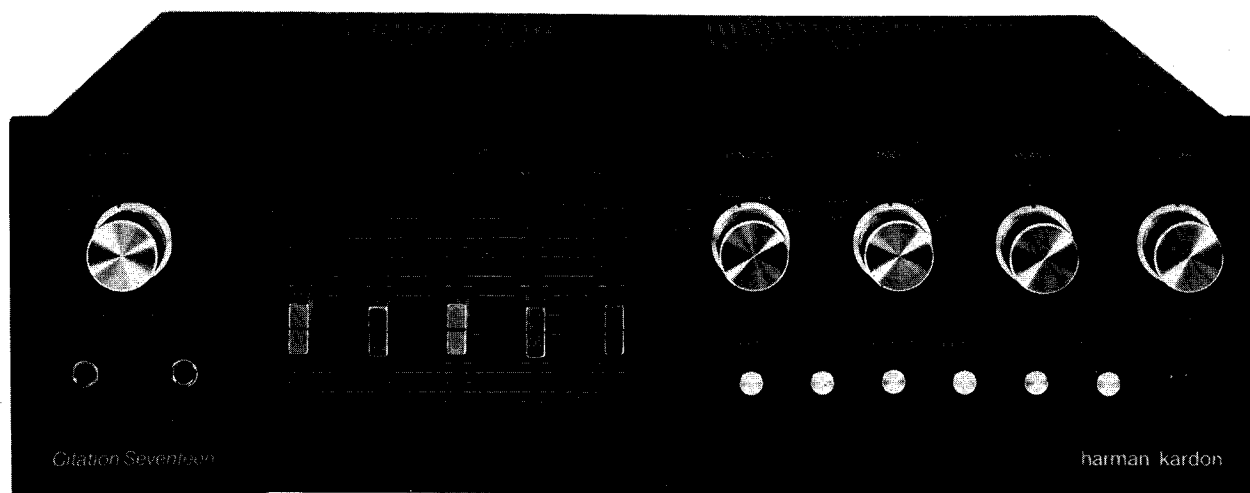


ERIC NELSON

The Citation Seventeen

Professional Solid State Stereophonic Preamplifier/Audio Equalizer

Technical Manual



WARNING

These technical instructions are for use by qualified service personnel only. To avoid electric shock, do not perform any servicing other than that contained in the operating instructions unless qualified to do so.

harman/kardon

SPECIFICATIONS

Output Amplifier

Audio Output:	Up to 14 volts RMS into 2200 ohms or greater (in parallel with 1500 picofarads)
Frequency Response:	Below 5Hz to beyond 125,000Hz ± 0.5 dB Below 3Hz to beyond 270,000Hz -3.0 dB
Square Wave Rise Time:	Less than 1.3 microseconds at 20,000Hz 0dB attenuation
Square Wave Tilt:	Less than 5% at 20Hz
Total Harmonic Distortion:	Less than 0.001% at 2 volts RMS output
Intermodulation Distortion:	Less than 0.0025% at equivalent 2 volts RMS output
Output Impedance:	Less than 100 ohms
Load Impedance:	2200 ohms or greater
Signal to Noise Ratio:	92dB below 2 volts RMS (with 20,000Hz filter)
Input Sensitivity:	200 millivolts for 2 volts RMS output
Input Impedance:	20,000 ohms
Filters:	
Subsonic cut:	-3 dB at 20Hz, 12 dB/octave
High cut:	-3 dB at 8000Hz, 12 dB/octave
Volume Control Tracking:	± 0.5 dB, 0dB to -60 dB attenuation

Phono Preamplifier

Equalization:	RIAA curve: ± 0.25 dB
Total Harmonic Distortion:	Less than 0.002%, 5 volts at tape output, 1000Hz
Intermodulation Distortion:	Less than 0.0025%, equivalent 5 volts at tape output, (RIAA inverter used)
Signal to Noise Ratio:	Better than 80dB below 10 millivolt input reference at 1000Hz
Input Sensitivity:	2.8 millivolts for 2 volts output, 1000Hz, at tape output
Input Impedance:	47,000 ohms $\pm 5\%$, 80 picofarads
Overload:	Greater than 18 millivolts at 20Hz, 180 millivolts at 1000Hz and 1.8 volts at 20,000Hz

General

Power Consumption:	21 watts maximum, 105 to 129 volts AC, 60Hz
Dimensions:	16-1/6"W x 4-3/4"H x 12"D (406mm x 120mm x 305mm)
Weight:	20 lbs. (9.0kg)

PRECAUTIONS

1. Always disconnect the chassis from power line when soldering. Turning the power switch OFF is not enough. Power line leakage passing through the heating element may destroy the transistors.
2. Never attempt to do any work on the transistor amplifiers without first disconnecting the AC line cord and waiting until the power supply filter capacitors have discharged.
3. Fuses must be replaced with size and type indicated. Use of other types can expose components to destructive current levels.

PRINTED CIRCUIT BOARD REMOVAL PROCEDURE

Removing the circuit boards requires a board puller, Harman/Kardon part #62333570. The use of pliers may damage the copper foil on the underside of the boards.

To dismount a board, loosen the edge guide hardware and tilt the edge guide back. Grasp the top edge of the board with the puller, being careful not to disturb any board components. Remove the board with a side-to-side rocking action.

To remove the Hi/Low Cut circuit board (Assembly #00134589A), loosen both edge guides. To remove the power supply circuit board (Assembly #00132837), remove the mounting screw.

When replacing a board, align it carefully in the edge guides and make sure the chassis connectors mate properly. Grasp the top edge of the board with the puller and push down with a side-to-side rocking action. When the board is in place, tighten the edge guide hardware. When replacing the power supply circuit board, replace the mounting screw.

ALIGNMENT PROCEDURES

EQUALIZER ADJUSTMENT

INSTRUMENTS: DC VTVM HP 410C or equivalent.

NOTE: Set Function Switch to PHONO 1.
Set Mode Switch to STEREO.
Set Balance Control to mid position.
Set Volume Control to min position.
All pushbuttons out except power.
All equalizers in flat position.

Step	EQUALIZER	CONNECT METER TO	ADJUST	ADJUST FOR
1	8 KHZ at Boost	P5 — Pin 3	VR2 on Left Equalizer Board	Zero Volts DC $\pm$ 1 mV
2	8 KHZ at Cut	P5 — Pin 3	VR3 on Left Equalizer Board	Zero Volts DC $\pm$ 1 mV
3	8 KHZ at Boost	P7 — Pin 3	VR2 on Right Equalizer Board	Zero Volts DC $\pm$ 1 mV
4	8 KHZ at Cut	P7 — Pin 3	VR3 on Right Equalizer Board	Zero Volts DC $\pm$ 1 mV

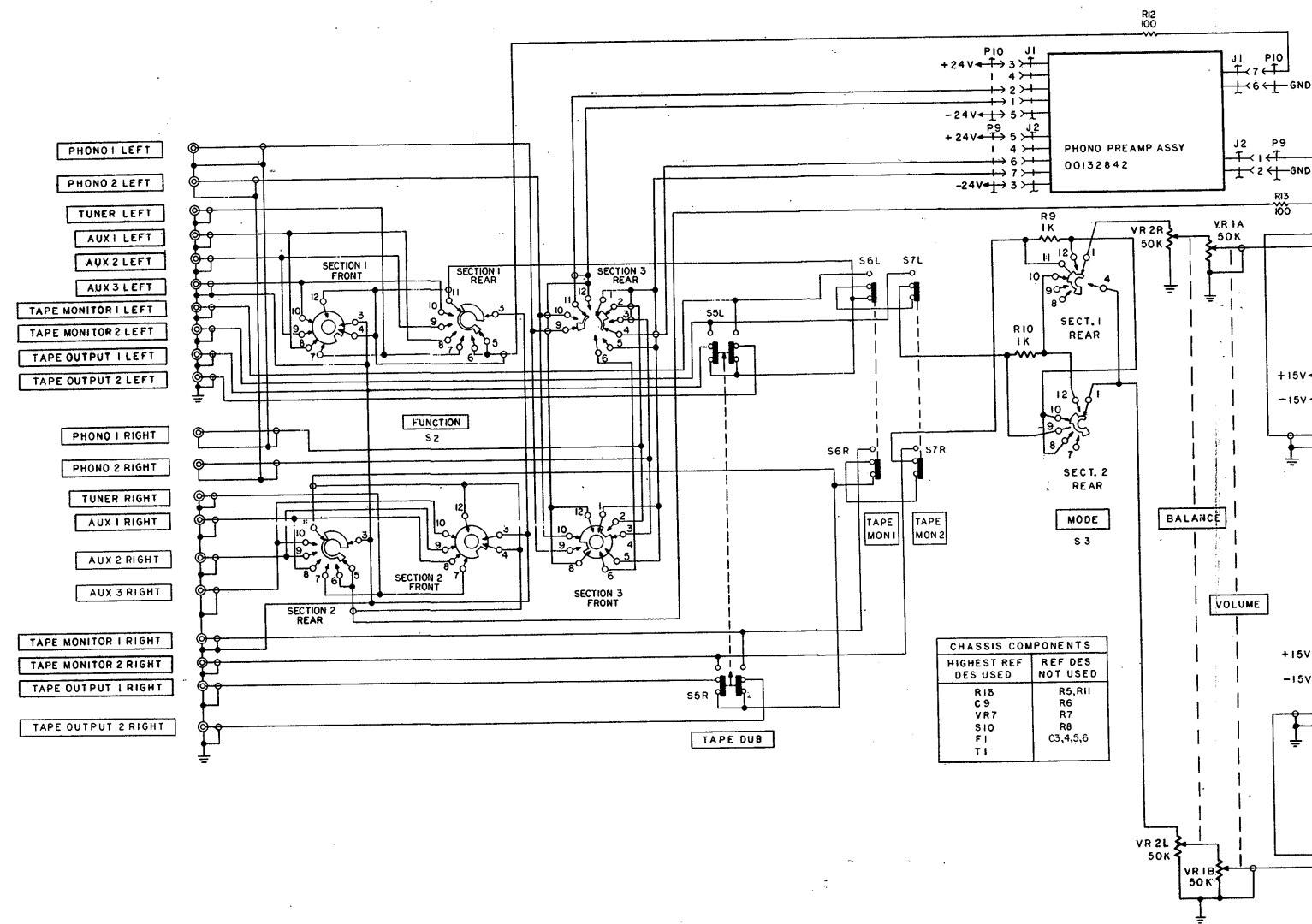
PHONO ADJUSTMENT

INSTRUMENTS: Distortion Measurement System, Sound Tech 1700.

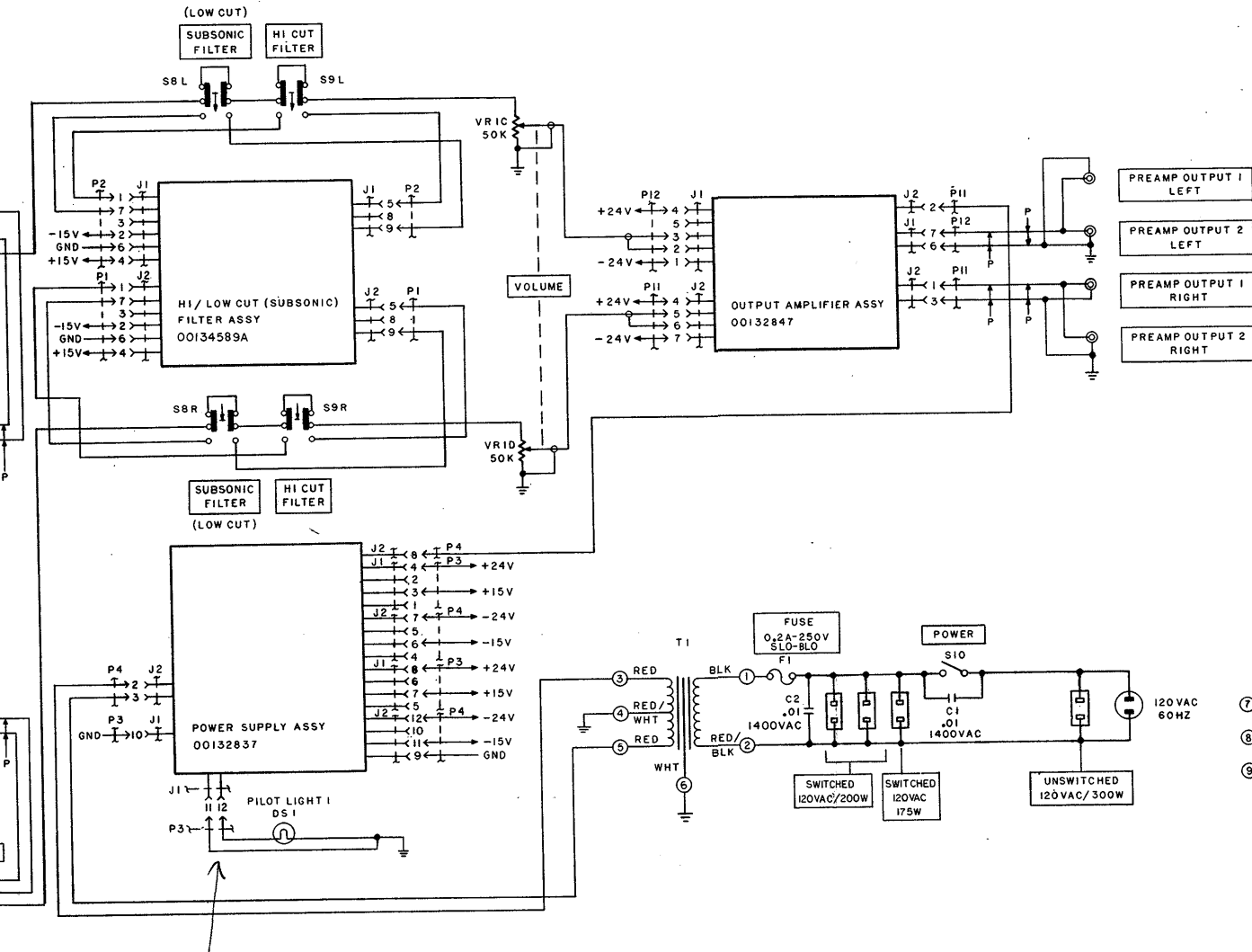
NOTE: Set Function Switch to PHONO 1.
Set Mode Switch to STEREO.
Set Balance Control to mid position.
Set Volume Control to min position.
All pushbutton out except power.
All equalizers in flat position.

Step	INPUT	OUTPUT	ADJUST	ADJUST FOR
1	20 Hz Left Phono 1	Left Tape Out 1 with 20k Ohm Load 5V RMS	VR1 on Phono Board	Least THD (0.01% maximum)
2	20 Hz Right Phono 1	Right Tape Out 1 with 20k Ohm Load 5V RMS	VR2 on Phono Board	Least THD (0.01% maximum)

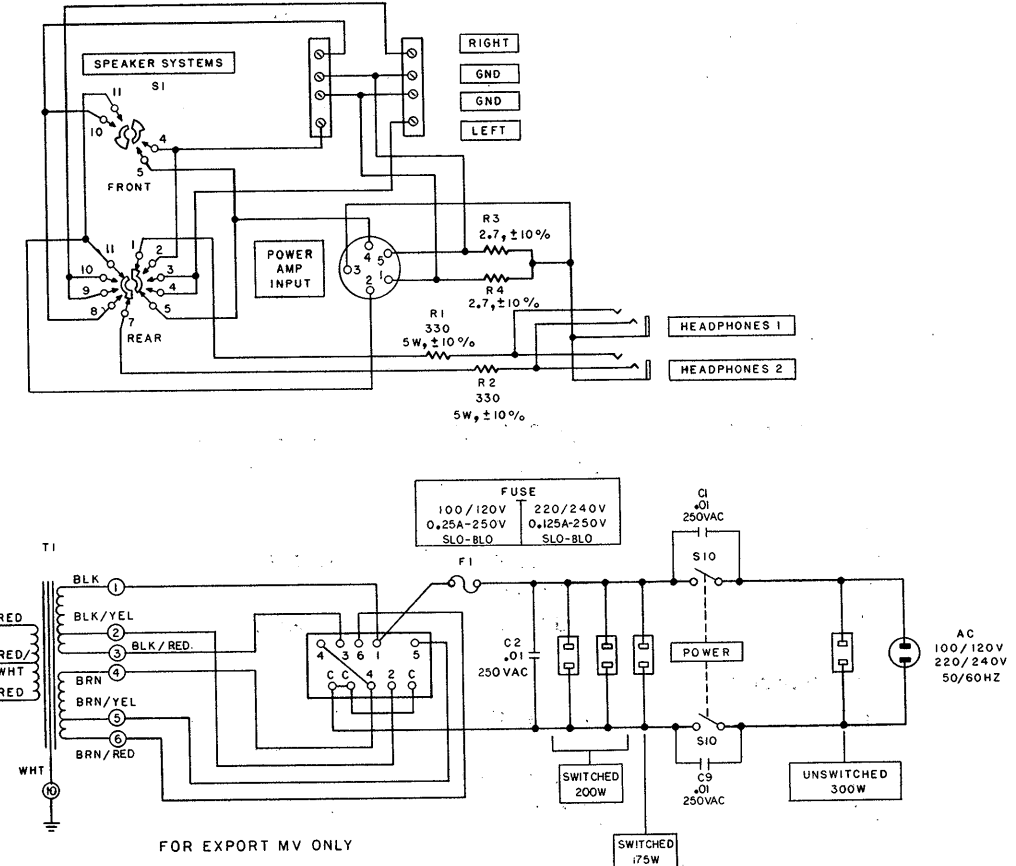
**SCHEMATIC DIAGRAM — MODEL CITATION 17
SYSTEM INTERCONNECTION**



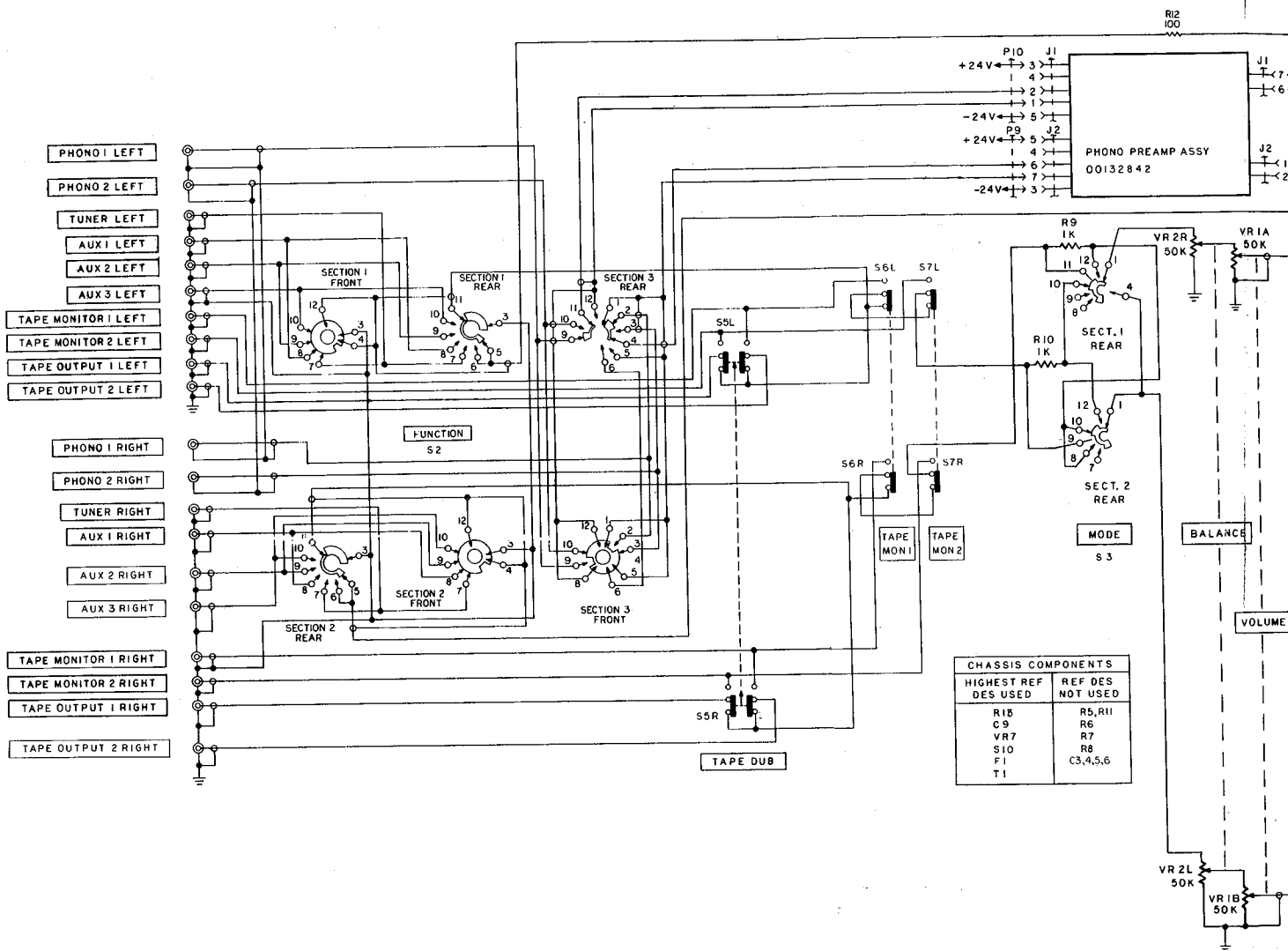
- NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL CAPACITOR VALUES ARE IN MICROFARADS.
 2. ALL RESISTOR VALUES ARE IN OHMS $\pm 5\%$, 1/4W.
 3. ALL PUSHBUTTON SWITCHES SHOWN IN THE NON-DEPRESSED, OFF, POSITION.
 4. MECHANICAL LINKAGE EXIST BETWEEN THE FOLLOWING COMPONENTS S1 FRONT & S1 REAR, S2 SECTION 1, 2 & 3 FRONT & REAR, S3 SECTION 1 FRONT & REAR, S4L & S4R, S5L & S5R, S6L & S6R, S7L & S7R, S8L & S8R, S9L & S9R, VR1A THRU VR1D, VR2L & VR2R, VR3L & VR3R, VR4L & VR4R, VR5L & VR5R, VR6L & VR6R, VR7L & VR7R.
 5. WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NO. IF NOT AVAILABLE USE REF DESIGNATION AND ASSY OR LOCATION USED
I.E. R1 CHASSIS
R1 PHONO PREAMP ASSY 00132842



- SWITCH POSITIONS
- | POSITION | FUNCTION |
|----------|----------|
| 1 | PHONO 1 |
| 2 | PHONO 2 |
| 3 | TUNER |
| 4 | AUX 1 |
| 5 | AUX 2 |
| 6 | AUX 3 |
- MODE SWITCH (SHOWN IN STEREO)
- | POSITION | FUNCTION |
|----------|------------|
| 1 | STEREO |
| 2 | STEREO REV |
| 3 | MONO |
| 4 | LEFT |
| 5 | RIGHT |
- SPEAKER SYSTEMS (SHOWN IN PHONES)
- | POSITION | FUNCTION |
|----------|---------------|
| 1 | PHONES |
| 2 | SYSTEM 1 |
| 3 | SYSTEM 2 |
| 4 | SYSTEMS 1 & 2 |



SCHEMATIC DIAGRAM – MODEL CITATION 17 SYSTEM INTERCONNECTION

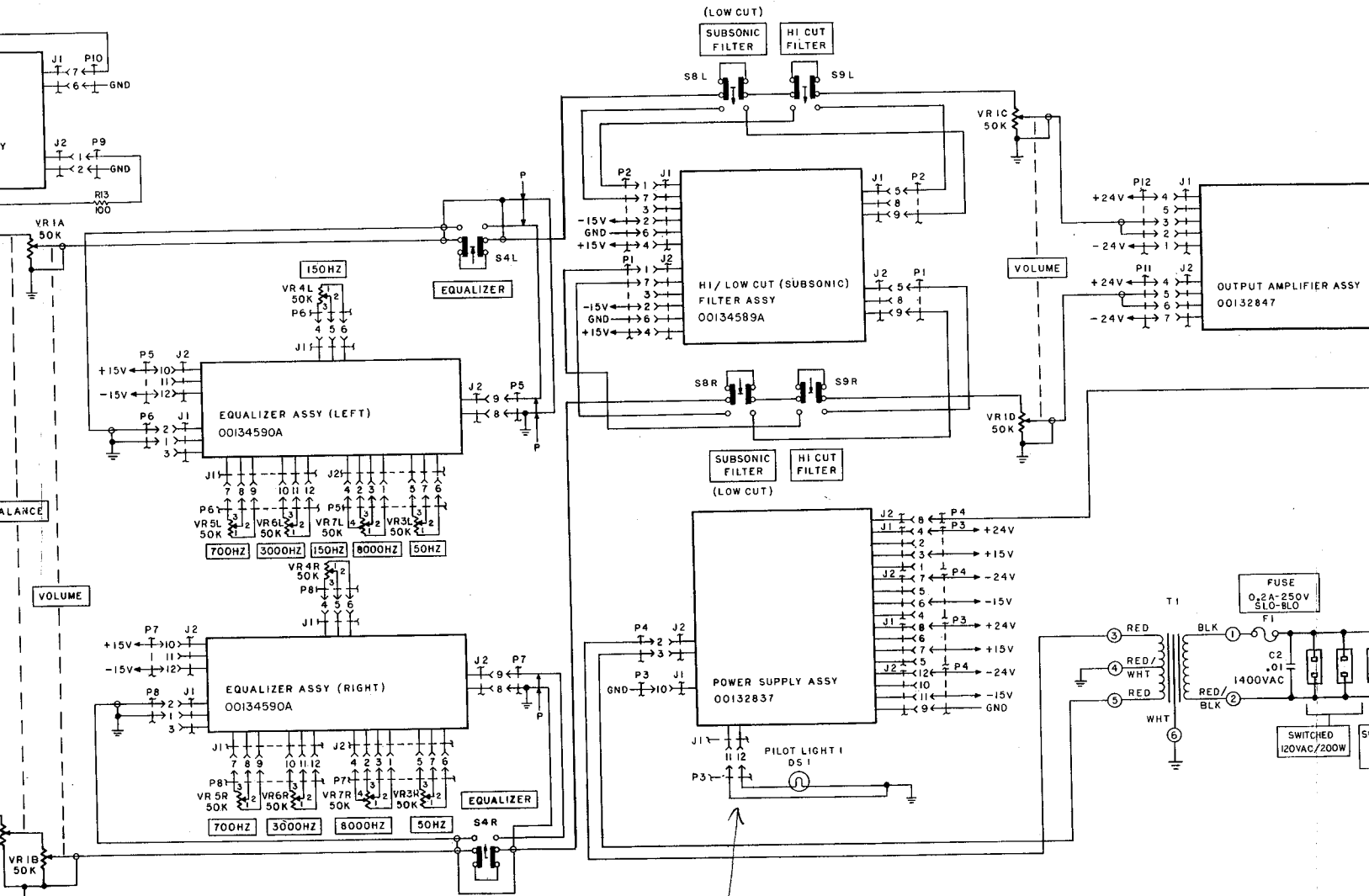


NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL RESISTOR VALUES ARE IN OHMS $\pm 5\%$, 1/4W.
3. ALL PUSHBUTTON SWITCHES SHOWN IN THE NON-DEPRESSED, OFF, POSITION.
4. MECHANICAL LINKAGE EXIST BETWEEN THE FOLLOWING COMPONENTS S1 FRONT & S1 REAR, S2 SECTION 1, 2 & 3 FRONT & REAR, S3 SECTION 1 FRONT & REAR, S4L & S4R, S5L & S5R, S6L & S6R, S7L & S7R, S8L & S8R, S9L & S9R, VR1A THRU VR1D, VR2L & VR2R, VR3L & VR3R, VR4L & VR4R, VR5L & VR5R, VR6L & VR6R, VR7L & VR7R.
5. WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NO. IF NOT AVAILABLE USE REF DESIGNATION AND ASSY OR LOCATION USED

I.E. R1 CHASSIS

R1 PHONO PREAMP ASSY 00132842



PINS 9+11
FOR P.L.
25 VDC

SSSED,
G
FRONT
S5R,
VR1D,
R,
ND

SWITCH POSITIONS

FUNCTION SWITCH (SHOWN IN PHONO1)

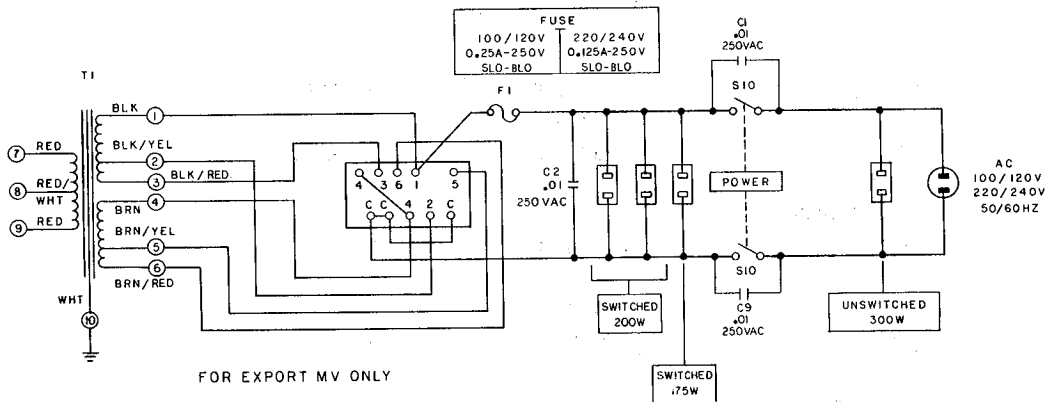
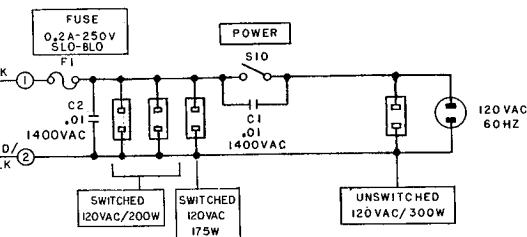
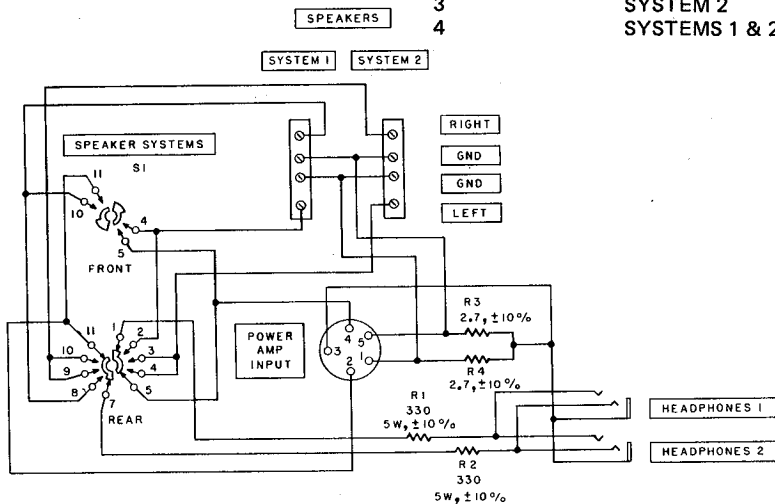
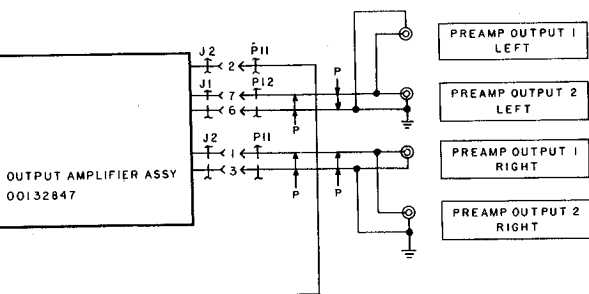
POSITION	FUNCTION
1	PHONO 1
2	PHONO 2
3	TUNER
4	AUX 1
5	AUX 2
6	AUX 3

MODE SWITCH (SHOWN IN STEREO)

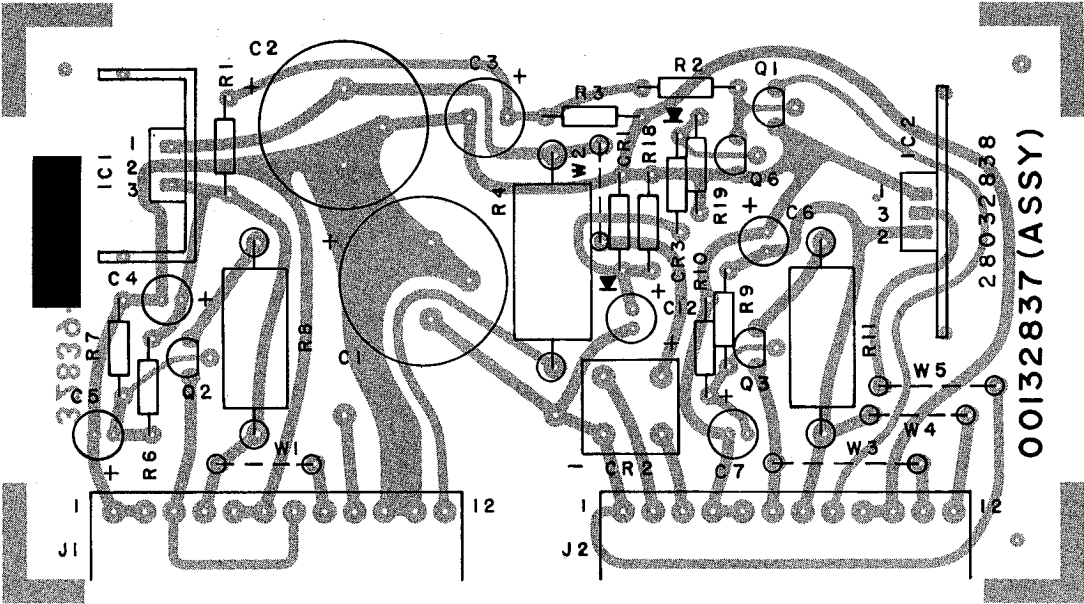
POSITION	FUNCTION
1	STEREO
2	STEREO REV
3	MONO
4	LEFT
5	RIGHT

SPEAKER SYSTEMS (SHOWN IN PHONES)

POSITION	FUNCTION
1	PHONES
2	SYSTEM 1
3	SYSTEM 2
4	SYSTEMS 1 & 2



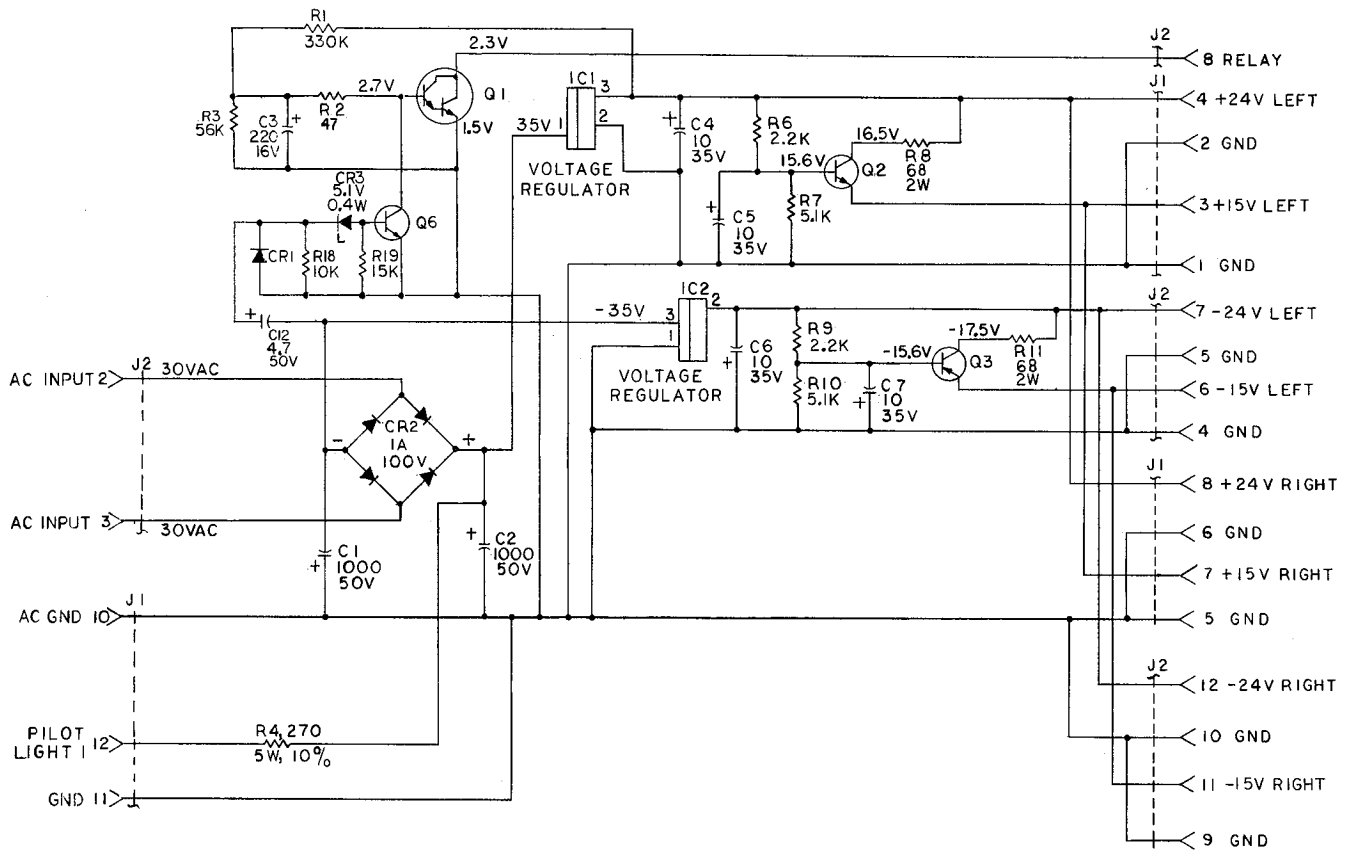
POWER SUPPLY
PC BOARD, SCHEMATIC



CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00132837	PC Bd Assy, Power Supply
DIODE		
CR1	41629338*	1N914
CR2	42132947*	Bridge, 1 Amp, 100V
CR3	42034751*	Zener, 5.1V, 5%, 0.4W
TRANSISTOR		
Q1	43029832*	NPN MPSA13
Q2	43045771A*	NPN PWR, 1.2W
Q3	43034771B*	PNP PWR, 1.2W
Q6	43025972*	NPN GP
INTEGRATED CIRCUIT		
IC1	43132954*	Voltage Regulator, Pos, μ A78M24UC
IC2	43132955*	Voltage Regulator, Neg, μ A79M24AUC

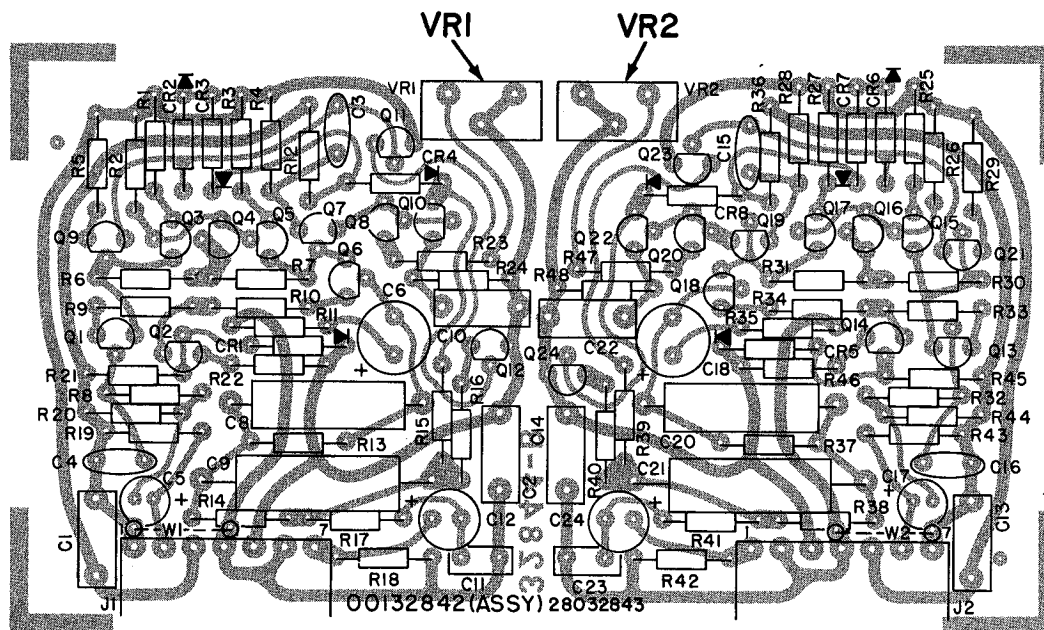
NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS.
2. ALL RESISTOR VALUES ARE IN OHMS, $\pm 5\%$, 1/4W.
3. CAUTION: WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NUMBER. IF H/K PART NUMBER IS NOT AVAILABLE USE REF DES AND ASSEMBLY USED ON. I.E. R1 POWER SUPPLY BD ASSY NO. 00132837



HIGHEST REF DES USED	REF DES NOT USED
R19	R5, 12-17
Q6	Q4, 5
IC2	C8-11
CR3	
C12	

PHONO PREAMP
PC BOARD, SCHEMATIC

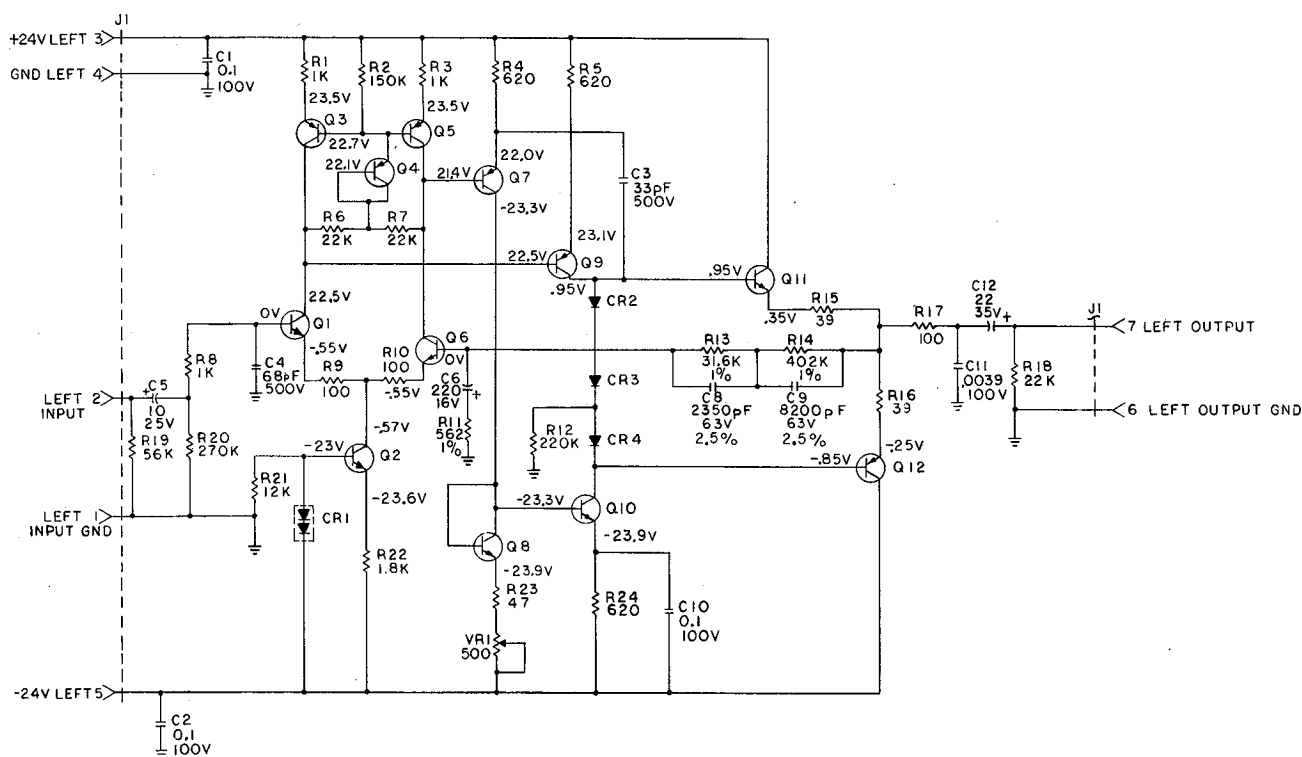
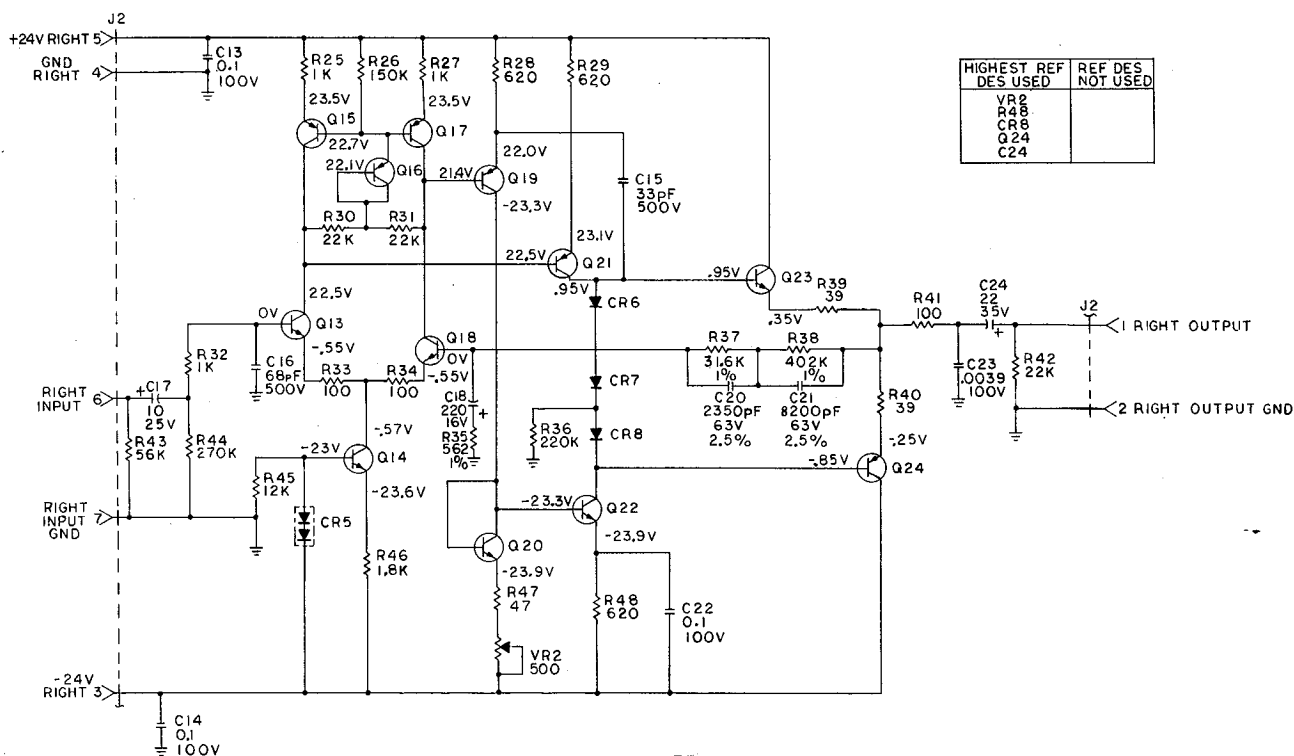


CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00132842	PC Bd Assy, Phono Preamp
DIODE		
CR1, 5	41624214*	Stabistor
CR2, 3, 4, 6, 7, 8	41629338*	1N914
TRANSISTOR		
Q1, 6, 13, 18	43034773A*	NPN Low Noise (GE D16Q10)
Q2, 8, 10, 11, 14, 20, 22, 23	43025972*	NPN GP
Q3, 4, 5, 7, 9, 12, 15, 16, 17, 19, 21, 24	43027722*	PNP GP
RESISTOR, FIXED, FILM, PRECISION		
R11, 35	37233128	562 Ohm, 1/4W, $\pm 1\%$
R13, 37	37232960	31.6K Ohm, 1/4W, $\pm 1\%$
R14, 38	37232961	402K Ohm, 1/4W, $\pm 1\%$
RESISTOR, VARIABLE		
VR1, 2	21632967	100 Ohm, PIHER PT15 LB

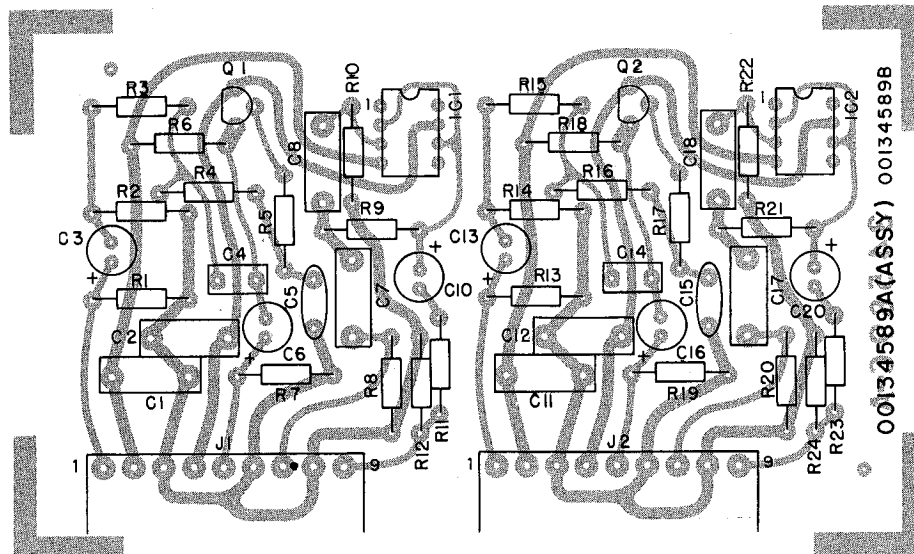
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2. ALL RESISTOR VALUES ARE IN OHMS, $\pm 5\%$, 1/4W.
3. CAUTION: WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NUMBER. IF H/K PART NUMBER IS NOT AVAILABLE USE REF DES AND ASSEMBLY USED ON. I.E. R1 PHONO PREAMP BD ASSY NO. 00132842

HIGHEST REF DES USED	REF DES NOT USED
VR2	
R48	
CR8	
Q24	
C24	



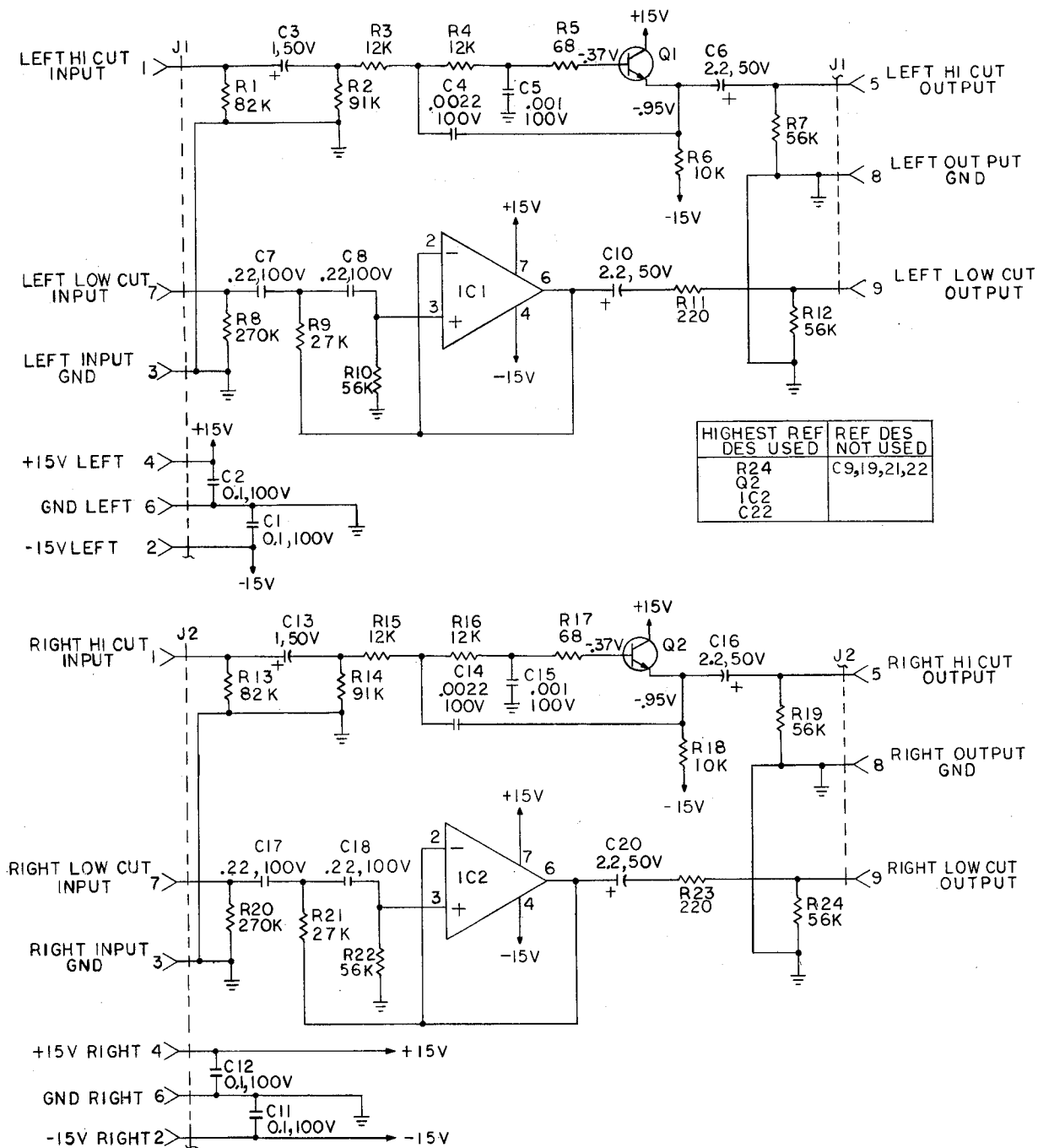
HI/LOW CUT (SUBSONIC)
PC BOARD, SCHEMATIC



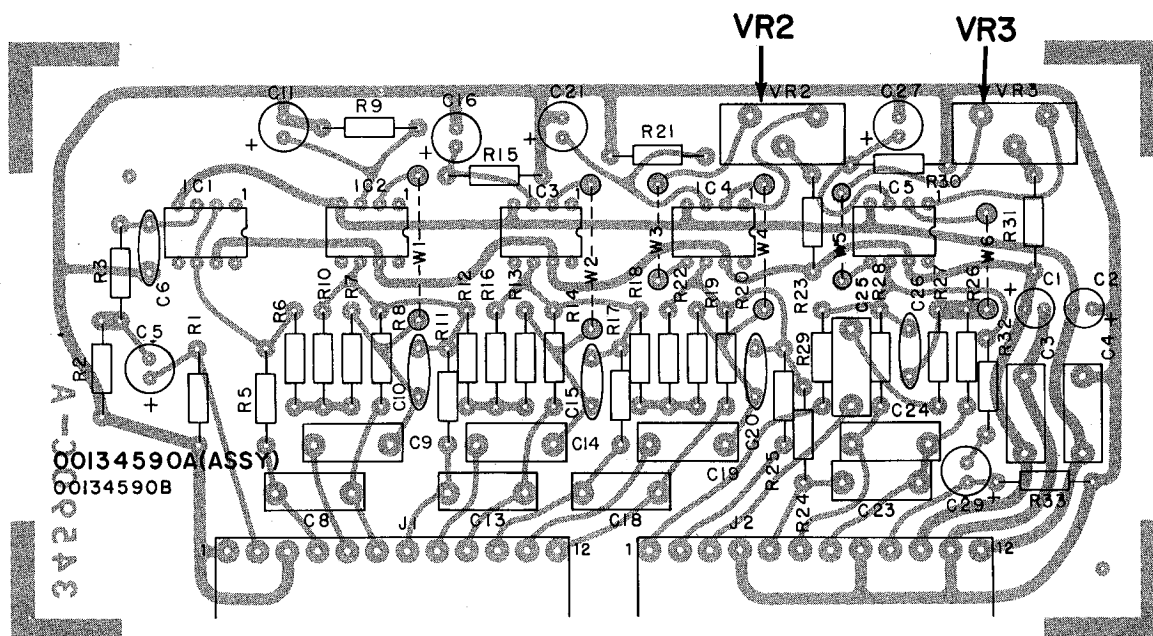
CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00134589A	PC Bd Assy, Hi/Low Cut
TRANSISTOR		
Q1, 2	43034773A*	NPN Low Noise (GE D16Q10)
INTEGRATED CIRCUIT		
IC1, 2	43134588*	Op Amp, LF 356N

NOTES: UNLESS OTHERWISE SPECIFIED

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2. ALL RESISTOR VALUES ARE IN OHMS, $\pm 5\%$, 1/4W.
3. CAUTION: WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NUMBER. IF H/K PART NUMBER IS NOT AVAILABLE USE REF DES AND ASSEMBLY USED ON. I.E. R1 HI/LOW CUT BD ASSY NO. 00134589A



EQUALIZER (LEFT & RIGHT)
PC BOARD, SCHEMATIC



CIRCUIT REF. NO.

H/K PART NO.

DESCRIPTION

00134590A*

PC Bd Assy, Equalizer

RESISTOR

VR2, 3

21632435

25K Ohm, Variable, PIHER PT15 LB

INTEGRATED CIRCUIT

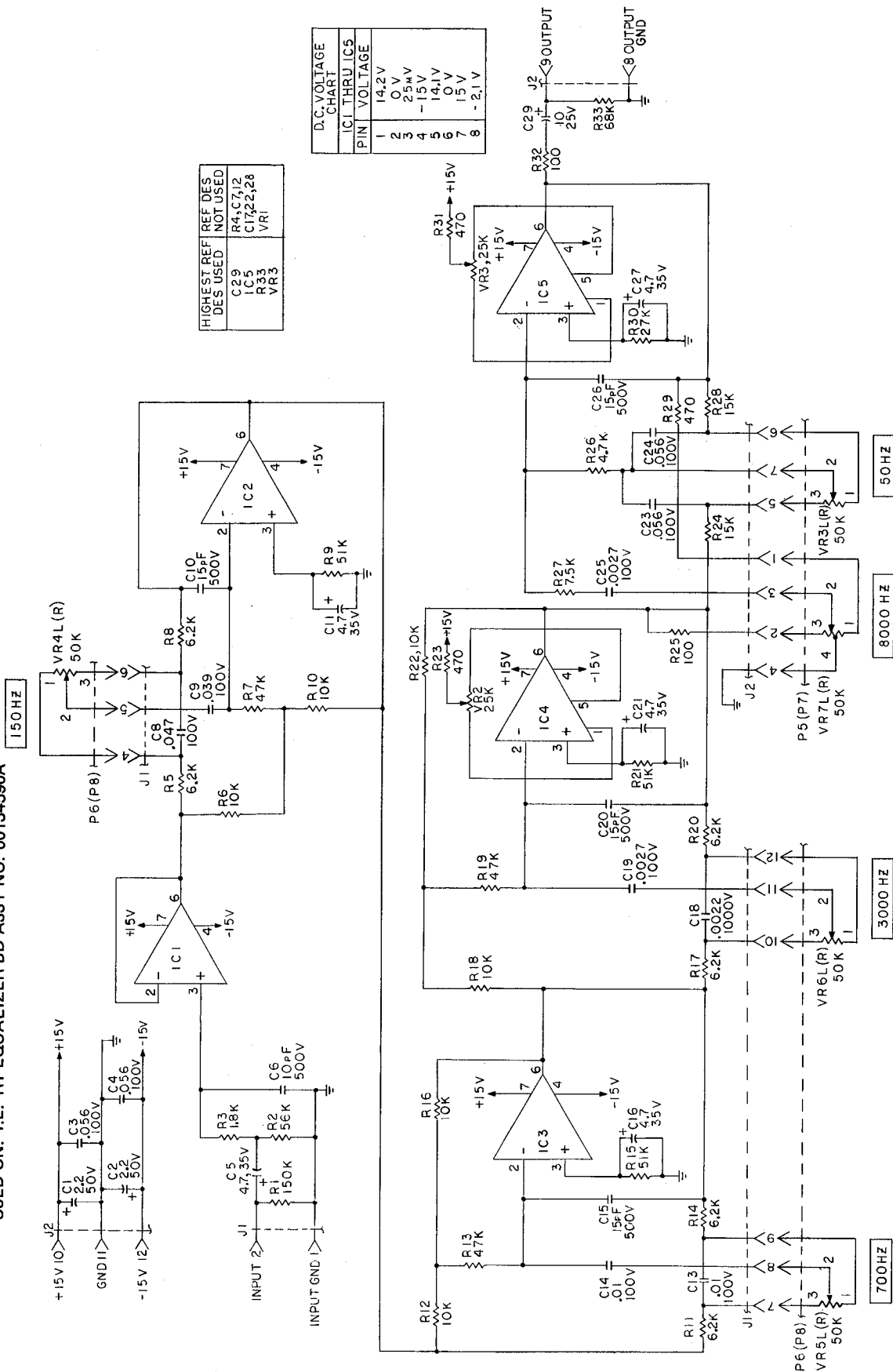
IC1, 2, 3, 4, 5

43134588A*

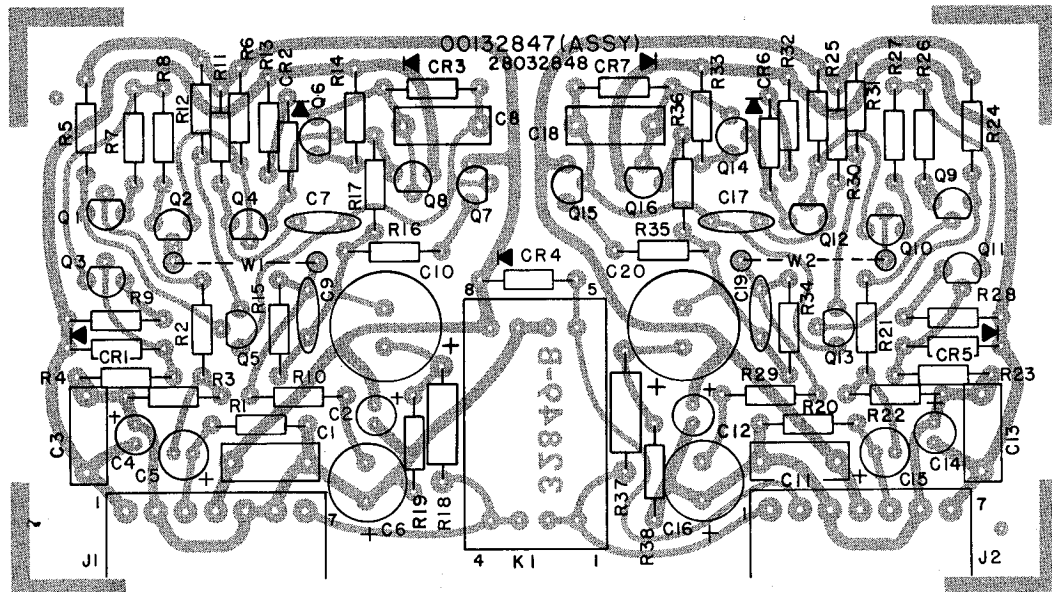
Op Amp, LF 356N

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2. ALL RESISTOR VALUES ARE IN OHMS, $\pm 5\%$, 1/4W.
3. CAUTION: WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NUMBER. IF H/K PART NUMBER IS NOT AVAILABLE USE REF DES AND ASSEMBLY USED ON. I.E. R1 EQUALIZER BD ASSY NO. 00134590A



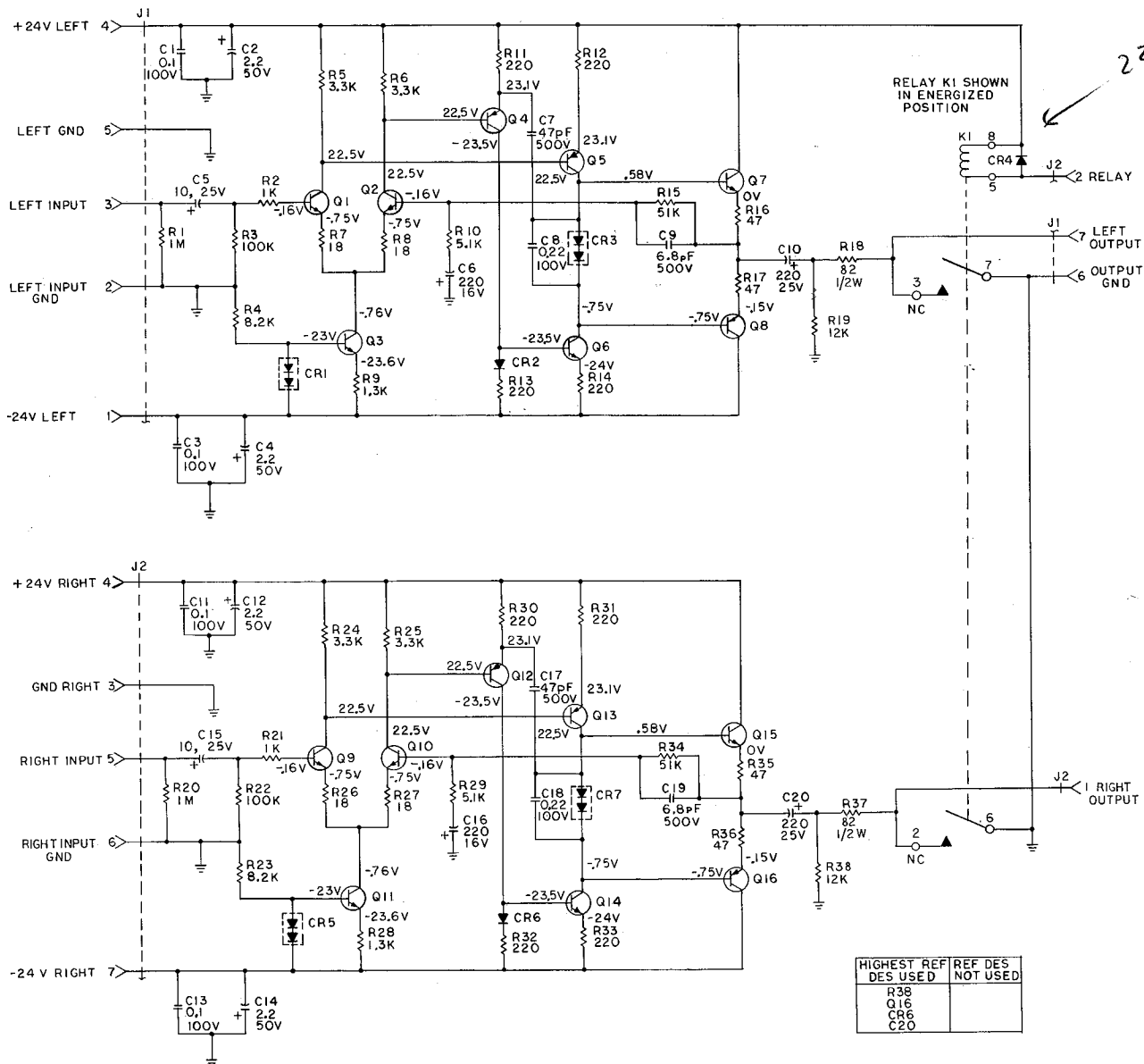
OUTPUT AMPLIFIER
PC BOARD, SCHEMATIC



CIRCUIT REF. NO.	H/K PART NO.	DESCRIPTION
	00132847	PC Bd Assy, Output Amp
DIODE		
CR1, 5	41624214*	Stabistor
CR2, 4, 6	41629338*	1N914
CR3, 7	41634702*	Stabistor
TRANSISTOR		
Q1, 2, 3, 6, 7 9, 10, 11, 14, 15	43025972*	NPN GP
Q4, 5, 8, 12, 13, 16	43027722*	PNP GP
RELAY		
K1	13033083	Reed, 2-pole

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3. CAUTION: WHEN ORDERING PARTS REFER TO PARTS LIST FOR H/K PART NUMBER. IF H/K PART NUMBER IS NOT AVAILABLE USE REF DES AND ASSEMBLY USED ON. I.E. R1 OUTPUT AMP BD ASSY NO. 00132847



CHASSIS PARTS LIST

REF. DES.	H/K PART NO.	DESCRIPTION
REAR PANEL		
	65416751	Receptacle, AC, Blk <i>— SWITCHED</i>
	65427146	Receptacle, AC, Wht <i>— UNSWITCHED</i>
FRONT PANEL AND CHASSIS		
S6, 7	25034905A	Switch Pushbutton, 2PDT
S4, 5, 8, 9	25034906A	Switch Pushbutton, 4PDT
S10	25032217	Power Switch, Push-type, DPST
S1	24025431	Switch, Speaker Select, 4 Position
S2	24033287	Switch, Function, 6 Position
VR1	22032993	Control, Volume
VR2	22026161	Control, Balance
VR3-7	22133914	Control, Slide, Audio Equalizers
S3	24025430	Switch, Mode
	65428021	Jack, Headphone
F1	45033317*	Fuse, Slo-Blo, 0.2 Amp, 250V
	65430519	Fuse Holder
CHASSIS DECORATIVE		
	63233525	Knob, Slide-control
	63232894	Pushbutton, Power, Red
	00233528	Subassy, Rotary Knob
	00233526	Subassy, Pushbutton Knob
	63034523B	Escutcheon - Black
	90232593	Escutcheon - Silver
MISCELLANEOUS		
T1	10132808	Transformer, Power
DS1	46532896*	Lamp, Midget Grooved <i>28V @ 40MA #388</i>
	57526338	Cable, Speaker, 5 Terminal
	65433557	<i>BARRIX STRIP</i> <i>CHICAGO MINIATURE</i>
MULTI-VOLTAGE		
T1	10133134	Transformer, Power
F1	45026404*	Fuse, Slo-Blo, 3AG, 0.25 Amp, 250V
F1	45033302*	Fuse, Slo-Blo, 3AG, 0.125 Amp, 250V
	65427580	Voltage Selector, Connector Set
	65426341	Connector, 5 Term

NOTE TO WARRANTY STATIONS: Items marked by asterisk (*) are recommended spare parts stock. Printed circuit board assembly numbers are shown for reference only. HARMAN/KARDON DOES NOT NORMALLY SUPPLY ASSEMBLED PRINTED CIRCUIT BOARDS.

NOTE: To speed handling of your order be sure to include both the model and serial numbers, in addition to the quantity, H/K part number and part description of the items ordered. Orders from independent dealers, independent servicemen, and retail customers will be shipped on a cash in advance basis. Harman/Kardon reserves the right to substitute equivalent parts for those originally installed in this chassis. All parts should be ordered from Harman/Kardon, 55 Ames Court, Plainview, L.I., N.Y. 11803, Att: Parts Department.