



Electro-Voice®
**ELX-1R BROADCAST
MIXER**

220 → 110V AC INLET

OWNER'S MANUAL

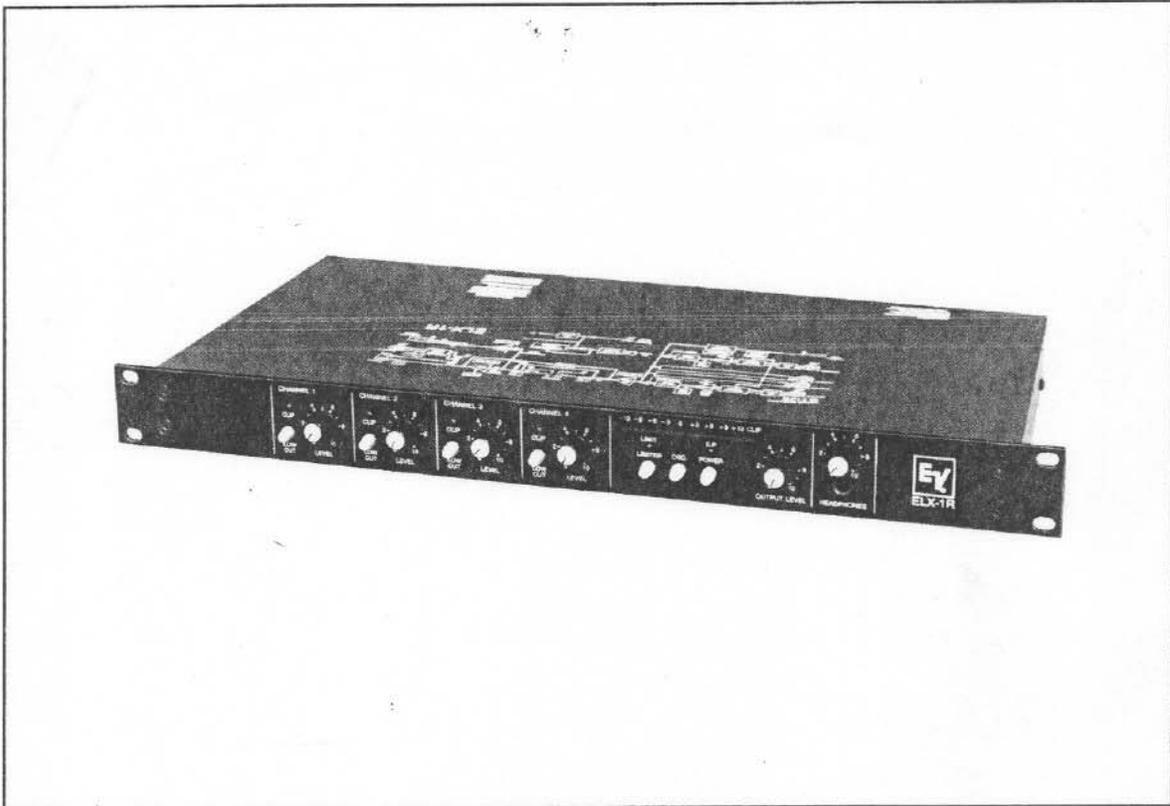


TABLE OF CONTENTS

FEATURES/DESCRIPTION.....	1
SPECIFICATIONS.....	2
BLOCK DIAGRAM.....	4
OPERATION.....	5
CALIBRATION.....	7
INPUT LEVEL CONTROLS.....	7
DISPLAY.....	7
LIMITER.....	7
OSCILLATOR.....	7
INSTALLATION.....	8
INPUT CONNECTIONS.....	8
HEADPHONE OUTPUT.....	8
EXTERNAL DC POWER SOURCE.....	8
STACKING JACKS.....	8
MAIN OUTPUTS.....	10
AUXILIARY INPUT.....	10
SCHEMATICS.....	11
PRINTED CIRCUIT BOARD LAYOUTS.....	14
SERVICE INFORMATION.....	15
WARRANTY.....	16

WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS EQUIPMENT TO RAIN OR MOISTURE.

FEATURES

- * Input circuit design incorporates RF filters and a balanced transformerless design for flat-frequency response, low distortion and low noise.
- * Space-saving compact design uses only one rack space (1.75 in.).
- * Ten-segment, three-color LED bargraph meter shows peak output level and has a clip indicator. Can be converted internally to VU characteristics.
- * Switchable low distortion 1-kHz sine-wave oscillator facilitates level calibration.
- * Output limiter prevents clipping. Yellow LED lights when limiting action occurs.
- * Input controls set gain of preamplifiers for optimum noise performance with any input signal.
- * LED indicator at each input lights if clipping occurs.
- * Headphone output, with separate power amplifier and level control, can drive headphones or a cue speaker.
- * Low-frequency cut controls for each input attenuate the low-frequency response.
- * Powerable from ac line or external dc source.
- * A single 3-pin female XLR-type connector accepts microphone and line-level inputs via a mic/line switch.
- * Switchable 30-volt phantom power is available at microphone inputs.
- * Two stacking jacks are provided for interconnection with additional mixers, and can also be modified for insert patching.
- * Auxiliary Input jack is provided for a fifth input or for stacking additional mixers.

DESCRIPTION

The ELX-1R is a compact, high-performance audio mixer designed for professional applications where reliable operation and clean sound are important. With its long list of features, it is extremely versatile and suitable for broadcast, P.A., recording or film productions. The ELX-1R mounts in a single rack space.

An LED bargraph display allows easy monitoring of the mixer's operation. The display shows the mixer's output level, as well as acting as a clip indicator. The time constants of the display can correspond to actual signal voltage, or can be altered to match the time constants of a VU meter. The display will then correlate with perceived loudness.

A limiter protects the output from clipping distortion which might otherwise occur during unexpected increases in program level. A yellow LED lights when limiting action occurs. The limiter threshold may be set for levels from +4 dBu to +14 dBu.

The mixer can accept a wide variety of mic and line-level inputs. Phantom power is available at the microphone inputs to power condenser-type microphones.

The low-frequency response of the inputs may be attenuated by enabling a low-frequency cut control located on the front panel.

Stacking jacks are provided for connecting additional mixers, as well as for insert patching. A fifth input may be connected to the Aux In jack.

Two independent transformer-isolated outputs may be accessed through a 3-pin male XLR-type connector or binding posts. The XLR connector is for both mic and line-level outputs, while the binding posts are for line-level inputs only.

The mixer may be powered through an ac outlet or an external 30-volt dc supply, with automatic switchover in the event of an ac power failure.

SPECIFICATIONS

Frequency Response,

Any input to any output:

30 Hz-20 kHz +0, -1 dB

THD,

Any output:

20 Hz-20 kHz at +4 dBu < .15%

50 Hz-20 kHz at +18 dBu < .15%

Stack or Headphone Output:

20 Hz-20 kHz at +18 dBu < .1%

Noise,

EIN, MIC Input, Max Gain, 150-ohm Source:

-129 dBu (typ)

Output Noise,

Inputs Down, Master Down:

< -80 dBu

Inputs Down, Master at Nominal:

< -78 dBu

Inputs Down, Master at Full Up:

< -65 dBu

Maximum Voltage Gain (± 2 dB),

Mic Input to Main Outputs:

91 dB

Mic Input to Headphone Output:

82 dB

Mic Input to Stack Output:

63 dB

Common Mode Rejection:

60 dB, 20 Hz-20 kHz (typ)

Phantom Power:

30 Vdc, 3.6 K Equivalent Source Resistance,

Mic Input Only

Low-Cut Filters

Slope

6 dB/octave

Corner Frequency:

100 Hz

Clip LED's:

Light 1 dB below clipping, follow supply voltage

Limiter Threshold (Changeable - see page 15):

+14 dBu

Oscillator,

Frequency:

1 kHz

Sine-Wave Distortion:

< 1.5%

Display (Changeable to VU - see page 15),

Range:

-12 dBu to clipping

Rise Time:

10 ms

Fall Time:

3 s

Shorting Protection:

Any output may be shorted indefinitely without causing damage

Operating Temperature Range:

-20°C to +60°C (-4°F to 140°F)

Power Requirement,

AC:

120 Vac, 60 Hz

External DC:

24-45 Vdc, 100 mA maximum

Enclosure:

Dark gray painted metal with white graphics

Dimensions:

Height:

4.45 cm (1.75 in.)

Depth:

20.96 cm (8.25 in.)

Width:

48.26 cm (19.00 in.)

Net Weight:

3.36 kg (7.4 lb)

INPUT SPECIFICATIONS

Input Impedance,

Mic:

3,500 ohms

Line:

30,000 ohms

Aux:

15,000 ohms

Stacking:

2,000 ohms

Stacking, Modified¹:

22,000 ohms

Nominal Source Impedance,

Mic:

300 ohms

Stack:

2,000 ohms

Nominal Level,

Mic:

-50 dBu
Line:
 -10 dBu
Aux:
 -10 dBu
Stacking:
 -10 dBu
Stacking, Modified¹:
 -10 dBu
Maximum Level,
Mic:
 -5 dBu
Line:
 +35 dBu
Aux:
 +18 dBu
Stacking:
 +18 dBu
Stacking, Modified¹:
 +30 dBu

OUTPUT SPECIFICATIONS

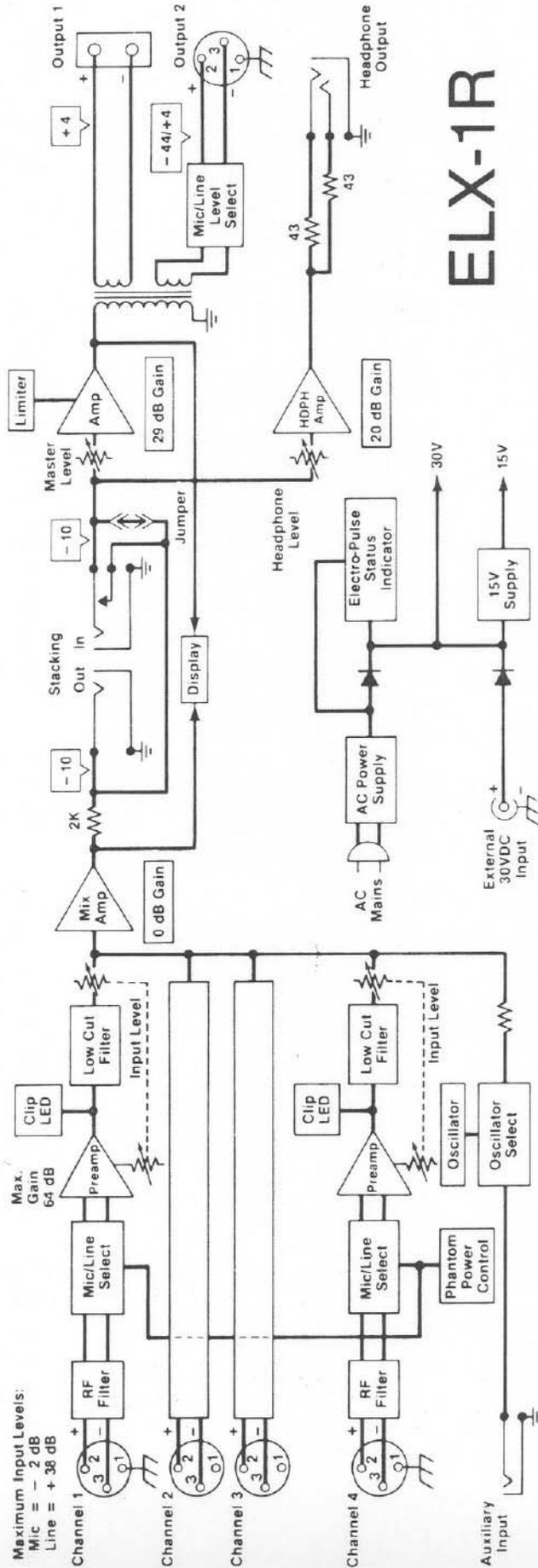
Output Impedance,
Main,
Binding Posts:
 60 ohms
XLR-Line Level:
 60 ohms
XLR-Mic Level:
 10 ohms
Headphone,
Left Channel:
 43 ohms
Right Channel:
 43 ohms
Stacking:
 2,000 ohms
Nominal Load Impedance,
Main,
Binding Posts:
 600 ohms
XLR-Line Level:
 600 ohms
Headphone,
Left Channel:
 8-600 ohms
Right Channel:

8-600 ohms
Stacking:
 2,000 ohms
Nominal Level,
Main,
Binding Posts:
 +4 dBu
XLR-Line Level:
 +4 dBu
XLR-Mic Level:
 -44 dBu
Headphone,
8-ohm Load:
 -11 dBu
600-ohm Load:
 -4 dBu
Stacking:
 -10 dBu
Maximum Level,
Main,
Binding Posts:
 +18 dBu
XLR-Line Level:
 +18 dBu
XLR-Mic Level:
 -30 dBu
Headphone,
8-ohm Load:
 -1 dBu
600-ohm Load:
 +18 dBu
Stacking:
 +12 dBu

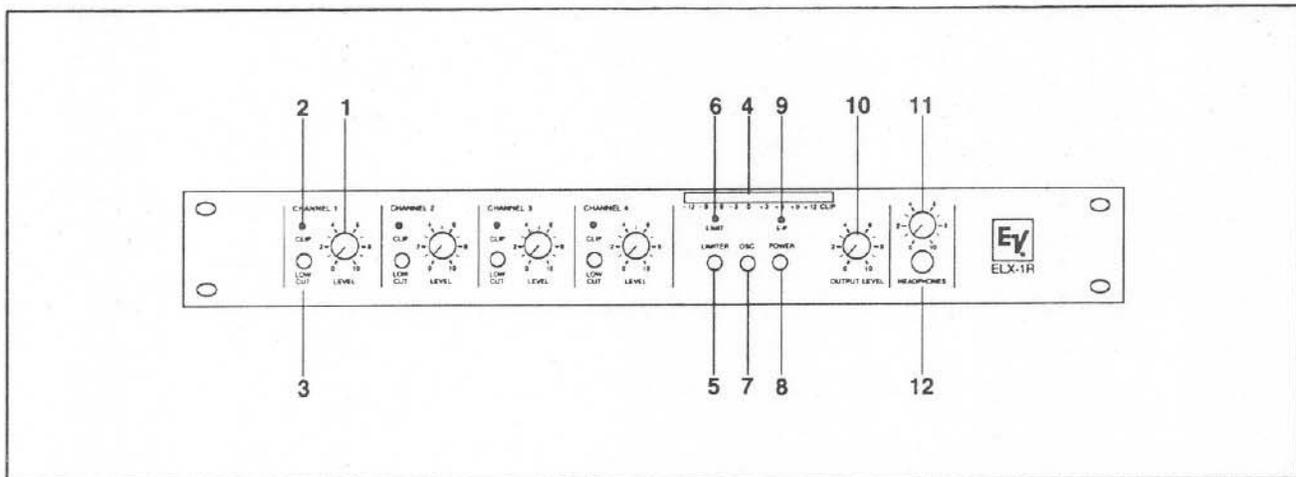
¹Stacking jacks can be modified for insert patching (see page 15).

²Outputs will operate with any load impedance without damage.

BLOCK DIAGRAM



ELX-1R



Pictorial 1 - Front Panel Diagram

OPERATION

Front Panel Connection and Controls (Refer to Front Panel Diagram, Pictorial 1)

1.INPUT LEVEL CONTROLS: These level controls simultaneously adjust the preamplifier gain and mix the input channels to the output.

2.INPUT CLIP INDICATORS: These LEDs light when the preamplifier is clipping. The level control should be turned down in this situation.

3.LOW-CUT CONTROLS: These controls attenuate the low-frequency response (at 100 Hz) of the input channels. Wind, handling and background noises may be reduced by switching the low-cut control at the appropriate input channel.

4.DISPLAY: This display indicates audio output levels. TO AVOID DISTORTION, DO NOT EXCEED "0 dB." The display will show a bargraph when the ac power is used. When external dc is used, the display will switch to a dot mode, lighting just one segment at a time to conserve power.

5.LIMITER SWITCH: This switch activates the limiter which protects the output from clipping distortion that might otherwise occur during unexpected increases in program level.

6.LIMITER LED INDICATOR: This LED lights when the limiter has been enabled.

7.OSCILLATOR SWITCH: This switch activates the built-in oscillator which is used for level checks or for

verifying operation of a system. The output is a 1-kHz sine wave. The Output Level control will set the level, which is indicated on the display. The oscillator signal is also available at the Stack Output jack at a fixed level of -10 dBu.

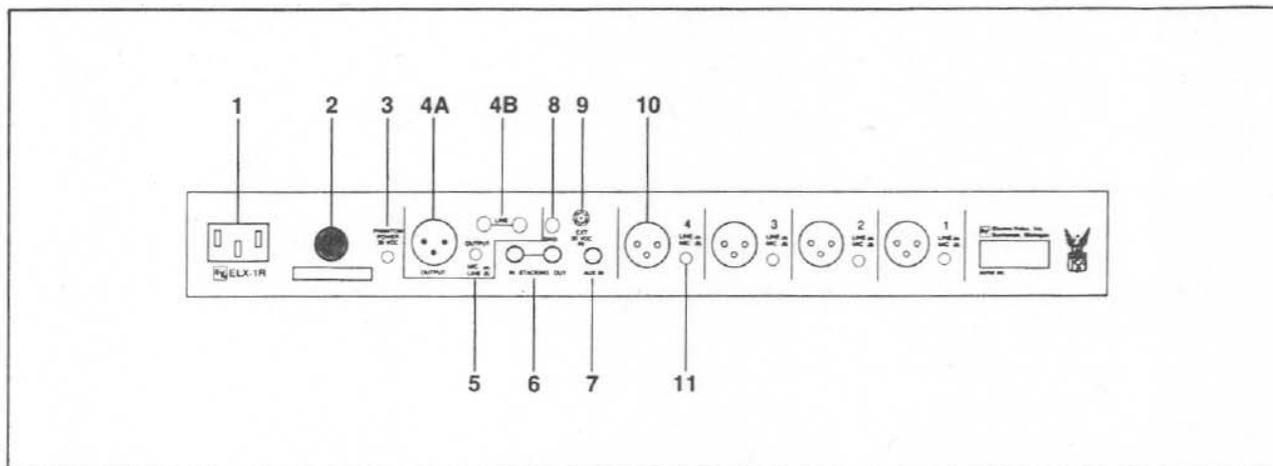
8.POWER SWITCH: This switch turns the mixer on or off.

9.ELECTRO-PULSE™ POWER STATUS INDICATOR: This LED will light steadily during ac operation. When external dc power is used, the LED will flash to indicate that the power is on. The flash rate corresponds to the supply voltage. The indication ranges from one second per flash to about five seconds per flash (low supply voltage). If the supply voltage drops to 18 volts or less, the Electro-Pulse™ LED will stop flashing.

10.OUTPUT LEVEL CONTROL: This control adjusts the level of the main output. The main output signal is available from two transformer windings, one connected to the Mic/line Output XLR-type connector and the other to the Line Output binding posts.

11.HEADPHONE OUTPUT CONNECTOR: This three-conductor jack is provided on the front panel to drive stereo headphones or a cue speaker.

12.HEADPHONE LEVEL CONTROL: This control adjusts the gain for the device connected to the Headphone Output Connector independently from the Output Level Control. This allows an output to be cued or a mix to be adjusted before the master volume control is brought up.



Pictorial 2 - Back Panel Diagram

OPERATION

Back Panel Connections and Controls (Refer to Back Panel Diagram, Pictorial 2)

1.AC POWER CONNECTOR: This receptacle is for an ac power cord (supplied with the unit).

2.FUSEHOLDER: This receptacle is for a .1 A, 250 V slow blow fuse (supplied with the unit).

3.PHANTOM POWER SWITCH: This switch applies phantom power to the microphone level inputs. Pins 2 and 3 have 30 Vdc with a source resistance of 3600 ohms. Pin 1 is the ground reference.

4.MAIN OUTPUT CONNECTORS: The main transformer-isolated output has two different connections, each with its own secondary winding:

A. LINE OUTPUT CONNECTOR: This binding post connection is for a line-level output.

B. MIC/LINE OUTPUT CONNECTOR: This 3-pin male XLR-type connector is for both mic and line-level outputs.

5.OUTPUT MIC\LINE LEVEL SELECT SWITCH: This switch selects either the mic or line output level for the XLR Main Output Connector.

6.STACKING CONNECTORS: These 1/4-inch jacks are for the connection of additional mixers to increase the number of inputs available.

7.AUXILIARY INPUT CONNECTOR: This 1/4-inch phone jack is for the output of another mixer or other

audio equipment to mix with the four input channels. The input is line level (-10 to +4 dBu) and buffered.

8.GROUND CONNECTOR: This jack is for grounding external devices.

9.EXTERNAL DC CONNECTOR: This power jack is for an external 30-volt dc supply to power the mixer.

10.INPUT CONNECTORS: These 3-pin female XLR-type connectors are for microphone and line-level inputs.

11. INPUT MIC\LINE LEVEL SELECT SWITCHES: These switches select either the mic or line input levels for each input channel. The line-level position should be used when the nominal input level is above -20 dBu.

CALIBRATION

(Before calibrating the mixer, connect it to the necessary external equipment as detailed in the INSTALLATION section, page 8).

INPUT LEVEL CONTROLS

To optimize the input levels, apply the loudest signal that will be encountered to the input. Set the Input Level Control as high as possible without lighting the Input Clip Indicator. Then reduce the level if necessary to create the desired mix.

DISPLAY

A ten-segment LED bargraph shows the level at the main outputs. The meter responds to peaks; its rise and fall times conform to the widely accepted Peak Program Master Standard, BS4297. By observing peak signal levels one can make use of the available headroom in the mixer (or following equipment) without the risk of clipping the signal. In normal operation, signal peaks should reach into the yellow display range (+3 to +12 dB). The 0-dB reference level is factory calibrated to read 0 dBu (sine wave).

To change the reference level (Refer to the Display and Power Supply Schematic, page 13):

1. Turn on the mixer with ac power.
2. Turn all level controls down.
3. Press oscillator switch on.
4. Connect a 600-ohm (or as desired) load and a voltmeter to the Main Output (either the binding posts or XLR-connector).
5. Increase the Master Output Level Control until the output reaches 0 dBu (0.775 V) or the desired reference.
6. Adjust R223 until the 0-dB LED just lights. R223 can be accessed through a hole in the PC board.

The last segment of the display is a LED clip indicator. It senses clipping at two places: the mix amplifier output, and the main output. If reducing the Output Level control does not affect a clip indication, then the mix amplifier is being overdriven. The actual threshold of the clip will drop if the supply voltage drops.

The time constants of the display can be changed to match those of a VU meter (the clip indicator will still operate normally). The meter indication will then correlate more with perceived loudness than with actual signal voltage. This modification is described in the SERVICE section, page 15.

LIMITER

The output level is limited to +14 dBu. The yellow limit indicator above the Limiter switch will light whenever limiting (gain reduction) occurs (see Figure 1). If large amounts of limiting are anticipated, be sure the Input Level controls are low enough so that the input preamps will not clip even with the lowest sound that might occur.

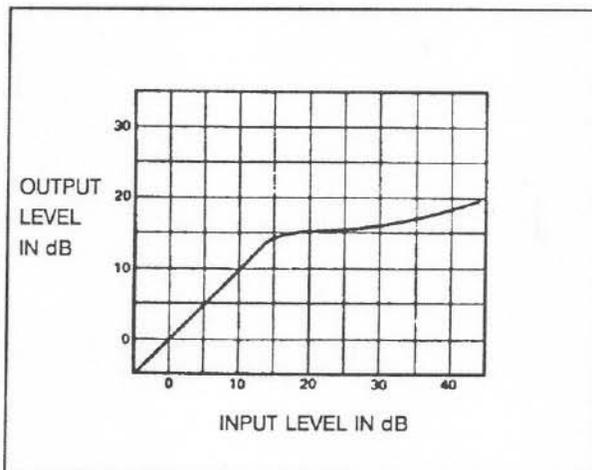


FIGURE 1 - LIMITER RESPONSE

The limiter threshold (+14 dBu) can be changed to a different level. This modification is described in the SERVICE section, page 15.

OSCILLATOR

To calibrate the oscillator:

1. Turn on the mixer with ac power.
2. Set all levels controls down.
3. Press the oscillator switch and measure the output voltage at the Stacking Output Jack.
4. Adjust R390 for -10 dBu (245 mV). The output should be a clean sine wave.

INSTALLATION

INPUT CONNECTIONS

Three-pin female XLR-type connectors are used for the balanced mic/line inputs. Pin 2 is +, pin 3 is -, and pin 1 is the shield-ground connection. Next to each input connector is a mic/line level select switch which allows any input level to be accommodated. The line level position should be used when the nominal input level is above -20 dBu.

HEADPHONE OUTPUT

The Headphone Output jack can be used as a separate line-level output. Like the main output, the signal will be clean, with very-low distortion and noise. A tip/ring/sleeve 1/4-inch phone plug should be used with this jack. If a two-conductor plug is used, it should be inserted only part way (to the first detent).

EXTERNAL DC POWER SOURCE

For external dc power operation, use a Switchcraft S-760 or equivalent power plug to insert into the .1-inch diameter pin-type jack. Place a .25 amp fuse in series with the power source. The external power

supply voltage should be between 24 and 45 volts for optimum performance, although the mixer will operate at lower voltages.

STACKING

The two stacking jacks are wired at the factory for passive mix bus connections. Two ELX-1R's can be interconnected by patching a stacking jack on one mixer to a stacking jack on the other mixer; it makes no difference which jack is used. Additional ELX-1R's can be added using one additional patch cord per mixer (see Figure 2). Each Output Level control will control only that mixer's output, which consists of the complete mix of all input channels. These jacks can also be used as fixed-level outputs; they are unaffected by the Output Level control.

The stacking jacks can be converted to a normalled pair for inserting auxiliary equipment in the signal path. This modification is described in the SERVICE section, page 15. If this modification is performed, other connection possibilities will exist (see Figure 3). Standard 1/4-inch two-conductor (or three-conductor) patch cords can be used.

The connections in Figure 2 (unmodified stacking jacks) result in some drop in signal level, which is par-

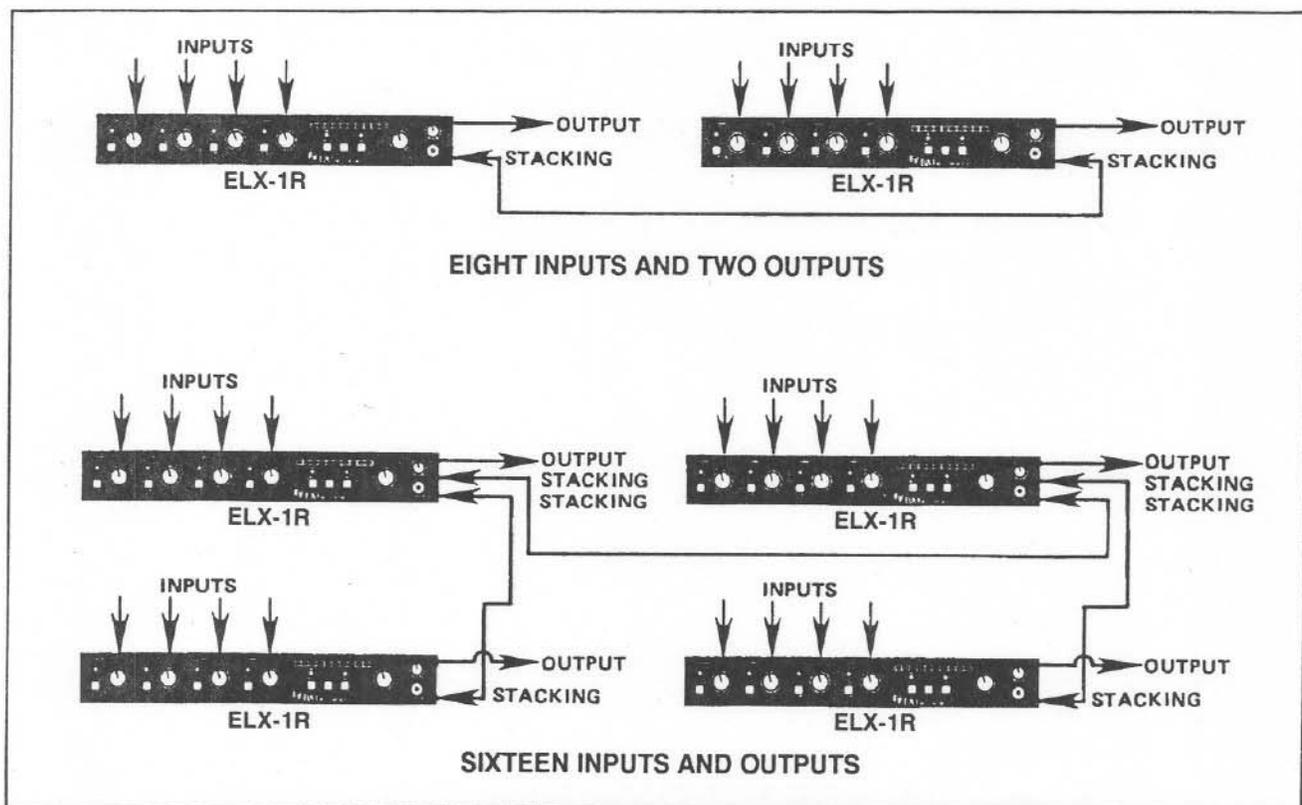
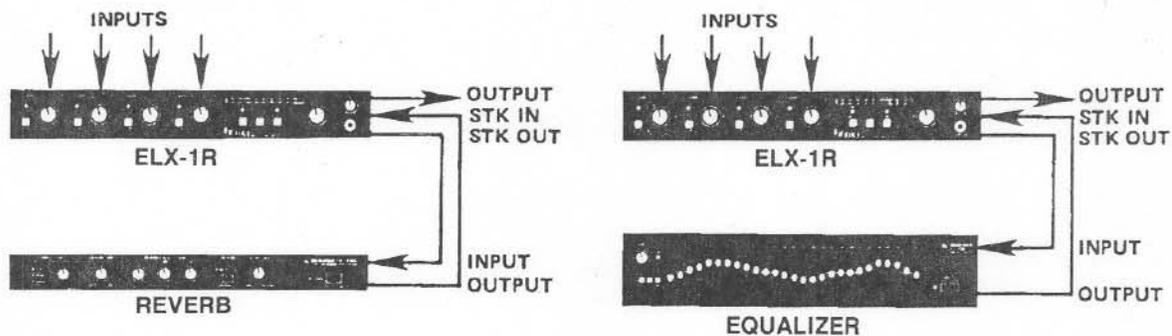
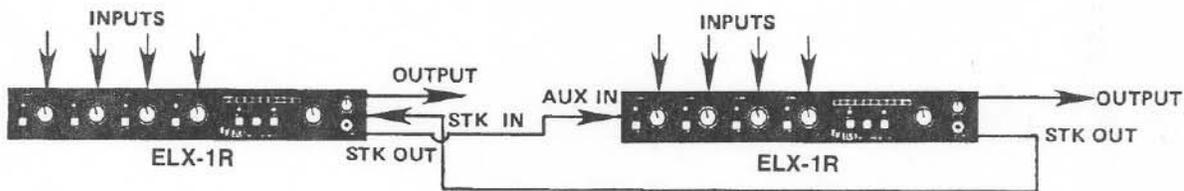


FIGURE 2 - POSSIBLE STACKING CONNECTIONS

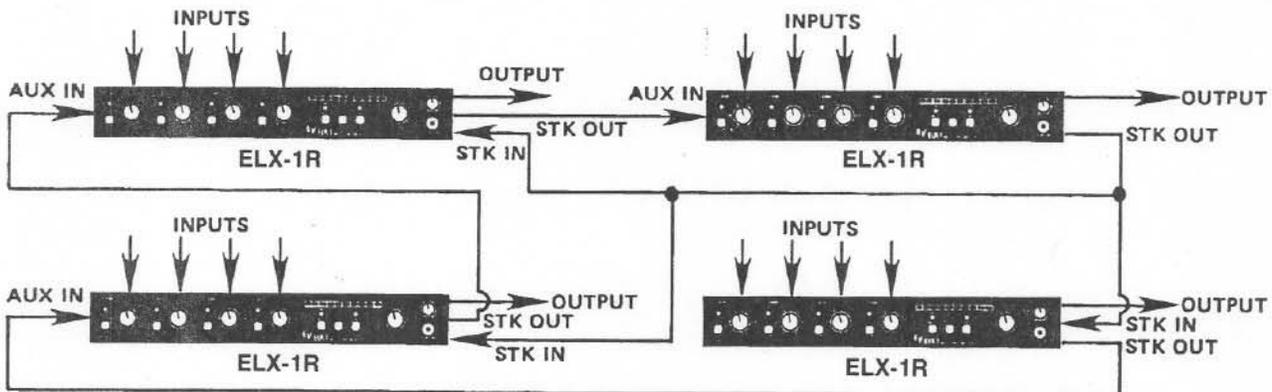


NOTE: HEADPHONES AND METER
WILL MONITOR PROCESSED SIGNAL

PROCESSOR INSERTED IN SIGNAL PATH



EIGHT INPUTS AND TWO OUTPUTS



SIXTEEN INPUTS AND FOUR OUTPUTS

FIGURE 3 - MODIFIED STACKING JACK CONNECTIONS

tially compensated by the use of more input channels. These connections use simple patch cords. In Figure 3, no level loss occurs; but, if three or more mixers are stacked and all outputs need to have the complete mix, some Y-connectors will be required.

MAIN OUTPUTS

The main transformer isolated output has two different connections, each with its own secondary winding. The binding post connection can hold a telephone line. The telephone company may require an interface device between the telephone line and the mixer. The other winding has a 3-pin male XLR connector with a level switch for line or mic level. Like the inputs, pin 2 is +, pin 3 is -, and pin 1 is shield ground.

AUXILIARY INPUT

The auxiliary input is line level (-10 to +4 dBu), buffered and feeds the mix bus. The output of another mixer or other audio equipment can be connected here to mix with the four input channels.

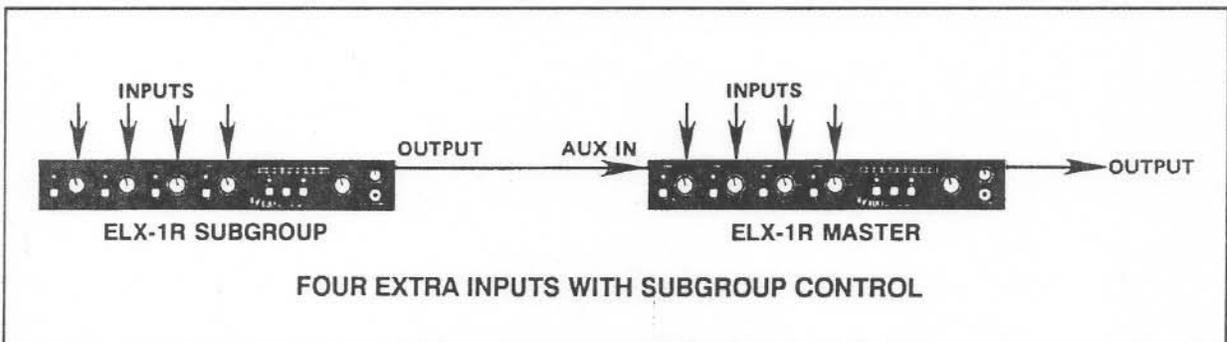
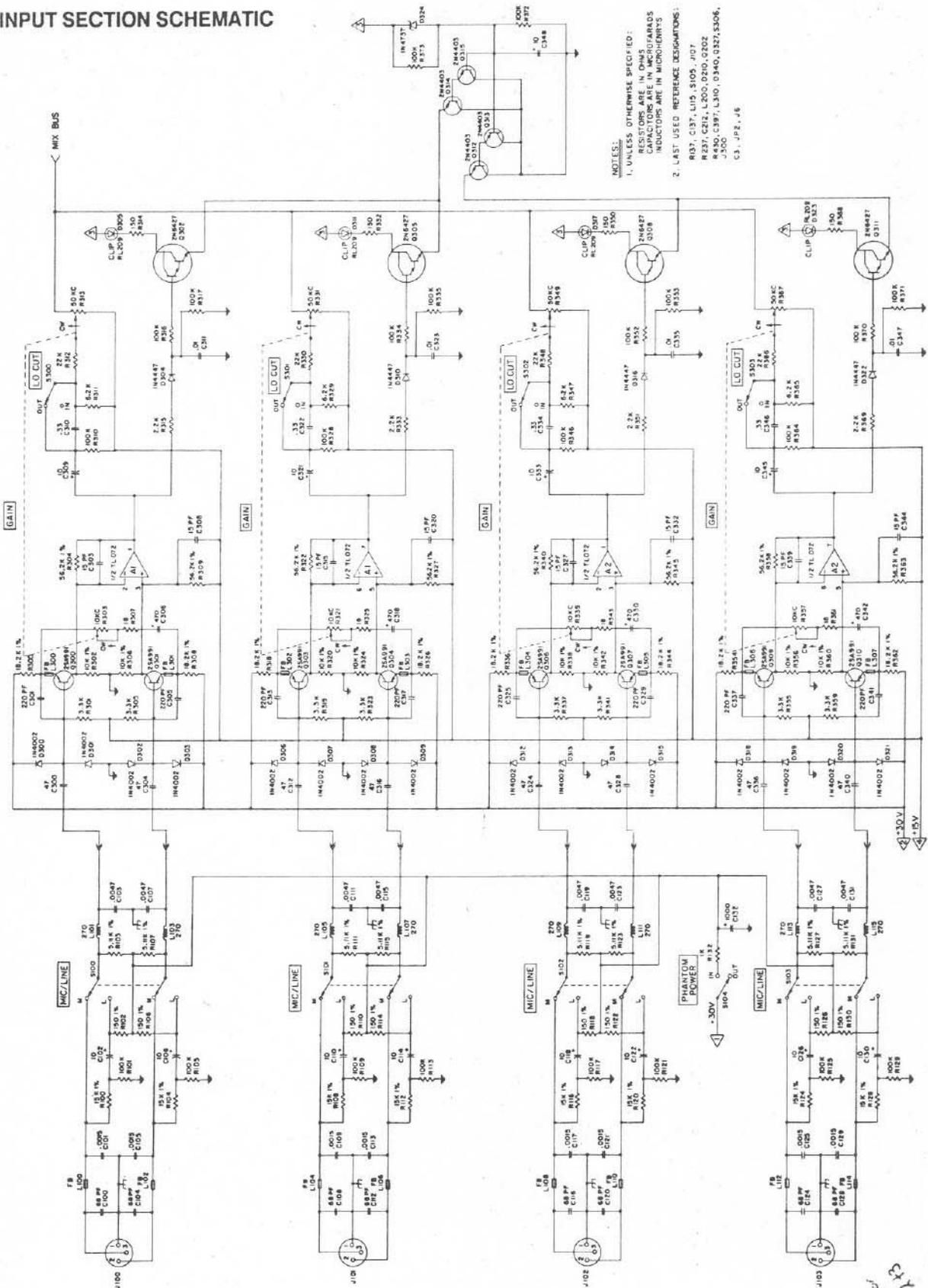
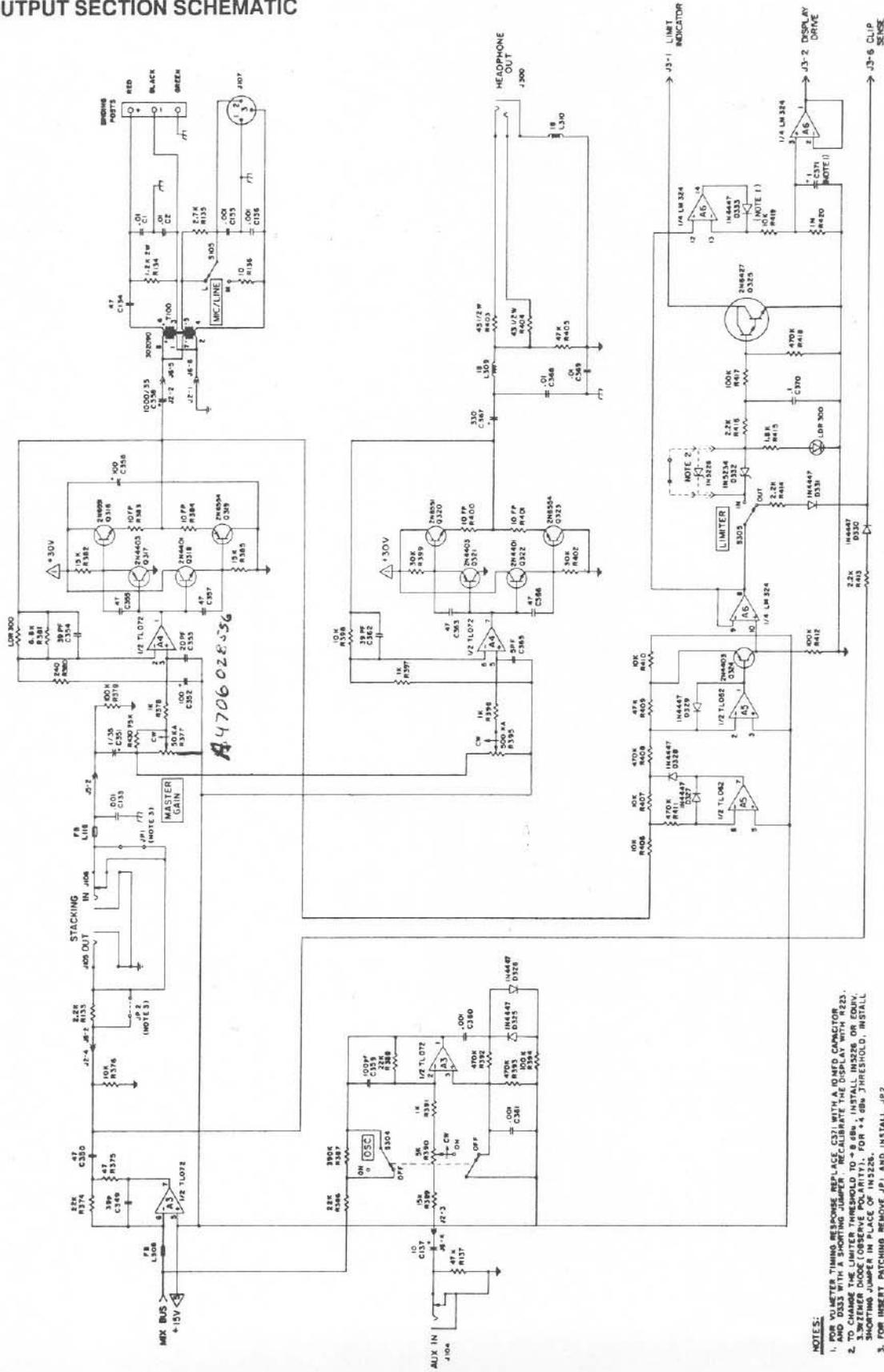


FIGURE 4 - USING THE AUXILIARY INPUT

INPUT SECTION SCHEMATIC

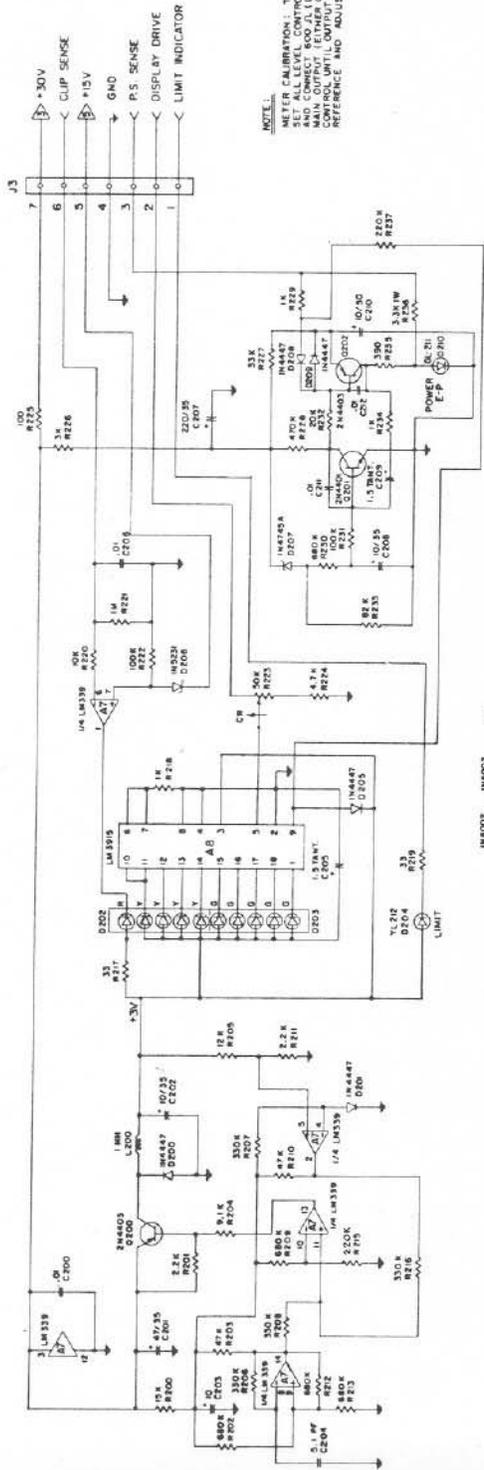


OUTPUT SECTION SCHEMATIC

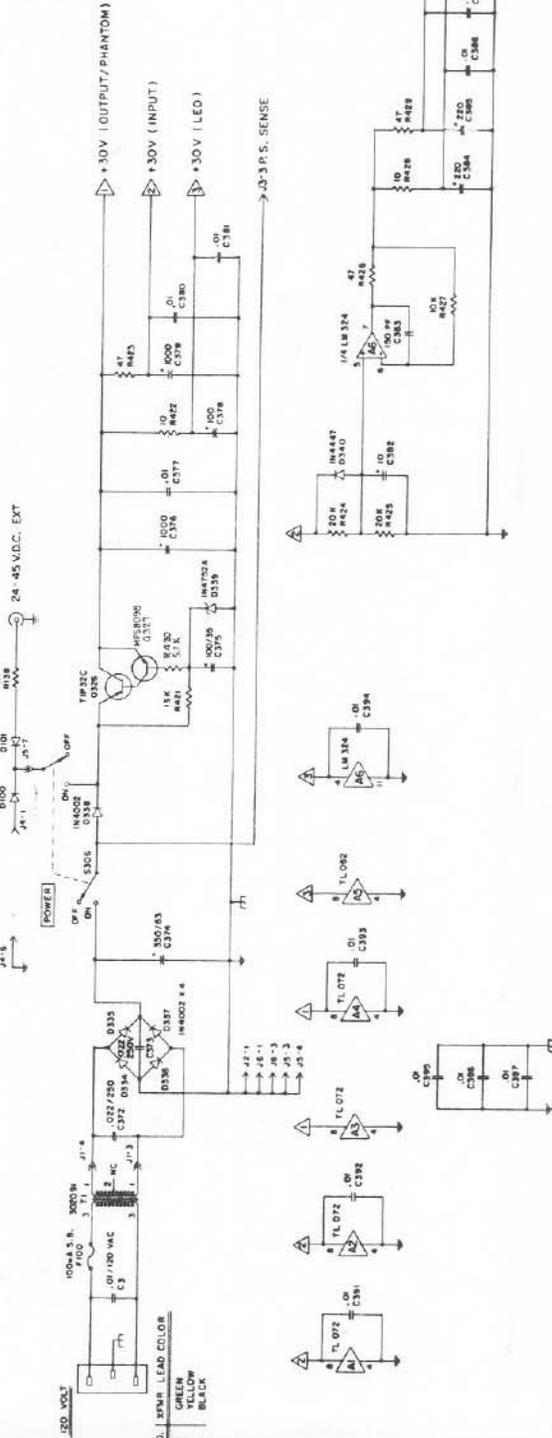


- NOTES:**
1. FOR VOLTMETER TIMING RESPONSE REPLACE C371 WITH A 10MFD CAPACITOR AND D533 WITH A SHORTING JUMPER. RECALIBRATE THE DISPLAY WITH R223.
 2. TO CHANGE OSCILLATOR THRESHOLD TO -8.6dB, INSTALL IN3228 OR EQUIV. TO CHANGE OSCILLATOR THRESHOLD TO -4.0dB, INSTALL IN3228. INSTALL SHORTING JUMPER IN PLACE OF IN3228. FOR +4.0dB THRESHOLD, INSTALL SHORTING JUMPER REMOVE J11 AND INSTALL J12.
 3. FOR INBERT PATCHING REMOVE J11 AND INSTALL J12.
 4. OSCILLATOR CALIBRATION: TURN ON MIXER WITH A.C. POWER AND SET ALL LEVEL CONTROLS DOWN. PRESS OSCILLATOR SWITCH AND MEASURE OUTPUT VOLTAGE WITH VOLTMETER. ADJUST R330 FOR -10.0dB (245mv). OUTPUT SHOULD BE A CLEAN SINE WAVE.

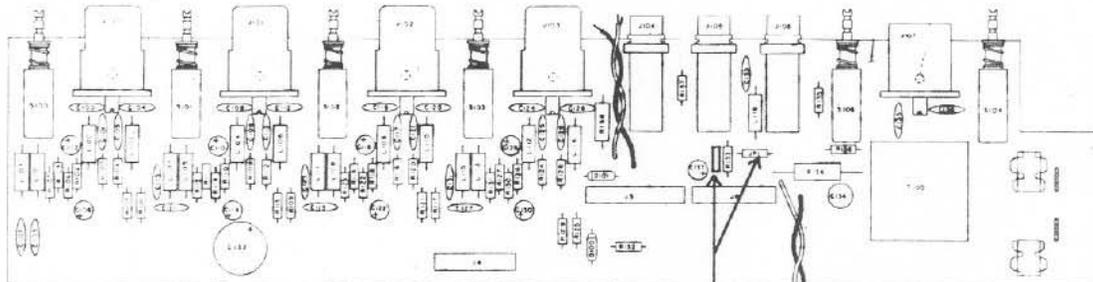
DISPLAY AND POWER SUPPLY SCHEMATIC



NOTE:
 METER CALIBRATION: TURN ON MIXER WITH A.C. POWER AND
 ADJ. ALL LEVEL CONTROLS DOWN. PRESS OSCILLATOR SWITCH
 MAIN OUTPUT (EITHER CONNECTION). INCREASE MASTER GAIN
 UNTIL METER REACHES 0.880 (75% OF DESIRED
 REFERENCE) AND ADJUST REEF UNTIL 0.88 LED JUST LIGHTS.



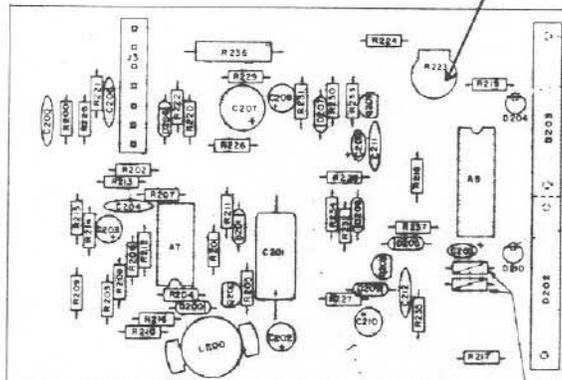
- NO. 10 PIN LEAD COLOR
 1 GREEN
 2 YELLOW
 3 BLACK



CONNECTOR BOARD

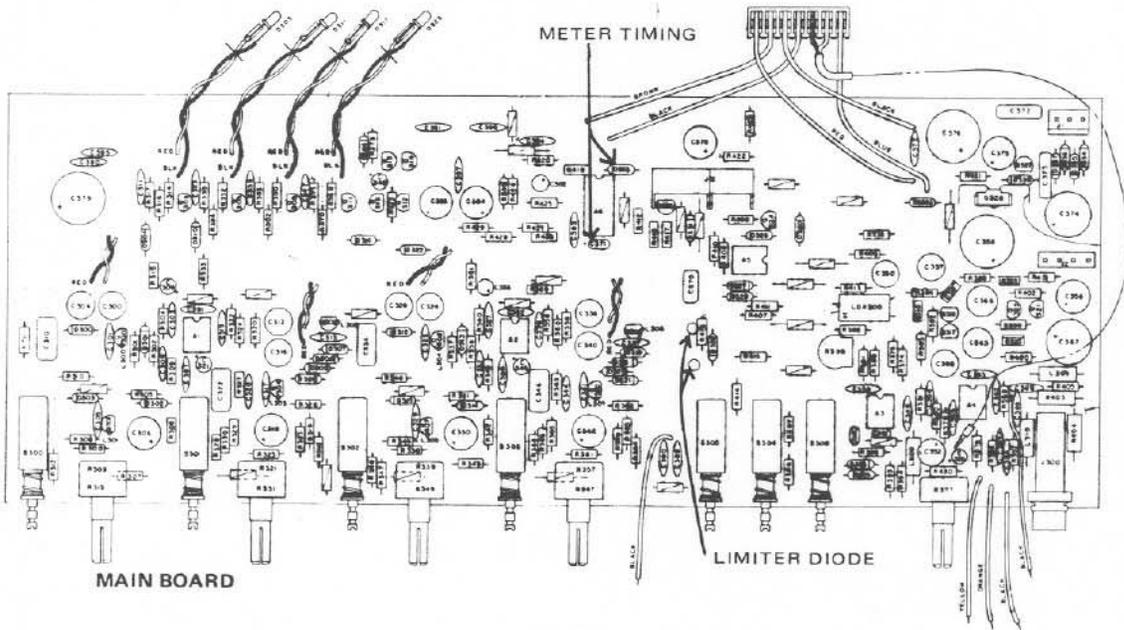
INSERT PATCHING

METER CALIBRATION



DISPLAY BOARD

METER TIMING



MAIN BOARD

LIMITER DIODE

SERVICE INFORMATION

CAUTION: HAZARDOUS VOLTAGES AND CURRENTS MAY BE ENCOUNTERED WITHIN THE CHASSIS. THE SERVICE INFORMATION CONTAINED IN THIS DOCUMENT IS FOR USE BY ELECTRO-VOICE AUTHORIZED WARRANTY STATIONS AND QUALIFIED SERVICE PERSONNEL ONLY.

TO REMOVE THE DISPLAY BOARD

1. Pull upward at the back of the board until the connector is disengaged, then slide the board out toward the back of the mixer.
2. When reinstalling, be sure the bargraph and individual LEDs are properly placed on the front panel.

TO SERVICE THE MAIN BOARD

1. Remove the nuts on the pots and the screws holding the printed circuit board.
2. If power is to be applied while servicing, be sure to ground the power supply to the chassis.
3. The rear board is held by three screws and five XLR-type connectors. The XLR-type connectors can be removed by rotating the screw in the small hole at the contact end of each connector. The board can then slide out toward the front.

TO CHANGE THE DISPLAY TIME CONSTANTS TO MATCH THOSE OF A VU METER (Refer to the Output Section Schematic, page 12)

1. Replace C371 with a 10 μ F capacitor.
2. Replace D333 with a shorting jumper.
3. Recalibrate the display with R223. R223 can be accessed through a hole in the PC board.

TO CHANGE THE LIMITER THRESHOLD (Refer to the Output Section Schematic, page 12)

The limiter threshold can be set for levels from +4 dBu through -14 dBu.

1. To change the limiter threshold to +8 dBu, install IN5226 or an equivalent Zener Diode in the location marked "Note 2" on the schematic.

2. For a +4-dBu threshold, install a shorting jumper instead of IN5226.

TO CONVERT THE STACKING JACK FOR INSERT PATCHING (Refer to the Output Section Schematic, page 12)

1. Remove JP1 and install JP2.

WARRANTY (Limited)-

Electro-Voice Broadcast Electronic Components are guaranteed for two years from date of original purchase against malfunction due to defects in workmanship and materials. If such malfunction occurs, unit will be repaired or replaced (at our option) without charge for materials or labor if delivered prepaid to the proper Electro-Voice service facility. Unit will be returned prepaid. Warranty does not extend to finish, appearance items or malfunction due to abuse or operation under other than specified conditions, nor does it extend to incidental or consequential damages. Some states do not allow the exclusion or limitation of consequential damages, so the above restrictions may not apply to you. Repair by other than Electro-Voice or its authorized service agencies will void this guarantee. A list of authorized service centers is available from Electro-Voice, Inc., 600 Cecil Street, Buchanan, MI 49107 (AC/616-695-6831); Electro-Voice West, 8234 Doe Avenue, Visalia, CA 93291 (AC/209-651-7777). This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Service and repair address for this product:

Electro-Voice, Inc., 3810 148th Avenue N.E., Redmond, WA 98052 (AC/206-881-9555).

Specifications subject to change without notice.