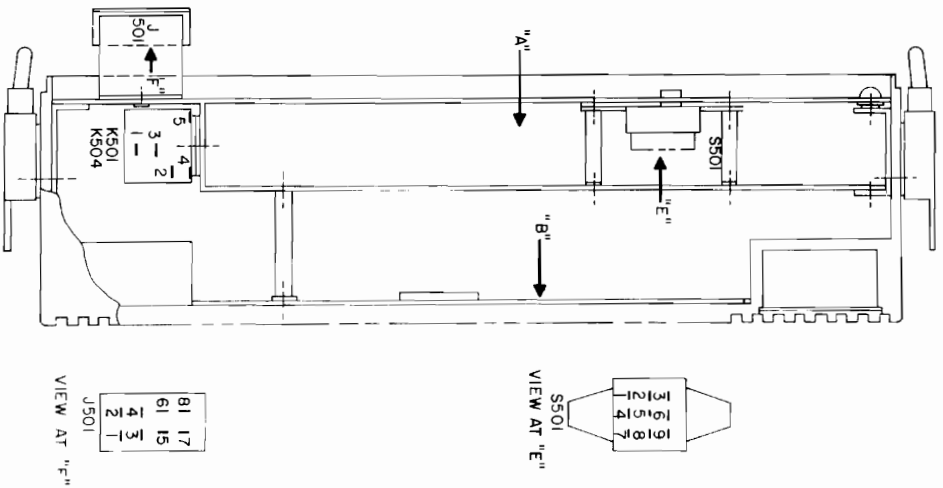
REV. C - To provide arc suppression for K502 contacts. Added C513, C514, RS16, RS17, and TB18.

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

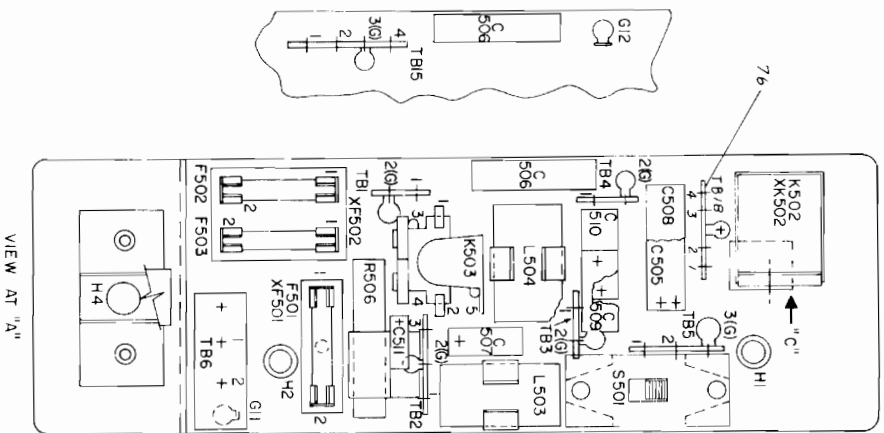


POWER SUPPLY 4EP47A10, 4EP47A11 & 4EP48A10

RC-1024

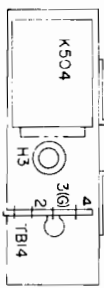
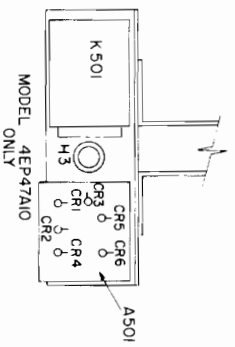
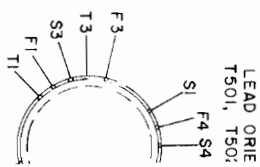
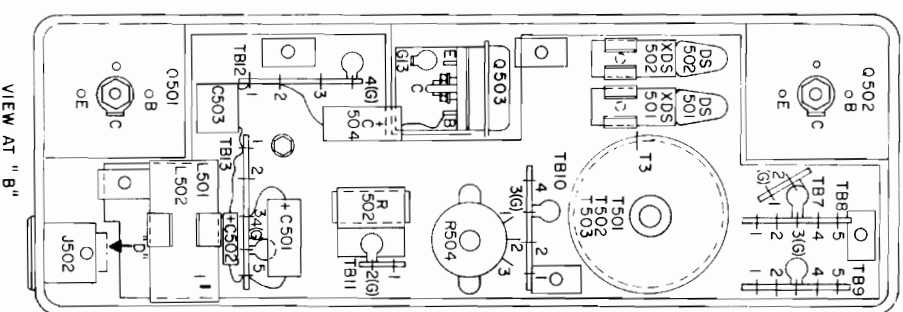
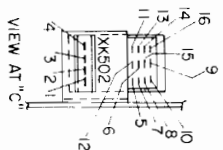


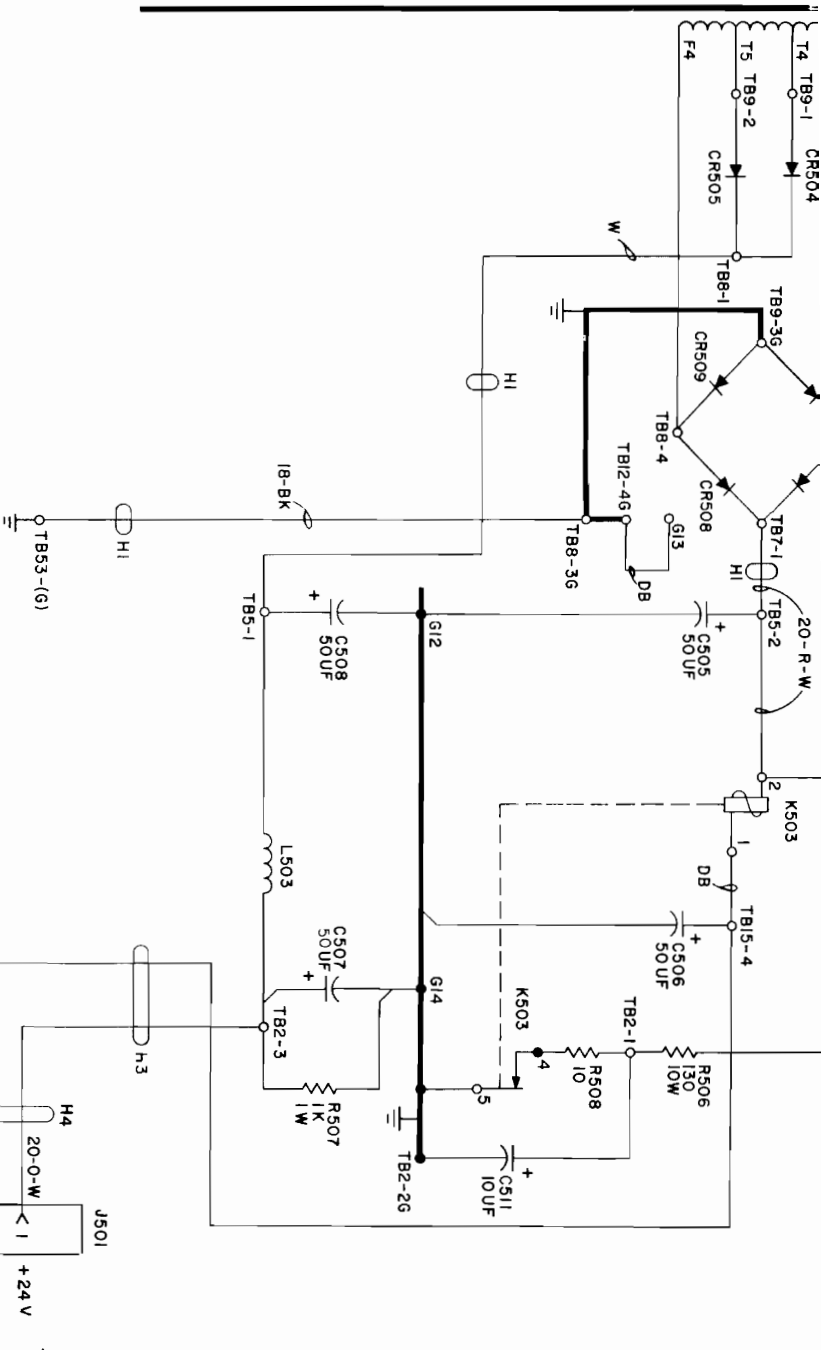
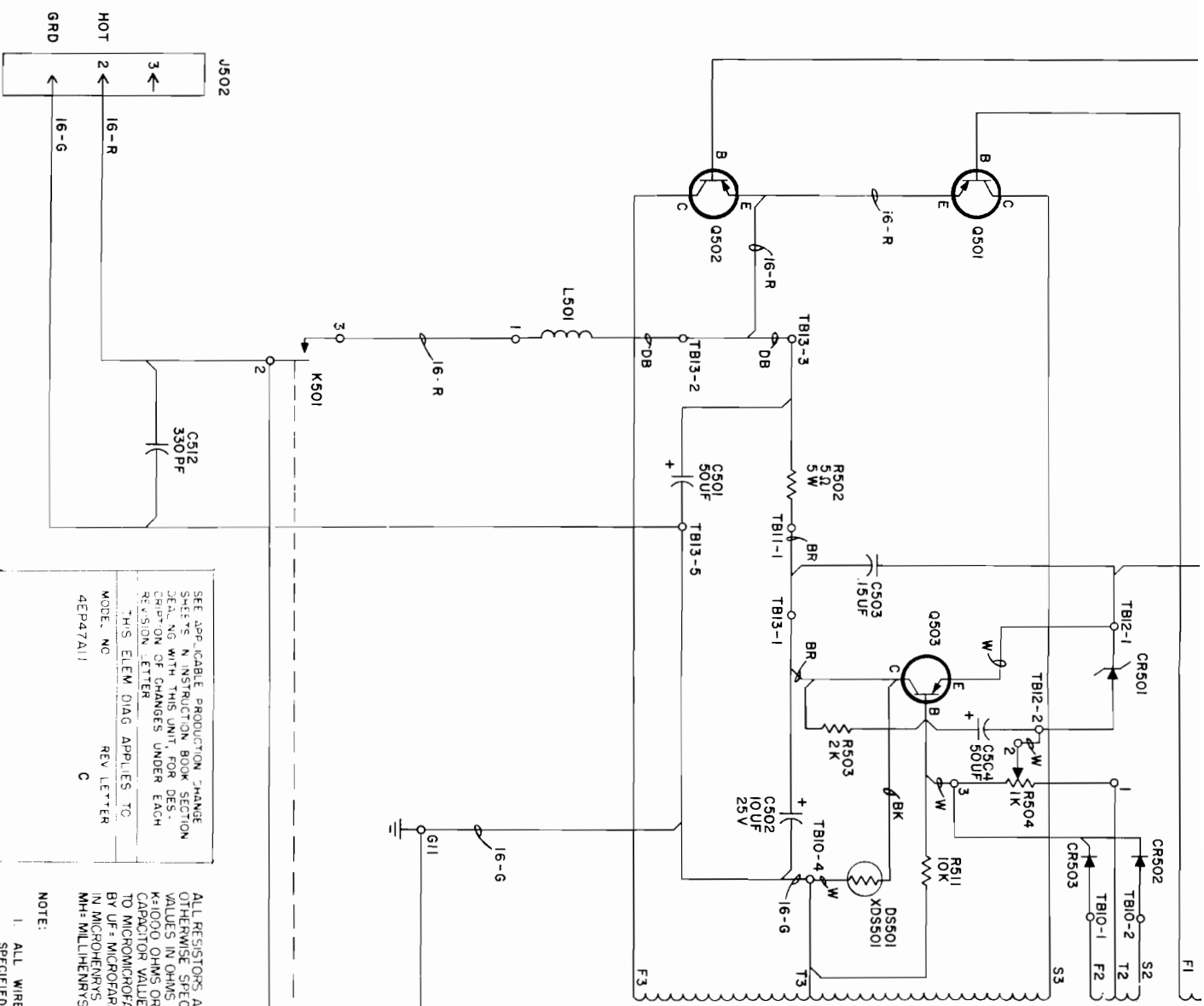
MODEL 4EP47A11
ONLY



MODEL 4EP48A10
ONLY

MODEL 4EP47A11
ONLY





SEE APPROPRIABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK DESIGNATING WITH THIS UNIT, FOR DESCRIPTION OF CHANGES UNDER EACH REVISION LETTER

THIS ELEM DIAG APPLIES TO	
MODE, NO	REV LETTER
4EP47A11	C

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:

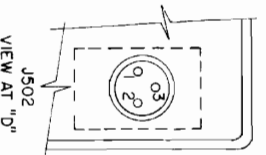
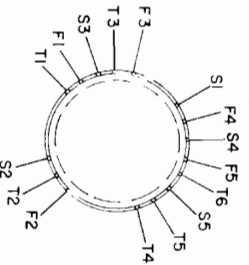
1. ALL WIRES N22 UNLESS OTHERWISE SPECIFIED.

(19D402526, Rev. 6)

SERVICE SHEET

12-VOLT, NEGATIVE GROUND
POWER SUPPLY MODEL 4EP47A11

LEAD ORIENTATION
T501, T502, T503



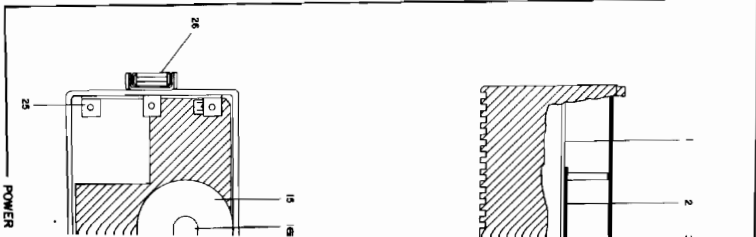
PARTS LIST

12 VOLT POWER SUPPLY
MODEL 4EP47A11
(PL-19D402318-G2)

SYMBOL	G-E PART NO.	DESCRIPTION
CS01	7489483-P17	----- CAPACITORS ----- Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
CS02	7489483-P7	Tubular, hermetically sealed, electrolytic: axial leads, 10 μ f +75% -10%, 25 VDCW; sim to Sprague 30D182A1.
CS03	5491189-P7	Mylare dielectric, dipped epoxy: radial leads, 0.15 μ f $\pm$ 20%, 50 VDCW; sim to Good-All Type 601PE.
CS04	7489483-P17	Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 25 VDCW; sim to Sprague 30D186A1.
CS05*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
	19B209283-P1	In Rev. B and earlier: Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 65 VDCW.
CS06*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
	7489483-P25	In Rev. B and earlier: Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 50 VDCW; sim to Sprague 30D200A1.
CS07*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
	5496287-P20	In Rev. B and earlier: Tubular, hermetically sealed, tantalum, dry solid: axial leads, 47 μ f $\pm$ 20%, 35 VDCW; sim to Sprague Type 150D.
CS08*	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
	19B209283-P1	In Rev. B and earlier: Tubular, hermetically sealed, electrolytic: axial leads, 50 μ f +75% -10%, 65 VDCW.
CS11	7489483-P27	Tubular, hermetically sealed, electrolytic: axial leads, 10 μ f +75% -10%, 150 VDCW; sim to Sprague 30D218A1.
CS12	7489162-P39	Silver mica, dipped phen: radial leads, 330 pf $\pm$ 5%, 500 VDCW; sim to Electro Motive Type DM-15.
CR501*	4036887-P12	----- DIODES AND RECTIFIERS ----- Silicon, Zener. 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.
DS501	19C307037-P6	----- INDICATING DEVICES ----- Lamp, incandescent: miniature, 28 v $\pm$ 0.1 v; sim to G-E 1815.
FS01	1R16-P2	----- FUSES ----- Cartridge, quick blowing: 3/4 amp at 250 v; sim to Littelfuse 312.750 or Bussmann AGC-3/4.

SYMBOL	G-E PART NO	DESCRIPTION
KS01	19B209240-P2	----- RELAYS ----- Armature, open: 12 VDC nominal, 2 w max operating, 100 ohms $\pm$ 10% coil res, 1 form C contact rated at 15 amps at 115 VAC; sim to Magnecraft W88-150.
KS03	19B209249-P1	Armature, open: 1 amp nominal, 1.1 w max operating, 0.5 ohm $\pm$ 20% coil res, 1 form C contact rated at 1 amp at 28 VDC or 115 VAC; sim to RBM X9559KT.
LS01	7143844-P2	----- INDUCTORS ----- Choke, RF: 120 μ h $\pm$ 10%, .064 ohm DC res max.
LS03	19B209166-P1	Reactor: 0.9 mh min, 0.5 ohm DC res max, 50 v peak, 50 VDC operating.
QS01 thru QS03	5490810-P1	----- TRANSISTORS ----- Germanium, PNP.
RS02	5493033-P1	----- RESISTORS ----- Wirewound: 5 ohms $\pm$ 5%, 5 w; sim to Tru-Ohm Type X-60.
RS03	3R7-P202K	Fixed composition: 2000 ohms $\pm$ 10%, 1/2 w.
RS04	19B209244-P1	Variable, wirewound: 1000 ohms $\pm$ 20%, 2 w, linear taper; sim to CTS BL37463.
RS06	5493035-P15	Wirewound: 130 ohms $\pm$ 5%, 10 w; sim to Tru-Ohm Type X-62.
RS07	3R78-P102K	Fixed composition: 1000 ohms $\pm$ 10%, 1 w.
RS08	3R78-P100K	Fixed composition: 10 ohms $\pm$ 10%, 1 w.
RS11	3R7-P103K	Fixed composition: 10,000 ohms $\pm$ 10%, 1/2 w.
TS02	PL-19B205009-G2	----- TRANSFORMERS ----- Transformer.
TB2	7775500-P7	----- TERMINAL BOARDS ----- 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.
XS0501	4032220-P1	----- SOCKETS ----- Lampholder, miniature: sim to Drake NS17.

SYMBOL	G-E PART NO	DESCRIPTION
1	PL-19A121823-G1	MECHANICAL PARTS (SEE RC-1234)
2	19A121830-P1	Support: approx 9-3/4 x 3-1/4 x 1-1/8 inches. (Not used).
3	7142162-P100	(Not used).
4	7118718-P4	Clip: sim to Prestole E-50005-038. (Used with LS01, 503).
5	4038930-P1	Clip. (Used with RS02, 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 JS01).
8	4035656-P14	(Not used).
9	19A121822-P1	Cover: approx 1-1/2 x 1-1/2 x 1/16 inches thick. (Used with QS01, 502).
10	4034214-P1	Mica washer: for 7/32 inch screw. (Used with QS01-503).
11	N405P9C13	Split washer: for 3/8 inch screw. (Used with QS01-503).
12	4032596-P1	Nut: 10-32. (Used with QS01-503).
13	4036835-P1	Terminal: sim to Shakeproof 2118-10-01-2520N. (Used with QS01-503).
14	4034228-P1	Flat washer: approx 1/2 inch dia. (Used with QS01-503).
15	19A121168-P1	Washer: approx 2 inches dia. (Used with TS01).
16	19A115316-P1	Cup washer: approx 9/16 inch dia; sim to Zierick 220. (Used with TS01).
17	7147194-P11	Bushing: approx 1/8 x 1/4 inch dia. (Used with QS01-503).
18	4031291-P1	Insulator. (Used with QS01-503).
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 Timmerman C1891-017-67.
24	19A121821-P1	Support. (Used with QS03).
25	PL-19B205011-G1	Support.
26	4029994-P13	Pull-down catch: sim to Nielsen Hardware SC-B-83314-2.



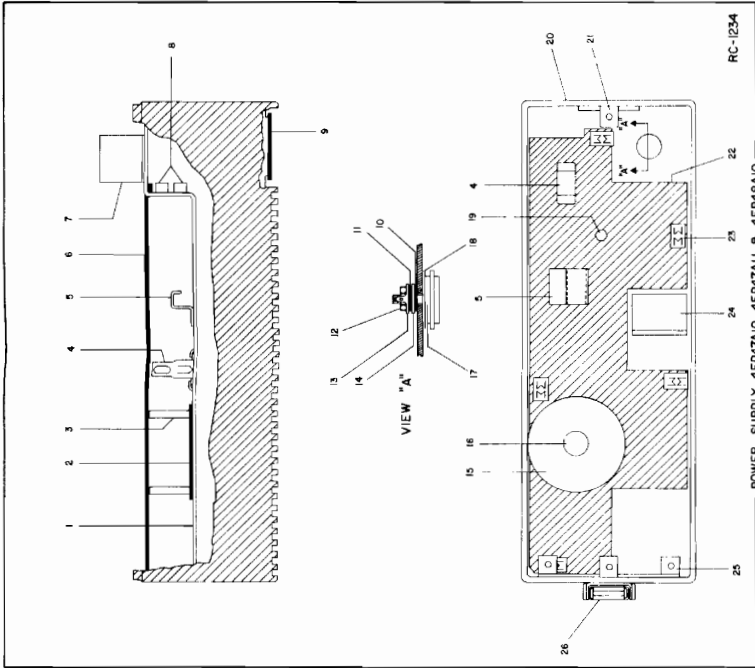
PRODUCTION CHANGES

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 C503, C506, C507 and C508.

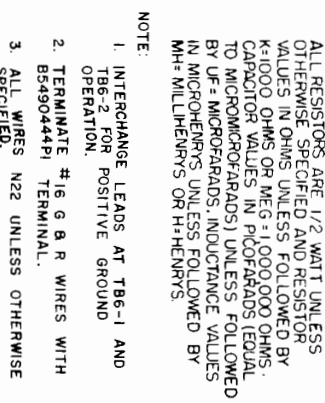
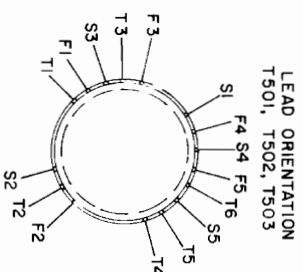
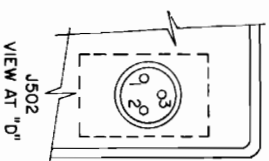


DESCRIPTION

MECHANICAL PARTS

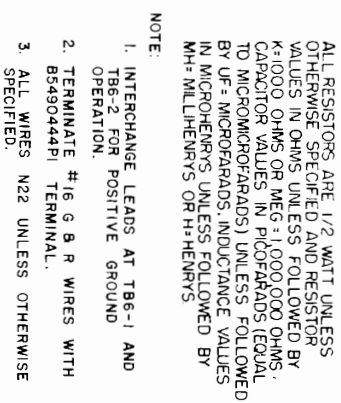
(SEE RC-1234)

- prt: approx 9-3/4 x 3-1/4 x 1-1/8 inches.
used).
- used).
- : sim to Prestole E-50005-038. (Used with
503).
- (Used with R502, 506).
- : approx 8-3/8 x 3-3/8 x 1/16 inches thick.
- prt: approx 2-1/8 x 1 x 1/32 inches thick.
with J501).
- used).
- : approx 1-1/2 x 1-1/2 x 1/16 inches thick.
with Q501, 502).
- washer: for 7/32 inch screw. (Used with
503).
- washer: for 3/8 inch screw. (Used with
503).
- 10-32. (Used with Q501-503).
- nal: sim to Shakeproof 2118-10-01-2520N.
with Q501-503).
- washer: approx 1/2 inch dia. (Used with
503).
- r: approx 2 inches dia. (Used with T501).
- isher: approx 9/16 inch dia; sim to Zierick
(Used with T501).
- g: approx 1/8 x 1/4 inch dia. (Used with
503).
- itor. (Used with Q501-503).
- : approx 1-5/16 inches long.
- g: approx 10-1/4 x 3-5/8 x 3 inches.
t.
- nut: sim to Tinnerman C1691-017-67.
- t. (Used with Q503).
- t.
- own catch: sim to Nielsen Hardware
3314-2.



SEE APPLICABLE PRODUCTION CHANGE SHEETS IN INSTRUCTION BOOK SECTION DEALING WITH THIS UNIT. FOR DES. CRPTION OF CHANGES UNDER EACH REVISION LETTER
THIS ELEM DIAG APPLIES TO
MODEL NO
REV LETTER
4EP48A10
E

MODEL NO	REV LETTER
4EP48A10	E



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

THIS ELEM DIAG APPLIES TO

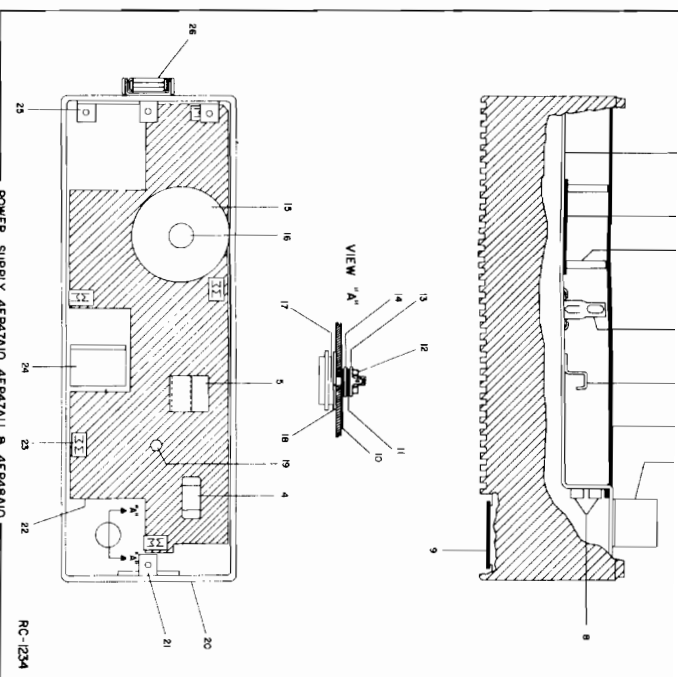
MODEL NO	REV LETTER
4EP48A10	E

6-VOLT, $\pm$ GROUND
POWER SUPPLY MODEL 4EP48A10

192-P1	----- INDUCTORS -----	Choke, RF: 50 μ h $\pm$ 10%, .02 ohm DC res max.
.66-P1		Reactor: 0.9 mh min, 0.5 ohm DC res max, 50 VDC operating.
-P1	----- TRANSISTORS -----	Germanium, PNP.
327-P1		Silicon, NPN. (Added by Rev C).
5-P6	----- RESISTORS -----	Wirewound: 3 ohms $\pm$ 5%, 5 w; sim to Tru-Ohm Type X-60.
5-P1		In Models of Rev B or earlier: Wirewound: 5 ohms $\pm$ 5%, 5 w; sim to Tru-Ohm Type X-60.
244-P1		Variable, wirewound: 1000 ohms $\pm$ 20%, 2 w; sim to CTS Type 117.
5-P15		Wirewound: 130 ohms $\pm$ 5%, 10 w; sim to Tru-Ohm Type X-62.
102K		Fixed composition: 1000 ohms $\pm$ 10%, 1 w.
100K		Fixed composition: 10 ohms $\pm$ 10%, 1 w.
301K		Fixed composition: 300 ohms $\pm$ 10%, 1 w.
102K		Fixed composition: 1000 ohms $\pm$ 10%, 1/2 w.
5-P17		Wirewound: 63 ohms $\pm$ 5%, 5 w; sim to Tru-Ohm Type X-60. (Added by Rev A). (Deleted by Rev C).
221J		Fixed composition: 220 ohms $\pm$ 5%, 1 w. (Added by Rev C).
102M		Fixed composition: 1000 ohms $\pm$ 5%, 1/2 w. (Added by Rev C).
1203009-C4	----- TRANSFORMERS -----	Transformer. In Models of Rev B or earlier: Transformer.
1203009-C3		
10-P1	----- TERMINAL BOARDS -----	Phen: 2 terminals.
10-P7		Phen: 3 terminals.
10-P1		Phen: 2 terminals.
10-P2		Phen: 3 terminals.
10-P2		Phen: 2 terminals; sim to Clinch 1781.
24-P1		Miniature, phen: 1 terminal.
24-P7		Miniature, phen: 4 terminals.
10-P10		Phen: 4 terminals.
24-P1		Miniature, phen: 1 terminal.
10-P3		Phen: 4 terminals.
10-P9		Phen: 5 terminals.
10-P16		Phen: 6 terminals. (Added by Rev C).
10-P6		Phen: 4 terminals. (Added by Rev A). (Deleted by Rev C).
20-P1	----- SOCKETS -----	Lampholder: sim to Drake NS17.
10-P1		Fuseholder: 5 amps at 125 v; sim to Littelfuse E-357001.
10-P2		Fuseholder, phen: 30 amps max; sim to Littelfuse 330284.

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 LS03, 504).
5	4038930-P1	Clip. (Used with RS02, 506).
6	19B205010-P1	Cover.
7	PL-19A121181-G1	Support. (Used with JS01).
8	4035656-P14	(Not used).
9	19A121822-P1	Cover. (Used with QS01, 502).
10	4034214-P1	Wta washer: for 7/32 inch screw. (Used with QS01-503).
11	N405P9C13	Split washer: for 3/8 inch screw. (Used with QS01-503).
12	4032596-P1	Nut: 10-32. (Used with QS01-503).
13	4036635-P1	Terminal: sim to Shakeproof 2118-10-01-2520N. (Used with QS01-503).
14	4034225-P1	Flat washer: approx 1/2 inch dia. (Used with QS01-503).
15	19A121168-P1	Washer: approx 2 inches dia. (Used with TS01).
16	19A115316-P1	Cup washer: approx 9/16 inch dia; sim to Zierick 220. (Used with TS01).
17	7147194-P11	Bushing: approx 1/8 x 1/4 inch dia. (Used with QS01-503).
18	4031291-P1	Insulator. (Used with QS01-503).
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 Finerman C1691-017-67.
24	19A121821-P1	Support. (Used with QS03).
25	PL-19B205011-G1	Support.
26	4029994-P3	Pull-down catch: sim to Nielsen Hardware SC-B-83314-2.

MECHANICAL PARTS
(SEE RC-1234)



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.

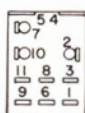
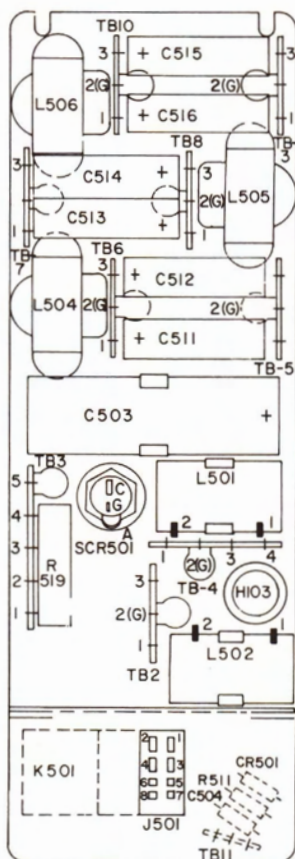
- REV. A - To improve performance of tone squelch. Added CR517, RS13 and TB17.
- REV. B - To provide relay arc suppression. Added CR518.
- REV. C - To provide a more stable 12-volt supply for both transmit and receive conditions. Added CR519, QS04, RS14, and RS15; changed RS02 and TS03; and deleted CR517 and RS13.
- REV. D - To isolate transmitter from 12 volt supply during receive operation. Added CR520.
- REV. E - To improve filtering at low temperatures - Changed CS05, CS06, CS07 and CS08.

TROUBLESHOOTING PROCEDURES

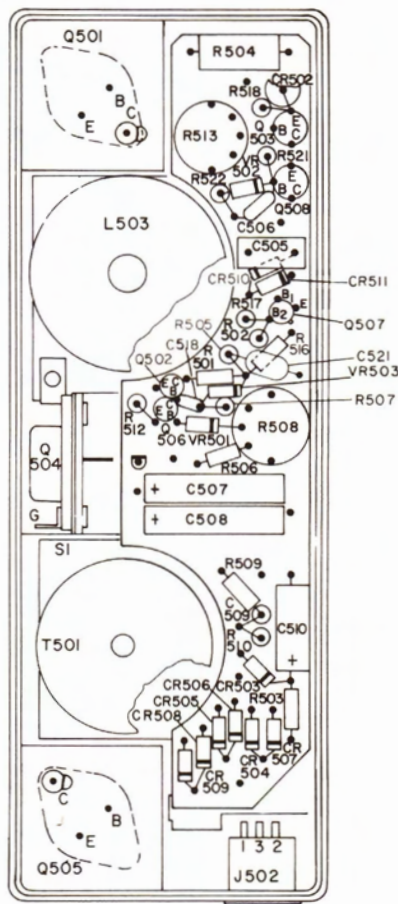
SYMPTOM	CHECK FOR THE FOLLOWING
No power supply output.	1. Open fuse (if replaced fuse blows instantly, check Q501 through Q505, Q508, SCR501, and R502 for shorts). 2. Correct polarity input. 3. Open CR501. 4. Shorted filter capacitors C503, C504, C511, C512, C513, and C514.
Output voltages low.	Shorted 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.

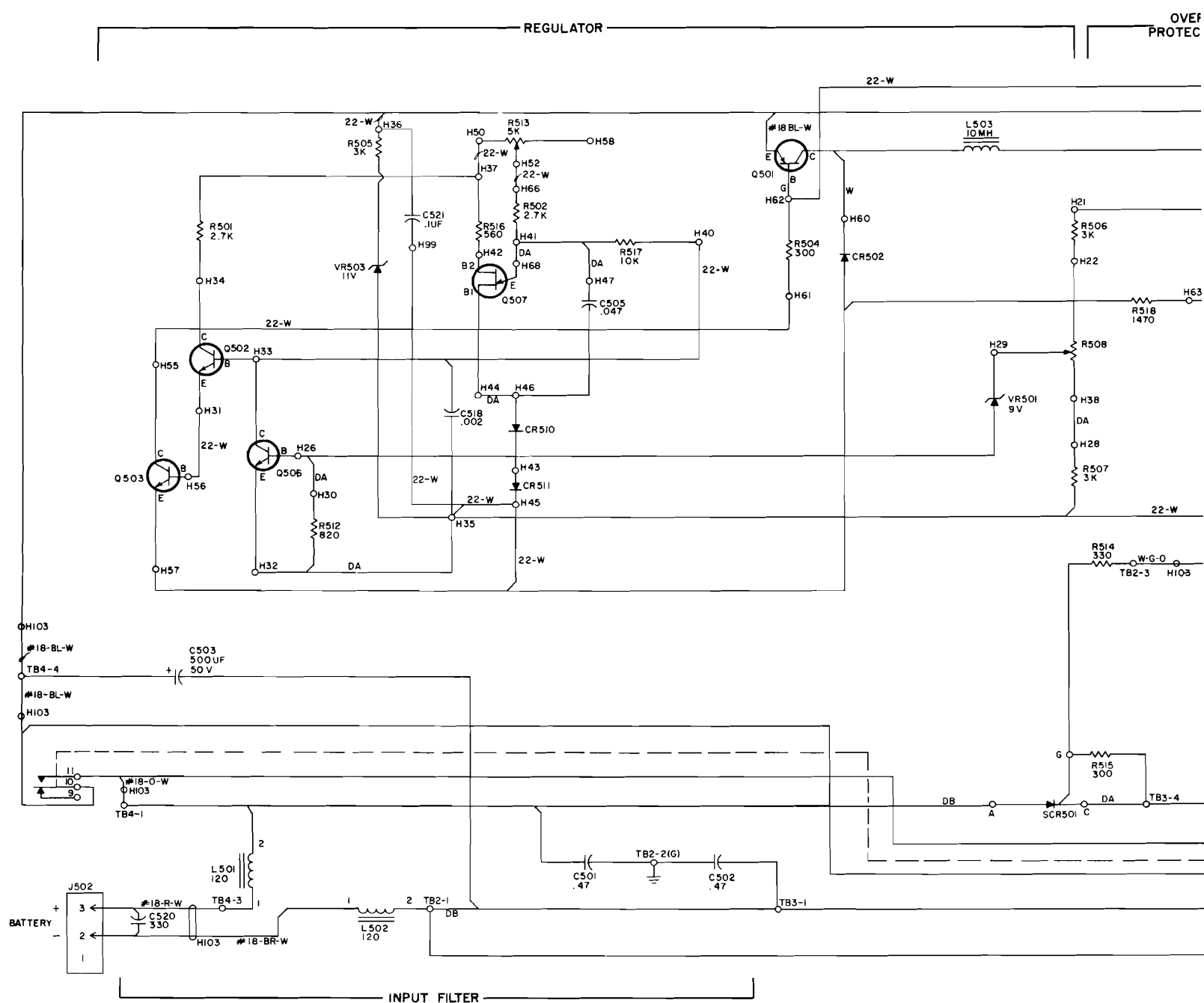
NOTE - After replacing a defective Q501, check CR503, R503, and CR502 for opens and check for approximately 3-volts across C510.

OUTLINE DIAGRAM



K501
TERMINAL VIEW





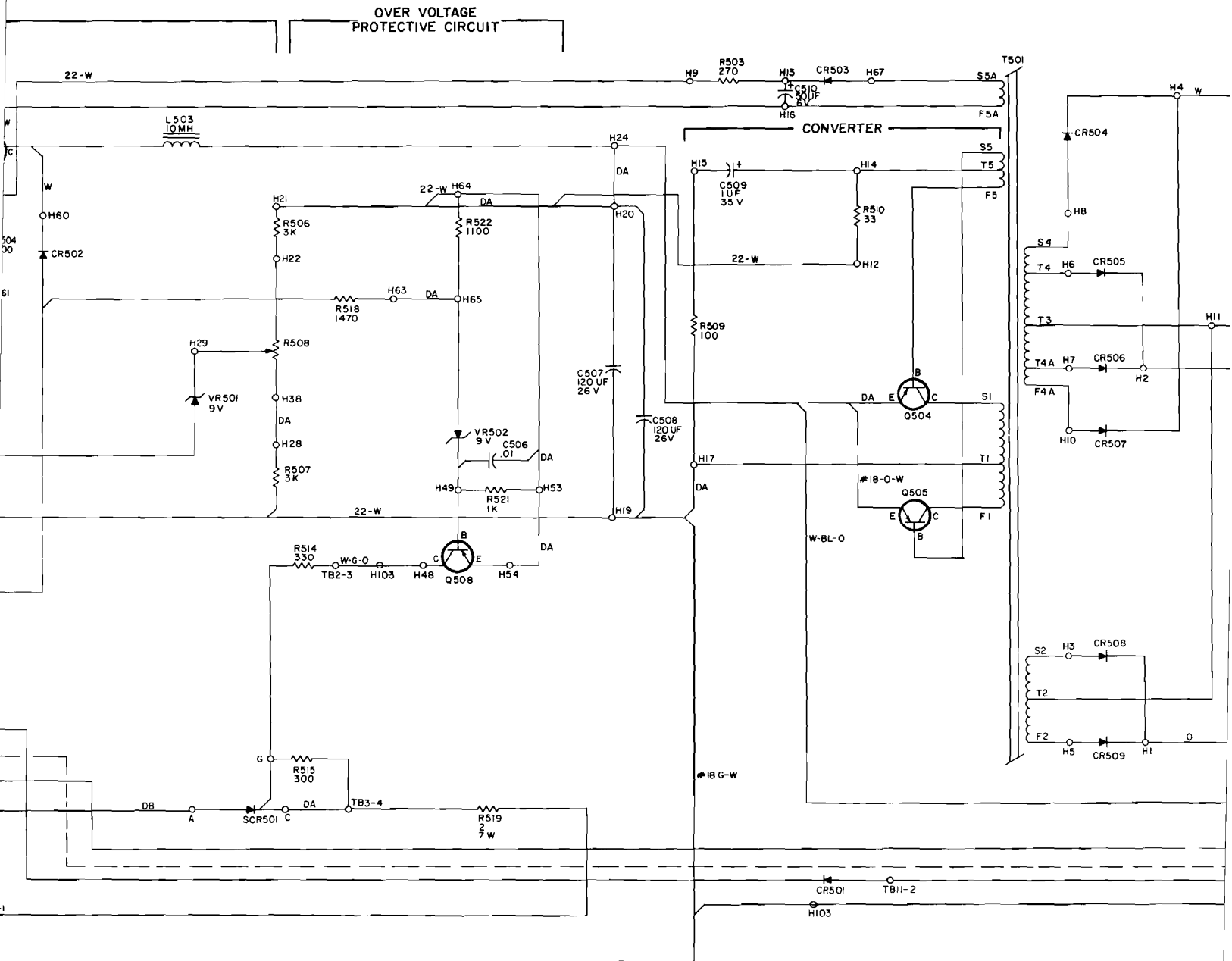
ADJUSTMENT

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 saw-tooth waveform across C505. Adjust R513 if necessary to obtain this waveform.

NOTES:
1. ALL WIRES N22 UNLESS SPECIFIED.
2. 22-W IS TEFLON WIRE.
3. PERMISSIBLE TO USE ON BUS WIRE JUMPERS.

SCHEMATIC DIAGRAM

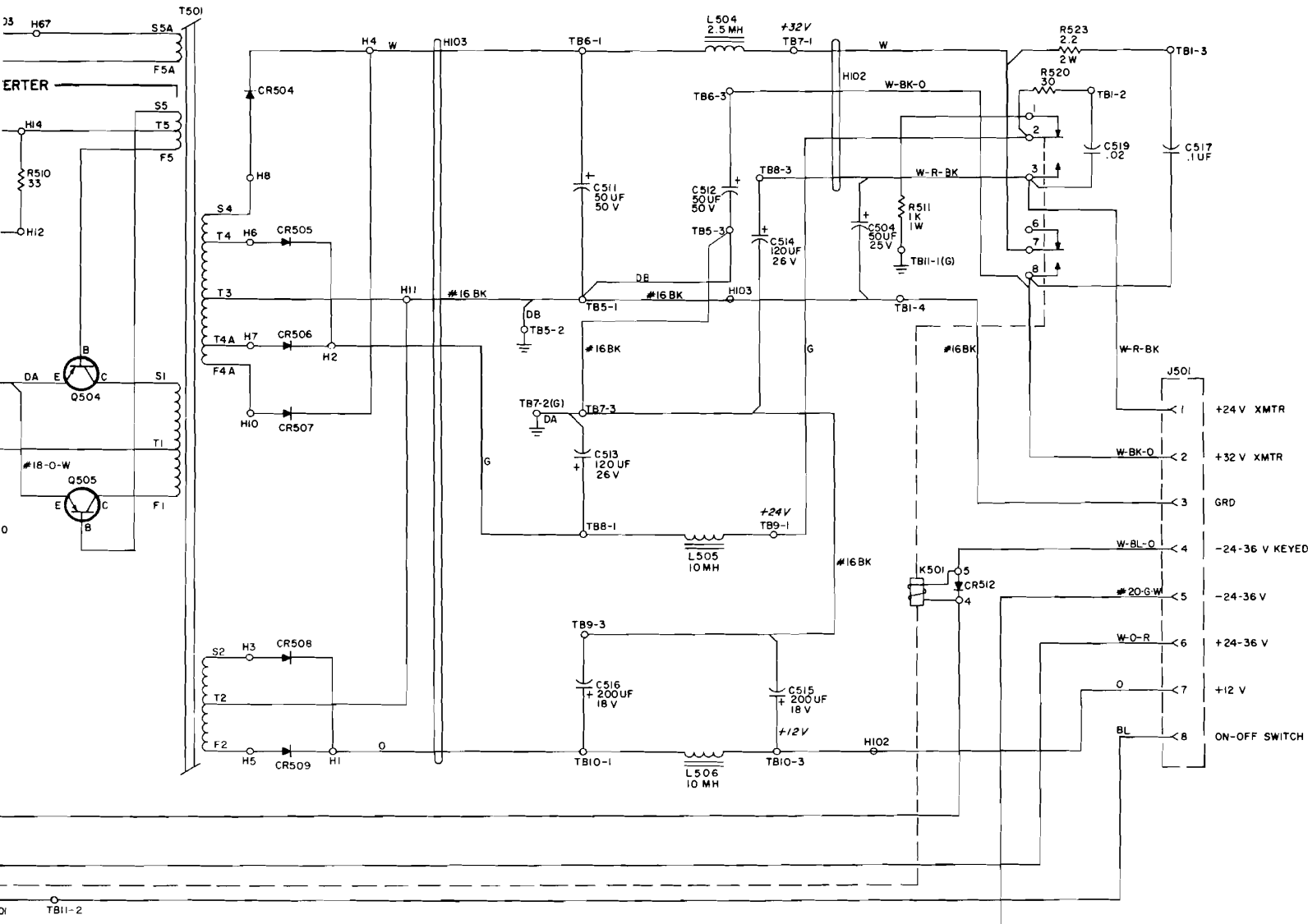


NOTES:

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 PICO FARADS (EQUAL TO MICROMICROFARADS) UNLESS FOLLOWED BY UF= MICROFARADS. INDUCTANCE VALUES IN MICROHENRYS UNLESS FOLLOWED BY MH= MILLIHENRYS OR H=HENRYS

IN ORDER TO RETAIN RATING PERFORMANCE, REPLACEMENT SERVICE PART SHOULD BE A COMPONENT HAVING THE SAME PART NUMBER SHOWN ON THE PARTS LIST



(19R620761, Rev. 5)

WATT UNLESS
AND RESISTOR
FOLLOWED BY
000 000 OHMS.
OF FARADS (EQUAL
UNLESS FOLLOWED
UCTANCE VALUES
FOLLOWED BY
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.

SERVICE SHEET

POWER SUPPLY
24/36 VOLT, $\pm$ GROUND
MODEL 4EP52A10

(RC-1364B)

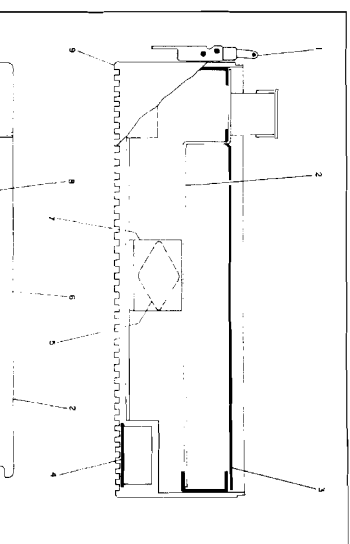
PARTS LIST

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

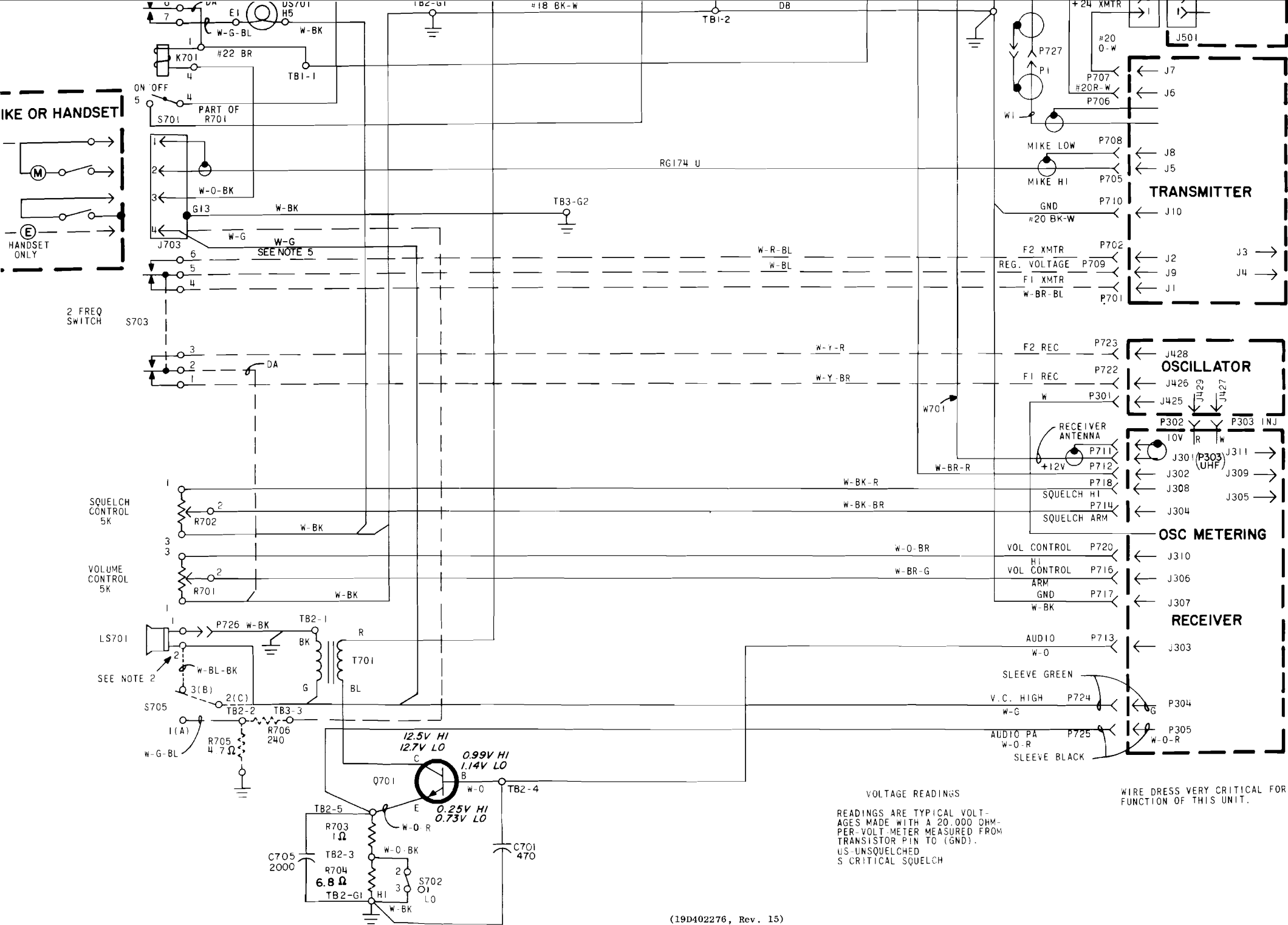
SYMBOL	G-E PART NO.	DESCRIPTION
C501 and C502	19A115028-P19	----- CAPACITORS ----- Polyester: 0.47 μ f $\pm$ 20%, 100 VDCW.
C503	5493132-P9	Electrolytic: 500 μ f +100% -10%, 50 VDCW; sim to Sprague 44D.
C504	19A115680-P4	Electrolytic: 50 μ f +150% -10%, 25 VDCW; sim to Mallory Type TT.
C505	19A115028-P411	Polyester: .047 μ f $\pm$ 5%, 200 VDCW.
C506	19B209243-P1	Polyester: .01 μ f $\pm$ 20%, 40 VDCW.
C507 and C508	19A115680-P9	Electrolytic: 120 μ f +150% -10%, 26 VDCW; sim to Mallory Type TT.
C509	5496267-P17	Tantalum, dry solid: 1 μ f $\pm$ 20%, 35 VDCW; sim to Sprague Type 150D.
C510	7489483-P4	Electrolytic: 50 μ f +75% -10%, 6 VDCW; sim to Sprague 30D133AL.
C511 and C512	19A115680-P6	Electrolytic: 50 μ f +150% -10%, 50 VDCW; sim to Mallory Type TT.
C513 and C514	19A115680-P9	Electrolytic: 120 μ f +150% -10%, 26 VDCW; sim to Mallory Type TT.
C515 and C516	19A115680-P10	Electrolytic: 200 μ f +150% -10%, 18 VDCW; sim to Mallory Type TT.
C517	7161189-P2	Ceramic disc: 0.1 μ f +80% -30%, 50 VDCW; sim to Sprague 36C172.
C518	5494481-P13	Ceramic disc: 2000 pf $\pm$ 20%, 1000 VDCW; sim to RMC Type JF Discap.
C519	7774750-P15	Ceramic disc: .02 μ f +100% -0%, 500 VDCW.
C520	7489162-P39	Silver mica: 330 pf $\pm$ 5%, 500 VDCW; sim to Electro Motive Type DM-15.
C521	19B209243-P107	Polyester: 0.1 μ f $\pm$ 10%, 50 VDCW. Added by REV. B.
CR501	4037822-P1	----- DIODES AND RECTIFIERS ----- Silicon.
CR502*	19A115823-P1	Silicon. In earlier than REV. A.
	19A115557-P1	Silicon.
CR502	19A115557-P1	Silicon.
CR503 thru CR512	4037822-P1	Silicon.
SCR501	19A115747-P1	Silicon controlled.
J501	19A121226-P1	----- JACKS AND RECEPTACLES ----- Connector, phen: 8 female contacts; sim to BH Jones 261-32-08-000 (modified).

SYMBOL	G-E PART NO	DESCRIPTION
		- - - - - INDUCTORS - - - - -
L501 and L502	7143944-P2	Choke, RF: 120 μ h $\pm 10\%$, .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 operating.
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 2N3646.
Q508	19A115562-P1	Silicon, PNP.
		- - - - - RESISTORS - - - - -
R501 and R502	3R77-P272K	Fixed composition: 2700 ohms $\pm 10\%$, 1/2 w.
R503	3R77-P271K	Fixed composition: 270 ohms $\pm 10\%$, 1/2 w.
R504	5493035-P9	Wirewound: 300 ohms $\pm 5\%$, 5 w; sim to Tru-Ohm Type X-60.
R505	3R77-P302K	Fixed composition: 3000 ohms $\pm 10\%$, 1/2 w.
R506 and R507	3R77-P302J	Fixed composition: 3000 ohms $\pm 5\%$, 1/2 w.
R508	19A115681-P1	Variable, wirewound: 1000 ohms $\pm 20\%$, 3 w; sim to CTS Series 115.
R509	3R77-P101K	Fixed composition: 100 ohms $\pm 10\%$, 1/2 w.
R510	3R77-P330J	Fixed composition: 33 ohms $\pm 5\%$, 1/2 w.
R511	3R78-P102K	Fixed composition: 1000 ohms $\pm 10\%$, 1 w.
R512	3R77-P821K	Fixed composition: 820 ohms $\pm 10\%$, 1/2 w.
R513	19A115681-P2	Variable, wirewound: 5000 ohms $\pm 20\%$, 3 w; sim to CTS Series 115.
R514	3R77-P331J	Fixed composition: 330 ohms $\pm 5\%$, 1/2 w.
R515	3R77-P301J	Fixed composition: 300 ohms $\pm 5\%$, 1/2 w.
R516	3R77-P561K	Fixed composition: 560 ohms $\pm 10\%$, 1/2 w.
R517	3R77-P103K	Fixed composition: 10,000 ohms $\pm 10\%$, 1/2 w.
R518	5493948-P217	Deposited carbon: 1470 ohms $\pm 1\%$, 1/2 w; sim to Texas Instrument Type CD1/2MR.
R519	5493035-P23	Wirewound: 2 ohms $\pm 5\%$, 7 w; sim to Tru-Ohm Type X-61.
R520	3R77-P300J	Fixed composition: 30 ohms $\pm 5\%$, 1/2 w.
R521	3R77-P102K	Fixed composition: 1000 ohms $\pm 10\%$, 1/2 w.
R522	5493948-P205	Deposited carbon: 1100 ohms $\pm 1\%$, 1/2 w; sim to Texas Instrument Type CD1/2MR.

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 TBU 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-8314-2.
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	19DA02428-P1	Casting.
10	M404P25C13	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	M402P11C13	Platwasher. (For 1/4 screw).
15	N210P20C13	Nut: 1/4 - 28.



Changes in the equipment identified by a "Revision" of the unit. The revision of the unit. The revision of the unit. Refer to the parts list for

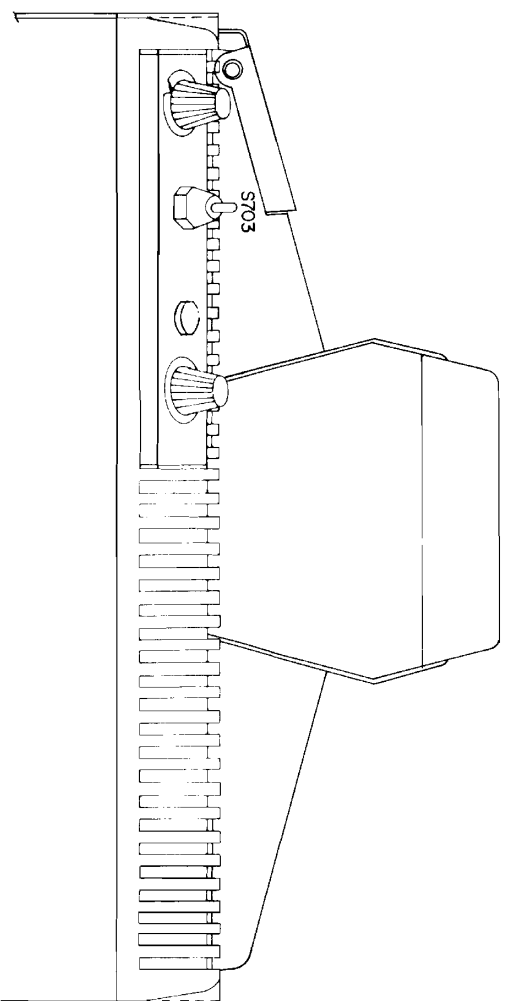


SERVICE SHEET

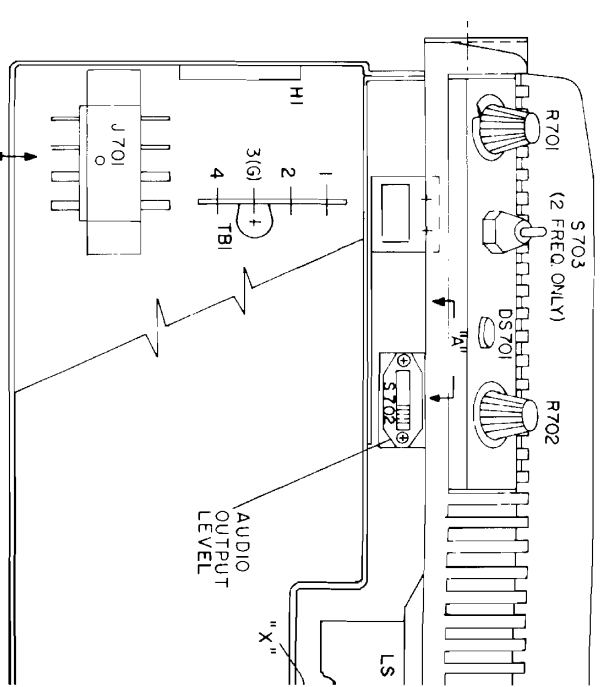
CONTROL UNIT
MODEL 4EC60A10, 12, 16 & 19

(RC-1075F)

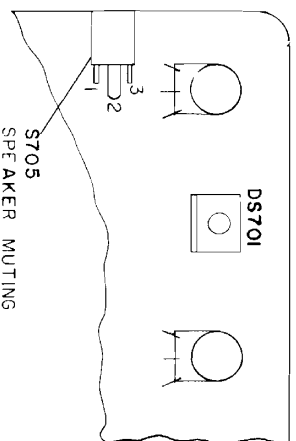
MODELS 4EC60A16 & 4EC60A19



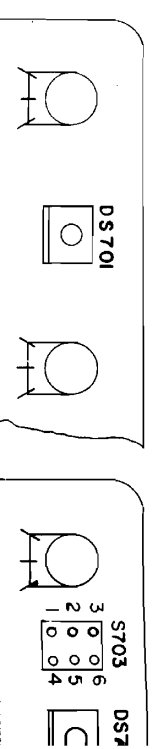
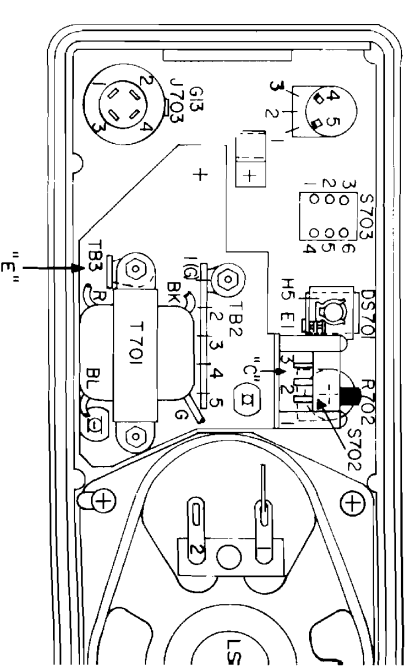
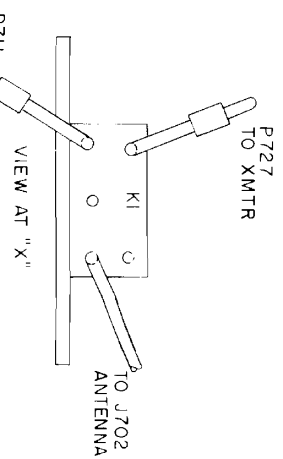
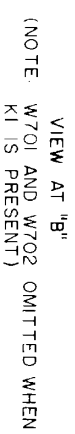
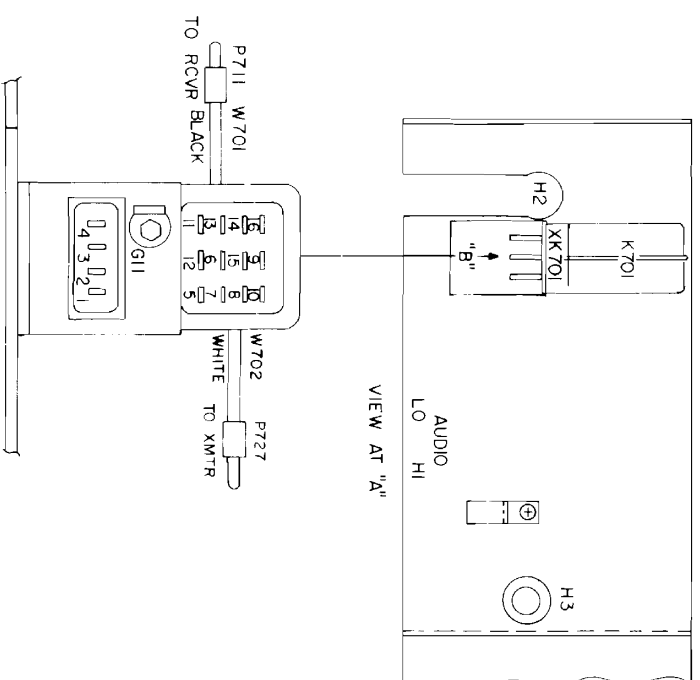
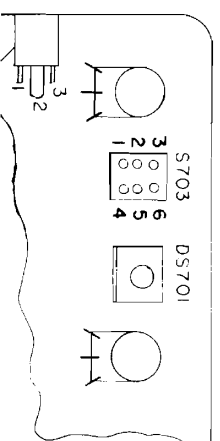
MODELS 4EC60A10 & 4EC60A12

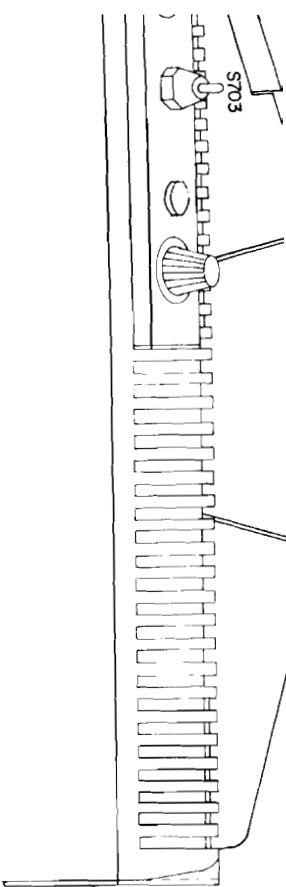


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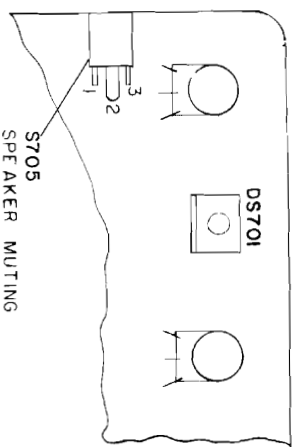


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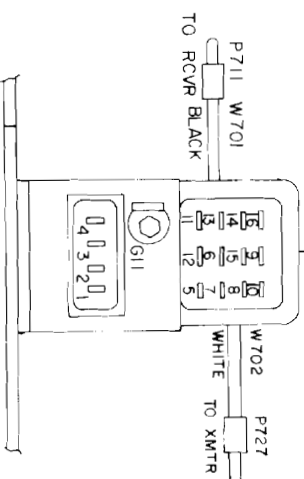
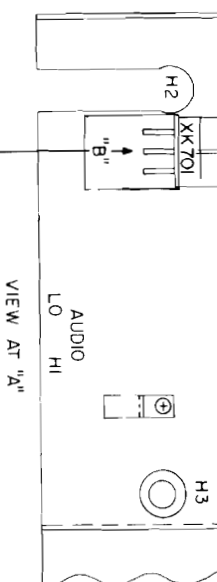
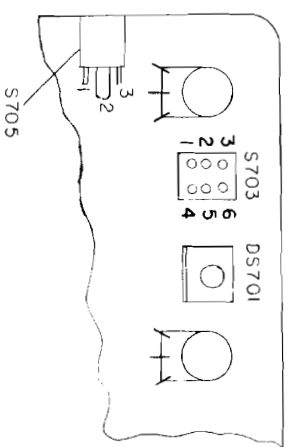




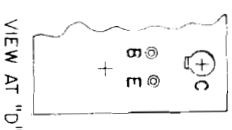
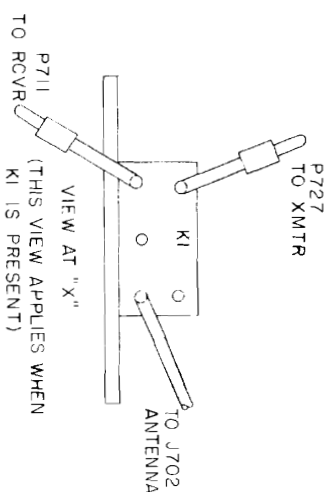
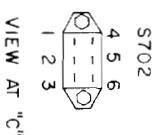
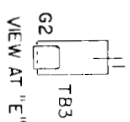
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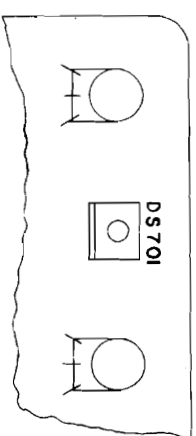
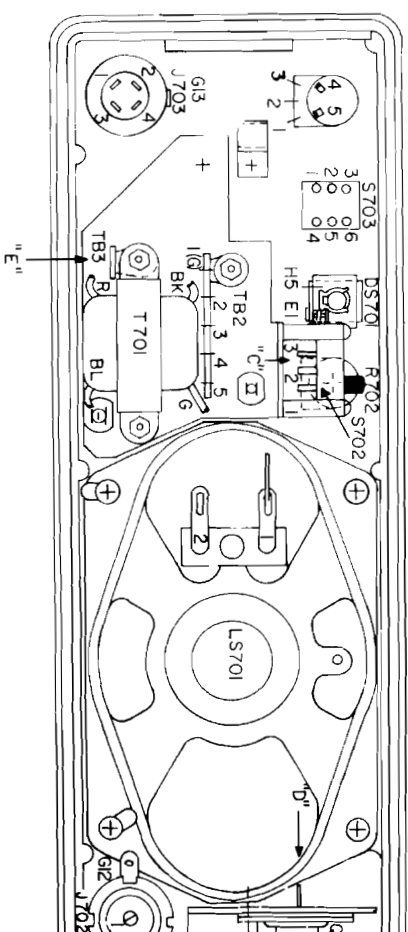
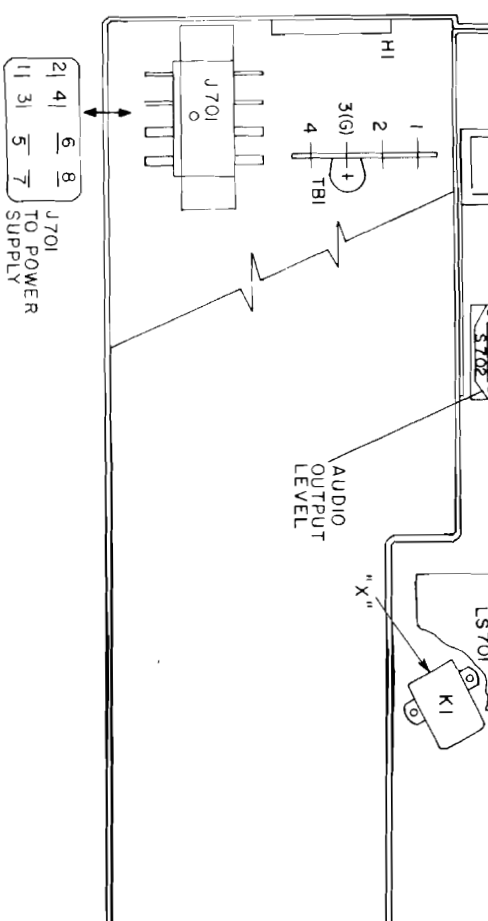
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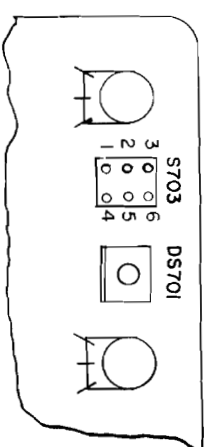
VIEW AT "B"
(NOTE W701 AND W702 OMITTED WHEN KI IS PRESENT)



(19D402604, Rev. 1)



MODEL 4EC60A10
1 FREQ



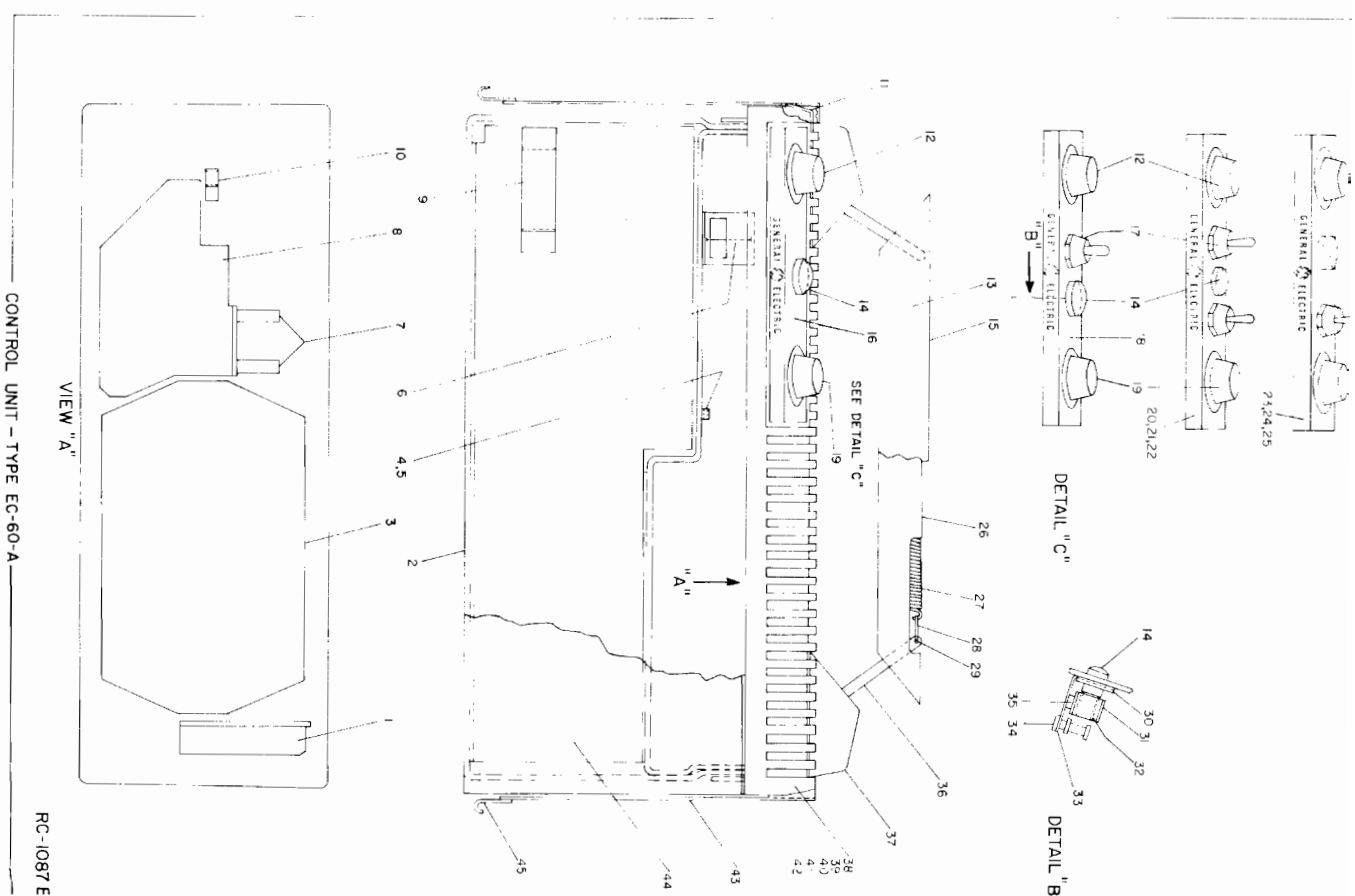
MODEL 4EC60A12
2 FREQ

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*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

all tip; rocket; sim to	Model 4EVI9C12 162-166 MHZ Model 4EVI9C13 166-174 MHZ Model 4EVI9C14 406-420 MHZ Model 4EVI9C15 450-470 MHZ
plastic metal aluminum brass steel others RP-	MECHANICAL PARTS (SEE RC-1087)
1	19A121154-PI Support. (Used with QT01).
2	19B204532-GI Chassis Assembly.
3	19B204527-PI Diaphragm.
4	7763541-P3 Clip. (Used with Channel Guard and Selective Calling only).
5	5491585-P9 Spring, retainer; sim to Allied Control 30040-2. (Used with K701).
6	7142162-P98 Spacer. (Used with R702).
7	19A121174-GI Chassis Assembly.
8	19A121178-PI Support. (Used with J701).
9	19A121199-PI Clip.
10	19A121215-PI Spring. (Used in Models 4EC60A10, 12 only).
11	19B204639-G2 Knob Assembly.
12	19C303537-GI Handle Assembly: (Includes items 15, 22, 27, 28, 29 and 36). (Used in Models 4EC60A10 and 4EC60A12 only).
13	19B204949-PI Jewel: red plastic; sim to Rohm and Haas 2444.
14	19B204492-PI Extrusion. (Part of Handle Assembly, 19C303537-GI)
15	NP243498 Nameplate: etched aluminum. (Used in Models 4EC60A10 and 4EC60A16 only).
16	5490135-P3 Boot, dust and moisture seal: silicon rubber; sim to AMP-Hexseal N-5032-B. (Used in Models 4EC60A12 and 4EC60A19 only).
17	NP243497 Nameplate: etched aluminum. (Used in Models 4EC60A12 and 4EC60A19 only).
18	19B204639-GI Knob Assembly. (Used with R702).
19	(Used in Model 4EC60A20 only).
20	(Used in Model 4EC60A15 only).
21	(Used in Model 4EC60A21 only).
22	(Used in Model 4EC60A14 only).
23	(Used in Model 4EC60A17 only).
24	(Used in Model 4EC60A18 only).
25	Handle. (Part of Handle Assembly, 19C303537-GI).
26	Spring. (Part of Handle Assembly, 19C303537-GI).
27	Retainer. (Part of Handle Assembly, 19C303537-GI)
28	Pin, dowel. (Part of Handle Assembly, 19C303537-GI).
29	Nut, speed: sim to Timmerman CI20046017-67.
30	Clip, spring tension: sim to Augat Brothers 6007.
31	Sleeving, insulation: 30 inches long.
32	Bracket.
33	

44	19B204501-GI Case Assembly.
45	4029994-PI Strike: chrome plated steel.
46	N509PI912C Pin, dowel. (Used in Models 4EC60A16, 19 only).
47	19A121741-PI Spring. (Used in Models 4EC60A16, 19 only).
48	19B204963-PI Lever. (Used in Models 4EC60A16, 19 only).
49	19C303679-PI Casting. (Used in Models 4EC60A16, 19 only).
50	19B204964-PI Handle. (Used in Models 4EC60A16, 19 only).
51	19A121742-PI Spacer. (Used in Models 4EC60A16, 19 only).
52	19B204965-PI Spring. (Used in Models 4EC60A16, 19 only).
53	19C303679-P2 Casting. (Used in Models 4EC60A16, 19 only).
54	N648P9004 Screw: Cap (Used for mounting handle).



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 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 between J5701-2 and J703-4.

REV. C - (Models 4EC60A16 & 19)

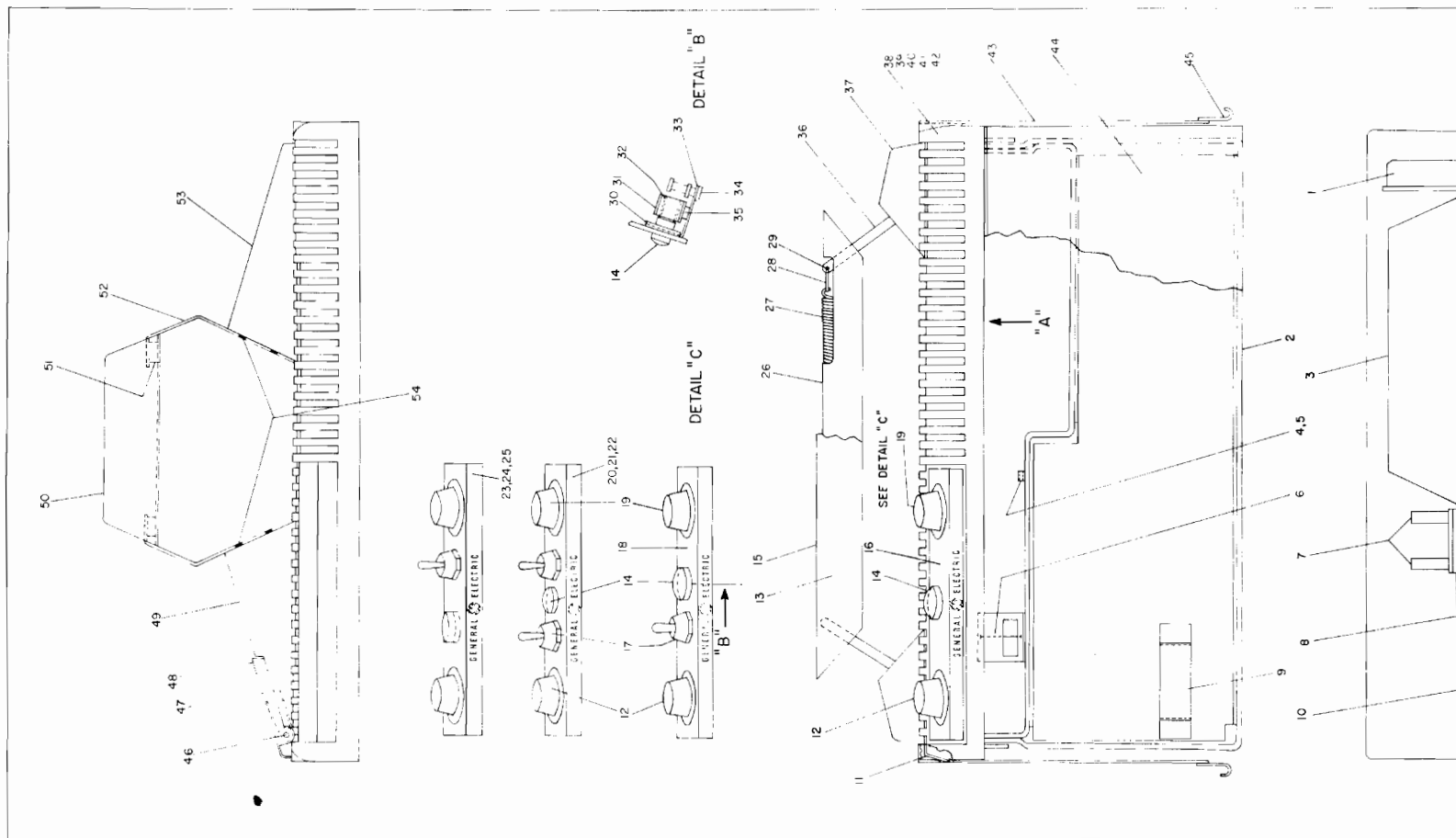
REV. D - (Models 4EC60A10 & 12)

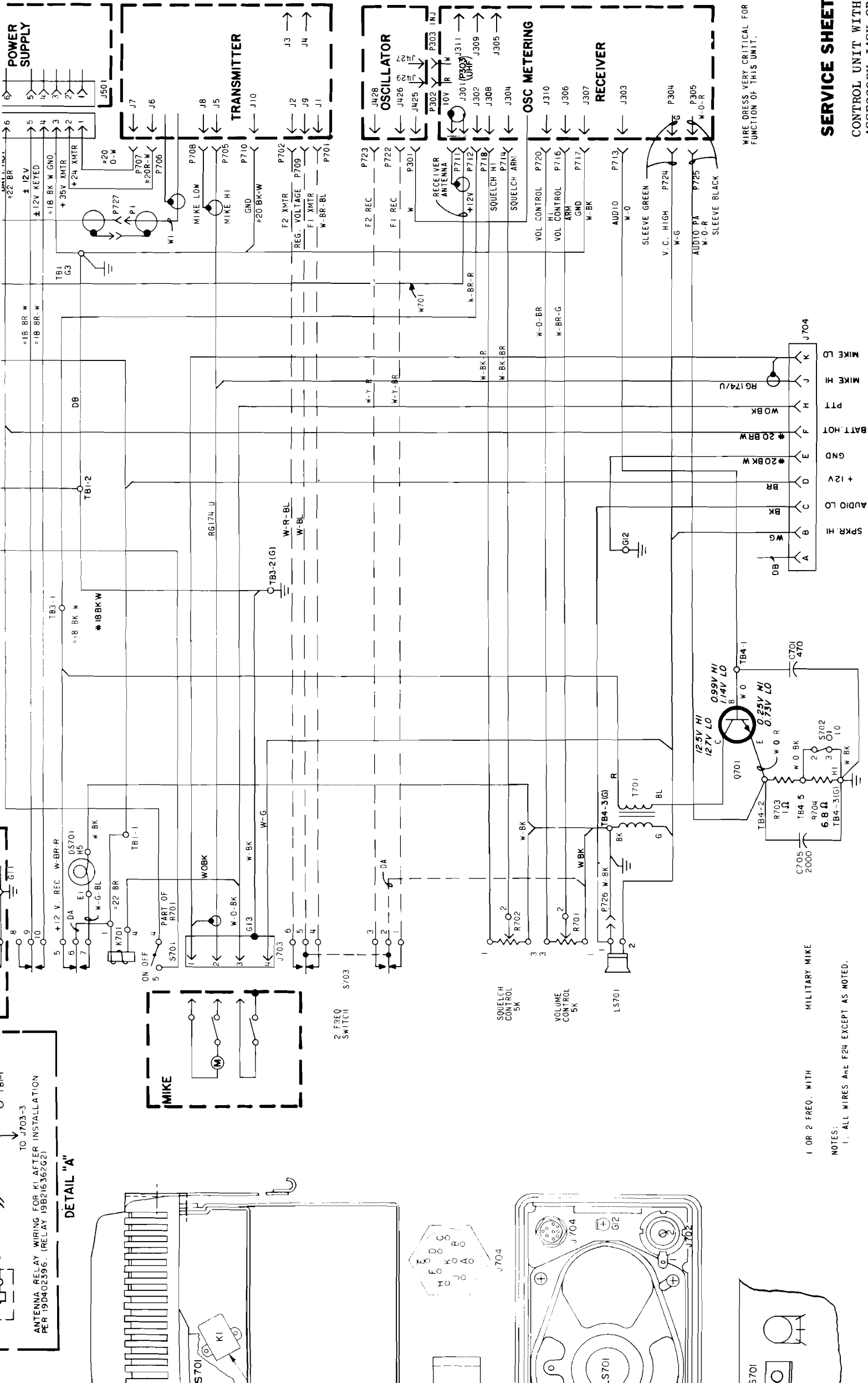
To incorporate an improved relay. Changed K701.

REV. D - (Models 4EC60A16 & 19)

REV. E - (Models 4EC60A10 & 12)

To eliminate instability of the receiver PA caused by the use of a higher gain PA transistor. Added C705 from the emitter of Q701 to the chassis.

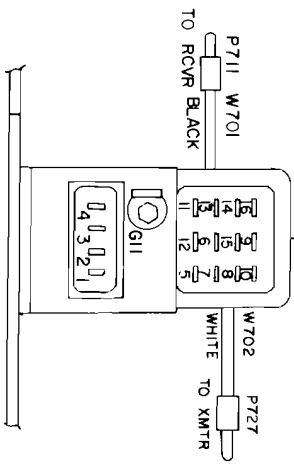
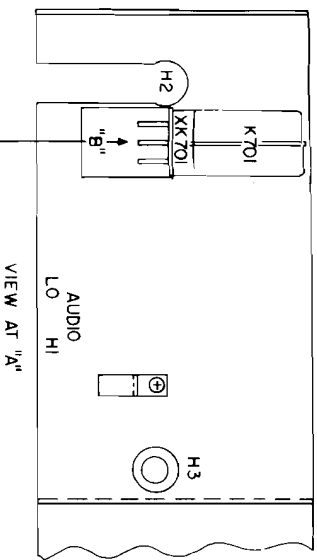




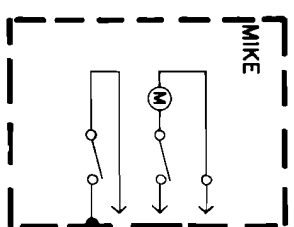
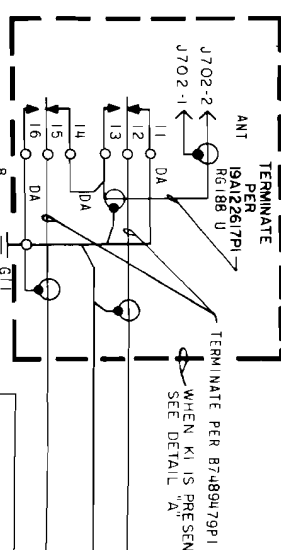
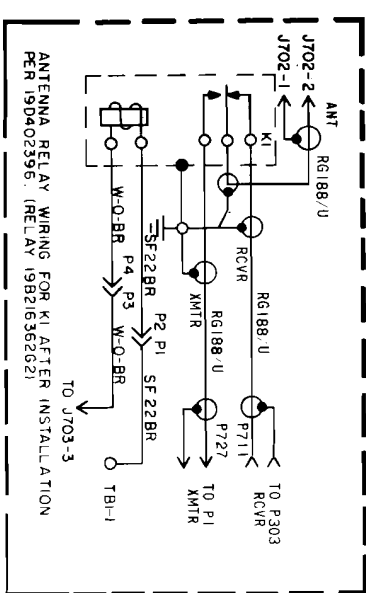
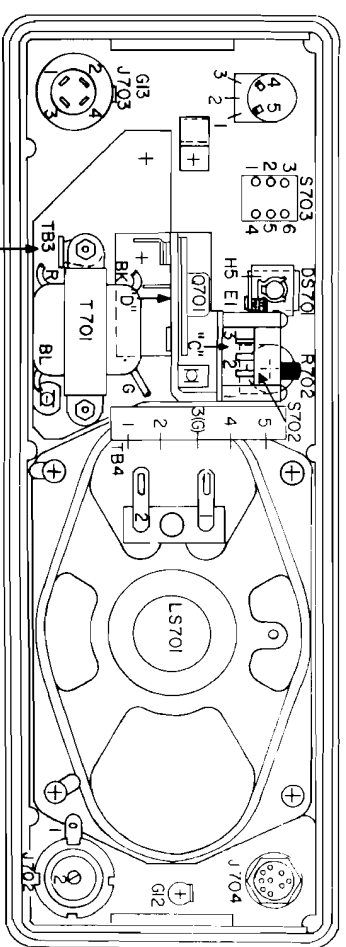
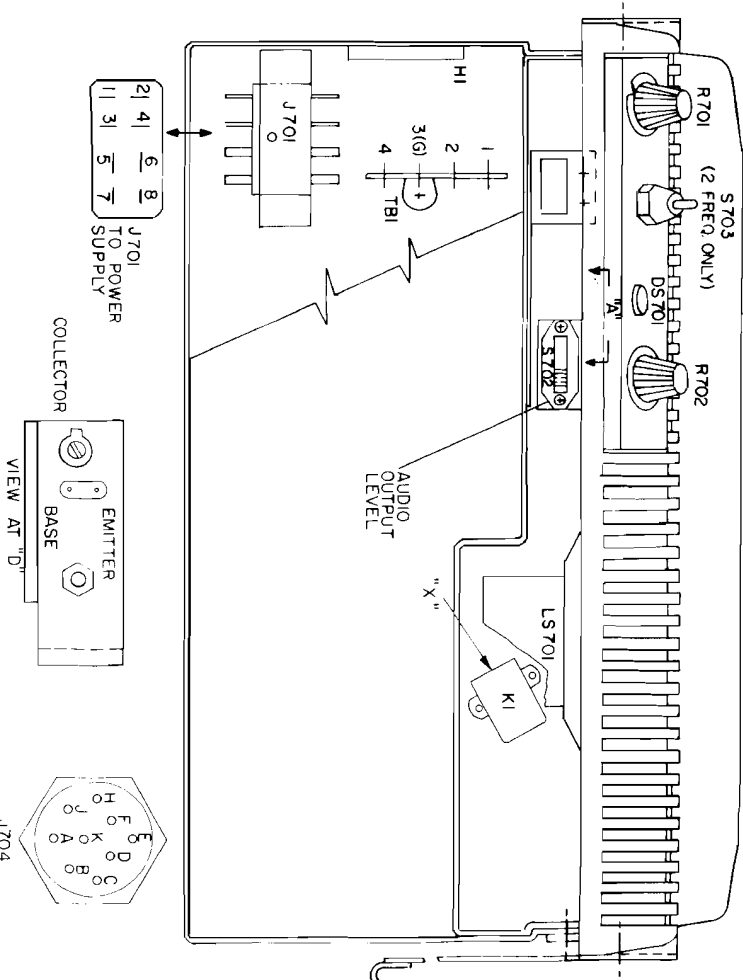
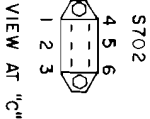
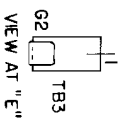
SERVICE SHEET

CONTROL UNIT WITH
ACCESSORY JACK OPTION
MODELS 4EC60A22 & 24

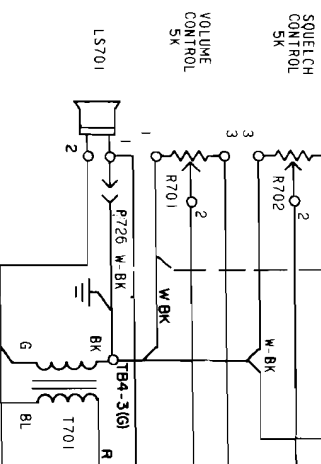
WIRE DRESS VERY CRITICAL FOR PROPER
FUNCTION OF THIS UNIT.

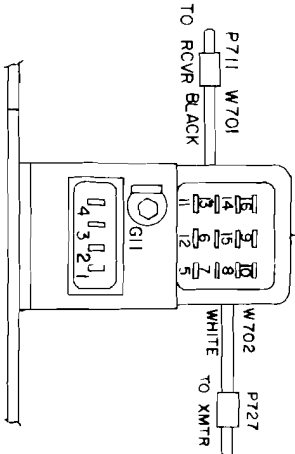
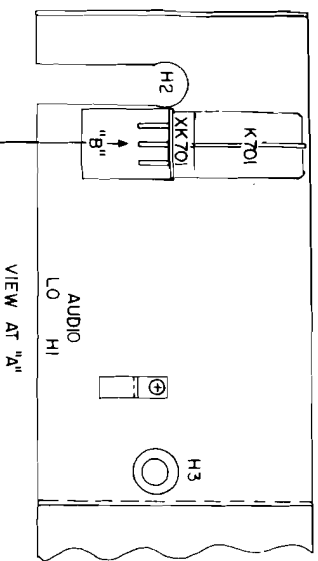


(NOTE: W701 AND W702 OMITTED WHEN KI IS PRESENT)

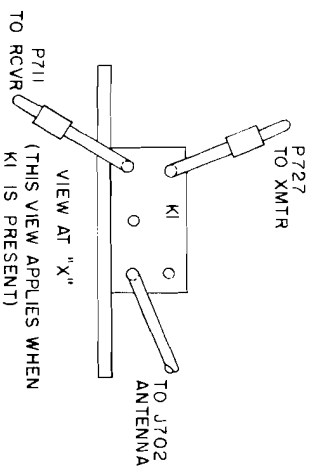
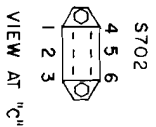


2 FREQ SWITCH S703

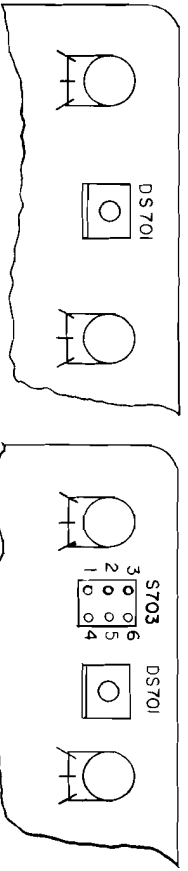
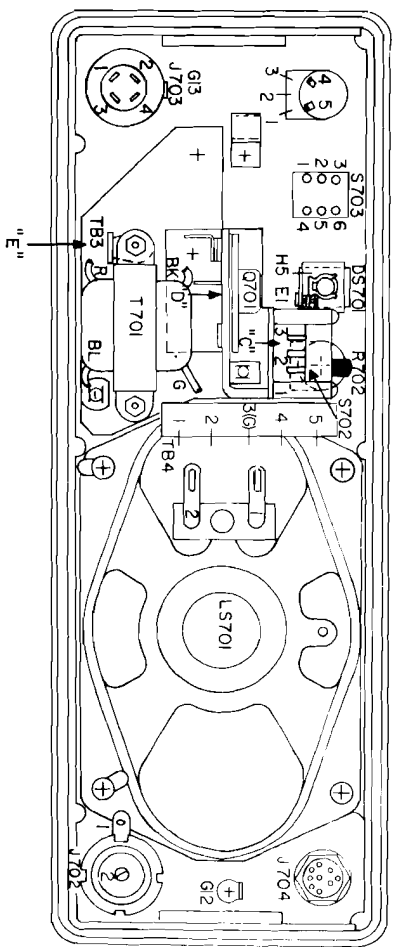
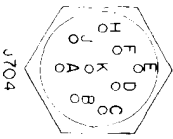
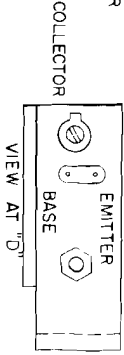
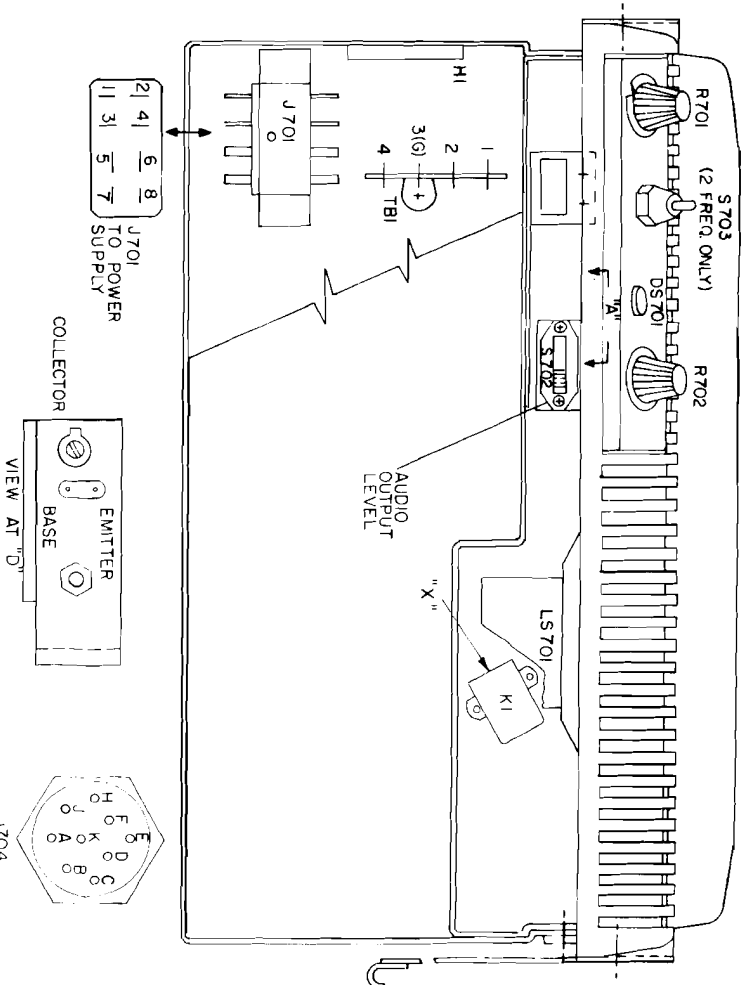




VIEW AT "B"
(NOTE: W701 AND W702 OMITTED WHEN KI IS PRESENT)



VIEW AT "X"
(THIS VIEW APPLIES WHEN KI IS PRESENT)

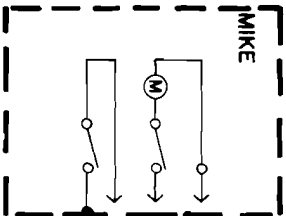


1 FREQ
4EC60A22

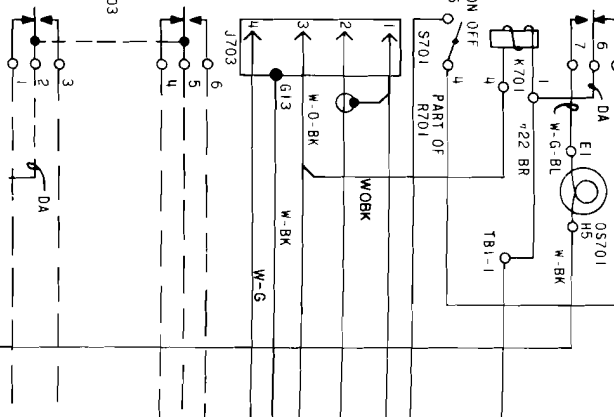
2 FREQ
4EC60A24

(19D402791, Rev. 1)

DETAIL A

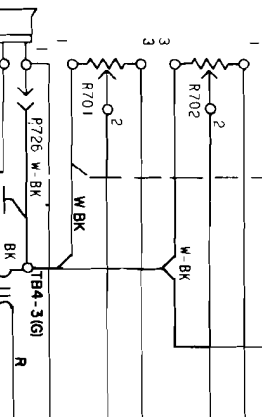


2 FREQ
SWITCH S703



SQUELCH
CONTROL 5K

VOLUME
CONTROL 5K



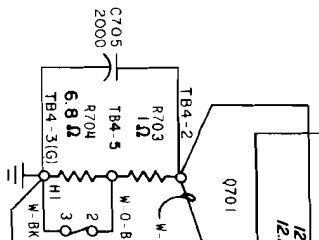
1 OR 2 FREQ. WITH
MILITARY MIKE

NOTES:

1. ALL WIRES ARE F24 EXCEPT AS NOTED.

3. ALL DASHED LINES ARE OPTION.

4. SLEEVE CONNECTIONS TO J701, K701 AND P701-P726.



PARTS LIST

LBI-3727A

CONTROL UNIT
 MODEL 4EC60A22 19D402279-G13 (Single Frequency) REV C
 MODEL 4EC60A24 19D402279-G15 (Two Frequency) REV C

SYMBOL	G-E PART NO.	DESCRIPTION
----- CAPACITORS -----		
C701	5494481-P7	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW.
C705*	5494481-P14	Ceramic disc: 2000 pf $\pm 10\%$, 1000 VDCW. Added by Rev C.
----- INDICATING DEVICES -----		
DS701	4034664-P1	Lamp, incandescent: 28 v, .04 amp; sim to GE 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-P15	Armature: 12 VDC nominal, 130 ohms res $\pm 10\%$, 4 form C contacts; sim to Allied Control T154.
	19C307010-P5	In Models earlier than Rev B: Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T154.
----- LOUDSPEAKERS -----		
LS701	19C307094-P1	Permanent magnet: 3.2 ohms $\pm 10\%$ voice coil imp., 3 w input, 325 ± 50 Hz resonance, paper dust cap; sim to Oaktron S7473.
----- PLUGS -----		
P701 and P702	4029840-P2	Contact, electrical; sim to Amp 42827-2. (Used in Models 4EC60A24 only).
P705	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P706 thru P708	4029840-P1	Contact, electrical; sim to Amp 41854.
P709	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P710	4029840-P1	Contact, electrical; sim to Amp 41854.
P712 thru P714	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P716 thru P718	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P720	4029840-P2	Contact, electrical; sim to Amp 42827-2.
P722 and P723	4029840-P2	Contact, electrical; sim to Amp 42827-2. (Used in Models 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.

SYMBOL	G-E PART NO	DESCRIPTION
R702	19C300097-P9	Variable, carbon film: 5000 ohms $\pm 20\%$, 1.4 w; sim to Mallory Type MLC.
R703	19B209022-P115	Wirewound, phen: 1 ohm $\pm 10\%$, 2 w; sim to IRC Type BWH.
R704	19B209022-P135	Wirewound, phen: 6.8 ohms $\pm 10\%$, 2 w; sim to IRC Type BWH.
----- 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 μ a 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 KHz, Pri 1: 55 ohms $\pm 10\%$ imp at 1 w, 0.895 ohm $\pm 10\%$ DC res, Sec 1: 3.2 ohms $\pm 10\%$ at 1 w, 0.168 ohm max DC res.
----- TERMINAL BOARDS -----		
TB1	7775500-P8	Phen: 4 terminals.
TB3	7775500-P44	Phen: 2 terminals.
TB4	7775500-P11	Phen: 5 terminals.
----- CABLES -----		
W701		CABLE ASSEMBLY 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.
----- CABLE ASSEMBLY -----		
W702		CABLE ASSEMBLY 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 -----		
		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.
----- ANTENNA RELAY KIT -----		
		19B216362-G2 (Includes J702 and K1)
----- POWER SUPPLY EXTENSION CABLE ASSEMBLY -----		
		19B204289-G1

SYMBOL	G-E PART NO	DESCRIPTION
		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 4EM33D10
----- MISCELLANEOUS -----		
		Switch: moisture proof. Shure Brothers RP-33.
		Cable and Plug Assembly. Approx 5 feet. Shure Brothers RP-35.
		Button, switch: red plastic. Shure Brothers RP-34.
		Cartridge, transmitter: controlled magnetic. Shure Brothers RP-32.
		Case, Mounting button and Nameplate: plastic. Shure Brothers RP-31.
		Shield. Shure Brothers RP-36.
----- HANDSET -----		
		MODEL 4EM33C10
----- MISCELLANEOUS -----		
		Switch. Shure Brothers RP-33.
		Cable and plug: approx 5 feet. Shure Brothers RP35.
		Button: red plastic. Shure Brothers RP-34.
		Cartridge, magnetic controlled. Shure Brothers RP-32.
		Case, mounting button and nameplate: plastic.
		Shield. Shure Brothers RP36.
----- PORTABLE ANTENNA -----		
		MODELS 4EY18A10-13 (Low Band)
----- MISCELLANEOUS -----		
	19C303707-G1	25-31 MHz 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.
	19C303707-G2	31-36 MHz 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.
	19C303707-G3	36-42 MHz 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.
	19C303707-G4	42-50 MHz 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 -----		

SYMBOL	G-E PART NO
3	7763541-P3
4	
5	5491595-P9
6	7142162-P98
7	19B205490-P1
8	19A121174-G2
9	19A121178-P1
10	19A121199-P1
11	19A121215-P1
12	19B204639-G2
13	19C303537-G1
14	19B204949-P1
15	19B204492-P1
16	NP243498
17	5490135-P3
18	NP243497
19	19B204639-G1
20	
21	
22	19C303538-P1
23	19A121363-P1
24	19A121173-P1
25	N533P1308
26	4031053-P6
27	4035711-P4
28	7150727-P116
29	19A121730-P1
30	4034512-P3
31	7142162-P96
32	19A121343-G1
33	19C303427-P1
34	19C303457-P7
35	19C303457-P9
36	
37	
38	
39	19A121169-G1
40	19B204501-G1
41	4029994-P1

	SYMBOL	G-E PART NO	DESCRIPTION	SYMBOL	G-E PART NO	DESCRIPTION
20%, 1/4 w:			AUTO GUTTER MOUNT ANTENNA MODEL 4EY20A10 (High Band)	3	7763541-P3	Clip.
sim to IRC				4		(Used with Channel Guard and Selective Calling only).
w; sim to			----- MISCELLANEOUS -----	5	5491595-P9	Spring, retainer; sim to Allied Control 30040-2. (Used with K701).
-----		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.	6	7142162-P98	Spacer. (Used with R702).
to Continen-		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.	7	19B205490-P1	Heat sink. (Used with Q701).
to Arrow-Hart EC60A24 only).				8	19A121174-G2	Chassis Assembly.
-----				9	19A121178-P1	Support. (Used with J701).
KHz,			MICROPHONE MODEL 4EM33D10	10	19A121199-P1	Clip.
895 ohm ±10%			----- MISCELLANEOUS -----	11	19A121215-P1	Spring.
ohm max DC			Switch: moisture proof. Shure Brothers RP-33.	12	19B204639-G2	Knob Assembly.
-----			Cable and Plug Assembly. Approx 5 feet. Shure Brothers RP-35.	13	19C303537-G1	Handle Assembly. (Includes items 15, 22, 23, 24, 25 and 32).
-----			Button, switch: red plastic. Shure Brothers RP-34.	14	19B204949-P1	Jewel: red plastic; sim to Rohm and Haas 2444.
-----			Cartridge, transmitter: controlled magnetic. Shure Brothers RP-32.	15	19B204492-P1	Extrusion. (Part of Handle Assembly, 19C303537-G1.
-----			Case, Mounting button and Nameplate: plastic. Shure Brothers RP-31.	16	NP243498	Nameplate; etched aluminum. (Used in Model 4EC60A22 only).
-----			Shield. Shure Brothers RP-36.	17	5490135-P3	Boot, dust and moisture seal: silicon rubber; sim to APW-Hexseal N-5032-B. (Used in Model 4EC60A24 only).
-----				18	NP243497	Nameplate; etched aluminum. (Used in Model 4EC60A24 only).
FRX 27-1.			HANDSET MODEL 4EM33C10	19	19B204639-G1	Knob Assembly. (Used with R702).
-----			----- MISCELLANEOUS -----	20		(Used in Model 4EC60A27 only).
RG-174/U.			Switch. Shure Brothers RP-33.	21		(Used in Model 4EC60A26 only).
-----			Cable and plug: approx 5 feet. Shure Brothers RP35.	22	19C303538-P1	Handle. (Part of Handle assembly, 19C303537-G1).
-----			Button: red plastic. Shure Brothers RP-34.	23	19A121363-P1	Spring. (Part of Handle assembly, 19C303537-G1).
-----			Cartridge, magnetic controlled. Shure Brothers RP-32.	24	19A121173-P1	Retainer. (Part of Handle assembly, 19C303537-G1).
FXR 27-2.			Case, mounting button and nameplate: plastic.	25	N533P1308	Pin, dowel. (Part of Handle assembly, 19C303537-G1).
-----			Shield. Shure Brothers RP36.	26	4031053-P6	Nut, speed; sim to Tinnerman C120046017-67.
-188/U.				27	4035711-P4	Clip, spring tension; sim to Augat Brothers 6007-8-CT.
-----				28	7150727-P116	Sleeving, insulation: 30 inches long, 0.198 inch inside diameter.
-----				29	19A121730-P1	Bracket.
Allied Control			PORTABLE ANTENNA MODELS 4EY18A0-13 (Low Band)	30	4034512-P3	Terminal, feed-thru, insulated; sim to Sealectro RST-MM-10-TUR.
-----			----- MISCELLANEOUS -----	31	7142162-P96	Spacer.
EMBLV		19C303707-G1	25-31 MHz 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.	32	19A121343-G1	Support Assembly. (Part of Handle assembly, 19C303537-G1).
-----		19C303707-G2	31-36 MHz 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.	33	19C303427-P1	Casting.
to Birnbach		19C303707-G3	36-42 MHz 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-431GE.	34	19C303457-P7	Casting. (Used in Model 4EC60A22 only).
polarized, XLR-4-11C.		19C303707-G4	42-50 MHz 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.	35	19C303457-P9	Casting. (Used in Model 4EC60A24 only).
DC; sim to				36		(Used in Model 4EC60A23 only).
-----				37		(Used in Models 4EC60A25, 26 only).
-----				38		(Used in Model 4EC60A27 only).
-----				39	19A121169-G1	Support Assembly.
-----				40	19B204501-G1	Case Assembly.
-----				41	4029994-P1	Strike: chrome plated steel.

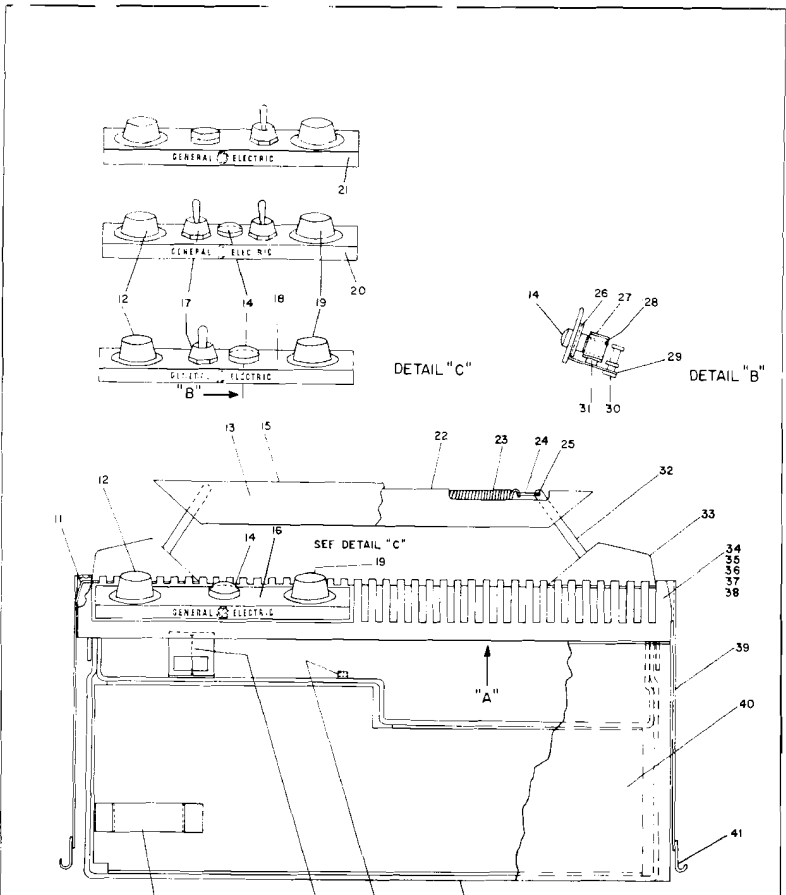
PRODUCTION CHANGES

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.

REV. B - To incorporate an improved relay. Changed K701.

REV. C - To eliminate instability of the receiver PA caused by the use of a higher gain PA transistor. Added C705 from the emitter of Q701 to the chassis.



del 4EC60A24 only).

3-3 KHz,
w, 0.895 ohm $\pm 10\%$
0.168 ohm max DC

*S

SEMBLY
-i-G1

sim to FRX 27-1.

JS

Type RG-174/U.

SEMBLY
-s-G2

sim to FXR 27-2.

JS

Type RG-188/U.

sim to Allied Control

LE ASSEMBLY
-3-G1

JS

s; sim to Birnhach

acts, polarized,
annon XLR-4-11C.

12 VDC; sim to

KIT
2

nd X1)

N CABLE ASSEMBLY
-3-G1

JS

s, cable clamp in
3-030.

cable clamp in cap;

feet long.

1

2

MICROPHONE
MODEL 4EM33D10

MISCELLANEOUS

Switch: moisture proof. Shure Brothers RP-33.

Cable and Plug Assembly. Approx 5 feet.
Shure Brothers RP-35.

Button, switch: red plastic. Shure Brothers RP-34.

Cartridge, transmitter: controlled magnetic.
Shure Brothers RP-32.

Case, Mounting button and Nameplate: plastic.
Shure Brothers RP-31.

Shield. Shure Brothers RP-36.

HANDSET
MODEL 4EM33C10

MISCELLANEOUS

Switch. Shure Brothers RP-33.

Cable and plug: approx 5 feet. Shure Brothers
RP35.

Button: red plastic. Shure Brothers RP-34.

Cartridge, magnetic controlled. Shure Brothers
RP-32.

Case, mounting button and nameplate: plastic.

Shield. Shure Brothers RP36.

PORTABLE ANTENNA
MODELS 4EY18A10-13
(Low Band)

MISCELLANEOUS

25-31 MHz 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.

31-36 MHz 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.

36-42 MHz 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.

42-50 MHz 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 4EY19C14 406-420 MHz
Model 4EY19C15 450-470 MHz

MECHANICAL PARTS

(SEE RC-1397)

Chassis Assembly.

Diaphragm.

11

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40

41

19A121215-P1

19B204639-G2

19C303537-G1

19B204949-P1

19B204492-P1

NP243498

5490135-P3

NP243497

19B204639-G1

19C303538-P1

19A121363-P1

19A121173-P1

N533P1308

4031053-P6

4035711-P4

7150727-P116

19A121730-P1

4034512-P3

7142162-P96

19A121343-G1

19C303427-P1

19C303457-P7

19C303457-P9

19A121169-G1

19B204501-G1

4029994-P1

Spring.

Knob Assembly.

Handle Assembly. (Includes items 15, 22, 23, 24,
25 and 32).

Jewel: red plastic; sim to Rohm and Haas 2444.

Extrusion. (Part of Handle Assembly, 19C303537-G1.

Nameplate; etched aluminum. (Used in Model
4EC60A22 only).

Boot, dust and moisture seal: silicon rubber;
sim to APM-Hexseal N-5032-B. (Used in Model
4EC60A24 only).

Nameplate; etched aluminum. (Used in Model
4EC60A24 only).

Knob Assembly. (Used with R702).

(Used in Model 4EC60A27 only).

(Used in Model 4EC60A26 only).

Handle. (Part of Handle assembly, 19C303537-G1).

Spring. (Part of Handle assembly, 19C303537-G1).

Retainer. (Part of Handle assembly, 19C303537-G1).

Pin, dowel. (Part of Handle assembly,
19C303537-G1).

Nut, speed; sim to Tinnerman C120046017-67.

Clip, spring tension; sim to Augat Brothers
6007-8-CT.

Sleeving, insulation: 30 inches long, 0.198
inch inside diameter.

Bracket.

Terminal, feed-thru, insulated; sim to Sealectro
RST-MM-10-TUR.

Spacer.

Support Assembly. (Part of Handle assembly,
19C303537-G1).

Casting.

Casting. (Used in Model 4EC60A22 only).

Casting. (Used in Model 4EC60A24 only).

(Used in Model 4EC60A23 only).

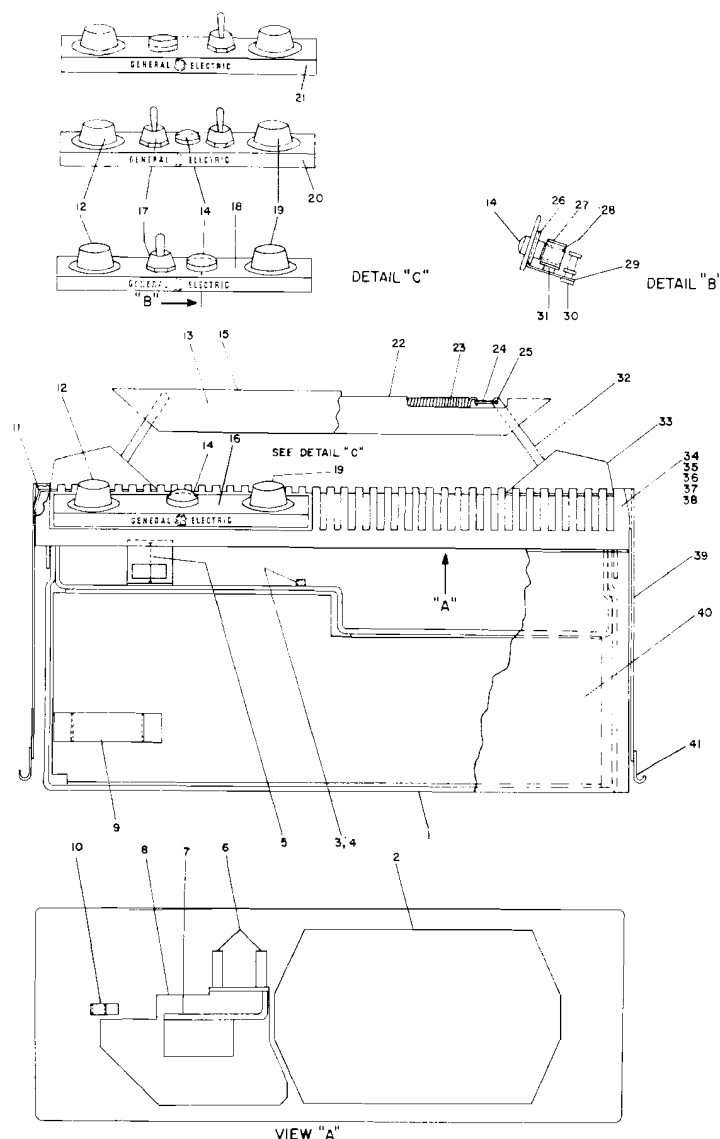
(Used in Models 4EC60A25, 26 only).

(Used in Model 4EC60A27 only).

Support Assembly.

Case Assembly.

Strike: chrome plated steel.



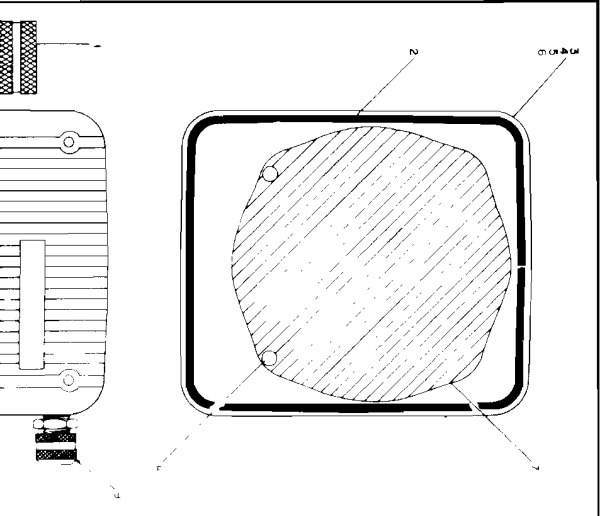
PARTS LIST

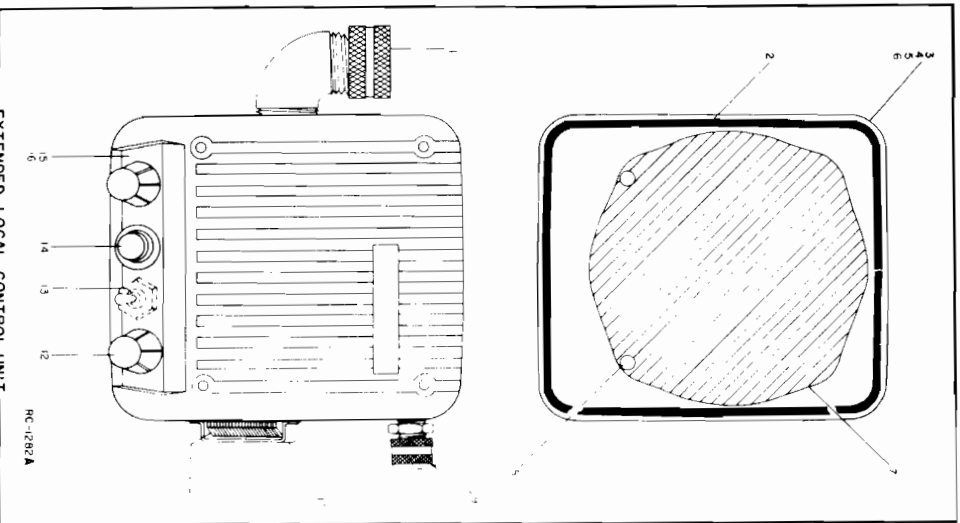
LB1-3668D

MODEL 4EC6A10	CONTROL UNIT	(1 Frequency)
MODEL 4EC6A11	(19D402603-G1)	
MODEL 4EC6A12	(19D402603-G2)	(2 Frequency)
MODEL 4EC6A13	(19D402603-G3)	(2 Frequency)
MODEL 4EC6A14	(19D402603-G4)	(1 Frequency with ACCESSORY JACK OPTION)
MODEL 4EC6A15	(19D402603-G6)	(2 Frequency with ACCESSORY JACK OPTION)
TRANSMITTER-RECEIVER	TOP PANEL	19D402599-G1
AND ASSOCIATED ASSEMBLIES		

SYMBOL	G-E PART NO.	DESCRIPTION
DS701	19C307037-P4	----- INDICATING DEVICES ----- Lamp, incandescent: 14 v; sim to GE 1815. ----- JACKS AND RECEPTACLES -----
J701	7489183-P5	Connector: 9 contacts: sim to Winchester M95-LIN. (Used in Models 4EC66A14, 15). ----- LOUDSPEAKERS -----
LS701	5491260-P7	Permanent magnet, 5-inch: 3.2 ohms $\pm 10\%$ voice coil imp, 15 w max operating, 385 cps $\pm 15\%$ resonance, paper dust cap: sim to Jensen Model P5-VAS12761. ----- RESISTORS -----
R701	19B209256-P2	Resistor/switch: includes Resistor, variable, 5000 ohms $\pm 20\%$, 0.25 w; Switch (S701), rotary, SPST, 15 amps at 10 v; sim to CTS Series 45. Variable, carbon film: 5000 ohms $\pm 20\%$, 0.5 w; sim to CTS Series 45. ----- SWITCHES -----
S701	5491899-P6	(Part of R701). Toggle: DPDT, 3 amps at 250 v; sim to Cutler-Hammer 8363K7. (Used in Model 4EC66A11). ----- TERMINAL BOARDS -----
TS701	19B205152-G1	Terminal board: 25 contacts. ----- SOCKETS -----
XD5701	7141855-PL5	Lamp: sim to Dialight 95-410-975 (modified). MECHANICAL PARTS (SEE NC-1282)
1	19A122065-P1	Bushing: 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	DiaPhraem: approx 2-3/8 inches dia.
8	19A121990-P1	Spacer. (Used with TS701).
9	19A122066-P1	Bushing: sim to Pyle-National DB-44516 (modified).
10	4031457-P1	Support. (Used with microphone).
11	4031458-P1	Spring. (Used with microphone).
12	4039182-G1	Knob. (Used with R701, 702).
13	5490135-P4	Boot: 15/32-32; sim to APH-Hexseal N-1030-B. (Used with S702 in Models 4EC66A11).

SYMBOL	G-E PART NO	DESCRIPTION
		TRANSMITTER-RECEIVER TOP PANEL 19D40259-9-GI REV A
C901	7489162-P39	----- CAPACITORS ----- Silver mica: 330 pf $\pm 5\%$, 500 VDCW; sim to Electro Motive Type DM-15.
C902	5494481-P7	Ceramic disc: 470 pf $\pm 20\%$, 1000 VDCW; sim to RMC Type JF Discap.
F901	7102873-P2	----- FUSES ----- Quick blowing: 15 amps at 32 v; sim to Littelfuse 311015 or Bussmann AGC-15.
J901	7473192-P31	----- JACKS AND RECEPTACLES ----- 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 S3-1R.
J903	19B200010-P2	Receptacle: 23 contacts; sim to Cannon Electric NK-L23-32S.
K901*	19C307010-P15	----- RELAYS ----- Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T134. In Models earlier than Rev A: Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T134.
P901	4029840-P2	----- PLUGS ----- Contact, electrical: sim to AMP 42827-2.
P902	4029840-P2	Contact, electrical: sim to AMP 41854.
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.
Q901	19A115327-P1	----- TRANSISTORS ----- Silicon, NPN.
R901	19B209022-P115	----- RESISTORS ----- Wirewound: 1 ohm $\pm 10\%$, 2 w; sim to IBC Type BWH.
R902	3R7-P473K	Composition: 47,000 ohms $\pm 10\%$, 1/2 w.
T901	19B209079-P1	----- TRANSFORMERS ----- Audio frequency: 0.3-3 KC freq range, P11: 55 ohms $\pm 10\%$ imp, 0.895 ohm $\pm 10\%$ DC res,

[illegible]

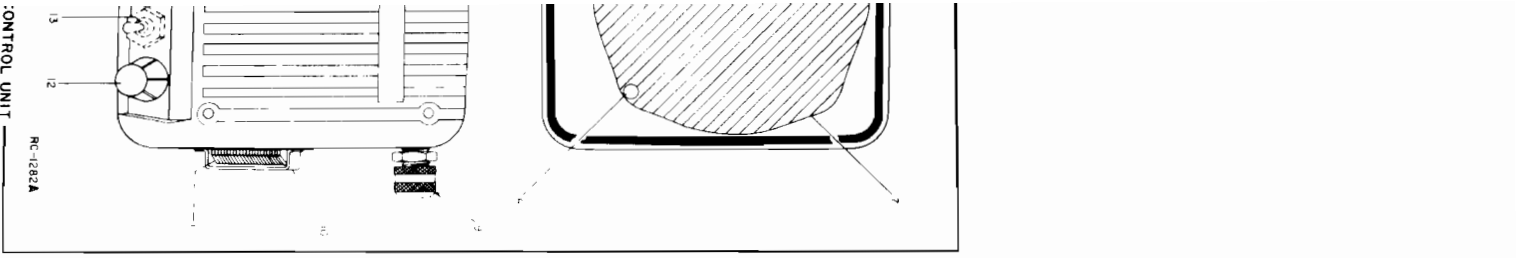


J701	7489183-P5	Connector: 9 contacts: sim to Winchester M95-LRN. (Used in Models 4EC66A14, 15).
L5701	5491260-P7	----- LOUDSPEAKERS ----- Permanent magnet, 5-inch: 3.2 ohms $\pm 10\%$ voice coil imp, 15 w max operating, 385 cps $\pm 15\%$ resonance, paper dust cap; sim to Jensen Model PS-VAS12761.
R701	19B209256-P2	----- RESISTORS ----- Resistor/switch: includes Resistor variable, 5000 ohms $\pm 20\%$, 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 $\pm 20\%$, 0.5 w; sim to CTS Series 45.
S701	5491899-P6	----- SWITCHES ----- (Part of R701).
S702		Toggle: DPDT, 3 amps at 250 v; sim to Cutler-Hammer 8363K7. (Used in Model 4EC66A11).
TR701	19B205152-G1	----- TERMINAL BOARDS ----- Terminal board: 23 contacts.
XDS701	7141855-P15	----- SOCKETS ----- Lamp: sim to Dalllight 95-410-975 (modified).
		MECHANICAL PARTS (SEE RC-1282)
1	19A122065-P1	Bushing: 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. (Used with TR701).
9	19A122066-P1	Bushing: sim to Pyle-National DB-44516 (modified).
10	4031457-P1	Support. (Used with microphone).
11	4031458-P1	Spring. (Used with microphone).
12	4039182-G1	Knob. (Used with R701, 702).
13	5490135-P4	Boot: 15/32-32; sim to APN-Hexseal N-1030-B. (Used with S702 in Models 4EC66A11).
14	19A115040-P9	Lens, panel light: red lens; sim to Dalllight 81-331. (Used with DS701).
15	NP248843	Nameplate. (Used in Models 4EC66A11, 13).
16	NP248844	Nameplate. (Used in Models 4EC66A10, 14).

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.
K901 *	19C307010-P15	----- RELAYS ----- Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T134.
	19C307010-P5	In Models earlier than Rev A: Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T134.
P901 and P902	4029840-P2	----- PLUGS ----- 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.
Q901	19A115527-P1	----- TRANSISTORS ----- Silicon, NPN.
R901	19B209022-P115	----- RESISTORS ----- Wirewound: 1 ohm $\pm 10\%$, 2 w; sim to IRC Type BW.
R902	3R77-P473K	Composition: 47,000 ohms $\pm 10\%$, 1/2 w.
TS901	19B209079-P1	----- TRANSFORMERS ----- Audio frequency: 0.3-3 KC freq range, P:1: 55 ohms $\pm 10\%$ imp, 0.895 ohm $\pm 10\%$ DC res, Sec: 3.2 ohms imp, 0.168 ohm DC res.
TB1	7775500-P8	----- TERMINAL BOARDS ----- Phen: 4 terminals.
TB2	7775500-P11	Phen: 5 terminals.
TB3	7775500-P7	Phen: 3 terminals.

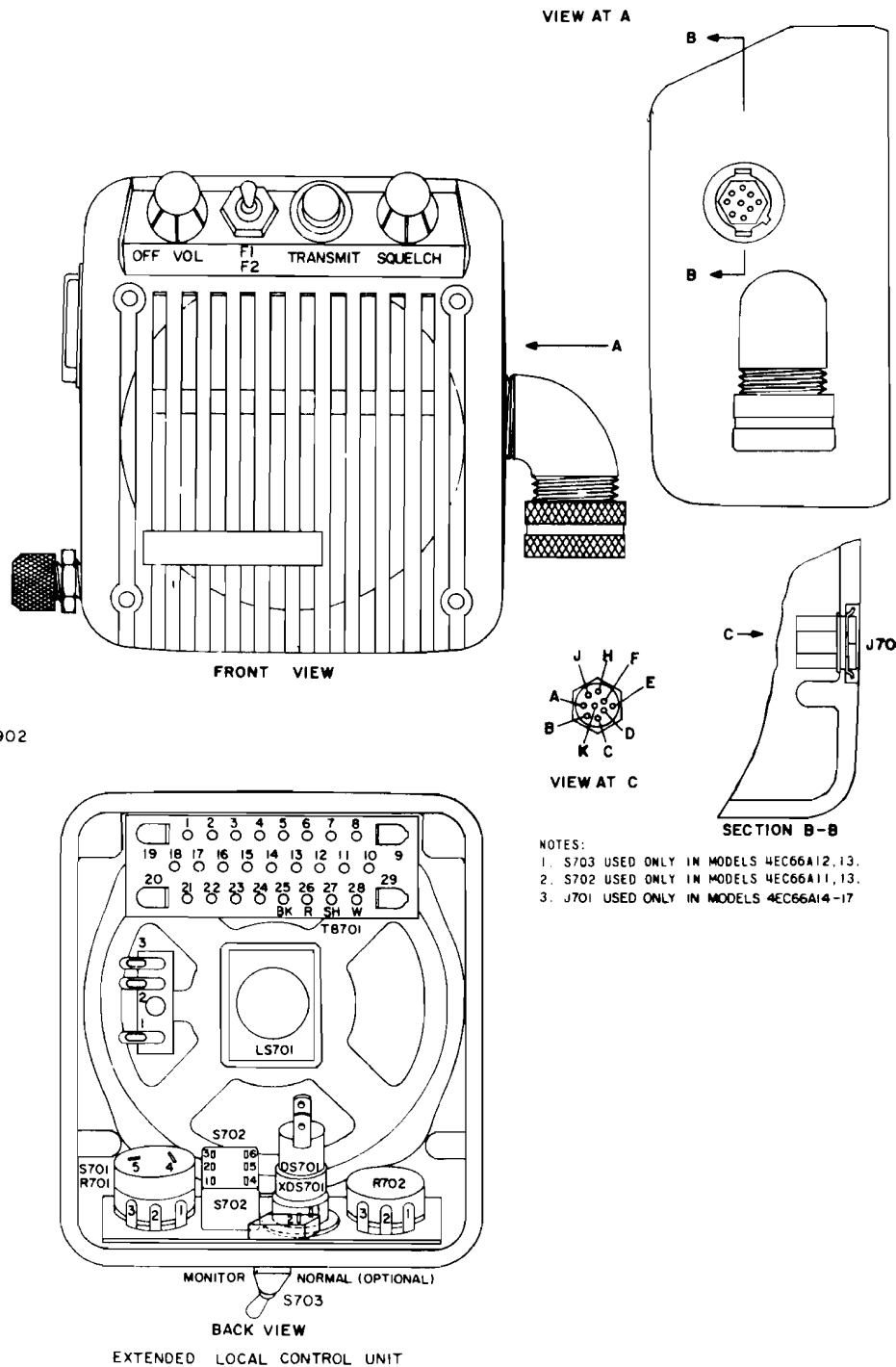
XK901	5491595-P5	19B209444-P1
		19B209265-P5
		19B209256-P2
		19B205128-G1
		19B205127-P1
		4029894-P1
		4037158-P7
		4032574-P2
		19A121981-G1
		7763541-P5
		19A121178-P1
		5491595-P9
		7763541-P3
		19B204532-G1
		19A122071-P1
		19A122010-G2
		5490969-P4
		5490969-P5
		5490969-P6
		7105381-P1
		2R22-P1

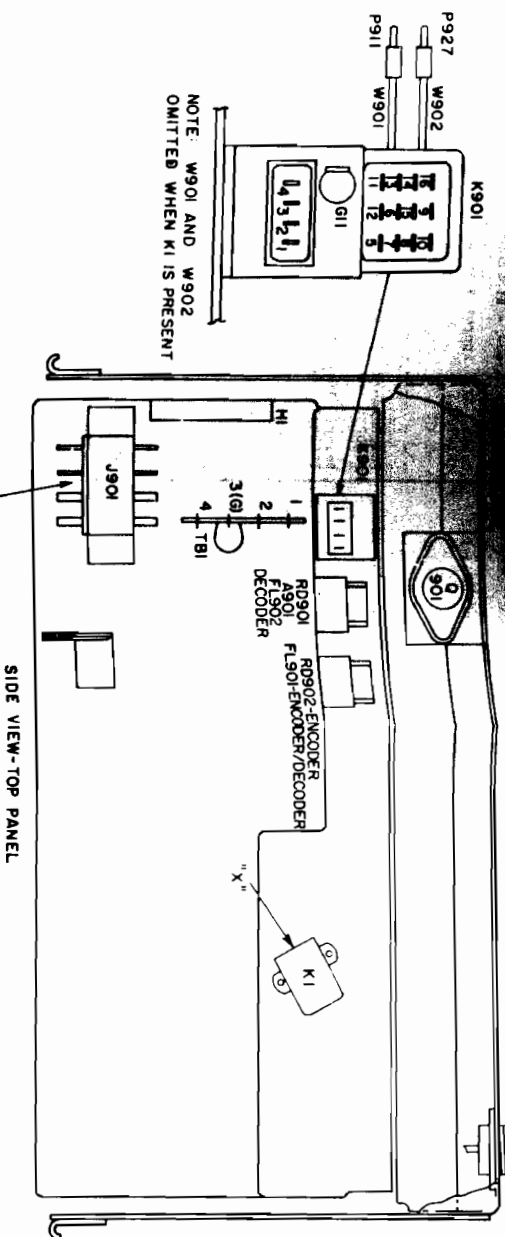
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



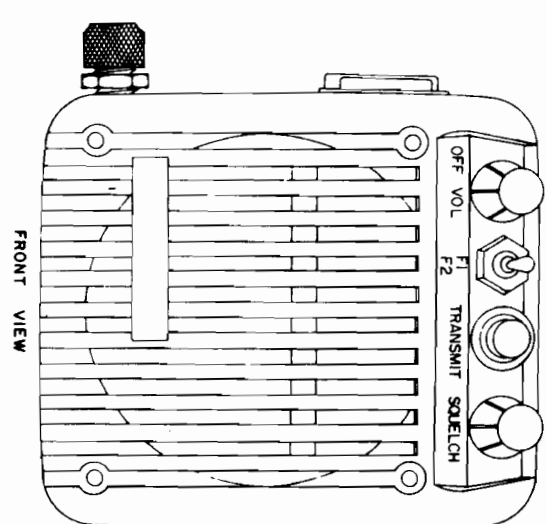
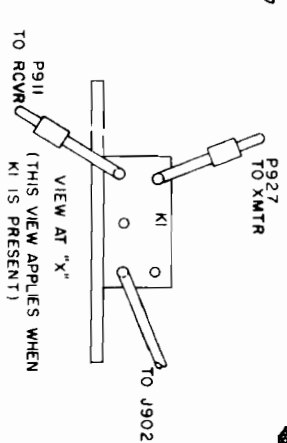
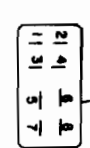
J701	7489183-P5	----- JACKS AND RECEPTACLES ----- Connector: 9 contacts; sim to Winchester M9S-LRN. (Used in Models 4EC66A14, 15).
L5701	5491260-P7	----- LOUSP/SP/ARENS ----- Permanent magnet, 5-inch; 3.2 ohms $\pm 10\%$ voice coil imp, 15 w max operating, 365 cps $\pm 15\%$ resonance, paper dust cap; sim to Jensen Model P5-VAS12701.
R701	19B209256-P2	----- RESISTORS ----- Resistor/switch: Includes Resistor variable, 5000 ohms $\pm 20\%$, 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 $\pm 20\%$, 0.5 w; sim to CTS Series 45.
S701		----- SWITCHES ----- (Part of R701).
S702	5491899-P6	Toggle: DPDT, 3 amps at 250 v; sim to Cutler-Hammer 8363K7. (Used in Model 4EC66A11).
TR701	19B205152-G1	----- TERMINAL BOARDS ----- Terminal board: 25 contacts.
XDS701	7141855-P15	----- SOCKETS ----- Lamp: sim to Dialight 95-110-975 (modified).
		MECHANICAL PARTS (SEE RC-1282)
1	19A122065-P1	Bushing; sim to Pyle-National DB-1191690 (modified).
2	4032574-P2	Gasket, cover, neoprene.
3	19DA02601-P1	Casting. (Used in Model 4EC66A10).
4	19DA02601-P2	Casting. (Used in Model 4EC66A11).
5	19DA02601-P5	Casting. (Used in Model 4EC66A14).
6	19DA02601-P6	Casting. (Used in Model 4EC66A15).
7	19B205162-P1	Diaphragm: approx 2-3/8 inches dia.
8	19A121990-P1	Spacer. (Used with TR701).
9	19A122066-P1	Bushing; sim to Pyle-National DB-44516 (modified).
10	4031457-P1	Support. (Used with microphone).
11	4031458-P1	Spring. (Used with microphone).
12	4039182-G1	Knob. (Used with R701, 702).
13	5490135-P4	Bolt: 15/32-32; sim to APN-Hexenal N-1030-B. (Used with S702 in Models 4EC66A11).
14	19A115040-P9	Lens, panel light; red lens; sim to Dialight 81-831. (Used with DS701).
15	NP248843	Nameplate. (Used in Models 4EC66A11, 15).
16	NP248844	Nameplate. (Used in Models 4EC66A10, 14).

		----- JACKS AND RECEPTACLES ----- Connector, phen: 8 terminals; sim to HB Jones 261-31-08-000.
J901	7473192-P31	
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-L-23-32S.
K901*	19C307010-P15	----- RELAYS ----- Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T154.
P901 and P902	4029840-P2	In Models earlier than Rev A: Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T154.
P905	4029840-P2	----- PLUGS ----- Contact, electrical: sim to AMP 42827-2.
P906 thru P908	4029840-P1	Contact, electrical: sim to AMP 42827-2.
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 P925	71417199-P2	Connector: female contact; sim to Winchester Electronics Z1604.
P926	4029840-P2	Contact, electrical: sim to AMP 42827-2.
Q901	19A115527-P1	----- TRANSISTORS ----- Silicon, NPN.
R901	19B209022-P115	----- RESISTORS ----- Wirewound: 1 ohm $\pm 10\%$, 2 w; sim to IRC Type BWH.
R902	3R77-P473K	Composition: 47,000 ohms $\pm 10\%$, 1/2 w.
T901	19B209079-P1	----- TRANSFORMERS ----- Audio frequency: 0.3-3 KC freq range; Pri: 56 ohms $\pm 10\%$ imp, 0.895 ohm $\pm 10\%$ DC res, Sec: 3.2 ohms imp, 0.168 ohm DC res.
T91	7775500-P8	----- TERMINAL BOARDS ----- Phen: 4 terminals.
T92	7775500-P11	Phen: 5 terminals.
T93	7775500-P7	Phen: 3 terminals.
		----- MISCELLANEOUS ----- Cable, RF: approx 4 inches; sim to Amphenol 421-105.
X1901	19B209044-P13	
X1902	19B209265-P3	----- SOCKETS ----- Rueholder: 15 amps at 250 v; sim to Littelfuse 342006.
X1901	5491595-P5	Relay: 16 contacts; sim to Allied Control 30034-2.
		ANTENNA RELAY KIT (Includes J902 and K1)
		MECHANICAL PARTS
	19B205129-G1	Cover. (Mounts J902, 903).
	19B205127-P1	Support. (Mounts locking latch).
	4029994-P1	Catch, pull-down. (Mates with catch on power supply to keep unit intact).
	4037158-P7	Channel, rubber; sim to Atlantic India Rubber X661. (Located above J901).
	4032574-P2	Gasket, cover, neoprene.
	19A121981-G1	Chassis. (Mounts T901, T92, 3).
	7763541-P5	Clip, cable. (Located between P901 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 X1901).
	19B204532-G1	Chassis.
	19A122071-P1	Grommet. (located by K901).
	19A122010-G2	----- ASSOCIATED ASSEMBLIES ----- Control Mounting Kit.
		132-470 MHZ ANTENNA MODEL 4E712A13
		----- MISCELLANEOUS ----- Antenna: includes 20-inch stainless steel whip, whip socket, antenna cable, cable adapter, PL-259 plug; sim to Antenna Specialists ASD201GE 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 RC-58/U. (Used with GE DWg 2R22-P1 and GE DWg 7105381-P1).
	7105381-P1	Adapter, cable: 1 x 7/16 inches dia. Type UC-175/U. (Used with GE DWg 2R22-P1 and Type RC-58/U cable).
	2R22-P1	Plug, coaxial: Signal Corps PL-259, sim to Amphenol 83-1SP. (Used with GE DWg 7105381-P1 and Type RC-58/U cable).

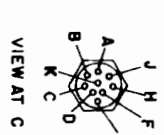




SIDE VIEW-TOP PANEL

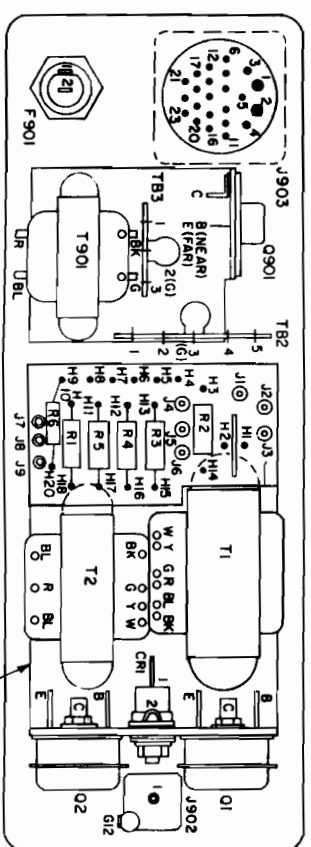


FRONT VIEW

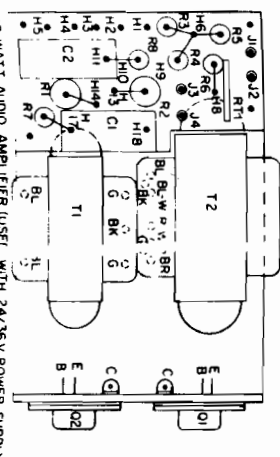


SECTION B-B

- 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.



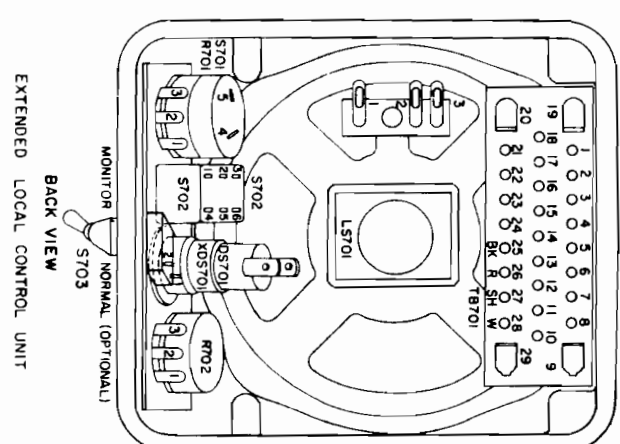
COMPONENT VIEW-TOP COVER PANEL



(19D402695, Rev. 6)

SERVICE SHEET

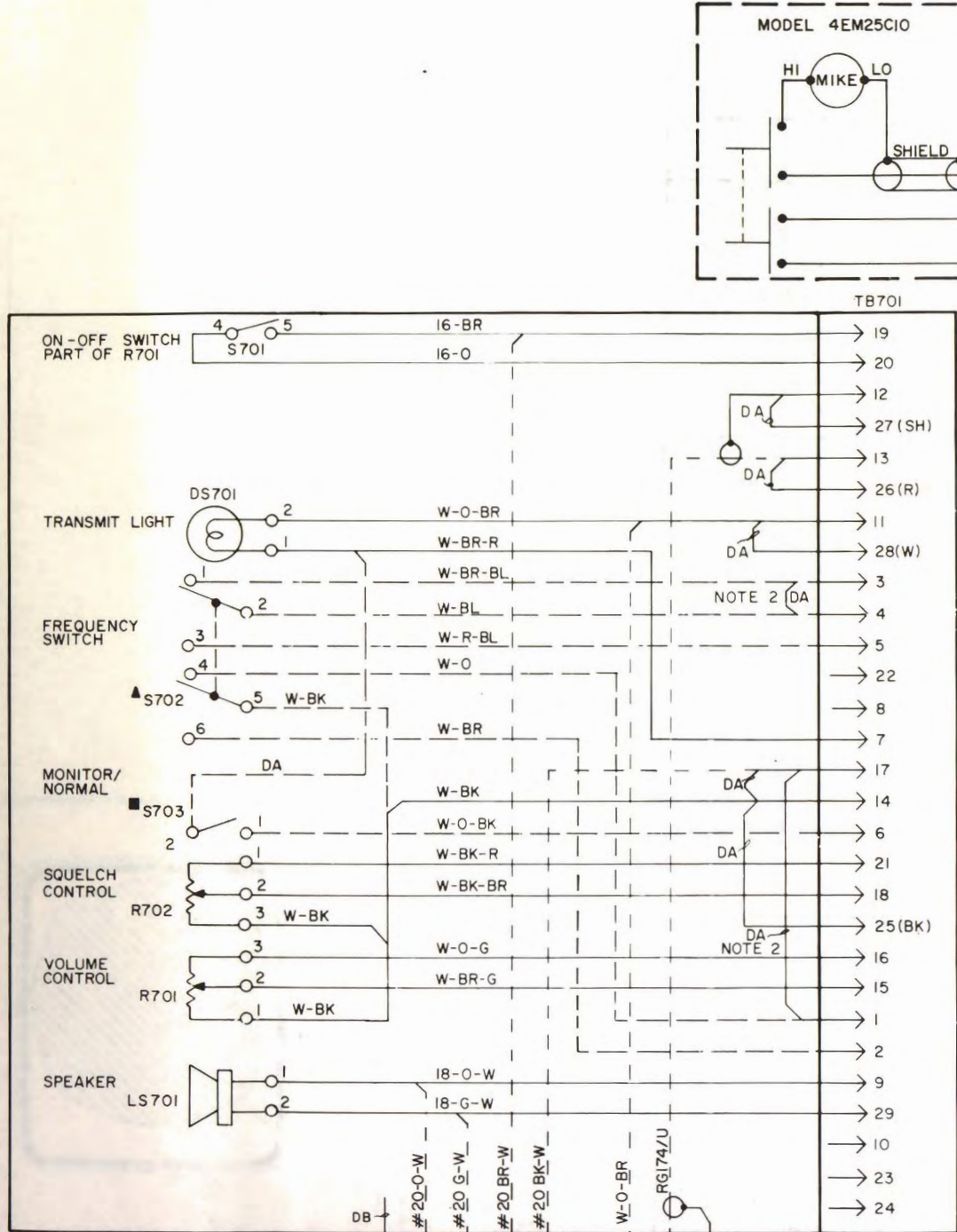
EXTENDED LOCAL CONTROL UNIT
 MODELS 4EC66A10, 11, 14 & 15
 AND TRANSMITTER-RECEIVER TOP PANEL
 PL-19D402599-G1 (Used with 6/12 Volt
 Power Supply)



EXTENDED LOCAL CONTROL UNIT

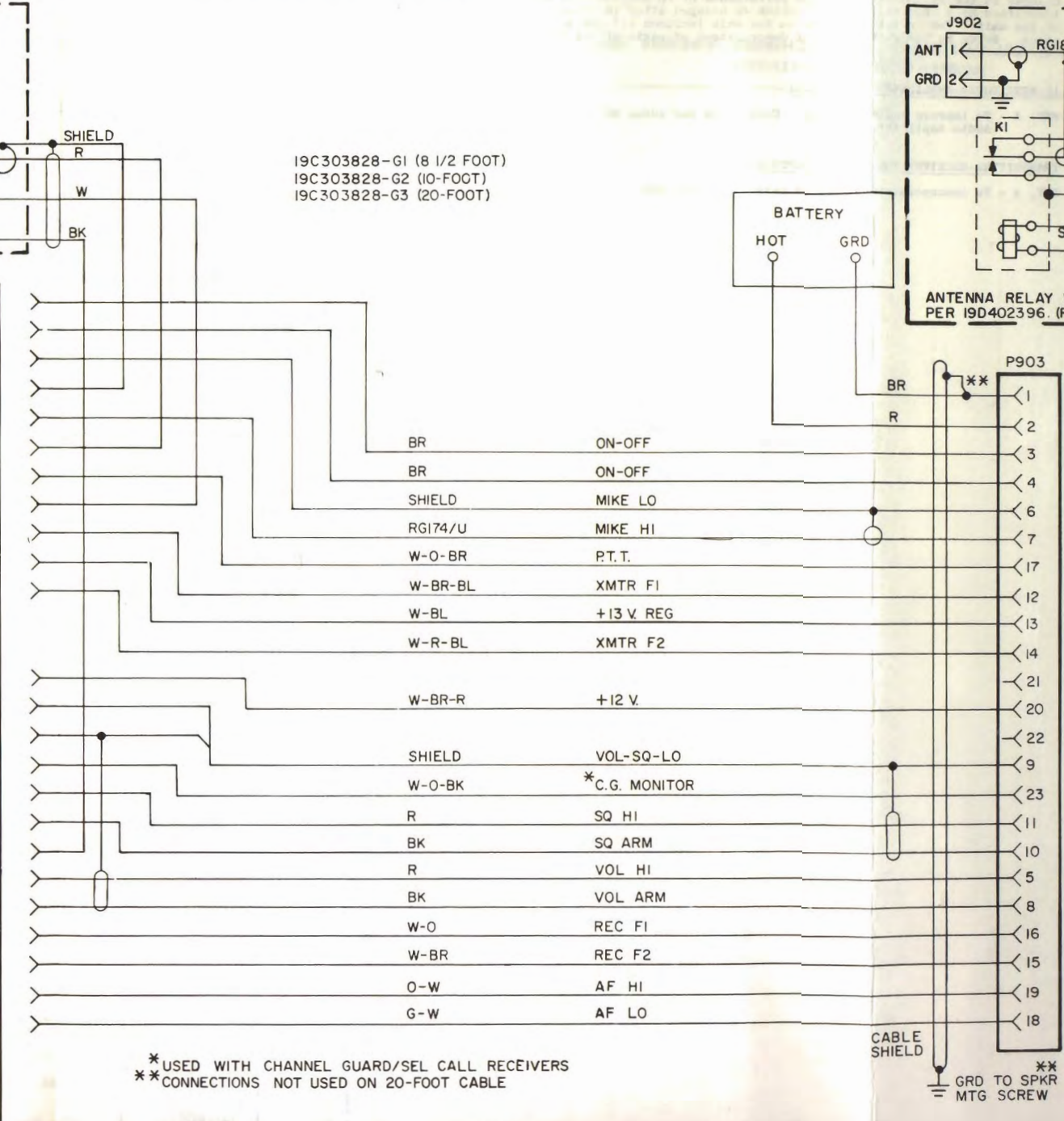
BACK VIEW

EXTENDED LOCAL CONTROL UNIT



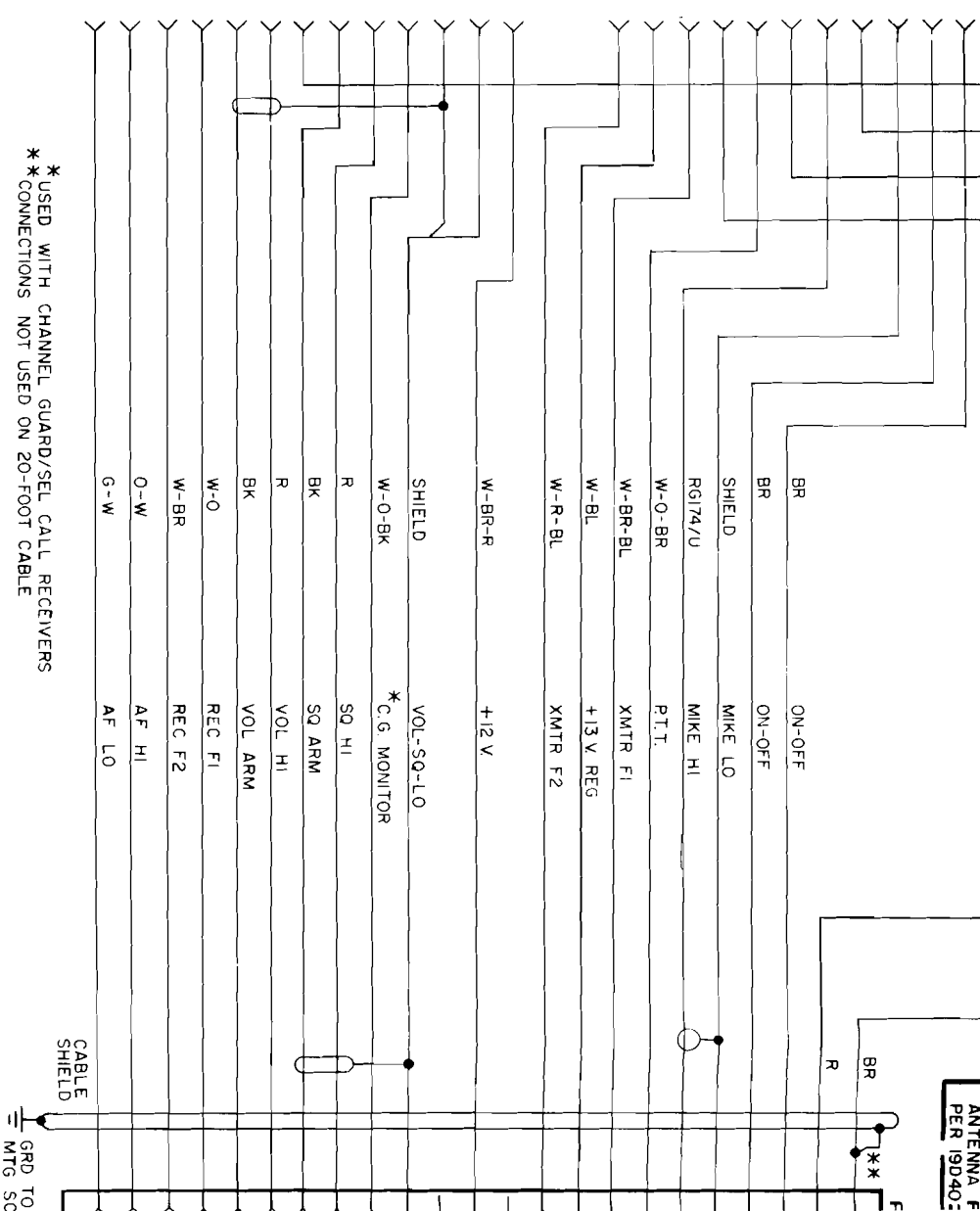
* MICROPHONE CONNECTIONS
TB701-28 PTT (W)
TB701-27 MIKE LO (SH)
TB701-26 MIKE HI (R)
TB701-25 GROUND (BK)

EXTENDED LOCAL CONTROL CABLE



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

NOTES:
1. ALL WIRES ARE SF24 EXCEPT AS NOTED.
2. ALL DASHED LINES ARE OPTION.

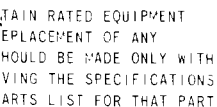


- NOTES.
1. ALL WIREs ARE SP24 EXCEPT AS NOTED.
2. ALL DASHED LINES ARE OPTION.
3. DELETE WIREs BETWEEN TB2-1 & TB3 3. ALSO BETWEEN TB2-5 & TB2-2, WHEN USING 10WATT AMPLIFIER.
4. FOR POSITIVE GROUND CHANGE WIRE FROM H6 TO TB2 3 & WIRE FROM H7 TO TB2 4
5. FOR 10 WATT AMPLIFIER OPTION WHEN USING 6 OR 28 VOLTS CHANGE P1, P2 & P3 TO APPROPRIATE JACK.
6. FOR SINGLE FREQUENCY UNITS REMOVE JUMPER BETWEEN J1 & J9 ON TRANSMITTER.

RC-1262

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

ANTENNA F
PER 19D40=



WHEN KI IS PRESENT
SEE DETAIL "A"



N-OFF SWITCH

- 12 V

TRY HOT

12 V

12 V KEY

BD

-32 V XMTR

24 V YMTB

TRANSMITTER

$\xleftarrow{J_7} + 24 \text{ V}$

← J6 +32 V

ANT

✓ J8 MIKE LO

✓ J5 MIKE HI

J|O

✓ JI

J9

12

← XMTR F2

RECEIVER

← J305 SQUELCH MON

← J308 SQUELCH HI

← J304 SOUFELCH ARM

J310 Vol. 11

J306 VOL 12M

✓	J426	✓	✓
---	------	---	---

REC FI
428

← REC F2
OSC

J425 J429 → | → P30

METER J427 → | → P30

← J301 (P303)

ANT (UHF)

← 3303 AUDIO

← P305 AUDIO P.A
SLEEVE

BLACK

SLEEVE
(GREEN)

SYMBOL	G-E PART NO	DESCRIPTION
		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.
	19C303707-P3	Model 4EY18A12, 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 4EY18A13, 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 4EY18A14, 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 4EY18A15, 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 4EY18A10-15).
		25-50 MHz ANTENNA (LOW BAND)
		- - - - - MISCELLANEOUS - - - - -
	7491074-P1	Antenna: includes 96-1/2 inch stainless steel rod; sim to Antenna Specialists ASPA3BGE.
	7102930-P3	Adapter, antenna: 2-5/16 inches. (Used with GE Dwg 7491074-P1).
	4033101-G1	Antenna package: includes base, adapter spring, cable and plug.
	7472880-G5	Antenna base. (Used in 4033101-G1).
	7476632-G4	Adapter spring. (Used in 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 4033101-G1).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with GE Dwg 5492239-P1 in 4033101-G1).
	4KY9A1	Coil, loading: 25-33 MHz; sim to Antenna Specialists ASPA87.
	19A121577-G1	Antenna hook kit.
	7134724-P1	Antenna hook. (Used in 19A121577-G1).
		PORTABLE ANTENNA MODELS 4EY19C10-15
		MODEL 4EY19C10 130-150.8 MHz MODEL 4EY19C11 150.8-162 MHz MODEL 4EY19C12 162-166 MHz MODEL 4EY19C13 166-174 MHz MODEL 4EY19C14 406-420 MHz MODEL 4EY19C15 450-470 MHz
		132-174 MHz ANTENNA MODEL 4EY20A10
		- - - - - MISCELLANEOUS - - - - -
	19C303620-P1	Antenna. Includes 19-1/2 inch stainless steel

SYMBOL	G-E PART NO	DESCRIPTION
		MICROPHONE MODEL 4EM25C10
	1	Cable clamp. Shure Brothers RP-21. (Includes parts 3 and 8).
	2	Switch. Shure Brothers RP-26.
	3	Case (back) and mounting button: plastic. Shure Brothers RP-21. (Includes parts 1 and 8).
	4	Switch button: red plastic. Shure Brothers RP-25.
	5	Spring. Shure Brothers RP-16. (Includes miscellaneous hardware).
	6	Shield. Shure Brothers RP-23.
	7	Cartridge, magnetic controlled.
	8	Case (front): plastic. Shure Brothers RP-21. (Includes parts 1 and 3).
	9	Cable: approx 6 feet.
		MICROPHONE MODEL 4EM33C10
		- - - - - MISCELLANEOUS - - - - -
		Switch. Shure Brothers RP-33.
		Cable and plug: approx 80 inches. Shure Brothers RP-35.
		Button: red plastic. Shure Brothers RP-34.
		Cartridge, magnetic controlled. Shure Brothers RP-32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP-94.
		Shield. Shure Brothers RP-36.
		MICROPHONE MODEL 4EM33D10
		- - - - - MISCELLANEOUS - - - - -
		Switch: moisture proof. Shure Brothers RP-33.
		Cable and plug: approx 80 inches. Shure Brothers RP-35.
		Button: red plastic. Shure Brothers RP-34.
		Cartridge, magnetic controlled. Shure Brothers RP-32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP-31.
		Shield. Shure Brothers RP-36.
		HANDSET MODEL 4EM34A10
		- - - - - MISCELLANEOUS - - - - -
		Cartridge, transmitter: controlled magnetic. Shure Brothers RP-13.
		Cartridge, receiver: 3 watt max power. Shure Brothers RP-41.
		Switch. Shure Brothers RP-81.
		Cable and plug: approx 5 feet. Shure Brothers RP-47.
		Handle, transmitter cap, receiver cap: phen, weather proof. Shure Brothers RP-49.
		POWER CONTROL CABLE 19C303828-G2

SYMBOL	G-E PART NO	DESCRIPTION
		POWER CONTROL CABLE 19C303828-G3
		- - - - - MISCELLANEOUS - - - - -
	19A115067-P3	Cable, 2-conductor: approx 23 feet; sim to Belden 7721.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric NK-L23-23C-3/4.
		DC TRICKLE CHARGE CABLE 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-Herssee 1624.
		AC CHARGING CABLE 5492570-G2
		- - - - - MISCELLANEOUS - - - - -
CL	7489159-P16	Capacitor, metallized plastic: 4 μ f $\pm$ 20%, 200 VDCW; sim to Sprague 118P40502S4.
	4034403-P1	Plug: sim to GE 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 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.

Changes in the eq
identified by a "
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sions. Refer to
revisions.

10-WATT POWER AMP

REV. A - To impro
Audio Am

TRANSMITTER-RECEI

REV. A - To incor

PRODUCTION CHANGES

LBI-3669C

PARTS LIST

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
PL-19B205165-G1
REV. A

10-WATT POWER AMPLIFIER 19B205165-G1

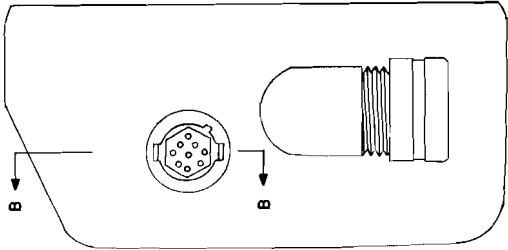
Rev. A - To improve audio response. Changed R1 and added R6 on 10-Watt Audio Amplifier.

TRANSMITTER-RECEIVER TOP PANEL 19D402599-G1

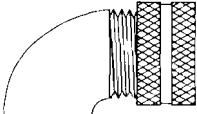
Rev. A - To incorporate an improved relay. Changed K901.

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 $\pm 5\%$, 2 w; sim to IRC Type BWH.
	19B209022-P137	In Models earlier than Rev A: Wirewound: 8.2 ohms $\pm 10\%$, 2 w; sim to IRC BWH.
R2	3R78-P100J	Composition: 10 ohms $\pm 5\%$, 1 w.
R3	3R78-P221J	Composition: 220 ohms $\pm 5\%$, 1 w.
R4 and R5	3R78-P111J	Composition: 110 ohms $\pm 5\%$, 1 w.
R6*	19B209022-P1	Wirewound: 0.27 ohms $\pm 5\%$, 2 w; sim to IRC Type BWH. (Added by REV A).
		- - - - - THERMISTORS - - - - -
RT1	19C300048-P3	Disc: 1 ohm $\pm 10\%$ 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.

VIEW AT A



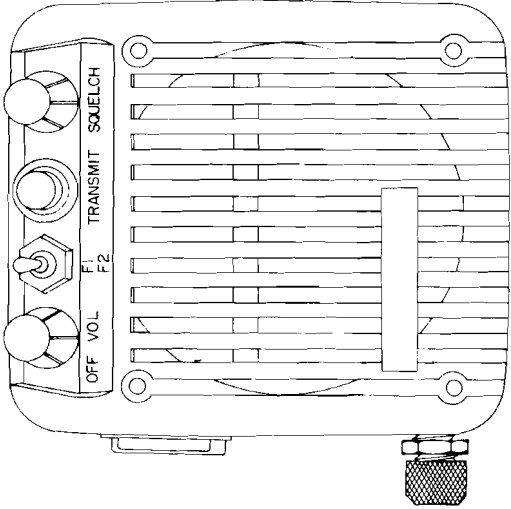
A



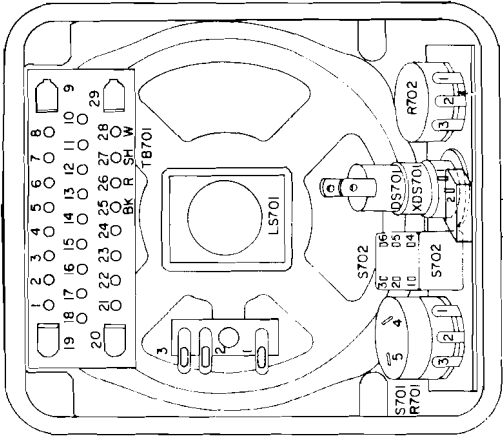
VIEW AT C

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.

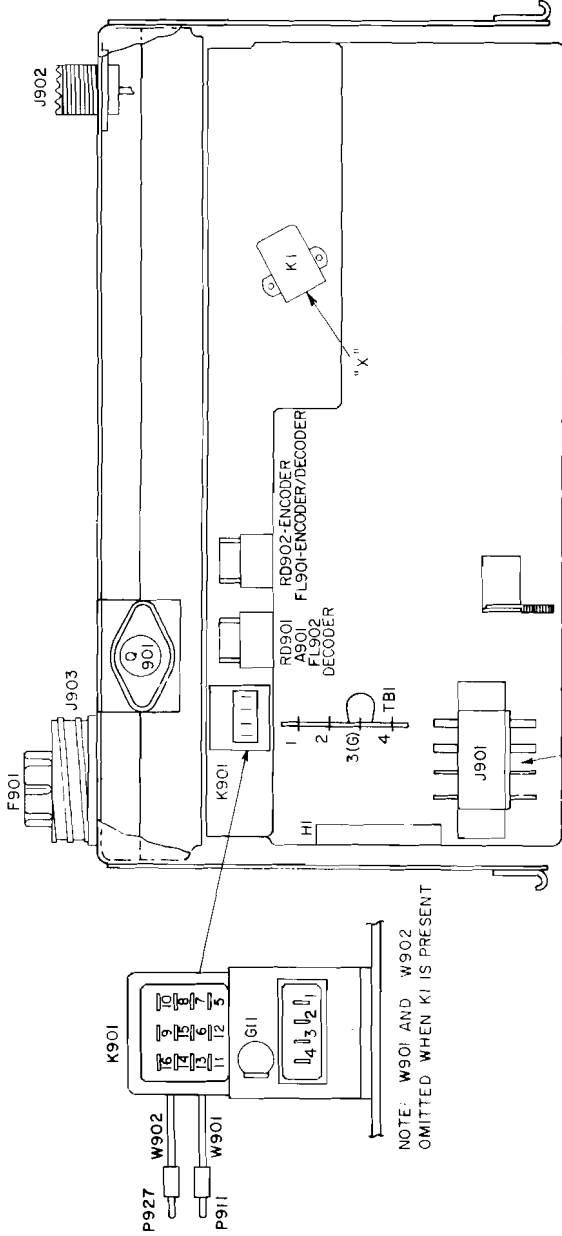


FRONT VIEW

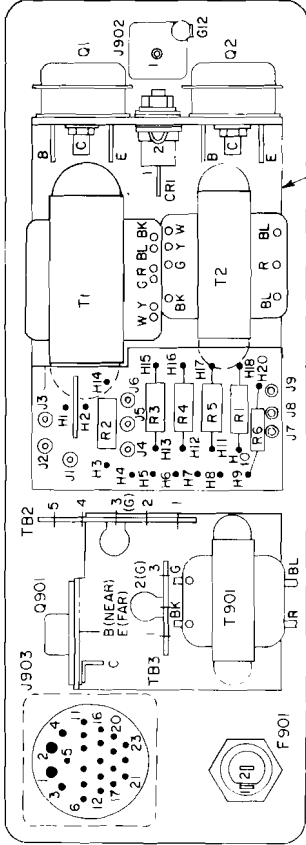
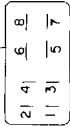


BACK VIEW

EXTENDED LOCAL CONTROL UNIT

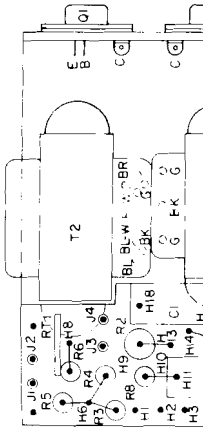


SIDE VIEW-TOP PANEL



COMPONENT VIEW-TOP COVER PANEL

10-WATT AUDIO AMPLIFIER (USED WITH 6V/2V POWER SUPPLY)



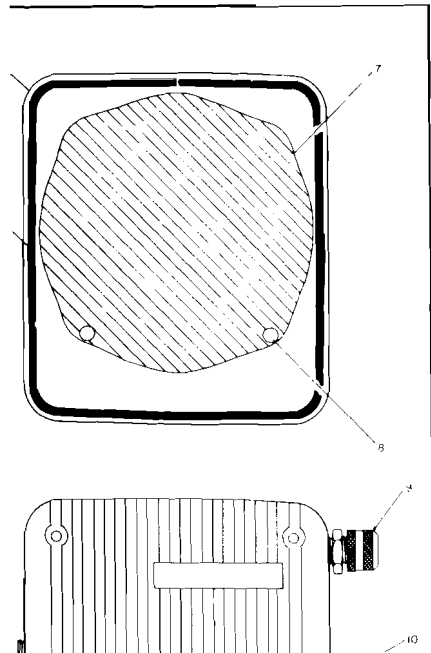
PARTS LIST

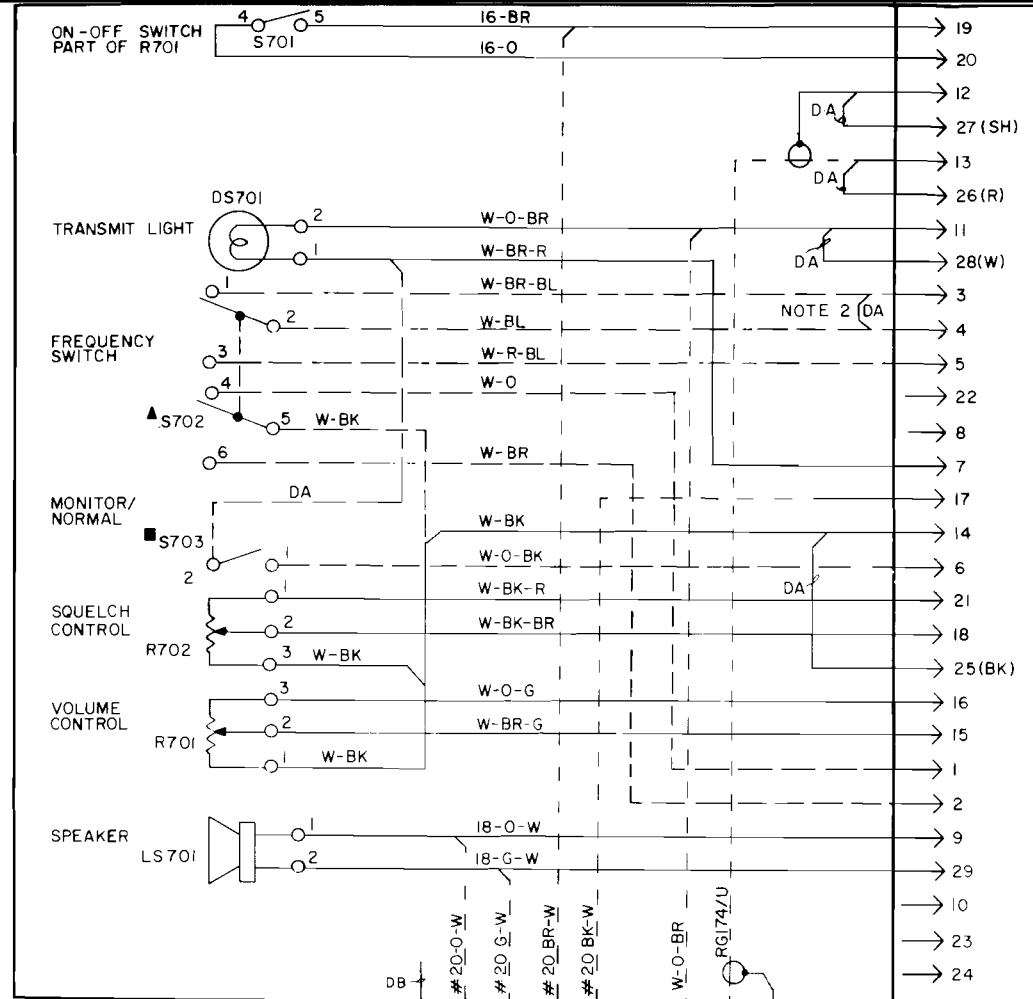
LBI-3681C
CONTROL UNIT
MODEL 4EC66A10 (19D402603-G1) (1 Frequency)
MODEL 4EC66A11 (19D402603-G2) (2 Frequency)
MODEL 4EC66A14 (19D402603-G5) (1 Frequency with ACCESSORY JACK OPTION)
MODEL 4EC66A15 (19D402603-G6) (2 Frequency with ACCESSORY JACK OPTION)
TRANSMITTER-RECEIVER TOP PANEL 19D402599-G4
AND
ASSOCIATED ASSEMBLIES

SYMBOL	G-E PART NO.	DESCRIPTION
----- INDICATING DEVICES -----		
DS701	19C307037-P4	Lamp, incandescent: 14 v; sim to GE 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 $\pm 10\%$ voice coil imp, 15 w max operating, 385 cps $\pm 15\%$ resonance, paper dust cap; sim to Jensen Model P5-VAS12761.
----- RESISTORS -----		
R701	19B209256-P2	Resistor/switch: includes Resistor, Variable, 5000 ohms $\pm 20\%$, 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 $\pm 20\%$, 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	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; 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. (Used with TB701).
9	19A122066-P1	Bushing; sim to Pyle-National DB-44516 (modified).
10	4031457-P1	Support. (Used with microphone).
11	4031458-P1	Spring. (Used with microphone).
12	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).

SYMBOL	G-E PART NO	DESCRIPTION
TRANSMITTER-RECEIVER TOP PANEL 19D402599-G4 REV A		
----- CAPACITORS -----		
C902	5494481-P7	Ceramic disc: 470 pf $\pm 20\%$, 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 $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T154.
	19C307010-P5	In Models earlier than Rev A: Armature: 12 VDC nominal, 130 ohms $\pm 10\%$ coil res, 4 form C contacts; sim to Allied Control T154.
----- 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 $\pm 10\%$, 2 w; sim to IRC Type BWH.
R902	3R77-P473K	Composition: 47,000 ohms $\pm 10\%$, 1/2 w.
----- TRANSFORMERS -----		
T901	19B209079-P1	Audio frequency: 0.3-3 KHz freq range, Pri: 55 ohms $\pm 10\%$ imp, 0.895 ohm $\pm 10\%$ 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.

SYMBOL	G-E PART NO	DESCRIPTION
CABLE ASSEMBLY 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 -----		
XX901	5491595-P5	Relay: 16 contacts; sim to Allied Control 30054-2.
MECHANICAL PARTS		
	19B205129-G2	Cover. (Mounts J902, 903).
	19B205127-P1	Support. (Mounts locking latch).
	4029994-P1	Catch, pull-down. (Mates with catch on power supply to keep unit intact).
	4037158-P7	Channel, rubber; sim to Atlantic India Rubber (Located above J901).
	4032574-P2	Gasket, cover, neoprene.
	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 XX901).
	19B204532-G1	Chassis.
	19A122071-P1	Grommet. (Located by K901).
----- ASSOCIATED ASSEMBLIES -----		
	19A122010-G2	Control Mounting Kit.
ANTENNA RELAY KIT 19B216362-G1 (Includes J902 and K1)		
132-470 MHz ANTENNA MODEL 4EY12A13		
----- MISCELLANEOUS -----		
		Antenna: includes 20-inch stainless steel whip socket, antenna cable, cable adapter, P 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 (Used with GE Dwg 2R22-P1 and GE Dwg 7105381).
	7105381-P1	Adapter, cable: 1 x 7/16 inches dia. Type UG-175/U. (Used with GE Dwg 2R22-P1 and Type RG-58/U cable).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-1SP. (Used with GE Dwg 7105381 and Type RG-58/U cable).
25-54 MHz ANTENNAS MODELS 4EY18A10-15 (LOW BAND)		

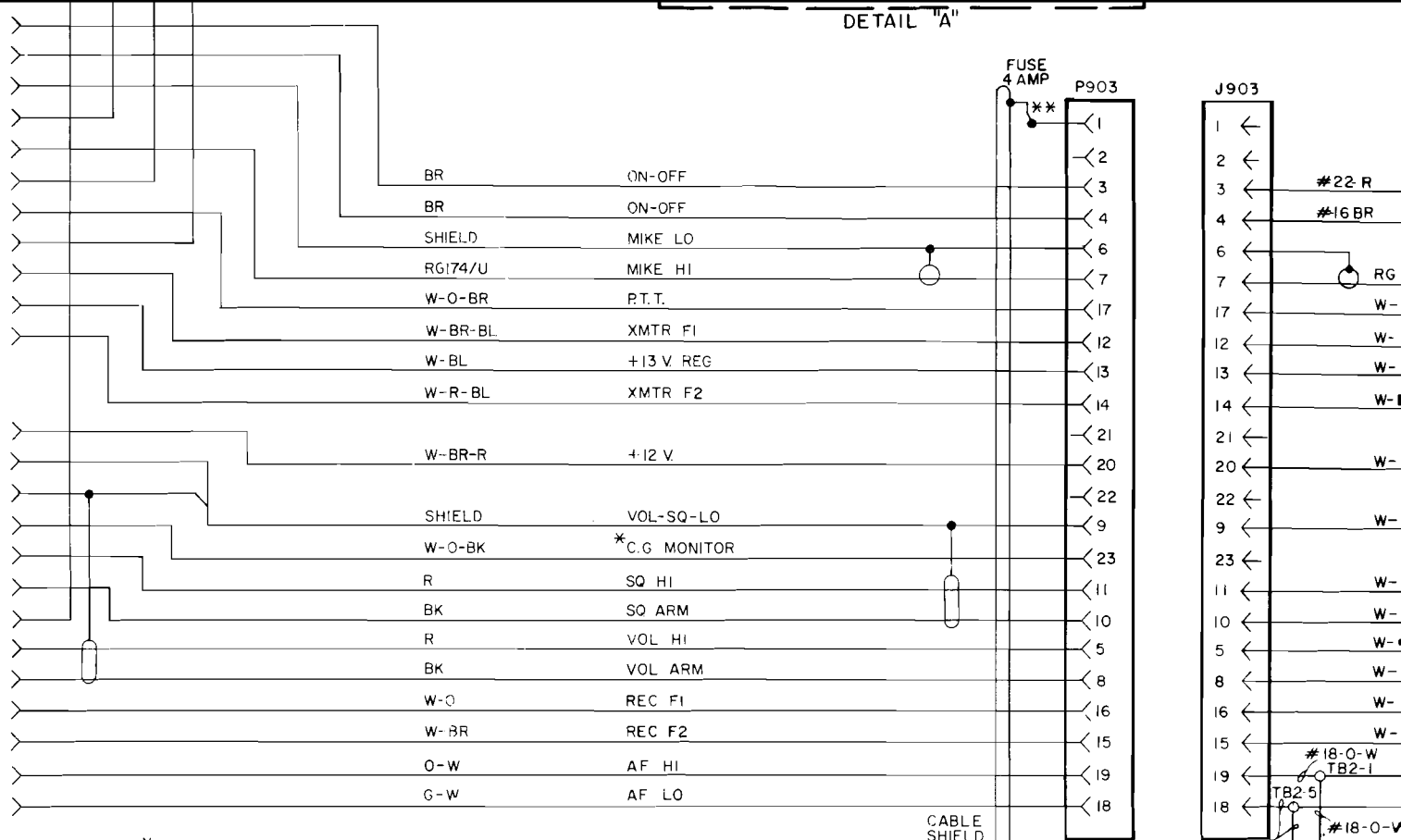




* MICROPHONE CONNECTIONS
 TB701-28 PTT (W)
 TB701-27 MIKE LO (SH)
 TB701-26 MIKE HI (R)
 TB701-25 GROUND (BK)

▲ 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. 5)

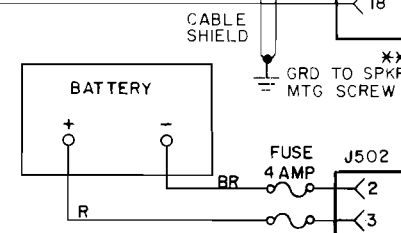


* USED WITH CHANNEL GUARD/SEL CALL RECEIVERS
 ** CONNECTIONS NOT USED ON 20-FOOT CABLE

NOTES:

- ALL WIRES ARE SF24 EXCEPT AS NOTED.
- ALL DASHED LINES ARE O-T-U.
- DELETE WIRES BETWEEN TB2 1 & TB3-3. ALSO BETWEEN TB2-5 & TB3 2. WHEN USING 10 WATT AMPLIFIER.
- FOR 10 WATT AMPLIFIER OPTION WHEN USING 24 OR 36 VOLTS CHANGE P1 & P2 TO APPROPRIATE JACK.
- FOR SINGLE FREQUENCY UNITS REMOVE JUMPER BETWEEN J1 & J9 ON TRANSMITTER.
- CONNECTIONS BETWEEN RECEIVER AND OSCILLATOR DO NOT EXIST ON UHF RECEIVERS.
- P303 - UHF SYSTEMS
 J301 - HIGH POWER HIGH BAND SYSTEMS
 ON HIGH POWER HIGH BAND SYSTEMS J301 CONNECTS TO P911 WITH CABLE 19A121176G6.

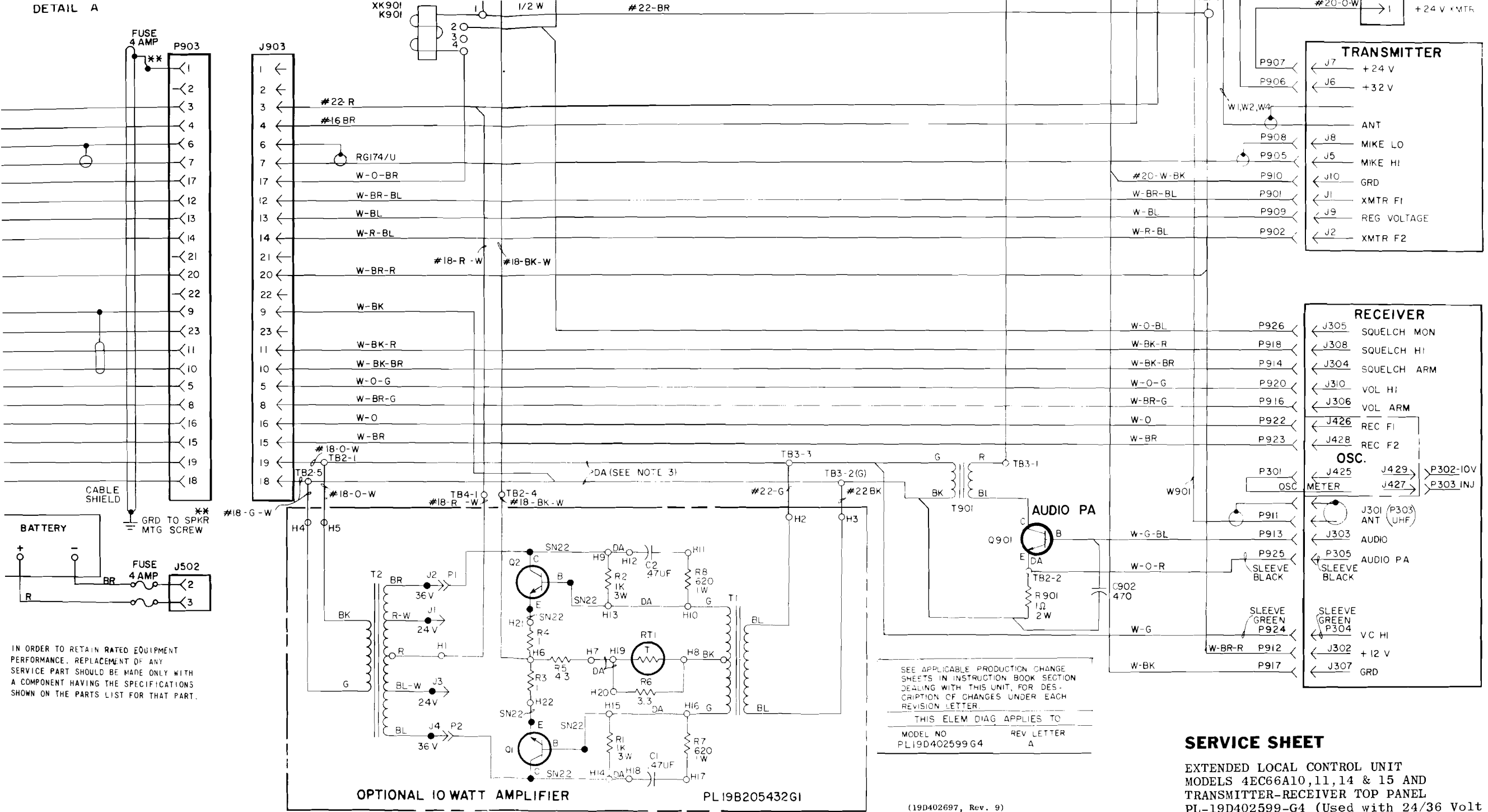
RC-1366B



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.

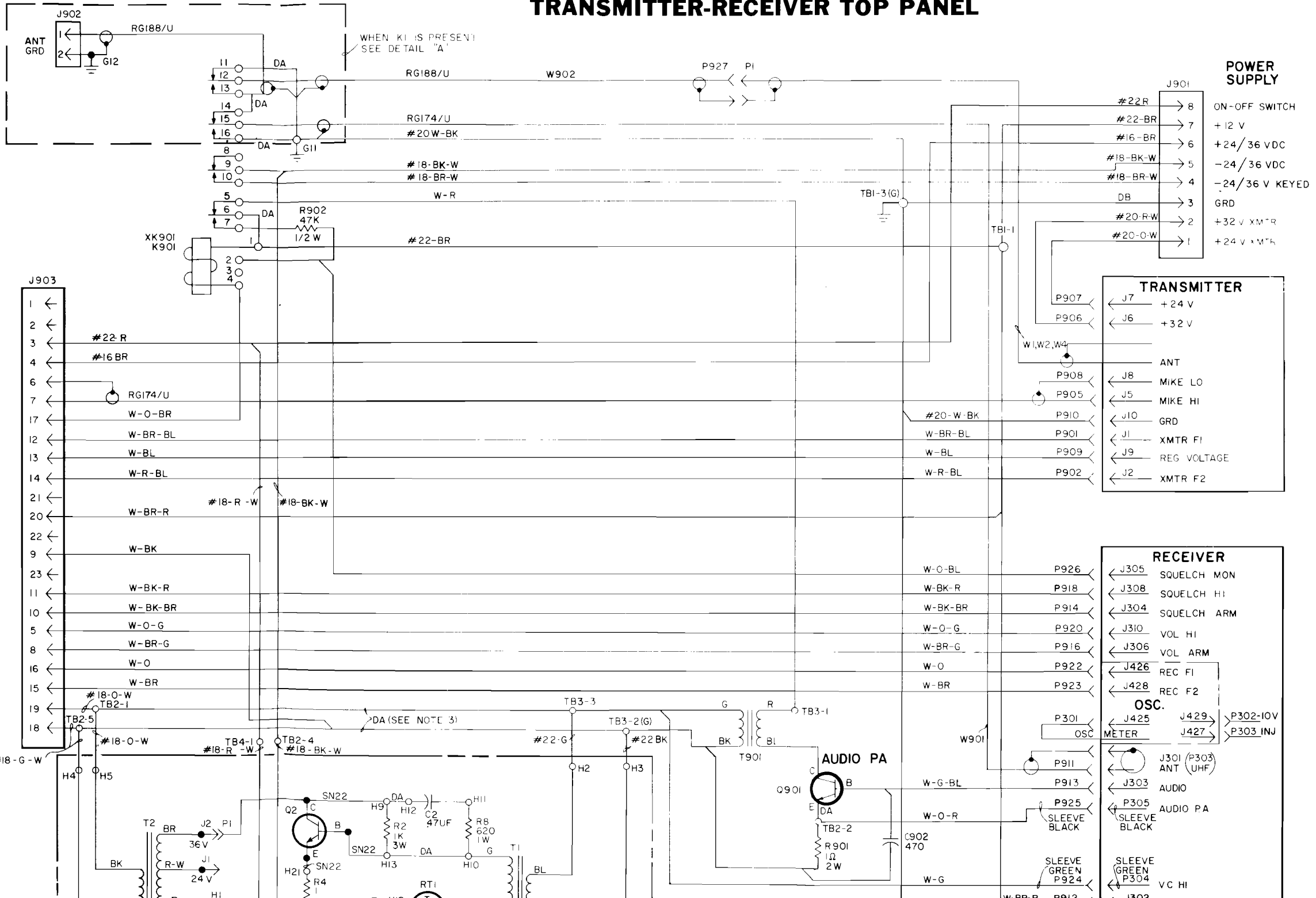
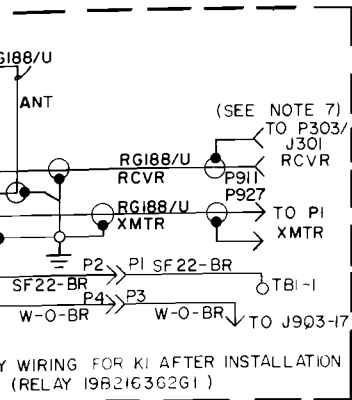
WIRE DRESS CRITICAL



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)

TRANSMITTER-RECEIVER TOP PANEL



ORDER TO RETAIN RATED EQUIPMENT

ION	SYMBOL	G-E PART NO	DESCRIPTION
ONE 33C10			POWER CABLE 19B205422-G1
OUS - - - - -			- - - - - MISCELLANEOUS - - - - -
3.		19A115067-P1	Cable, 2 conductor: approx 10 feet; sim to Belden 31713.
nches. Shure Brothers		19A115776-P2	Phenolic: sim to Bussman Type HHJ.
Brothers RP-34.		1R16-P7	Cartridge, quick blowing: 4 amps at 250 v; sim to Littelfuse 312004 or Bussman MTH-4.
ed. Shure Brothers		4034405-P3	Plug: 3 sockets; sim to Cannon Electric XLR-3-11C.
meplate: plastic.			POWER CABLE 19B205422-G2
6.			- - - - - MISCELLANEOUS - - - - -
ONE 33D10		19A115067-P1	Cable, 2-conductor: approx 23 feet; sim to Belden 31713.
OUS - - - - -		19A115776-P2	Phenolic: sim to Bussman Type HHJ.
ure Brothers RP-33.		1R16-P7	Cartridge, quick blowing: 4 amps at 250 v; sim to Littelfuse 312004 or Bussman MTH-4.
nches. Shure Brothers		4034405-P3	Plug: 3 sockets; sim to Cannon Electric XLR-3-11C.
Brothers RP-34.			AC CHARGING CABLE 5492570-G2
ed. Shure Brothers			- - - - - MISCELLANEOUS - - - - -
meplate: plastic.			
6.	C1	7489159-P16	Capacitor, metallized plastic: 4 μ f $\pm$ 20%, 200 VDCW; sim to Sprague 118P40502S4.
T 34A10		4034403-P1	Plug: sim to GE 4304-3.
OUS - - - - -		7160478-P1	Cable, 2-conductor: approx 87 inches; sim to Birnbach 789.
trolled magnetic.		4034405-P5	Plug: 5 sockets: sim to Cannon Electric XLR-5-11C.
max power. Shure			POWER SUPPLY EXTENSION CABLE 19B204289-G1
1.			- - - - - MISCELLANEOUS - - - - -
et. Shure Brothers		7473192-P19	Receptacle: 8 terminals; sim to HB Jones 261-32-08-030.
eiver cap: phen, rs RP-49.		7473192-P26	Plug: 8 terminals; sim to HB Jones 261-31-08-030.
L CABLE 8-G4		7162441-P23	Sleeving, electrical: approx 7/16 inch dia.
OUS - - - - -			
10 feet; sim to Belden			
annon Electric			
L CABLE 28-G5			
OUS - - - - -			
23 feet; sim to			
annon Electric			
RGE CABLE 3-G2			
OUS - - - - -			

LBI-3633B

PARTS LIST		
10 WATT AUDIO AMPLIFIER PL-19B205432-G1		
SYMBOL	G-E PART NO.	DESCRIPTION
C1 and C2	19A115028-P19	- - - - - CAPACITORS - - - - - Polyester: 0.47 μ f $\pm$ 20%, 100 VDCW.
P1 and P2	4029840-P2	- - - - - PLUGS - - - - - Contact, electrical: sim to AMP 42827-2.
Q1 and Q2	19A115622-P1	- - - - - TRANSISTORS - - - - - Silicon, NPN; sim to Type 2N3441.
R1 and R2	19A115736-P1	- - - - - RESISTORS - - - - - Metal film: 1000 ohms $\pm$ 10%, 3 w; sim to Corning Glass Type LPl-3.
R3 and R4	19B209022-P115	Wirewound: 1 ohm $\pm$ 10%, 2 w; sim to IRC Type BWH.
R5	19B209022-P30	Wirewound: 4.3 ohms $\pm$ 5%, 2 w; sim to IRC Type BWH.
R6	19B209022-P127	Wirewound: 3.3 ohms $\pm$ 10%, 2 w; sim to IRC Type BWH.
R7 and R8	3R78-P62LJ	Composition: 620 ohms $\pm$ 5%, 1 w.
RT1	19C300048-P3	- - - - - THERMISTORS - - - - - Disc: 1 ohm.
T1	19B209355-P1	- - - - - TRANSFORMERS - - - - - Audio freq: 0.3-3 kHz freq range, Pri: 3.6 ohms $\pm$ 10% imp, 0.2 ohm DC res, Sec: 75 ohms imp, 5.5 ohms $\pm$ 15% DC res.
T2	19B209354-P1	Audio freq: 0.3-3 kHz freq range, Pri: 120 ohms $\pm$ 10% imp, 5.4 ohms $\pm$ 15% DC res, Sec: 3.5 ohms imp, 0.3 ohm DC res.
		MODIFICATION KIT PL-19A122384-G1
C1	5496267-P14	- - - - - CAPACITORS - - - - - Tantalum: 15 μ f $\pm$ 20%, 20 VDCW; sim to Sprague Type 150D.
R1	19B209022-P127	- - - - - RESISTORS - - - - - Wirewound: 3.3 ohms $\pm$ 10%, 2 w; sim to IRC Type BWH.

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.

CONTROL UNIT (4EC66A10-17)

REV. A - To eliminate noise in receiver at low volume control settings.
Deleted jumpers between TB701-14 & TB701-17 and TB701-1 & TB701-17.

SYMBOL	G-E PART NO	DESCRIPTION
	19C303707-P3	Model 4EY18A12, 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 4EY18A13, 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 4EY18A14, 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 4EY18A15, 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 4EY18A10-15).
		25-50 MHz ANTENNA (LOW BAND)
		----- MISCELLANEOUS -----
	7491074-P1	Antenna: includes 96-1/2 inch stainless steel rod; sim to Antenna Specialists ASPA3BGE.
	7102930-P3	Adapter, antenna: 2-5/16 inches. (Used with GE Dwg 7491074-P1).
	4033101-G1	Antenna package: includes base, adapter spring, cable and plug.
	7472880-G5	Antenna base. (Used in 4033101-G1).
	7476632-G4	Adapter spring. (Used in 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 4033101-G1).
	2R22-P1	Plug, coaxial: Signal Corps PL-259; sim to Amphenol 83-15P. (Used with GE Dwg 5492239-P1 in 4033101-G1).
	4KY9A1	Coil, loading: 25-33 MHz; sim to Antenna Specialists ASPA87.
	19A121577-G1	Antenna hook kit.
	7134724-P1	Antenna hook. (Used in 19A121577-G1).
		PORTABLE ANTENNA MODELS 4EY19C10-15
		MODEL 4EY19C10 130-150.8 MHz MODEL 4EY19C11 150.8-162 MHz MODEL 4EY19C12 162-166 MHz MODEL 4EY19C13 166-174 MHz MODEL 4EY19C14 406-420 MHz MODEL 4EY19C15 450-470 MHz
		132-174 MHz ANTENNA MODEL 4EY20A10
		----- 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.
		MICROPHONE MODEL 4EM25C10
		Cable clamp, Shure Brothers RP-21. (Includes

SYMBOL	G-E PART NO	DESCRIPTION
		MICROPHONE MODEL 4EM33C10
		----- MISCELLANEOUS -----
		Switch. Shure Brothers RP-33.
		Cable and plug: approx 80 inches. Shure Brothers RP-35.
		Button: red plastic. Shure Brothers RP-34.
		Cartridge, magnetic controlled. Shure Brothers RP-32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP-94.
		Shield. Shure Brothers RP-36.
		MICROPHONE MODEL 4EM33D10
		----- MISCELLANEOUS -----
		Switch: moisture proof. Shure Brothers RP-33.
		Cable and plug: approx 80 inches. Shure Brothers RP-35.
		Button: red plastic. Shure Brothers RP-34.
		Cartridge, magnetic controlled. Shure Brothers RP-32.
		Case, mounting button and nameplate: plastic. Shure Brothers RP-31.
		Shield. Shure Brothers RP-36.
		HANDSET MODEL 4EM34A10
		----- MISCELLANEOUS -----
		Cartridge, transmitter: controlled magnetic. Shure Brothers RP-13.
		Cartridge, receiver: 3 watt max power. Shure Brothers RP-41.
		Switch. Shure Brothers RP-81.
		Cable and plug: approx 5 feet. Shure Brothers RP-47.
		Handle, transmitter cap, receiver cap: phen, weather proof. Shure Brothers RP-49.
		POWER CONTROL CABLE 19C303828-G4
		----- MISCELLANEOUS -----
	19A115067-P1	Cable, 2-conductor: approx 10 feet; sim to Belden 31713.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric NK-L23-23C-3/4.
		POWER CONTROL CABLE 19C303828-G5
		----- MISCELLANEOUS -----
	19A115067-P3	Cable, 2-conductor: approx 23 feet; sim to Belden 7721.
	19B200010-P3	Plug: 23 contacts; sim to Cannon Electric NK-L23-23C-3/4.
		DC TRICKLE CHARGE CABLE

SYMBOL	G-E PART NO	DESCRIPTION
		POWER CABLE 19B205422-G1
		----- MISCELLANEOUS -----
	19A115067-P1	Cable, 2 conductor: approx 10 feet: sim to Belden 31713.
	19A115776-P2	Phenolic: sim to Bussman Type HHJ.
	1R16-P7	Cartridge, quick blowing: 4 amps at 250 v; sim to Littelfuse 312004 or Bussman MTH-4.
	4034405-P3	Plug: 3 sockets; sim to Cannon Electric XLR-3-11C.
		POWER CABLE 19B205422-G2
		----- MISCELLANEOUS -----
	19A115067-P1	Cable, 2-conductor: approx 23 feet; sim to Belden 31713.
	19A115776-P2	Phenolic: sim to Bussman Type HHJ.
	1R16-P7	Cartridge, quick blowing: 4 amps at 250 v; sim to Littelfuse 312004 or Bussman MTH-4.
	4034405-P3	Plug: 3 sockets; sim to Cannon Electric XLR-3-11C.
		AC CHARGING CABLE 5492570-G2
		----- MISCELLANEOUS -----
CL	7489159-P16	Capacitor, metallized plastic: 4 μ f $\pm$ 20%, 200 VDCW; sim to Sprague 118P40502S4.
	4034403-P1	Plug: sim to GE 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 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.

SYMBOL	G-E PART
CL and C2	19A115028-P
P1 and P2	4029840-P2
Q1 and Q2	19A115622-P
R1 and R2	19A115736-P
R3 and R4	19B209022-P
R5	19B209022-P
R6	19B209022-P
R7 and R8	3R78-P62LJ
RT1	19C300048-P
T1	19B209355-F
T2	19B209354-F
C1	5496267-P1
R1	19B209022-P

LBI-3633B

STEP 1 - QUICK CHECKS

SYMPTOM	PROCEDURE
Before making any other checks, measure for approximately 24 VDC on heat sink of Q6, and 32 volts with rechargeable battery supply and 24 volts with dry battery supply on collector of Q1 in PA Assembly and orange glow on RT1.	
A. NO OSCILLATOR OUTPUT, BULB RT1 AT FULL BRIGHTNESS	Check for short on 13.5-volt line.
	Check for defective regulator transistor Q7.
B. NO OSCILLATOR OUTPUT, BULB RT1 OUT	Check bulb RT1 and Zener diode CR1.
C. NO OSCILLATOR OUTPUT, BULB RT1 NORMAL	Check two-frequency switch.
NO MODULATION	Check for approximately 3.6 VDC at collector of Q9. If the reading is either 0 volts or 10 volts, change audio transistors.
	Check connection of mic shielded lead to board.
	Check setting of MOD ADJ R15 (Refer to Transmitter Alignment Procedure).
LOW POWER OUTPUT	Check adjustment of FL1/FL2-C1 and -C2 (Refer to Transmitter Alignment Procedure).
NO POWER OUTPUT. VERY LOW READING ON AMPL-1. MULT-3 READING NORMAL OR HIGH.	If reading at emitter of Q5 (J11-4) is very low, and reading at emitter of Q4 (J11-3) is normal or high, replace Q5.

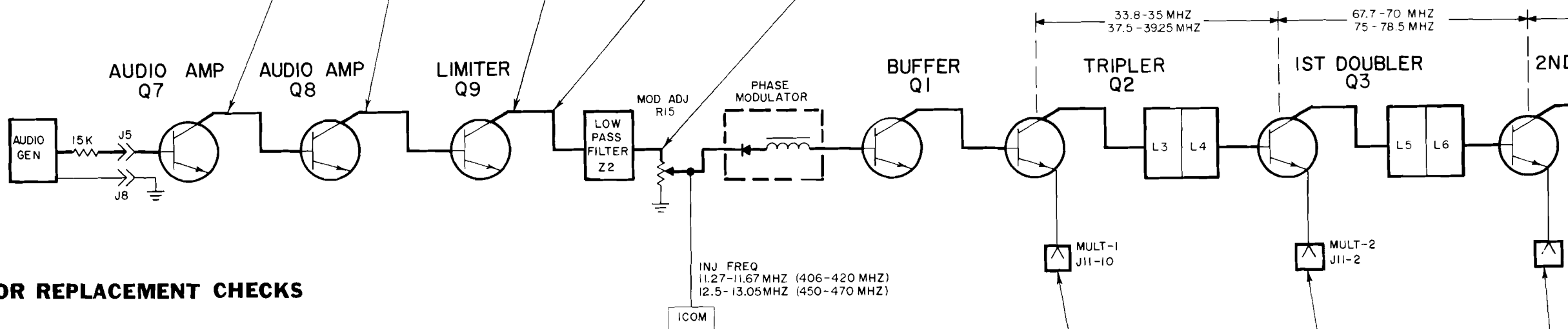
PA TRANSISTOR CHECKS

To determine if PA transistor is defective:

1. Check voltage at E3-2 on PA casting. If power supply is not defective, the voltage should be approximately 28 volts. If the voltage is below 24 volts, Q1 is defective and should be replaced.
2. Tune C40 on exciter for maximum reading at J11-5. Reading should be 0.2 volts (minimum). If reading is low, check the exciter for low drive. If reading is ok, retune C40 for maximum power and proceed to step 3.
3. Tune C6, C11, C12 & C13 for a reading of at least 0.7 volts at test metering position "F". If a reading of 0.7 volts cannot be obtained, the PA transistor is defective.

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

AC-VTVM	AC-VTVM
ADJUST AUDIO GENERATOR FOR AN OUTPUT OF 400 MILLIVOLTS AT 1 KHZ	
WITH THE TRANS-MITTER KEYED, READING AT COLLECTOR OF Q9 SHOULD BE APPROX 4 VAC	WITH THE TRANS-MITTER KEYED, READING AT MOD ADJUST (R15) SHOULD BE APPROX 2.1 VAC



the PA transistor Q1:

in the two hex cap screws adjacent to the PA transistor hold-down

re the transistor hold-down nut.

der one transistor lead at a time with a 50-watt soldering iron. scribe to hold the lead away from the printed circuit board until older cools.

out the transistor and remove the old solder from the printed
g board.

the new transistor leads (if required) to approximately 3/8-inch
hs. Cut the collector lead at a 45° angle for future identifica-
The letter "C" on the top of the transistor indicates the
ctor.

a coating of silicone grease around the transistor mounting surface and place the transistor in the mounting hole. Align the leads down in the Outline Diagram. Then hold the body of the transistor against the hold-down nut and spring washer, using moderate torque (12-inch pounds-maximum).

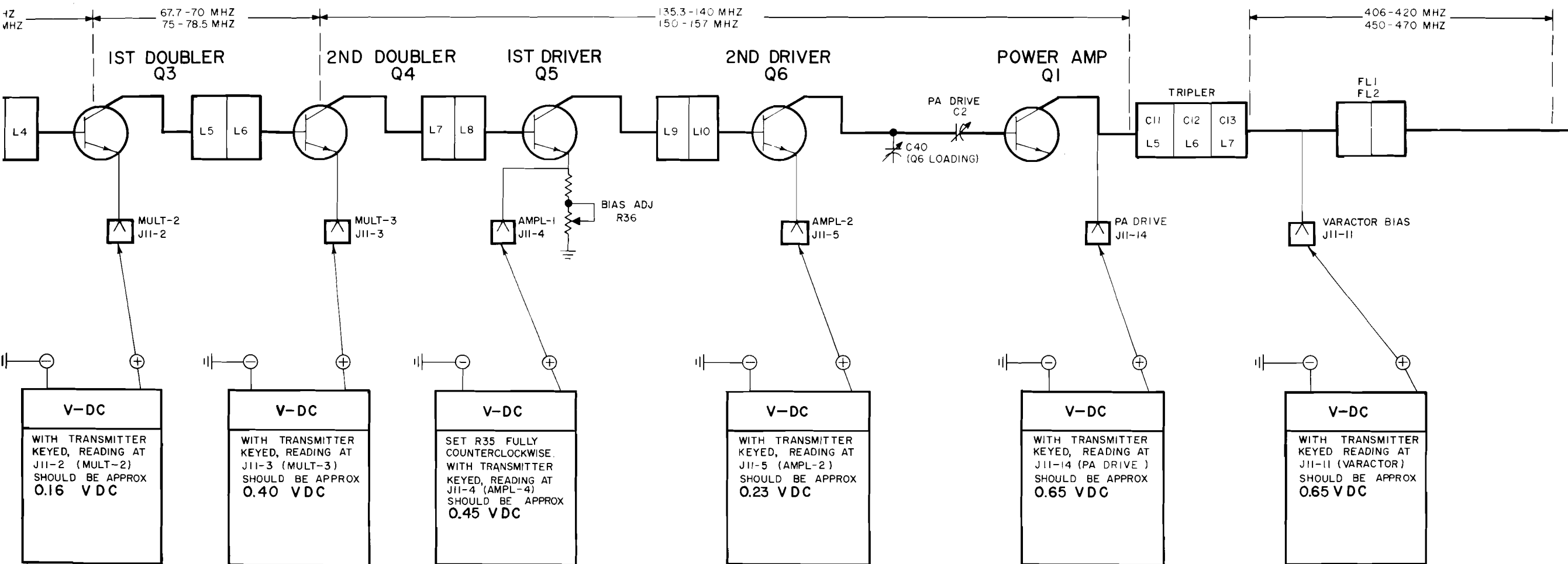
r the leads to the printed circuit pattern. Start at the inner

- 20,000 OHM-PER-VOLT DC METER

The diagrams show three voltmeter setups, each with a negative terminal (-) and a positive terminal (+) connected to a circuit point. The voltmeter is labeled 'V-DC'.

- Diagram 1 (Left):** The voltmeter is connected to J11-10 (MULT-1). The reading is 0.18 VDC.
- Diagram 2 (Middle):** The voltmeter is connected to J11-2 (MULT-2). The reading is 0.16 VDC.
- Diagram 3 (Right):** The voltmeter is connected to J11-3 (MULT-3). The reading is 0.40 VDC.

Each diagram includes the text: "WITH TRANSMITTER KEYED, READING AT [J11-10 (MULT-1) / J11-2 (MULT-2) / J11-3 (MULT-3)] SHOULD BE APPROX [0.18 VDC / 0.16 VDC / 0.40 VDC]".



TROUBLESHOOTING PROCEDURE

406-470 MHz TRANSMITTER
MODELS 4ET88A10 & 11

(RC-1736)

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 5.5K ohms with negative meter probe to ground, or 4K ohms with positive meter lead to ground.
NO REGULATED 10 VOLTS	Check the 12-volt supply. Then check regulator Q319 and regulator circuit. Resistance reading of 10-volt supply from the emitter of Q319 to ground should be 2K 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 Q303. Check crystal Y301 (substitution method)
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 (SIMILAR TO BOONTON MODEL 91-CA OR MILLIVAC TYPE MV-1B C.
2. SIGNAL ON RECEIVER FREQUENCY (BELOW SATURATION) CORRECT FREQUENCY CAN BE DETERMINED BY ZEROING THE DISCRIMINATOR.

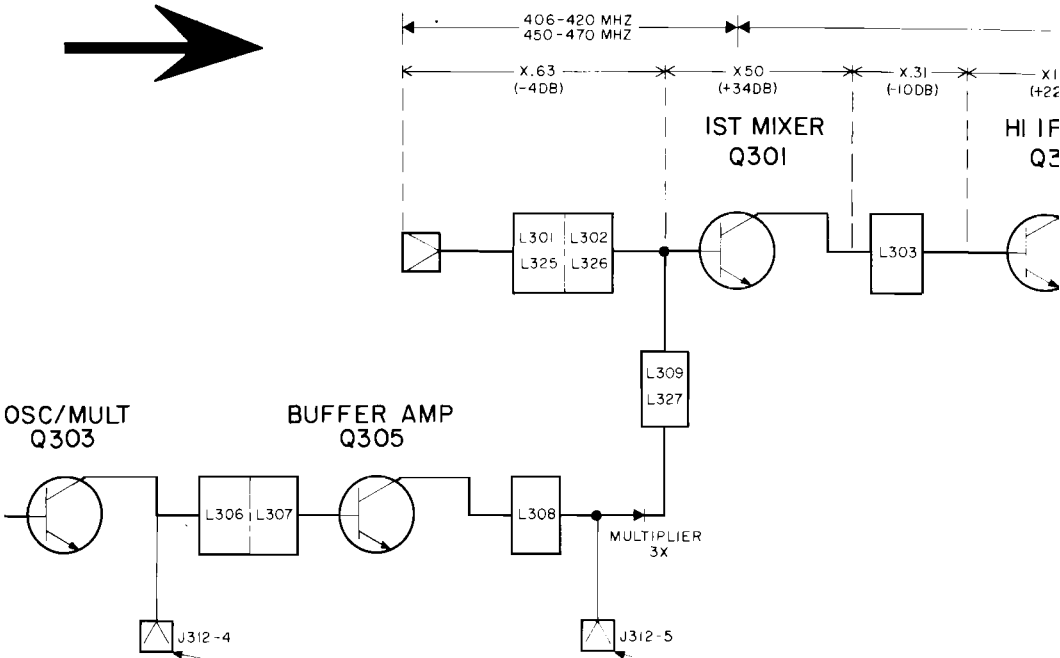
PROCEDURE

1. APPLY PROBE TO INPUT OF STAGE (FOR EXAMPLE, BASE OF RF AMP). PEAK RESONANT CIRCUIT OF STAGE BEING MEASURED AND TAKE VOLTAGE READING (E₁).
2. MOVE PROBE TO INPUT OF FOLLOWING STAGE (1ST MIXER). REPEAT FIRST RESONANT CIRCUIT THEN PEAK CIRCUIT BEING MEASURED AND TAKE READING (E₂).
3. CONVERT READINGS (BY SUBTRACTING E₁ FROM E₂ ON THE DB SCALE OF RF VOLTMETER, OR) BY MEANS OF THE FOLLOWING FORMULA.

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

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

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



STEP 2A- SIMPLIFIED VTVM GAIN CHECKS

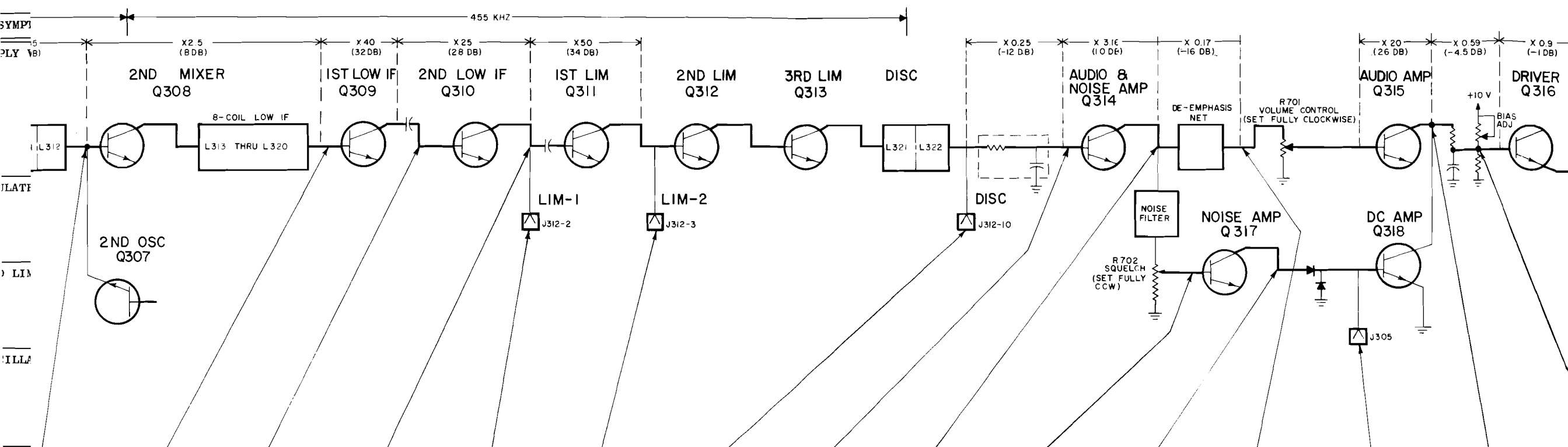
EQUIPMENT REQUIRED:

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

PRELIMINARY STEPS:

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

SIGNAL GENERATOR INPUT AT P303. MAINTAIN SETTING AT DISCRIMINATOR ZERO		
PROCEDURE		
READING	0.34 VDC EX-3-A 0.12 VDC MULTMTR 0.25 VDC	-1. EX-3- MULTM

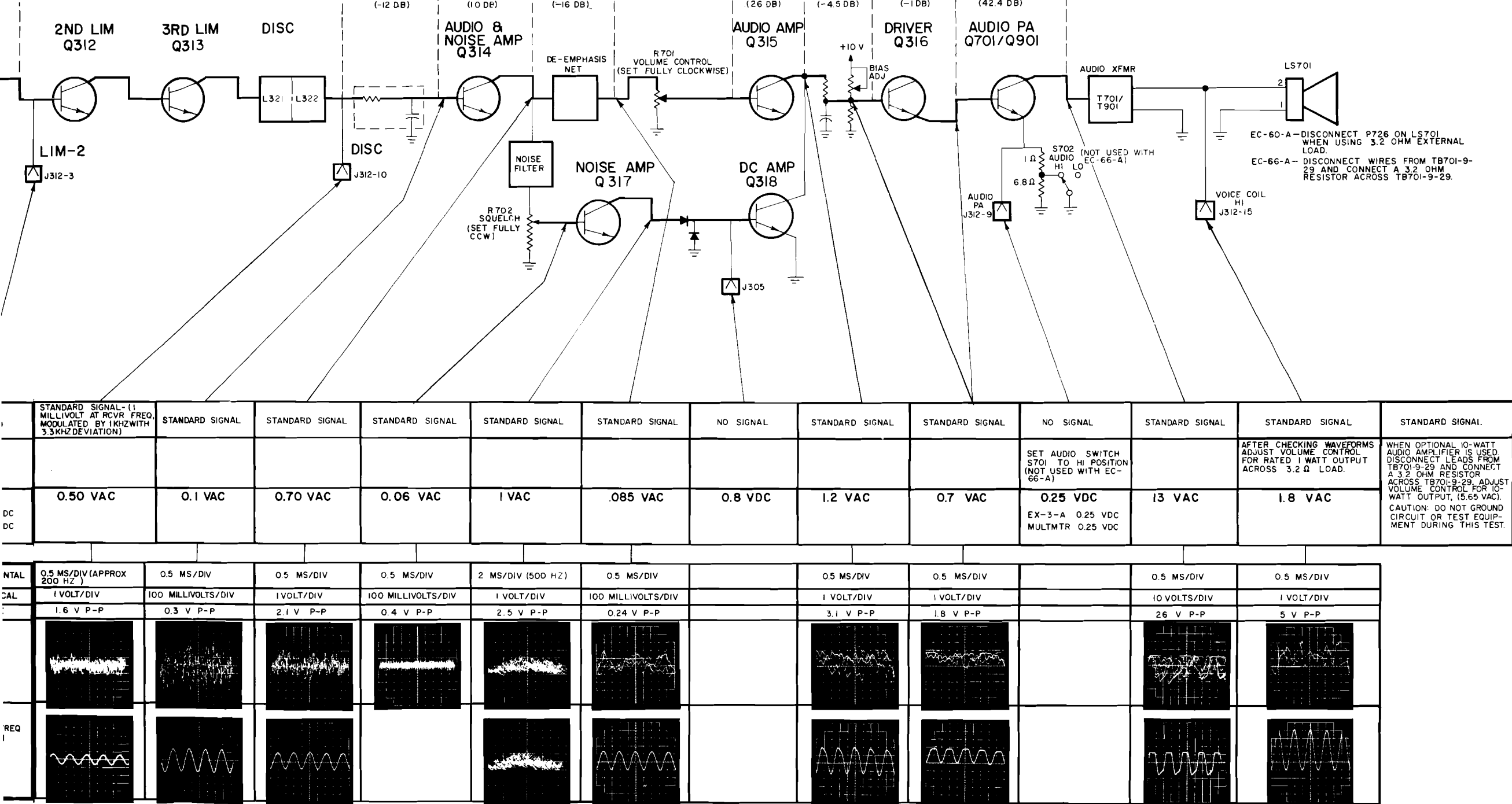


MODULATED	UNMODULATED	UNMODULATED	UNMODULATED	100 MICROVOLTS UNMODULATED	1 MICROVOLT UNMODULATED	STANDARD SIGNAL- (1 MILLIVOLT AT RCVR FREQ, MODULATED BY 1KHZ WITH 3.3 KHZ DEVIATION)	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL	NO SIGNAL	STANDARD SIGNAL	STANDARD SIGNAL
INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%	INCREASE SIGNAL GENERATOR OUTPUT FROM ZERO UNTIL VTVM READING DECREASES BY 5%											
ATOR OUTPUT SHOULD BE APPROX 500 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 500 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 600 MICROVOLTS	GENERATOR OUTPUT SHOULD BE APPROX 10 MICROVOLTS	1.75 VDC EX-3-A 0.34 VDC MULTMTR 0.75 VDC	1.25 VDC EX-3-A 0.26 VDC MULTMTR 0.55 VDC	0.50 VAC	0.1 VAC	0.70 VAC	0.06 VAC	1 VAC	.085 VAC	0.8 VDC	1.2 VAC	

-AUDIO & SQUELCH WAVEFORMS

- EQUIPMENT REQUIRED:
1. OSCILLOSCOPE
 2. SIGNAL GENERATOR (MEASUREMENTS M560 OR EQUIVALENT).

SCOPE SETTING	HORIZONTAL	0.5 MS/DIV (APPROX 200 HZ)	0.5 MS/DIV	0.5 MS/DIV	0.5 MS/DIV	2 MS/DIV (500 HZ)	0.5 MS/DIV		0.5 MS/DIV	0.5 MS/DIV
	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
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	1.1 V P-P
NOISE WAVE FORM										
STANDARD SIGNAL (1 MILLIVOLT AT RECEIVER FREQ MODULATED BY 1 KHZ WITH 3.3 KHZ DEVIATION)										



TROUBLESHOOTING PROCEDURE

406-470 MHz RECEIVER
 MODELS 4ER53A10.11.12 & 13

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 & ET-88-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.

STEP
2A

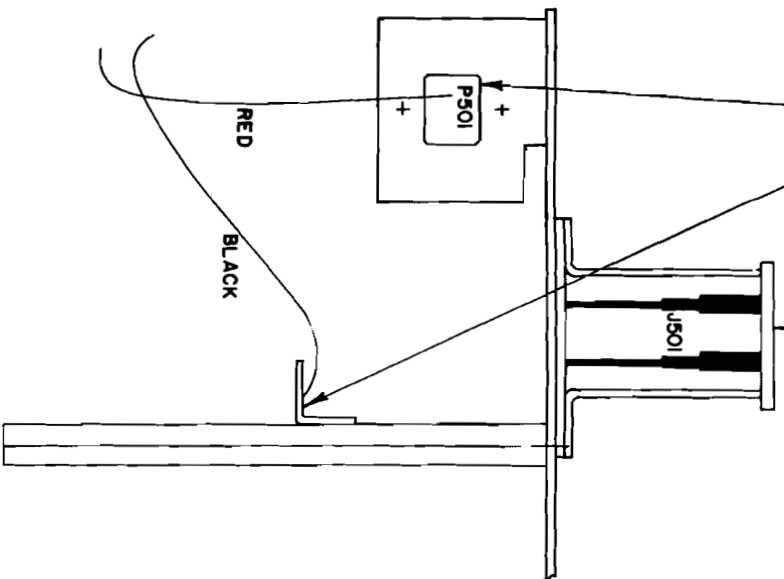
P501

RED

EN

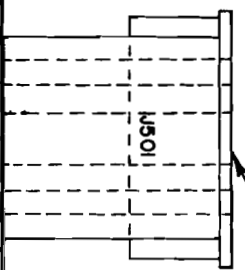
STEP
2A

STEP
6B



END VIEW

STEP
1B



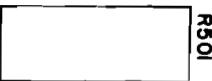
STEP
1C

STEP
2B

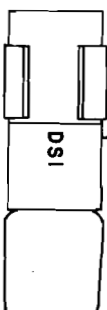
STEP
3



F502

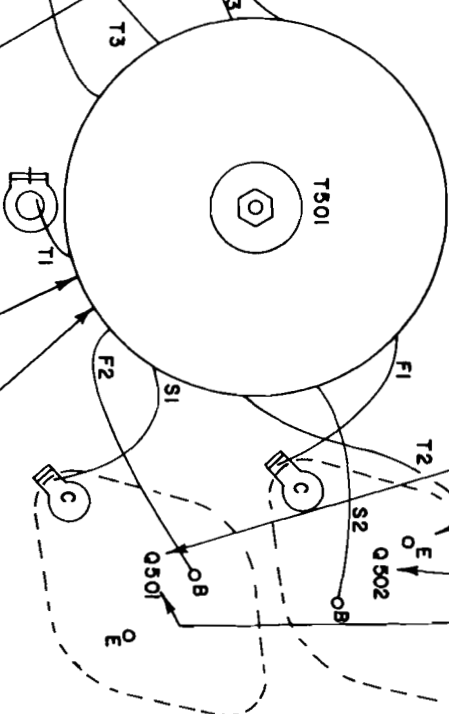


R501



DS1

SIDE VIEW



STEP
7C

STEP
7B

STEP
7A

STEP
8

STEP
6A

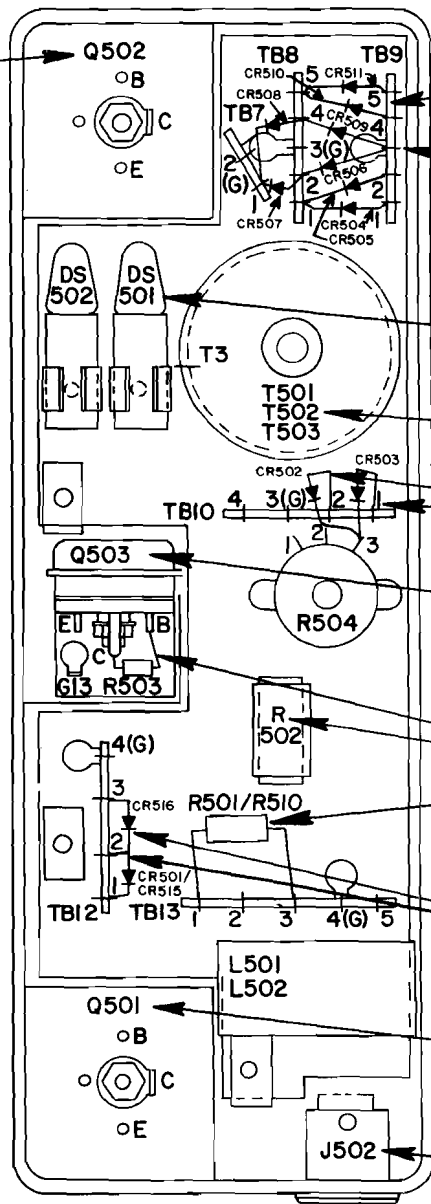
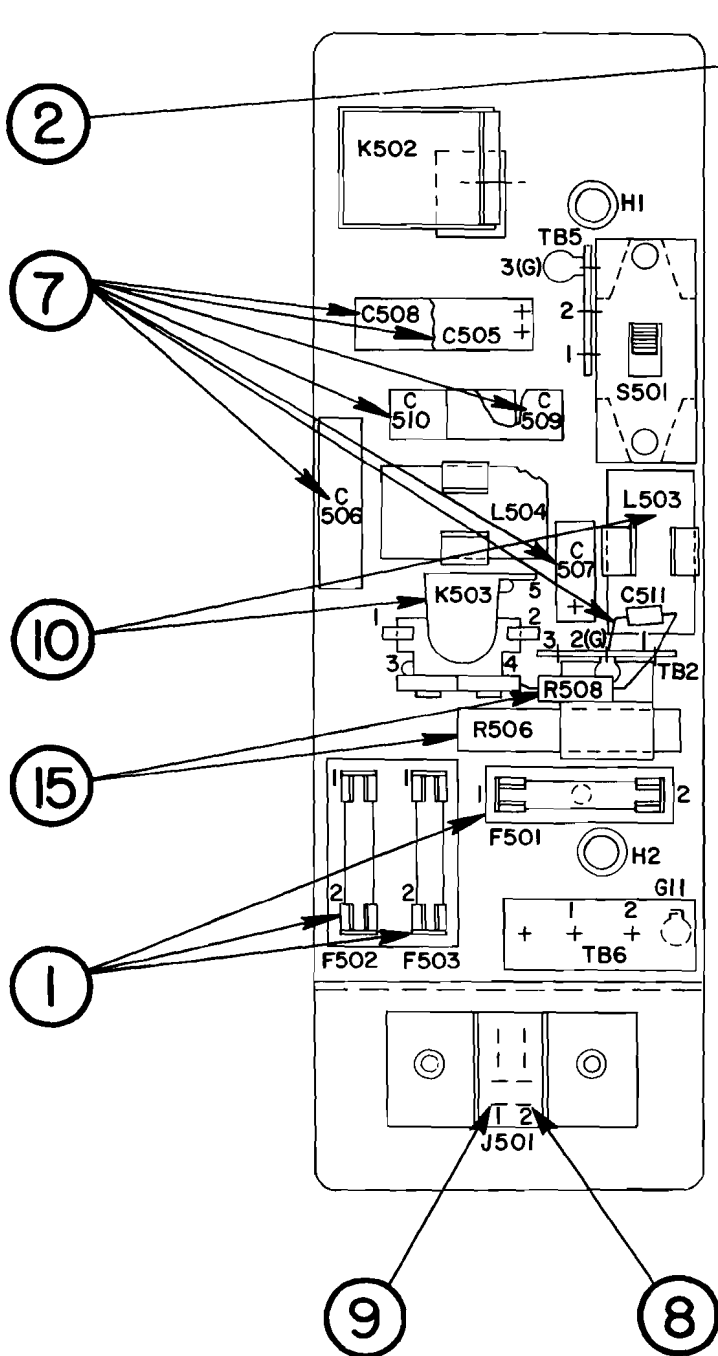
STEP
5

STEP
4

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
Output voltages below normal with input supply voltage normal	Connections from J502 to transformer board (see Service Sheet) ③
	Shorts or opens in diodes and capacitors in transformer secondary ⑦
	Normal high B+ load: (ET-61-A, ET-62-A and ET-88-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, ET-62-A and ET-88-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
High voltage (32 v) much lower than normal, and low voltage (24 v) negative with respect to ground	Continuity of K503 winding and L503 ⑩
	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 PRO

POWER SUPPLY
MODELS 4EP47A10, 11 & 4EP48A1C

(RC-1237B)

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