Film-Tech

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7.0 KT-100 Dual Power Amplifier

7.1 Introduction

The KT-100 Dual Power Amplifier is designed with the latest state-of-the-art technology:

Two Power Supplies. Each amplifier channel has its own power supply for added dependability and to minimize the problem of ground loops in multiple-amplifier systems.

Conservatively rated output devices. No current limiting is used except for low load impedances or short circuits.

LED indicators. "Ready" and "protect/clip" indicators show the status of each amplifier channel. The red LED indicator illuminates when the output relay has tripped because of DC in the output, high temperatures, or peak clipping.

NOTE:
PAGES 3,4,5 MISSING

7.2 Front and Rear Panels

Refer to Figure 7.1. Front Panel of the KT-100.

1. Power Switch.

2. Ready Indicator (Green). This LED is on during normal operation.

3. Protect/Clip Indicator (Red). This LED indicates standby, protect, or clipping conditions.

4, Gain Controls. The L (Left), R (Right), C (Center), and S (Surround) levels need to be adjusted only once for most installations. The controls are behind the protective covers.

(88.9 mm H X 483 mm W X 292.1 mm D.)

Weight 30.5 pounds.

(13.8 kilograms.)

Kintek products are manufactured under one or more of the following U.S. patents: 3,681,618; 3,714,462; 3,789,143; 4,101,849; 4,097,767. Other patents pending.

7.4 Installation

7.4.1 Unpacking and Mounting

Remove the unit from its shipping carton. The KT-100 was carefully inspected and tested at the factory. Contact your dealer in the event of any problems. We suggest saving the shipping carton and packing materials for safely transporting the unit in the future.

7.4.2 Precautions

When locating any electronic equipment near heat sources, provide adequate clearance for ventilation. Excessive heat shortens the life of any electronic component. Avoid high humidity and water.

Mounting electronic equipment and connecting cables as far as possible from motors and large power transformers lessens the possibility of 60-Hz hum being heard in the system.

7.5 Operation

7.5.1 System Alignment

Make all adjustments per the alignment procedures in Section 1.5.1.

7.6 Theory of Operation

7.6.1 Flow Chart SEE FIG 7.4

7.6.2 Schematic and Board Layouts

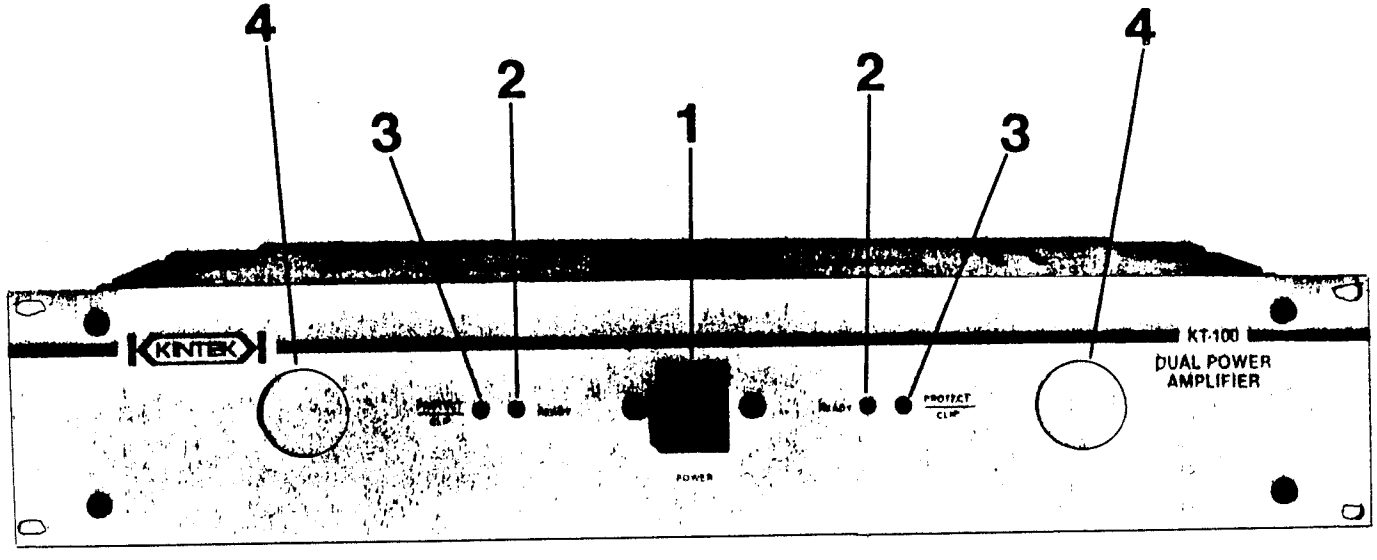


Figure 7.1. Front Panel of the KT-100.

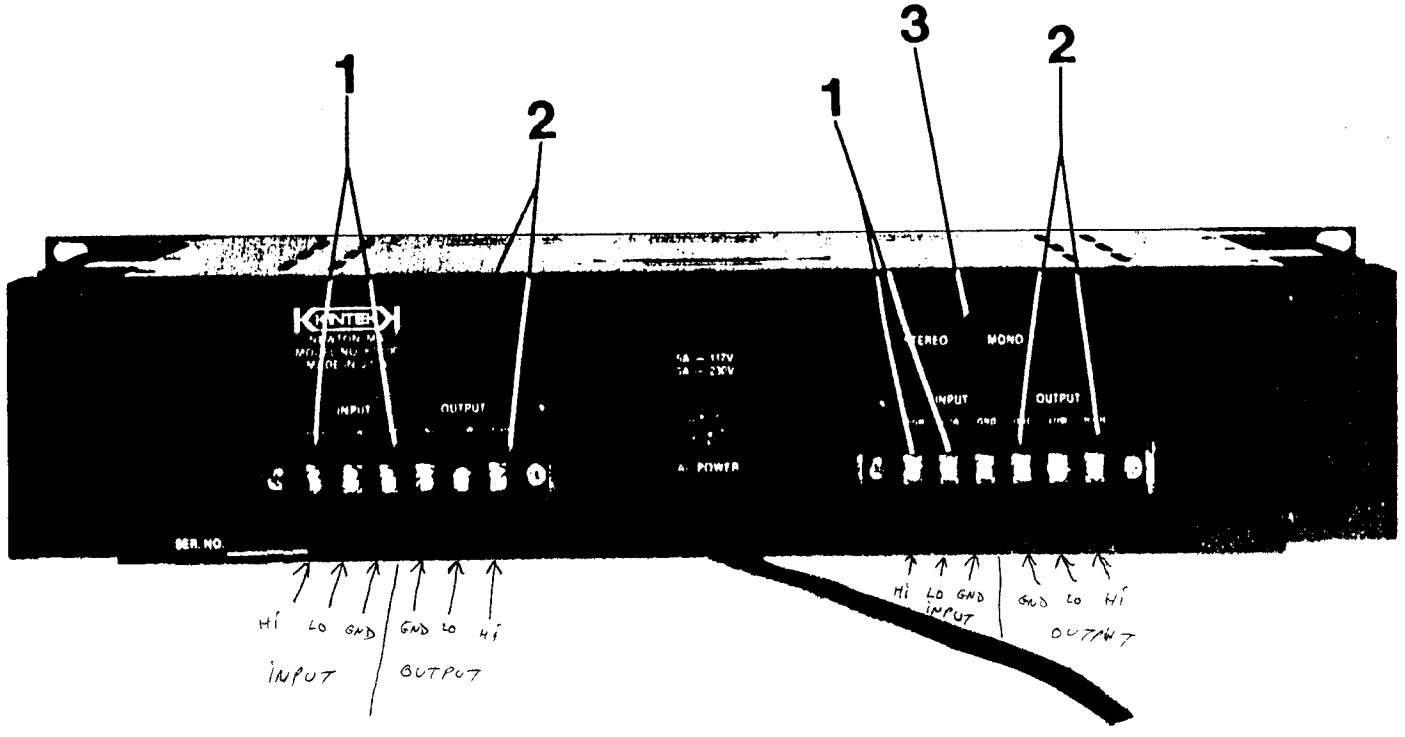


Figure 7.2. Rear Panel of the KT-100.

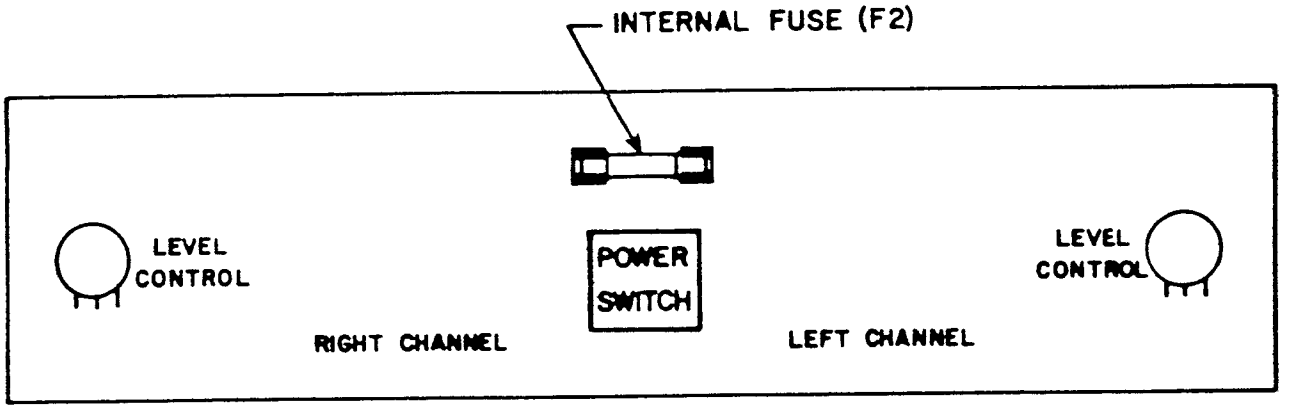


FIGURE 7.3. LOCATION OF INTERNAL FUSE

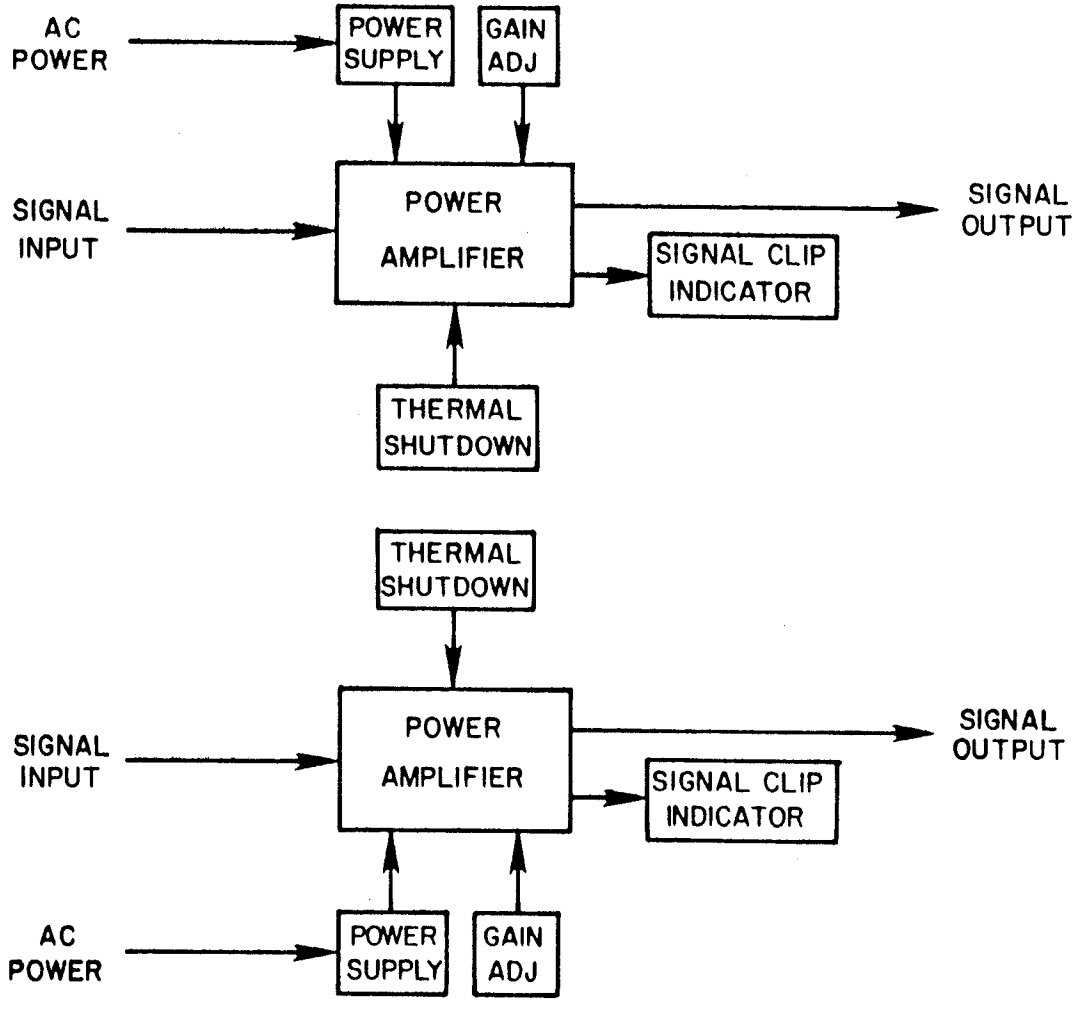
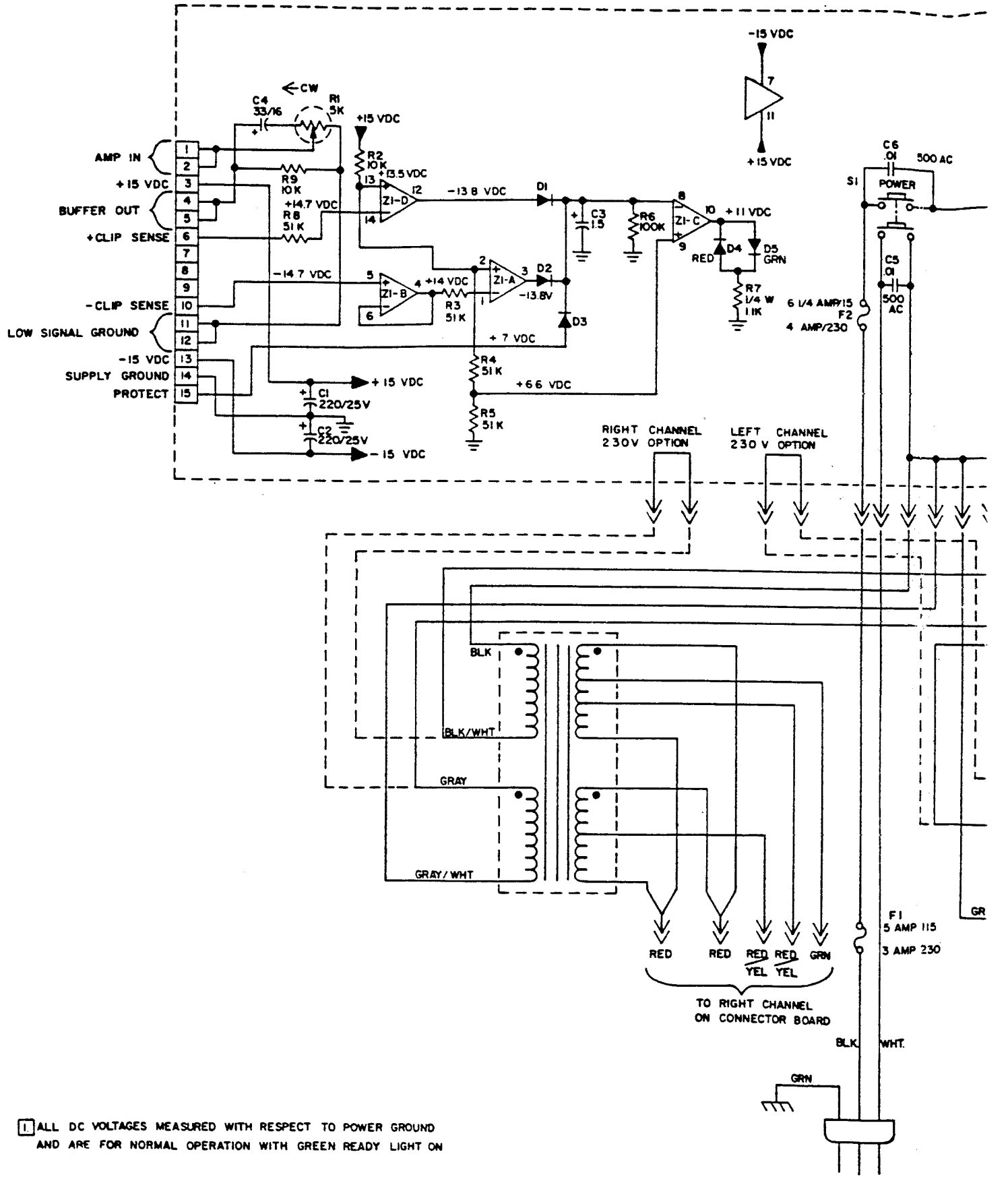


FIGURE 7.4. FLOW CHART OF THE KT-100.



[1] ALL DC VOLTAGES MEASURED WITH RESPECT TO POWER GROUND AND ARE FOR NORMAL OPERATION WITH GREEN READY LIGHT ON

NOTES: UNLESS OTHERWISE SPECIFIED.

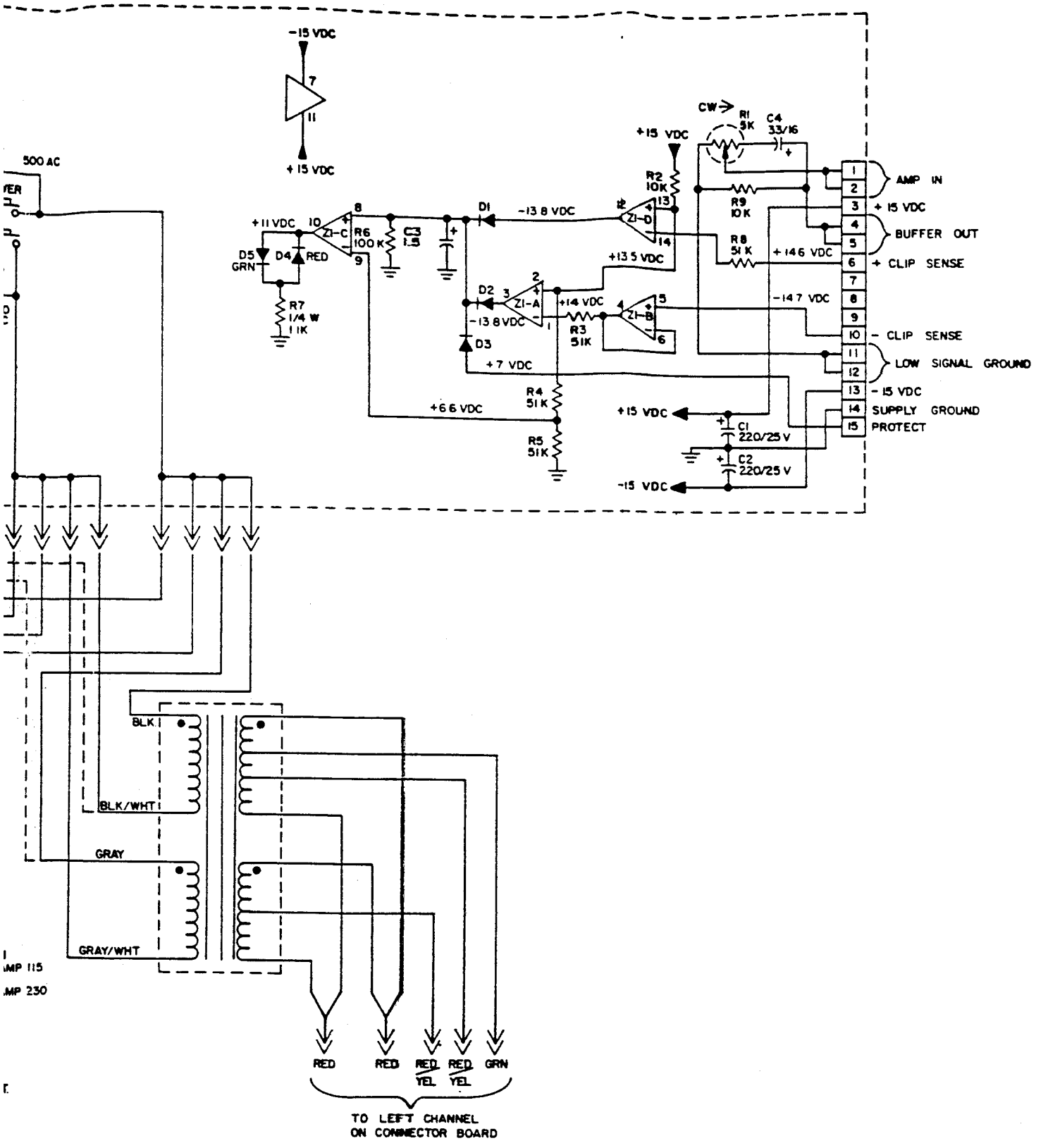
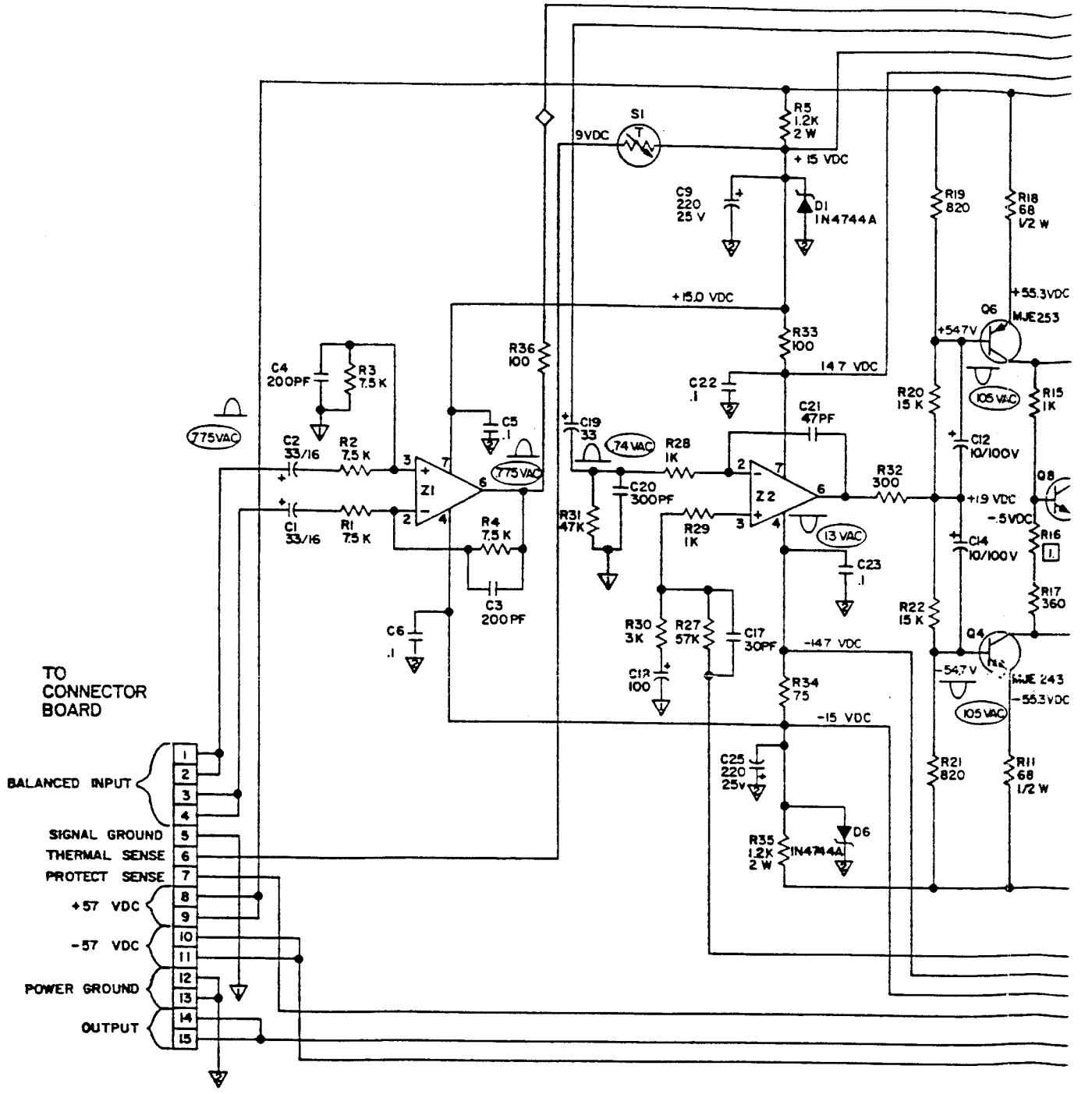


FIGURE 7.5B
SCHEMATIC OF THE KT-100



3. ALL SIGNAL LEVELS + PHASE REFERENCED TO 775 VAC 1KHZ AT INPUT WITH LEVEL CONTROL FULLY CLOCK WISE.

2. ALL VOLTAGES MEASURED WITH RESPECT TO CIRCUIT GROUND (BLACK BINDING POST).

1. VALUE IS SELECTED AT TEST TO PRODUCE 550VDC ACROSS R23 OR R26.

NOTES: UNLESS OTHERWISE SPECIFIED.

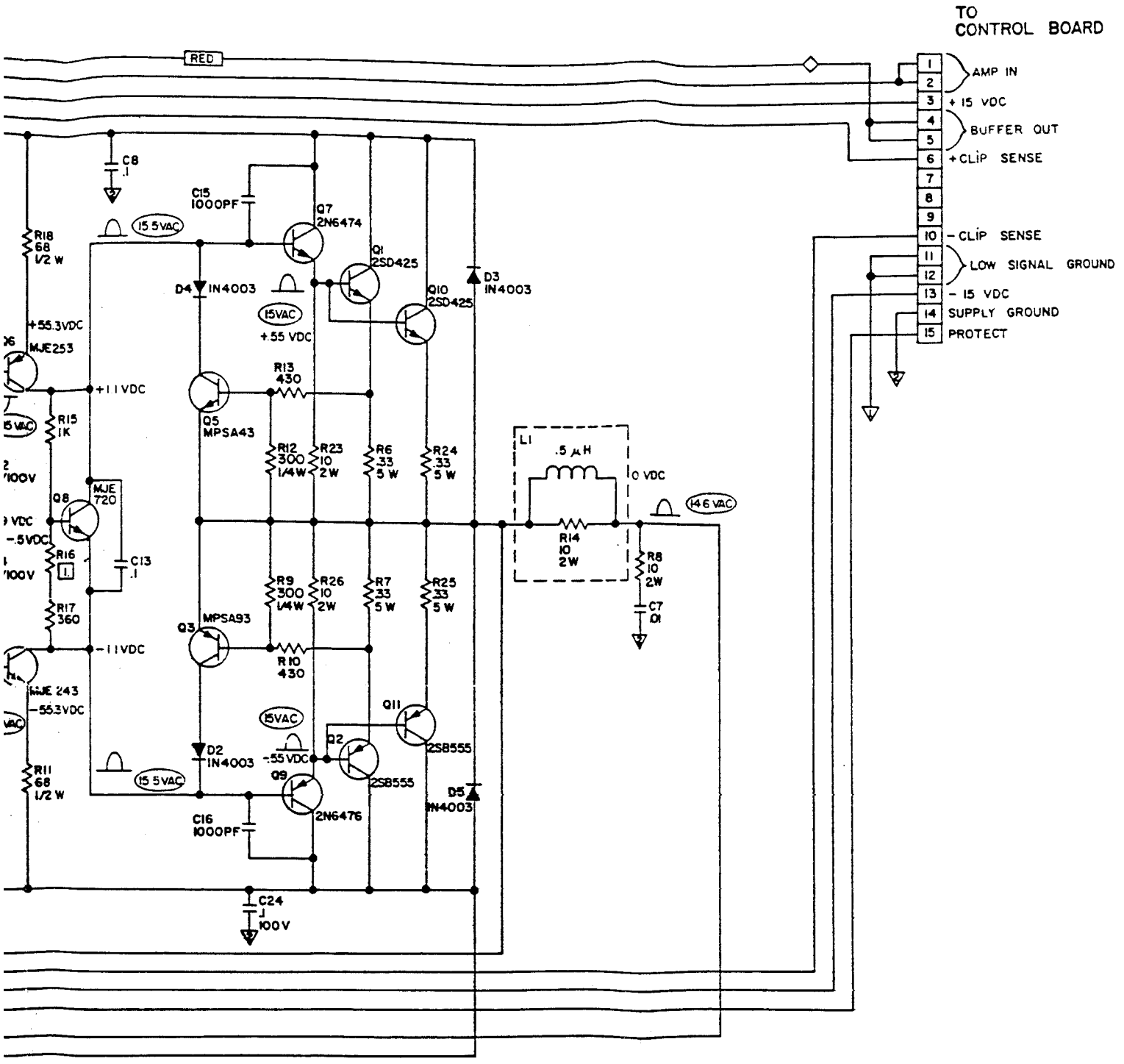
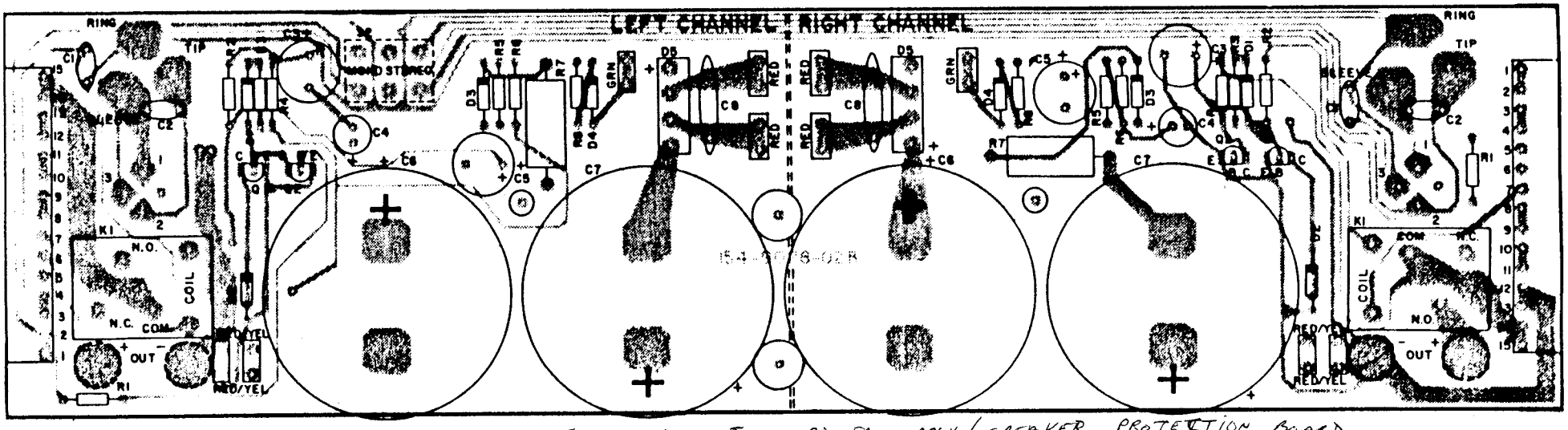


FIGURE 7.5C
SCHEMATIC OF THE KT-100



#154-9028-02F POWER SUPPLY/SPEAKER PROTECTION BOARD

FIGURE 7.6A
BOARD LAYOUT OF THE KT-100

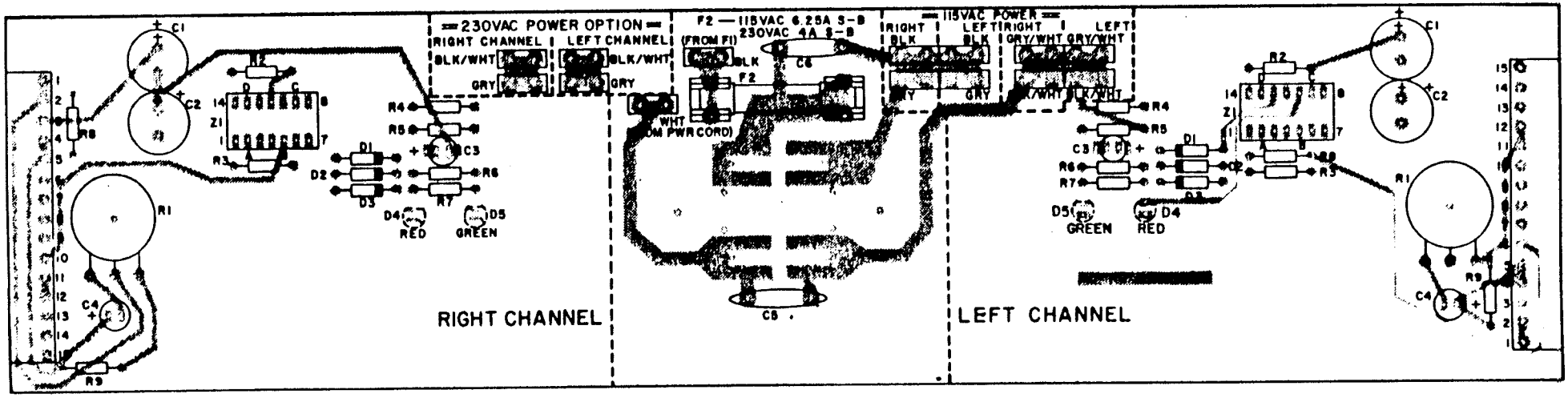


FIGURE 7.6B
BOARD LAYOUT OF THE KT-100

#154-9038-02E FRONT PANEL AND VOLUME CONTROL BOARD

KINTEK KT-100 DUAL POWER AMPLIFIER
Parts List

154-9038-02E Front Panel & Volume Control Board

C1,C2	220mfd, 25 volt Radial Capacitor
C3	1.5mfd, 20 volt Tantalum Capacitor
C4	33mfd, 16 volt Radial Capacitor
C5,C6	Disc Capacitor, 103 (.01 mfd)
F2	Fuse, 6.25 amp Slo-Blo
S1	Power Switch, Square, # DPA 3C 9C9
R1	Volume Control, 5K
R2,R9	10K ¼watt
R3,R4, R5,R8	51K ¼watt
R6	100K ¼watt
R7	1.1K ¼watt
D1-D3	1N4003 Diode
D4	LED, Green (left), Red (right)
D5	LED, Red (left), Green (right)
Z1	RC4136N Quad Op Amp SK9172 or ECG 997

154-9028-02F Power Supply/Speaker Protection Board

C1,C2	Disc Capacitor, 101M (.0001 mfd, 20%)
C3	220 mfd, 25 volt Radial Capacitor
C4	100 mfd, 10 volt Radial Capacitor
C5	470 mfd, 25 volt Radial Capacitor
C6, C7	11,000 mfd, 60 volt (75 surge) Screw terminal Computer capacitor, Mallory Type CGS (20-99552 or 235-7907A)
F1	Fuse, Main Power, 5amp Slo-Blo
D1-D4	1N4004 Diode
D5	KBL02 Bridge Rectifier, 200 v, 4a. ECG 5318 or SK 5028/5309
Q1,Q2	MPSA13 NPN Darlington ECG 46 or SK 9442
K1	Relay, 12vdc, 10 amp contacts, Aromat HL2-DC12V or ECG RLY 2342

R1	43K ¼watt	R2	75K ¼watt	R3	680 ohm ¼w
R4	22K ¼watt	R5	3.3K ¼watt	R6	22K ¼watt
R7	5.6K 2watt	R8	5.1 ohm ¼watt		

2 Power Transformers---Uni-Sync, Inc. A BSR Company
Model 100, 137-0004-00

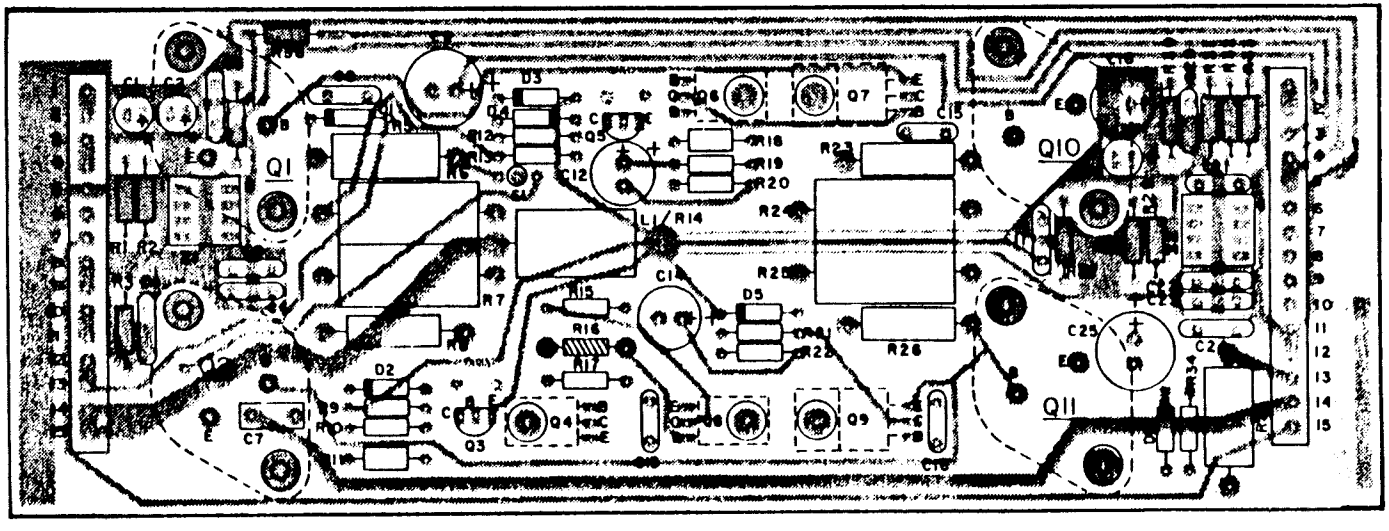


FIGURE 7.6C
BOARD LAYOUT OF THE KT-100
154-9020-02F
LEFT AND RIGHT CHANNEL POWER AMPS

KINTEK KT-100 DUAL POWER AMPLIFIER
Parts List

154-9020-02F Left & Right Channel Power Amplifier Boards

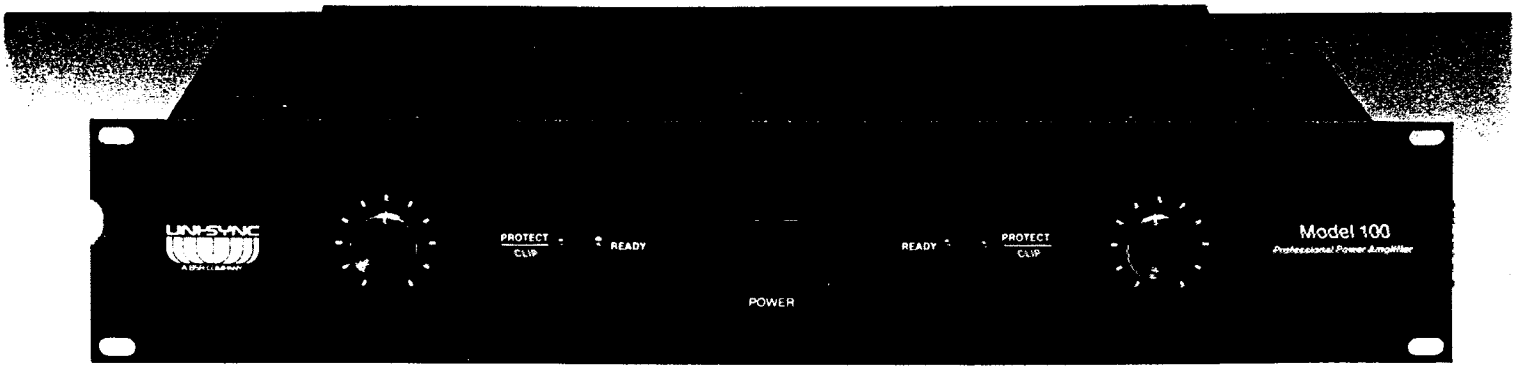
Q1	2SD424	NPN 150w	SK3836/284
Q2	2SB555	PNP 100w	SK3359/281
Q3	MPSA93	PNP	SK3434/288
Q4	MJE243		
Q5	MPSA43	NPN	SK3433/287
Q6	MJE253		
Q7	2N6474	NPN 40w	SK3440/291
Q8	MJE720	NPN	SK3190/184
Q9	2N6476	PNP 40w	SK3441/292
Q10	2SD425	NPN 100w	SK3297/280
Q11	2SB554	PNP 150w	SK3846/285
Z1	LF356N	JFET Input Op Amp 8-pin Dip	SK9147/937M
Z2	LF357H	JFET Input Op Amp 8-pin Can	SK9146/937
D1,D6	1N4744	15 volt, 1 watt zener diode	SK15V or ECG 145A
D2,D3, D4,D5	1N4004	Diode	
S1	Thermal	Overload shutdown sensor	
C1,C2,C19		33mfd, 16 volt Radial Capacitor	
C9,C25		220mfd, 25 volt Radial Capacitor	
C12,C14		10mfd, 100 volt Radial Capacitor	
C18		100mfd, 10 volt Radial Capacitor	
C3,C4		Disc Capacitor, 201M (.0002 mfd. 20%)	
C5,6,8,13,22,23,24		Disc Capacitor, .1mfd, 100 volt	
C7		Mylar Capacitor, .01mfd, 100 volt	
C10,C11		NOT USED---LEAVE EMPTY	
C15,C16		Small Disc Capacitor, 102 (.001mfd 50 volt)	
C17		Small Disc Capacitor, 30pf	
C20		Disc Capacitor, 301M (.0003mfd, 20%)	
C21		Small Disc Capacitor, 47pf	

R1-4	7.5K
R5	1.5K,5w
R6,R7	
R24,R25	.33ohm,5w
R8	10ohm,2w
R9,R12,R32	300ohm
R10,R13	430ohm
R11,R18	68ohm, ½w
R14/L1	10ohm, 3w with 13 turns #18 wire wrapped on it
R15,R28,R29	1K
R16	consists of 2 ¼w resistors in series, 22 ohm and 68 or 100 ohm
R17	360 ohm
R19,R21	820 ohm
R20,R22	15K
R23,R26,R33	100 ohm
R27	Precision ¼watt value brn-red-blue-pur-grn
R30	3K
R31	47K
R34	75 ohm
R35	1.2K, 5watt

All Resistors are ¼watt unless specified at a higher value.

KINTEK KT-100 AMPLIFIER

MODEL 100
Professional Power Amplifier



Two Amplifiers: Not just a stereo amplifier, but actually two amplifiers in one chassis, which means accurate bass response, greater dynamics and elimination of the crosstalk distortion phenomenon.

Design: Greater efficiency due to technically superior transformer and heat sink designs.

Size: Smallest dual 100 watt professional power amplifier on the market - a 3½ inch package.

True modular construction: road tested interlocking PC board assemblies eliminate inconsistencies in performance, and serviceability problems found in hand-wired products.

Connections: Balanced bridging XLR and ¼ inch phone inputs; both may be used balanced or unbalanced. Outputs are 5-way Banana Binding Posts. Mono operation switch.

Protection Features: On/off transient speaker protection circuitry for DC offset; SOA limiting circuitry; Independent Thermal Shutdown.

Available Power Monitor: Actually monitors distortion delivered by the amplifier and indicates any distortion in excess of .05% by illuminating the red LED display on the front panel.

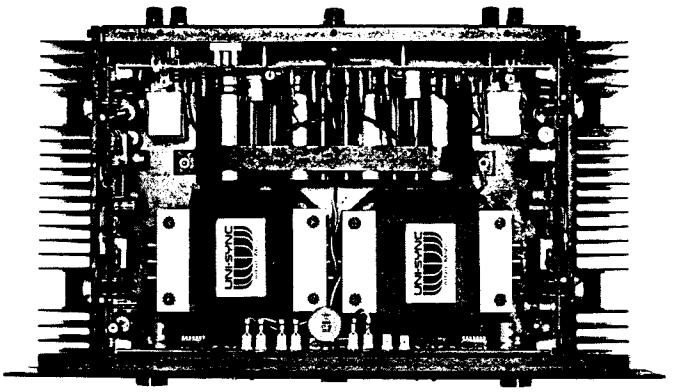
Fully complementary output stage.

Power/Peak/Protect Indicator: Red and green LED's displays green for power/ready and red for rear and protect.

UNI-SYNC
A BSR COMPANY

MODEL 100

Professional Power Amplifier



ARCHITECTURAL SPECIFICATIONS

The Power Amplifier shall be dual channel with individual level controls and Red/Green LED Available Power Monitor display on each channel. The amplifier shall provide an electronically balanced and unbalanced high impedance input without modification or addition. Inputs shall be 3-conductor XLR and 3-conductor ¼ inch phone jacks, and the outputs shall be 5-way banana binding posts. There shall be a slide switch for mono operation. The amplifier shall have dual power supplies and shall actually be two individually powered amplifiers in one chassis.

T .mplifier shall be capable of delivering 100 watts minimum sine wave continuous average power output per channel with both channels driving 8 ohms loads over a power band from 20Hz to 20kHz. The maximum total harmonic distortion shall be no more than .03% in the same power band.

Amplifier construction shall be completely modular. The entire amplifer circuit except for the power supply shall be mounted on a single circuit board attached to the externally exposed heat sink of each channel to facilitate serviceability. This assembly shall be removable from each side of the unit. Internal construction shall consist of double sided plated through PC boards with gold plated interconnect contacts for reliability. The power cord and the transformer shall be the only handwired components in the amplifier. The output circuitry shall be fully complementary. The amplifier shall have an Available Power Monitor that actually monitors distortion delivered by the amplifier and indicates any distortion in excess of .05% by illuminating the red LED display on the front panel. Each channel shall have separate thermal shutdown, and relay isolated speaker protection.

The amplifier shall be standard 19" rack-mountable 3.5" high, and constructed of black textured 13 gauge steel with a 3/16" black anodized aluminum front panel. No front panel feature shall protrude more than 3/16" past the front panel.

The performance specifications shall be listed under SPECIFICATIONS and shall be met or exceeded.

The amplifier shall be the Uni-Sync Model 100.

SPECIFICATIONS:

OUTPUT POWER AND DISTORTION:

STEREO MODE: 8 OHM LOAD
100 watts minimum sine wave continuous average power output per channel with both channels driving 8 ohm loads over a power band from 20Hz to 20kHz. The maximum total harmonic distortion at any power level from 250 milliwatts to 100 watts shall be no more than .03%.

1kHz POWER:
110 watts into 8 ohms per channel, both channels operating .1% total harmonic distortion.

STEREO MODE: 4 OHM LOAD
150 watts minimum sine wave continuous average power per channel with both channels driving 4 ohm loads over a power band 20Hz to 20kHz. The maximum total harmonic distortion at any power level from 250 milliwatts to 150 watts shall be no more than .05%.

1kHz POWER:
165 watts per channel into 4 ohms, both channels operating .1% total harmonic distortion.

MONO MODE: 8 OHM LOAD
250 watts minimum sine wave continuous average power output monaural driving a 8 ohm load over a power band from 20Hz to 20kHz. The maximum total harmonic distortion at any power level from 250 milliwatts to 250 watts shall be no more than .05%.

1kHz POWER:
300 watts into 8 ohms. .1% total harmonic distortion.

CROSSTALK:
1kHz -130db 20kHz -100db (input shorted)

INTERMODULATION DISTORTION:
Less than .01% from 250 milliwatts to rated output (60Hz and 7kHz 4:1 ratio).

HUM AND NOISE LEVEL: -105db

INPUT SENSITIVITY:
1.5 volts for maximum output. Voltage gain 26db (20 times).

FREQUENCY RESPONSE: -3db 1Hz and 65kHz.

INPUT IMPEDANCE: Unbalanced 15K ohms. Balanced 15K ohms.

OUTPUT IMPEDANCE: Designed for any load impedance of 4 ohms or greater.

RISE TIME: Less than 5 microseconds.

SLEW RATE:
20 volts/per microsecond (1kHz square wave 100 watts 8 ohm load).

TIM:
Less .05% 250 milliwatts to rated (3.18kHz square wave, 15kHz sine wave 4:1 ratio).

DAMPING FACTOR: 8 OHM LOAD
Greater than 250 @ any frequency from 20Hz to 1kHz.
Grater than 70 @ 20kHz

UNI-SYNC
A BSR COMPANY

Designers & Manufacturers of Professional Audio Systems & Equipment
742 Hampshire Road / Westlake Village, California 91361 / (805) 497-0766

MODEL 50

MODEL 100

PROFESSIONAL POWER AMPLIFIER

OWNER'S MANUAL

OPERATION AND SERVICE

AMPLIFIER MANUAL

INTRODUCTION

The Uni-Sync Professional Power Amplifier is the product of painstaking research and development. It is truly a professional amplifier taking the term "professional" and understanding its context. A professional is an individual that has their respective trade or craft down pat, taking the existing technology and improving on its overall application.

This is what we at Uni-Sync have accomplished. We desined a unique heat sink to dissipate heat more effectively. Since we pride ourselves on our transformers, we were able to design a transformer capable of performing better under any conditions. Had we not our own transformer manufacturing facility, much time, energy and technology would have been lost.

Our experience with printed circuit board design and application enabled us to manufacture an amplifier that will consistently meet specifications, no awkward wiring harness which changes distortion when moved.

Perhaps the most unique design feature is the utilization of a dual power supply. Each of the Uni-Sync Amplifiers benefit from this piece of technology. There are actually two amps in one chassis. Your benefit is an amplifier that delivers a better, cleaner, more transparent sound, eliminating the phenomenon of crosstalk distortion.

All of these factors combined have led to the development of what we feel is the superior amplifier. A rugged product meeting the demands and specifications of off and on the road use, yet an amplifier that sounds good.

Please send in your warranty card, we've left plenty of room for your comments, which we look forward to hearing.

Thank you.

INSPECTION:

Immediately upon receipt of your amplifier, inspect it carefully for discrepancies or damage. Should there be any, notify the freight company and your dealer.

Your shipping container should be saved as it is specially designed for transporting your amplifier in good condition. You can use it for moving or any possible equipment maintenance needs.

INSTRUCTION ON USING THIS MANUAL

This manual has been designed specifically to aid the user in the operation and service of the Uni-Sync Professional Power Amplifiers. In order to simplify the instructions, we follow the notion of signal flow, and therefore give a verbal block diagram to the operational procedure of the amplifier.

The resultant manual shows the inter-relationship between the controls, features and functions. The first section of the manual deals with the basic operation instructions. The second section provides the trouble-shooting and service sections, including schematics, block diagrams and parts lists.

DESCRIPTION

The Uni-Sync Power Amp is designed with the latest state-of-the-art technology.

1. Dual Power Supplies: Two totally separate power amps, not even a common ground. Less chance of ground loops in multiple amplifier systems.

2. Balanced electronic inputs for low hum and noise pick-up.

3. Wide band: 5MHZ devices in both input and output. Good power bandwidth and high slew rate and resulting low transient intermodulation distortion.

4. Conservatively rated output devices so that no current limiting is used except for low load impedences or short circuits.

5. Specially designed heat sinks for more than adequate heat dissipation.

6. Custom designed and built power transformers for greater efficiency and less weight.

7. LED ready and Protect/Clip Indicators to let you know the status of the amplifier. The red clip indicator not only indicates when the output relay has tripped due to d.c. on the output, or over temperature, but also to indicate peak clipping at as low as .05% THD.

CONTROLS & CONNECTIONS

1. INPUT JACKS: Balanced XLR type and 1/4 inch phone inputs both may used balanced or unbalanced. Located on the back on each corner, these balanced inputs are 15k ohms with maximum input of +20db (7.75 volts). (See hook-up instructions for input wiring information.)

2. OUTPUT TERMINALS: 5-way Banana Binding Posts are located on the back panel on each corner. (See hook-up instructions for output wiring information.)

3. MONO/STEREO SWITCH: Located on the back panel to the right of the fuse and power cord. In the Stereo position the amplifier is used in it's normal mode with the left and right input producing corresponding signals to their respective outputs. In the Mono position, the right input jacks are disconnected, and the left input jacks feed both channels. (See section on amplifier bridging theory.) When in Mono operation, the level controls for both channels still function, therefore, they both must be set at the same level. (See hook-up instructions for Mono input and output wiring.)

4. POWER SWITCH: Located in the center of the front panel; this switch applies power to both channels, push-on and push-off operation.

5. LEVEL CONTROLS: Left and right level controls are located on opposite sides of the front panel.

Located electrically between an input buffer amplifier and the power amplifier; therefore changes in level will not alter the input impedance of the amplifier.

READY and PROTECT/CLIP INDICATORS: Adjacent to each level control are the green(ready) and red(protect/clip) LED indicators. The green ready LED is on during normal operating conditions. Upon first turning on the amplifier the red LED is operative, this stays until the Amp stabilizes (about 3 seconds) and the output relays switch on. The protect indicators flash whenever the relay switches off during operation; due to circuit failure or high temperature. The red LED functions as well as a clip detection indicator. It comes on whenever the output begins to clip or on transients. The clip sensing circuitry is extremely sensitive and will indicate distortion as low as .05% THD, with any load. Periodic clip indicators will probably be inaudible.

HOOK-UP INSTRUCTIONS

NOTE: Prior to making all connections, make certain the amplifier power is off and both level controls are down. After hook-up, turn level controls up slowly to insure proper installation. Speaker line fuses are recommended.

1. AC POWER: UNI-SYNC Power Amplifiers are factory wired for 115V AC operation domestic use. 230V AC operation is possible with a simple wiring change.

   The amplifier has an equipment ground power cord for safety. Since the amplifier inputs and outputs are not connected to chassis ground, no ground loops will occur between the amplifier and equipment used in conjunction with it. The equipment ground pin should not be isolated because dangerous operating conditions may result.

   NOTE: Use an AC main that is capable of supplying the necessary power for the amplifier. (See specifications for fuse size and power consumption.)

2. INPUTS: Each channel has both an XLR Type 3 Pin Female Connector and a stereo 1/4 inch Phone Jack. Either connector can be used for balanced or unbalanced inputs. The connector pin polarities are:

BALANCED INPUTS

XLR	Phone Jack	
1	Sleeve	Shield
2	Ring	-Signal
3	Tip	+Signal

UNBALANCED INPUTS

XLR	Phone Jack	
1	Sleeve	Shield
2	Ring	Shield
3	Tip	+Signal

NOTE: For balanced inputs, a Mono 1/4 inch phone plug may also be used.

3. DUAL CHANNEL OPERATION(STEREO): Place the Mono/Stereo switch in the stereo position and connect the inputs.

Outputs: Speaker connections are made to the 2 sets of binding posts. They accomodate dual banana plugs, trimmed wires or spade lugs. The positive output (red binding post) is connected to the speaker's positive terminal and the negative output (black binding post) is connected to the speaker's negative terminal.

4. MONO OPERATION: Place the Mono/Stereo switch in the mono position and connect the left channel input only. With the amplifier in the mono mode, the right channel input jacks are disconnected from the amplifier. The left channel input is connected to the left amp as usual, and to the right amp out of phase.

Outputs: Speaker connections are made to the 2 red binding posts. The left channel connects to the speaker's positive terminal and the right channel connects to the speaker's negative terminal.

NOTE: Since there is no common ground between the two amplifiers, a ground strap of heavy gauge wire must be connected between the left and right channel black(ground) binding posts.

5. RECOMMENDED SPEAKER WIRE GAUGES: UNI-SYNC Power Amplifiers have a damping factor greater than 250 into an 8 ohm load. To maintain as high a factor as possible, speaker wires should adhere to the following recommended wire gauges.

SPEAKER IMPEDANCE	MINIMUM WIRE GAUGE FOR LENGTH OF RUN			
	10ft	20ft	50ft	100ft
4	16	14	8	6
8	18	16	12	10
16	22	18	14	12

6. MOUNTING: Your amplifier can either be rack mounted or free standing on the provided rubber feet.

115 VAC to 230 VAC CONVERSION

Each Uni-Sync amplifier is factory wired for 110-120 volt operation. However, each power transformer is wound with two primary windings that are connected in parallel on the front panel control board by the use of quick connect terminals. To convert the amplifier to 220-240 VAC operation, remove the top panel (AC power disconnected) and move the gray and black/white transformer leads from their 115 volt terminals to their 230 volt terminals, on the same PC board.

Change both fuses to the 230 VAC values labeled on the control board schematic. Replace the top cover, check out the amplifier for proper operation, and label it as wired for 230 VAC.

DISASSEMBLY

To gain access to the inside of the amplifier, the first step should always be to remove the top cover. Although amplifier Heat Sink modules can sometimes be removed and replaced without removing the top cover, visual alignment ensures proper connector pin insertion and any problem should be isolated to the amplifier module before a new one is installed.

Most trouble shooting can be done with just the top cover removed. The P.C. boards have plated through holes, so most components can be removed and replaced from the component side of the board.

AMPLIFIER HEAT SINK MODULE:

To remove an amplifier module, first remove the top cover. Then remove the 4 flathead screws from the bottom and the 3 (1 in the front and two in the back) Allen head screws. Pull the module straight out from the connectors.

When reinstalling the module, make sure the connector pins line up with the connectors on the front and back panel P.C. boards. Then push the module straight in.

To remove the P.C. board from the heat sink, unsolder the thermistor (S1) first. Then remove the screws from all transistors (Q4,Q6,Q8,Q7, & Q9) mounted under the circuit board and all the output transistors. After repair, remount the circuit board in reverse order insuring that the output transistor pins line up properly with the sockets on the circuit board. Also, insure that all mica insulators are positioned properly and evenly coated with a thin layer of Heat Sink compound on both sides.

FRONT PANEL CONTROL BOARD:

To remove the front panel control board, first remove the top cover and both amplifier modules. Remove the front panel and then the level control knobs. After the level control mounting nuts the circuit board is loose, but to remove the board completely the transformers will have to be unplugged and possibly loosened and slid back.

BACK PANEL CONNECTOR BOARD:

Since the connector board is soldered to the back panel connectors (D3F and output terminals, it should not be removed unless it is impossible to perform repairs with it in the chassis.

To remove the connector board, first remove the top cover and both amplifier modules. Remove the capacitor bracket/s and any screws on the back panel holding standoffs on the circuit board.

To unsolder the connectors, start by heating the output terminal connections to the circuit board alternately and pulling gently outward on the board. Care should be used to make sure that the solder joints are molten as the board is pulled away to prevent pulling the pads off of the board. When the board is flexed sufficiently, let the terminal connections solidify and heat the D3F terminals so that the board unflexes away from the D3F. Then repeat the above procedure until one end of the board is completely unsoldered. The opposite end of the board should be unsoldered the same way.

The most important concept to keep in mind in unsoldering on a plated through P.C. board is to keep enough solder on the connection to provide heat transfer through the hole to melt the solder on both sides. Therefore, it is frequently better to add solder to a sparse connection while unsoldering it rather than trying to remove the solder all the way through the hole. The solder can then be removed and the holes cleaned up after the component terminal is removed.

TROUBLE SHOOTING

POWER AMPLIFIER

Other than op-amp IC failures, most problems in the direct coupled section of the power amplifier can be found with a v.o.m. This is true because many failures are due to opened or shorted semiconductors and their associated resistors and capacitors.

Usually the entire output section should be checked with an ohmeter, since the amplifier is direct coupled and one failure may cause or be caused by another failure in the circuit. Most components can be checked in circuit, especially if the output transistors are removed and checked separately.

After checking the circuit and replacing defective components, check for proper D.C. operation by running the amplifier up slowly on a variac while monitoring bias voltage (across R23 or R26 = .530 VDC) and output center voltage at L1. This procedure can be done with the output transistors removed and no load connected.

If the bias voltage goes above .530 VDC or the center voltage goes positive or negative and stays there, determine the cause before applying a higher supply voltage. When the circuit works properly for D.C., apply a signal and make sure the amplifier passes signal properly. Install the output transistors and check the amplifier with load connected.

Relay and lamp indicator circuits: Both the relay and lamp circuits are purely D.C. circuits. Refer to circuit descriptions and schematic voltages for proper operation. If a problem occurs, measure the D.C. voltages circuit to determine the cause of the problem.

TROUBLE SHOOTING (Con't.)

If the amplifier goes into thermal cut out at too low a temperature (should be 75°C for Model 50, 85°C for Model 100), check the base voltage of Q2, on the connector board just after the relay turns off. Also, check the resistances of R1 and R5. If the voltages on the base of Q2 is +1.2 volts D.C. and R1 and R5 are proper, change the thermistor S1 on the amplifier board. If the voltage at the base of Q2 is less than +1.2 volts D.C., replace Q2.

CIRCUIT DESCRIPTION

GENERAL:

Although the stereo amplifier is made up of 4 circuit boards, each amplifier is independant of the other. The front control board and rear connector board have identical circuitry on either side, except for the common power switch and transformer primary connections on the control board and the mono/stereo wiring on the connector board.

Each channel has its own power supply on the connector board along with input connections and relay circuitry. The amplifiers receive power and input signal from the connector board and apply the final amplified signal back to the output terminals via the relay on the connector board.

The amplifier boards on the heat sinks consist of a balanced differential input buffer stage. The output of the buffer amplifier is applied to the level control on the front control board and then back to the input i.c. of the main amplifier. The main amplifier has a full complementary predriver, driver and output stages directly coupled together and to the protection relay on the connector board. The protection relay and its circuitry perform these three functions:

1. It delays connection to the speakers until the power supplies and amplifier have stabilized to prevent turn-on thumps and damage to the speakers.
2. It disconnects the speakers if there is any d.c. on the output terminals.

It disconnects the amplifier from its load if the amplifier is over safe operating temperature.

CIRCUIT DESCRIPTION(Con't.)

The indicator lamp circuit will show red under two conditions: whenever the relay is de-energized for any reason, and whenever the amplifier begins to clip on the positive or negative peaks. The lamp circuit is set up for normal operation to show green. Whenever the input sense voltages from the relay circuit or the + and - supply voltages change from normal operation, the indicator circuit changes polarity to turn on the red lamp.

DETAILED CIRCUIT DESCRIPTIONS:

Power Supply

A.C. Power is applied to the supplies via a common back panel fuse, an internal fuse on the control board (one value higher than the back panel fuse for circuit safety), and the power switch which powers the primaries of the transformers. Each channel has separate positive and negative supply voltages derived from the balanced bridge rectifier circuit connected to the center-tapped secondary windings.

There is alaso an 11 VAC tap (green wire) on the secondary connected to a half wave rectifier (D4) to supply +12 VDC to the protection relay circuit in each channel.

The positive and negative 15 VDC used for the op-amps in each channel are derived from zener circuits on each amplifier board, R5 and D1 for +15 VDC and R5 and D6 for -15 VDC.

INPUT WIRING:

The input signal comes into the amplifier via either an XLR type 3 pin connector or a 3 conductor 1/4" phone jack (see hook-up section for the wiring scheme used). The left channel connectors are connected directly to the input of the left channel amplifier while the right

'hannel connectors are connected to right channel amplifier via the mono/stereo switch (when it is in the stereo position). When the switch is in the mono position, the right channel amplifier input is connected to the left channel input connectors, only in reverse order. I.E., pin 3 (1/4" tip) goes to the inverting input and pin 2 (1/4" ring) goes to the non-inverting input. This mono wiring scheme provides the out-of-phase condition for the right channel which is necessary of the bridged operation of the amplifiers.

AMPLIFIER CIRCUIT:

The input stage (Z1) is a differential amplifier stage with unit gain to provide a balanced input and buffer stage to the level control. The maximum input before clipping of Z1 is +20db (7.75V).

The output of Z1 is applied to the level control which in turn applies signal to the inverting input of Z2. The inverted signal out of Z2 is coupled to the bases of the predriver transistors Q4 and Q6 via C14 and C16 respectively. Q4 and Q6 provide base to collector phase inversion to bring the output in phase with the input and provide most of the voltage gain for the amplifier.

The driver/output, darlington stages provide only current gain and have no phase inversion so that the output signal remains in phase with the input. R27/C17 and R30/C18 provide proper negative feedback for a voltage gain of 26db.

Q8 is the DC bias transistor. It is mounted on the heat sink along with the driver transistors, Q7 and Q9 and the output transistors to :ovide proper thermal stability. As the temperature of the amplifier increase, the beta of all transistors increases. Therefore, as the temperature increases, Q9 conducts more, reducing the bias voltage on

Q7 and Q9, thereby stabilizing the bias current.

Bias is adjusted by selecting R16 to provide a D.C. volatge drop across R23 or R26 of.530 VDC when the amplifier is at idle temperature (25°C). The larger the value of R16 the lower the bias on the drivers and vice-versa. R16 will usually fall between 51 and 150 ohms.

D4 and Q5 provide safe operating area (S.O.A.) limiting on the positive half cycles and D2 and Q3 provide S.O.A. limiting on the negative half cycles. This limiting is accomplished by connecting the base-emitter junctions of Q3 and Q5 across the emitter resistors of Q1 and Q2 respectively via attenuator networks R13/R12 and R10/R9 respectively.

Whenever the voltage drop (and resulting current) across R6 or R7 reaches the maximum safe current (dependent on supply voltage) for the output devices, Q3 and Q5 are turned on to limit the drive signal to Q7 and Q9, and therefore the output transistors.

RELAY CIRCUIT:

The relay drive circuit is made up of primarily Q1, R2, C3, and the +12 VDC is developed across R2 and C3 in series. C3 charges slowly through R2 and when it reaches approximately +1.2 VDC (about 3 seconds), Q1 turns on and pulls the bottom of K1 coil down, energizing the relay.

When power is turned off, the+vdc supply is discharged quickly to the main negative supply through R3 and R7, and the relay drops out. C3 also discharges to the negative supply through D1. Since the negative supply discharges fairly slowly with the load disconnected, D3 is provided to prevent a large negative voltage from developing across C3 and the base emitter junction of Q1. D2 provides suppression of the counter EMF generated by the collapsing magnetic field on the de-energized coil of K1, thereby preventing damage to Q1.

Q1 (and the relay) are turned off if there is DC on the output, or if the temperature of the amplifier is too high. If there is a positive DC voltage on the output, Q2 is turned on and pulls down the base of Q1, therby turning Q1 off. If a negative DC voltage is on the output, it is fed directly to the base of Q1 to turn it off.

The filtering action of R6 and C4 (on positive half cycles) and R4 and C3 (on negative half cycles) prevent the relay from turning off on normal AC signals (above approximately 15HZ to full power).

If the heat sink temperature becomes too great (75°C) for the Model 50 and (80°C) for the Model 100, the resistance of the thermistor (S1) on the amplifier circuit board will decrease to a low enough value (approximately 4k ohms) to cause a large enough voltage to be applied to the base of Q2, via R1, to turn it on and turn Q1 and the relay off, thus disconnecting the amplifier from the load so that it can cool down. When the amplifier, and therefore the thermistor have cooled sufficiently Q2 will turn off and the amplifier will operate into the load.

READY/PROTECT-CLIP INDICATOR LAMP CIRCUIT:

The indicator lamp circuit consists of 4 operational amplifiers (1-RC4136): three sections are used as comparators (A,C, & D) and one section (B) is as a saturated follower amp to invert the sense voltage to a positive voltage The normal operating voltages are shown on the schematic with D5, the green (ready) L.E.D. biased on.

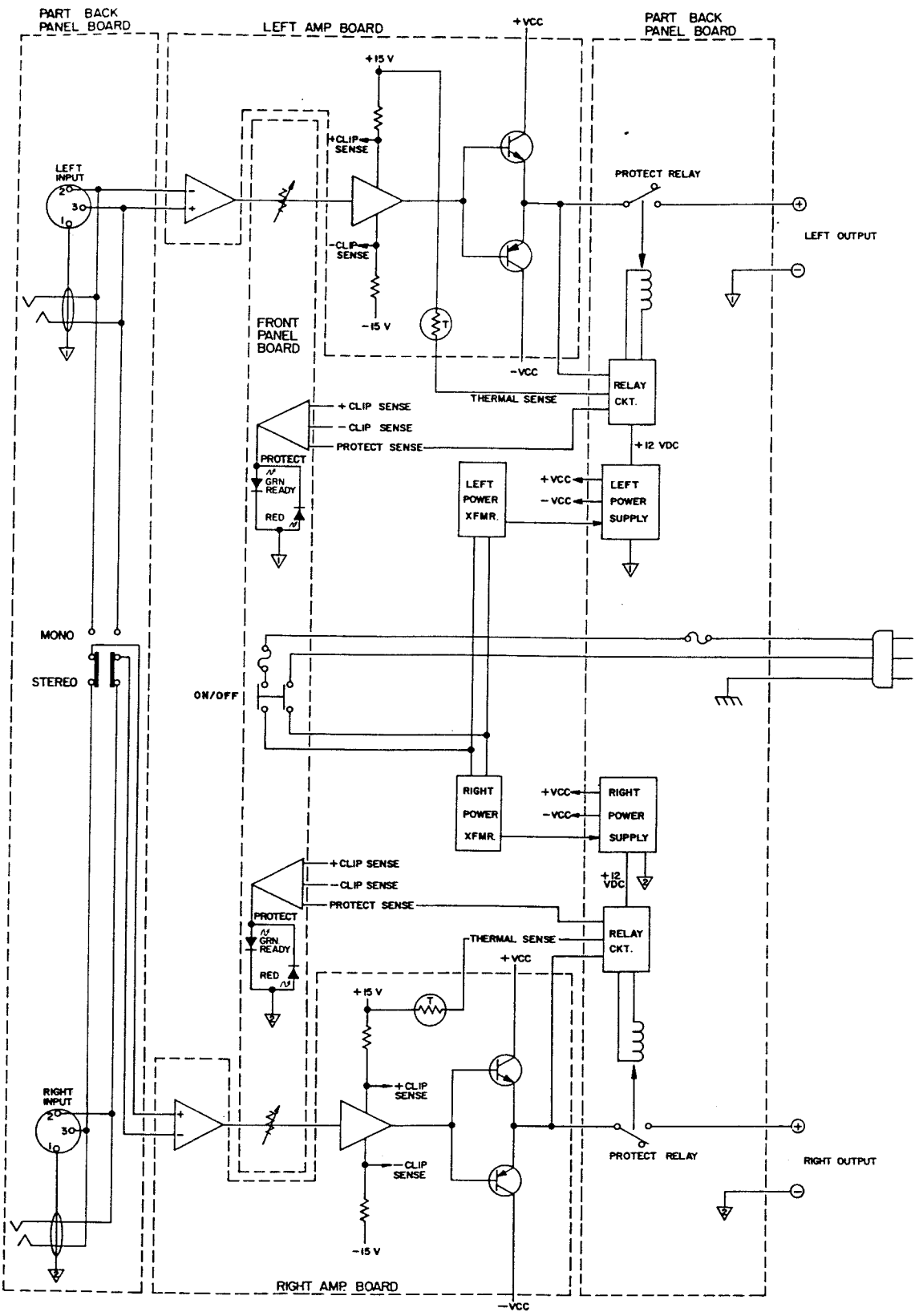
If the relay should open for any reason, +120 VDC from the protect sense line (from the bottom of the relay coil) is applied to the inverting input (pin 8) of Z1-C via D3. Since this voltage is higher than the 6.6. volts on the non-inverting input (pin 9), the output is

driven negative, therefore, D5 turns off and D4 (the red protect L.E.D.) turns on.

D1 and D2 are logic diodes to prevent the positive voltage from the protect sense from being applied to the outputs of Z1-A and D.

The + and - clip sense voltages are obtained from the + and - supply voltages to Z2 in the amplifier. Under normal operating conditions, Z2 draws very little current (about 4 ma) and the voltage drop across the series resistors R33 & R34 is small (see voltages on schematic). However, whenever the amplifier goes into clipping, Z2 loses its negative feedback for the duration of the clip and draws a significantly larger current from the supply (positive or negative, depending on the polarity of the clipped polarity). This increase in current is reflected in a decrease in the supply voltage to Z2 and is coupled to the + or - clip sense input on the indicator circuit.

The positive DC voltage on the non inverting inputs of Z1-D and Z1-A is set so that a clipped signal representing as low as .05% THD will drop the clip sense voltage on the inverting inputs enough to cause the output of Z1-D or Z1-A to go positive and apply the positive voltage to the inverting input on Z1-C this causing the red (clip) L.E.D. to flash on.



UNI-SYNC

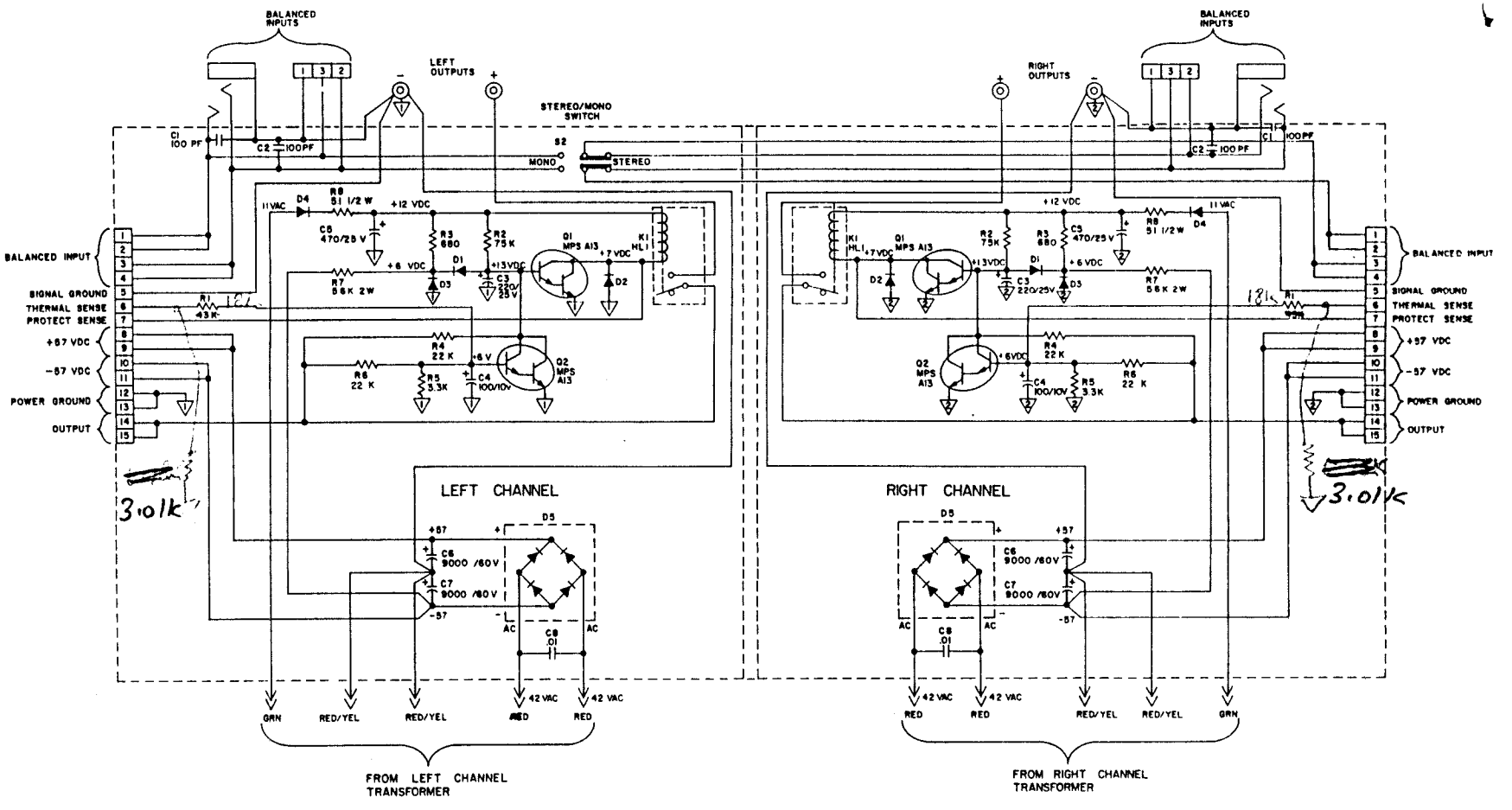
MODEL 5001-6001-00 BLOCK DIAGRAM

BLOCK DIAGRAM

INITIAL RELEASE

DO NOT SCALE DRAWING

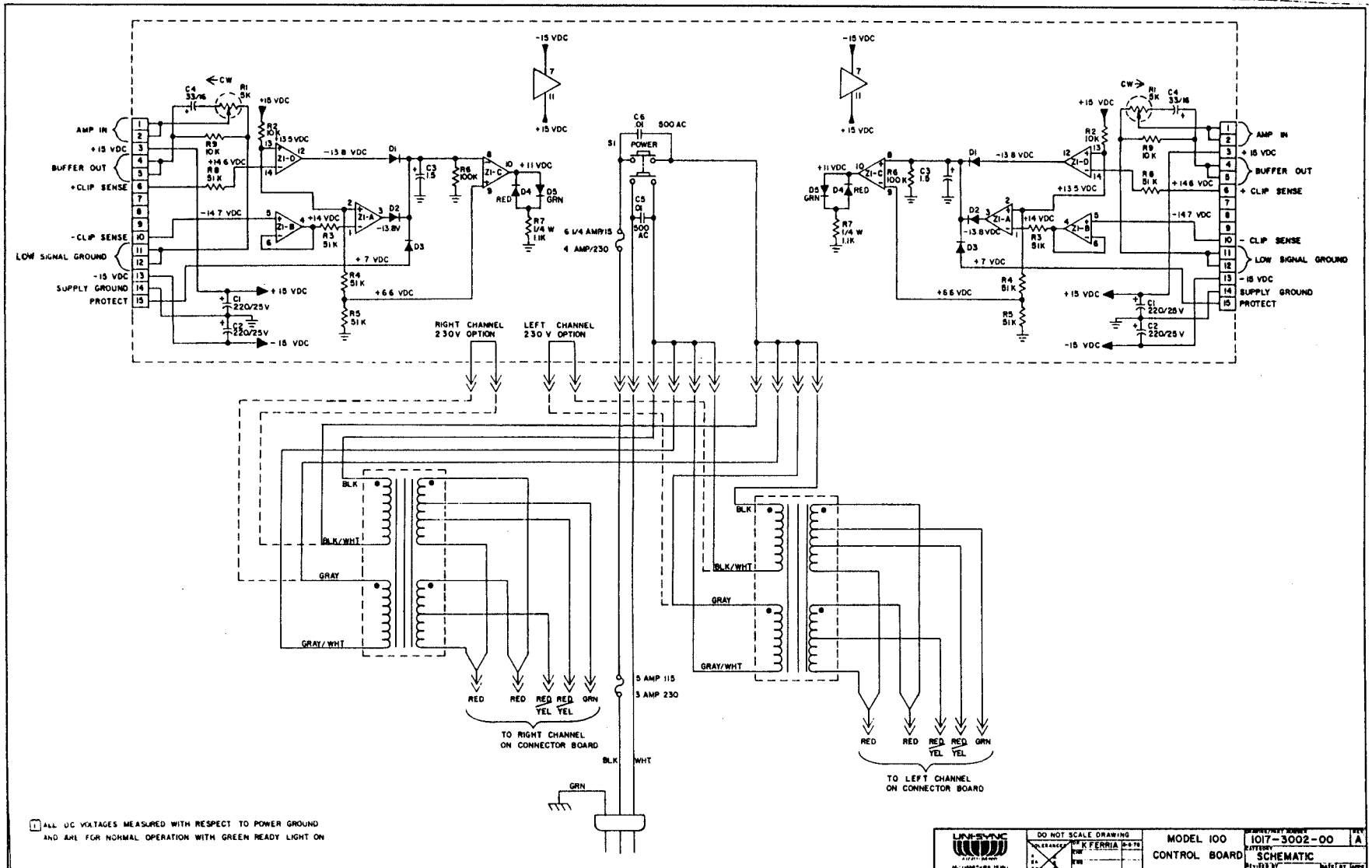
UNLESS OTHERWISE SPECIFIED.

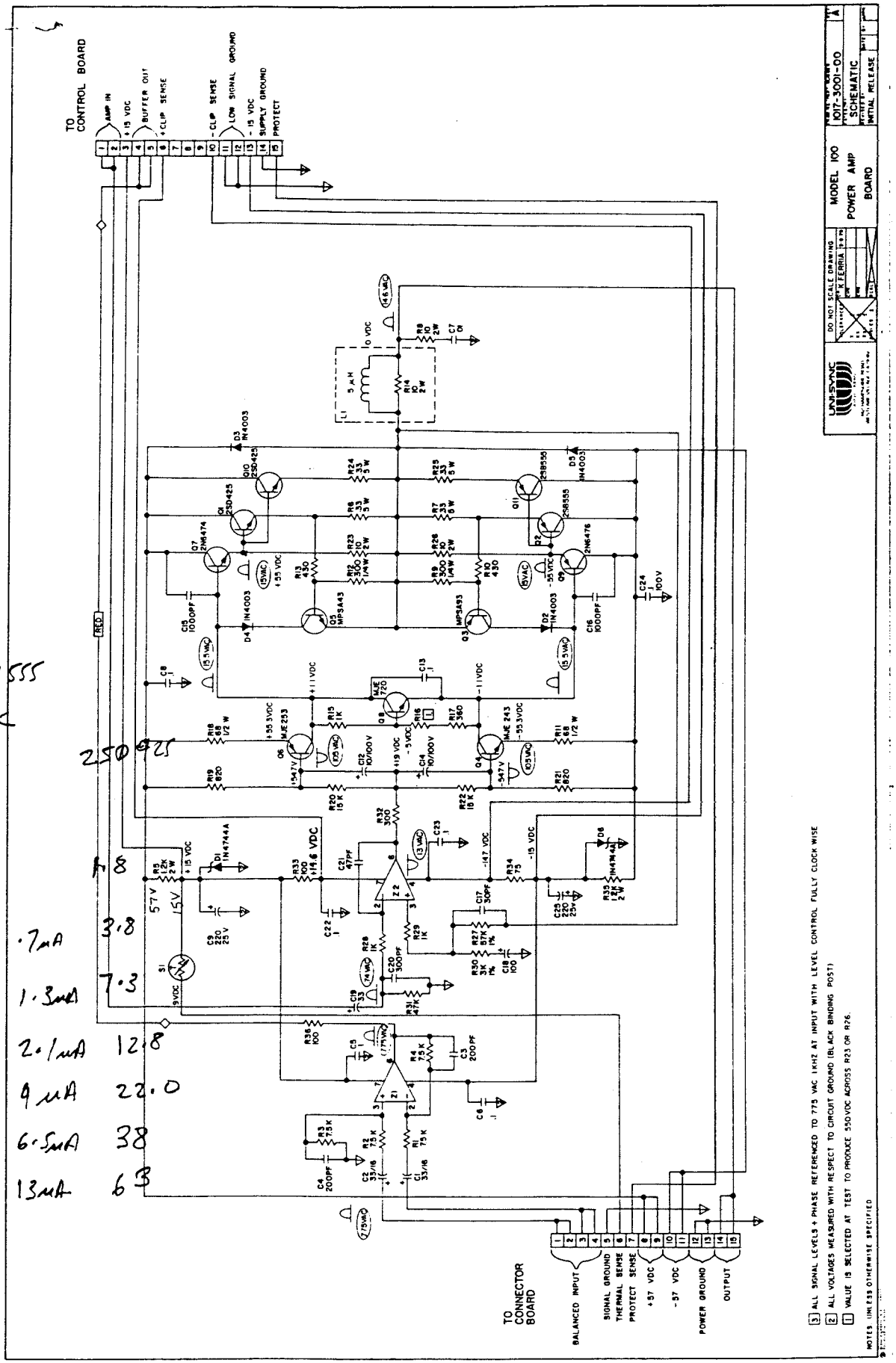


[2] ALL VOLTAGES MEASURED WITH RESPECT TO CIRCUIT GROUND(BLACK BINDING POST).
[1] RELAY CIRCUIT VOLTAGES ARE FOR NORMAL OPERATION WITH RELAY ON

NOTES: UNLESS OTHERWISE SPECIFIED.

UNI-SYNC	DO NOT SCALE DRAWING	MODEL 100 CONNECTOR BOARD	1017-3003-00 A
	K. FERRIA		SCHEMATIC
			INITIAL RELEASE


AMP IN
+15 VDC
BUFFER OUT
+CLIP SENSE
-CLIP SENSE
LOW SIGNAL GROUND
-15 VDC
SUPPLY GROUND
PROTECT
CW
+15 VDC
-15 VDC
+13.5 VDC
-13.8 VDC
+14.6 VDC
-14.7 VDC
+14 VDC
+11 VDC
+7 VDC
+6.6 VDC
POWER
6 1/4 AMP/115
4 AMP/230
5 AMP 115
3 AMP 230
RIGHT CHANNEL 230V OPTION
LEFT CHANNEL 230 V OPTION
BLK
BLK/WHT
GRAY
GRAY/WHT
RED
RED YEL
GRN
WHT
TO RIGHT CHANNEL ON CONNECTOR BOARD
TO LEFT CHANNEL ON CONNECTOR BOARD
1 ALL DC VOLTAGES MEASURED WITH RESPECT TO POWER GROUND AND ARE FOR NORMAL OPERATION WITH GREEN READY LIGHT ON
UNLESS OTHERWISE SPECIFIED
LINK-SYNC
DO NOT SCALE DRAWING
DR K FERRIA 6-8-76
MODEL 100
CONTROL BOARD
1017-3002-00
A
SCHEMATIC
INITIAL RELEASE



2SB555
1.2A
40°C .1mV 2SD425
50°C .2
60 .5
70 .9 .7mA 3.8
80 1.6 1.3mA 7.3
90 2.8 2.1mA 12.8
100 4.7 9mA 22.0
110 7.8 6.5mA 38
120 16 13mA 63
130 28
.4 41