

# **Hafler** PRO 1200

*Professional Power Amplifier*



## **INSTALLATION**

*And*

## **OPERATION**

Please refer to this serial number in all communications regarding this equipment.

## SPECIFICATIONS

### POWER RATING:

Less than 0.01% total harmonic distortion at any power level up to 60 watts continuous average power per channel into 8 Ohms at any frequency between 20Hz and 20 kHz with both channels driven. 170 watts into 8 Ohms at less than 0.01% THD from 20Hz to 20kHz in monophonic bridged position.

### IM DISTORTION (IHF):

Less than 0.005% from 1 to 60 watts, each channel, into 8 Ohms.

### TYPICAL THD AT 60 WATTS INTO 8 OHMS:

20 Hz: 0.002%  
1 kHz: 0.002%  
20 kHz: 0.006%

### FREQUENCY RESPONSE INTO 8 OHMS:

-3dB, 4Hz to 200kHz at 1 watt.  
+0dB, -0.5dB, 10Hz to 40kHz at 60 watts.

### TYPICAL CHANNEL SEPARATION:

20Hz: >75dB  
1kHz: >85dB  
20kHz: >65dB

### SIGNAL TO NOISE RATIO, UNWEIGHTED:

Exceeds 100dB referred to 60 watts into 8 Ohms.

### INPUT IMPEDANCE: 22,000 Ohms

### INPUT SENSITIVITY for 60 watts into 8 Ohms:

Unbalanced: 1.6 volts RMS  
Balanced: 0.8 volts RMS per phase

### DAMPING FACTOR:

100 to 1kHz into 8 Ohms, 50 to 10kHz into 8 Ohms.

### POWER CONSUMPTION:

60 watts both channels into 8 Ohms: 600 VA  
Quiescent: 60VA

### SIZE: 3 1/4" high plus 1/2" feet, 19" wide, 9 1/2" deep, plus 1 1/4" for handles.

### NET WEIGHT: 18 lbs.

### SHIPPING WEIGHT: 20 lbs.

### ALL SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

## INTRODUCTION

The Hafler PRO1200 is a two channel medium power audio amplifier which has been engineered to meet high performance and reliability standards while maintaining affordability.

The amplifier employs a sonically proven circuit topology driving MOSFET output devices. These devices provide exceptional reliability as a result of their inherent ruggedness and resistance to abusive operating conditions. Consequently, the PRO1200 is capable of delivering high current into low impedance loads, and generally the amplifier will not be damaged in the case of accidental short circuit at the output. The drive circuitry is a simple and effective arrangement using high quality components to ensure longevity and, above all, sonic excellence.

## INSTALLATION

### VENTILATION

Adequate air flow is important to the continuing reliability of any power amplifier. Cool air must be able to circulate freely through the perforations in the cover and under the chassis, and around the heatsinks. It is expected that the amplifier will always be resting on its feet, which should be on a hard enough surface that air flow underneath will not be obstructed. If the amplifier is mounted in a rack, or through a panel, the feet may be removed so long as adequate ventilation is provided through the bottom openings. It is normal for the cover and heatsinks to become warm during use.

### MOUNTING

The front panel is designed to fit a standard 19" rack at 3.5" intervals or alternatively the unit may be stacked. The feet may also be removed if desired when rack mounting.

## LINE CONNECTIONS AND SWITCHING

The PRO1200 is normally wired for use on 120V AC power lines, as in the USA. If your line voltage is different, you need the special Hafler export power transformer which accommodates many other line voltages. Be sure your amplifier is wired for your line voltage before you plug it in.

The PRO1200's power switch may be left on, and the amplifier switched remotely by connecting its line cord to a pre-amplifier (or other control center) which provides a switched 3-way AC outlet. Make sure that the control device can supply a current of 5 Amperes to the PRO1200, in addition to the current required by any other switched units. You may instead connect the amplifier directly to a wall outlet and control it with its own front panel power switch.

# NOTICE - IMPORTANT SAFETY INFORMATION

## DO NOT DISPOSE OF - KEEP FOR FUTURE REFERENCE

### Safety Instructions

1. **Read Instructions**

All the safety and operating instructions of your Hafler equipment should be read before power is applied to the equipment.
2. **Retain Instructions**

These safety and operating instructions should be held for future reference.
3. **Heed Warnings**

All warnings on the equipment and in the operating instructions are important and should be followed.
4. **Follow Instructions**

All operating and use instructions are important and should be followed.
5. **Heat**

The equipment should be kept away from areas of high temperature, such as heater vents, radiators, stoves/ovens, fireplaces, etc.
6. **Ventilation**

The equipment should be used in an area suitable for proper ventilation. Care should be taken to not impede airflow in and around the cabinet. Do not mount on a carpeted shelf or in an enclosure consisting of more than five sides. Allow for proper clearance above the equipment.
7. **Water and Moisture**

The equipment should not be used in or around water – such as a bathtub, sink, or swimming area. Also, the equipment should not be used in areas prone to flooding – such as a basement.
8. **Power Sources**

The equipment should be connected only to a power source of the same voltage and frequency as that listed on the rear panel near the power cord entry point.
9. **Power Cord Protection**

Power cords should be run so that they do not interfere with the movement of objects in the room - people, fan blades, utility carts, etc. Also, care should be taken that the cord is not pinched or cut, and placed so that it is not in danger of being pinched or cut, as in under a rug, around a tight corner, etc.
10. **Grounding and Polarization**

The power supply cord is of a polarized type designed to reduce the risk of electric shock sustained from a live cabinet. It is assumed to be of a suitable length for most uses of the equipment. The use of extension cords and power strips is discouraged unless they are of suitable rating to deliver the required current for safe equipment operation and can be used so that the polarization of the plug is not defeated. If an extension cord is required, it is important that the blades of the plug be able to insert fully into the receptacle. Professional amplifiers with a 3-conductor line cord must never have the ground pin of the plug defeated.
11. **Non-Use Periods**

During extended periods of non-use the power supply cord should be kept unplugged from the power source.
12. **Cleaning**

The equipment should be cleaned only as detailed by the owners manual.
13. **Object and Liquid Entry**

Care should be taken so that objects and/or liquids, such as cleaning fluids, are not spilled into the enclosure of the equipment.
14. **Damage Requiring Service**

Hafler equipment should be serviced by qualified service personnel when:

  - A. The power supply cord or plug has been damaged; or
  - B. Objects have fallen, or liquid has been spilled into the equipment; or
  - C. The equipment has been exposed to rain; or
  - D. The equipment does not appear to operate normally or exhibits a marked change in performance; or
  - E. The equipment has been dropped, or the enclosure damaged.
15. **Servicing**

The user should not attempt to service the equipment beyond that which is described in the manual. All other service should be referred to qualified service personnel.

16. **Carts and Stands**  
The equipment should be used only with a cart or stand of sufficient strength and stability for the use intended.
- 16A. An equipment and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the equipment and cart combination to topple.
17. **Power Lines**  
An outdoor antenna should be located away from power lines.

18. **Outdoor Antenna Grounding**  
If an outside antenna is to be used with the Hafler Tuner, be sure that the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70-1984, provides information with respect to the proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connections to grounding electrodes, and requirements for the grounding electrode. See Figure 1.

### EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE

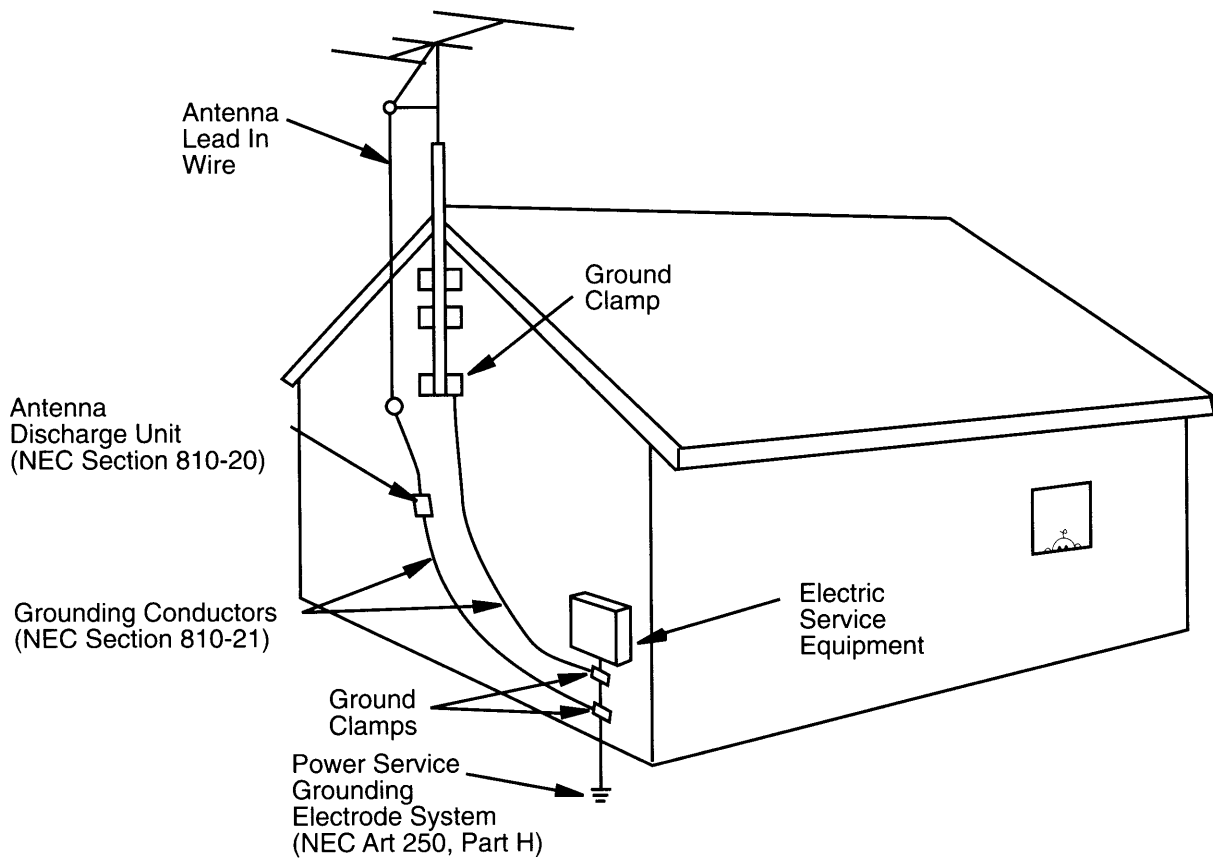


FIGURE 1

## CONNECTING CABLES

### SIGNAL INPUT:

Both 1/4" phone and XLR balanced connectors are provided on the back panel. These connectors are wired in parallel for each channel, so that either may be used with no further switching. The unused connector may be used to "daisy chain" other amplifiers from the same source using the appropriate cables.

To achieve maximum noise rejection, balanced lines should be used for the inputs (two out-of-phase polarity signal conductors plus a ground shield). The XLR connectors are wired for the IEC international standard, which connects the #1 pin to the ground shield; the #2 pin as the non-inverting or "hot" signal; and the #3 pin as the inverting or "return" signal. The phone jacks are wired with the sleeve as the ground shield; the tip as the non-inverting signal; and the ring as the inverting signal. Note that in other equipment the two signal connectors are sometimes interchanged from what is stated here—it is therefore wise to check for consistency among the equipment being installed.

For an unbalanced input line (one signal conductor and a ground shield), connect the signal conductor to the non-inverting input, and connect the ground shield to the input ground AND the inverting input of the amplifier. Note that with a two conductor 1/4" phone jack, this connection is automatically made, assuming that the sleeve (which is longer than that of a three circuit phone jack and includes the ring) is the ground shield and the tip is the signal. In this case, simply insert the phone jack fully into the input of the amplifier.

For bridged mono operation, only use the channel B input and set the mono/stereo switch to mono. Make no connection to the channel A input jacks. In this mode the channel B gain control determines the gain of the amplifier. See below for a description of loudspeaker connection in this mode.

To prevent noise or hum, it is essential that all input connections are secure, and that the cables are not frayed or loosely connected to the plug.

### OUTPUT:

The wires which connect the speakers to the amplifier should be of sufficient size to preserve the PRO1200's high damping factor. Standard #18 gauge lamp cord is satisfactory for up to 15 feet if your speakers are of 8 Ohms or higher impedance. A heavier gauge (#16 or larger) wire should be used with 4 Ohm speakers or 8 Ohm speakers at a greater distance. Special loudspeaker cables which have adequate thickness to accommodate long runs are usually available from audio dealers. The PRO1200's red and black outputs accept standard banana plug connectors, including the

double ones with 3/4" spacing. These are the most convenient to use if you will be disconnecting the speakers occasionally. The terminals will also clamp a spade lug, or a bare wire through the hole in the center post. Be sure there are no frayed wire ends which could touch adjacent terminals or the chassis. Tin bare wire ends with solder to secure all strands.

### PHASING:

Consistent phase relationships are important when connecting speakers in order to enable full bass reproduction as well as midrange and high frequency time alignment. To be sure all speakers in a system are wired in phase to the amplifier, each ground or - speaker terminal should be connected to its black ground terminal on the PRO1200, and the speakers + terminal to the corresponding red terminal. Speaker connecting cable identifies one wire from the other by color of the wire, or by marking or coloring the insulation. NOTE: In the special case of monophonic operation of the PRO1200, (described later) different speaker connections are employed.

### GROUNDING:

The black output terminals of the PRO1200 are connected together internally. This facilitates the use of external devices which use a common ground connection, such as some headphone junction boxes. You must be sure that the ground or shield connection from such a device goes to a black terminal on the PRO1200. NOTE: no such connection may be made when the PRO1200 is connected for bridged mono operation.

The back panel of the PRO1200 also contains a chassis/float ground switch for ground isolation. This switch should be set for minimum system hum and/or noise.

## CONVENTIONAL STEREO CONNECTIONS

It is best to make all connections with the PRO1200 switched off. Each of the stereo speakers connects to one horizontal pair of red and black outputs, as identified A or B on back of the PRO1200. The input signals connect to the corresponding input jacks, and the mono/stereo switch should be set to stereo.

## CONNECTIONS FOR MONOPHONIC OPERATION

When you wish to drive a single loudspeaker with increased power capability, the PRO1200 can be operated in a bridged mode which drives both channels with the same signal and combines their output to deliver more than 150 watts into 8 Ohms. In this arrangement, the speaker is

connected only to the two red output terminals. The B red terminal is + and the A red terminal is the - connection. NO CONNECTIONS MAY BE MADE TO ANY BLACK TERMINALS!! Set the mono/stereo switch to mono, and connect the input signal to the B channel input only. IMPORTANT NOTE: Never use a speaker with an impedance of less than 8 Ohms when operating the PRO1200 in the bridged mono mode. The increased current could overheat the amplifier.

## OPERATION

The power lamp in the power switch will glow whenever power is applied to the PRO1200. If it does not light, check for a blown AC line fuse.

The PRO1200 is equipped with a unique protection system that constantly monitors the temperature of the output devices and takes corrective action to prevent damage to the amplifier as a result of excessive overheating. Under most conditions, the PRO1200 heatsinks will dissipate the heat required to maintain safe operating temperatures, and the unit will play continuously. If the amplifier is driven at high volumes into speakers with an impedance of less than 8 Ohms, and/or there is inadequate ventilation, the heatsinks could heat to a level that would cause the protection circuitry to shut off the amplifier for a short time (normally less than 15 seconds) to prevent damage. The PRO1200 will return to normal operation, and if the overheating condition is still present, the cycle will repeat. In this case, check the surroundings of the unit to insure sufficient air flow around the heatsinks and through the vent holes. Otherwise, check the load impedance connected to the outputs to see if it is far below 8 Ohms.

## FUSES:

The PRO1200 is supplied with a 5 Ampere Slo-Blo AC line fuse and four power supply fuses. If one of these fails, it is usually indicative of a fault which will require professional service.

## FACTORY SERVICE AND LIMITED WARRANTY

If you encounter any difficulty or have any questions concerning your PRO 1200 Amplifier, please call our Customer Service Department weekdays, 8 a.m. to 3:30 p.m., Mountain Standard Time, at 602-967-3565.

Should you have any doubts as to whether the amplifier is malfunctioning and requires service, please call us before sending in for repair. All units being returned (regardless of warranty status) must receive a Return Authorization (RA) number. In addition, we can offer troubleshooting assistance that may simplify or even eliminate the need for factory service.

The Hafler PRO1200 Amplifier is warranted to the original owner (non-transferable) for three years from the date of purchase, including, parts, labor, and return shipping costs within the continental United States, Alaska, and Hawaii. This warranty applies only to products sold in the United States of America.

For warranties outside the U.S.A., please contact your local agent.

It is the owner's responsibility to pay shipping (preferably United Parcel Service, UPS) to the factory; collect shipments will not be accepted. Units under warranty should be accompanied by a copy of the dated Bill of Sale. Use the original carton and all packing material, with the RA number clearly marked on the outside of the package. Be sure to include a return address, the RA number, a daytime telephone number, and a brief description of the difficulty, including whether it occurs continuously or intermittently.

This warranty gives you specific legal rights. You may also have other rights which vary from state to state.

## CHASSIS PARTS LIST

DESIGNATOR	PART DESCRIPTION	PART #	DESIGNATOR	PART DESCRIPTION	PART #
C34	.01mfd Ceramic Disk	CD-103/20	F6	2.5 Amp Slo-Blo (export)	FS-002.5SB
C37	.01mfd Ceramic Disk, UL approved	CD-103A	SW2	Grounding Switch	SWH-103
C38	.01mfd Ceramic Disk	CD-103/20	SW3	Power Switch	SWH-144
DB1	Diode Bridge	SSH-609	T1	Power Transformer	TT-P125
F5	5 Amp Slo-Blo	FS-005SB			

## PC70 PARTS LIST

DESIGNATOR: "B" Channel ("A" Channel)

DESIGNATOR	PART DESCRIPTION	PART #	DESIGNATOR	PART DESCRIPTION	PART #
R1 (R13)	1.0M Ohms, 1/4w, 1%, Metal Film	RMP/4-1004	C3 (C13)	0.1 mfd, 100v, 10% Polycarbonate	CPC-104
R2 (R14)	1.0M Ohms, 1/4w, 1%, Metal Film	RMP/4-1004	C4 (C14)	10mfd, 16v, Nonpolar Electrolytic	CERNP-106
R3 (R15)	2.0k Ohms, 1/4w, 1%, Metal Film	RMP/4-2001	C5 (C15)	10mfd, 16v, Nonpolar Electrolytic	CERNP-106
R4 (R16)	2.0k Ohms, 1/4w, 1%, Metal Film	RMP/4-2001	C6 (C16)	0.1 mfd, 100v, 10% Polycarbonate	CPC-104
R5 (R17)	47.5k Ohms, 1/4w, 1%, Metal Film	RMP/4-4752	C7	0.01 mfd, 100v, 10% Polyester	CP-103
R6 (R18)	47.5k Ohms, 1/4w, 1%, Metal Film	RMP/4-4752	C8	0.01 mfd, 100v, 10% Polyester	CP-103
R7 (R19)	2.74k Ohms, 1/4w, 1%, Metal Film	RMP/4-2741	C9	100 mfd, 35v, 20% Polar/Electro	CER-107B
R8 (R20)	2.74k Ohms, 1/4w, 1%, Metal Film	RMP/4-2741	C10	100 mfd, 35v, 20% Polar/Electro	CER-107B
R9 (R21)	1.82k Ohms, 1/4w, 1%, Metal Film	RMP/4-1801	CR1	1N5240B 10v, 1/2w, 5% Zener	SSH-600
R10 (R22)	2.0k Ohms, 1/4w, 1%, Metal Film	RMP/4-2001	CR2	1N5240B 10v, 1/2w, 5% Zener	SSH-600
R11	1.5k Ohms, 5w, 10%, Wire Wound	RW5152	CR3	1N5240B 10v, 1/2w, 5% Zener	SSH-600
R12	1.5k Ohms, 5w, 10%, Wire Wound	RW5152	CR4	1N5240B 10v, 1/2w, 5% Zener	SSH-600
R23	475 Ohms, 1/4w, 1%, Metal Film	RMP/4-4750	J1 (J3)	PC Mount XLR Connector	CCH-209
R24	475 Ohms, 1/4w, 1%, Metal Film	RMP/4-4750	J2 (J4)	PC Mount Phone Jack	CCH-208
RV1 (RV3)	500 Ohms, Trim Pot	RVH-501A	J5 (J6)	3 Pin Male Connector	CCH-137
RV2 (RV4)	50k Ohms, Single Type Pot	RVH-503H	J7	3 Pin Male Connector	CCH-137
C1 (C11)	150 PFD, 500V, 5% Dipped Mica	CM-151	J8	3 Pin Male Connector	CCH-137
C2 (C12)	150 PFD, 500V, 5% Dipped Mica	CM-151	U1 (U3)	TL082 Dual Op-Amp	SSH-655
			U2	NE5532 Dual Op-Amp	SSH-667

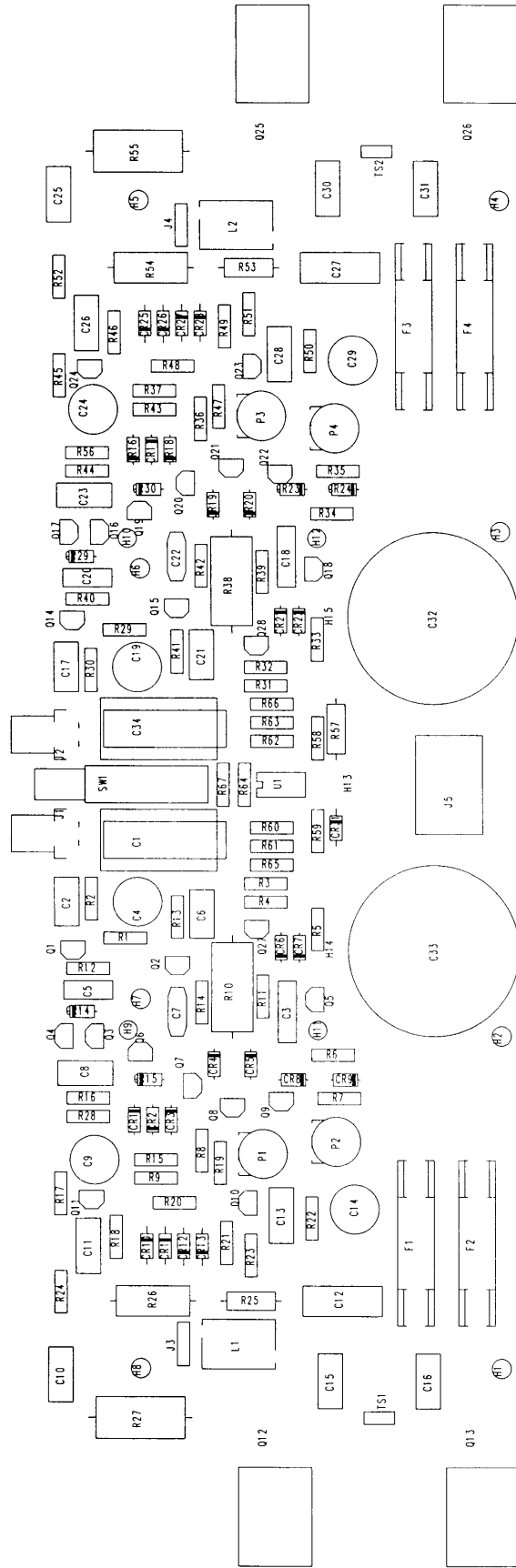
## PC58 PARTS LIST

DESIGNATOR: "B" Channel ("A" Channel)

DESIGNATOR	PART DESCRIPTION	PART #	DESIGNATOR	PART DESCRIPTION	PART #
R1 (R29)	1.1k Ohms 1/4w 1% Metal Film	RMP/4-1101	C13 (C28)	0.1 mfd 100V, 20%, Polyester	CP-104A
R2 (R30)	22.1k Ohms 1/4w 1% Metal Film	RMP/4-2212	C14 (C29)	100 mfd 50V, 20%, Polar/Electrolytic	CER-107C
R3 (R31)	47 Ohms 1/4w 5% Carbon Film	RC/4-470	C15 (C30)	0.1 mfd 100V, 20%, Polyester	CP-104A
R4 (R32)	47 Ohms 1/4w 5% Carbon Film	RC/4-470	C16 (C31)	0.1 mfd 100V, 20%, Polyester	CP-104A
R5 (R33)	10k Ohms 1/4w 1% Metal Film	RMP/4-1002	C32	6800 mfd, 63V, 75%, Polar/Electrolytic	CER-688D
R6 (R34)	680 Ohms 1/4w 5% Carbon Film	RC/4-681	C33	6800 mfd, 63V, 75%, Polar/Electrolytic	CER-688D
R7 (R35)	10 Ohms 1/4w 5% Carbon Film	RC/4-100	C35 (C36)	330pF, 500V, Dipped Mica	CM-331
R8 (R36)	680 Ohms 1/4w 5% Carbon Film	RC/4-681	Q1 (Q14)	2N5550 NPN Transistor	SSH-613
R9 (R37)	2.2k Ohms 1/4w 5% Carbon Film	RC/4-222	Q2 (Q15)	2N5550 NPN Transistor	SSH-613
R10 (R38)	5.1k Ohms 5w 5% Wire Wound	RWB5-502	Q3 (Q16)	2N5401 PNP Transistor	SSH-708
R11 (R39)	22k Ohms 1/4w 5% Carbon Film	RC/4-223	Q4 (Q17)	2N5401 PNP Transistor	SSH-708
R12 (R40)	1k Ohms 1/4w 5% Carbon Film	RC/4-102	Q5 (Q18)	2N5550 NPN Transistor	SSH-613
R13 (R41)	1.1k Ohms 1/4w 1% Metal Film	RMP/4-1101	Q6 (Q19)	2N5401 PNP Transistor	SSH-708
R14 (R42)	22.1k Ohms 1/4w 1% Metal Film	RMP/4-2212	Q7 (Q20)	2N5401 PNP Transistor	SSH-708
R15 (R43)	10 Ohms 1/4w 5% Carbon Film	RC/4-100	Q8 (Q21)	2N2222 NPN Transistor	SSH-611
R16 (R44)	27 Ohms 1/4w 5% Carbon Film	RC/4-270	Q9 (Q22)	2N5550 NPN Transistor	SSH-613
R17 (R45)	47 Ohms 1/4w 5% Carbon Comp.	RC/4-470C	Q10 (Q23)	2N5401 PNP Transistor	SSH-708
R18 (R46)	470 Ohms 1/4w 5% Carbon Film	RC/4-471	Q11 (Q24)	2N5550 NPN Transistor	SSH-613
R19 (R47)	10 Ohms 1/4w 5% Carbon Film	RC/4-100	Q12 (Q25)	25K1056 N-Channel MOSFET	SSH-710
R20 (R48)	220 Ohms 1/4w 5% Carbon Film	RC/4-221	Q13 (Q26)	25J160 P-Channel MOSFET	SSH-709
R21 (R49)	68 Ohms 1/4w 5% Carbon Film	RC/4-680	Q27 (Q28)	2N5550 NPN Transistor	SSH-613
R22 (R50)	47 Ohms 1/4w 5% Carbon Comp.	RC/4-470C	CR1 (CR16)	1N4148 Silicon Diode	SS-162
R23 (R51)	10 Ohms 1/4w 5% Carbon Film	RC/4-100	CR2 (CR17)	1N4148 Silicon Diode	SS-162
R24 (R52)	10 Ohms 1/4w 5% Carbon Film	RC/4-100	CR3 (CR18)	1N4148 Silicon Diode	SS-162
R25 (R53)	30 Ohms 1/2w 5% Carbon Film	RC/2-300	CR4 (CR19)	1N4148 Silicon Diode	SS-162
R26 (R54)	2.7 Ohms 1w Metal Film	RM1-027	CR5 (CR20)	1N4148 Silicon Diode	SS-162
R27 (R55)	10 Ohms 2w 5% Metal Film	RM2-100	CR6 (CR21)	1N4148 Silicon Diode	SS-162
R28 (R56)	10 Ohms 1/4w 5% Carbon Film	RC/4-100	CR7 (CR22)	1N4148 Silicon Diode	SS-162
R57	4.7k Ohms 1/2w 5% Carbon Film	RC/2-472	CR8 (CR23)	1N4148 Silicon Diode	SS-162
R58	100k Ohms 1/4w 1% Metal Film	RMP/4-1003	CR9 (CR24)	1N4148 Silicon Diode	SS-162
R59	12.1k Ohms 1/4w 1% Metal Film	RMP/4-1212	CR10 (CR25)	1N4148 Silicon Diode	SS-162
R60	10k Ohms 1/4w 1% Metal Film	RMP/4-1002	CR11 (CR26)	1N5240B 10V, 1/2W, 5% Zener	SSH-600
R61	33k Ohms 1/4w 5% Carbon Film	RC/4-333	CR12 (CR27)	1N5240B 10V, 1/2W, 5% Zener	SSH-600
R62	10k Ohms 1/4w 5% Carbon Film	RC/4-103	CR13 (CR28)	1N4148 Silicon Diode	SS-162
R63	33k Ohms 1/4w 5% Carbon Film	RC/4-333	CR14 (CR29)	1N4148 Silicon Diode	SS-162
R64	5.11k Ohms 1/4w 1% Metal Film	RMP/4-511	CR15 (CR30)	1N4148 Silicon Diode	SS-162
R65 (R66)	1k Ohms 1/4w 5% Carbon Film	RC/4-102	CR31	1N5245B 15V, 1/2W, 5% Zener	SS-212
R67	22k Ohms 1/4w 5% Carbon Film	RC/4-223	F1 (F3)	5A, AGC/3AG	FS-005
C1 (C34)	2.2 mfd, 50V, 20%, Polypropylene	CPP-205C	F2 (F4)	5A, AGC/3AG	FS-005
C2 (C17)	220 pfd, 75V, 10%, Polypropylene	CPP-221	P1 (P3)	1k Ohms, Variable	RVH-102
C3 (C18)	330 pfd 630V, 3%, Dipped Mica	CM-331	P2 (P4)	500 Ohms, Variable	RVH-501
C4 (C19)	100 mfd Non-Polar Radial	CERNP-107	L1 (L2)	6 Microhenry, Inductor	TT-6.0
C5 (C20)	47 pfd 630V, 3%, Dipped Mica	CM-470	SW1	Switch, Bridging	SWH-510
C6 (C21)	220 pfd 75V, 10%, Polypropylene	CPP-221	TS1 (TS2)	Thermistor	SSH-730
C7 (C22)	3 pfd 500V, Dipped Mica	CM-030	U1	LM393N Dual Comparator	SS-207
C8 (C23)	0.001 mfd 250V, 10%, Polypropylene	CPP-102			
C9 (C24)	100 mfd 50V, 20%, Polar/Electrolytic	CER-107C			
C10 (C25)	0.1 mfd 100V, 20%, Polyester	CP-104A			
C11 (C26)	0.1 mfd 100V, 20%, Polyester	CP-104A			
C12 (C27)	0.033 mfd 160V, 10%, Polypropylene	CPP-333			

*Parts values and types subject to change without prior notice.*

PC58 BOARD LAYOUT



H16 H17 H18 H19 H20 H21

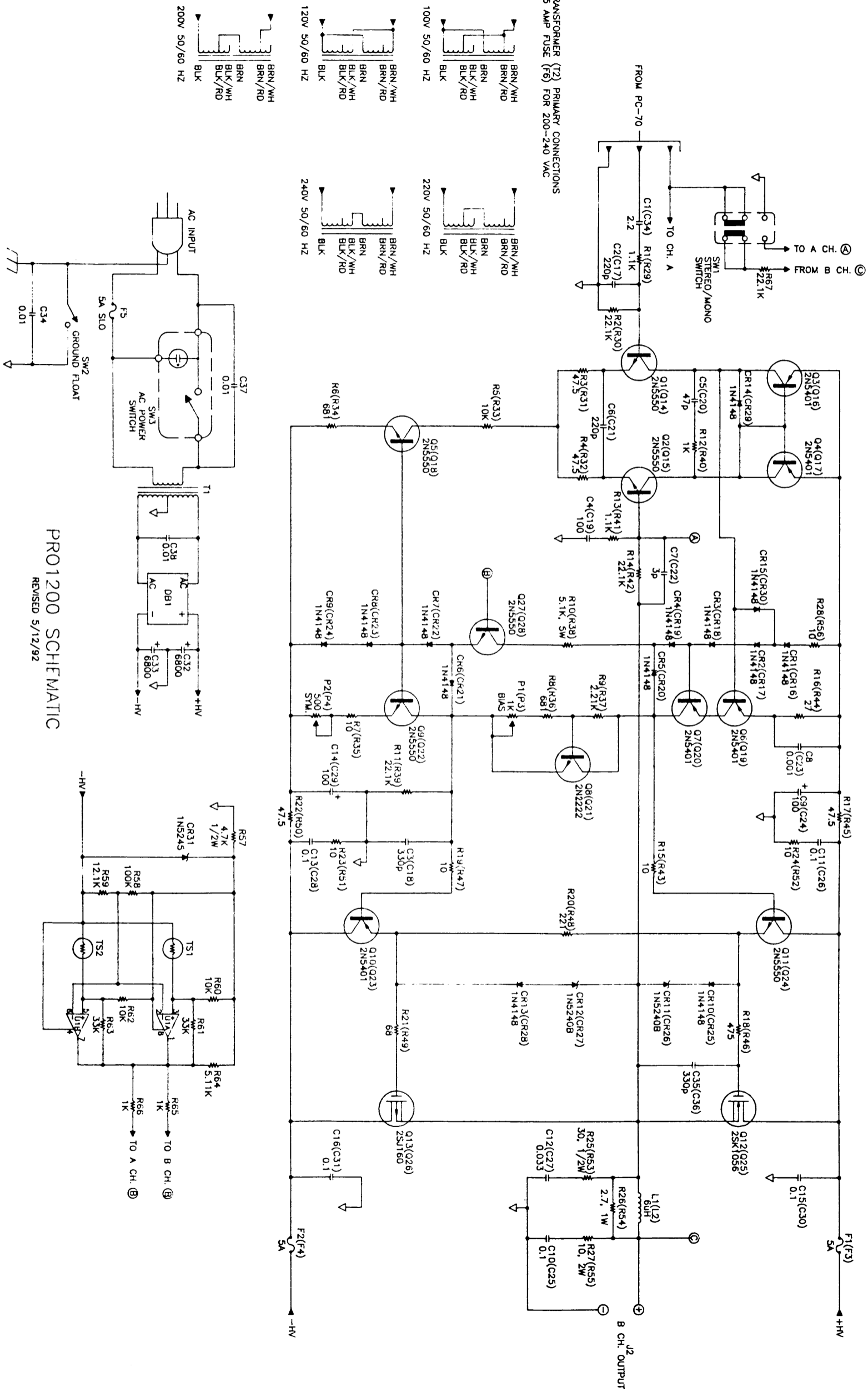


**PC58 SCHEMATIC DIAGRAM**

NOTE: UNLESS SPECIFIED OTHERWISE

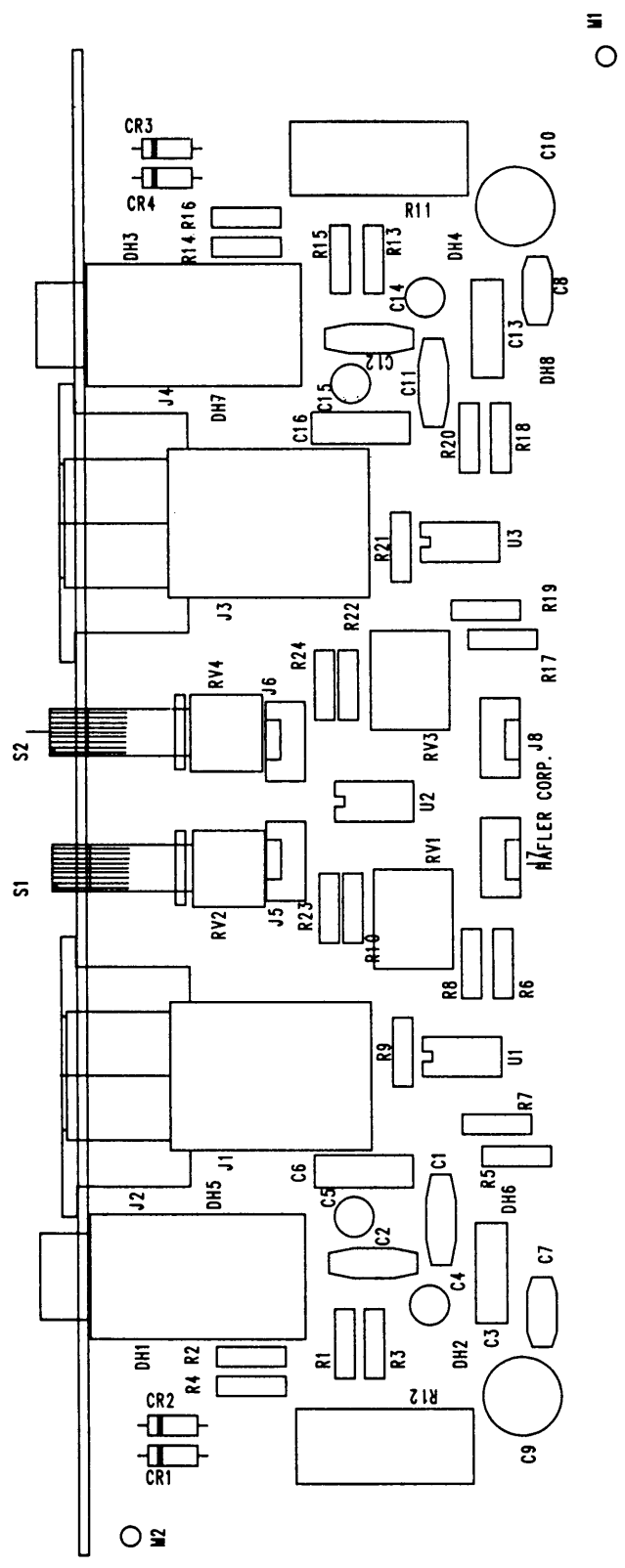
1. ALL RESISTORS IN OHMS
2. ALL CAPACITORS IN MICROFARADS
3. "B" CHANNEL SHOWN  
"A" CHANNEL DESIGNATORS IN PARENTHESIS
4. STEREO/MONO SWITCH SHOWN IN STEREO

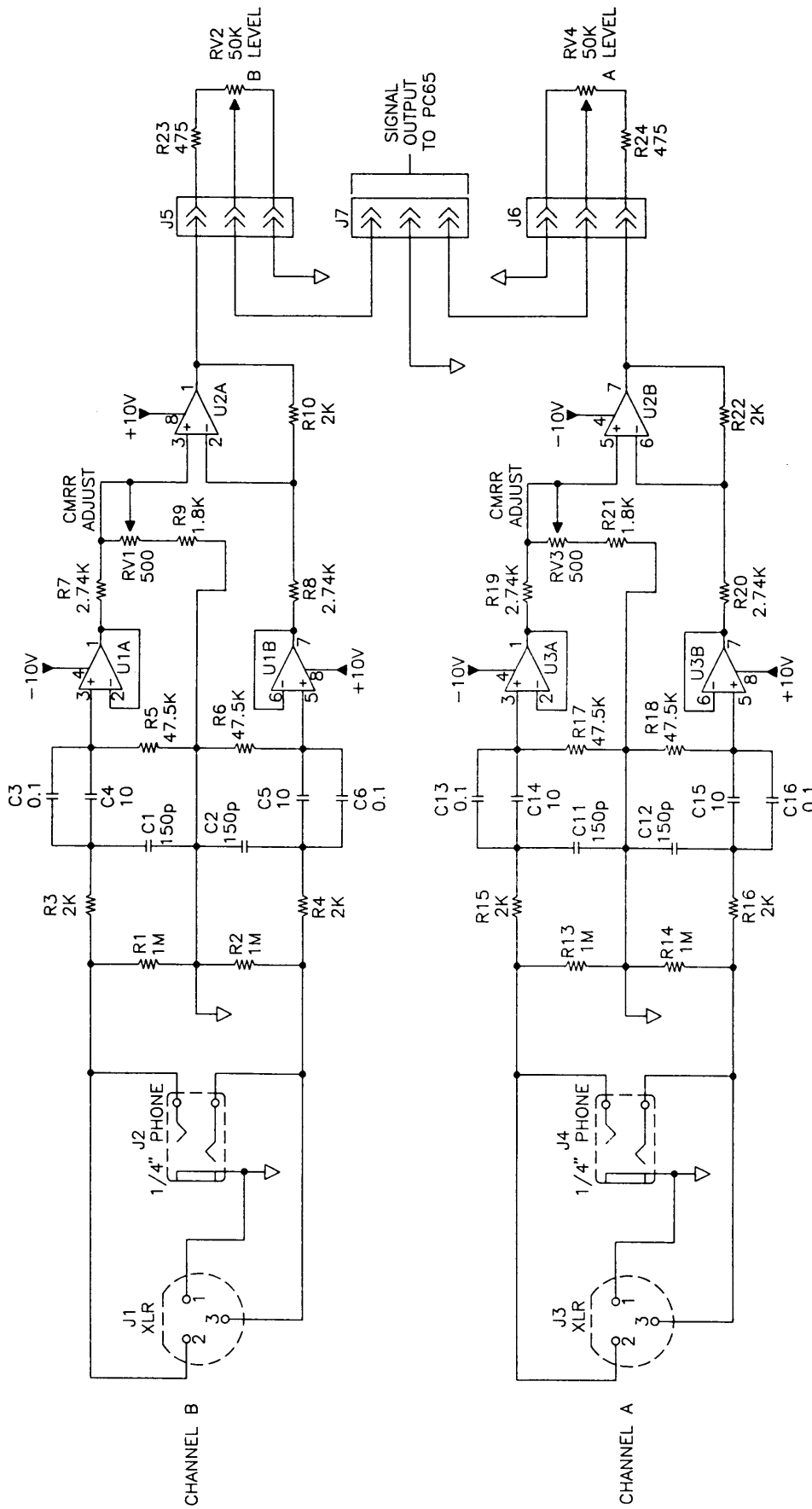
EXPORT TRANSFORMER (T2) PRIMARY CONNECTIONS  
USE 2.5 AMP FUSE (F6) FOR 200-240 VAC



PRO1200 SCHEMATIC  
REVISED 5/12/92

PC70 BOARD LAYOUT





**PC-70 SCHEMATIC DIAGRAM**

1. ALL RESISTORS IN OHMS  
1/4 WATT, 1%, METAL-FILM
2. ALL CAPACITORS IN MICROFARADS
3. U1, U3 ARE TLO82's
4. U2 IS NE5532
5. CR1-CR4 ARE IN5240B's



**HAFLER**

**A DIVISION OF**

**ROCKFORD CORPORATION**

**641 SOUTH ROCKFORD DRIVE**

**TEMPE, ARIZONA 85281 U.S.A.**

**IN U.S.A. (602) 967-3565**

**IN CANADA, CALL KORBON (416) 567-1929**

**IN EUROPE, FAX (49) 421-487-877**

**IN PACIFIC ASIA, FAX (65) 339-0363**