MOBILE RADIO

MAINTENANCE MANUAL

MULTI-TRANSMITTER CONTROL PANEL

SPECIFICATIONS *

CONTROL PANEL

Input Voltage	117 Volts AC ±10%, 50/60 Hz
Transmit Audio Input	
Impedance	600 ohms
Level	1 Volt RMS minimum
Transmit Audio Output	
Impedance	600 ohms
Level	+11 dBm maximum
Distortion	5% maximum from 300 to 3000 Hz
Frequency Response	+1 to -3 dB from 300 to 3000 Hz
Line Output (Control)	
Current	30 milliamperes maximum
Voltage	135 Volts DC maximum

DELAY LINE PANEL

Frequency Response	±1 dB from 300 to 3000 Hz
Insertion Loss (at 1000 Hz)	2 dB
Maximum Input Level	+ 11 dBm
Input and OutPut Impedance	600 ohms
Total Delay Time (at 1000 Hz)	1 Millisecond minimum
Delay Steps (at 1000 Hz)	85 microseconds ±10%
Envelope Delay	±10% from 500 to 3000 Hz

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

MULTI-TRANSMITTER CONTROL PANEL

GENERAL ELECTRIC

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WARNING

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

COMBINATION NOMENCLATURE

1st & 2nd Digits	3rd Digit	4th Digit
Product	No. of Transmitters	Standard
SC Multi-Transmitter Control	**2** 2 Transmitters	**1**
	3 3 Transmitters	
	4 4 Transmitters	
	5 5 Transmitters	
	6 6 Transmitters	
	7 7 Transmitters	
	8 8 Transmitters	
	9 9 Transmitters	
	0 10 Transmitters	

OPTIONS

Options	Description
7429	Test Receiver
7430	Delete DM Cabinet
7431	VM Cabinet (Deletes DM Cabinet)
7432	Delay Line Panel (2 Lines)
7433	Delay Line Panel (1 Line)

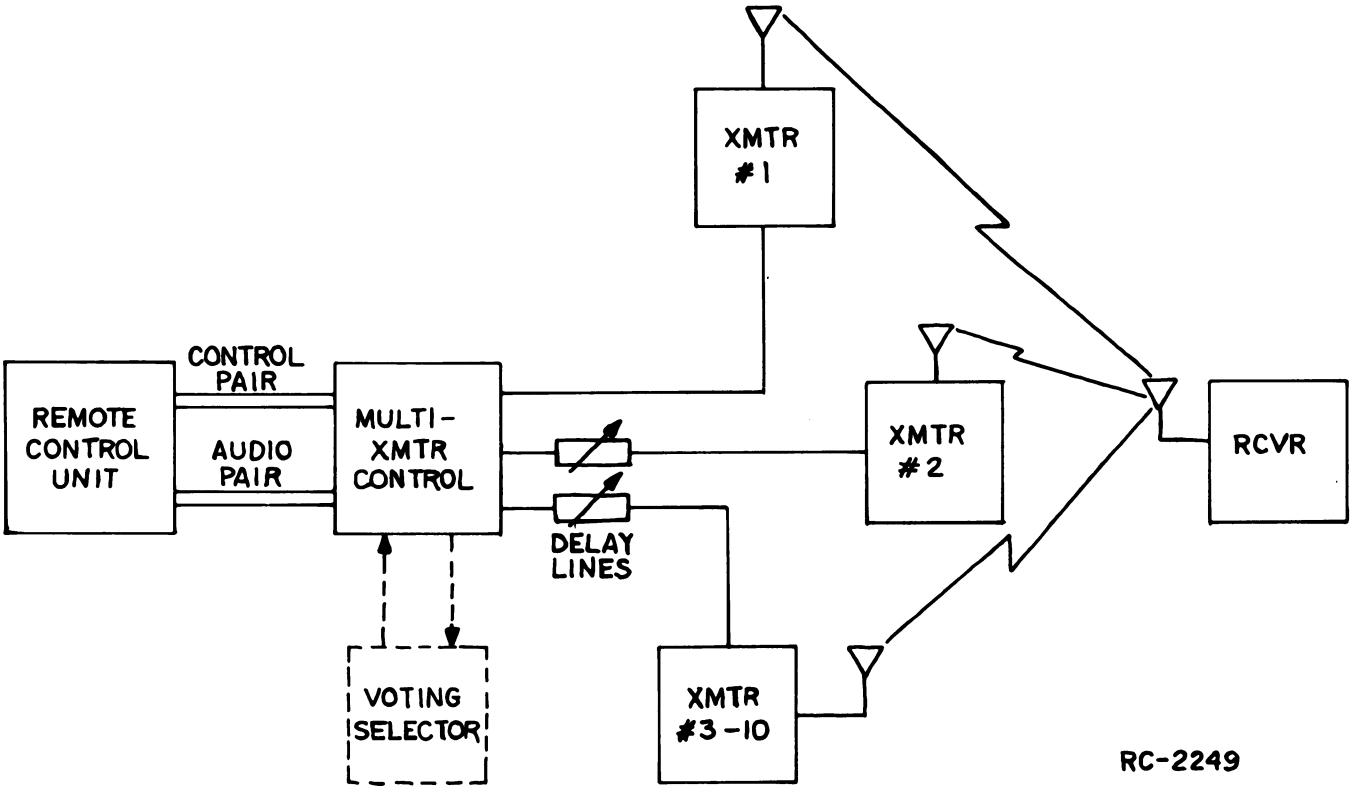


Figure 1 Multi-Transmitter Control System

DESCRIPTION

The General Electric Multi-Transmitter Control Panel is used with the Deskon remote control unit, Transistorized Control Console, Command Control Center or equivalent for controlling up to 10 transmitters in multiple transmitter systems. The multiple transmitters are located so the RF output of the transmitters saturates a specified operating area. This permits a receiver operating anywhere within the area to receive a strong, readable signal. A second Control Panel can be added in parallel for controlling up to 20 transmitters.

The output of the Control Panel is connected to the remote transmitters by DC control lines (metallic pairs).

A typical multi-transmitter control system is shown in Figure 1. The Multi-Transmitter Control Panel normally mounts in a Desk Mate cabinet.

The Control Panel is available without the cabinet for mounting in a 19-inch rack (requires four rack units). The Control Panel is also available in a 69-inch Floor Mount cabinet.

Control current from the Remote Control Unit activates the Control Panel. Keying the remote microphone applies control current to the Control Panel, energizing a keying relay.

Energizing the keying relay on the Control Panel switches the audio circuits from "receive" to "transmit", and applies a control current to each of the transmitter telephone pairs.

Audio from the Remote Control Unit is amplified, divided into 10 separate outputs and applied to the telephone pairs.

In the receive condition (keying relay unenergized), separate audio outputs are available at terminals on the back of the Control Panel. These audio outputs can be used as inputs to a Voting Selector Panel in a receiver voting system, or as inputs to a Command Control Center monitor panel. A single receiver output can be used as an input to a TCC, Deskon, etc.

One or more delay line panels are supplied with the Control Panel, depending on the number of transmitters controlled. The delay line panels are necessary for keeping the audio signals applied to the transmitters in phase.

CONTROL AND INDICATORS

The power OFF-ON switch and 12 indicator lights are located on the front of the panel. Other controls are mounted on

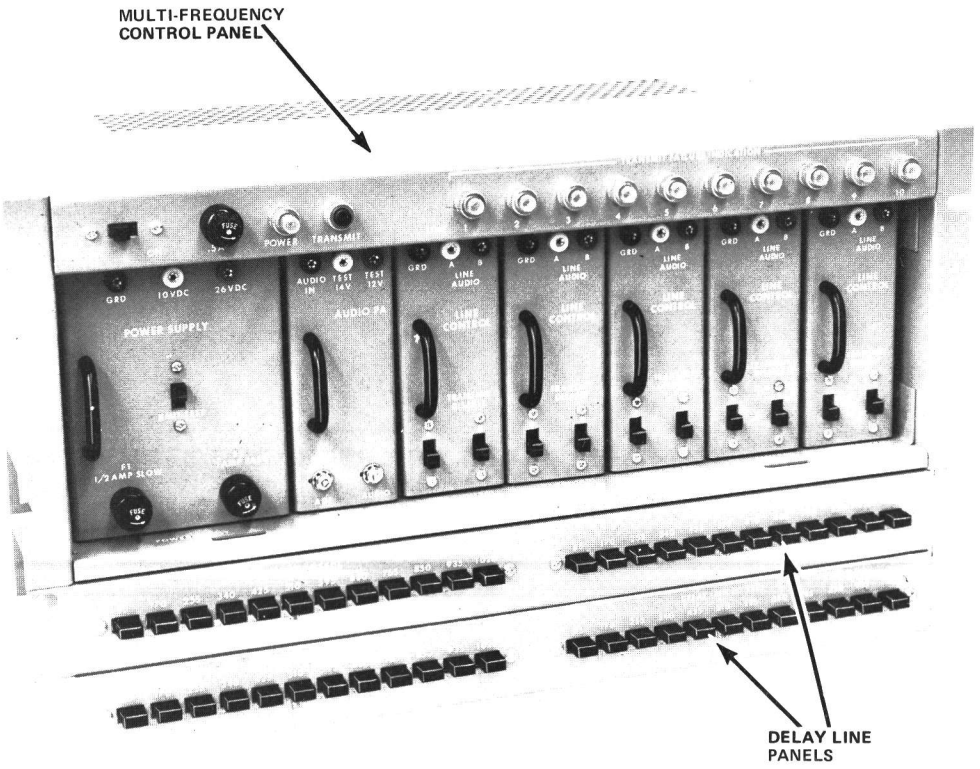


Figure 2 - Control Panel

the front of the plug-in modules (See Figure 2).

INDICATOR LIGHTS

Placing the OFF-ON switch in the ON position applies power to the Control Panel and lights the White POWER indicator light. Keying the Control Panel Lights the red TRANSMIT light.

If the power output of any of the transmitters should drop 3 dB or more, the drop is detected by an RF level detector at the remote station. This activates a failure alarm switch which turns on the appropriate white TRANSMIT FAILURE INDICATOR on the Control Panel. Connection points to the FAILURE circuit are provided on the back of the panel for activating an external alarm. Whenever the FAILURE light turns on, the associated External Line Failure connection drops to ground potential. A common connection is also provided that drops to ground potential whenever any transmitter fails.

CONTROLS

A TRANSMIT TEST switch is located on the front of the Power Supply Module. Placing the switch in the TEST position applies control voltage to the output lines to key the station transmitters. Placing the switch in the TEST position also lights the Red TRANSMIT light on the Control Panel.

Two TRANSMIT-DISABLE switches are located on each Line Control Module. Placing one of the switches in the DISABLE position removes the control voltage and audio to the selected transmitter, disabling the transmitter.

A LINE AUDIO ADJUST and BIAS ADJUST potentiometer are mounted on the Audio PA module. Instructions for setting these controls are contained in the Adjustment Procedure (See Table of Contents).

TELEPHONE LINE CHARACTERISTICS

A key link in multi-transmitter systems is the telephone pair. A standard multi-transmitter system may require up to ten audio pairs to connect the output of the Control Panel to the different transmitters.

Two problems encountered in the Multiple Telephone Line systems that affect system performance are:

- Lines with different frequency response
- Lines with different audio phase delay.

FREQUENCY RESPONSE

The frequency response of different telephone lines can vary greatly. This can cause annoying changes in pitch between the different transmitters. It is recommended that the frequency response of each telephone pair be measured and the difference between the lines observed. Telephone Line Evaluation forms are available to aid in making the measurements. A pad of 25 of these forms can be obtained by ordering ECP-774.

After the frequency responses have been measured, the lines should be equalized as required by the serviceman or the telephone company.

AUDIO PHASING

Differences in the delay of the telephone lines results in differences in the phase of the audio applied to the transmitter. Unless a receiver is cleanly captured by one of the transmitters (normally requires signal ratios greater than 6 dB), the additional audio recovered may add out-of-phase and detract from system performance. For example, ten miles of H88 loaded cable has a delay of approximately one millisecond. Ten miles of non-loaded cable has a delay of approximately one-fifth of a millisecond.

A method of determining the delay of each telephone pair, and the adjustment of the delay line to equalize delays is contained in the System Adjustment Procedure (See Table of Contents).

INSTALLATION

CABINET

Install the cabinet within 6 feet of a 117-VAC, 50/60 Hz power source, and as close to the telephone line termination block as possible. Be sure to leave sufficient room on each side of the cabinet so that both of the cabinet side panels can be removed for servicing.

A separate 15-ampere, 117 VAC circuit should be provided for the Control Panel. A separate line will prevent an interruption of communications if a failure occurs in other building circuits.

NOTE

An optional 220/117-Volt AC step-down transformer is available for locations having a 220-Volt AC power source.

The power cable is supplied with a three-prong plug. One prong grounds the equipment to protect personnel. If a three-prong socket is not available, a two-prong adaptor may be used until a three-prong outlet is installed. When a two-prong adaptor is used, the attached ground wire must be connected to building ground. Make a continuity check between the Control Panel rack and a known ground point to make sure that a good ground connection has been made.

Check the electrical code to assure compliance with local ordinances.

CONTROL PANEL

Option 7430 provides the Control Panel without the Desk Make cabinet. Install the panel in 19-inch rack with #12-24 x 1/2 inch screws. Then connect the power supply cable to a grounded, three-prong 117 Volt, 50/60 Hz outlet.

TEST RECEIVER

Option 7429 provides a receiver power supply Model 4EP39A11, and speaker Model 4EZ16A21 for use with a MASTR Professional Series receiver. The power supply (with receiver) mounts in the bottom of the cabinet. Make the following connections to the power supply:

1. Connect a jumper from TB501-7 to TB501-8 (GND).
2. Connect the speaker leads to TB501-13 and TB501-9 (GND).
3. Using a three-conductor, #16 power card, connect the 117 Volt leads to TB501-1 and TB501-2, and the ground lead to TB501-9.
4. Connect the antenna cable to J501 on the power supply.
5. Adjust the VOLUME and SQUELCH controls as directed in the Initial Adjustment Procedure in Maintenance Manual LBI-4172.

TRANSMITTER FREQUENCY ADJUSTMENT

In multi-transmitter systems, the difference in transmitter frequencies can cause a heterodyning tone in a receiver located where the signal strength of two transmitters is approximately equal. The frequency of this "beat" note can be made to approach 0 Hz through the use of highly stable oscillators in the transmitters.

The stability of the oscillators is better than the measurement capability of most field measuring instruments. Therefore, it is necessary to set the transmitters on frequency by one of the following methods.

NOTE

Do not attempt to adjust the frequency of any of the stable oscillators until the oscillators have had a warm-up time of at least eight hours.

Pre-Installation Adjustment

Before installing the transmitters at their final location, it is recommended that they be assembled at a central location where a monitor receiver is available. Turn the transmitters ON and allow the stable oscillators to warm up for at least eight hours.

To gain access to the frequency adjust control, remove and retain the screw and gasket mounted in the FREQ ADJUST hole. Always replace the screw and gasket after adjustment to keep the oscillator hermetically sealed. The recommended tuning tool is JFD #5284 or equivalent. Adjust the frequency as follows:

1. Select one of the transmitters as the "standard". Check the frequency to assure compliance with FCC Rules and Regulations.
2. Key the "standard" transmitter (Xmtr 1). Then key one of the other transmitters (Xmtr 2) and listen for a beat note at the monitor receiver. Some adjustment of transmitter power levels may be required to make the beat note more audible. Best results are obtained when the two transmitters deliver equal signals to the monitor receiver.
3. Adjust the frequency of the Xmtr 2 stable oscillator until the beat note is at the lowest possible frequency. It should be possible to adjust the Xmtr 2 oscillator for a near zero beat note.
4. Repeat Steps 2 and 3 for each of the remaining transmitters, comparing each one against the "standard"(Xmtr 1).
5. Check the frequency of each transmitter independently to assure compliance with FCC Rules and Regulations.

Service Note: A signal tracer similar to Heath IT-12 (used with the monitor receiver) will greatly improve the audibility of the best notes when adjusting the stable oscillators. In transistorized receivers, connect the signal tracer probe to the base of the 1st limiter. In tubed receivers, connect the probe to the grid of the 1st limiter.

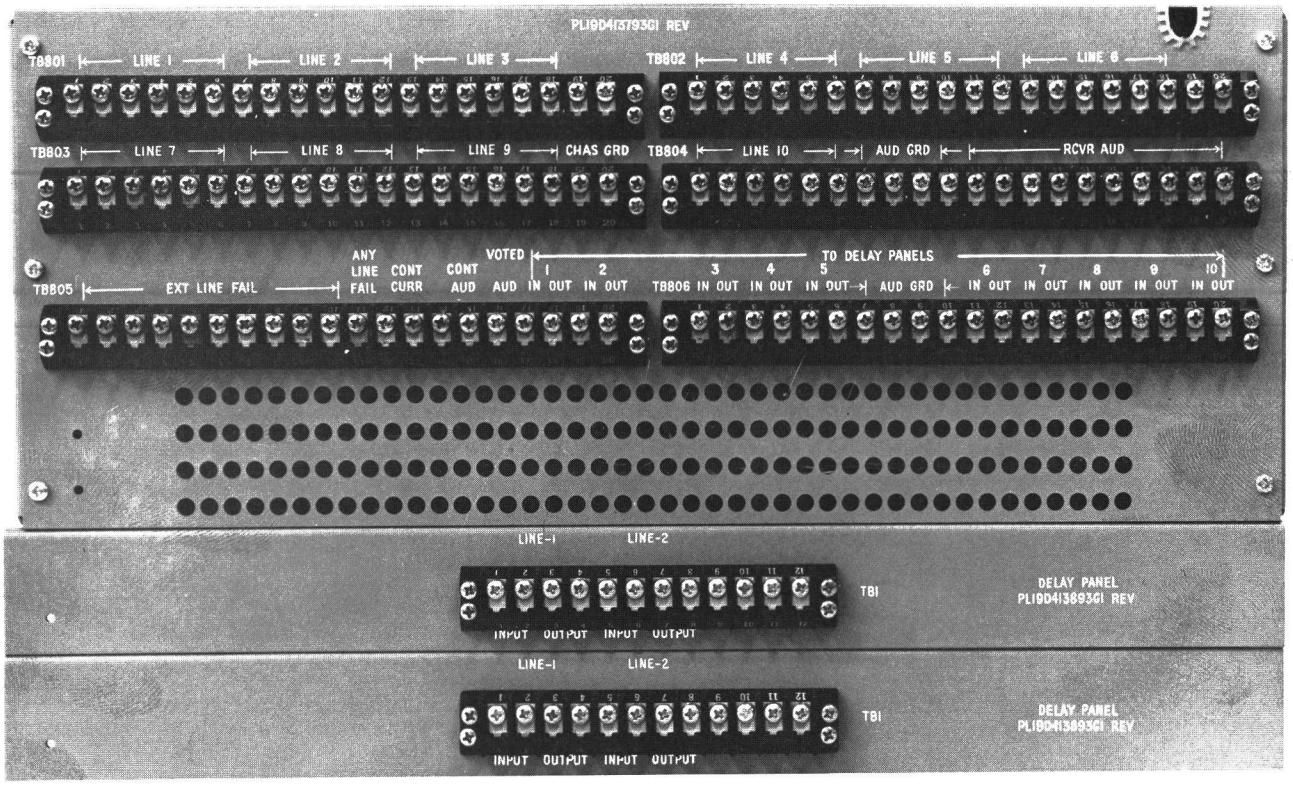


Figure 3 - Terminal Board Panel

Adjustment After Installation

Frequency adjustments required after installation of the transmitters will utilize Steps 1 through 5 of the Pre-Installation Adjustment. This adjustment also requires a monitor receiver in the field at a point where the signal strengths of the two transmitters used are approximately equal. Use of the signal tracer as described in the Service Note is recommended for this procedure.

In addition, communications must be provided from the monitor receiver location to the transmitter being adjusted. This is required so that the person at the monitor receiver may guide the technician who is adjusting the transmitter frequency.

CONNECTIONS

All connections are made to terminal boards TB801 through TB807 on the back of the Control Panel. Remove the back cover of the Control Panel to gain access to the terminal boards (See Figure 3).

REMOTE INPUT

Connections from the Remote Control Unit consists of a control pair and an audio pair. Make the connections as follows:

1. Connect the control pair to TB805-12 and TB805-13 (GND).

2. Connect the audio pair to TB805-14 and TB805-15 (GND).

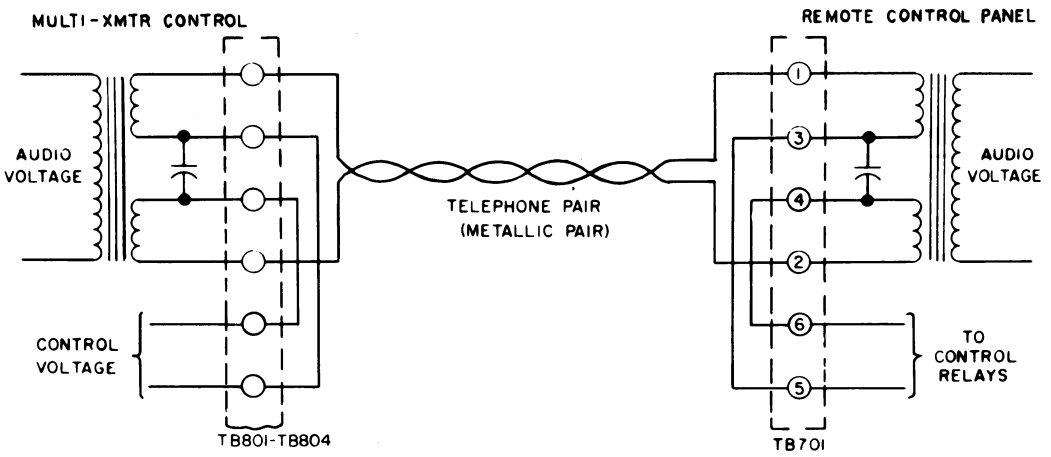
LINE OUTPUT

The DC control voltages and audio voltages for lines 1 through 10 are connected through telephone pairs with DC continuity. In general, there are three methods of connecting the audio and control circuits to the telephone lines (See Figure 4).

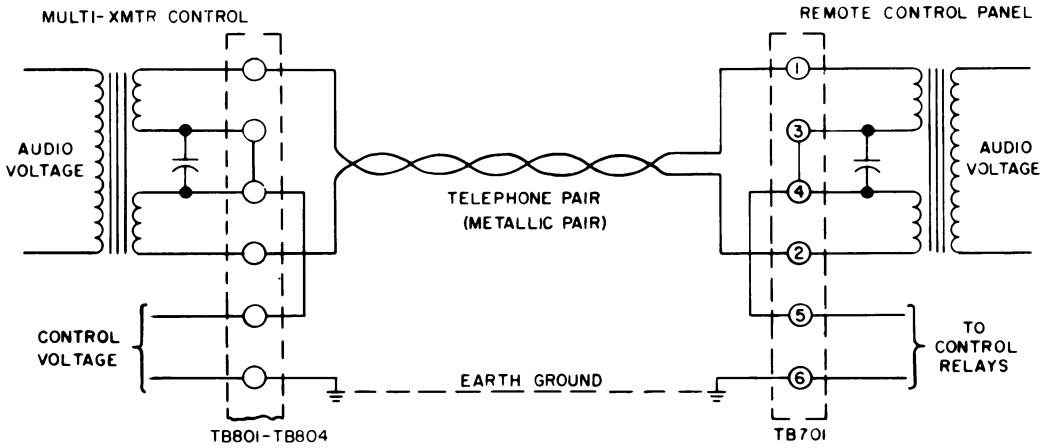
Method 1 - Uses one metallic pair for both audio and control. The control current is simplexed from one line to the other by splitting the transformer windings with capacitors.

Method 2 - Uses one metallic pair for both audio and control and simplexes the control current from the transformer center taps to an earth ground.

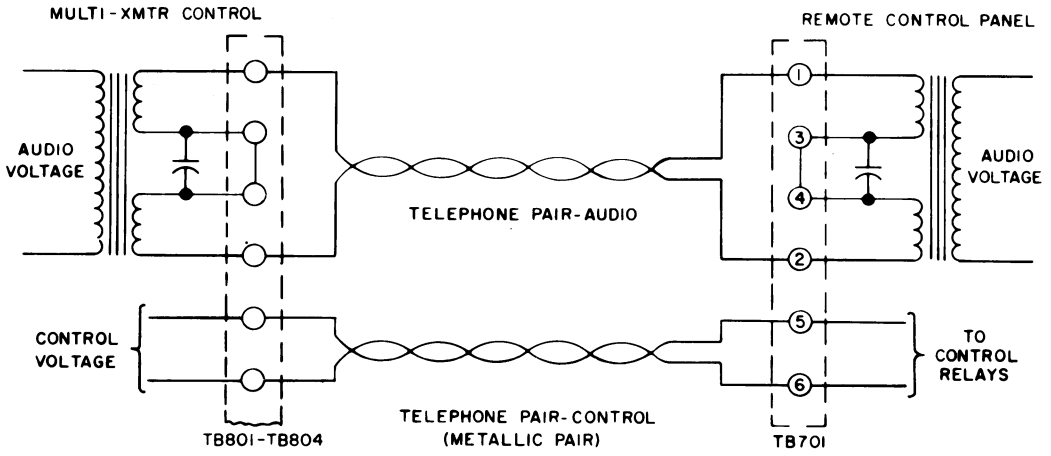
Method 3 - Uses two telephone pairs; one metallic pair for audio and one metallic pair for control.



METHOD 1 - SINGLE TELEPHONE PAIR WITH CONTROL SIMPLEXED LINE TO LINE



METHOD 2 - SINGLE TELEPHONE PAIR WITH CONTROL SIMPLEXED BETWEEN CENTER TAP AND GROUND



METHOD 3 - SEPARATE CONTROL AND AUDIO PAIRS

RC-2250

Figure 4 - Telephone Line Connections For Each Line Used

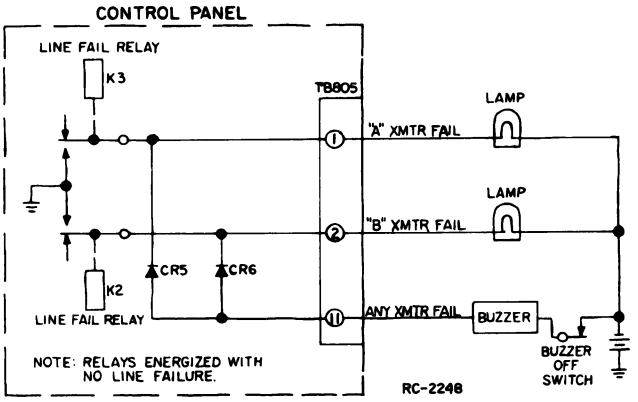


Figure 5 - Typical External Line Failure Circuit

RECEIVER AUDIO

For satellite receiver applications, receiver audio high is available at TB804-11 through TB804-20 (10 terminals). Connect each audio high and an audio ground to the Voting Selector inputs. Connect the voted audio from the Voting Selector to TB805-16 and one of the audio ground terminals. A #22 AWG twisted pair is recommended for the audio leads.

For single receiver applications (without voting), connect the audio high directly to TB805-16.

EXTERNAL LINE FAIL

Terminals TB805-1 through -11 are provided for customer-supplied external line failure alarms. TB805-1 through -10 are for individual line failure alarms, and provide a 2-ampere relay contact to ground. TB805-11 is for "any line" failure, and provides a relay contact to ground through a one-ampere diode. A typical external line failure alarm circuit is shown in Figure 5.

DELAY LINE CONNECTIONS

Delay Line panels must be added whenever additional transmitters are added to the system. Delay lines may also be cascaded when the required delay exceeds that available from a single delay line. To install additional delay lines, refer to the Interconnection Diagram and Installation Instructions as listed in the Table of Contents.

SYSTEM ADJUSTMENT

Before starting the System Adjustment procedure, all AC power connections, telephone lines and ground connections should be completed at the Remote Control Unit, Multi-Transmitter Control Panel, and the Remote stations.

The base station should be properly aligned, and the stable oscillators set on frequency as directed in the Transmitter Frequency Adjustment section of this Manual.

REMOTE CONTROL UNIT

Adjust the Remote Control Unit as directed in the Adjustment Procedure in the applicable Maintenance Manual except for the LINE OUTPUT. Set the LINE OUTPUT control for 2 Volts RMS (+8 dBm) or less where required by local regulations. Leave the audio generator connected to set the LINE AUDIO control in the Multi-Transmitter Control Panel, and the Line Compensation kit at the Remote Control Panel (KC-16-A).

MULTI-TRANSMITTER CONTROL PANEL

Adjustments for the Multi-Transmitter Control Panel include setting the LINE AUDIO output control and the BIAS ADJUST.

Line Audio

1. Turn the Control Panel ON.
2. Apply a 30 millivolt, 1000 Hz signal to the microphone input at the Remote Control Unit. The LINE OUTPUT control Unit must be set for an output of 2 Volts RMS (+8 dBm).
3. Connect an AC-VTVM across terminals TB801-1 and -2. Use a 0.5 mFd capacitor in series with the meter lead if a DC voltage is simplexed line-to-line.
4. Adjust LINE AUDIO control R1502 for 2.7 Volts RMS (+11 dBm), or as required by local telephone company regulations.

Bias Adjustment

The BIAS ADJUSTMENT is set at the factory and should normally require no further adjustment. However, if it should become necessary to replace the audio PA transistors, set the BIAS ADJUST control as follows:

1. Turn the power OFF. Unplug and remove the Audio PA module. Plug the Extender Board Assembly into the Audio PA jack (J802), and connect the Audio Module to jack J1 on the Extender Board cable.

2. Remove the jumpers connected from J2 to J3 and from J4 to J5 on the front of the Extender Board.

3. Connect a milliammeter to J3(+) and J2 (ground).

4. Turn the power ON. With no audio applied, set BIAS ADJUST control R1501 for 20 Milliamperes.

5. Turn the power OFF and replace the Audio PA Module in J802.

REMOTE BASE STATION

Modulation Input

Adjust the remote control panel on each station as directed in Maintenance Manual LBI-4155 except for the Modulation Input Adjustment. Adjust the MODULATION INPUT control (R27) on the Intercom-Compression board for 3.3 kHz deviation for each transmitter.

Transmit Fail

Remote Control Panel type KC-16-A is equipped with a RF failure detector circuit. When the transmitter output power drops 50% (3 dB) or more, a relay on the KC-16-A de-energizes. De-energizing the relay inserts a resistance in the telephone loop. This change in current is detected at the Multi-Transmitter Control Panel, lighting the Transmit Fail light and activating the external alarm. To set the transmit fail circuit:

1. Connect a milliammeter in series with the control line.

2. Key the transmitter from the Multi-Transmitter Control Panel and reduce the transmitter RF output by approximately 50%.

3. With the transmitter keyed, adjust the RF level control (R1 or R10) on the RF Level detector until its relay just energizes.

NOTE

On medium power stations, remove the test set metering plug for this adjustment. Also, the plug must be removed for normal operations.

4. Reduce the transmitter power output an additional 5 to 10 Watts until the RF Level Detector relay de-energizes. Then adjust the 6-milliampere current control (R6) for a line current of 6 milliamperes.

5. Realign the transmitter for the proper power output.

6. Repeat this procedure for each transmitter in the system.

DELAY LINE PANEL

The Delay Line Panel is provided for equalizing the delay of the different telephone lines to insure that the audio signals applied to the transmitter are in phase.

Each delay line has 12 pushbuttons for selecting a delay of up to one millisecond in steps of 85 microseconds. Whenever a delay of more than one millisecond is required, two delay lines can be connected in series to provide a total delay of up to two milliseconds.

This procedure provides a method for determining which telephone line is electrically the longest (has the greatest delay). This procedure also provides a method of adjusting the delay lines to "build out" the delay of all other telephone lines to equal the line with the longest delay.

Equipment Required

1. Audio oscillator with a calibrated, continuously-variable frequency control.

2. A monitor receiver on the transmitter frequency

3. An oscilloscope with accessible horizontal input to display the Lissajous patterns required when adjusting the audio phasing.

Connect the equipment as shown in the Test Set-Up diagram (Figure 6).

FINDING LONGEST LINE

1. Disconnect Delay Line harness wires from TB805 and TB806. Note the wire numbers as the harness wires must be re-connected later.

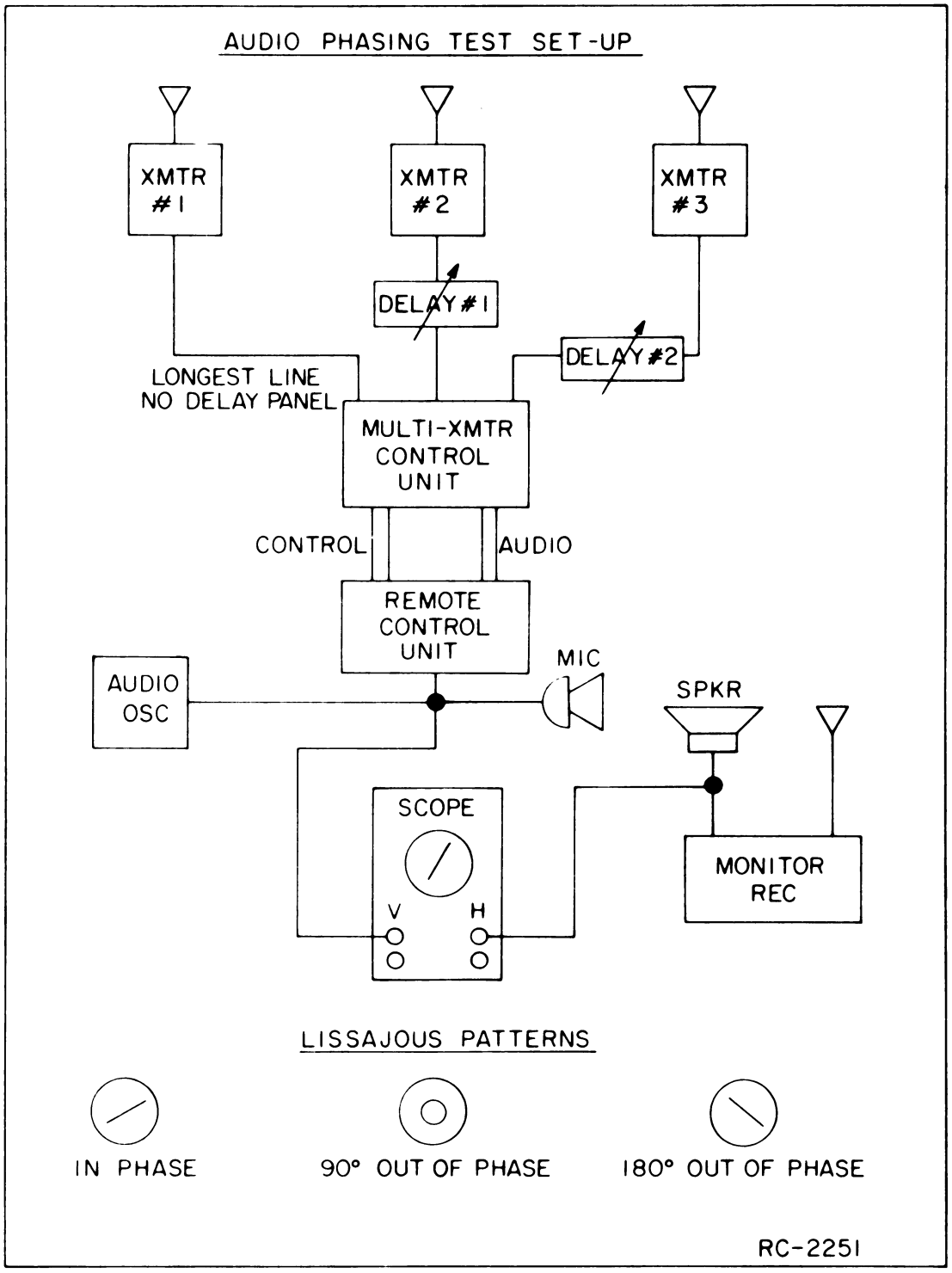


Figure 6 - Test Set-Up

2. Connect jumpers between the following terminals for each line used as shown in the following chart:

For:	Jumper:
Line #2	TB805-19 & 20
Line #3	TB806- 1 & 2
Line #4	TB806- 3 & 4
Line #5	TB806- 5 & 6
Line #6	TB806-11 & 12
Line #7	TB806-13 & 14
Line #8	TB806-15 & 16
Line #9	TB806-17 & 18
Line #10	TB806-19 & 20

3. Select transmitter #1 at the Multi-Transmitter Control Panel, and disable all of the other transmitters.

4. Key the transmitter from the Remote Control Unit and set the audio oscillator frequency to a point nearest 1000 Hz where the oscillator audio and received audio are in phase (see Lissajous patterns). Write down the frequency.

5. Next, increase the audio oscillator frequency until the two audio signals are 180° out of phase. Write down this frequency.

6. Repeat the above steps for each transmitter used. The transmitter that is farthest electrically from the Multi-Transmitter Control Panel will have the smallest difference in frequency between the in-phase and 180° out-of-phase audio frequencies.

7. Connect the longest line to TB805-17 and -18 (Line 1). Then disconnect all of the jumpers except on Line 1, and re-connect the Delay Line Panel harness wires to TB805 and TB806.

EQUALIZING DELAYS

1. Set the frequency of the audio oscillator for the same in-phase frequency noted for the longest line.

2. Disable all transmitters except the transmitter associated with Line 2. Key the transmitter and progressively increase the delay on the Delay Line associated with Line 2 until the audio signals are as nearly in phase as possible.

3. Set the frequency of the audio oscillator for the 180° out-of-phase frequency noted for the longest line and key the transmitter. If the proper delay has been selected, the audio signals should be nearly 180° out-of-phase.

   If the audio signals are not 180° out-of-phase, the delay may have been set incorrectly. If this occurs, select other delay buttons until the in-phase and out-of-phase relationship is approximately the same as the longest line.

4. Repeat the above procedure for each line until all lines are built out to equal the delay of the longest line.

NOTE

If the in-phase and out-of-phase relationships of any given line cannot be made to approximate the longest line, there may be a 180° phase reversal somewhere along the line. If this seems to be the problem, that telephone line can be reversed at the Multi-Transmitter Control Panel. However, if the simplexed line-to-line method is used, the control jumpers must also be reversed to provide proper polarity of control current.

5. Record the audio frequencies at which the in-phase and out-of-phase relationships were obtained to facilitate future servicing.

MAINTENANCE

The Multi-Transmitter Control Panel was designed for ease of servicing and minimum maintenance. All of the modules plug in to card-edge connectors mounted on the panel, and can be easily unplugged for routine inspection and maintenance.

NOTE

Turn the power OFF before removing or replacing any of the modules.

An Extender Board assembly is supplied with the Control Panel for servicing any of the modules out of the panel. The Extender Board plugs into the module connector, and the module plugs into the jack on the Extender Board Cable.

WARNING

The Line Control Module printed wiring board is supplied with both 117 Volts AC and 125 Volts DC. Be extremely careful when servicing the Line Control Module.

SIGNAL QUALITY CHECKS

If an area that normally receives good quality signals should start getting poor quality signals, the following checks can be used to determine the cause.

First, check the transmit FAIL lights on the Control Panel to determine if an abnormal power output has been detected. Then check each transmitter individually for a good quality signal in the affected area. If the individual transmitters appear to be operating normally, it will be necessary to check the frequency and delay of each transmitter.

Frequency

The frequency can be checked by keying two transmitters at a time and listening for a beat note. If an annoying beat note is heard, re-adjust the transmitter stable oscillator as directed in the Transmitter Adjustment Procedure.

Delay

The delay lines should normally require no adjustment after the initial set-up. However, the telephone company could have changed or re-routed one or more of the telephone lines to the transmitters. Check the delay of each line as directed in the Delay Line section of the System Adjustment Procedure. If the in-phase and out-of-phase relationships are not obtained at the frequencies determined at the initial set-up, re-adjustment of the delay lines is required.

LAMP REPLACEMENT

The indicator lamps can be replaced from the front of the Control Panel. To replace the lamps:

1. Turn the power OFF.
2. Unscrew the colored lens and pull the lamp out of its socket.
3. Plug in the new lamp and replace the colored lens.
4. Turn the power ON.

TROUBLESHOOTING

A Troubleshooting Procedure is provided to assist the serviceman in maintaining the Control Panel (See Table of Contents). The procedure contains Quick-checks to help isolate the problem, and voltage readings for the Power Supply, Audio PA and Line Controls Modules.

CIRCUIT ANALYSIS

The basic Control Panel consists of a Power Supply Module, an Audio PA Module and up to five Line Control Modules mounted in a Shelf Assembly. The Delay Line Panel(s) are normally mounted under the Shelf Assembly.

Reference to symbol numbers mentioned in the following text can be found on the Applicable Schematic Diagram, Outline Diagram and Parts List (see Table of Contents).

A simplified diagram of the Control Panel is shown in Figure 7.

POWER SUPPLY

The Power Supply Module consists of the +26 Volt regulator, the +10 Volt regulator, the remote line keying relay, and the Transmit Test switch.

Turning the OFF-ON switch on the front panel to the ON position applies 117 Volts AC to the primary of step-down transformer T501. The transformer primary is protected by fuse S501.

The voltage across the secondary winding is applied to full-wave bridge rectifiers CR1 through CR4. The rectified output is filtered by C501 and applied to the +26 Volt regulator circuit. F502 protects the transformer secondary and rectifiers.

26-Volt Regulator

The rectified output voltage turns on regulator transistors Q1 and Q501. Thirteen-Volt Zener diodes CR5 and CR6 keep the base of Q1 at 26 Volts, which keeps the base bias of Q501 constant. This clamps the output voltage at the emitter of Q501 at approximately 26 Volts. Capacitor C1 provides additional filtering. A continuous +26 Volts is applied to the keying relay, to Transmit Test switch S501, and to the Audio PA module. The regulated +26 Volts is metered at J503 and J501 (ground).

10-Volt Regulator

The 10-Volt regulator transistor (Q502) operates on the regulated +26 Volts. The 11-Volt Zener diode (CR7) keeps the base bias of Q502 constant, keeping the output voltage at the emitter at 10-Volts. The output of the 10-Volt regulator operates the transmit FAIL lights. The regulated 10-Volts is metered at J502 and J501 (ground).

Keying Relay

The control voltage from the remote control unit is connected to E/5 and F/6 on the Power Supply Board.

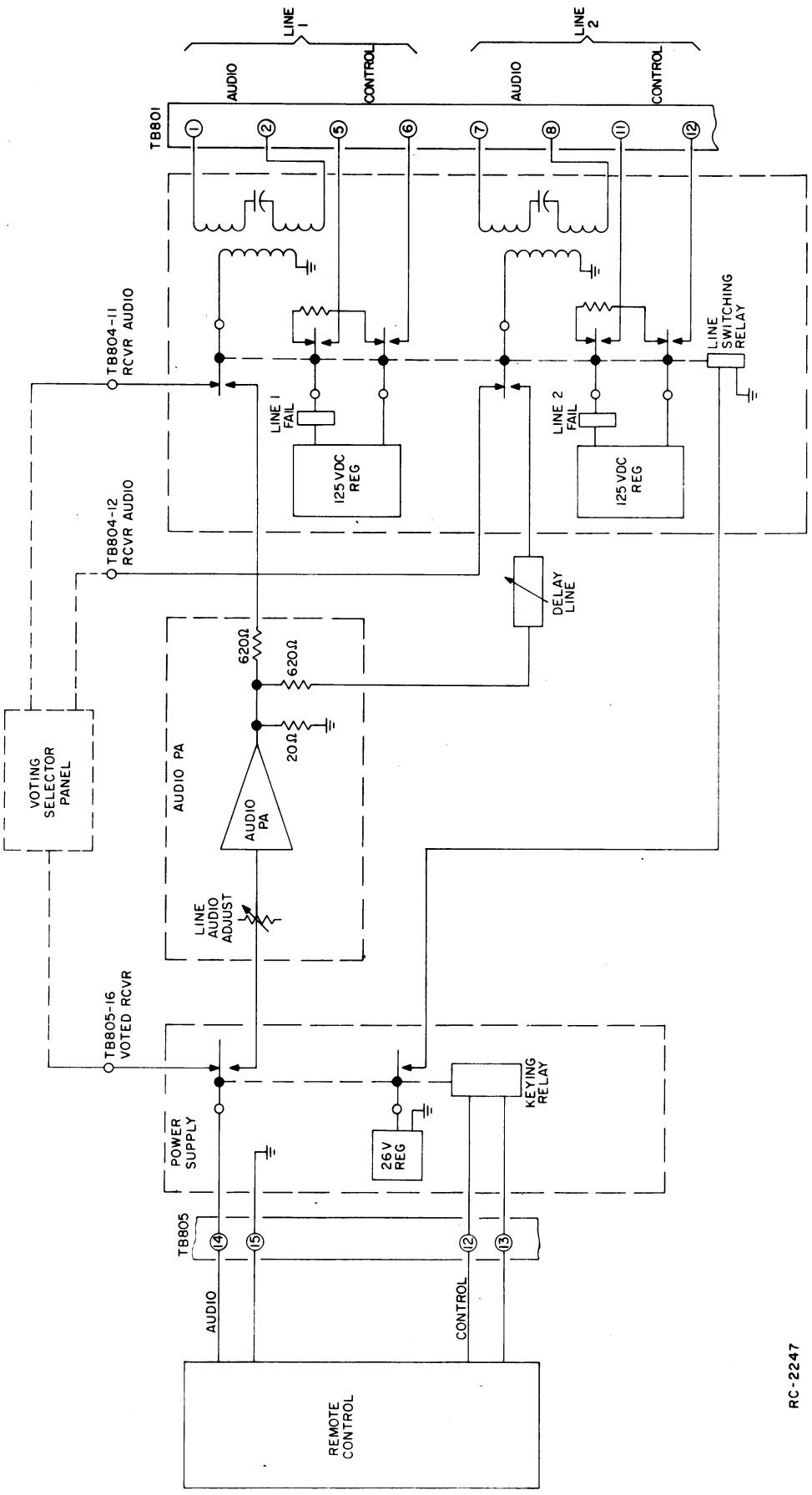


Figure 7 - Simplified Control Panel Diagram

Keying the remote microphone energizes keying relay K1. Energizing the relay switches the audio from the receive mode to the transmit mode, applying the audio to the Audio PA Module. Energizing the keying relay also applies +26 Volts to the Line Control Module to energize the line switching relay.

AUDIO PA MODULE

The Audio PA circuit consists of Q1 through Q4 mounted on a printed wiring board, and power amplifier transistors Q1501 and Q1502 mounted on a separate heatsink.

Switched audio from the Remote Control Unit is coupled through LINE AUDIO control R1502 to the base of pre-amplifier Q1. The output of Q1 is applied to the base of driver - amplifiers Q3 and Q4. Following the drivers is a complimentary push-pull power amplifier consisting of Q1501 and Q1502. The power amplifier output is divided into ten outputs (L/10 through W/19, and built out to 600 ohms for each individual line. The audio is connected through a line output transformer on the Line Control Module (or a delay line and transformer) to the telephone pair.

LINE CONTROL MODULE

Each Line Control Module contains two identical audio and line current circuits for controlling two transmitters. Up to five line Control Modules can be plugged into the Control Panel for controlling up to 10 transmitters.

As the two audio/control circuits are identical, only one of the circuits will be described in this section.

Control Voltage

Turning the power switch ON applies 117 Volts AC to power transformer T855. The voltage developed across the Green-Green windings is applied to full-wave bridge rectifiers CR10 through CR13. The rectified output is filtered by C3 and C5, and applied to the regulator circuit.

Applying voltage to the circuit energizes the XMTR FAIL relay (K3), and turns on series regulator transistors Q851 and Q852. Zener diode VR1 holds the base bias on Q852 at 125 Volts, which keeps the base bias on Q851 constant. This holds the output voltage at the emitter of Q851 at approximately 125 Volts DC.

When line switching relay K1 is de-energized, the regulator output is connected across load resistor R5. Energizing K1 applies the control voltage through the TRANSMIT DISABLE switch (S851) to the telephone line. Placing the switch in the DISABLE position opens the control voltage line, disabling the associated transmitter.

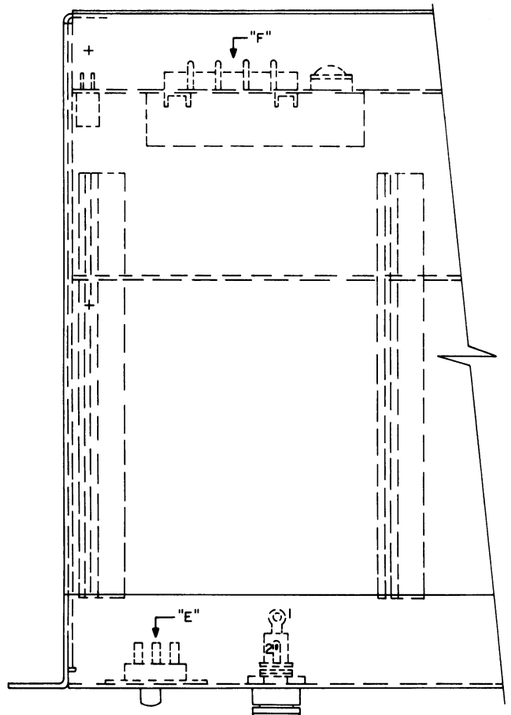
Line Fail Circuit

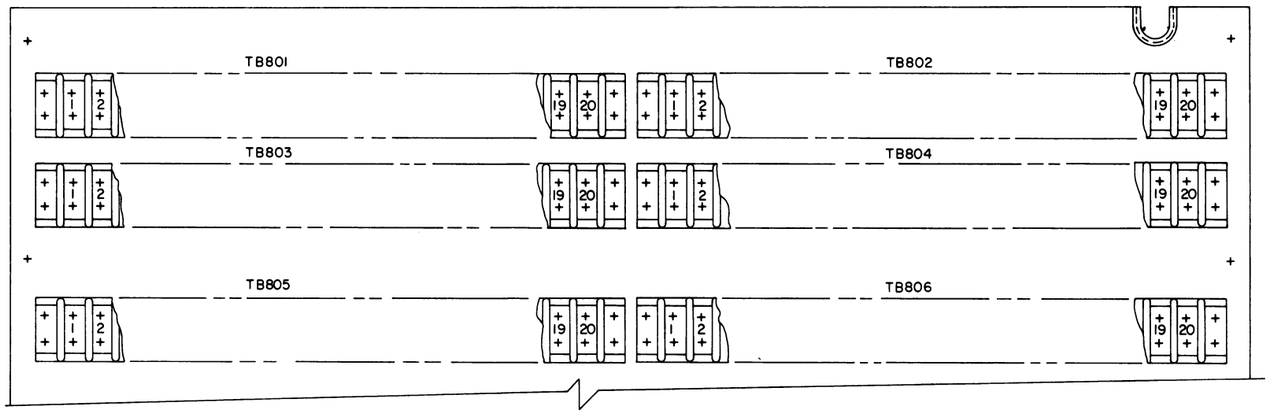
The 15 milliampere XMTR FAIL relay remains energized as long as power is applied to regulator circuit, and the transmitter power output isn't reduced by 50% or more. A drop in power of 50% or more is detected by a failure circuit at the station. This reduction in power energizes a relay that switches a resistance into the control pair, reducing the control current to 6 milliamperes. The 6-milliampere control current causes the XMTR FAIL relay to de-energize, completing a ground path for the FAIL light and the external alarm connection when the transmitter is keyed.

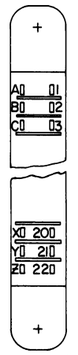
Audio

When the line switching relay is not keyed, audio from a satellite receiver or station receiver is coupled through line transformer T851 and through normally closed relay contacts to the receiver audio terminals on TB804. The receiver audio signals can be connected to a receiver Voting Selector Panel, or a single receiver output can be connected to the Voted Audio Terminal to be heard at the Remote Control Unit.

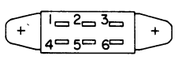
Keying the line switching relay switches the audio circuits from receive to transmit. Audio from the Remote Control Unit is coupled through the line transformer and applied to the telephone pair.



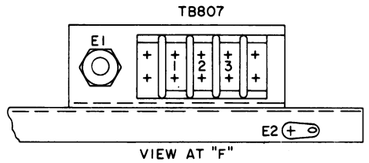




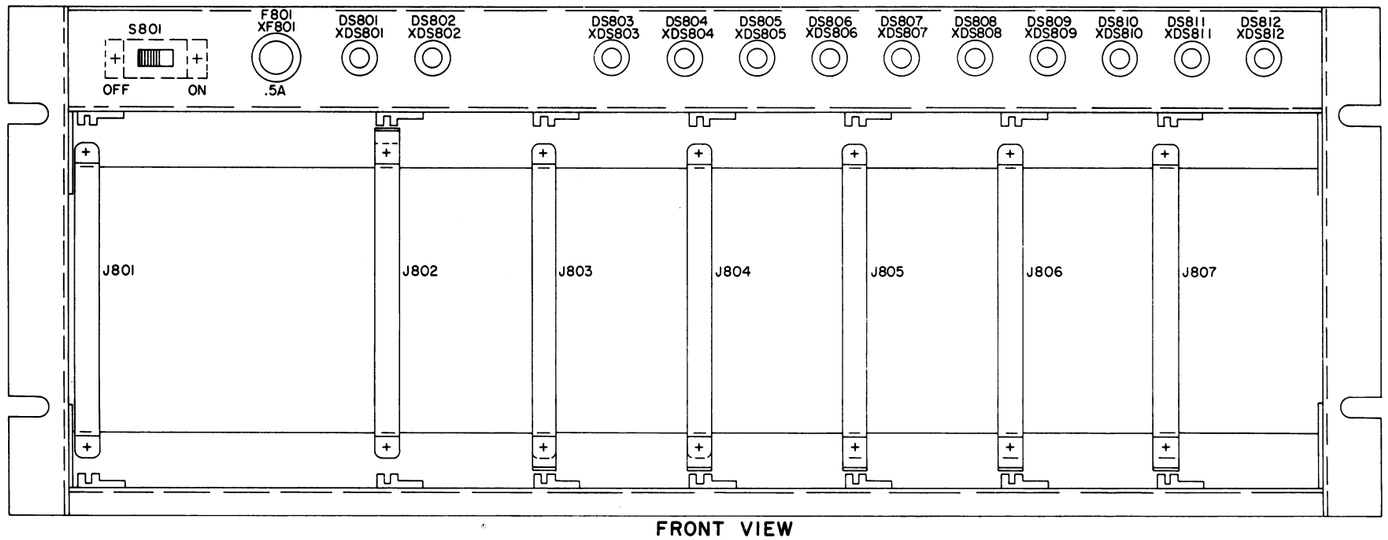
VIEW AT "A"
TYP. NUMBERING
FOR J801-J807



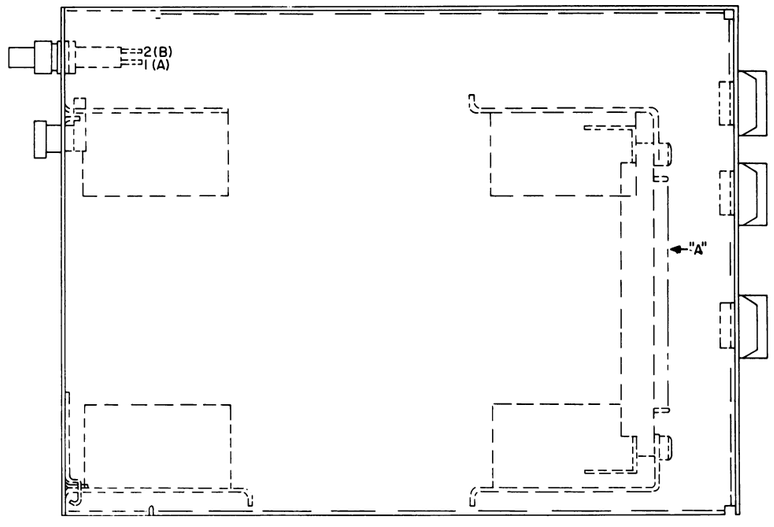
VIEW AT "E"



VIEW AT "F"



FRONT VIEW
(COVER REMOVED)



OUTLINE DIAGRAM

SHELF ASSEMBLY

(19D416591, Rev. 0)

14 Issue 1

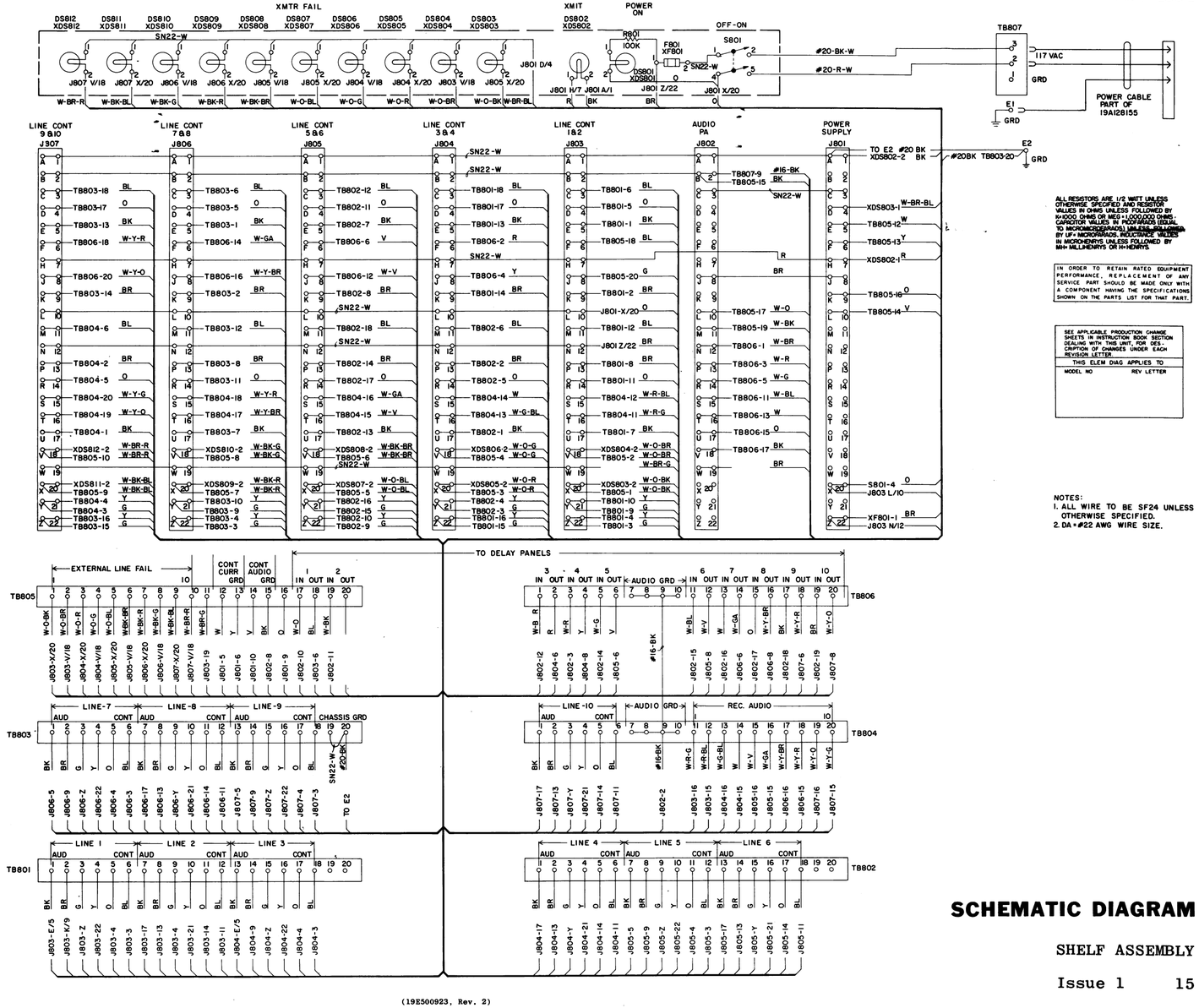
PARTS LIST

LBI-4326

SHELF ASSEMBLY
19D413793G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - INDICATING DEVICES - - - - - - -
DS801	5495995P3	Cartridge, neon: uses Type NE-2Y lamp, white lens; sim to Dialco 38-A313-1535.
DS802	5495995P34	Cartridge, incandescent: 28 v, red lens; sim to Dialco 39-28-1471.
DS803 thru DS812	5495995P41	Cartridge, incandescent: 28 v, white lens; sim to Dialco 507-3910-1435-600.
		- - - - - - - - - - TERMINALS - - - - - - - - - -
E2	4036994P1	Terminal, solder: sim to Zierick Mfg Corp 505.
		- - - - - - - - - - FUSES - - - - - - - - - -
F801	7487942P3	Slow blowing: 1/2 amp at 250 v; sim to Bussman MDL-1/2.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J801 thru J807	5496085P4	Connector, printed board: 44 contacts; sim to Methode 80 Series 6044-1155-00.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R801	3R77P104K	Composition: 0.10 megohm ±10%, 1/2 w.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S801	19B209261P12	Slide: 2 poles, 3 positions, .5 amp at 125 VDC or 3 amps at 125 VAC; sim to Swiftcraft 46313MDR.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB801 thru TB806	19C301086P12	Feed-thru, phen: 20 terminals; sim to GE CR151D.
TB807	19C301086P1	Feed-thru, phen: 3 terminals; sim to GE CR151D.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XDS801 thru XDS812	5495995P50	Lampholder: sim to Dialco 7538-600.
XF801	19B209005P1	Fuseholder: 15 amps at 250 v; sim to Littelfuse 342012.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	7160508P2	Nut, sheet spring. (Used with TB801-TB806).
	5495995P54	Lock washer: sim to Dialco 8101-000-0012-01. (Used with DS801-DS812).
	5495995P53	Nut, hex: sim to Dialco 4901-000-0012-01. (Used with DS801-DS812).
	5495995P52	Nut, knurled: sim to Dialco 2708-508-7538-00. (Used with DS801-DS812).
	5495995P51	Nut, knurled: sim to Dialco 5808-000-0012-04. (Used with DS801-DS812).

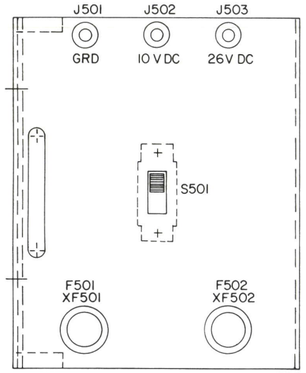
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

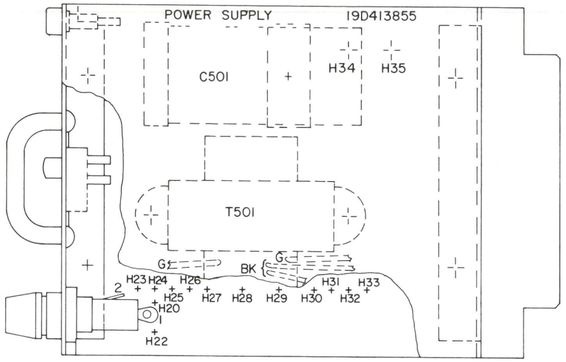


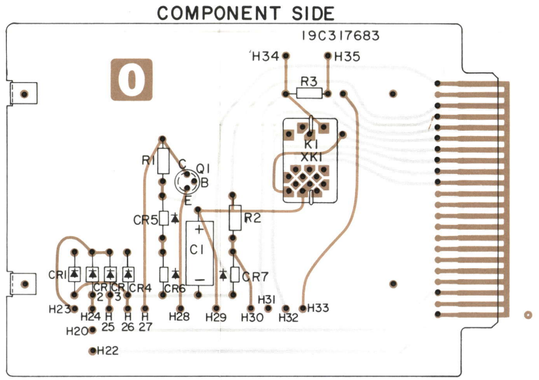
(19E500923, Rev. 2)

SCHEMATIC DIAGRAM

SHELF ASSEMBLY

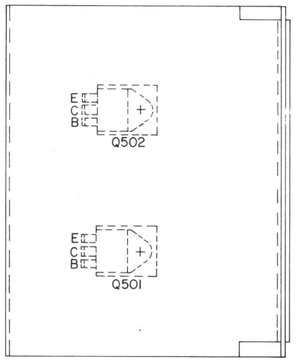


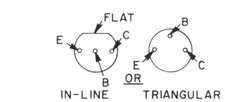




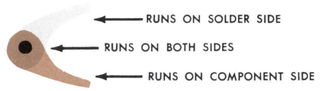
(19D416580, Rev. 0)
(19C317681, Sh. 1, Rev. 0)
(19C317681, Sh. 2, Rev. 0)

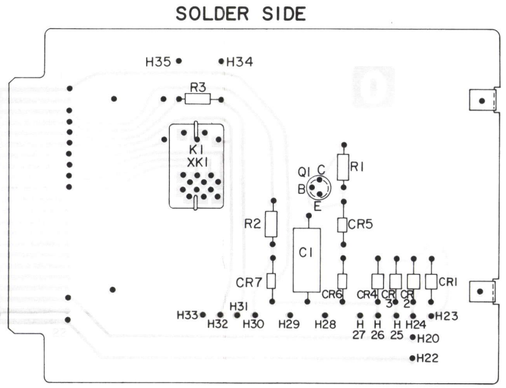
TERMINAL VIEW





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





(19D416580, Rev. 0)
(19C317681, Sh. 2, Rev. 0)

OUTLINE DIAGRAM

POWER SUPPLY MODULE

PARTS LIST

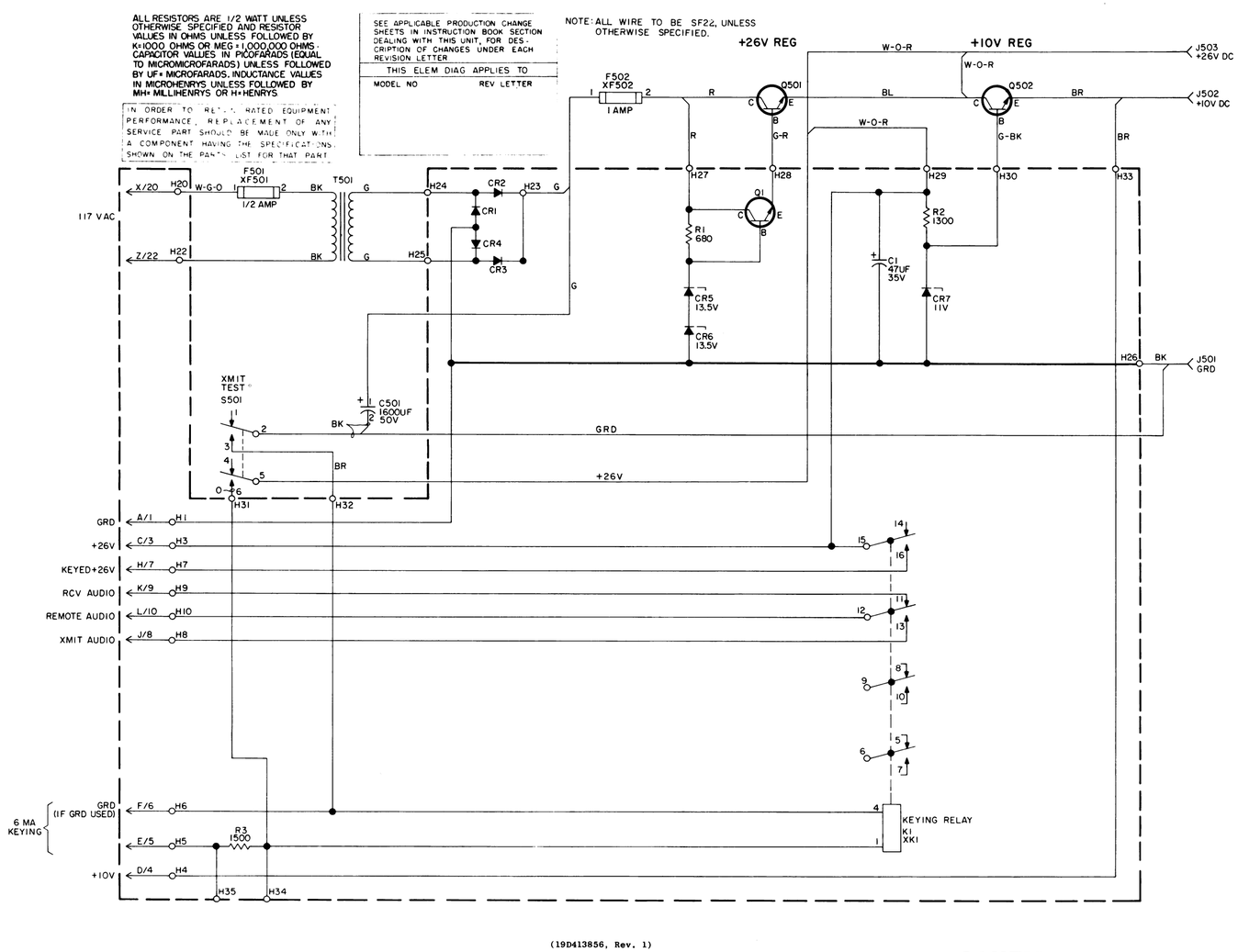
LBI-4330

POWER SUPPLY MODULE
19D413855G1

SYMBOL	GE PART NO.	DESCRIPTION
A501		COMPONENT BOARD 19C317683G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1	5496267P20	Tantalum: 47 µf ±20%, 35 VDCW; sim to Sprague Type 150D.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 thru CR4	4037822P1	Silicon.
CR5 and CR6	4036887P10	Silicon, Zener.
CR7	4036887P8	Silicon, Zener.
		- - - - - - - - - - RELAYS - - - - - - - - - -
K1	19C307010P10	Armature: 28 VDC nominal, 1.5 w max operating, 3480 ohms ±10% coil res, 3 form C contacts; sim to Allied Control TS-154-CC-C.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q1	19A115300P1	Silicon, NPN; sim to Type 2N3053.
		- - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P681K	Composition: 680 ohms ±10%, 1/2 w.
R2	3R77P132K	Composition: 1300 ohms ±10%, 1/2 w.
R3	3R77P152J	Composition: 1500 ohms ±5%, 1/2 w.
		- - - - - - - - - - SOCKETS - - - - - - - - - -
XK1	5491595P5	Relay: 16 contacts; sim to Allied Control 30054-2.
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C501	7476442P20	Electrolytic, twist-prong: 1600 µf +250-10%, 50 VDCW; sim to PR Mallory WP-068.
		- - - - - - - - - - FUSES - - - - - - - - - -
F501	7487942P3	Slow blowing: 1/2 amp at 250 v; sim to Bussmann MDL-1/2.
F502	1R16P3	Quick blowing, cartridge: 1 amp 250 v; sim to Littelfuse 312001 or Bussmann AGC 1.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J501	7150763P1	Jack, tip, stake-in: black nylon body, sim to Alden Products 110BC1.
J502	7150763P5	Jack, tip, stake-in: yellow nylon body, sim to Alden Products 110BC1.
J503	7150763P2	Jack, tip, stake-in: red nylon body, sim to Alden Products 110BC1.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q501 and Q502	19A116203P2	Silicon, NPN.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S501	19B209261P11	Slide: DPST, 2 poles, 2 positions, .5 amp VDC or 3 amp at 125 VAC; sim to Swiftcraft 46204MR.

SYMBOL	GE PART NO.	DESCRIPTION
T501	19B209188P1	- - - - - - - - - TRANSFORMERS - - - - - - - - - Power, step-down: Pri: 117 v, 50/60 Hz, Sec: 25.2 v, 1 amp.
XF501 and XF502	19B209005P1	- - - - - - - - - - SOCKETS - - - - - - - - - - Fuseholder: 15 amps at 250 v; sim to Littelfuse 342012.
	5491595P9	- - - - - - - - - MISCELLANEOUS - - - - - - - - - Retainer: spring; sim to Allied Control 30040-2. (Used with K1).
	7118719P7	Clip, spring tension: sim to Prestole E-50011-041. (Used with C501).
	19A122682P2	Handle.
	19A116023P2	Insulator, plate. (Used with Q501 and Q502).
	19A116022P1	Insulator, bushing. (Used with Q501 and Q502).

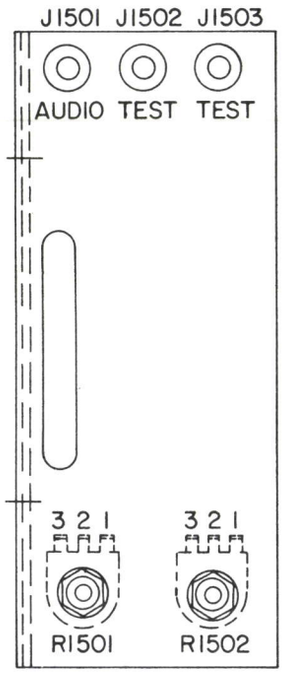
*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

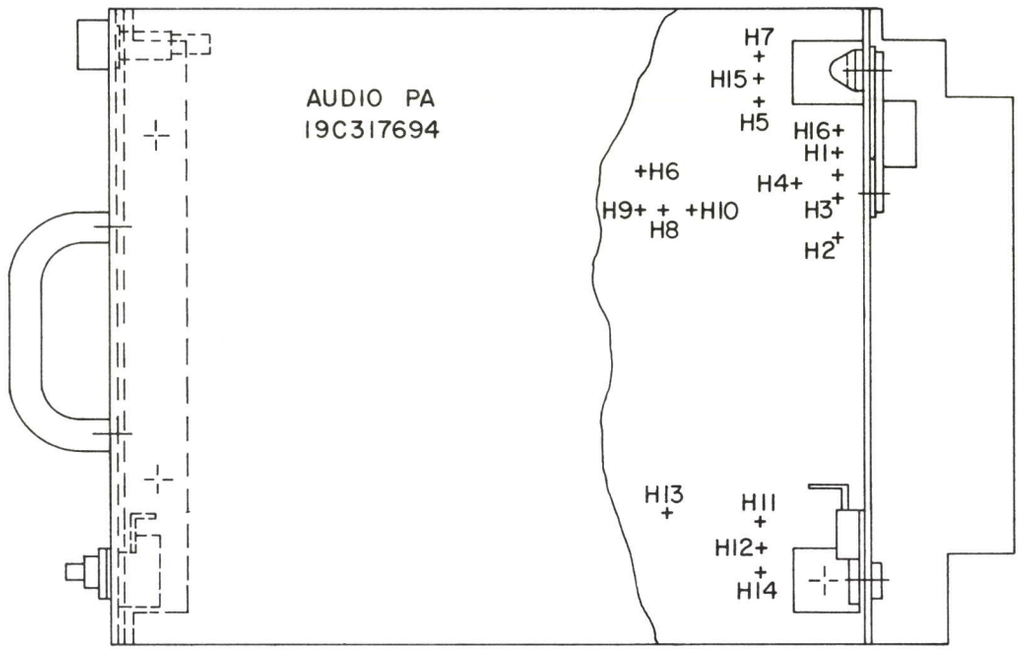


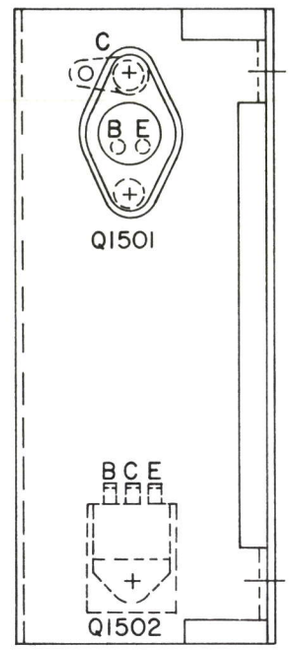
(19D413856, Rev. 1)

SCHEMATIC DIAGRAM

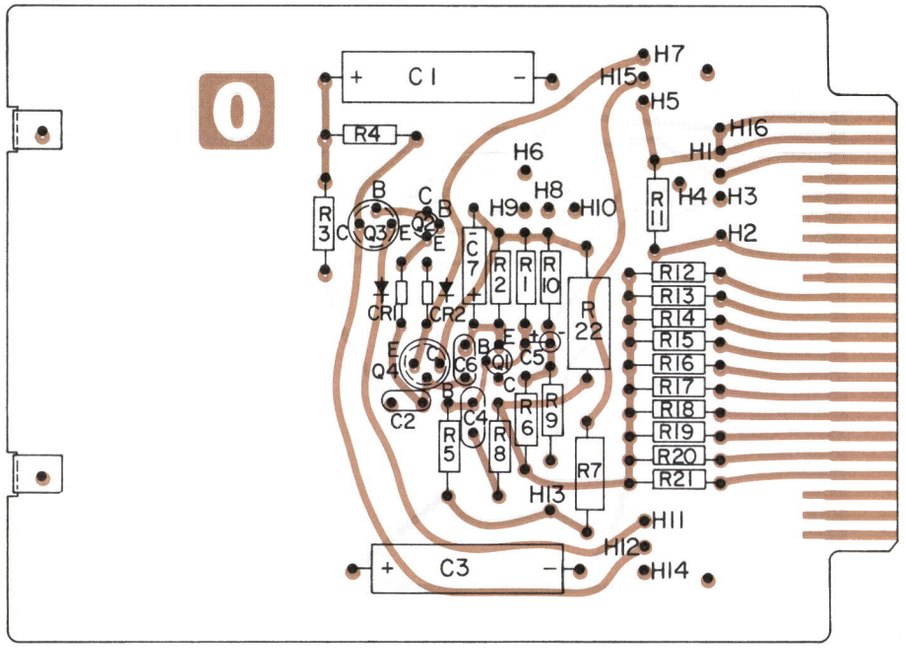
POWER SUPPLY MODULE





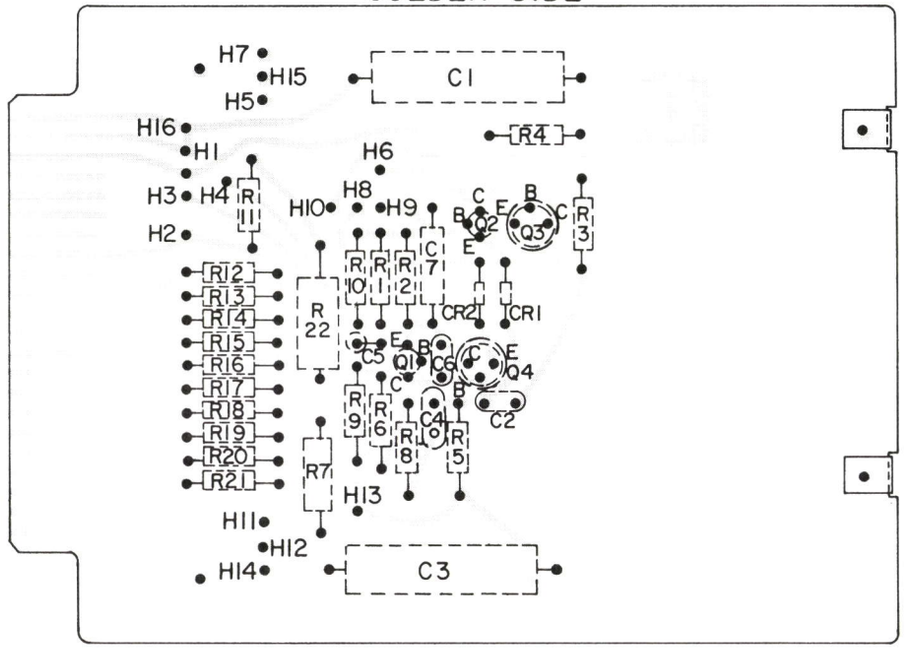


COMPONENT SIDE

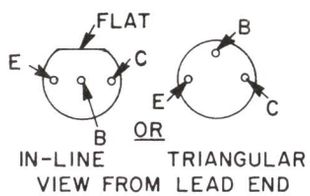


(19C320152, Rev. 0)
(19C317691, Sh. 1, Rev. 0)
(19C317691, Sh. 2, Rev. 0)

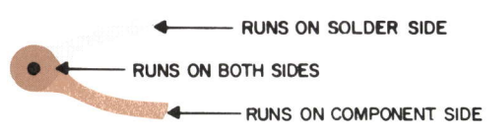
SOLDER SIDE



(19C320152, Rev. 0)
(19C317691, Sh. 2, Rev. 0)



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



OUTLINE DIAGRAM

AUDIO PA MODULE

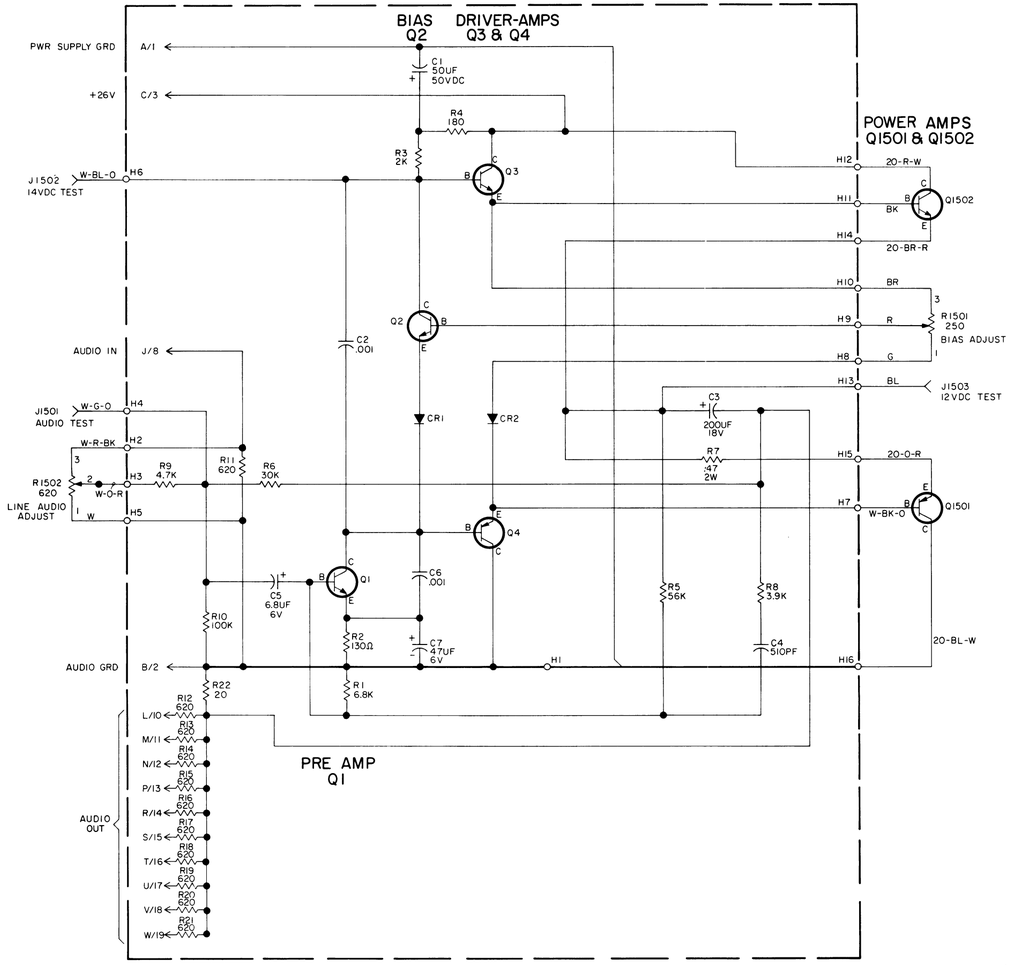
PARTS LIST

LBI-4327

AUDIO PA MODULE
19C317694G1

SYMBOL	GE PART NO.	DESCRIPTION
A1501		COMPONENT BOARD 19C317689G1
		- - - - - - - - - CAPACITORS - - - - - - - - -
C1	19A115680P6	Electrolytic: 50 µf +150% -10%, 50 VDCW; sim to Mallory Type TT.
C2	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C3	19A115680P10	Electrolytic: 200 µf +150% -10%, 18 VDCW; sim to Mallory Type TT.
C4	7489162P44	Silver mica: 510 pf ±5%, 300 VDCW; sim to Electro Motive Type DM-15.
C5	5496267P1	Tantalum: 6.8 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
C6	5494481P111	Ceramic disc: 1000 pf ±20%, 1000 VDCW; sim to RMC Type JF Discap.
C7	5496267P2	Tantalum: 47 µf ±20%, 6 VDCW; sim to Sprague Type 150D.
		- - - - - - - DIODES AND RECTIFIERS - - - - - -
CR1 and CR2	19A115250P1	Silicon.
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1	19A115362P1	Silicon, NPN; sim to Type 2N2925.
Q2	19A115123P1	Silicon, NPN; sim to Type 2N2712.
Q3	19A115300P1	Silicon, NPN; sim to Type 2N3053.
Q4	19A115706P1	Silicon, PNP; sim to Type 2N3638
		- - - - - - - - - RESISTORS - - - - - - - - -
R1	3R77P682K	Composition: 6800 ohms ±10%, 1/2 w.
R2	3R77P131J	Composition: 130 ohms ±5%, 1/2 w.
R3	3R77P202K	Composition: 2000 ohms ±10%, 1/2 w.
R4	3R77P181K	Composition: 180 ohms ±10%, 1/2 w.
R5	3R77P563K	Composition: 56,000 ohms ±10%, 1/2 w.
R6	3R77P303J	Composition: 30,000 ohms ±5%, 1/2 w.
R7	19B209022P7	Wirewound: 0.47 ohms ±5%, 2 w; sim to IRC Type BWH.
R8	3R77P392K	Composition: 3900 ohms ±10%, 1/2 w.
R9	3R77P472K	Composition: 4700 ohms ±10%, 1/2 w.
R10	3R77P114K	Composition: 0.11 megohm ±10%, 1/2 w.
R11 thru R21	3R77P621J	Composition: 620 ohms ±5%, 1/2 w.
R22	3R79P200J	Composition: 20 ohms ±5%, 2 w.
		- - - - - - - JACKS AND RECEPTACLES - - - - - -
J1501	7150763P4	Jack, tip, stake-in: green nylon body, sim to Alden Products 110BC1.
J1502	7150763P5	Jack, tip, stake-in: yellow nylon body, sim to Alden Products 110BC1.
J1503	7150763P6	Jack, tip, stake-in: blue nylon body, sim to Alden Products 110BC1
		- - - - - - - - - TRANSISTORS - - - - - - - - -
Q1501	19A115792P1	Silicon, PNP.
Q1502	19A116203P2	Silicon, NPN.
		- - - - - - - - - RESISTORS - - - - - - - - -
R1501	19C300124P15	Variable, carbon film: 200 ohms ±20%, 1/8 w; sim to PR Mallory MLC.
R1502	19C300124P10	Variable, carbon film: 10,000 ohms ±20%, 1/8 w; sim to PR Mallory MLC.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4036555P1	Insulator, washer: nylon. (Used with Q3).
	4036994P1	Terminal, solder: sim to Zierick Mfg Corp 505. (Used with Q1501).
	19A116022P1	Insulator, bushing. (Used with Q1502).
	19A116023P2	Insulator, plate. (Used with Q1502).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



(19D413862, Rev. 2)

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

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

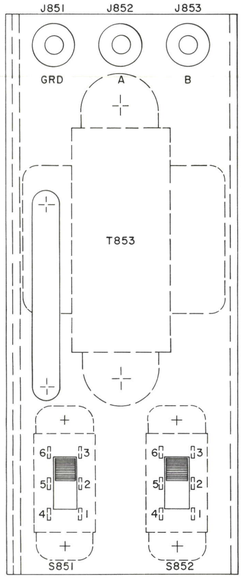
THIS ELEM DIAG APPLIES TO

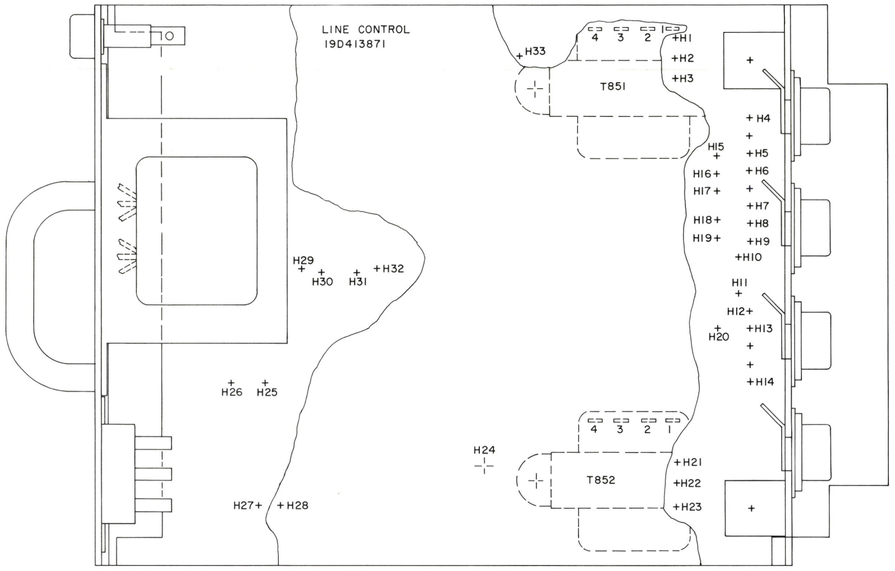
MODEL NO. REV LETTER

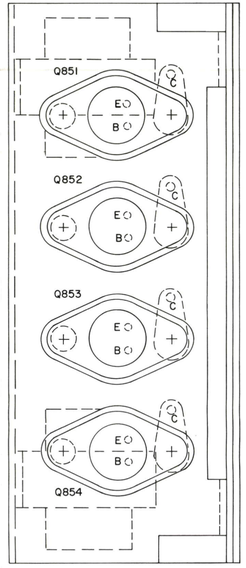
NOTE: ALL WIRE TO BE SF-22 UNLESS OTHERWISE SPECIFIED.

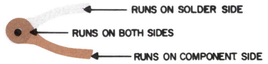
SCHEMATIC DIAGRAM

AUDIO PA MODULE

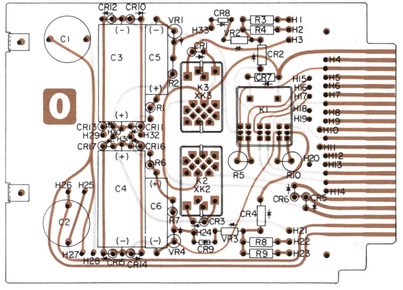






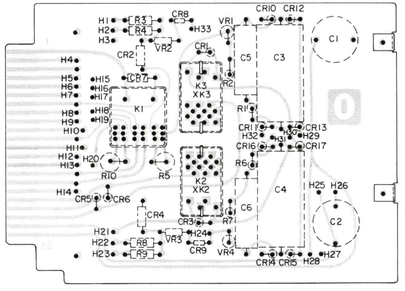


COMPONENT SIDE



(19D416588, Rev. 0)
(19C317701, Sh. 1, Rev. 0)
(19C317701, Sh. 2, Rev. 0)

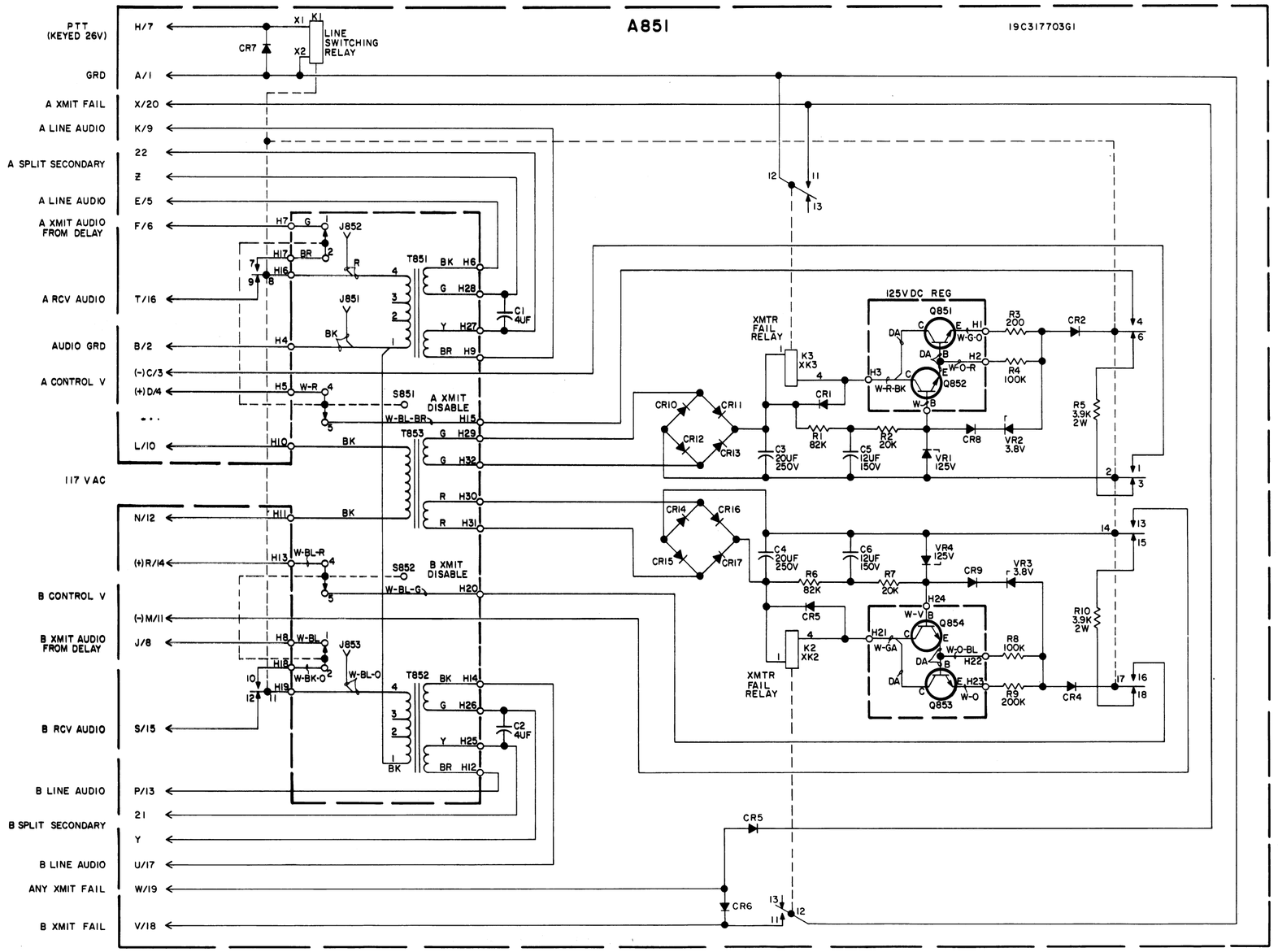
SOLDER SIDE



(19D416588, Rev. 0)
(19C317701, Sh. 2, Rev. 0)

OUTLINE DIAGRAM

LINE CONTROL MODULE



(19D413884, Rev. 1)

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.

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

NOTE: ALL WIRE TO BE SF22, UNLESS OTHERWISE SPECIFIED.

SCHEMATIC DIAGRAM

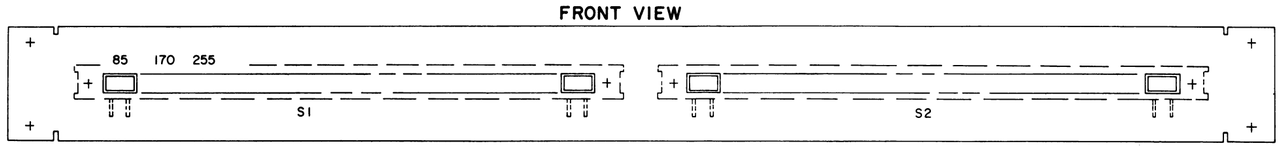
LINE CONTROL MODULE

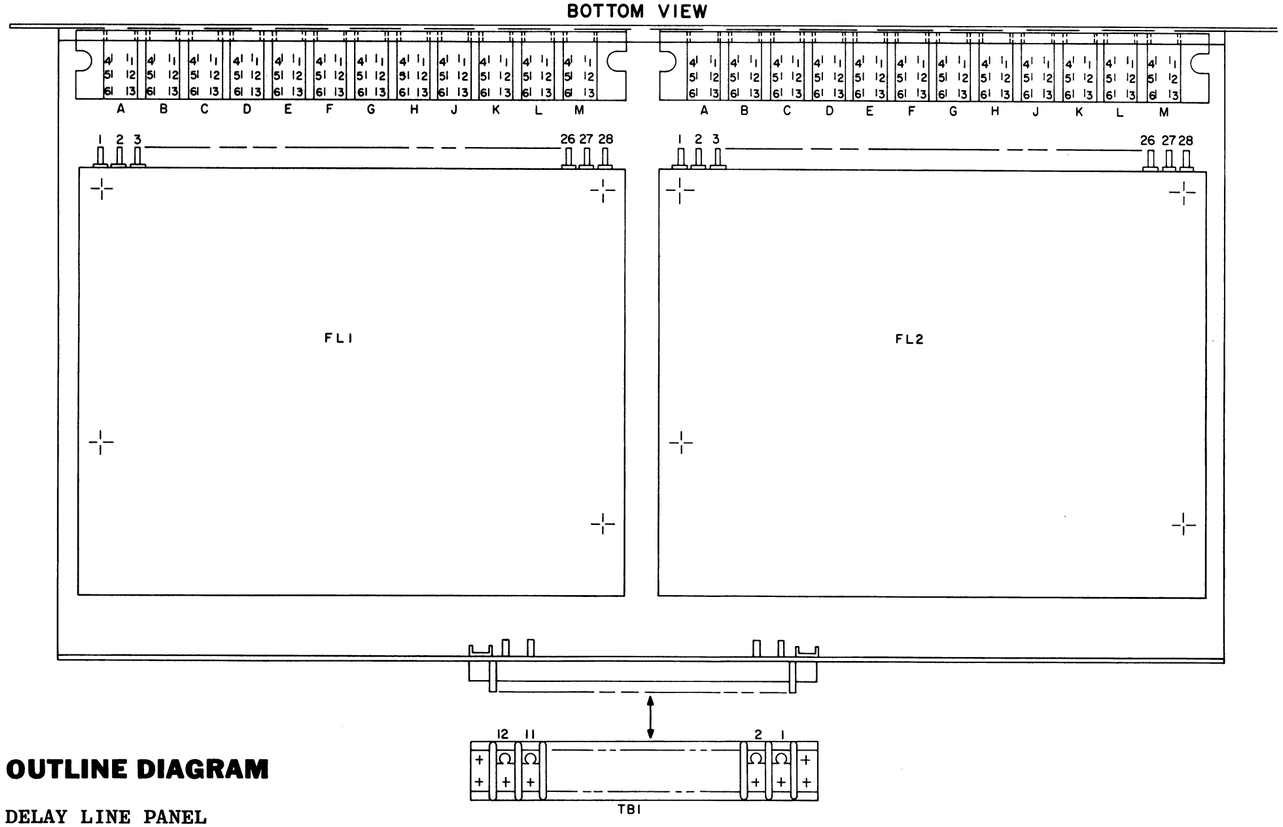
PARTS LIST

LBI-4328

LINE CONTROL MODULE
19D413871G1

SYMBOL	GE PART NO.	DESCRIPTION
A851		COMPONENT BOARD 19C317703G1
		- - - - - - - - - - CAPACITORS - - - - - - - - - -
C1 and C2	7486445P5	Electrolytic, non polorized: 4 µf +250% -10%, 50 VDCW.
C3 and C4	7774846P24	Ceramic disc: 180 pf ±10%, 500 VDCW, temp coef 0 PPM.
C5 and C6	19A115680P15	Electrolytic: 12 µf +150% -10%, 150 VDCW; sim to Mallory Type TT.
		- - - - - - - - DIODES AND RECTIFIERS - - - - - - -
CR1 thru CR7	4037822P1	Silicon.
CR8 and CR9	19A115250P1	Silicon.
CR10 thru CR17	4037822P1	Silicon.
		- - - - - - - - - - - - RELAYS - - - - - - - - - -
K1	19B209375P6	Armature: 1150 ohms ±10% coil res, 28 VDC nominal; sim to CP Clare LB-0060J00.
K2 and K3	19C307010P11	Armature: 30 VDC nominal, 1.5 w max operating, 1550 ohms ±10% coil res, 1 form A, 1 form C, 1 form D contacts; sim to Allied Control T154-X631.
		- - - - - - - - - - - RESISTORS - - - - - - - - - -
R1	3R77P823J	Composition: 82,000 ohms ±5%, 1/2 w.
R2	3R77P203J	Composition: 20,000 ohms ±5%, 1/2 w.
R3	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R4	3R77P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R5	3R79P392J	Composition: 3900 ohms ±5%, 2 w.
R6	3R77P823J	Composition: 82,000 ohms ±5%, 1/2 w.
R7	3R77P203J	Composition: 20,000 ohms ±5%, 1/2 w.
R8	3R77P104J	Composition: 0.10 megohm ±5%, 1/2 w.
R9	3R77P161J	Composition: 160 ohms ±5%, 1/2 w.
R10	3R79P392J	Composition: 3900 ohms ±5%, 1/2 w.
		- - - - - - - - VOLTAGE REGULATORS - - - - - - - -
VR1	19A115528P28	Silicon, Zener.
VR2 and VR3	4036887P3	Silicon, Zener.
VR4	19A115528P28	Silicon, Zener.
		- - - - - - - - - - - SOCKETS - - - - - - - - - - -
XK2 and XK3	5491595P7	Relay: 10 contacts; sim to Allied Control 30054-4.
		- - - - - - - - JACKS AND RECEPTACLES - - - - - - -
J851	7150763P1	Jack, tip, stake-in: black nylon body, sim to Alden Products 110BC1.
J852	7150763P5	Jack, tip, stake-in: yellow nylon body, sim to Alden Products 110BC1.
J853	7150763P6	Jack, tip, stake-in: blue nylon body, sim to Alden Products 110BC1.
		- - - - - - - - - - TRANSISTORS - - - - - - - - - -
Q851 thru Q854	19A115783P1	Silicon, NPN.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S851 and S852	19B209261P8	Slide: DPDT, 2 poles, 2 positions, .5 amp VDC or 3 amps at 125 VAC; sim to Switcraft 462066.
		- - - - - - - - - - TRANSFORMERS - - - - - - - - - -
T851 and T852	19A115731P1	Audio freq: 300 to 6000 Hz, Pri (1-4): 22 ohms ±15% DC res, Pri (2-3): 12.5 ohms ±15% DC res, Sec 1: 13 ohms ±15%, Sec 2: 13 ohms ±15%.
T853	19A116527P1	Power, step-up: Pri: 117 VRMS, 50/60 Hz, Sec 1: 160 ±5 VDC at 0.018 amps, Sec 2: 160 ±5 VDC at 0.018 amps.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	4036994P1	Terminal, solder: sim to Zierick Mfg Corp 505. (Used with Q851-Q854).
	5491595P9	Retainer: spring; sim to Allied Control 30040-2. (Used with K2 and K3).





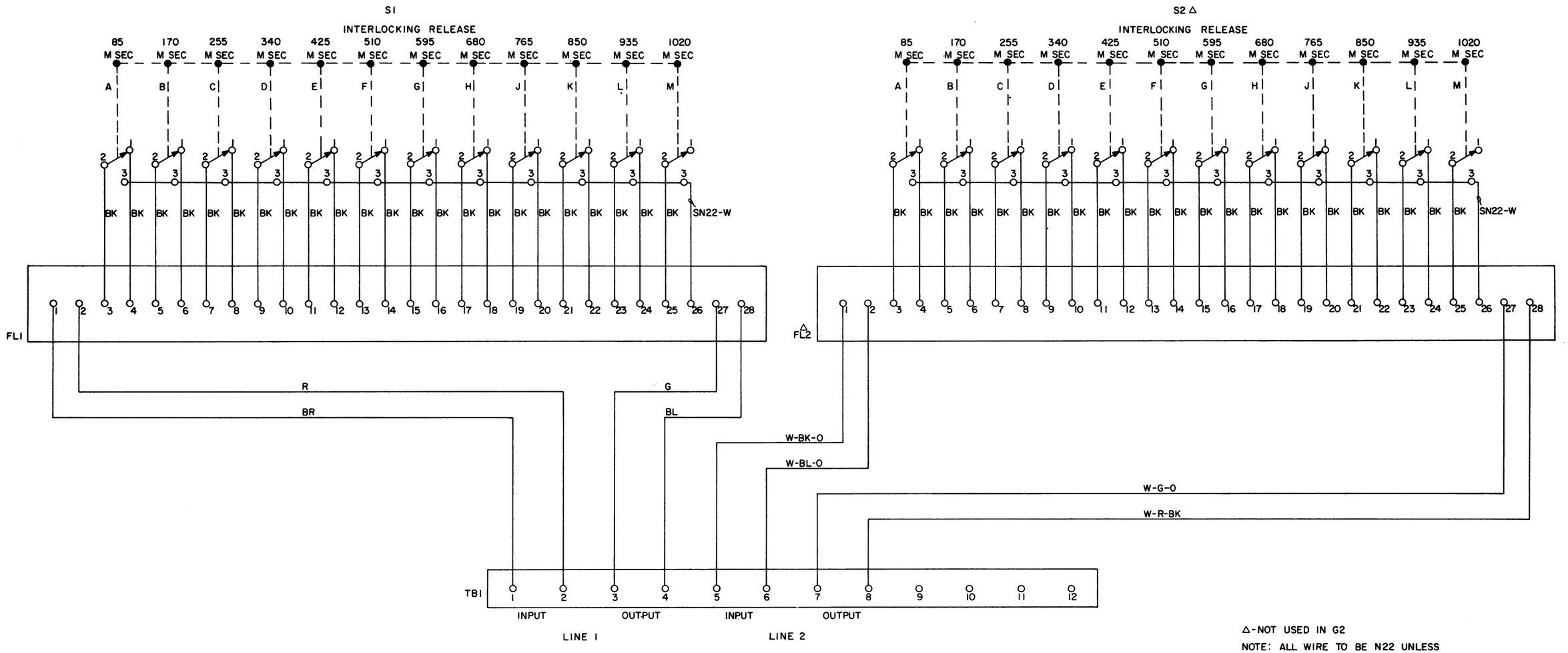
OUTLINE DIAGRAM

DELAY LINE PANEL

Issue 1

(19D416568, Rev. 0)

 *COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES



△-NOT USED IN G2

NOTE: ALL WIRE TO BE N22 UNLESS OTHERWISE SPECIFIED.

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

(19D413891, Rev. 0)

SCHEMATIC DIAGRAM

DELAY LINE PANEL

Issue 1

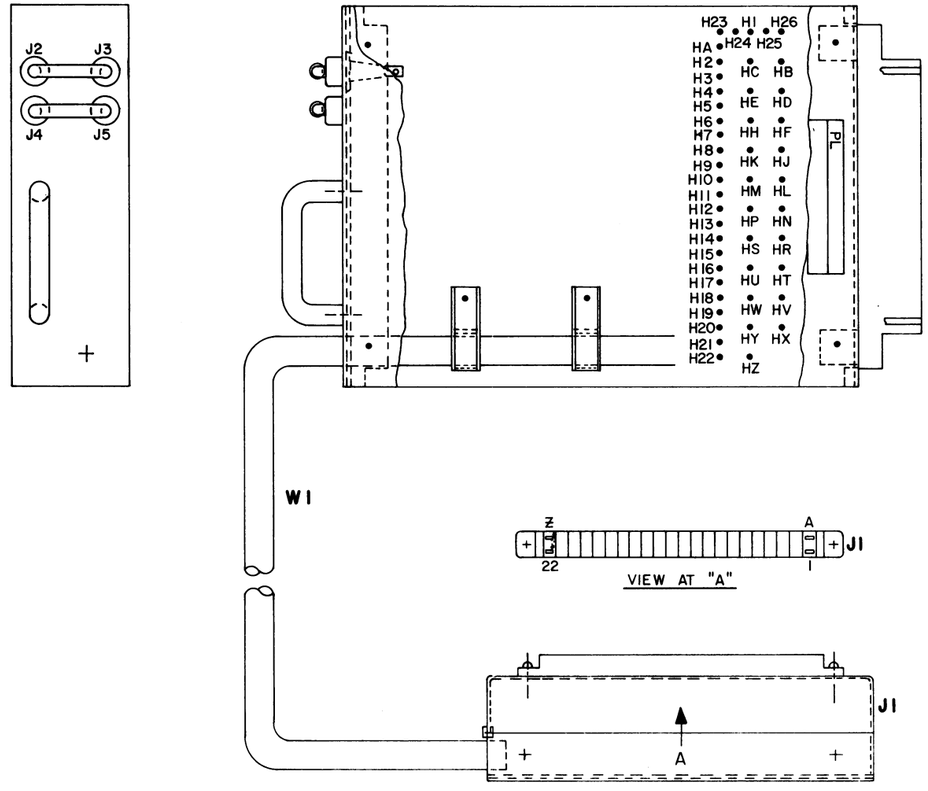
PARTS LIST

LBI-4329

DELAY LINE PANEL
19D413893G1-G2

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - - - FILTERS - - - - - - - - - -
FL1 and FL2	19D403033G1	Delay Line Filter: 900 Hz.
		- - - - - - - - - - SWITCHES - - - - - - - - - -
S1 and S2	19B209443P1	Push: 12 stations, DPDT; sim to Switchcraft XM40226.
		- - - - - - - - - TERMINAL BOARDS - - - - - - - - -
TB1	19C301086P8	Feed-thru, phen: 12 terminals; sim to GE CR151D.
		- - - - - - - - - - MISCELLANEOUS - - - - - - - - - -
	7160508P2	Nut, sheet spring: sim to Tinnerman C1356-632-157. (Used to secure TB1).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES.



(19C320041, Rev. 0)

OUTLINE DIAGRAM

EXTENDER BOARD ASSEMBLY

Issue 1

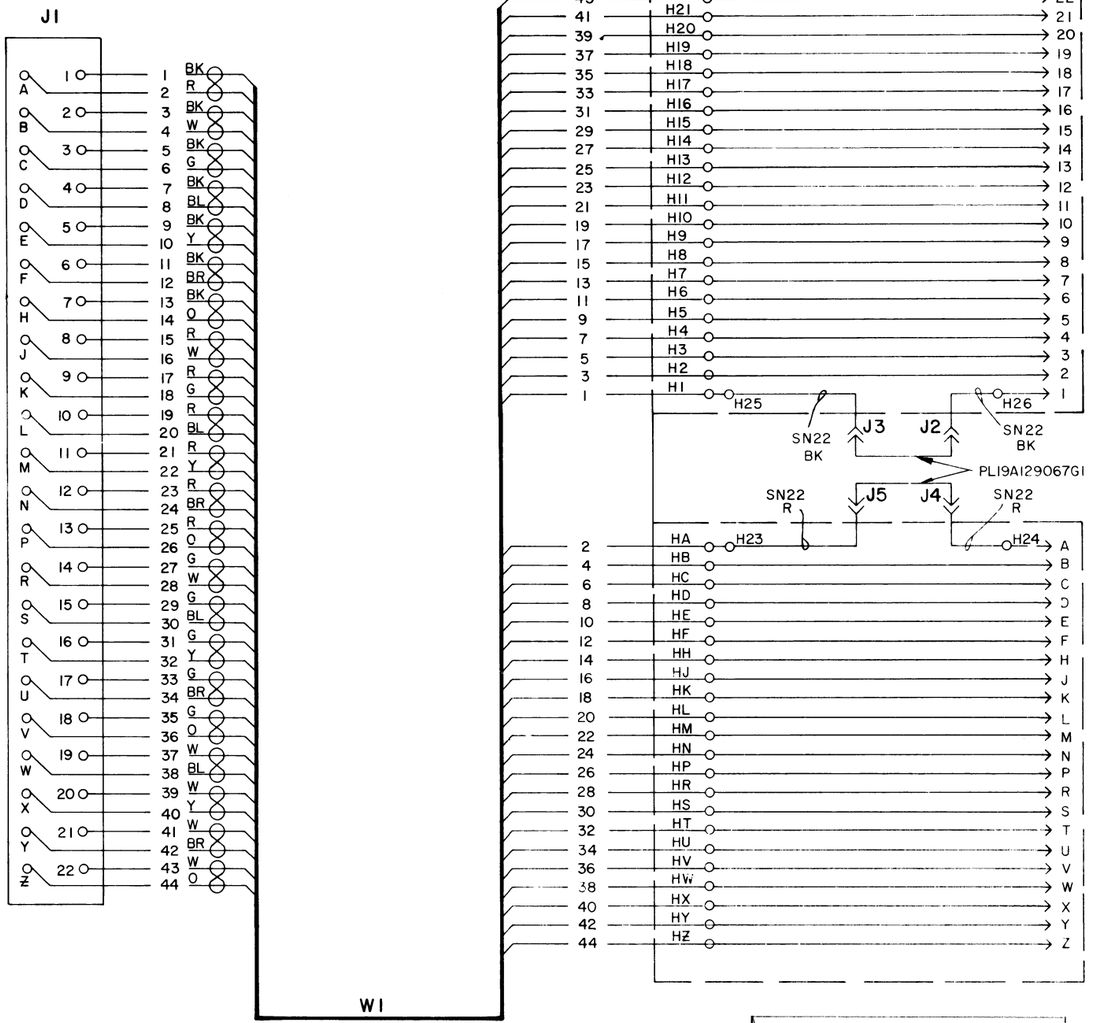
PARTS LIST

LBI-4309

EXTENDER BOARD
19C317762G1

SYMBOL	GE PART NO.	DESCRIPTION
		- - - - - - - - JACKS AND RECEPTACLES - - - - - -
J1		(Part of W1).
J2 and J3	7150763P4	Jack, tip, stake-in: green nylon body, sim to Alden Products 110BC1.
J4 and J5	7150763P6	Jack, tip, stake-in: blue nylon body, sim to Alden Products 110BC1
		- - - - - - - - - - - CABLES - - - - - - - - - - -
W1	19C317973G1	Cable: approx 6 feet long, includes (J1) 5496085P4.
		- - - - - - - - - MISCELLANEOUS - - - - - - - - -
	19A122682P2	Handle.
	4029851P15	Clip, loop. (Used with W1).
	19A129067G1	Jumper. (Located between J2-J3 and J4-J5).

*COMPONENTS ADDED, DELETED OR CHANGED BY PRODUCTION CHANGES

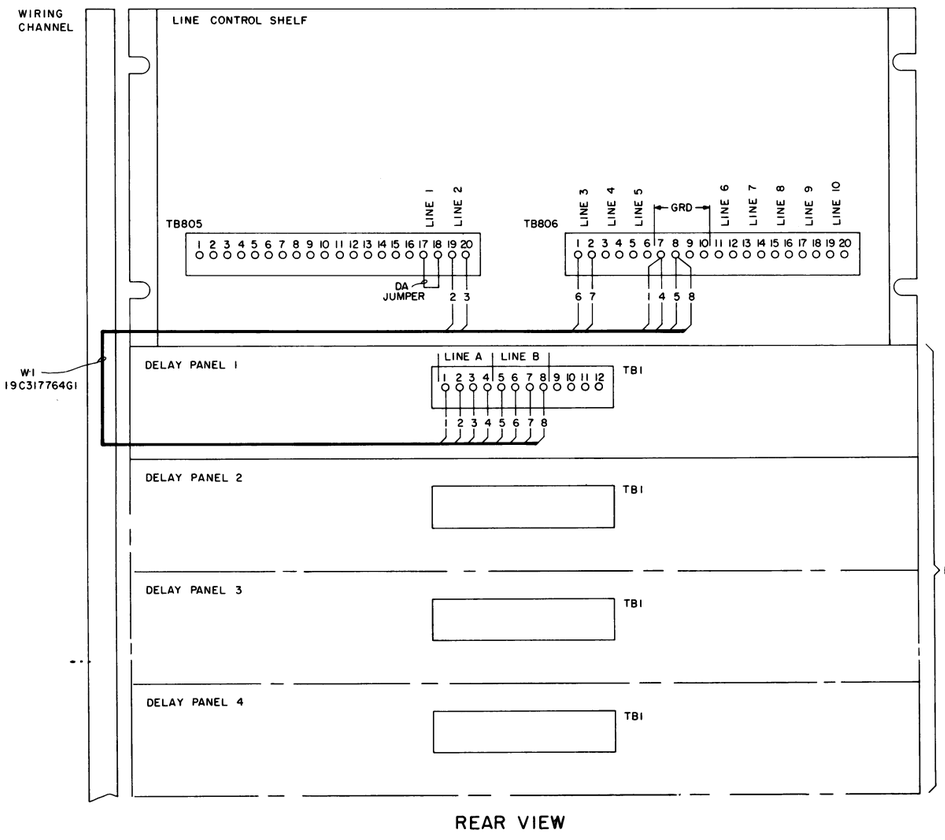


(19C317760, Rev. 2)

SCHEMATIC DIAGRAM

EXTENDER BOARD ASSEMBLY

Issue 1



FACTORY INTERCONNECT INSTRUCTIONS:

1. AN INTERCONNECT HARNESS (W1) IS SUPPLIED WITH EACH DELAY PANEL.
2. CONNECT THE HARNESS SUPPLIED WITH DELAY PANEL #1 AS SHOWN. (LINES #2 & 3) CONNECT A DA JUMPER BETWEEN TB805-17 AND 18.
3. FOR EACH SUCCESSIVE HARNESS USED, CONNECT ONE END TO ITS RESPECTIVE DELAY PANEL (CONNECTIONS SAME AS ON DELAY PANEL #1) AND THE OTHER END AS LISTED BELOW:

ALL WIRES NUMBERED	CONNECT TO
1,4,5 AND 8	TB806-7,8,9 OR 10

A- DELAY PANEL #2 (LINES #4 & 5)

WIRE #	TO
2	TB806-3
3	TB806-4
6	TB806-5
7	TB806-6

B- DELAY PANEL #3 (LINES #6 & 7)

WIRE #	TO
2	TB806-11
3	TB806-12
6	TB806-13
7	TB806-14

C- DELAY PANEL #4 (LINES 8 & 9)

WIRE #	TO
2	TB806-15
3	TB806-16
6	TB806-17
7	TB806-18

D- DELAY PANEL #5 (LINE 10)

WIRE #	TO
2	TB806-19
3	TB806-20
6	CLIP OFF
7	CLIP OFF

4. IF OPTIONAL DELAY PANELS ARE ORDERED MOUNT THEM IMMEDIATELY BELOW THE LAST DELAY PANEL. DO NOT CORRECT THE INTERCONNECT HARNESS SUPPLIED WITH THE OPTIONAL DELAY PANEL. THIS WILL BE CONNECTED AFTER THE FIELD REQUIREMENTS ARE DETERMINED.
5. IF A SINGLE SECTION DELAY PANEL IS USED, CLIP OFF HARNESS WIRES 5, 6, 7 & 8 AT BOTH ENDS OF THE HARNESS ASSOCIATED WITH THAT DELAY PANEL. THE SINGLE SECTION DELAY PANEL IS TO BE USED FOR THE LAST LINE.

PLI9D413893G1 OR G2

(19D413926, Sh. 1, Rev. 1)

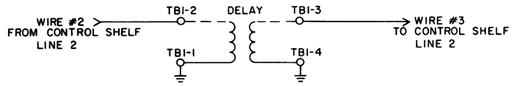
FIELD INSTRUCTIONS (CASCADING DELAY LINES)

THE CONTROL UNIT IS SHIPPED WITH LINE #1 STRAPPED FOR USE WITH NO DELAY INSERTION. THE JUMPER ACROSS TB805-17 & 18 DOES THIS. LINE #1 SHOULD BE CONNECTED TO THE TRANSMITTER THAT IS ELECTRICALLY THE FARTHEST FROM THE CONTROL UNIT.

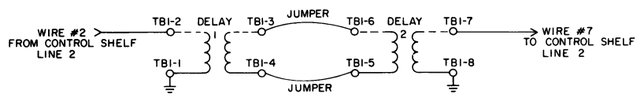
A SINGLE DELAY SECTION (UP TO 1 MSEC. DELAY) IS CONNECTED IN EACH SUCCESSIVE LINE. IF MORE THAN 1 MSEC. DELAY IS REQUIRED IN ANY GIVEN LINE, 2 DELAY SECTIONS CAN BE CASCADED TO GIVE UP TO 2 MSEC. DELAY. THIS CAN BE DONE BY CLIPPING (FROM W1) WIRES 3, 4, 5 AND 6 AT THE CONTROL SHELF. BE SURE THE WIRES 3 & 6 THAT ARE CLIPPED FROM THE CONTROL SHELF END ARE THOSE ASSOCIATED WITH THE DELAY PANEL UNDER CONSIDERATION. PLACE JUMPERS AT THE DELAY PANEL ACROSS 3 & 6 AND ACROSS 4 & 5. AT THE CONTROL SHELF MOVE WIRE #7 TO THE TERMINAL PREVIOUSLY OCCUPIED BY WIRE #3.

IT MUST BE REMEMBERED THAT THIS PROCEDURE HAS LEFT THE NEXT SUCCESSIVE LINE WITHOUT A DELAY PANEL ATTACHED. A NEW DELAY PANEL MUST BE INSERTED IN THIS LINE USING THE FACTORY INTERCONNECTION INSTRUCTIONS AS A GUIDE.

TYPICAL SINGLE DELAY SECTION FOR LINE #2



TYPICAL CASCADING DELAY SECTIONS FOR LINE #2



(19D413926, Sh. 2, Rev. 1)

FIELD EXPANSION NOTES

1. TO ADD A SINGLE LINE TO AN ODD NUMBER OF LINES (THAT IS TO A SYSTEM ALREADY USING 3, 5, 7 OR 9 LINES).
   A. NO ADDITIONAL LINE CONTROL MODULE NEEDED.
   B. CONNECT SINGLE SECTION DELAY PANEL (USING INTERCONNECT HARNESS SUPPLIED) AS FOLLOWS.
      1. CLIP OFF AT BOTH ENDS OF HARNESS (WIRES 5, 6, 7 & 8).
      2. CONNECT TO TB806-7, 8, 9 OR 10 (WIRES 5 & 8).
      3. FOR LINE #4

WIRE #	TO
2	TB806-3 & TBI-2
3	TB806-4 & TBI-3

      4. FOR LINE #6

WIRE #	TO
2	TB806-11 & TBI-2
3	TB806-12 & TBI-3

      5. FOR LINE #8

WIRE #	TO
2	TB806-15 & TBI-2
3	TB806 16 & TBI-3

      6. FOR LINE #10

WIRE #	TO
2	TB806-19 & TBI-2
3	TB806-20 & TBI-3

2. TO ADD A SINGLE LINE TO AN EVEN NUMBER OF LINES (THAT IS TO A SYSTEM ALREADY USING 2, 4, 6 OR 8 LINES).
   A. INSTALL THE LINE CONTROL MODULE PER APPLICATION ASM. 19D413936.
   B. CONNECT THE SINGLE SECTION DELAY PANEL PROVIDED PER THE FACTORY INTERCONNECT INSTRUCTIONS FOR THE PARTICULAR LINE INVOLVED.
3. TO ADD 2 LINES OR ANY MULTIPLE THEREOF TO AN ODD NUMBER OF LINES (THAT IS TO A SYSTEM ALREADY USING 3, 5, OR 7 LINES).
   A. INSTALL LINE CONTROL MODULES PER APPLICATION ASM. 19D413936.
   B. DISCONNECT THE SINGLE SECTION DELAY PANEL (ALREADY IN SYSTEM) AND ITS ASSOCIATED INTERCONNECT HARNESS. SAVE THIS PANEL & HARNESS FOR THE LAST LINE USED.
   C. INSTALL DELAY PANELS AND INTERCONNECT HARNESSES PER FACTORY INTERCONNECT INSTRUCTIONS.
4. TO ADD 2 LINES OR ANY MULTIPLE THEREOF TO AN EVEN NUMBER OF LINES (THAT IS TO A SYSTEM ALREADY USING 2, 4, 6 OR 8 LINES).
   A. INSTALL LINE CONTROL MODULES PER APPLICATION ASM. 19D413936.
   B. CONNECT DELAY PANELS PER FACTORY INTERCONNECT INSTRUCTIONS USING INTERCONNECT HARNESSES PROVIDED.
5. TO ADD A COMBINATION OF (2 LINE OPTIONS) AND (SINGLE LINE OPTIONS), INSTALL THE (2 LINE OPTIONS) FIRST PER THE APPROPRIATE NOTE, THEN ADD THE (SINGLE LINE OPTION) PER THE APPLICABLE NOTE.

INTERCONNECTION DIAGRAM

DELAY LINE PANEL INSTALLATION

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.

DF-9028

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GENERAL ELECTRIC COMPANY • LYNCHBURG, VIRGINIA 24502

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