

SDA-8A STEREO DISTRIBUTION AMPLIFIER

Technical Manual

PR&E DOCUMENT #75-15

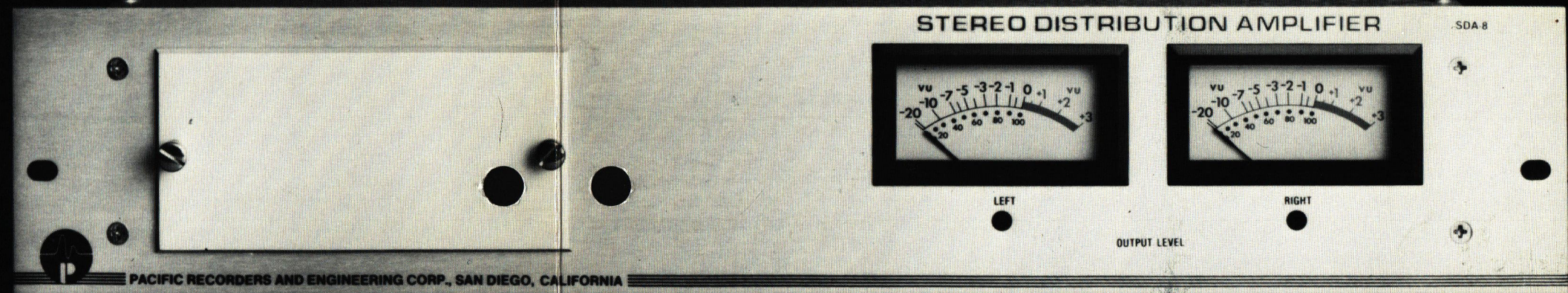


PACIFIC RECORDERS & ENGINEERING CORPORATION

2070 Las Palmas Drive, Carlsbad, CA 92009 619-438-3911 FAX: 619-438-9277

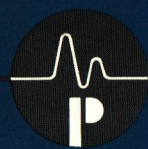
If You Didn't Get This From My Site,
Then It Was Stolen From...

www.SteamPoweredRadio.Com



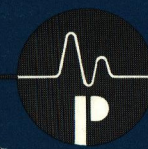
SDA-8

STEREO DISTRIBUTION AMPLIFIER

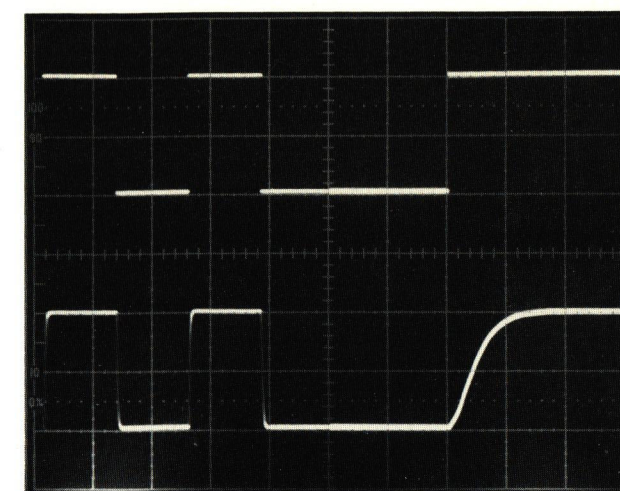


PACIFIC RECORDERS & ENGINEERING CORPORATION

2070 Las Palmas Drive - Carlsbad, CA 92008 - 619-438-3911 - Telex: 181777



PACIFIC RECORDERS & ENGINEERING CORPORATION



Upper Trace
2KHz Square
Wave Input
Lower Trace
Amplifier Output
Left Trace
0.2 ms/div
Right Trace
10 μs/div
Amplifier Output
Rise Time: 9μs
Overshoot: 0%
Ringing: None

FEATURES: ■ BRIDGING STEREO INPUT TO EIGHT STEREO OUTPUTS ■ HIGH OUTPUT LEVEL, HEADROOM CAPABILITY ■ ADJUSTABLE GAIN, UNITY TO 30 dB ■ BRIDGING/TERMINATING INPUT MODE SELECTION ■ VERY LOW NOISE AND DISTORTION ■ EXCELLENT FREQUENCY AND TRANSIENT RESPONSE ■ TRUE VU METERING, SWITCHABLE TO INPUTS/OUTPUTS ■ XLR - TYPE INPUT/OUTPUT CONNECTORS ■ EFFECTIVE RF SUPPRESSION

The SDA - 8 is a high quality stereo distribution amplifier designed for general purpose use in professional audio systems. While designed as a stereo amplifier, the SDA - 8 features excellent crosstalk isolation between the stereo channels, and, therefore is also an ideal distribution amplifier for two monaural signals.

The inputs are balanced bridging, 25K ohm, which are switchable to 600 ohm terminating. The stereo bridging inputs may be parallel fed from a common signal thus providing sixteen outputs. Careful attention to the input transformer and amplifier designs has insured excellent frequency and transient response while minimizing noise and distortion.

The gain of each stereo channel may be adjusted from unity to 30 dB. This wide range makes SDA - 8 the universal amplifier for broadcast signal distribution. The gain controls are feed-back type which maintain optimum noise and headroom performance for all gain settings.

The distribution outputs are differential, balanced to ground, and designed to drive 600 ohm or higher (bridging) loads. Each output is capable of simultaneous level in excess of +26 dBm into 600 ohm loads, and +27 dBm into 10K ohm or greater bridging loads.

The VU meters conform to ASA specifications and are switch-

able from output to input reading. The meters are driven by bridging buffer amplifiers which isolate the distortion products of the meter movement rectifiers. The buffer amplifiers allow a "0" VU calibration trim range of +4 dBm to +8 dBm.

The amplifier and power supply designs are a combination of discrete and integrated circuitry. All components are conservatively rated for high performance, long life operation. The amplifier is constructed on an epoxy glass, double-sided PC board. The use of an extensive ground plane shield on the component side of the circuit board, in addition to decoupling and bypass techniques, ensures amplifier stability in high RF environments.

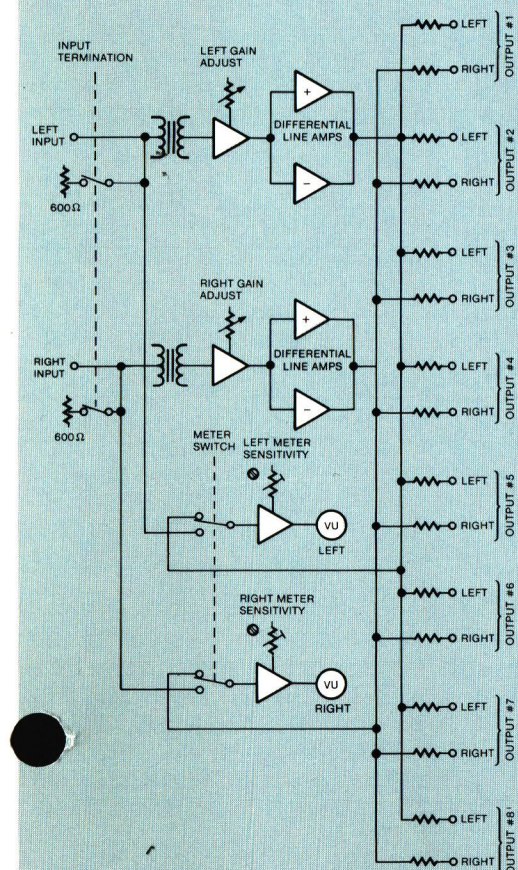
STEREO DISTRIBUTION AMPLIFIER CONTROL FUNCTIONS:

Input Termination switch provides a 600 ohm termination for the bridging inputs.

Meter Input/Output switch selects the meter monitoring source. INPUT reads the level at the amplifier input connectors; OUTPUT reads the pre-split level of the output amplifiers

Gain Trim controls have a range of unity to 30 dB input to output gain.

SDA - 8 Functional Block Diagram



SDA - 8 TECHNICAL SPECIFICATIONS

- Source Impedance** 600 ohms
- Input Impedance** 25K ohms, balanced and floating, transformer isolated.
- Gain Range** Unity to 30 dB.
- Outputs** Eight balanced, differential outputs per channel.
- Load Impedance** 600 ohms or greater per output
- Source Impedance** 78 ohms, resistive
- Nominal Output Level** +8 dBm. VU meter may be recalibrated for +4 dBm reference.
- Maximum Output Level** +26 dBm into eight 600 ohm loads, +27 dBm into bridging loads.
- Output Isolation** Short circuit of any one output results in no amplitude change at other outputs.
- Crosstalk Isolation** Greater than 80 db, 20Hz to 20KHz
- Frequency Response** 20Hz to 20KHz, +0, -0.7 dB
- Input Noise** -112 dBm RMS equivalent input noise, 600 ohm source, 20KHz bandwidth.
- Output Noise** -82 dB below output, (reference +8 dBm), 600 ohm source, 20KHz bandwidth, 30 dB gain.
- Distortion, T.H.D.** Less than 0.005% @ 1KHz, +8 dBm. Less than 0.07% @ 1KHz, +26 dBm. Less than 0.06%, 20Hz to 20KHz, +8 dBm.
- Distortion I.M.** Less than 0.003% SMPTE, +8 dBm. Less than 0.03% SMPTE, +26 dBm.
- Square Wave Response** Rise time less than 10 μs. No overshoot or ringing. 2 KHz square wave test signal.

**PR&E DOCUMENT #75-15
STATUS PAGE
(Revision A-1 - JULY 1992)**

This listing provides a reference of current pages of this document, and their revision numbers (i.e., A.1, A.2, etc.). When a revision to this document is received from PR&E, simply replace the old pages with the new ones, discard the old pages, and post the new status page in the front of this manual (**NOTE**: It may be desirable to retain replaced status pages in order to have a record of document changes). If deemed necessary by our Engineering Department, comment information relating to any change may also be included on this page.

<u>Page No.</u>	<u>Revision</u>	<u>Comments</u>
ALL	A	New Release.
PAGE 26	A-1	Schematic revision.

SDA-8A

STEREO DISTRIBUTION AMPLIFIER

TECHNICAL MANUAL

1.0 GENERAL INFORMATION

This chapter contains an introduction to the SDA-8A Stereo Distribution Amplifier Technical Manual, an overview of the SDA-8A's features, its specifications and warranty information.

1.1 INTRODUCTION

PR&E is in the business of supplying the finest audio systems to the world's leading broadcast facilities. Your decision to go with PR&E means that you expect more than simple working hardware. Please be assured that it is our strong desire to provide each of our customers with the kind of products, systems, documentation and support that we would specify if we were in your position.

We invite your comments and suggestions for improvement of this document, and of all our services. By constant attention to our customer's needs, we will continue to earn our reputation for excellence, and to refine our understanding of the requirements of the marketplace.

This manual is designed to provide the information required to understand, install, operate, and maintain the SDA-8A Stereo Distribution Amplifier. It is assumed that the reader has a working knowledge of audio devices, systems, and installation practices. To obtain the maximum benefit of the distribution amplifier's capabilities, it is strongly recommended that the Installation, Setup and Operation, and Equipment Description chapters of this manual be read completely prior to installing the unit.

Each SDA-8A is thoroughly tested and "burned-in" prior to packing for shipment. Should you encounter any difficulty during installation or initial operation, we recommend that you contact PR&E for assistance.

1.2 OVERVIEW

The SDA-8A is a high quality stereo distribution amplifier designed for general purpose use in all professional audio applications. The successor to the very popular SDA-8, the SDA-8A incorporates several new and unique features while using half the rack space of the SDA-8. Among the improvements are a front panel headphone jack, a transformerless input with an extremely high common mode rejection ratio (CMRR), an input mode switch allowing the choice of stereo or a variety of mono inputs, a patch point on the rear panel for the insertion of processing equipment, the use of Molex connectors, and the placing of the output amplifiers on plug-in removable function modules, for ease of replacement.

Although primarily a stereo amplifier (with excellent separation between the stereo channels), the SDA-

8A is also an ideal distribution amplifier for monaural signals. The unique input mode switch permits the amplifier to distribute the STEREO input to eight stereo outputs, or to distribute a choice of three monaural modes (LEFT, RIGHT or SUM L+R) to sixteen monaural outputs.

The fully-regulated power supply features a toroidal power transformer, which is compact, efficient, and has very low electromagnetic field radiation. The amplifier and power supply design are a combination of discrete and integrated circuitry. All components are conservatively rated for high performance and long-life operation.

All controls and adjustments are located behind a translucent plexiglass security panel to discourage unauthorized tampering, while allowing viewing of the power indicator and panel settings.

1.3 SPECIFICATIONS

Following is a list of specifications for the SDA-8A Stereo Distribution Amplifier:

INPUTS:

Source Impedance	600 ohms or less.
Input Impedance	40K ohms balanced, 600 ohms switchable option.
Input Level Range:	
Main Input	Adjustable from -30 dBu to +9 dBu.
Patch Return Input	Nominal -10 dBu.
Input Headroom	Greater than 20 dB above nominal input.
Input CMRR:	
Main Input	Greater than 80 dB below 1kHz; greater than 60 dB from 20 Hz to 20 kHz.
Patch Return Input	Greater than 40 dB at 1kHz.

OUTPUTS:

Output Source Impedance	80 ohms balanced, 40 ohms single ended.
Output Level:	
Main Output	Adjustable from +4 dBm to +8 dBm.
Patch Send Output	Nominal -10 dBu.
Headphone Output	+4 dBm to +8 dBm, depending on Main Output.
Maximum Output Level (Main)	+26 dBm into 600 ohm loads; +27 dBu into bridging loads.

FREQUENCY RESPONSE +0 dB, -0.6 dB, from 20 Hz to 20 kHz.

NOISE 80 dB below output, reference +8 dBu, 600 ohm source, 20 kHz bandwidth.

DISTORTION, T.H.D. Less than 0.008%, +26 dBu input, +26 dBm output into a 600 ohm load, 80 kHz meter bandwidth.

DISTORTION, I.M.D.	Less than 0.008%, +26 dBu input, +26 dBm output into a 600 ohm load, SMPTE test method.
STEREO SEPARATION	Better than 80 dB at 1 kHz.
POWER REQUIREMENTS	10 watts at 117 VAC, +/- 10%, 60 Hz.

NOTES:

- A) These specifications are for the basic signal paths, per channel, with 600 ohm loads connected to the program outputs.
- B) 0 dBu corresponds to an amplitude of 0.775 volts RMS regardless of the impedance of the circuit. It is the same voltage value as 0 dBm measured in a 600 ohm circuit. This enables convenient level measurement with meters calibrated for 600 ohm circuits.
- C) Noise specifications are based upon a 20 kHz measurement bandwidth. The use of a meter with a 30 kHz bandwidth will result in a noise measurement increase of approximately 1.7 dB.

Pacific Recorders & Engineering Corporation reserves the right to change specifications without notice or obligation.

1.4 WARRANTY INFORMATION

This product carries a manufacturer's warranty which is subject to the following guidelines and limitations:

- A) Except as expressly excluded hereinafter, Pacific Recorders & Engineering Corporation ("Seller") warrants equipment of its own manufacture against faulty workmanship or the use of defective materials for a period of one (1) year from date of shipment to Buyer. The liability of the Seller under this Warranty is limited to replacing, repairing or issuing credit (at the Seller's discretion) for any equipment, provided that Seller is promptly notified in writing within five (5) days upon discovery of such defects by Buyer, and Seller's examination of such equipment shall disclose to its satisfaction that such defects existed at the time shipment was originally made by seller, and Buyer returns the defective equipment to Seller's place of business in Carlsbad, California, packaging and transportage prepaid, with return packaging and transportage guaranteed.
- B) Equipment furnished by Seller but manufactured by another shall be warranted only to the extent provided by the other manufacturer.
- C) Thermal filament devices such as lamps and fuses are expressly excluded from this warranty.
- D) The warranty period on equipment or parts repaired or replaced under warranty shall expire

upon the expiration date of the original warranty.

- E) This Warranty is void for equipment which has been subject to abuse, improper installation, improper operation, improper or omitted maintenance, alteration, accident, negligence (in use, storage, transportation or handling), operation not in accordance with Seller's operation and service instructions, or operation outside of the environmental conditions specified by Seller.

- F) This Warranty is the only warranty made by Seller, and is in lieu of all other warranties, including merchantability and fitness for a particular purpose, whether expressed or implied, except as to title and to the expressed specifications contained in this manual. Seller's sole liability for any equipment failure or any breach of this Warranty is as set forth in subparagraph A) above; and Seller shall not be liable or responsible for any business loss or interruption, or other consequential damages of any nature whatsoever, resulting from any equipment failure or breach of this warranty.

2.0 INSTALLATION

This chapter provides instruction in the proper installation of the SDA-8A. Included are sections outlining general installation guidelines, cable preparation, rear panel configuration, audio input connection, audio output connection, patch point connection, grounding and shielding, and power connection.

2.1 GENERAL GUIDELINES

The SDA-8A should be carefully unpacked and inspected for any shipping damage. If the inspection reveals any damage, file a claim with the delivering carrier. The packing material should be kept as evidence of mishandling, as well as to allow return of the equipment to the factory if necessary.

The packed items should include the SDA-8A itself, the power cord, the legend panel (PR&E #80-1041) and a connector kit (PR&E #76-60). This connector kit is used to prepare the audio input and output cables (as described in Section 2.2), and contains the following:

<u>DESCRIPTION</u>	<u>QTY</u>	<u>PR&E#</u>
Connector Housing, 12 Pin, Male	1	15-605
Connector Housing, 6 Pin, Male	9	15-603
Molex Crimp Pins, Male	70	15-3

When installing the SDA-8A, signal and AC power connections are made via the connectors located on the rear of the unit (reference Figure 2.2).

The SDA-8A requires one rack unit of height (1.75 inches) in a standard rack width of 19 inches. The depth of the SDA-8A from the rack rails is 10 inches, however, it is recommended that the installation allow an additional two inches to accommodate rear panel connections and cable bends.

The legend panel is mounted on the far right side of the SDA-8A, adjacent to the VU meters, and is held in place by the same mounting screws which secure the SDA-8A in the rack rails. To install, simply line up the holes in the legend panel with the mounting holes in the SDA-8A front panel, then secure the SDA-8A into the rack rails. Slide the legend into the legend panel from the right side.

NOTE: Legend dimensions are 1-9/16" by 13/16".

The power transformer used in the SDA-8A is a toroidal type, which exhibits a low radiated hum field.

NOTE: Care should be taken to avoid locating the SDA-8A within six feet of any intense electromagnetic hum fields such as those produced by large power transformers and motors. Likewise, cables to and from the unit should be routed to achieve maximum practical distance from AC mains power wiring. Particular attention should be paid to some of the low-cost, supposedly "professional", power amplifiers which have appeared in the marketplace. In many cases the low cost has been partially achieved through the use of small core power transformers operating at or on the edge of saturation. While these units may

operate to their own specifications, the electromagnetic fields they radiate may impair the performance of the SDA-8A or neighboring equipment, such as tape recorders or magnetic phonograph cartridges.

2.2 CABLE PREPARATION

Before beginning the installation, a plan should be drawn up showing how the system will be interconnected. All cables and connectors should be tagged with numbers and/or legends, and logged.

Only unspliced, preferably new, cables should be used in connecting the SDA-8A. Audio input and output connections should be made with 2-conductor stranded insulated foil shielded cable with drain wire. The cable used should be equivalent to Belden types 8451, 9451, or 8761.

Strip the cable insulation jacket and foil shield back about 1-1/2 inches, and sleeve the shield drain wire with heat-shrink tubing, leaving about 3/16 inch of the wire exposed. Then, strip the insulation of each signal wire back about 3/16 inch, and sleeve the shield (at cable ends) with heat-shrink tubing.

NOTE: It is very important to sleeve the cable drain wire and the shield (at cable ends) with heat-shrink tubing. This is the only means of assuring an installation in accordance with recommended grounding procedures.

The Molex pins are designed so that the short tab "ears" are crimped onto the stripped wire to make the electrical connection, while the long "ears" are crimped over the insulated section of the wire to help support the connection. See Figure 2.1 for an example of a properly crimped Molex pin.

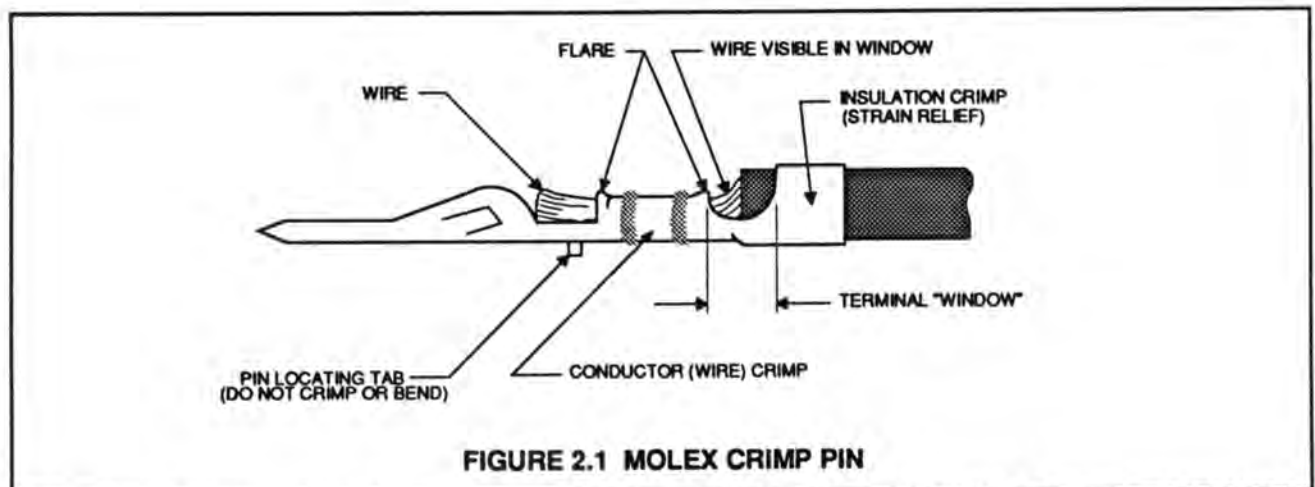


FIGURE 2.1 MOLEX CRIMP PIN

In order to crimp, insert the short ears of the Molex crimp pin into notch "B" of the crimping tool (PR&E #70-3), with the ears pointing toward the letter "B". Insert the wire into the terminal so that the stripped portion is between the short crimp ears, and the insulation is between the long crimp ears. Crimp the short ears.

Now place the long ears of the pin into tool notch "A", with the ears pointing toward the letter "A". Crimp the long ears over the insulated section of the wire.

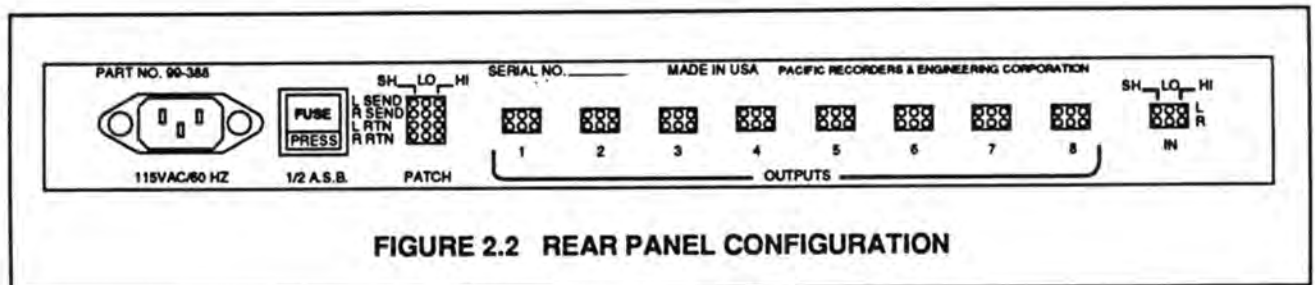
NOTE: When using Molex Crimping Tool #HTR-1719-C (PR&E #70-5), place a pin into slot "B" with

the long ears on the "B" side of the tool and pointing toward the letter "B". Place the wire into the tool from the "B" side, and then crimp the pin.

Once the pins are crimped, they may be inserted and locked into the nylon connector housing (a click can be felt indicating that the locking ears on the pin have set). If a pin is inserted in the wrong connector position, or it is desired to make a circuit change, use the connector pin extractor tool (PR&E #70-4) to release the pin and press it out of the connector housing.

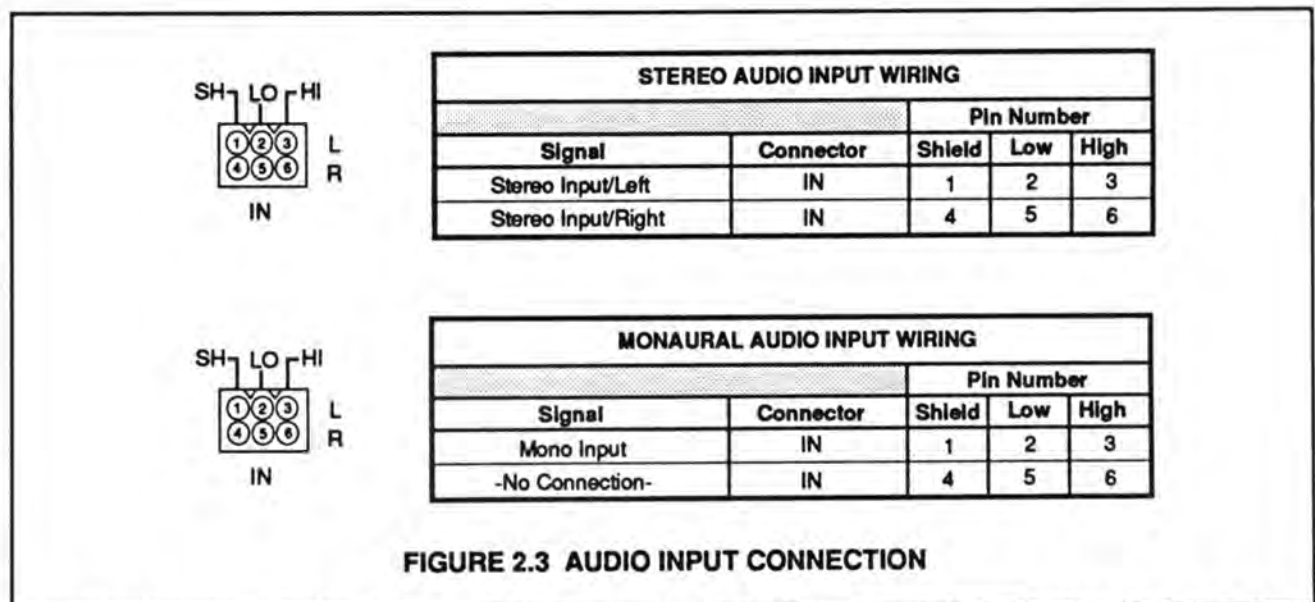
2.3 REAR PANEL CONFIGURATION

The rear panel of the SDA-8A is configured to allow for ease of power, audio input, audio output, and patch point connection. See Figure 2.2 for an example of the SDA-8A's rear panel configuration.



2.4 AUDIO INPUT CONNECTION

SDA-8A audio input connection is accomplished by means of a 6-pin Molex connector located on the rear panel assembly. Pin assignment for both stereo and monaural applications is defined in Figure 2.3.

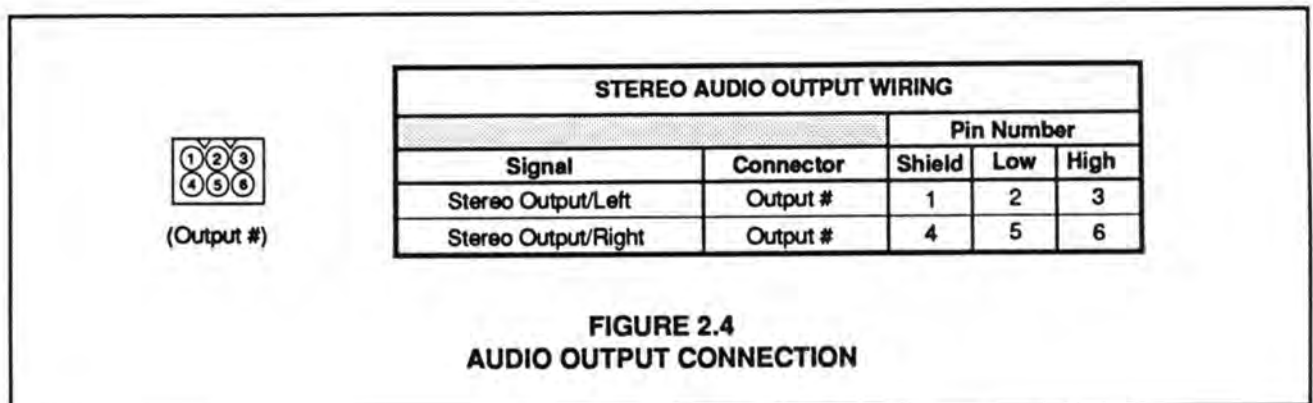


A standard connection theme is used throughout most PR&E equipment designs - the use of 3, 6, 9 and 12 pin Molex connectors for audio wiring. This system of pin assignments takes advantage of the three pin per row design of the Molex connectors and, therefore, makes visual inspection of the finished wiring

easier. As viewed from the rear of the product, the shields (if connected) are always connected to the left pins, the low wires (black) to the center pins and the high wires (red) to the right pins. While this inspection will not indicate if a connector is in the correct position, it will verify proper shield and polarity connection.

2.5 AUDIO OUTPUT CONNECTION

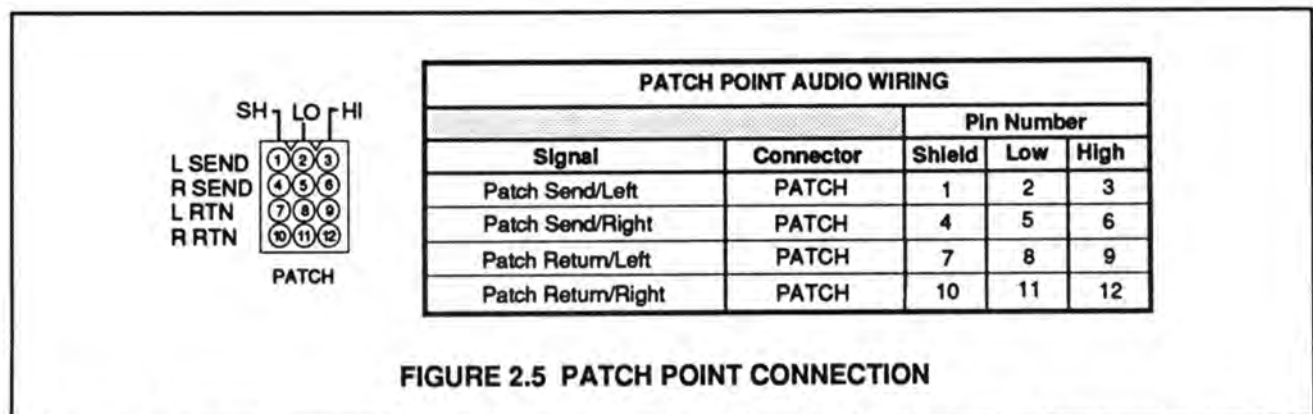
SDA-8A audio output connection is accomplished by means of the eight 6-pin Molex connectors located on the rear panel assembly. Pin assignment is defined in Figure 2.4.



NOTE: When using the SDA-8A for monaural distribution, pins 1 through 3 provide one output, and pins 4 through 6 provide another. This increases the number of output connectors from 8 (for stereo applications) to 16 (for mono applications).

2.6 PATCH POINT CONNECTION

The patch connector allows for the insertion of signal processing equipment at a point prior to the SDA-8A's output amplifiers. This connector is located on the rear panel assembly, and its pin assignment is defined in Figure 2.5.



NOTE: When no processing equipment is installed in the signal path, ensure that the shorting plug assembly (PR&E #90-667) is installed at the patch point.

Grounding in modern broadcast equipment is more critical than with older devices of more limited band-pass capabilities. Achieving low impedance system ground with a small piece of equipment is relatively easy. However, the problem becomes progressively more difficult as the overall system becomes larger. When designing our consoles and accessories, much thought is given to system grounding requirements and the elimination of DC path ground loops.

The shield pins on each SDA-8A connector are tied directly to the chassis, as is the central audio ground. The power cord assembly then provides SDA-8A to ground connection.

A preferred method of connecting the line shields in a system is to connect **both** ends of every shield to **all** affiliated equipment. However, this method is only satisfactory if every component shares a common earth ground. This can be accomplished using isolated ground receptacles tied to the station's "technical ground".

If isolated ground receptacles are not available when grounding the SDA-8A, observe the following guidelines:

- A) Shields of cables connecting the console to auxiliary equipment should be connected at the console end only, and should not be terminated to the ground of the auxiliary equipment.
- B) Ensure that the auxiliary equipment is connected to a "clean" ground by its power cord assembly, or by the addition of a separate ground wire connected between the chassis of the auxiliary equipment and the station's "technical ground".

NOTE: Buzz pickup is generally electrostatic, due to capacitive pickup between an audio line and a power line. When shielded lines are used this should be no problem, unless the audio lines are run in the same wire-way or areas as a power line. Radio-frequency interference can also manifest itself as a buzz in the program audio. RF interference is minimized by the extensive RF bypassing and ground-plane techniques used in the SDA-8A, and the shielded lines external to the unit.

2.8 POWER CONNECTION

The SDA-8A is designed to operate from 115 VAC, 60Hz, and requires a line fuse with a 1/2 ASB rating. Should the fuse ever need to be replaced, replace with the proper type only. The appropriate 3-wire power cord (supplied with the equipment) should be installed between SDA-8A and the AC mains.

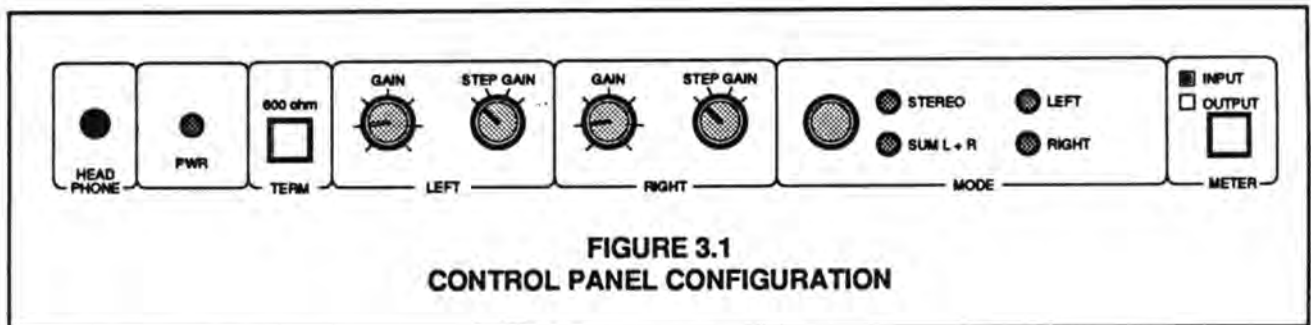
WARNING: Do not defeat the safety ground in any way. To do so may provide a potentially dangerous condition to the operator.

3.0 SETUP AND OPERATION

This chapter provides instruction in the proper setup and operation of the SDA-8A. Included are sections outlining control panel configuration, input mode selection, level adjustment, VU meter selection, 600 ohm termination, and level alignment.

3.1 CONTROL PANEL

The control panel of the SDA-8A is configured to allow for ease of mode selection, VU meter selection, and level adjustment. There is also an LED to indicate that power is supplied to the unit, a headphone jack, and a 600 ohm input termination selector switch. See Figure 3.1 for an illustration of the SDA-8A's control panel.



3.2 INPUT MODE SELECTOR

The Mode selector, located on the SDA-8A's front panel assembly, is a four-position rotary switch accompanied by four LEDs, which indicate the input mode selected (reference Figure 3.1). This switch allows the selection of one of four different input modes: STEREO, LEFT, RIGHT, and SUM L+R. In the STEREO mode, indicated by the illumination of a green LED, the amplifier distributes a stereo signal to the eight stereo output connectors located on the rear panel.

In each of the three monaural modes (LEFT, RIGHT or SUM L+R), indicated by the illumination of a red LED, an identical signal is sent to both left and right channel outputs on each rear panel connector. The LEFT mode sends the left channel input to both channel outputs; the RIGHT mode sends the right channel input to both channel outputs; and the SUM L+R mode sums the left and right channel inputs into one monaural signal, and then sends this monaural signal to both channel outputs. In this way, the SDA-8A can be used to distribute a monaural signal to a total of 16 channel outputs.

3.3 LEVEL ADJUSTMENT

There are two gain controls for each channel, located on the SDA-8A's front panel assembly (reference Figure 3.1). The gain of each input amplifier is adjustable, to accommodate nominal input levels ranging from -30 dBu to +9 dBu. The Step Gain control is a four-position rotary switch, which adjusts the gain in 10 dB increments. The Gain control is a rotary trim-pot with a continuous gain adjustment range of 12 dB, to be used for "fine tuning". For a more detailed description of the use of these controls, see

Section 3.6.

The gain controls are in the feedback loop of the input stages, to maintain optimum noise and headroom performance for any gain setting. The input headroom remains at a constant 20 dB above the nominal input signal level.

3.4 VU METERS

The miniature VU meters fully conform to ANSI specifications, and are switchable between the input and output of the amplifier by means of the winkey Schadow input/output selector button, located on the SDA-8A's front panel assembly adjacent to the VU meters (reference Figure 3.1). This button will be orange when the VU meters are monitoring amplifier input, and black when the VU meters are monitoring amplifier output.

The meters are driven by bridging buffer amplifiers, to isolate the distortion by-products of the meter movement rectifiers. These buffer amps allow a "0" VU calibration trim with a signal range of +4 dBm to +8 dBm.

3.5 600 OHM TERMINATION

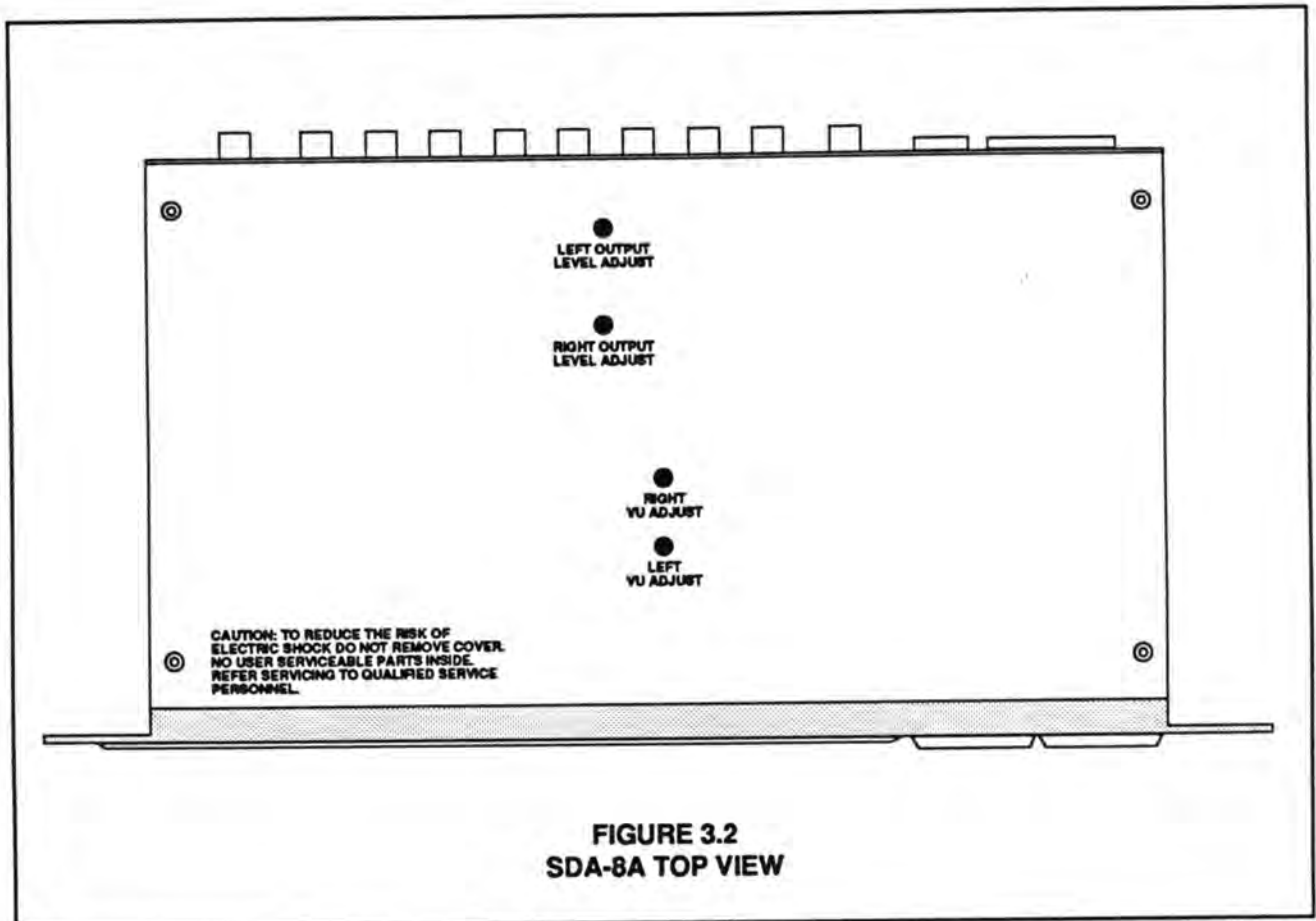
The SDA-8A's inputs are balanced and bridging, with a 40k ohm impedance. This may be switched to a 600 ohm termination, if necessary, by means of the 600 ohm TERMINATION button located on the SDA-8A's front panel assembly adjacent to the ON LED (reference Figure 3.1). This button will be orange when the 600 ohm termination is implemented, and black when it is not.

3.6 LEVEL ALIGNMENT

The SDA-8A is factory calibrated at the time of shipment for an output level of +8 dBm (unless a level of +4 dBm is specifically requested), with a -10 dBu patch return level. Once aligned, the gain trim controls on the output amplifiers should not require trimming unless components which affect amplifier gain have been replaced. If this is the case, align the SDA-8A per the following procedure:

NOTE: The following procedure describes alignment for an output level of +8 dBm. The trim-pots described in this procedure are all accessible through holes provided in the SDA-8A's top cover (reference Figure 3.2).

1. Remove the patch connector shorting plug, or processing equipment (if installed).
2. Connect a -10 dBu 1 kHz sinusoidal signal generator to the Left Patch Return (reference Figure 2.5), and an AC voltmeter with a 600 ohm input termination to the Left Output of one of the audio connectors.
3. Adjust the LEFT OUTPUT LEVEL ADJUST trim-pot until the output measures +8 dBm.
4. With the front panel METER selector in the OUTPUT position, adjust the LEFT VU METER



ADJUST trim-pot until the left meter reads 0 VU.

5. Repeat steps 2 through 4 for the right channel.
6. Replace the patch connector shorting plug or re-connect the processing equipment, and connect the 1 kHz signal generator to the SDA-8A's Left Input Connector. Set the generator's output voltage to be the same as the output level of the source equipment to be connected to the SDA-8A's input.
7. Using the front panel STEP GAIN and GAIN control switches, adjust the amplifier's input gain until the Left VU meter reads 0 VU.
8. Repeat steps 6 and 7 for the right channel.

4.0 EQUIPMENT DESCRIPTION

This chapter describes the various equipment and features incorporated into the SDA-8A. Included are sections describing the input circuitry, mode selector, output amplifier, VU meter buffer amplifier, and power supply.

4.1 INPUT CIRCUITRY

NOTE: The two stereo channels operate identically, so, for simplicity, only the left channel will be discussed below.

The input amplifiers are designed to accommodate the nominal input level range of -30 dBu to +9 dBu, while maintaining an extremely high common mode rejection ratio of 60 dB or greater (80 dB below 1 kHz). This can only be accomplished through the use of careful circuit design, accurate adjustment, and immaculate grounding and printed circuit layout techniques.

NOTE: The CMRR adjustments are factory aligned using an Automated Test Equipment (A.T.E.) system, and should not be adjusted by the user. To do so may severely degrade common mode performance.

The input circuitry is divided into three stages: an input attenuator, an adjustable gain amplifier, and a switchable gain amplifier.

The input attenuator, made up primarily of R5, R6, R7 and R8, serves to attenuate any common mode signal component to within the common mode range of the adjustable gain amplifier. Trim-pot R24 and resistors R12 and R14 provide common mode balance for the attenuator circuit. Likewise, C23 provides high frequency common mode balance for input filter capacitors C7 and C8.

The adjustable gain inverting amplifier is configured with three operational amplifiers on a plug-in function module operating with cross-coupled input stage feedback with gain trim control R17. The plug-in function module contains its own low and high frequency common mode balance controls, which optimize the CMR of the module. C16 serves to minimize DC offset voltages by dropping the gain of A3 to unity at DC. The shield around this cap prevents capacitor signals from crosstalking into the surrounding circuits, which would upset the common mode balance.

The switchable gain amplifier is configured as an inverting amplifier, whose gain is determined by the 4-position front panel GAIN switch. When the switch is fully counterclockwise the four resistors are in series, causing the gain to be minimum. As the switch is rotated in the clockwise direction, the resistors are sequentially shorted out, causing the gain to increase by approximately 10 dB every step. The output of this amplifier drives the Patch Point at a nominal -10 dBu.

The input headroom of the entire circuit is 20 dB above nominal input.

4.2 MODE SELECTOR

The Patch Return inputs to the distribution amplifier are balanced, to prevent any common mode noise from being introduced into the outboard wiring. The outputs of these unity gain differential amplifiers drive channel selection relays K1 and K101. The outputs of these relays drive mono shorting relay K2, through resistors R36 and R136. The relays are energized when the MODE switch sends a voltage to the appropriate coil.

When the MODE switch is in the STEREO position, DS1 is illuminated, and none of the three relays is energized, causing the Left and Right stereo signals to be sent to the output amplifiers. When the mode switch is in placed in either the LEFT or RIGHT positions, either DS4 or DS3 (respectively) is illuminated, and either K1 or K101 is energized, causing the Left or Right signal to be sent to both output amplifiers. When the mode switch is in the SUM L + R position, DS2 is illuminated and K2 is energized, causing the Left and Right signals to resistively mix through R36 and R136, and the composite sum to be sent to both output amplifiers.

4.3 OUTPUT AMPLIFIER

NOTE: The two stereo channels operate identically, so, for simplicity, only the left channel will be discussed below.

The output of MODE selection relay K1 drives variable gain buffer amplifier U5. The voltage gain of U5 is adjusted by trim-pot R43 (accessible through the SDA-8A's top cover), and has a gain range of 7 dB to 14.5 dB. The output of U5 is connected to line amplifiers A1 and A2, which operate as a push-pull pair to provide balanced drive to the distribution output lines. A1 and A2 are plug-in function modules designed to deliver high currents while maintaining excellent distortion specifications. The outputs of A1 and A2 are routed to the rear panel printed circuit board, and to the eight output connectors through the 39 ohm build-out resistors which serve to isolate the loads.

NOTE: Do not ground either the high or low lines of the balanced outputs. If it is necessary to take an unbalanced output, use the high and shield connections only.

4.4 VU METER BUFFER AMPLIFIER

NOTE: The two stereo channels operate identically, so, for simplicity, only the left channel will be discussed below.

The VU meter buffer amplifier consists of dual integrated circuit amplifier U6, configured for a balanced symmetrical input and operating with cross-coupled feedback. The gain of the amplifiers is adjusted by trim-pot R62 (accessible through the SDA-8A's top cover), and has enough gain range to accommodate inputs from +3 dBu to +9 dBu. The output of the two amplifiers is coupled to the VU meter through the recommended source resistance of 3600 ohms, at a nominal signal level of +4 dBu (0 VU). Light emitting diodes DS1 and DS2 provide overdrive protection to the meter movement.

4.5 POWER SUPPLY

The power supply for the SDA-8A uses a toroidal power transformer to minimize the radiated field. The bipolar 16 volt supply is powered from two separate windings of power transformer T1, wired in a center-tap configuration. The secondaries are rectified by diode bridge CR12, and filtered by capacitors C1 and C4. U1 is a positive and U2 a negative integrated circuit adjustable regulator. The various small components around the regulators are used to set the output voltage, and improve the noise and transient response of the regulators.

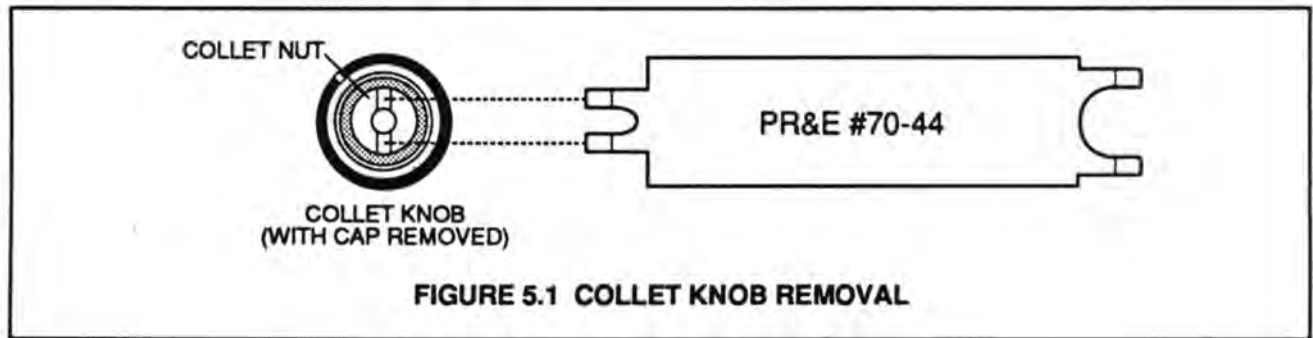
5.0 MAINTENANCE

This chapter contains sections describing routine maintenance, installation and servicing tools, common mode adjustment, and replacement parts for the SDA-8A.

5.1 ROUTINE MAINTENANCE

Routine maintenance is usually limited to checking button switches for proper operation and keeping panel surfaces clean. The panel surfaces are finished with a baked polyurethane paint and may be cleaned with a weak solution of dishwashing detergent. The security door is fabricated from plexiglass and should only be cleaned using a clean, soft cloth.

The knobs used for the SDA-8A's rotary controls are attached to the pot and switch shafts with collets instead of set screws. The machined brass collets provide the advantages of true alignment and concentricity with the axis of rotation, no set screws to score the shaft, the ability to clutch slip when excessive force is applied, and no holes in the side of the knob for the set screws. To remove a collet knob, carefully pry off the top cap of the knob using an Exacto knife or similar tool. Use PR&E tool #70-44 (as shown in Figure 5.1) to turn the nut on the collet counterclockwise. Once the nut is loosened, the collet should release from the shaft. This nut should not need to be removed unless the collet refuses to release.



5.2 TOOLS

The following tools may be desired for installing and servicing the SDA-8A. If you already have a PR&E console, you probably own these tools. If not, they can be purchased for a nominal charge.

<u>DESCRIPTION</u>	<u>PR&E#</u>
MOLEX connector pin crimp tool	70-3
MOLEX connector pin extractor tool	70-4
MOLEX connector pin crimp tool (#HTR-1719-C)	70-5
Wrench for collet knobs	70-44

5.3 CMRR ADJUSTMENT

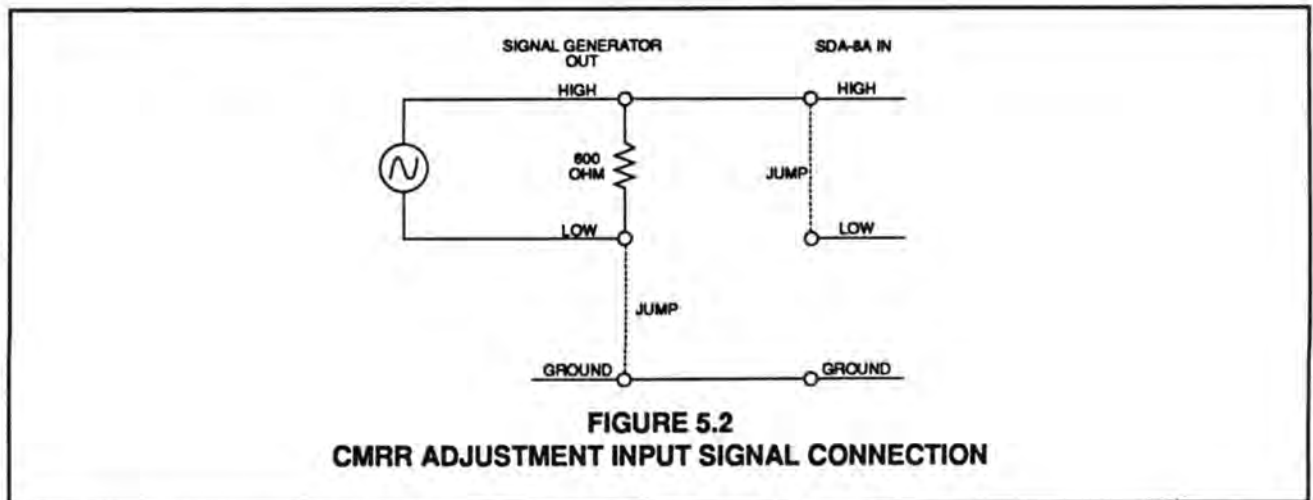
The SDA-8A's common mode rejection ratio (CMRR) is factory adjusted at the time of shipment, and should not require adjustment unless components which affect amplifier gain have been replaced. While

it is highly recommended that the SDA-8A be returned to the factory for maintenance of this type, the SDA-8A's CMRR may be adjusted per the following procedure:

NOTE: This procedure is divided into descriptions for both left and right channel adjustment.

LEFT CHANNEL ADJUSTMENT

1. Connect a 20 Hz balanced signal at a reference level of +20 dBm to the SDA-8A's left input, per the connection diagram shown in Figure 5.2.



2. Connect any one of the SDA-8A's left outputs to a Sound Technology 1710 Distortion Measurement System or an AC voltmeter.
3. Rotate the front panel left gain trim-pot and front panel left gain step switch fully counterclockwise.
4. Adjust trim-pot R8 on output amplifier function module A3 (as shown in Figure 5.3) to obtain a minimum output level.
5. Rotate the front panel left gain trim-pot fully clockwise.
6. Adjust trim-pot R24 on the main PC assembly to obtain a minimum output level.

NOTE: Trim-pots R8 and R24 are interactive, so repeat steps 3 through 6 until minimum output levels of at least 90 dB below the +20 dBm reference level are obtained and confirmed.

7. Change the input signal to 20 kHz.
8. Rotate the front panel left gain trim-pot fully counterclockwise.
9. Adjust variable capacitor C10 on the output amplifier function module (A3) to obtain a

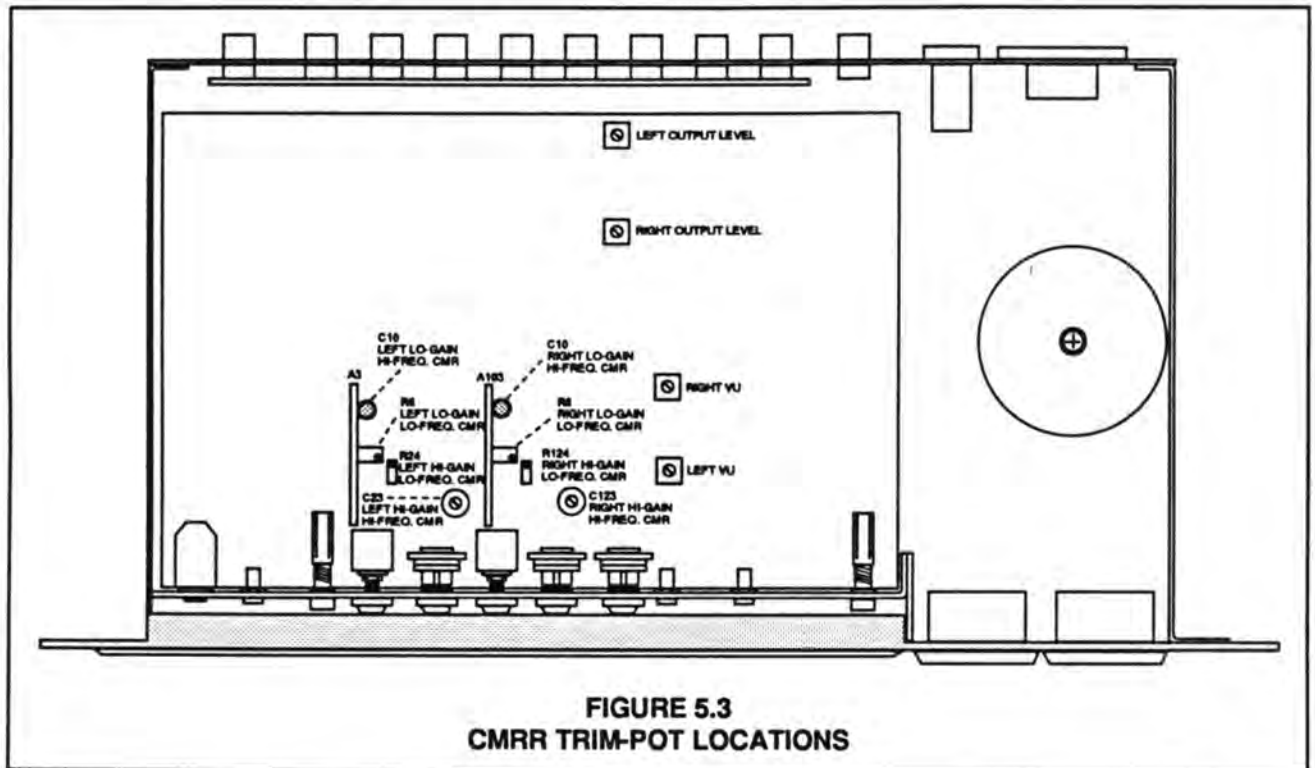


FIGURE 5.3
CMRR TRIM-POT LOCATIONS

minimum output level.

10. Rotate the front panel left gain trim-pot fully clockwise.
11. Adjust variable capacitor C23 on the main PC assembly to obtain a minimum output level.

NOTE: Capacitors C10 and C23 are interactive, so repeat steps 8 through 11 until minimum output levels of at least 60 dB below the +20 dBm reference level are obtained and confirmed.

12. Return the front panel left gain trim-pot to the fully counterclockwise position.

RIGHT CHANNEL ADJUSTMENT

1. Connect a 20 Hz balanced signal at a reference level of +20 dBm to the SDA-8A's right input, per the connection diagram shown in Figure 5.2.
2. Connect any one of the SDA-8A's right outputs to a Sound Technology 1710 Distortion Measurement System or an AC voltmeter.
3. Rotate the front panel right gain trim-pot and front panel right gain step switch fully counterclockwise.
4. Adjust trim-pot R8 on output amplifier function module A103 (as shown in Figure 5.3) to obtain a minimum output level.

5. Rotate the front panel right gain trim-pot fully clockwise.
6. Adjust trim-pot R124 on the main PC assembly to obtain a minimum output level.
NOTE: Trim-pots R8 and R124 are interactive, so repeat steps 3 through 6 until minimum output levels of at least 90 dB below the +20 dBm reference level are obtained and confirmed.
7. Change the input signal to 20 kHz.
8. Rotate the front panel right gain trim-pot fully counterclockwise.
9. Adjust variable capacitor C10 on the output amplifier function module (A103) to obtain a minimum output level.
10. Rotate the front panel left gain trim-pot fully clockwise.
11. Adjust variable capacitor C123 on the main PC assembly to obtain a minimum output level.
NOTE: Capacitors C10 and C123 are interactive, so repeat steps 8 through 11 until minimum output levels of at least 60 dB below the +20 dBm reference level are obtained and confirmed.
12. Repeat steps 8 through 11 until minimum output levels are obtained, then return the front panel right gain trim-pot to the fully counterclockwise position.

NOTE: Once both the left and right channels have been CMRR adjusted, the SDA-8A must be level aligned per the procedure contained in Section 3.6 of this document.

5.4 REPLACEMENT PARTS

Most of the components used are standard items of general availability. However, should difficulty be encountered locating any of the items, PR&E maintains a stock of replacement parts. The power supply transformer and Schadow button switches are manufactured to custom design specifications and are, therefore, available only from PR&E.

The following is a partial list of parts and assemblies used in the SDA-8A, and PR&E part numbers for easy reference:

DESCRIPTION	PR&E#
Button Cap, "Winkey", Square, Blk-Org	25-769
Capacitors	
Electrolytic, 10 μ F, 25V, Radial, NP	60-84
Electrolytic, 22 μ F, 16V, Radial	60-55
Electrolytic, 22 μ F, 25V, Radial, NP	60-85
Electrolytic, 47 μ F, 16V, Radial, NP	60-81
Electrolytic, 100 μ F, 16V, Radial, NP	60-82

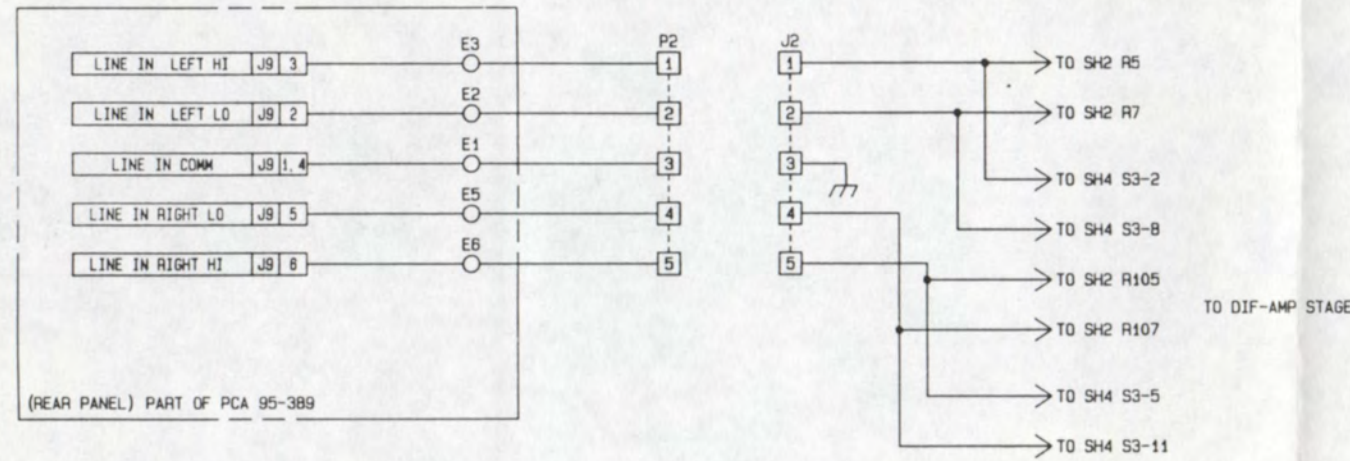
<u>DESCRIPTION</u>	<u>PR&E#</u>
Electrolytic, 220 μ F, 16V, Radial, NP	60-83
Electrolytic, 470 μ F, 50V, Axial	60-28
Tantalum, 10 μ F, 35V	65-5
Caps	
Blue (for S110 knob)	32-123
Green (for S110 knob)	32-152
Connector Kit	76-60
Diode, 1N914B	11-13
Fuse, 1/2 ASB, 250V	30-5
Fuse Holder	30-711
Headphone Jack	17-54
Insulator, for TO-220AB, Silpad	31-3
Integrated Circuits	
Op Amp, DIP, NE5534N	20-28
Op Amp, Dual, LF353N	20-32
Op Amp, Dual, 8-pin DIP, NE5532N	20-53
Knob, 11MM, 1/8" Shaft, Grey	32-120
Knob Assembly (for S110 knob)	90-327-1
LEDs	
Diffused, Red	12-7
Panel Mount, Green	12-50
Panel Mount, Red	12-53
Nut Cover, Black (for S110 knob)	32-158
Potentiometer, Single, 10K, CCW Mod Log	24-122
Regulators	
Variable, 1.5A, Pos., LM317T	20-49
Variable, 1.5A, Neg., LM337T	20-59
Shorting Plug Assembly	90-667
Switches	
Pushbutton, Black/Orange	25-602
Rotary, 1 Pole, 4 Position	27-17
Transistor/Diode Assemblies	
MJE171 & 1N914B	90-119-1
MJE181 & 1N914B	90-119-2
Trimpots	
Multi-turn, Cermet, 10K ohm	24-56
Multi-turn, 50 ohm	24-61
Single-turn, Cermet, 10K ohm	24-54

6.0 SCHEMATICS & DRAWINGS

This chapter is made up of the following schematics and drawings:

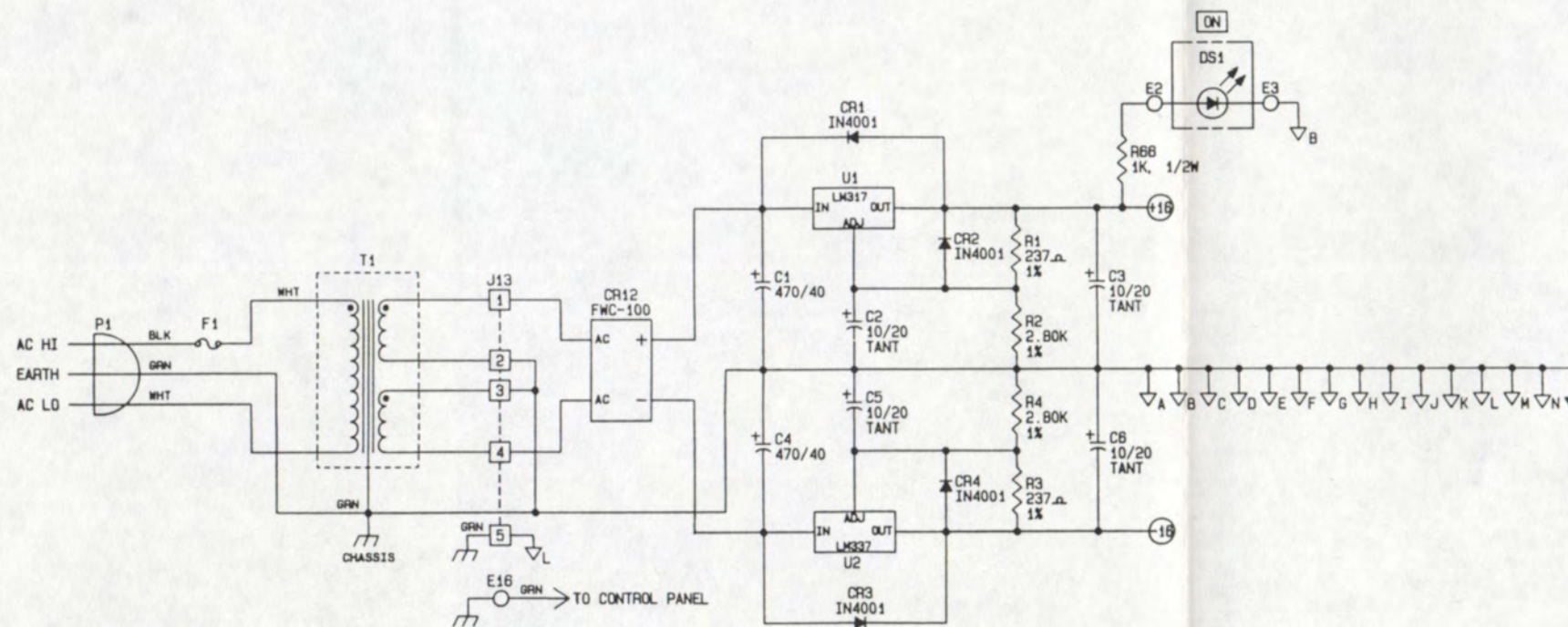
- 6.1 Stereo Distribution Amplifier Schematic
- 6.2 Output Amplifier Function Module Schematic
- 6.3 Instrument Input Function Module Schematic
- 6.4 Stereo Distribution Amplifier PC Assembly

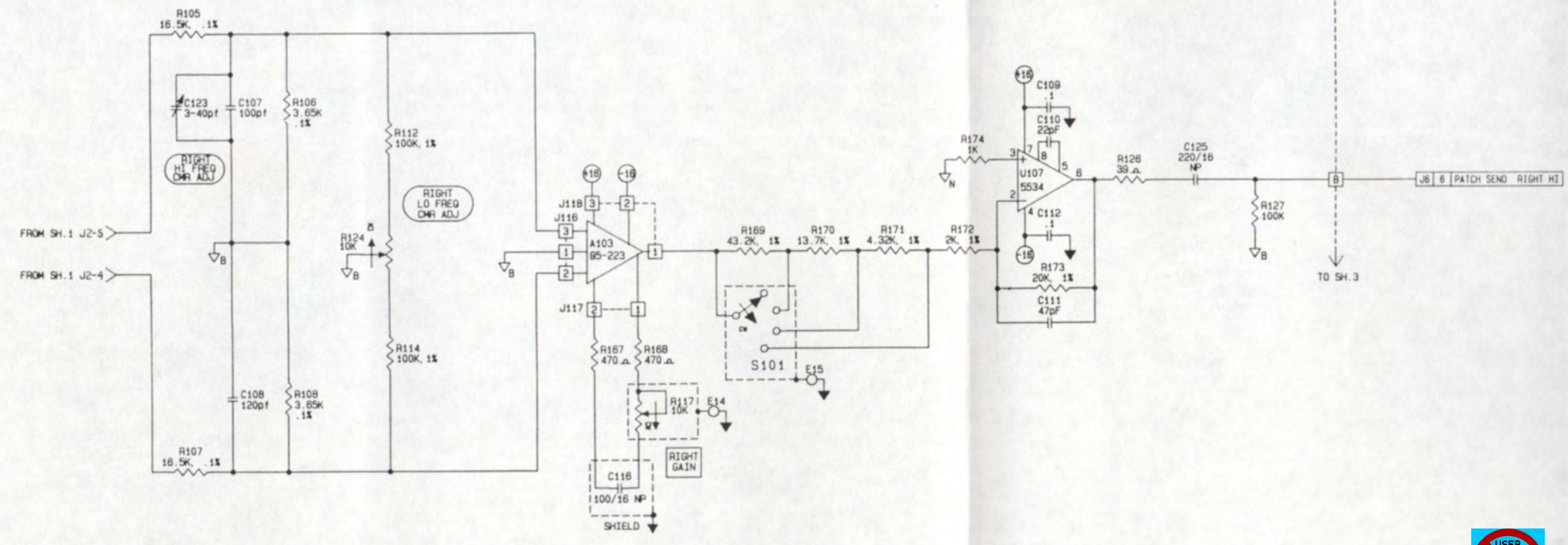
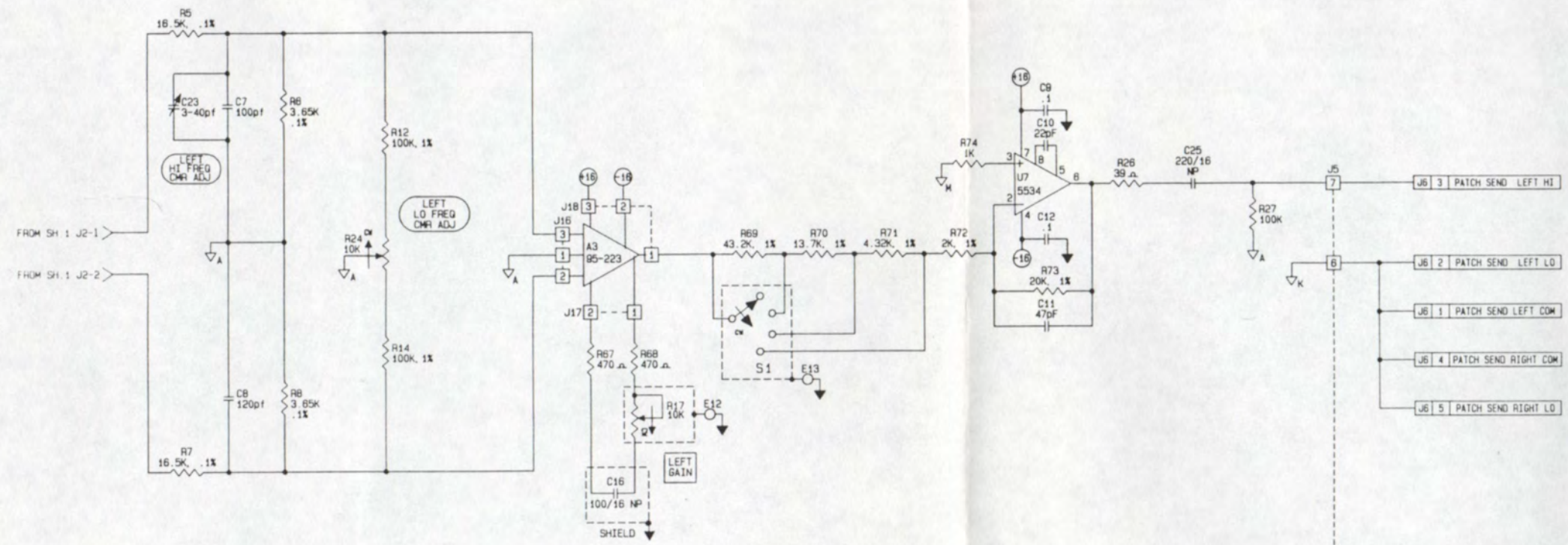
NOTE: On PR&E schematics, capacitor values are in microfarads (μF), unless otherwise specified, and resistors are 1/4 watt, 5%, unless otherwise specified.

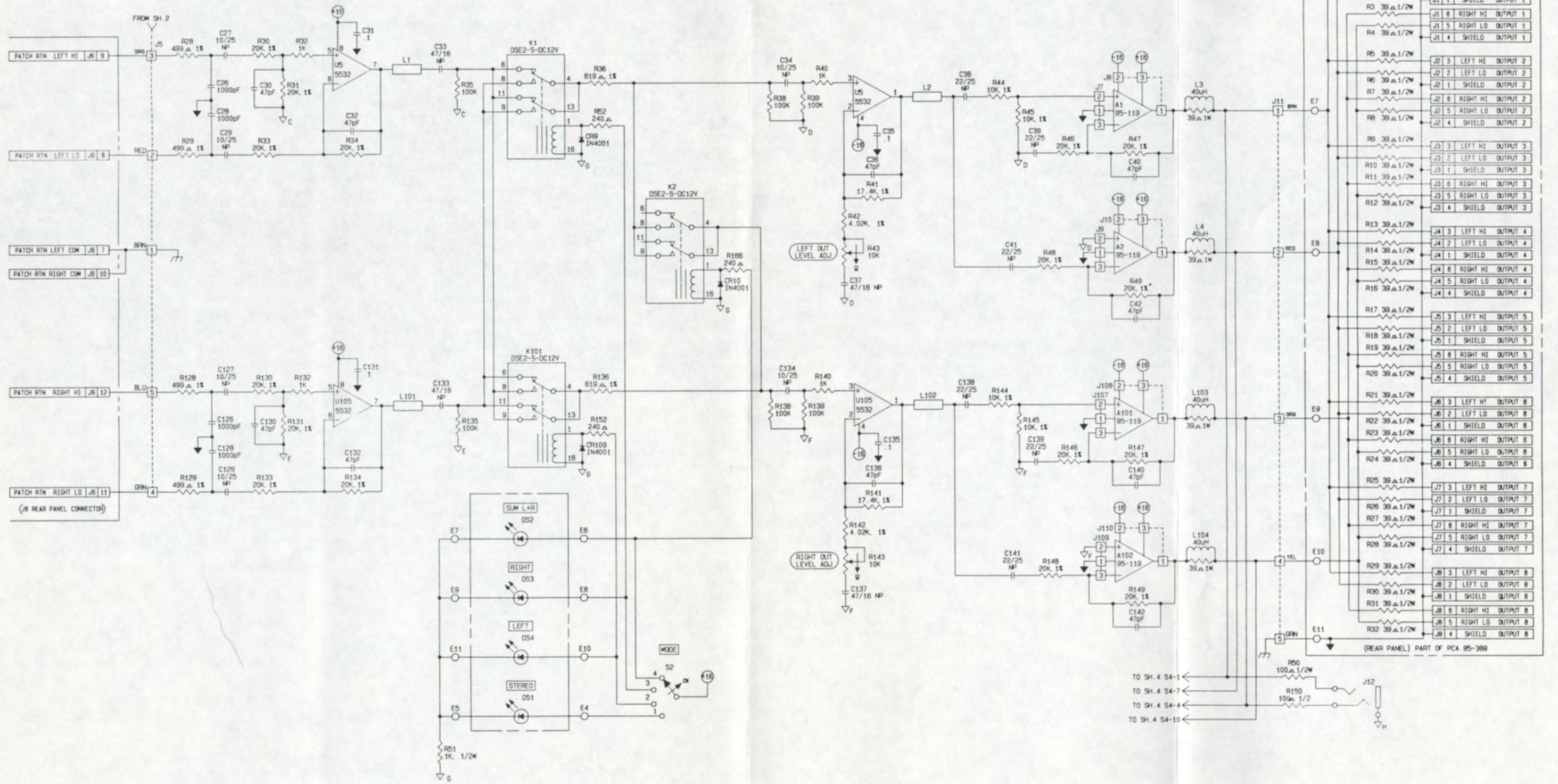


GROUND SYMBOLS	
	AUDIO COMMON
	LOGIC COMMON
	GROUND PLANE
	CHASSIS GROUND

REFERENCE DESIGNATOR CHART	
LAST USED	UNUSED
C153	C13-15, 22, 24, 54-106, 113-115, 124
CR109	CR5-8, 11, 13, 14-108
DS107	DS1-5, 8-105
E16	E1
J118	J1, 4, 6, 15, 19-106, 111-113, 115
K101	K3-100
L104	L5-100
R174	R9-11, 13, 15, 16, 18-23, 25, 37, 75-104, 109-111, 113, 115, 116, 118-123, 125, 137, 151
S101	S5-100
U107	U3, 4, 8-104



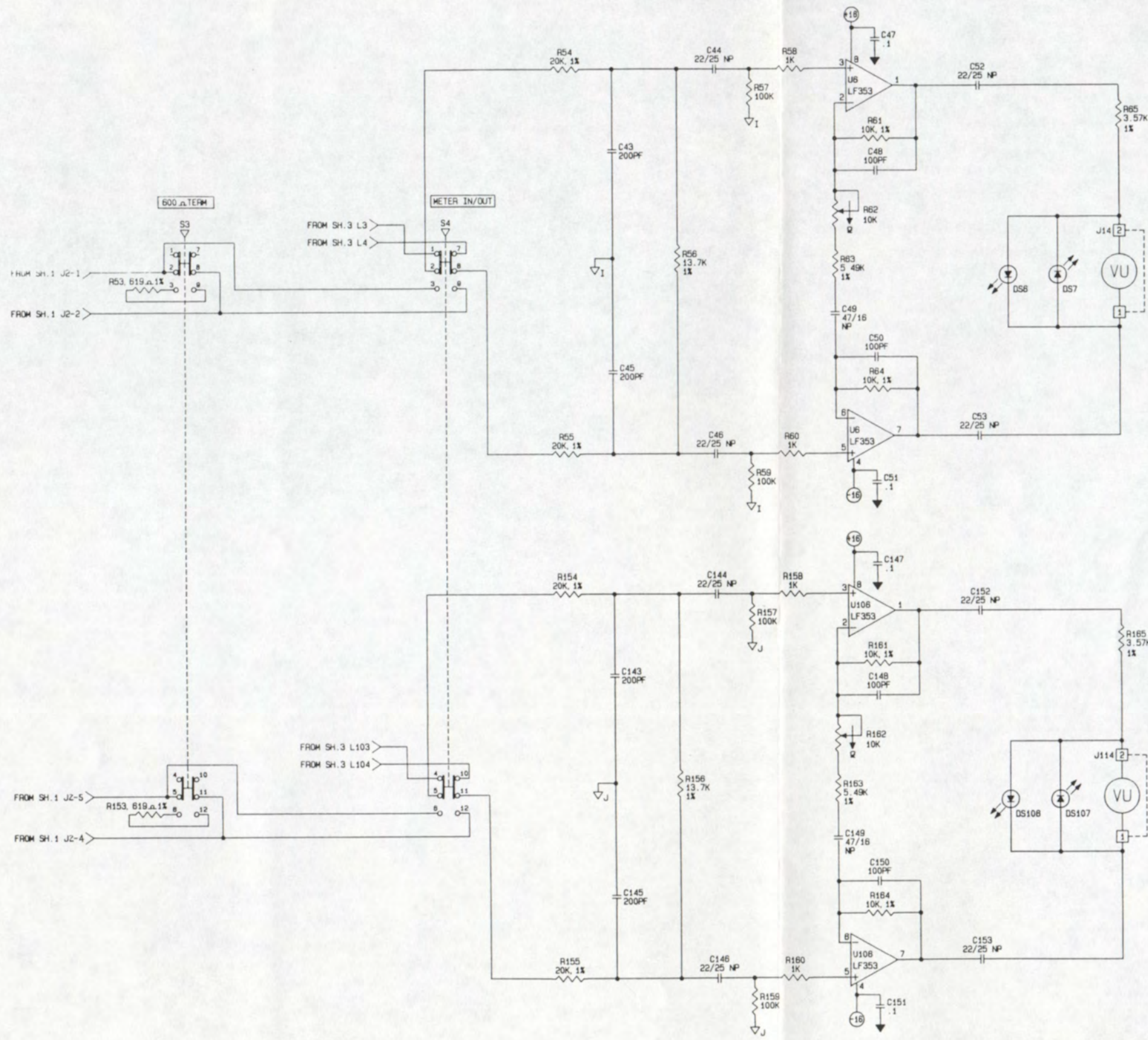




If You Didn't Get This From My Site,
Then It Was Stolen From...
www.SteamPoweredRadio.Com

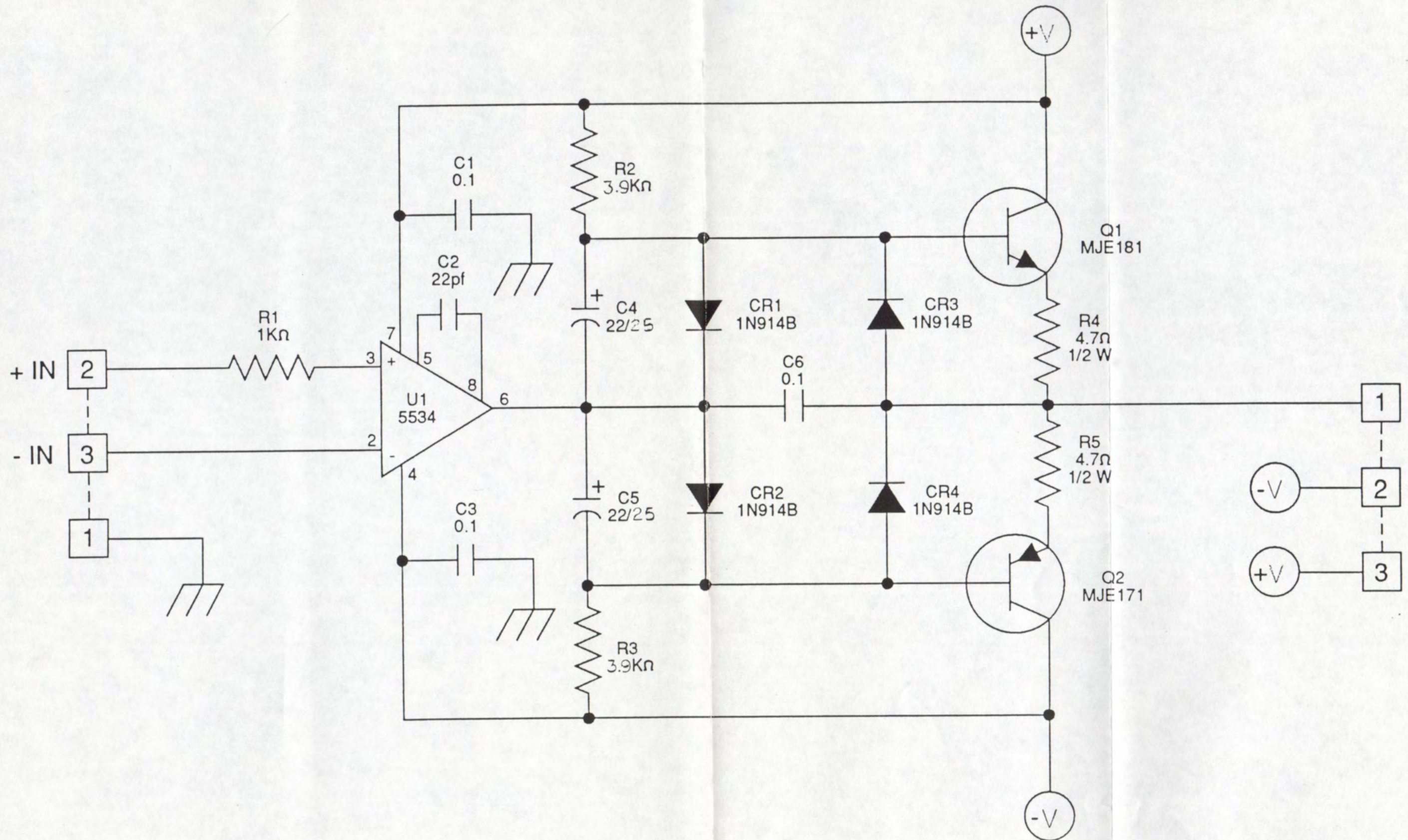


6.1 STEREO DISTRIBUTION AMPLIFIER SCHEMATIC SHEET 3 OF 4



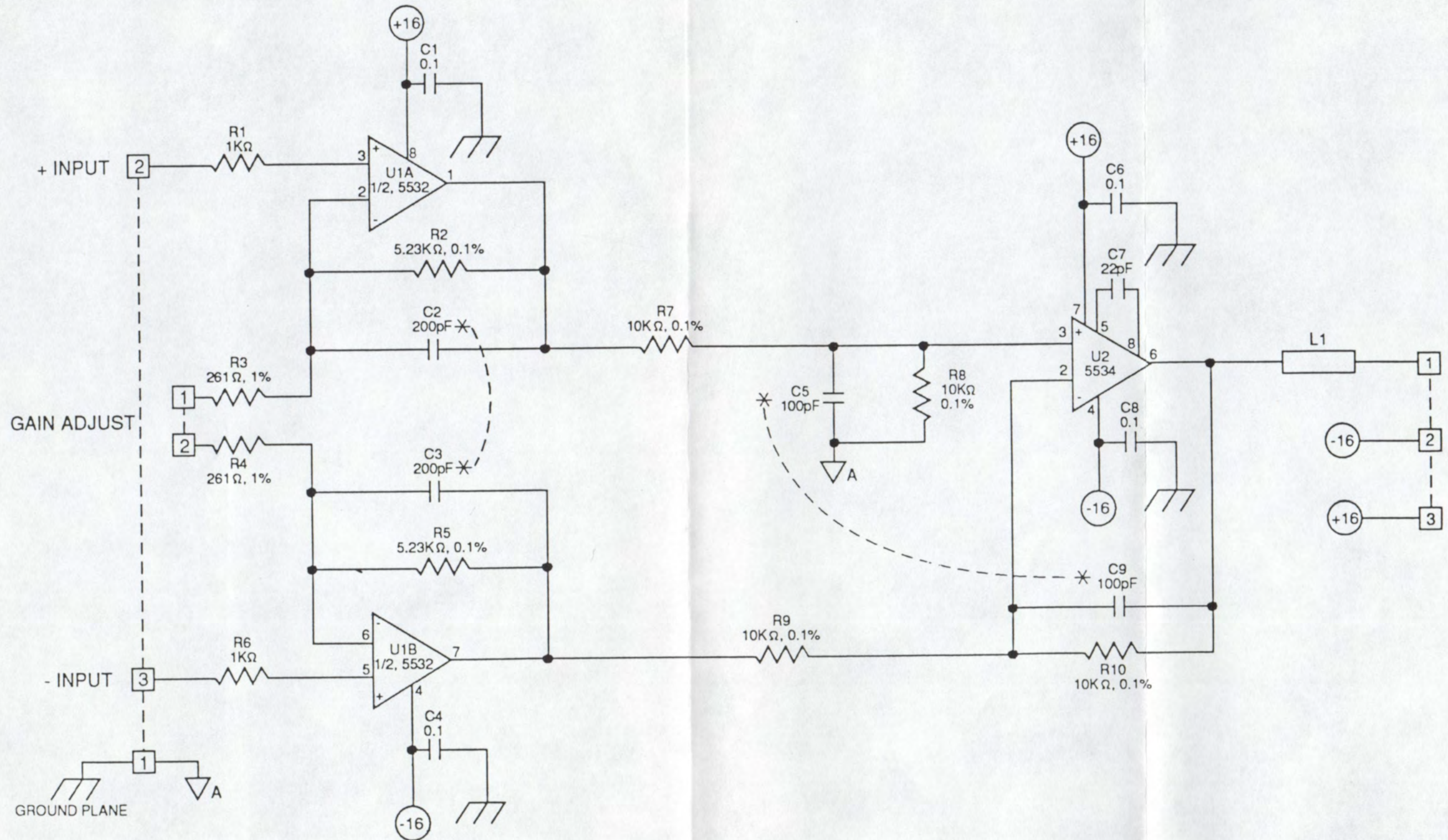
6.1 STEREO DISTRIBUTION AMPLIFIER SCHEMATIC SHEET 4 OF 4





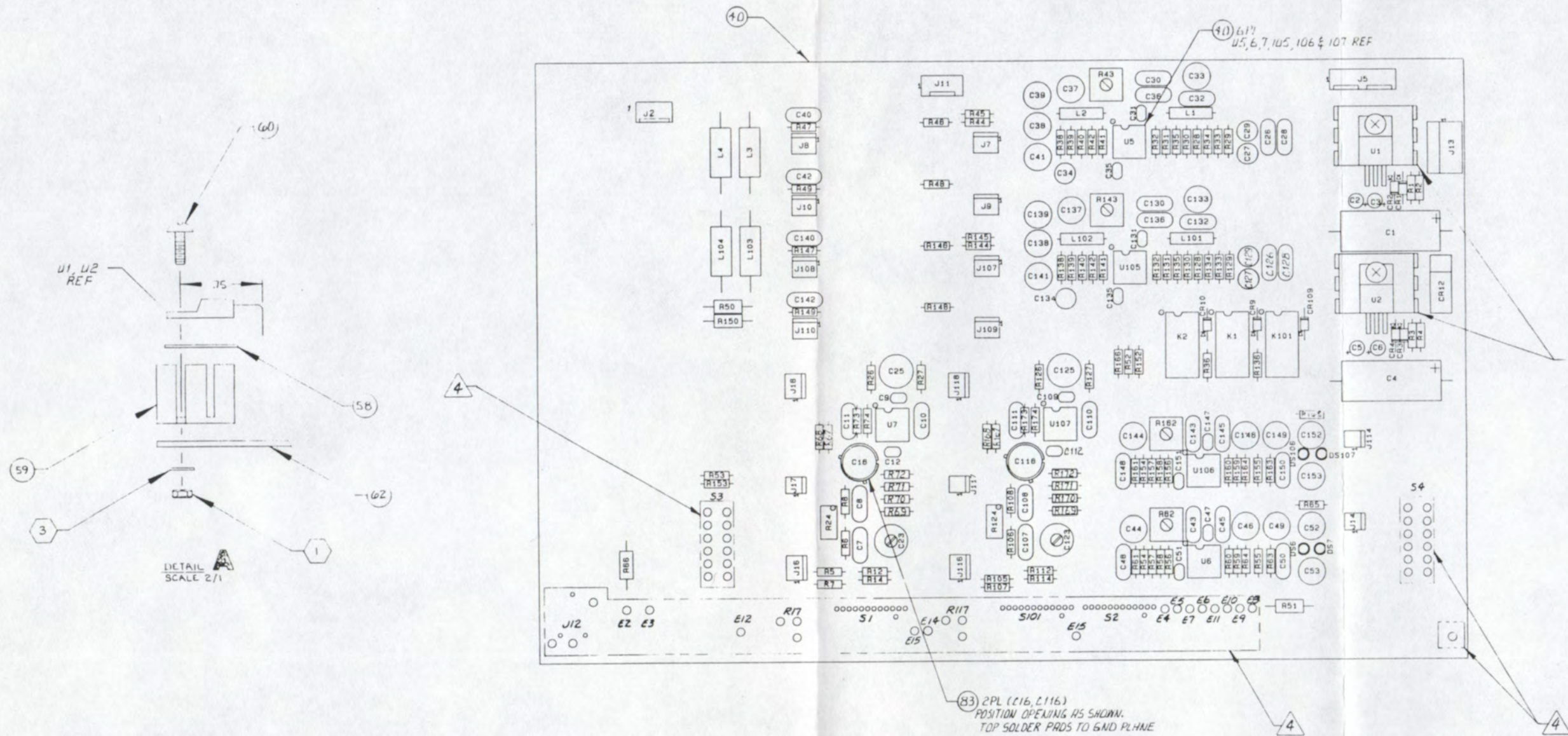
6.2 OUTPUT AMPLIFIER FUNCTION MODULE SCHEMATIC





* - - - * MATCHED PAIRS





SEE DETAIL A

