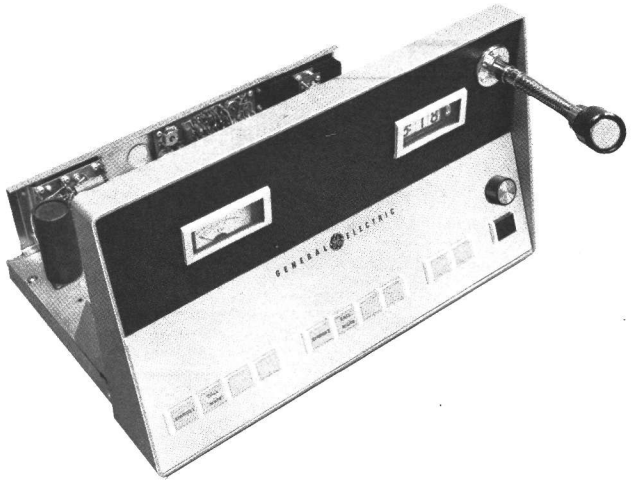
MOBILE RADIO

MAINTENANCE MANUAL

CONTROL PANEL MODEL 4EC76A24
(FOR DUAL-STATION CONTROL)



SPECIFICATIONS *

Audio Output	
Speaker	Greater than 10 watts, less than 1-1/2% distortion @ 5 watts, 117 VAC, -15% +20%
Line	+16 dBm maximum with less than 1-1/2% distortion, with compression
Frequency Response	+1/2 to -3 dB, 200 to 10,000 Hz, reference 1000 Hz
Compression Range	With audio input increase of 30 dB beyond start of compression, output level increased less than 3 dB
Power Requirements	130 watts, 117 VAC, 50/60 Hz
Input and Output Impedance	600 ohms
Temperature Range	-30°C to +60°C (-22°F to +140°F)

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

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5131	Supervisory Control
5145	12/24-Hour, 60-Hz, Clock
5155	Tone Alert
5161	Intercom
5170	Line Compensation

WARNING

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

DESCRIPTION

General Electric Control Panel Model EC76A18 is designed for use in the turret center section of a Radio Control Center. Electrical components are mounted on a 19-inch drawer-type chassis which can easily be removed from the turret to facilitate maintenance and servicing. The panel provides push button selection of remote control functions at two base stations by changing the level and polarity of DC control currents.

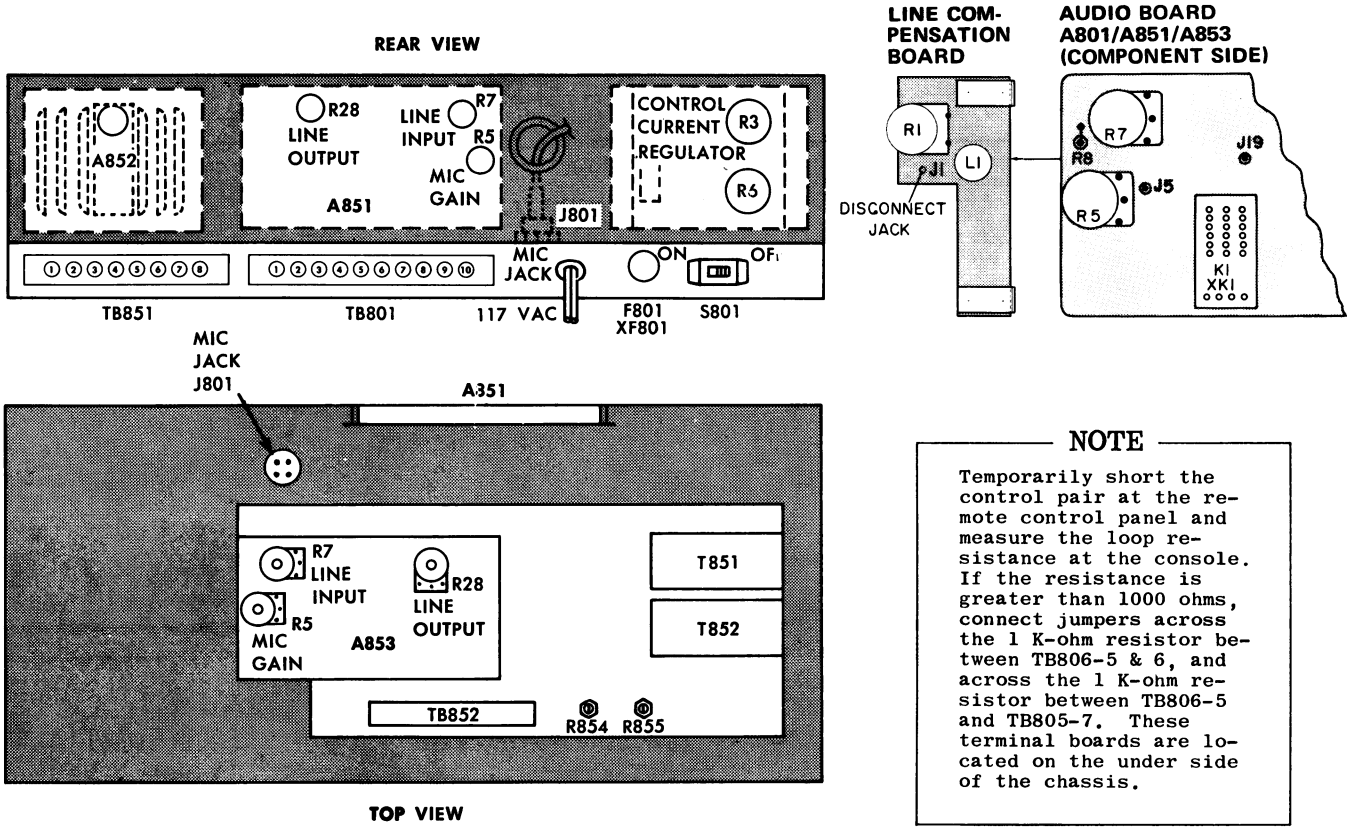
Printed circuit board techniques, silicon transistors and other solid state devices are designed into the basic modules of the panel to assure maximum reliability. The audio section of the panel contains a compression-amplifier for equalizing audio output levels over a wide range of microphone and line input levels. When sending messages, the compression-amplifier helps compensate for variations in speech levels. When receiving messages, the compression-amplifier prevents speaker "blasting" caused by variations in the input signal levels from station or paralled control equipment. A compression-amplifier accessory is available for use with the 4KC16A10 Remote Control Panel (at the base station) for simplifying or eliminating line level settings in parallel operations.

External control connections are made to the panel at TB801 and TB851. Power cable W801 connects to AC power through a convenience outlet on the console turret. Switch S801 on back of the panel chassis turns power ON and OFF.

Table 1 lists options which are available to meet different requirements of individual two-way radio systems.

ADJUSTMENT

Before adjusting the control panel, make sure that all AC power lines, phone lines and ground connections have been completed at the control panel location



NOTE

Temporarily short the control pair at the remote control panel and measure the loop resistance at the console. If the resistance is greater than 1000 ohms, connect jumpers across the 1 K-ohm resistor between TB806-5 & 6, and across the 1 K-ohm resistor between TB806-5 and TB805-7. These terminal boards are located on the under side of the chassis.

Figure 1 - Control Panel Adjustments

and the base station. Also, the base station should have been properly aligned, and the station LINE LEVEL ADJUST (R1501 on the EP-38-A in MASTER stations) set for not more than 2.7 volts RMS (+11 dBm) at the audio pair with maximum system deviation at 1000 Hz applied to the base station receiver antenna jack.

LINE INPUT

The LINE INPUT controls on A851 and A853 have been adjusted at the factory for an input of 180 millivolts RMS (-12 dBm) for threshold of compression. The controls may be adjusted for an input as low as -20 dBm for threshold of compression. Use of excessive compression will accent background and line noise during pauses in transmission.

Procedure:

1. Feed a 1000-Hz signal onto station 1 audio pair (connected at TB1-1 and TB1-2) from the source with the largest line loss (this may be the base station or another console.) Adjust the audio generator output for the maximum permissible level (up to +16 dBm).

2. Select STATION 1 push button. (Switch must be lighted.)

3. Adjust the LINE INPUT control (R7) on A851 for threshold of compression as indicated by the compression meter, or by a reading of 0.4 volt DC on a 20,000 ohm-per-volt meter connected from A851-J19 to ground.

4. Press the STATION 1 switch to turn the switch light off. In this position STATION 2 audio is connected to the compression meter.

5. Feed a 1000 Hz signal onto Station 2 audio pair (connected at TB2-1 and TB2-2) from the source with the largest line loss (this may be the base station or another console). Adjust the audio generator output for the maximum permissible level (up to +16 dBm).

6. Adjust the LINE INPUT control (R7) on A853 for threshold of compression as indicated by the compression meter, or by a reading of 0.4 volt DC on a 20,000 ohm-per-volt meter connected from A853-J19 to ground.

RELEASE TIME FOR COMPRESSOR

The release time of the compressor-amplifier circuit (on audio board A851/A853) is the time required for the unit to restore full gain after an input signal that has driven the unit into compression is removed.

The release time is determined by the value of R25 which was selected at the factory for average operating conditions. When overall system requirements indicate that a shorter release time is needed. R25 may be replaced with a different value resistor as shown in Table 2.

Table 2 - Compressor Release Time

Value of R25	Release Time
100K-ohms (standard)	2 seconds
27K-ohms	1 second
17K-ohms	0.5 second

Reducing the release time, however, will result in an increase in background noise picked up during pauses in transmission.

MIC GAIN

The MIC GAIN Control (R5) has been adjusted at the factory according to the type of microphone ordered with the control equipment. Setting R5 for excessive compression will accent background noise during pauses in transmission.

Procedure:

1. Apply a 1000-Hz signal to A851-J3 and J4 (GND) at the level indicated in the following chart.

For Microphone Type:	Set Input Level For:
EM-35-A (Goose-Neck Mike)	10 Millivolts
EM-28-A (Desk Mike)	12 Millivolts
EM-25-A (Military Mike)	60 Millivolts
EM-26-A (Handset)	60 Millivolts
EM-13-A (Boom Mike)	6 Millivolts

2. Adjust MIC GAIN control R5 on A851/A853 (see following note) for threshold of compression as indicated by the compression meter or by a reading of 0.4 volt DC on a 20,000 ohm-per-volt meter connected from A851/A853-J19 to ground.

NOTE

The compression meter is connected to A851 when STATION 1 switch is lighted and to A853 when STATION 1 switch is not lighted.

LINE OUTPUT

The control panel has been set at the

factory for a maximum line output of 2.7 volts RMS (+11 dBm). The line output may be reduced when required by local telephone company regulations or whenever line losses and noise pickup permit an adequate signal-to-noise ratio.

Procedure:

1. Feed a 1000-Hz, 30 millivolt signal into pins 1 and 2 of microphone jack J801.

2. Connect an AC-VTVM across the audio pair. Use a 0.5-mFd capacitor in series with the meter if DC is being simplexed line-to-line.

3. For single Radio Control Centers or Paralleled Radio Control Centers (with Compression or Intercom accessory at the station): Adjust LINE OUTPUT control R28 on A851 and A853 for the maximum permissible level (up to +16 dBm).

4. For paralleled Radio Control Centers (and no Compression-Amplifier or Intercom accessory at the station): Set the control center with the highest line loss for the maximum permissible level (up to +16 dBm). Measure the RMS voltage at the station with an AC-VTVM. Then set the LINE OUTPUT control R28 on the remaining control centers to produce the same level at the station as the first control center.

CONTROL VOLTAGES

Two-Frequency Transmit

1. Connect a DC milliammeter in series with the STATION 1 control line (positive lead of meter to TB801-5).

2. Select STATION 1 and the associated XMIT 1 push button.

3. Key the transmitter and set CONTROL CURRENT adjustment R3 for 6 milliamps.

4. Connect a DC milliammeter in series with the STATION 2 control line (positive lead of meter to TB851-5).

5. Select STATION 2 and the associated XMIT 1 push button.

6. Key the transmitter and set CONTROL CURRENT adjustment R6 for 6 milliamps.

Channel Guard

1. Connect a DC milliammeter in series with the STATION 1 control line (positive lead to TB801-5).

2. Push in the STATION 1 switch and the associated CHANNEL GUARD MONITOR switch. Adjust the CONTROL CURRENT adjustment (R3) for 6 milliamps.

3. Connect a DC milliammeter in series with the STATION 2 control line (positive lead to TB851-5).

4. Push in the STATION 2 switch and the associated CHANNEL GUARD MONITOR switch. Adjust CONTROL CURRENT adjustment R6 for 6 Milliamps.

SPEAKER AMPLIFIER BIAS CONTROL

BIAS ADJ control R5 on A852 is pre-set at the factory and should not require further adjustment. However, if adjustment is necessary, use the following procedure.

1. Disconnect the wire from J3 and insert a milliammeter in series with J3 and the wire.

2. With no signal input, adjust BIAS ADJ control for 20 milliamps.

MUTE CONTROL

Mute controls R854 and R855 have been set at the factory for 20-dB muting. They may be re-adjusted for any desired muting level between 0 and 40-dB in the following manner.

1. Select the STATION 1 mute function with the Station 1 CALL-MUTE switch (MUTE portion of the CALL-MUTE switch lighted).

2. With a signal input on audio line #1 (connected at TB1-1 and -2), adjust R854 for the desired mute level.

3. Select the STATION 2 mute function with STATION 2 CALL-MUTE switch.

4. With a signal input on audio line #2 (connected at TB2-1 and -2), adjust R855 for the desired mute level.

TONE ALERT OSCILLATOR (Option 5155)

The Tone Alert Oscillator has been adjusted at the factory to provide 1 volt RMS output and should not require readjustment. If adjustment is necessary, use the following procedure.

1. Remove the control panel from the console turret and set panel on its side to expose the Tone Alert Oscillator Board.

2. Connect an AC-VTVM across audio pair TB801-1 and 2.

3. Press the TONE push button.

4. Adjust R8 on the Tone Alert Oscillator

Board for a meter reading of 1 volt RMS (or less when required by local regulations).

VU METER

The VU Meter was set at the factory to indicate 0 VU at a +11 dBm line output. If the line output is set for other than +11 dBm, it will be necessary to re-adjust R9 on the VU meter to obtain 0 VU readings.

Procedure:

1. Connect an AC-VTVM across the audio pair (TB801-1 and -2). Use a 0.5 mFd capacitor in series with the meter if a DC voltage is simplexed line-to-line.

2. With Station 1 selected and the console keyed, apply a 1000 Hz signal to A851-J3 and -J4 (GND) at the proper input level for the microphone being used (see chart in MIC GAIN setting).

3. Reduce the signal being applied to A851-J3 and -J4 until the line level is reduced by 10 dB.

4. Set R9 on the VU Meter for 0 VU. The VU Meter should indicate frequent peaks in to -1 to +3 VU range when talking into the microphone in a normal tone of voice. There should also be an indication on the VU meter with Station 2 selected.

5. If the meter is connected to indicate 0 VU readings in the receive mode (the Orange lead connected to A853-J8 and the Red lead connected to A851-J8 instead of -J17), apply a 1000 Hz signal as directed in Step 2. Measure the voltage level at A801-J8 with an AC-VTVM. Then, reduce the input signal until the voltage at J8 is reduced 10 dB, and set R9 on the VU Meter for 0 VU.

LINE COMPENSATION

The Line Compensation kits are shipped from the factory disconnected to prevent interference with normal adjustment of the console (the White wire connected to Disconnect Jack J1 on the Line Compensation board). After all adjustments to the Console have been completed, activate the kits by disconnecting the White wires from J1 on the Line Compensation boards and connecting them to A851-J5 and A853-J5.

Procedure:

1. Apply a 3000 Hz signal to the audio pair from the base station. Adjust the audio generator to produce the highest permissible line level.

2. Adjust LINE INPUT control R7 on both A851 and A853 for threshold of compression as indicated by the Compression Meter, or by a reading of 0.4 volt DC as measured from A851/A853-J19 to ground.

3. Remove the 3000 Hz signal and apply a 600 Hz signal to the audio pair from the base station at the same level as the 3000 Hz signal was applied.

4. Adjust R1 on the Line Compensation board for threshold of compression as indicated by the Compression Meter, or by a reading of 0.4 volt DC as measured from A851/A853-J19 to ground.

NOTE

If a reading of 0.4 volt DC cannot be obtained by adjusting R1, re-adjust R7 on the Audio Board for a reading of 0.4 volt DC as measured from A851/A853-J19 to ground.

SETTING THE CLOCK

To set the clock, turn power OFF. (This may be done by unplugging the control panel line cord from the AC receptacle in the turret, or by operating the main power switch S1 on the desk console). Turn the indicator wheels in either direction until the correct time shows in the window, then turn power ON.

CIRCUIT ANALYSIS

The control panel circuitry consists of dual-audio amplifier stages, a self contained power supply, and controls and indicator lights.

Audio circuits consist of audio boards A851 and A853, speaker amplifier A852 and two PA transistors (Q851 and Q852) mounted in a heat sink on the control panel chassis.

The power supply provides the control currents for the switching functions, and the supply voltages for the audio stages, relay and indicator lights.

The VOLUME control, push button switches, indicator lights, clocks and meters mount on the front of the control panel.

For ease of adjustment, the LINE INPUT, LINE OUTPUT and MIC GAIN controls are adjusted through holes in the back panel. Instructions for setting the controls are contained in the Adjustment Procedure Section.

AUDIO BOARD A851

Audio board A851 is used with STATION 1

as a mike-to-line amplifier in the transmit or intercom mode, and as a line-to-speaker amplifier in the receiver mode. A simplified switching diagram is shown in Figure 2.

Transmit Mode

Pressing the TRANSMIT switch energizes relay K851, which mutes the loud speaker. Assuming STATION 1 is selected, A851-K1 also energizes and connects audio from the common-emitter preamplifier (Q1) through MIKE GAIN control R5 to the compressor-amplifier (Q2-Q7). The output of the compressor-amplifier is connected through LINE OUTPUT control R28 and contacts of K1 to class A audio amplifier Q9. A temperature compensating thermistor (RT2) keeps the base bias of Q9 constant over wide variations in temperature. The output of Q9 is coupled through line matching transformer T802 to the audio pair.

Receive Mode

Incoming audio is coupled through line-matching transformer T802 to audio board A851. The audio input (from J17) is connected through the normally closed relay contact to LINE INPUT control R7, and then to the compressor-amplifier. One portion of the compression-amplifier output is connected through the CALL/MUTE circuits and the VOLUME control to the speaker amplifier (A852). The remaining portion is connected to the STATION 1 light flasher (A854).

Compressor-Amplifier

The compressor-amplifier circuit consists of gain control stage Q2, high gain audio amplifiers Q3 through Q6, and DC amplifier Q7.

When audio is applied to the compressor-

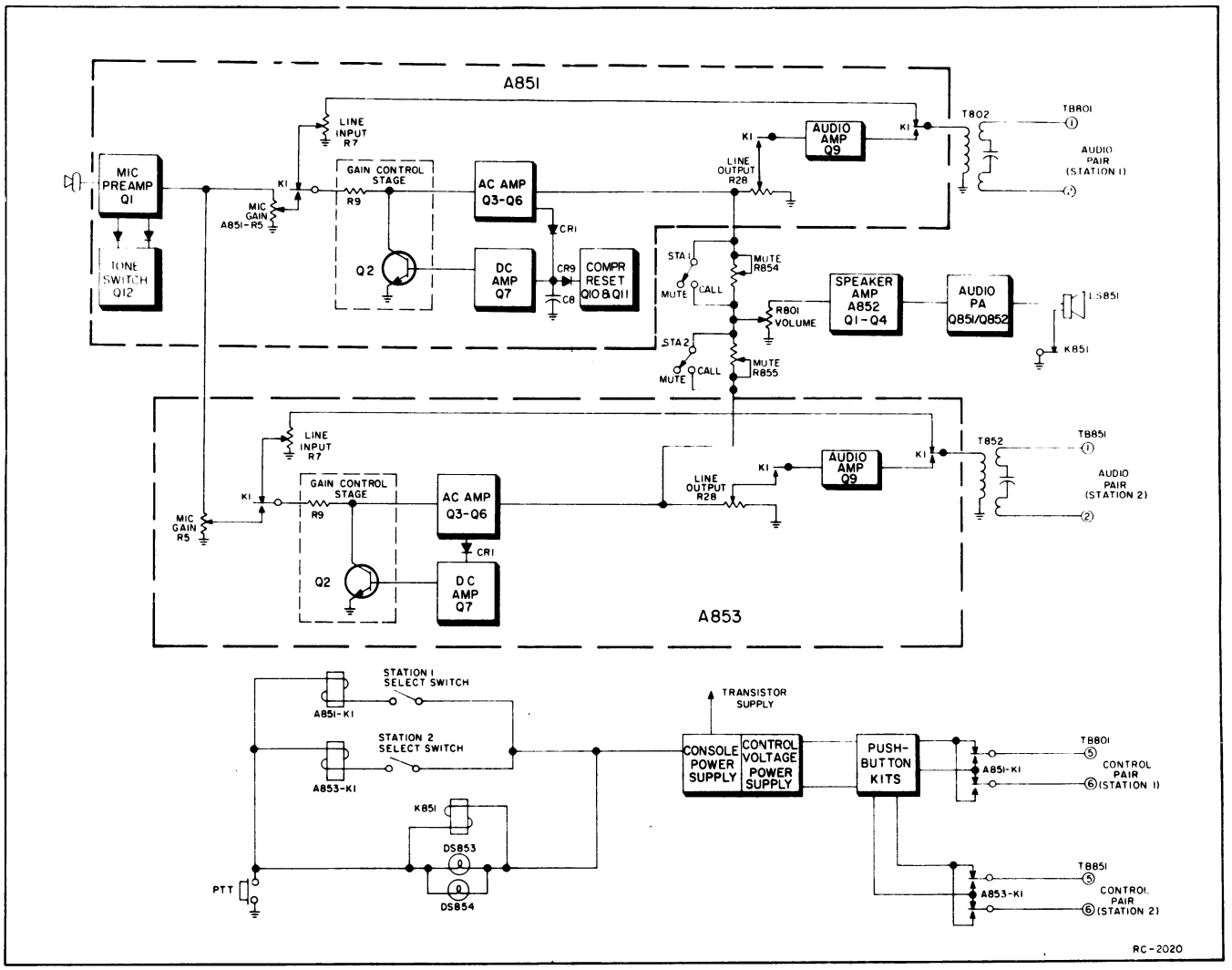


Figure 2 - Block Diagram of Model 4EC76A24 Control Panel

amplifier, resistor R9 and the AC impedance of transistor Q2 act as a voltage divider for the AC input signal. The output of Q2 is amplified by a four stage, direct-coupled amplifier (Q3 through Q6). Both AC and DC feedback in the amplifier circuit provides for extremely stable operation.

One portion of the amplified output is fed through line output control R28 to audio amplifier Q9 (in the transmit mode) or through VOLUME control R801 to speaker amplifier A852 (in the receive mode). The remaining portion is rectified by detector CR1, filtered by C8 and amplified by DC current amplifier Q7. This DC output is fed back to the base of gain control transistor Q2.

The amount of DC feedback to the gain control stage determines the AC impedance of Q2. When the input level rises, the AC amplifier output starts to increase. The output is detected, amplified, and fed back to the base of Q2. The increase in feedback reduces the AC impedance of Q2 which decreases the audio voltage to the AC amplifier keeping the amplifier output constant.

When the audio input decreases, the output of the AC amplifier starts to decrease, reducing the feedback to Q2. This raises the AC impedance of Q2 and increases the audio voltage to the AC amplifier, keeping the amplifier output constant.

COMPRESSION RESET

Compression Reset transistors Q10 and Q11 reset the compressor-amplifier when switching from the transmit-to-receive or the receive-to-transmit mode (keying or unkeying the microphone). Resetting the compressor-amplifier prevents losing the first portion of a weak signal due to the compressor release time when a high amount of compression is required.

Pressing the PTT button on the microphone drops the potential at J29 from 24 volts to ground, and applies a negative-going pulse to the cathode of CR4. The negative-going pulse forward biases CR4, turning on Q10 and Q11 for approximately 10 milliseconds. When tured on, the collector of Q11 drops to near ground potential, forward biasing CR9 and discharging capacitor C8 to reset the compressor.

Releasing the PTT button raises the potential at J29 from ground to +24 volts, applying a positive-going pulse to the anode of CR3. The positive-going pulse forward biases CR3, turning on Q10 and Q11. Q11 conducts for approximately 10 milliseconds, forward biasing CR9 and discharging C8 to reset the compressor.

TONE SWITCH

Tone Switch Q12 prevents tone from a Type 99 or Digital encoder from being applied to the telephone pair while the microphone is keyed, or audio being applied to the telephone pair while tone is being transmitted. The tone switch is mounted on Audio Board A851, and also functions for Audio Board A853.

Keying the microphone at the console grounds the base of Q12, keeping it turned off. This allows the voltage at the junction of R48 and R49 in the collector circuit of Q12 to rise to approximately +10 volts DC. The +10 volts back biases CR5, preventing any tone present at tone input jack J33 (on A851) from being transmitted.

Activating the external encoder applies tone to tone input jack J33, and grounds encoder transmit jack J34. Grounding J34 forward biases CR7 and CR8, energizing relay K1 and turning on tone switch Q12. Turning on Q12 drops its collector voltage to near ground potential, forward biasing diodes CR5 and CR6.

Forward biasing CR6 grounds the base of mic preamp Q1, disabling the stage. Forward biasing CR5 allows the tone to be coupled through MIC GAIN control R5 to the compressor-amplifier.

AUDIO BOARD A853

Audio board A853 is used with STATION 2 and is identical to audio board A851 except it does not have a microphone preamplifier or tone switch. The microphone preamplifier and tone switch on A851 also serves A853. The output of the preamplifier is switched to the appropriate compressor-amplifier (on A851 or A853) by the transmit relay contacts.

SPEAKER AMPLIFIER

The speaker amplifier consists of Q1, Q2, Q3 and Q4 mounted on a printed board (A852) and power transistors Q851 and Q852 mounted on a separate heat sink. The input audio signal at J1 is applied to the base of Q1. The output of Q1 is applied to driver transistors Q3 and Q4 and then to power amplifiers Q851 and Q852. The amplified output at J2 of A852 is connected to the speaker high lead by means of jumpers on TB801.

Q2 provides a slight forward bias to the bias to the base circuit of driver transistors Q3 and Q4 to prevent cross-over distortion. The bias is controlled by R5 which is set at the factory for optimum circuit performance (refer to the Adjustment Section).

POWER SUPPLY

Turning OFF-ON switch S801 to the ON position applies 117 volts AC to the primary of power transformer T801. The primary is fused by F801. The power supply contains two rectifier circuits in the secondary of T801 to provide control and operating voltages for the control panel.

Full-wave bridge rectifiers CR801 through CR804 supply the control current. R806 is a bleeder resistor for filter capacitor C801. The output is connected to TB802 and TB852 for application of the push button switch kits.

Full-wave rectifiers CR805 and CR806 supply four operating voltages for the transistorized audio stages, indicator lights and switching relay. Two unregulated voltages operate the indicator lamps, relays K1 and K851 and supply the audio driver and final audio amplifier circuits. Two regulated outputs supply the AC and DC amplifiers and microphone preamplifier. The voltage regulator consists of C804, R804 and Zener diode VR801.

LIGHT FLASHER (A854 and A855)

Light Flasher A854 (Station 1) or A855 (Station 2) samples the audio output of AC amplifier Q6 on the associated audio board. While a signal is being received, a portion of the audio at Q6 is connected through Q5 of the flasher circuit to emitter-follower Q4, causing Q4 to conduct. Q1 will then turn on and trigger relaxation oscillator Q2 and Q3. Each time Q3 in the oscillator conducts, the CALL lamp (connected in the Q3 collector circuit) flashes to indicate the presence of audio.

CONTROL CIRCUITS

Through the use of accessory kits and options, the control panel can perform a maximum of five different control functions for each station. This is accomplished by applying two different levels and polarities of control current to activate up to four relays on the station remote control panel. The control current required to select each function is listed in Table 3. Instructions for setting control currents are given in the Adjustment Procedure Section.

Single Frequency Transmit and Receive

When no accessory kits or options are used, the control panel provides a single, non-regulated DC control output of approximately 6 milliamps into a 7,500 ohm load (the equivalent of a 2,500 ohm line in series with a 5,000 ohm station control panel).

Multi-Frequency Switching

Whenever two polarities are required for switching functions, connections from the power supply to the control pair are transposed by the push-button switch kit and relay K1 as shown in Figure 3.

When two levels of the same polarity

FUNCTION	Current at TB801-5 (relative to TB801-6) For STATION 1 Current at TB851-5 (relative to TB851-6) For STATION 2				
	0	+6mA	+15mA	-6mA	-15mA
One Frequency Transmit and 1 Frequency Receive (P)	Receive	Transmit			
Two Frequency Transmit and 1 Frequency Receive (P)	Receive	Transmit (Tx - F1)	Transmit (Tx - F2)		
One Frequency Transmit and 2 Frequency Receive	Receive (Rx - F1)	Transmit		Receive (Rx - F2)	
Two Frequency Transmit and 2 Frequency Receive	Receive (Rx - F1)	Transmit (Tx - F1)	Transmit (Tx - F2)	Receive (Rx - F2)	
One Frequency Transmit and receive with Channel Guard (P)	Channel Guard Receive	Monitor (noise squelch)	Transmit		
Repeater Disable (Option 5127)	Receive	Transmit		Repeater Disable	

NOTE

Only those functions followed by the symbol (P) can be used in parallel consoles.

Table 3 - Control Current and Function Chart

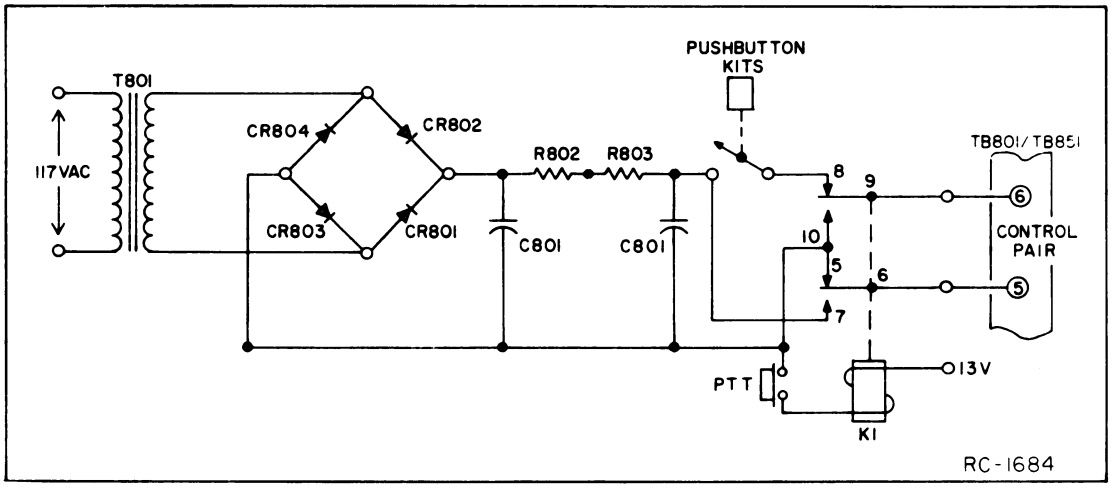


Figure 3 - Simplified Polarity Switching Diagram

are required, a high voltage regulator circuit and a variable resistor are provided in the power supply circuit as shown in Figure 4. The high-voltage regulator stabilizes the output of the control panel at 125 volts DC. This is to comply with telephone company regulations which require a maximum line-to-ground voltage of 135 volts DC.

The variable resistor is switched into the circuit to set the low level control current for 6 milliamps. This assures proper pick-up of the 6-mA relay, as well as the dropout of the 15-mA relay at the station control panel. The high level control current is not adjustable, since the 15-mA relay will operate satisfactorily at levels above 15-mA.

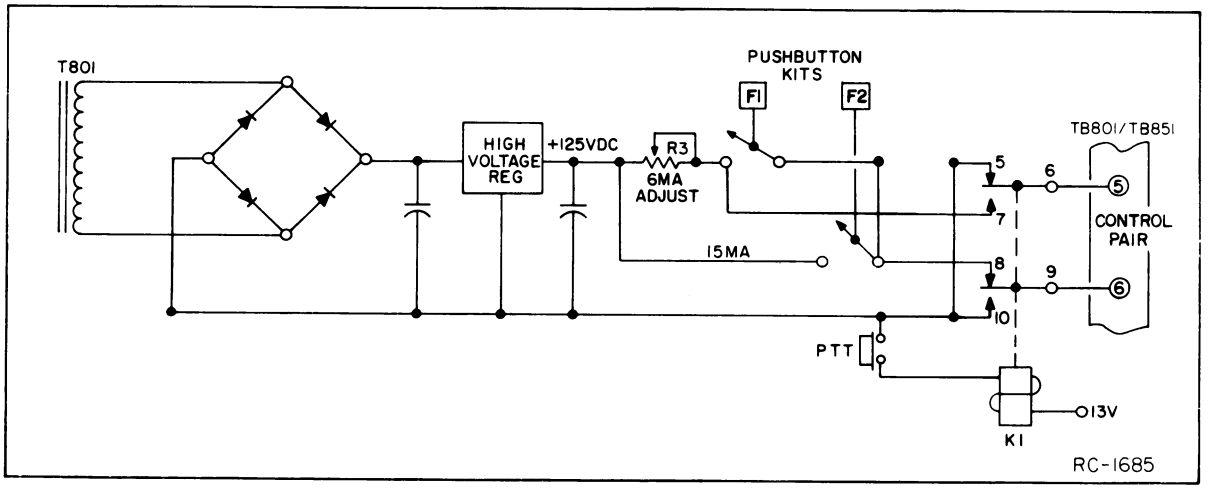


Figure 4 - Simplified Control Current Switching Diagram

Channel Guard

In standard Channel Guard applications, the CHANNEL GUARD MONITOR switch is located on the front panel. In addition, a high voltage regulator and a series current regulator circuit is used. The current regulator is set for 6 milliamps into the line and prevents current soaring when several control consoles are operated in parallel.

When the CHANNEL GUARD MONITOR push button switch is not depressed, bias for the series regulator is grounded through contacts 1 and 2 of the switch, and no control current is applied to the control pair. This selects Channel Guard operation at the base station and only those transmissions coded by the proper channel guard tone will be heard at the control panel.

Pressing the CHANNEL GUARD MONITOR push button, removes the ground on the series regulator, and applies 6 milliamps to the control pair. This disables the station Channel Guard, so that all transmissions on the receiver frequency can be heard. Pressing the TRANSMIT button applies 15 milliamps to the control pair to key the transmitter.

When the optional 4EM28B10 microphone is used, the station can be monitored by pressing the MONITOR button on the microphone.

Remote/Repeater Control

In Remote/Repeater applications, the station transmitter may be keyed by either an incoming RF signal (repeater operation), or by a control current from the control panel. Two different methods may be employed to give the dispatcher priority over repeater operations.

1. Without Repeater Disable Option: When the Repeater Disable option is not used pressing the TRANSMIT switch applies +6 milliamps to the control pair. This energizes the transmit relay on the remote control panel, which opens the ground return of the carrier operated switch or relay on the repeater panel. The station will operate as a remote only as long as the TRANSMIT switch at the control panel is pressed.

2. Repeater Disable (Option 5127): With the Repeater Disable option, pressing in the REPEATER DISABLE push button applies -6 milliamps to the control pair. This energizes an optional relay on the remote control panel which opens the ground return to the carrier operated switch or relay on the repeater panel. The station will operate as a remote as long as the push button remains depressed.

OTHER ACCESSORIES AND OPTIONS

Supervisory Control (Option 5131)

According to FCC regulations, if other parallel remote control facilities are employed in the system and their number and location are not specified on the station license, the dispatcher must be able to cut any conversation off the air that he judges unfit for transmission.

Pressing the SUPV CONTROL push button shorts the control pair, terminating the transmission. The dispatcher can use the intercom (if present) to prevent a recurrence of the unauthorized transmission before releasing the short on the control pair.

Tone Alert Oscillator (Option 5155)

The Tone Alert Oscillator accessory is used by the dispatcher to transmit an alerting tone to call attention to messages of more than usual importance. The accessory consists of a tone board, push button switch and indicator light. The tone oscillator includes a multivibrator circuit and a two section RC filter.

Pressing the tone alert push button applies a 13.5 volt supply voltage to the tone oscillator, energizes K851 to mute the speaker, energizes selected transmit relays (A851/A853-K1) to key the station transmitter, and lights the red transmit lamp on the front of the control panel. The nominal 1000-Hz output of the tone oscillator board is connected to J7 and J31 on Audio Board A851, fed to the selected audio-pair, and transmitted by the station. R8 has been adjusted to provide a tone output of approximately 2 volts RMS at the audio pair.

Intercom Switch Kit (Option 5161)

The Intercom Switch Kit permits communication between paralleled control consoles without keying the transmitter. It also permits intercommunication between the control console and the base station when the remote control panel (4KC16A10) has been equipped with the intercom accessory.

Pressing the INTERCOM switch energizes K1 on the selected audio board (A851/A853) switching the board to the transmit mode. It also opens the control current path to prevent the transmitter from keying and disables the transmit light on the control panel.

VU and Compression Meters

The control panel is supplied with a

compression meter which enables the operator to check the line level of the control panel in the transmit, intercom or receive mode. The dial of the compression meter is not numerically calibrated. The line levels are indicated by red and green areas. The threshold of compression is marked by a red line in the center of the meter. A meter reading in the red area indicates undercompression, while a reading anywhere in the green area indicates a proper output level (within 1 dB of normal).

An optional VU meter (Option 5159) may be used in place of the compression meter to provide a relative indication of the audio levels applied to and received from the audio pair. Audio from the compressor or from the line is coupled through potentiometer R9 to the base of class A amplifier Q1. The output of Q1 drives the meter.

The meter is normally shipped from the factory adjusted to indicate frequent peaks in the -1 to +3 VU range when the operator is talking into the microphone in a normal tone of voice. For this type of operation, the Line Output is set for +11 dBm. If desired, the meter may be set for -1 to +3 VU peaks at lower operating levels. Complete instructions for setting the VU meter are contained in the Adjustment Procedure (see Table of Contents).

The meter is normally connected to operate from the audio pair in the receive mode, and from the compressor-amplifier output in the transmit mode. If 0 VU readings are desired in the receive mode, move the Orange lead from A853-J17 to A853-J8, and the Red lead from A851-J17 to A851-J8. The meter will now operate from the compressor-amplifier output in both the transmit and receive mode.

The operational status of the STATION 1 select switch determines which audio line is metered by the compression or VU meters. When STATION 1 is selected (switch lighted), audio line #1 is metered. When STATION 1 is not selected (switch not lighted), audio line #2 is metered.

Clocks

A 12-hour clock, which operates on 117 VAC at 60 Hz, is provided on the control panel to facilitate log keeping. The clock is connected so that it operates with power switch S801 ON or OFF. Optionsl clock are available for operation on 50 or 60 Hz as described in the Option Index.

Line Compensation (Option 5169)

The line compensation option compensates for high frequency telephone-line losses in the 1000 to 3000 Hertz range. The option consists of a parallel L-C circuit in series with a potentiometer, and should be used when the high frequency attenuation in the 2500 to 3000 Hz range is more than 10 dB below the 400 to 600 Hz level. Complete instructions for setting the line compensation option are contained in the Adjustment Procedure (see Table of Contents).

NOTE

When the line compensation kit is installed at the factory, the kit is shipped with White lead connected to J1 on the line compensation board to disable the option. After the TCC is installed and all necessary adjustments have been completed, connect the White lead to J5 on compressor-amplifier board A801, and adjust potentiometer R1 as directed in the Adjustment Procedure.

MAINTENANCE

REMOVING CONTROL PANEL FROM TURRET

Remove the control panel from the console turret in the following manner:

1. Grasp the control panel frame and pull the panel forward until the stop is reached.
2. To completely remove the panel from the turret, lift the panel to clear the stop and pull forward. No electrical disconnections are required to set the panel on the desk top.

INDICATOR LAMP REPLACEMENT

Replace defective push-button switch lamp as follows:

1. Grasp the switch lens (nameplate) and pull forward to remove the indicator assembly and gain access to the indicator lamp.
2. Remove the defective indicator lamp from its socket by pressing on the bulb end, and install the new lamp.
3. Reinstall the indicator assembly. The assembly must be in the extended configuration shown in Figure 5 before it can be reinstalled in the panel.

TROUBLESHOOTING PROCEDURE

A step-by-step Troubleshooting Procedure is provided in Table 4 to help the serviceman quickly isolate and correct any problems that may arise.

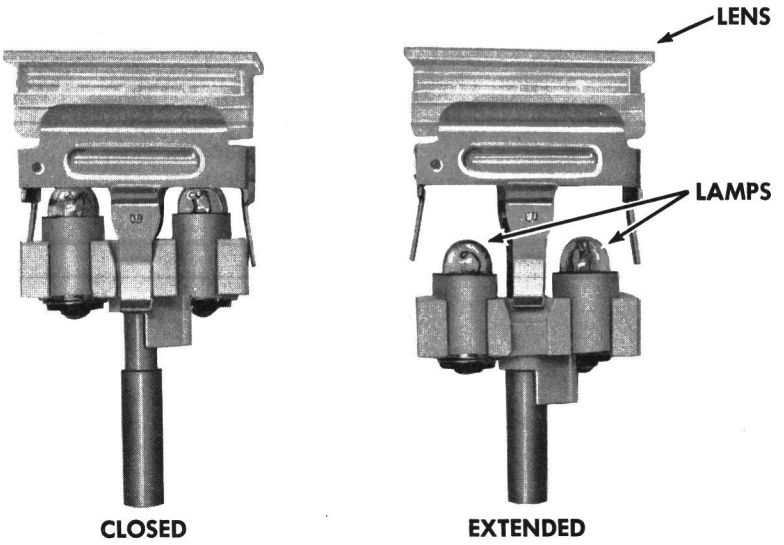


Figure 5 - Switch Indicator Assembly

Table 4 - Troubleshooting Procedure

SYPMTOM	PROCEDURE
No audio from the speaker.	1. Make sure that VOLUME control R801 is not set at minimum (fully counterclockwise). 2. Check to see that the console is not in the transmit mode (red trasnmit light on). If the light is on, check for a short in the push-to-talk circuit. 3. Check supply voltage at J3 of A852. 4. Check Bias Adjust R5 on A852 for setting described in the Adjustment Procedure. If R5 cannot be adjusted for the correct reading, check Q1-Q4, Q851 and Q852.
Audio from one station only.	1. Check the audio input with an AC-VTVM across TB801-1 and -2 (for Station 1) or TB851-1 and -2 (for Station 2). If audio is present, go to step 2. 2. Check with AC-VTVM for audio at A851-J17 (for Station 1) or A853-J17 (for Station 2). 3. Check the setting of LINE INPUT control R7 on A851/A853 (refer to the Adjustment Procedure). If R7 cannot be adjusted for the correct reading, check relay contacts K1-11, -12 and -13. 4. Check supply voltages J1, J2 and J13 on A851, or J1 and J13 on A853. 5. Check the DC voltages for Q3-Q6 on A851/A853 (refer to the Schematic Diagram).
No audio output for either line when the microphone is keyed.	1. Check the microphone leads. 2. Key the microphone and check the DC voltages on A851-A1 (refer to the Schematic Diagram).

Table 4 - Troubleshooting Procedure (Cont'd)

SYMPTOM	PROCEDURE
No audio output for one line when microphone is keyed. Other line OK.	1. Check relay K1 on A851 (for Station 1) or K1 on A853 (Station 2). 2. Check the setting of MIC GAIN control R5 on A851 (for Station 1) or R5 on A853 (for Station 2). Refer to the Adjustment Procedure. 3. Check the setting of LINE OUTPUT control R28 on A851 (for Station 1) or R28 on A853 (for Station 2). Refer to the Adjustment Procedure. 4. Check capacitor C13 on A851/A853.
No control current for either control pair. (Refer to Table 3 for control currents and functions).	With the microphone unkeyed, check for a reading of 150 to 200 volts DC between TB802-3 and TB802-6.
No control current to one control pair. Current to other control pair OK.	1. Check Station 1 control current circuit as follows: a) Check to see that relay K1 on A851 energizes when the microphone is keyed. If relay K1 doesn't energize, check for 24 volts DC at J30. If 24 volts is present, check continuity between J801-3 and J29, and check for an open between J29 and J30 (relay coil). b) Check jumper connections on TB802 (refer to the Schematic Diagram and to the applicable Service Sheet for accessory kits and options). 2. Check Station 2 control current circuit as follows: a) Check to see that relay K1 on A853 energizes when the microphone is keyed. If relay K1 doesn't energize, check for 24 volts DC at J30. If 24 volts is present check continuity between J801-3 and J29, and check for an open between J29 and J30 (relay coil). b) Check jumper connections on TB852 (refer to the Schematic Diagram and to the applicable Service Sheet for accessory kits and options).

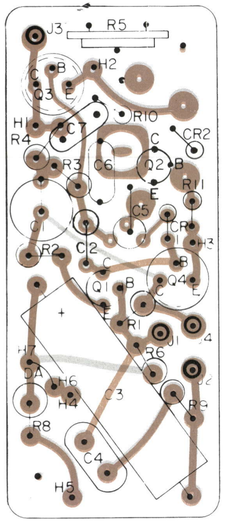
PARTS LIST

LBI-4181B

CENTER CONTROL PANEL
MODEL 4EC76A24

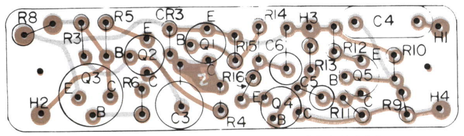
SYMBOL	GE PART NO.	DESCRIPTION
A851		AUDIO BOARD 19C303936G5
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1 and C2	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C3	19A115028P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C4	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C5	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C6	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C7	5496267P107	Tantalum: 100 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C8	5496267P103	Tantalum: 150 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C10	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C11	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C13	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C14	5494481P128	Ceramic disc: 2700 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C15	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C18	5494481P27	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C19	7491930P10	Polyester: .22 µf ±20%, 100 VDCW; sim to GE Type 61F.
C20*	5496267P18	Tantalum: 6.8 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
		In REV C and earlier:
	19B209243P7	Polyester: 0.1 µf ±20%, 50 VDCW.
		- - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1	19A115250P1	Silicon.
CR2	4037822P1	Silicon.
CR3 thru CR9	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - - -
J1 thru J8	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J10 thru J14	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J16 thru J34	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - - RELAYS - - - - - - - - - -
K1	19C307010P14	Armature: 24 VDC nominal, 1.5 w max operating, 430 ohms ±15% coil res, 6 form C contacts; sim to Parelco R10-E250-1.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115889P3	Silicon, NPN; sim to Type 2N2712.
Q2	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q3 and Q4	19A115889P3	Silicon, NPN; sim to Type 2N2712.
Q5 thru Q7	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q9*	19A115300P1	Silicon, NPN; sim to Type 2N3053.
		In REV D and earlier:
	19A115786P1	Silicon, NPN.
Q10	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q11	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q12	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - RESISTORS - - - - - - - - -
R2	3R77P473J	Composition: 47,000 ohms ±5%, 1/2 w.
R3	3R77P272J	Composition: 2700 ohms ±5%, 1/2 w.
R4	3R77P393J	Composition: 39,000 ohms ±5%, 1/2 w.
R5	19B209358P9	Variable, carbon film: approx 200 to 100,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R6	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R7	19B209358P7	Variable, carbon film: approx 75 to 25,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R8	3R77P361J	Composition: 360 ohms ±5%, 1/2 w.
R9	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R10	3R77P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R11	3R77P332J	Composition: 3300 ohms ±5%, 1/2 w.
R12	3R77P222J	Composition: 2200 ohms ±5%, 1/2 w.
R13	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R14	3R77P101J	Composition: 100 ohms ±5%, 1/2 w.
R15	3R77P333J	Composition: 33,000 ohms ±5%, 1/2 w.
R16	3R77P104J	Composition: 0.10 megohms ±5%, 1/2 w.
R17	3R77P275J	Composition: 2.75 megohms ±5%, 1/2 w.
R18	3R77P331J	Composition: 330 ohms ±5%, 1/2 w.
R19	3R77P394J	Composition: 0.39 megohm ±5%, 1/2 w.
R20	3R77P623J	Composition: 62,000 ohms ±5%, 1/2 w.
R21	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R22	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R23	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R25	3R77P104K	Composition: 0.10 megohm ±10%, 1/2 w.
R26	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R28	19B209358P5	Variable, carbon film: approx 75 to 5000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R31	3R77P912J	Composition: 9100 ohms ±5%, 1/2 w.
R38	3R77P100K	Composition: 10 ohms ±10%, 1/2 w.
R39	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
R40	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
R44	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R45	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R48	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R49	3R152P104K	Composition: 0.10 megohm ±10%, 1/4 w.
R50	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R51	3R152P434J	Composition: 0.43 megohm ±5%, 1/4 w.
R52 and R53	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R54	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R55*	3R77P180K	Composition: 18 ohms ±10%, 1/2 w. Added by REV C.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT2	5490828P14	Thermistor: 100 ohms ±5%, color code white; sim to Globar Type 783F-6.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XK1	19B209172P1	Relay, phen: 22 contacts; sim to Allied Control 30054-24.
A852		COMPONENT BOARD 19B205803G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	5496267P20	Tantalum: 47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C2*	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
		In REV F and earlier:
	7774750P4	Ceramic disc: .001 µf +100% -0%, 500 VDCW.
C3	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C4	7489162P44	Silver mica: 510 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
C5	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C6	7774750P4	Ceramic disc: .001 µf +100% -0%, 500 VDCW.
C7*	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap. Added by REV G.
		- - - - - - - DIODES AND RECTIFIERS - - - - -
CR1 and CR2	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1 thru J4	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q2	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q3	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q4	19A115706P2	Silicon, PNP; sim to 2N3638.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P272J	Composition: 2700 ohms ±5%, 1/2 w.
R2	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R3	3R77P202J	Composition: 2000 ohms ±5%, 1/2 w.
R4	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R5*	19B209358P105	Variable, carbon film: approx 75 to 5000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
		In REV F and earlier:
	19B209113P1	Variable, wirewound: 250 ohms ±20%, 2.5 w; sim to CTS Series 110.
R6	3R77P223J	Composition: 22,000 ohms ±5%, 1/2 w.
R8	19B209022P7	Wirewound: .47 ohms ±5%, 2 w; sim to IRC Type BWH.
R9	3R77P392K	Composition: 3900 ohms ±10%, 1/2 w.
R10* and R11*	3R152P151J	Composition: 150 ohms ±5%, 1/4 w. Added by REV G.
A853		AUDIO BOARD 19C303936G6
		- - - - - - - - - CAPACITORS - - - - - - - - -
C2	19A116080P5	Polyester: 0.047 µf ±20%, 50 VDCW.
C3	19A115028P116	Polyester: 0.22 µf ±20%, 200 VDCW.
C4	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C5	5496267P14	Tantalum: 15 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C6	5496267P10	Tantalum: 22 µf ±20%, 20 VDCW; sim to Sprague Type 150D.
C7	5496267P107	Tantalum: 100 µf ±20%, 10 VDCW; sim to Sprague Type 150D.
C8	5496267P103	Tantalum: 150 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C10	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C11	5496267P9	Tantalum: 3.3 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C13	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C14	5494481P128	Ceramic disc: 2700 pf ±10%, 1000 VDCW; sim to RMC Type JF Discap.
C15	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C18	5494481P27	Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C19	7491930P10	Polyester: .22 µf ±20%, 100 VDCW; sim to GE Type 61F.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1	19A115250P1	Silicon.
CR2	4037822P1	Silicon.
CR3 and CR4	19A115250P1	Silicon.
CR9	19A115250P1	Silicon.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J4 thru J8	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J10 thru J14	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
J16 thru J32	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - - RELAYS - - - - - - - - - -
K1	19C307010P14	Armature: 24 VDC nominal, 1.5 w max operating, 430 ohms ±15% coil res, 6 form C contacts; sim to Parelco R10-E250-1.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q2	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q3 and Q4	19A115889P3	Silicon, NPN; sim to Type 2N2712.
Q5 thru Q7	19A115889P1	Silicon, NPN; sim to Type 2N2712.
Q9*	19A115300P1	Silicon, NPN; sim to Type 2N3053.
		In REV C and earlier:
	19A115786P1	Silicon, NPN.
Q10	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q11	19A115362P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - RESISTORS - - - - - - - - -
R5	19B209358P9	Variable, carbon film: approx 200 to 100,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R6	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R7	19B209358P7	Variable, carbon film: approx 75 to 25,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R8	3R77P361J	Composition: 360 ohms ±5%, 1/2 w.
R9	3R77P333K	Composition: 33,000 ohms ±10%, 1/2 w.
R10	3R77P103J	Composition: 10,000 ohms ±5%, 1/2 w.
R11	3R77P332J	Composition: 3300 ohms ±5%, 1/2 w.
R12	3R77P222J	Composition: 2200 ohms ±5%, 1/2 w.
R13	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R14	3R77P101J	Composition: 100 ohms ±5%, 1/2 w.
R15	3R77P333J	Composition: 33,000 ohms ±5%, 1/2 w.
R16	3R77P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R17	3R77P275J	Composition: 2.7 megohms ±5%, 1/2 w.
R18	3R77P331J	Composition: 330 ohms ±5%, 1/2 w.
R19	3R77P394J	Composition: 0.39 megohms ±5%, 1/2 w.
R20	3R77P623J	Composition: 62,000 ohms ±5%, 1/2 w.
R21	3R77P153J	Composition: 15,000 ohms ±5%, 1/2 w.
R22	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R23	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R25	3R77P104K	Composition: 0.10 megohms ±10%, 1/2 w.
R26	3R77P102K	Composition: 1000 ohms ±10%, 1/2 w.
R28	19B209358P5	Variable, carbon film: approx 75 to 5000 ohms ±20%, 0.25 w; sim to CTS Type U-201.
R31	3R77P912J	Composition: 9100 ohms ±5%, 1/2 w.
R38	3R77P100K	Composition: 10 ohms ±10%, 1/2 w.
R39	3R77P511J	Composition: 510 ohms ±5% 1/2 w.
R40	3R77P332K	Composition: 3300 ohms ±10%, 1/2 w.
R44	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R45	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R52 and R53	3R152P393J	Composition: 39,000 ohms ±5%, 1/4 w.
R54	3R152P623J	Composition: 62,000 ohms ±5%, 1/4 w.
R55*	3R77P180K	Composition: 18 ohms ±10%, 1/2 w. Added by REV C.
		- - - - - - - - - THERMISTORS - - - - - - - - -
RT2	5490828P14	Thermistor: 100 ohms ±5%, color code white; sim to Globar Type 783F-6.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XK1	19B209172P1	Relay, phen: 22 contacts; sim to Allied Control 30054-24.
A854 and A855		LIGHT FLASHER BOARD 19B205802G3
		- - - - - - - - - CAPACITORS - - - - - - - - -
C3	5496267P19	Tantalum: 22 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C4	19A116080P104	Polyester: 0.033 µf ±10%, 50 VDCW.
C5	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C6	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR3	19A115250P1	Silicon.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115123P1	Silicon, NPN.
Q2	19A115768P1	Silicon, PNP; sim to Type 2N3702.
Q3	19A115300P2	Silicon, NPN; sim to Type 2N3053.
Q4 and Q5	19A115123P1	Silicon, NPN; sim to Type 2N2712.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



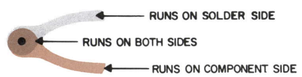
SPEAKER AMPLIFIER BOARD
A852

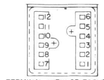
(19B205733, Sh. 1, Rev. 0)
(19B205733, Sh. 2, Rev. 0)



LIGHT FLASHER BOARD A854/A855

(19A122938, Sh. 1, Rev. 2)
(19A122938, Sh. 2, Rev. 2)

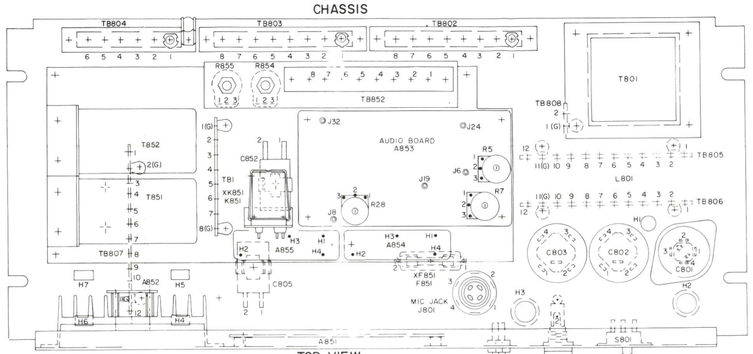




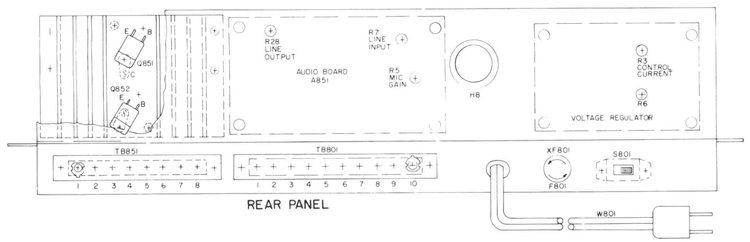
TERMINAL VIEW OF T851/T852

TERMINAL VIEW OF XK851

CHASSIS

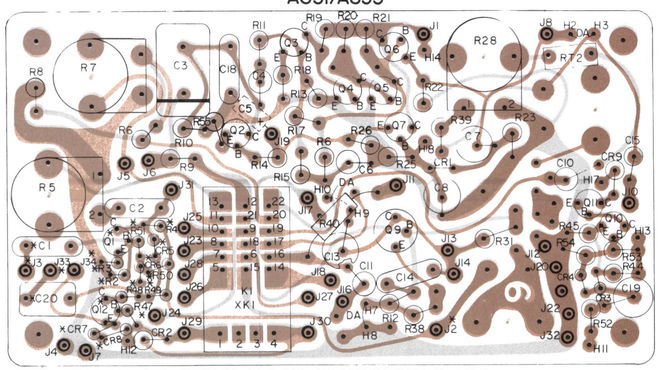


TOP VIEW

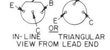


REAR PANEL

AUDIO BOARD
A851/A853



LEAD IDENTIFICATION

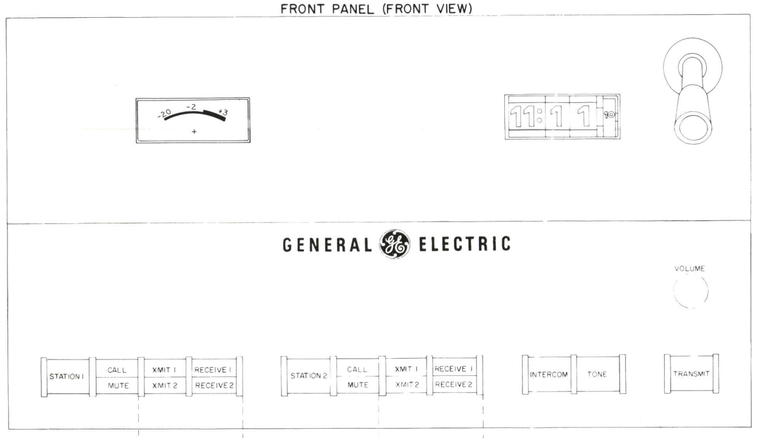


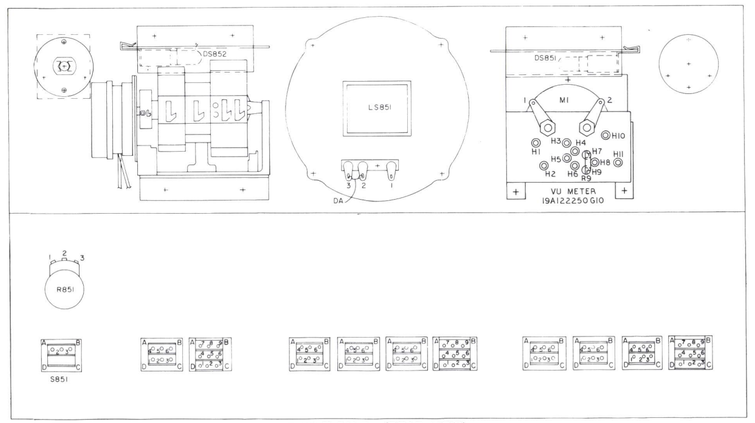
NOTE: LEAD ARRANGEMENT, AND NOT CASE SHAPE, IS DETERMINING FACTOR FOR LEAD IDENTIFICATION

*C1, C20, CR5 - CR8, J2, J3, J33, J34, R2 - R4 & R47 - R51 NOT PRESENT IN A853

(19C303937, Sh. 1, Rev. 9)
(19C303937, Sh. 2, Rev. 9)

FRONT PANEL (FRONT VIEW)



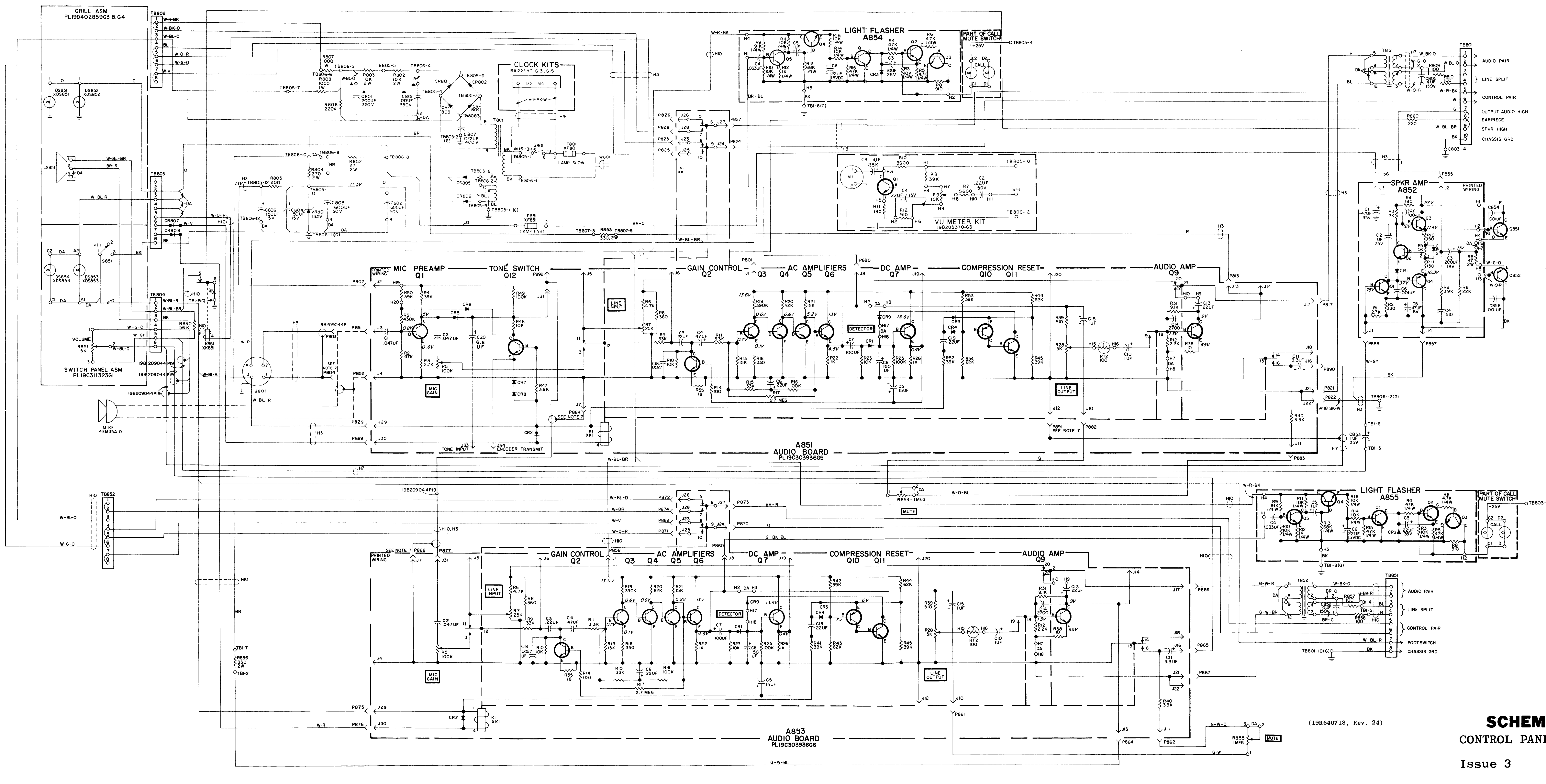


FRONT PANEL (REAR VIEW)

(19R640769, Rev. 6)

OUTLINE DIAGRAM

CONTROL PANEL
MODEL 4EC76A24



VOLTAGE READINGS

ALL READINGS ARE DC VOLTAGES TAKEN WITH A 20,000 OHM-PER-VOLT METER, AND MEASURED FROM THE TRANSISTOR PIN TO GROUND WITH NO SIGNAL APPLIED TO THE CONSOLE. READING AT EMITTER OF Q7 INDICATES THRESHOLD OF COMPRESSION.

NOTES:

1. IF THE LOOP RESISTANCE OF THE TELEPHONE PAIR IS 1000 OHMS OR GREATER, CONNECT A JUMPER FROM TB806-5 TO TB806-6 AND FROM TB806-5 TO TB805-7.
2. FOR PARALLEL OPERATION, REMOVE RESISTOR R8 FROM AUDIO BOARD.
3. TERMINATE ALL WIRES GOING TO A851, A853 AND ALL "J" NUMBERS ON A852 WITH A4029840P2 EXCEPT AS NOTED IN NOTE 7.
4. ALL WIRES N22 UNLESS OTHERWISE SPECIFIED.
5. JUMPERS USED ON TB801, TB802 AND TB852 ARE A7147217P1 LINK.
6. LEADS FROM GRILL ASM PL19D402859G3 & G4 & SWITCH PANEL ASM PL19C311323G1 & G2 GOING TO TB803 & TB804 TO BE TERMINATED WITH 19B209260P103.
7. P804, P884, P868 & P891 TERMINAL IS A4029840P1.

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

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

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

THIS ELEM DIAG APPLIES TO

MODEL NO	REV LETTER
PL19D402859G3	
PL19D402859G4	
PL19C311323G1	
PL19C311323G2	
PL19E500826G2 (SEE 19R620796)	
PL19C303936G5	E
PL19C303936G6	D
PL19B205802G3	A

PL19D402859G3 - GRILL ASM - RIGHT MIKE
PL19D402859G4 - GRILL ASM - LEFT MIKE
PL19C311323G1 - SWITCH PANEL - 1 ROW
PL19C311323G2 - SWITCH PANEL - 2 ROWS
PL19E500826G2 - RCVR CHASSIS - 4EC76A14-17

(19R640718, Rev. 24)

SCHEMATIC DIAGRAM

CONTROL PANEL MODEL 4EC76A24

SYMBOL	G-E PART NO	DESCRIPTION
		---------- RESISTORS ----------
R3	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R4	3R152P473K	Composition: 47,000 ohms ±10%, 1/4 w.
R5 and R6	3R152P472K	Composition: 4700 ohms ±10%, 1/4 w.
R8	3R77P911J	Composition: 910 ohms ±5%, 1/2 w.
R9	3R152P913J	Composition: 91,000 ohms ±5%, 1/4 w.
R10 and R11	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R12	3R152P102K	Composition: 1000 ohms ±10%, 1/4 w.
R13	3R152P683K	Composition: 68,000 ohms ±10%, 1/4 w.
R14	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w.
R15	3R152P473K	Composition: 47,000 ohms ±10%, 1/4 w.
R16*	3R152P103K	Composition: 10,000 ohms ±10%, 1/4 w. Added by REV A.
		CONTROL PANEL CHASSIS 19E500826G2 MODIFICATION KIT 19A122731G1
		---------- CAPACITORS ----------
C801	7772471P42	Electrolytic: 100-200 µf +100% -10%, 300 VDCW; sim to Mallory Type FP.
C802 and C803	7476442P20	Electrolytic: 1600 µf +250% -10%, 50 VDCW; sim to PM Mallory WP-068.
C804	5496267P12	Tantalum: 150 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C805	7486445P1	Electrolytic, non polarized: 4 µf +100% -10%, 150 VDCW.
C806	5496267P12	Tantalum: 150 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
C807	19A115028P49	Polyester: .022 µf ±20%, 400 VDCW.
C852	7486445P1	Electrolytic, non polarized: 4 µf +100% -10%, 150 VDCW.
C853	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C854*	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Dimcap.
	5494481P27	In REV F and earlier: Ceramic disc: 2700 pf ±20%, 1000 VDCW; sim to RMC Type JF Dimcap.
C856*	5494481P11	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Dimcap. Added by REV G.
		------- DIODES AND RECTIFIERS ------
CR801 thru CR808	4037822P1	Silicon.
		---------- FUSES ----------
F801	7487842P5	Slow blowing: 1 amp at 250 v; sim to Bussman MDL-1.
F851	1A16P3	Quick blowing, cartridge: 1 amp 250 v;
		-------- JACKS AND RECEPTACLES ------
J801		Connector. Includes:
	19A116061P2	Receptacle: 4 female contacts; sim to Amphenol Type 91-PM4F-1000.
	19A116061P4	Lockwasher.
	19A116061P5	Nut, knurled.
		---------- RELAYS ----------
K851	5491595P3	Armature: 1.5 w operating, 700 ohms ±15% coil res, 2 form C contacts; sim to Allied Control T154-X-101.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- PLUGS ----------
P801 thru P803	4029840P2	Contact, electrical: sim to AMP 42827-2.
P804	4029840P1	Contact, electrical: sim to AMP 41854.
P810 and P811	4029840P2	Contact, electrical: sim to AMP 42827-2.
P813	4029840P2	Contact, electrical: sim to AMP 42827-2.
P816 and P817	4029840P2	Contact, electrical: sim to AMP 42827-2.
P821	4029840P2	Contact, electrical: sim to AMP 42827-2.
P823 thru P830	4029840P2	Contact, electrical: sim to AMP 42827-2.
P854 thru P867	4029840P2	Contact, electrical: sim to AMP 42827-2.
P868	4029840P1	Contact, electrical: sim to AMP 41854.
P869 thru P877	4029840P2	Contact, electrical: sim to AMP 42827-2.
P880	4029840P2	Contact, electrical: sim to AMP 42827-2.
P882 and P883	4029840P2	Contact, electrical: sim to AMP 42827-2.
P884	4029840P1	Contact, electrical: sim to AMP 41854.
P885	4029840P2	Contact, electrical: sim to AMP 42827-2.
P886 and P887	4029840P1	Contact, electrical: sim to Amp 41854.
P888 thru P890	4029840P2	Contact, electrical: sim to AMP 42827-2.
P891	4029840P1	Contact, electrical: sim to AMP 41854.
P892	4033348P1	Contact, electrical: sim to Bead Chain M125-34.
		---------- TRANSISTORS ----------
Q851*	19A116118P3	Silicon, NPN.
		In REV E and earlier:
	19A115527P1	Silicon, NPN.
Q852*	19A116375P2	Silicon, PNP.
		In REV E and earlier:
	19A115792P1	Silicon, PNP.
		---------- RESISTORS ----------
R802 and R803	3R79P103K	Composition: 10,000 ohms ±10%, 2 w.
R804	3R79P391K	Composition: 390 ohms ±10%, 2 w.
R805	3R77P201J	Composition: 200 ohms ±5%, 1/2 w.
R806	3R77P224J	Composition: 0.22 megohm ±5%, 1/2 w.
R807 and R808	3R78P102K	Composition: 1000 ohms ±10%, 1 w.
R809 and R810	3R77P101J	Composition: 100 ohms ±5%, 1/2 w.
R830	3R77P563K	Composition: 56,000 ohms ±10%, 1/2 w.
R852	3R79P270K	Composition: 27 ohms ±10%, 2 w.
R853	3R79P331J	Composition: 330 ohms ±5%, 2 w.
R854 and R855	5494774P110	Variable, carbon film: 1 megohm ±20%, 0.2 w; sim to CTS Series 70 Control.
R856	3R79P331J	Composition: 330 ohms ±5%, 2 w.
R857 and R858	3R77P101K	Composition: 100 ohms ±10%, 1/2 w.
R860	3R77P221K	Composition: 220 ohms ±10%, 1/2 w.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- SWITCHES ----------
S801	7145098P1	Slide: DPDT, 0.75 amp at 125 VAC or 0.5 amp at 125 VDC; sim to Stackpole SS-150.
		---------- TRANSFORMERS ----------
T801	19A115677P1	Power, step-down, step-up: Pri: 117 VRMS ±20%. Sec: 5.7/18/24/125 VDC.
T851 and T852	19C307069P1	Audio: 300-4000 Hz freq range, 1 KHz ref freq. Imp ratio: Pri: 1-4 (2-3 CT) 600 ohms. Sec: 7-10 (8-9 CT) 150 ohms ±15%, 6-11 (8-9 CT) 600 ohms ±15%, 5-12 (8-9 CT) 1350 ohms ±15%.
		-------- TERMINAL BOARDS --------
TB1	7775500P18	Phen: 8 terminals.
TB801	7117710P10	Phen: 10 terminals; sim to Cinch 1799.
TB802 and TB803	7117710P8	Phen: 8 terminals; sim to Cinch 1780.
TB804	7117710P6	Phen: 6 terminals; sim to Cinch 1776.
TB805 thru TB807	7775500P28	Phen: 12 terminals.
TB808	7775500P104	Phen: 2 terminals.
TB851 and TB852	7117710P8	Phen: 8 terminals; sim to Cinch 1780.
		-------- VOLTAGE REGULATORS --------
VR801	4036887P10	Silicon, Zener.
		---------- CABLES ----------
W801	4036441P7	Cable, power: 2 conductor with 2-contact plug, approx 7 feet long.
		---------- SOCKETS ----------
XF801	19B209005P1	Fuseholder, post type: 15 amps at 250 v; sim to Littelfuse 342012.
XF851	7141008P1	Fuseholder: 5 amps at 125 v; sim to Littelfuse 3-337001.
XK851	5491595P4	Relay: 10 contacts; sim to Allied Control 30054-1.
		HARNESS ASSEMBLY 19E500826G4 (Includes C804, C806, C807, CR801-CR806, J801, P801-P804, P810, P811, P813, P816, P817, P821, P823-P830, P854-P857, P886, P887, R802-P808, R852, R853, S801, TB805-TB807, VR801, XF851).
		HARNESS ASSEMBLY 19A122731G2 (Includes CR807, CR808, P880-P884, P888-P892)
		HARNESS ASSEMBLY 19C311935G2 (Includes P858-P877)
		GRILLE ASSEMBLY 19D402859G3 and G4
		-------- INDICATING DEVICES --------
DS851 and DS852	19C307037P20	Lamp, incandescent: 28 v; sim to GE 757.
		---------- LOUDSPEAKERS ----------
LS851	5491260P7	Permanent magnet, 5-inch: 3.2 ohms ±10% voice coil imp, 15 w max operating, 385 Hz ±15% resonance, paper dust cap; sim to Jensen Model PS-YAS12761.

SYMBOL	G-E PART NO	DESCRIPTION
		---------- SOCKETS ----------
XDS851 and XDS852	19B209342P2	Lampholder: sim to Leecraft 7-04-1.
		SWITCH PANEL ASSEMBLY 19C311323G1
		---------- RESISTORS ----------
R851	5496870P11	Variable, carbon film: 5000 ohms ±20%; sim to Mallory LC(5K).
		---------- SWITCHES ----------
S851		TRANSMIT SWITCH AND INDICATOR ASSEMBLY 19B205756G1
		-------- INDICATING DEVICES -------
DS853 and DS854	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
	19C307029P20	Push: lighted, 1 circuit SPDT, momentary action, 5 amps at 250 VAC; sim to Micro Switch 2D100. (See HC-1666).
		---------- SOCKETS ----------
XDS853 and XDS854		Part of Actuator and holder. (Refer to Mechanical Parts breakdown and RC-1666).
		ACCESSORY KITS
		COMPRESSION METER 19A122250G9
		METER ASSEMBLY 19B205370G2
		---------- METERS ----------
M2	19A115695P1	Panel, DC: 1 ma mechanism.
		---------- RESISTORS ----------
R6	3R77P511J	Composition: 510 ohms ±5%, 1/2 w.
		-------- THERMISTORS --------
RT1	5490828P33	Rod: 2200 ohms ±10%; sim to Globar Type 0325F.
		-------- TERMINAL BOARDS --------
TB1	7775500P24	Phen: 8 terminals.
		12 HOUR CLOCK 19A122687G12
		CLOCK ASSEMBLY 19B205805G1
		---------- METERS ----------
M1	7491080P5	Clock, cyclometer: 117 VAC, 50 Hz; sim to Pennwood Numechron 1P-12H.
		12 HOUR CLOCK 19A122687G13
		CLOCK ASSEMBLY 19B205805G2
		---------- METERS ----------
M2	7491080P1	Clock, cyclometer: 117 VAC, 60 Hz; sim to Pennwood Numechron 1P-12H.
		24 HOUR CLOCK 19A122687G14
		CLOCK ASSEMBLY 19B205805G3
		---------- METERS ----------
M3	7491080P6	Clock, cyclometer: 117 VAC, 50 Hz; sim to Pennwood Numechron 1P-24H-AM/PM.

SYMBOL	G-E PART NO	DESCRIPTION
		24 HOUR CLOCK 19A122687G15
		CLOCK ASSEMBLY 19B205805G4
		---------- METERS ----------
M4	7491080P2	Clock, cyclometer: 117 VAC, 60 Hz; sim to Pennwood Numechron 1P-24H-AM/PM.
		GOOSENECK MICROPHONE 4EM35A10
		---------- MICROPHONES ----------
	19B209404P1	Microphone, dynamic, gooseneck: rated at 30,000 ohms imp into 50,000 ohms load.
		---------- PLUGS ----------
P851	4029840P2	Contact, electrical: sim to Amp 42827-2.
P852	4029840P1	Contact, electrical: sim to AMP 41854.
		MECHANICAL PARTS (SEE HC-1666)
1	19A115725P1	Strain relief. (Used with W801).
2	19A115368P1	Retainer. (Used with K1 on A851 and A853).
3	19B205762P1	Locking pin. (Part of Control panel latch assembly).
4	19B205792P1	Heat sink. (Used with Q851 and Q852).
5	7142162P91	Spacer. (Used with A852).
6	4036555P1	Insulator, disc. (Used with Q3 and Q4 on A852 and Q3 on A854 and A855).
7	4029851P8	Clip, loop. (Located by TB803 and TB804).
8	5491595P8	Retainer. (Used with K851).
9	19C311302P3	Grille. (Right Mike).
	19C311302P4	Grille. (Left Mike).
10	19A122700P1	Window. (Used with clock and meter).
11	19B205766P1	Escutcheon. (Used with clock and meter).
12	19A115873P1	Bumper. (Located on bottom (back edge) of Control panel).
13	19A115873P2	Bumper. (Located on bottom (front edge) of Control panel).
14	19C311304P1	Dummy switch.
15	19A122697G2	Nameplate.
16	19C307029P3	Retainer. (Used with panel switches).
17	19A115837P1	Knob, push on. (For R851).
18	19C307029P16	Actuator-Holder. (Includes XDS853 and XDS854).
19	19C307029P10	Pushbutton-Lens.

PRODUCTION CHANGES

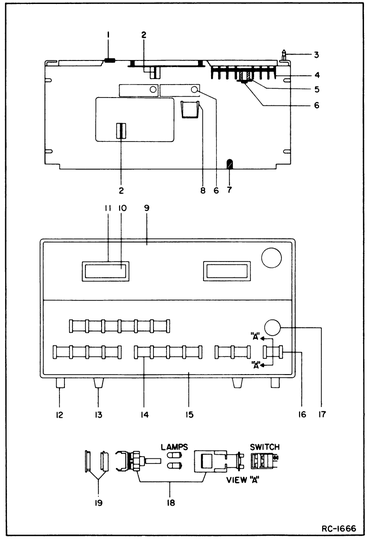
Changes in the equipment to improve performance or to simplify circuits are identified by a "Revision Letter", which is stamped after the model number of the unit. The revision stamped on the unit includes all previous revisions. Refer to the Parts List for descriptions of parts affected by these revisions.

REV. A & B - Audio Board 19C303936G5&6
Incorporated in initial shipment.

REV. C - Audio Board 19C303936G5&6
To improve low frequency recovery time of compressor circuit. Added R35.

REV. D - Audio Board 19C303936G5
To improve frequency response. Changed C20.

REV. A - Light Flasher Board 19B205802-G3
To eliminate false call lamp flashing.
Added R16.

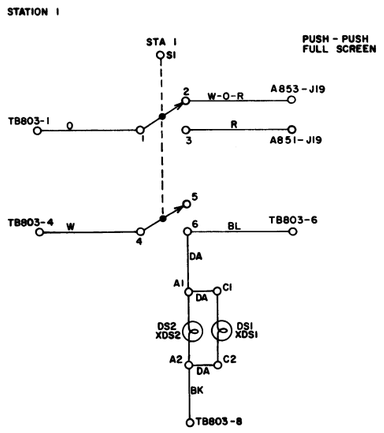


RC-1666

STATION SELECT SWITCHES

SCHEMATIC DIAGRAM

STATION 1



(19A122720, Rev. 0)

PARTS LIST

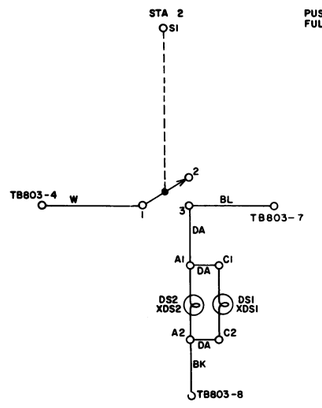
STATION 1 and 2 SELECT

SYMBOL	G-E PART NO.	DESCRIPTION
S1**		SWITCH ASSEMBLY 19C311259-G9
		- - - - - - - - - INDICATING DEVICES - - - - - - - - -
DS1 and DS2	19C307037-P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - - SWITCHES - - - - - - - - - - -
	19C307029-P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D26.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1 and XDS2		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
2	19C307029-P4	Pushbutton-Leps.
4	19C307029-P16	Actuator-Holder. (Includes XDS1 and XDS2).
		** When an optional VU Meter is supplied, the Station 1 Select switch changes as specified in the parts list for the VU Meter option.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SCHEMATIC DIAGRAM

STATION 2



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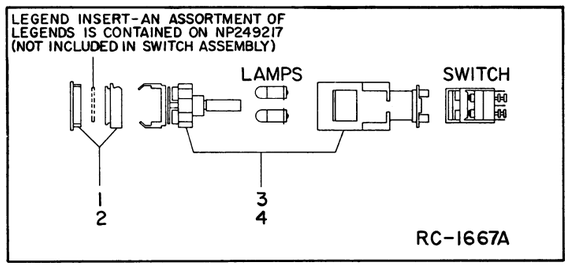


CALL/MUTE

PARTS LIST

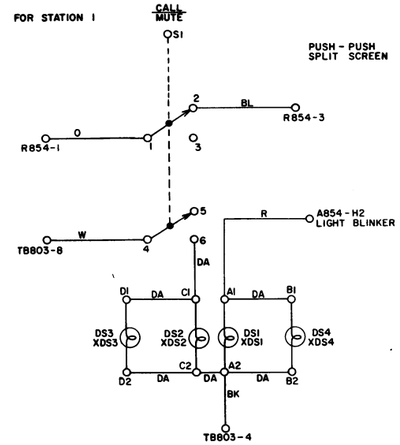
CALL/MUTE FOR STATION 1 AND 2

SYMBOL	G-E PART NO.	DESCRIPTION
S1		SWITCH ASSEMBLY 19C311259-G8
		- - - - - - - - - INDICATING DEVICES - - - - - - - - -
DS1 thru DS4	19C307037-P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - - SWITCHES - - - - - - - - - - -
	19C307029-P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D26.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1 thru XDS4		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
1	19C307029-P15	Pushbutton-Lens.
3	19C307029-P17	Actuator-Holder. (Includes XDS1 thru XDS4).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SCHEMATIC DIAGRAM

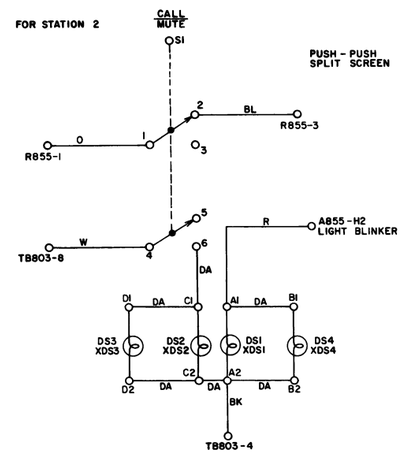
STATION 1



(19A122722, Rev. 0)

SCHEMATIC DIAGRAM

STATION 2



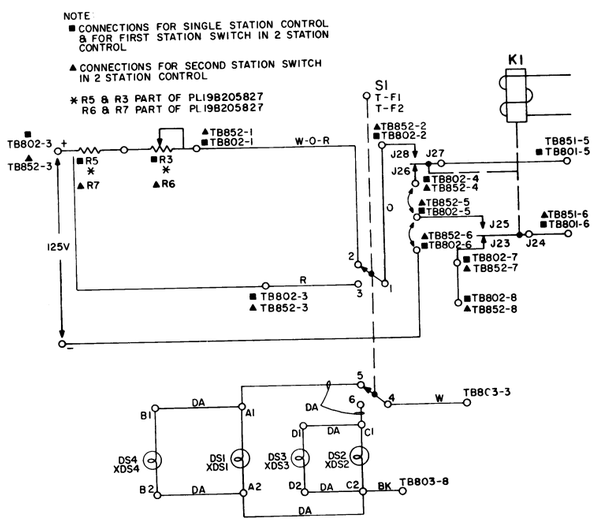
(19A122723, Rev. 0)

SERVICE SHEET

STATION SELECT AND CALL/MUTE

2 FREQ TRANSMIT – 1 FREQ RECEIVE

SCHEMATIC DIAGRAM



(19B205774, Rev. 0)

PARTS LIST

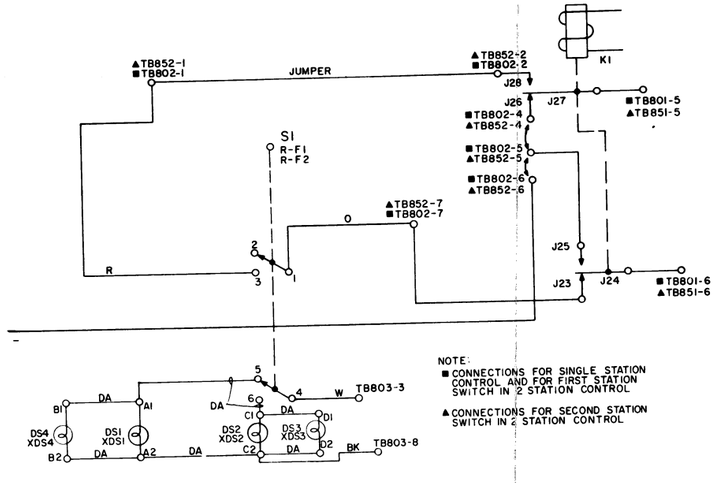
2 FREQ TRANSMIT - 1 FREQ RECEIVE

SYMBOL	G-E PART NO.	DESCRIPTION
S1		SWITCH ASSEMBLY 19C311259-G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 thru DS4	19C307037-P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029-P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC: sim to Micro Switch 2D26.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS1 thru XDS4		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
1	19C307029-P15	Pushbutton-Lens.
3	19C307029-P17	Actuator-Holder. (Includes XDS1 thru XDS4).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

1 FREQ TRANSMIT – 2 FREQ RECEIVE

SCHEMATIC DIAGRAM



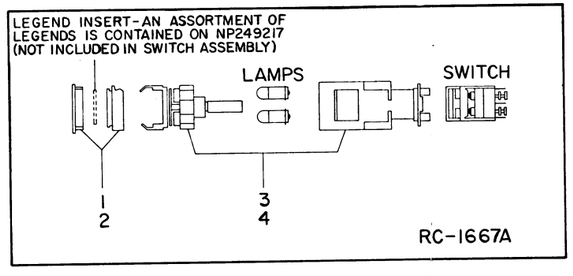
(19B205775, Rev. 0)

PARTS LIST

1 FREQ TRANSMIT - 2 FREQ RECEIVE

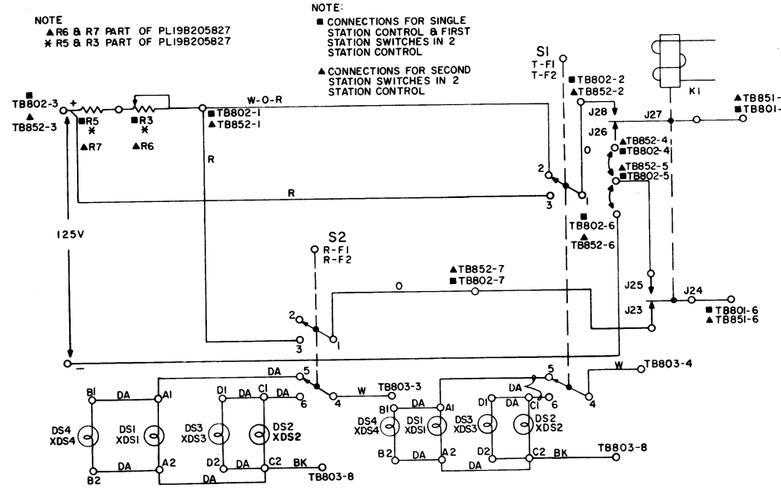
SYMBOL	G-E PART NO.	DESCRIPTION
S1		SWITCH ASSEMBLY 19C311259-G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 thru DS4	19C307037-P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029-P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC: sim to Micro Switch 2D26.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS1 thru XDS4		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
1	19C307029-P15	Pushbutton-Lens.
3	19C307029-P17	Actuator-Holder. (Includes XDS1 thru XDS4).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



2 FREQ TRANSMIT – 2 FREQ RECEIVE

SCHEMATIC DIAGRAM



(19B205776, Rev. 0)

PARTS LIST

2 FREQ TRANSMIT - 2 FREQ RECEIVE

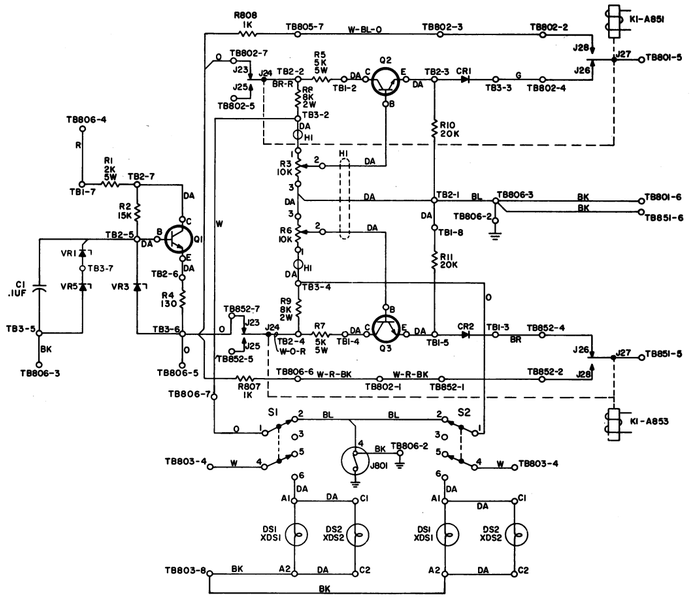
SYMBOL	G-E PART NO.	DESCRIPTION
S1 and S2		SWITCH ASSEMBLY 19C311259-G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 thru DS4	19C307037-P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029-P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC: sim to Micro Switch 2D26.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS1 thru XDS4		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
1	19C307029-P15	Pushbutton-Lens.
3	19C307029-P17	Actuator-Holder. (Includes XDS1 thru XDS4).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SERVICE SHEET

2-FREQ TRANSMIT & 1-FREQ RECEIVE;
1-FREQ TRANSMIT & 2-FREQ RECEIVE AND
2-FREQ TRANSMIT & 2-FREQ RECEIVE

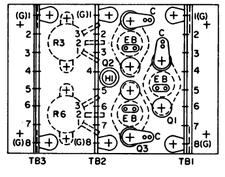
SCHEMATIC DIAGRAM



(19C311351, Rev. 3)

OUTLINE DIAGRAM

CHANNEL GUARD REGULATOR
19A122737-G4



(19A127359, Rev. 0)

PARTS LIST

CHANNEL GUARD

SYMBOL	GE PART NO.	DESCRIPTION
		MODIFICATION KIT 19A122687G16
		REGULATOR BOARD 19A122737G4
		---------- CAPACITORS ----------
C1	19A115028P14	Polyester: 0.1 µf ±20%, 200 VDCW.
		------- DIODES AND RECTIFIERS ------
CR1 and CR2	4037822P1	Silicon.
		---------- TRANSISTORS ----------
Q1 thru Q3	19A115783P1	Silicon, NPN.
		---------- RESISTORS ----------
R1	7478711P34	Wirewound: 2000 ohms ±5%, 7 w; sim to Sprague Type 454E.
R2	3R77P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R3	19B209244P3	Variable, wirewound: 10,000 ohms ±20%, 2 w; sim to CTS Type 117.
R4	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R5	7478711P38	Wirewound: 5000 ohms ±5%, 7 w; sim to Sprague Type 454E.
R6	19B209244P3	Variable, wirewound: 10,000 ohms ±20%, 2 w; sim to CTS Type 117.
R7	7478711P38	Wirewound: 5000 ohms ±5%, 7 w; sim to Sprague Type 454E.
R8 and R9	3R79P822K	Composition: 8200 ohms ±10%, 2 w.
R10 and R11	3R77P203J	Composition: 20,000 ohms ±5%, 1/2 w.
		---------- TERMINAL BOARDS -------
TB1 thru TB3	7775500P18	Phen: 8 terminals.
		---------- VOLTAGE REGULATORS ------
VR1	19A115528P28	Silicon, Zener.
VR3	4036887P5	Silicon, Zener.
VR5	19A115528P4	Silicon, Zener.
S1		SWITCH ASSEMBLY 19C311259G2
		------- INDICATING DEVICES -------
DS1 and DS2	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
		---------- SWITCHES ----------
	19C307029P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D26.
		---------- SOCKETS ----------
XDS1 and XDS2		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
2	19C307029P4	Pushbutton-Lens.
4	19C307029P16	Actuator-Holder. (Includes XDS1 and XDS2).

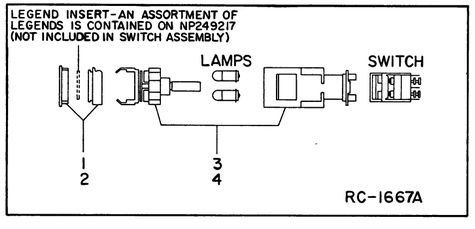
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

PARTS LIST

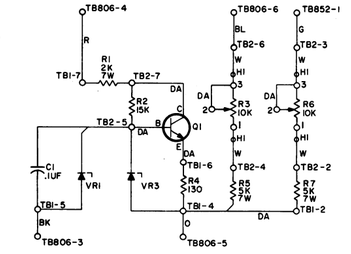
HIGH VOLTAGE REGULATOR
19A122737G2

SYMBOL	GE PART NO.	DESCRIPTION
		---------- CAPACITORS ----------
C1	19A115028P14	Polyester: 0.1 µf ±20%, 200 VDCW.
		---------- TRANSISTORS ----------
Q1	19A115783P1	Silicon, NPN.
		---------- RESISTORS ----------
R1	7478711P34	Wirewound: 2000 ohms ±5%, 7 w; sim to Sprague Type 454E.
R2	3R77P153K	Composition: 15,000 ohms ±10%, 1/2 w.
R3	19B209244P3	Variable, wirewound: 10,000 ohms ±20%, 2 w; sim to CTS Type 117.
R4	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R5	7478711P38	Wirewound: 5000 ohms ±5%, 7 w; sim to Sprague Type 454E.
R6	19B209244P3	Variable, wirewound: 10,000 ohms ±20%, 2 w; sim to CTS Type 117.
R7	7478711P38	Wirewound: 5000 ohms ±5%, 7 w; sim to Sprague Type 454E.
		---------- TERMINAL BOARDS -------
TB1 and TB2	7775500P18	Phen: 8 terminals.
		---------- VOLTAGE REGULATORS ------
VR1	19A115528P28	Silicon, Zener.
VR3	4036887P5	Silicon, Zener.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



SCHEMATIC DIAGRAM



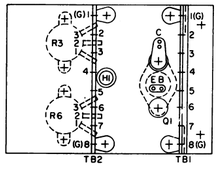
IN ORDER TO RETAIN RATED EQUIPMENT PERFORMANCE, REPLACEMENT OF ANY SERVICE PART SHOULD BE MADE ONLY WITH A COMPONENT HAVING THE SPECIFICATIONS SHOWN ON THE PARTS LIST FOR THAT PART.

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.

(19B205828, Rev. 3)

OUTLINE DIAGRAM

HIGH VOLTAGE REGULATOR
19A122737-G2



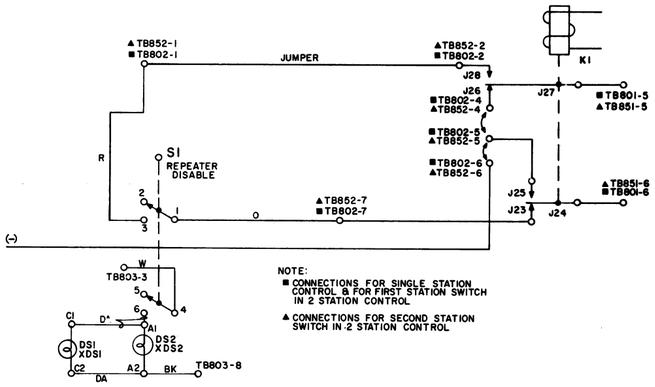
(19A127360, Rev. 0)

SERVICE SHEET

CHANNEL GUARD AND
HIGH VOLTAGE REGULATOR

REPEATER DISABLE OPTION 5127

SCHEMATIC DIAGRAM



(19B205779, Rev. 0)

PARTS LIST

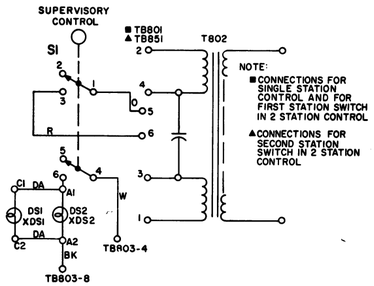
REPEATER DISABLE (OPTION 5126)

SYMBOL	GE PART NO.	DESCRIPTION
S1		SWITCH ASSEMBLY 19C311259G2
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 and DS2	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D26.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1 and XDS2		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
2	19C307029P4	Pushbutton-Lens.
4	19C307029P16	Actuator-Holder. (Includes XDS1 and XDS2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

SUPERVISORY CONTROL OPTION 5131

SCHEMATIC DIAGRAM



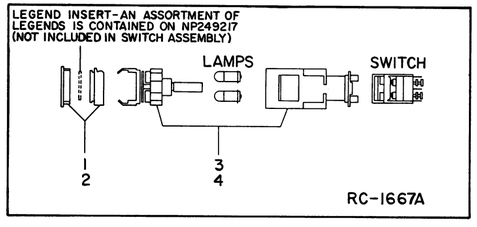
(19A122684, Rev. 0)

PARTS LIST

SUPERVISORY CONTROL (OPTION 5130)

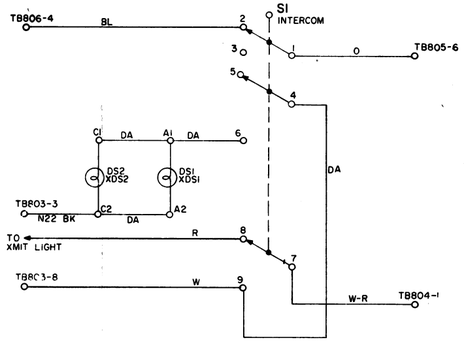
SYMBOL	GE PART NO.	DESCRIPTION
S1		SWITCH ASSEMBLY 19C311259G2
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 and DS2	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D26.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1 and XDS2		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
2	19C307029P4	Pushbutton-Lens.
4	19C307029P16	Actuator-Holder. (Includes XDS1 and XDS2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



INTERCOM OPTION 5161

SCHEMATIC DIAGRAM



(19B205786, Rev. 3)

PARTS LIST

INTERCOM (OPTION 5161)

SYMBOL	GE PART NO.	DESCRIPTION
S1		SWITCH ASSEMBLY 19C311259G1
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 thru DS4	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029P11	Push: lighted, 2 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D26.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1 thru XDS4		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
1	19C307029P15	Pushbutton-Lens.
3	19C307029P17	Actuator-Holder. (Includes XDS1 thru XDS4).

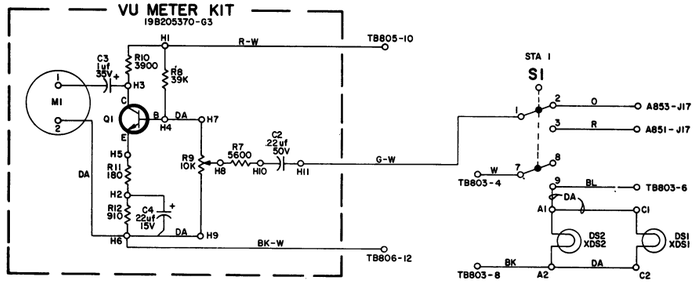
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

SERVICE SHEET

REPEATER DISABLE;
SUPERVISORY CONTROL
AND INTERCOM

VU METER
OPTION 5159

SCHEMATIC DIAGRAM



(19B205840, Rev. 1)

PARTS LIST

VU METER (OPTION 5159)

SYMBOL	GE PART NO.	DESCRIPTION
		MODIFICATION KIT 19A122687G17
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116080P9	Polyester: 0.22 µf ±20%, 50 VDCW.
C3	5496267P17	Tantalum: 1.0 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
C4	5496267P10	Tantalum: 22 µf ±20%, 15 VDCW; sim to Sprague Type 150D.
		- - - - - - - - - - - METERS - - - - - - - - - -
M1	19A115713P1	Audio level, VU: -20 to +3 scale.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115362P1	Silicon, NPN; sim to Type 2N2925.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R7	3R77P562J	Composition: 5600 ohms ±5%, 1/2 w.
R8	3R77P393J	Composition: 39,000 ohms ±5%, 1/2 w.
R9	19B209358P106	Variable, carbon film: approx 75 to 10,000 ohms ±10%, 0.25 w; sim to CTS Type X-201.
R10	3R77P392J	Composition: 3900 ohms ±5%, 1/2 w.
R11	3R77P181J	Composition: 180 ohms ±5%, 1/2 w.
R12	3R77P911J	Composition: 910 ohms ±5%, 1/2 w.
S1		SWITCH ASSEMBLY (STATION 1 SELECT) 19C311259G10
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 and DS2	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029P18	Push: lighted, 3 circuits, SPDT each, alternate action, 5 amps at 250 VAC; sim to Micro Switch 2D10.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS1 and XDS2		Part of Actuator and Holder (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
2	19C307029P4	Pushbutton-Lens.
4	19C307029P16	Actuator-Holder. (Includes XDS1 and XDS2).

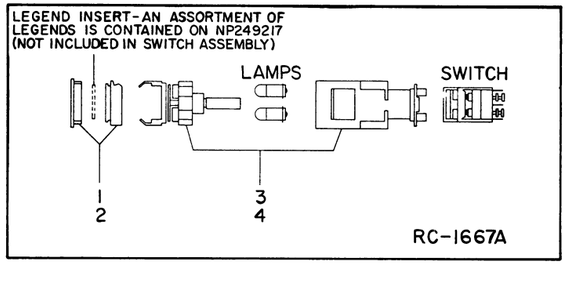
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

PARTS LIST

TONE ALERT (OPTION 5155)

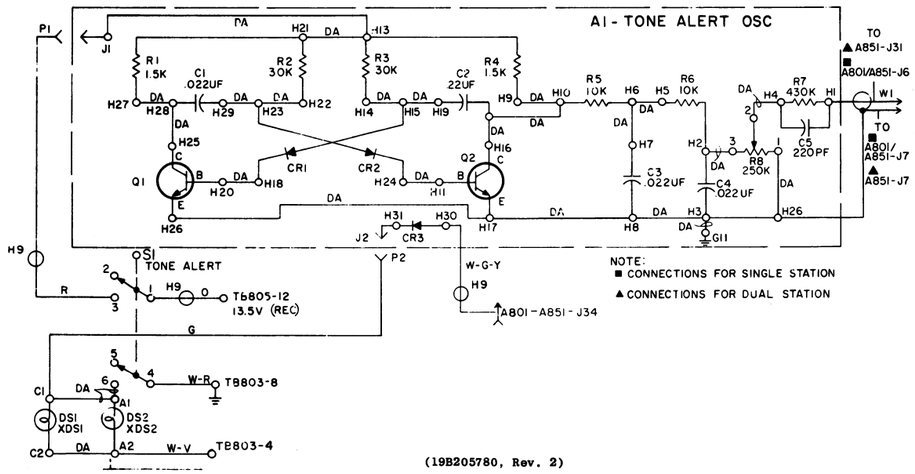
SYMBOL	GE PART NO.	DESCRIPTION
		MODIFICATION KIT 19A122687G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 thru C4	19A115028P109	Polyester: 0.022 µf ±20%, 200 VDCW.
C5	7489162P35	Silver mica: 220 pf ±5%, 500 VDCW; sim to Electro Motive Type DM-15.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - - -
CR1 thru CR3	19A115250P1	Silicon.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - - -
J1 and J2	4033513P2	Contact, electrical: sim to Bead Chain L93-2.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1 and Q2	19A115123P1	Silicon, NPN; sim to Type 2N2712.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P152K	Composition: 1500 ohms ±10%, 1/2 w.
R2 and R3	3R77P303J	Composition: 30,000 ohms ±5%, 1/2 w.
R4	3R77P152K	Composition: 1500 ohms ±10%, 1/2 w.
R5 and R6	3R77P103K	Composition: 10,000 ohms ±10%, 1/2 w.
R7	3R77P434K	Composition: 0.43 megohm ±10%, 1/2 w.
R8	19B209358P110	Variable, carbon film: approx 500 to 250,000 ohms ±20%, 0.25 w; sim to CTS Type X-201.
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W1	19A122228G1	Cable assembly: approx 15 inches long. Includes:
	4029840P2	Electrical contact.
S1		SWITCH ASSEMBLY 19C311259G3
		- - - - - - - - INDICATING DEVICES - - - - - - - -
DS1 and DS2	19C307037P26	Lamp, incandescent: 28 v; sim to GE 387.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
	19C307029P6	Push: lighted, 2 circuits, SPDT each, momentary action, 5 amps at 250 VAC; sim to Micro Switch 2D2.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XDS1 and XDS2		Part of Actuator-Holder. (Refer to RC-1667).
		MECHANICAL PARTS (SEE RC-1667)
2	19C307029P4	Pushbutton-Lens.
4	19C307029P16	Actuator-Holder. (Includes XDS1 and XDS2).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



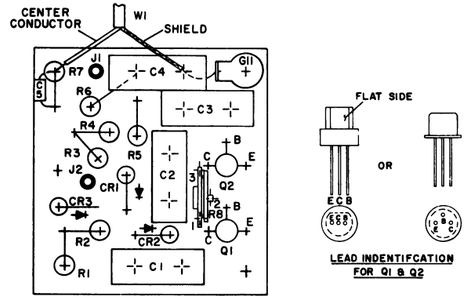
TONE ALERT
OPTION 5155

SCHEMATIC DIAGRAM



(19B205780, Rev. 2)

OUTLINE DIAGRAM

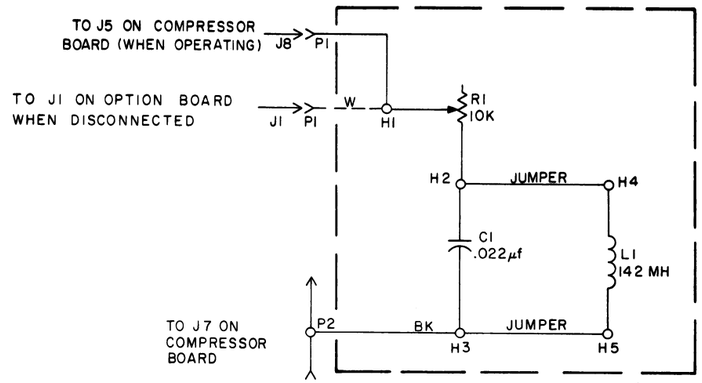


(19B205610, Rev. 1)

SERVICE SHEET

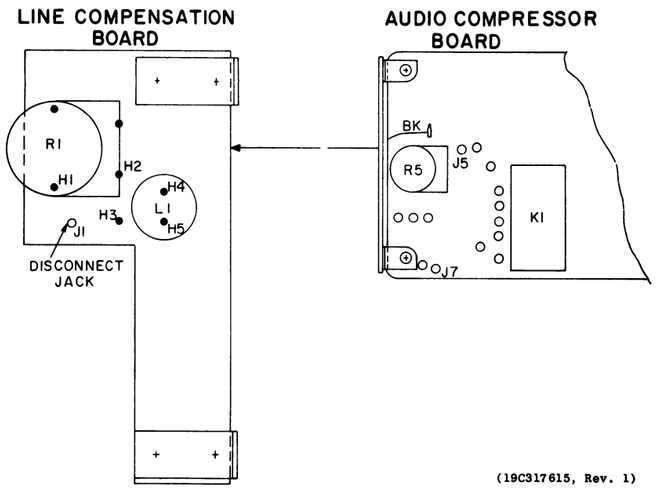
TONE ALERT AND VU METER

SCHEMATIC DIAGRAM



(19C317615, Rev. 1)

OUTLINE DIAGRAM



(19C317615, Rev. 1)

PARTS LIST

LINE COMPENSATOR
19B216906G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	19A116080P103	Polyester: 0.022 μf ±10%, 50 VDCW.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1	4033513P4	Contact, electrical: sim to Bead Chain L93-3.
		- - - - - - - - - - INDUCTORS - - - - - - - - - -
L1	19B209405P1	Reactor, audio freq: 142 mh ±5%, at 0.1 v thru 0.27 v; sim to Aladdin 405-101.
		- - - - - - - - - - - PLUGS - - - - - - - - - -
P1	4029840P2	Contact, electrical: sim to Amp 42827-2.
P2	4033348P1	Contact, electrical: sim to Bead Chain M 125-34.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	19B209358P6	Variable, carbon film: approx 75 to 10,000 ohms ±20%, 0.25 w; sim to CTS Type U-201.

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.

ORDERING SERVICE PARTS

Each component appearing on the schematic diagram is identified by a symbol number, to simplify locating it in the parts list. Each component is listed by symbol number, followed by its description and GE Part Number.

Service parts may be obtained from Authorized GE Communication Equipment Service Stations or through any GE Radio Communication Equipment Sales Office. When ordering a part, be sure to give:

1. GE Part Number for component
2. Description of part
3. Model number of equipment
4. Revision letter stamped on unit

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

Should further information be desired, or should particular problems arise which are not covered sufficiently for the purchaser's purposes, contact the nearest Radio Communication Equipment Sales Office of the General Electric Company.

MAINTENANCE MANUAL

LBI-4176

MOBILE RADIO DEPARTMENT
GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

GENERAL ELECTRIC

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