TRACE ELLIOT

SERVICE MANUAL

DATE : December 29, 1999
Product Code: N/A
Model Number : AH300 series 6

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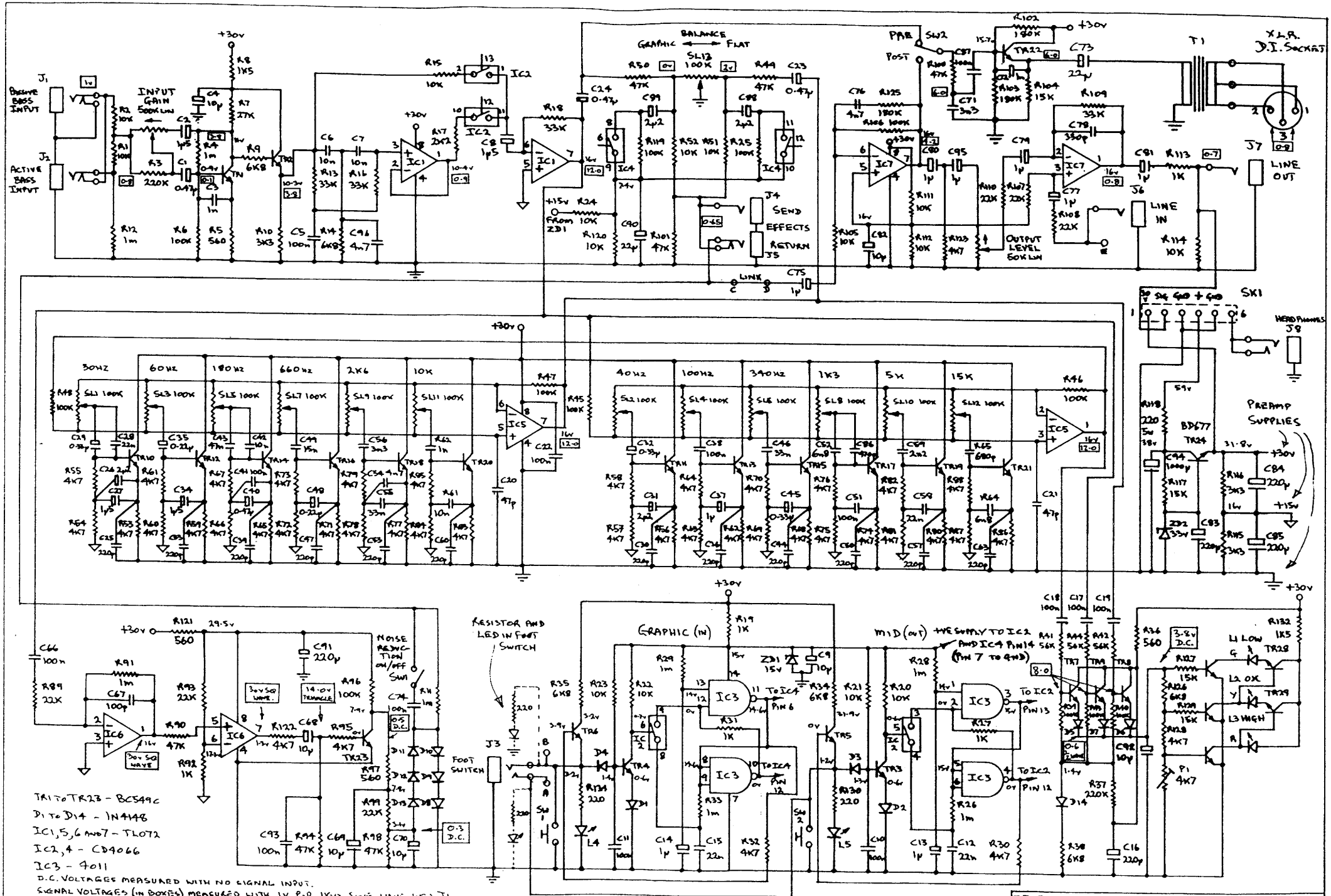
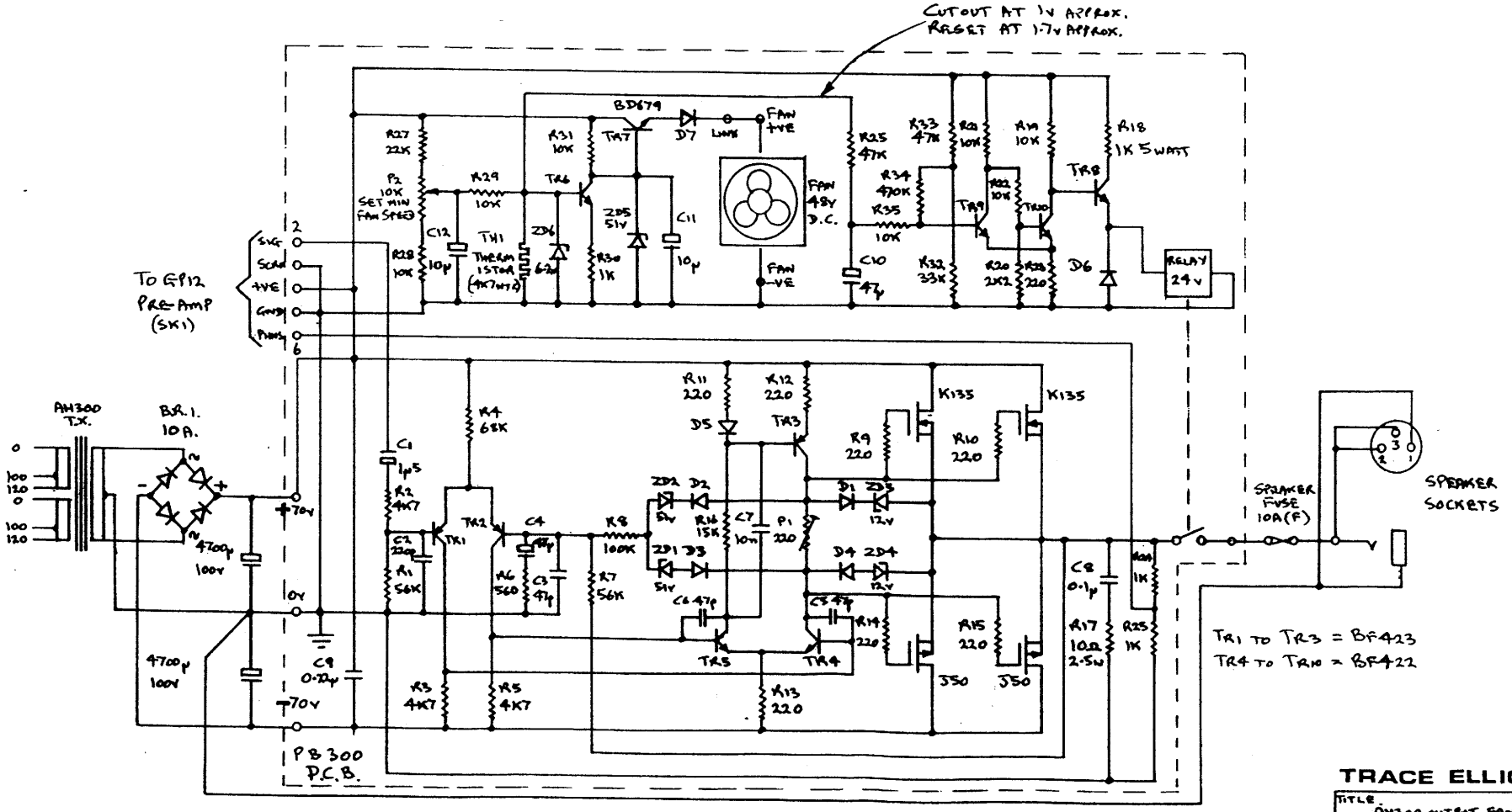

PASSIVE BASS INPUT
ACTIVE BASS INPUT
INPUT GAIN
BALANCE
GRAPHIC
FLAT
PRE
POST
SEND
EFFECTS
RETURN
LINK
OUTPUT LEVEL
LINE IN
LINE OUT
XLR D.I. SOCKET
SK1
HEADPHONES
PREAMP SUPPLIES
30Hz
60Hz
180Hz
660Hz
2K6
10K
40Hz
100Hz
340Hz
1K3
5K
15K
GRAPHIC (in)
MID (out)
FOOT SWITCH
NOISE REDUCTION on/off SW1
TR1 TO TR23 - BC549C
D1 TO D14 - 1N4148
IC1,5,6 AND 7 - TL072
IC2,4 - CD4066
IC3 - 4011
D.C. VOLTAGES MEASURED WITH NO SIGNAL INPUT.
SIGNAL VOLTAGES (IN BOXES) MEASURED WITH 1V P-P. 1KHz SINE WAVE INTO J1.
INPUT GAIN SET TO 8. GRAPHIC FLAT, OUTPUT LEVEL SET ON 2.
GRAPHIC "in". MID "out". ALL MEASUREMENTS ARE 0V - 0V.
TRACE ELLIOT
SERIES 6
TITLE. GP12 CIRCUIT
DRAWN C. Sutton.
DATE. 3-1-89
DWG NO:- GP12



TRACE ELLIOT SERIES 6

TITLE: AH300 OUTPUT, FAN CONTROL AND THERMAL TRIP.		
DRAWN: C BUTTON	DATE: 6-2-89	DWG NO:- AH300

GP12 PREAMPLIFIER

The **GP12** preamplifier is used in the following **Trace Elliot Series 6** products:

Amplifier Heads: AH200, AH300, AH500, VA400

Combo amplifiers: 1210, 1215

Rack Mount Equipment: GP12X

TECHNICAL SPECIFICATIONS

Inputs	Passive Bass	Impedance 100k Ohms Input Range 50mV to 10V (peak-peak)
	Active Bass	Impedance 10k Ohms Input Range 100mV to 20V (peak-peak)
	Effects Return	Impedance 50k Ohms Nominal Input Level 0dBv (0.775v RMS)
	Line Input	Impedance 50k Ohms Nominal Input Level 0dBv
Outputs	Effects Send	Impedance 10k Ohms Nominal Level 0dBv
	Line Output	Impedance 600 Ohms Nominal Level 0dBv Maximum Level +9dBv (7v RMS)
	DI Output	600 Ohms, Transformer Balanced Nominal Level 0dBv (Pins 2& 3)
Equalisation	Graphic	+/- 15dB at 12 centre frequencies
	Mid Pre Shape	+6dB at 50 Hz and 2kHz, -6dB at 400 Hz
Frequency Response		-3dB at 22 Hz and 25kHz
Signal/Noise Ratio		Better than 80dB (EQ flate, Mid out)
Distortion		Less than 0.05% THD

GP12 CIRCUIT DESCRIPTION

INPUT J1/J2

J1 and J2 are the instrument inputs to the GP12. A signal entering J1 is passed to the first stage via R2 with R1 in parallel. Resistor R12 is to decouple any D.C. appearing on the input to ground.

A signal entering J2 is passed to the first stage via R1, again with R12 as a D.C. path to ground. This time however, R2 has one end connected to ground via the switched contact on J1. This provides a degree of attenuation to the "Active Bass" input J2 with the combination of R1 and R2 acting as a potential divider across the input.

FIRST STAGE

The first stage is made up of transistors TR1 and TR2. TR2 is an "emitter follower" stage to provide a low impedance output to feed the next stage (the Mid Pre Shape circuit).

TR1 is the input gain/attenuation stage with its level controlled by the "Input Gain" pot. Gain is achieved by moving the pot's wiper toward the input and attenuation by moving the wiper to the opposite end, providing negative feedback from the collector to the base of TR1.

The supply to this first stage comes in via R8 and is decoupled with C4 to prevent any power supply noise from reaching this sensitive input circuit. C3 is to bypass any high frequency noise and prevent radio breakthrough, etc.

MID PRE SHAPE

The combination of C5, C6, C7 and C96, along with resistors R13, R14 and R16 form a "Band Reject" filter. This provides a "Mid Cut" to any signal passing through it. The filter is buffered by one half of IC1.

The "Mid Pre Shape" switching is performed by IC2 and an analog switch on the input to the second half of IC1. By closing one of these switches either the "Straight" sound via R15 or the "Pre Shaped" sound via R17 may be selected. These two resistors also set the gain of the following stage with a greater gain being provided by the smaller value of R17. As this is in the output from the "Pre Shape" circuit it provides a "Top" and "Bottom" boost as well as a "Mid" cut to the "Pre Shaped" sound.

As long as the D.C. voltage on the input to the analog switches is the same, the switching will be click free. This voltage is provided from the emitter of transistor TR2.

THE GRAPHIC SECTION

The graphic equalisation section is configured around IC5. The input signal comes from the output of IC2 Pin 7 via R45 into the first half of the graphic.

The graphic is split into two halves with each covering six frequency bands. The signal from the first half (IC5 Pin 1) is passed to the second half by resistor R48.

Each frequency band of the graphic is composed of one transistor, two capacitors and three resistors, forming a resonant circuit. Taking the 10kHz band as an example, the transistor is TR20, the resistors are R83, R84 and R85, and the two frequency determining capacitors are C61 and C62.

This circuit presents a low impedance to the slider of the graphic pot SL11 at its 10kHz centre frequency. Thus, moving the slider down reduces the amount of signal at this frequency reaching Pin 5 of IC5 (the non-inverting input) producing a "Cut" at 10kHz, whereas moving the slider up reduces the amount of feedback via R47 back into Pin 6 of IC5, increasing the gain at 10kHz, producing a "Boost".

The 220pF capacitor C60 is included to increase the stability of the resonant circuit. The two 47pF capacitors C20 and C21 help tp prevent any high frequency oscillation or R.F. pick-up.

The output of the graphic stage comes from IC5 Pin 7 and is fed back into the Graphic/Flat balance control circuit.

GRAPHIC/FLAT BALANCE CIRCUIT

The signal from the graphic stage is fed into the circuit via C23 and R49 to one end of the Graphic/Flat balance slider. The other end of the slider is fed with the signal from the "Mid Pre Shape" circuit IC1 Pin 7. The wiper of the slider goes to ground so that moving the slider from one end to the other will attenuate either the signal from the graphic or the signal from before the graphic, allowing a balance between these two signals to be set.

The output from this circuit is via R51 and R52 and is at the correct level to go to the effects send socket.

GRAPHIC IN/OUT SWITCHING

C88 and C89 connect the signals from either end of the balance slider into the two analog switches. Closing one or other of these will short out any A.C. signal present to ground allowing through only that signal which has not been shorted - ie. it selects the signal from either before or after the graphic stage, thus switching the graphic in and out.

The other side of the analog switches are connected to ground as far as A.C. is concerned by capacitor C90, but are actually biased up to a D.C. voltage of 7.5 volts. This is necessary to allow the analog switches to function correctly.

NOISE REDUCTION

The signal from IC1 Pin 7 is fed via C66 and R89 into the first half of IC6 where it is boosted in level. R90 feeds this signal to the non-inverting input of a comparator stage, with the threshold of the comparator being set by the potential divider R92/R93 supplying a fixed level to the inverting input.

Each time the signal from R90 goes above this threshold, the output on Pin 7 swings from -ve supply to +ve supply. This biases on transistor TR23 which in turn discharges capacitor C69 quickly via R97.

Once transistor TR23 has turned off, then C69 will slowly recharge via R96. This charging and discharging of C69 brings the noise reduction "In" and "Out" in the following way.

The diode chain D8 to D13 will normally appear as an open circuit to A.C. signals unless it is forward biased, when it appears as a short circuit. As C69 slowly charges up, it also charges up C70 via R99. This rising voltage gradually forward biases the diodes and when the noise reduction switch is closed, this will add a progressive "Top" cut by putting C74 directly across the signal path. However, when C69 quickly discharges, this instantly removes the effect of capacitor C74, removing the noise reduction.

It can be seen from this description that the noise reduction comes in gradually when no signal is present and is removed instantly as soon as any signal is present at the input.

SIGNAL LEVEL INDICATION

Transistors TR7, TR8 and TR9 are fed from three separate points throughout the GP12. These three transistors then combine to feed the level indication circuit. In this way, the level is monitored at all the critical points in the GP12 ensuring that clipping or distortion cannot take place without the level indication circuit detecting it.

The combined output of these three transistors is a varying D.C. voltage that is developed across capacitor C92, feeding the voltage divider chain of R126, R128 and P1, with P1 adjusting the point at which the red "Overload" LED comes on. When the voltage across C92 reaches a high enough level, it will bias on transistor TR25, lighting the "Increase Gain" LED. As the voltage increases, it will bias on transistor TR26, lighting the "OK" LED. This will also cause the transistor TR28 to be turned off, making the "Increase Gain" LED go out. As this voltage again increases, the "Overload" LED will be lit by transistor TR27 and the "OK" LED will be turned off by TR29.

THE OUTPUT STAGE

The signal from the "Effects Return" socket is passed via C75 and R105 to the first half of IC7. This stage has a gain of 10 in order to return the signal back to line level. This then feeds the "Output Level" pot and the "Post EQ" D.I. stage.

C76 and R125 are for high frequency compensation purposes, with C80, C95 and R123 forming a "High Pass" filter to set the low frequency roll off for the pre amp output. R111 and R112 form a potential divider across the supply for biasing up IC7 to half this voltage. C82 decouples this half supply point to ground.

The "Output Level" pot sets the level of signal passed to the final stage, formed around the second half of IC7. This feeds the "Line Out" socket as well as the signal output to the PCB connector socket. The "Line Input" socket feeds into the non-inverting input on this op amp (Pin 3) to be mixed with the pre amp signal. C78 sets the high frequency limit of the output from the GP12 and R109 sets the gain of this final stage.

PREAMP SUPPLY REGULATION

The supply voltage comes into the GP12 PCB on connector Pin 4. This voltage is dropped across R118 to a suitable level for the regulator transistor TR24. C94 helps to smooth out any ripple on the incoming supply.

TR24 (the BD677) is working as a series regulator with its output voltage being set with a 33 volt zener diode in its base. The voltage across the zener diode is provided by resistor R117, with any noise produced by the the zener being decoupled by C83.

The output voltage from the regulator is dropped across the potential divider R115 and R116 to provide a half supply reference to the op amps in the preamp. C84 and C85 hold this voltage stable.

D.I. PROTECTION CIRCUIT.

The D.I. switch selects the signal from either before the graphic but after the "Mid Pre Shape" (Pre EQ), or from after the graphic and after the Effects Return (Post EQ). This signal is passed to the D.I. drive transistor TR22. This directly drives the transformer T1 to provide the balanced and isolated D.I. output.

R103 and R103 bias the transistor base to half supply, R104 sets the D.C. conditions on the emitter, C72 is high frequency bypass and C73 couples the AC signal through to drive the transformer.

GP12/5

GRAPHIC AND PRE SHAPE SWITCHING

Both the graphic and the pre shape switching circuits operate in the same way. Taking the graphic switching as an example, we have two of the NAND gates of IC3, one analog switch from IC2 and a transistor TR4 that form the actual switching circuit. TR6 is there to turn on or off the status LED on the pre amp and in the foot switch.

The supply to the switching circuit is zenered down to 15v by ZD11. This also provides the supply to IC2 and IC4, the analog switches. On power up, capacitor C14 will be in a discharged state and will hold the voltage on Pin 3 of IC13 low. This will mean that the output on Pin 11 is high, which is in turn connected to Pins 8 and 9, resulting in Pin 10 being low. Pin 10 is connected back via R31 to Pin 12. Pin 11 (high) is connected via R32 to the base of Transistor TR6. This transistor will turn on, lighting LED L4 and the LED in the foot switch if connected. By the time C14 has charged up, circuit conditions will have stabalised. This ensures that the circuit always comes on in a known condition – graphic in, pre shape out.

The switching over of the circuit is accomplished every time the analog switch IC2 (Pins 8 and 9) is closed. From our initial condition, Pins 8 and 9 of IC3 are high. This will charge up the capacitor C15 via R33 making Pin 8 on IC2 high also. Closing the analog switch takes Pin 12 of IC3 high and, as Pin 13 is already high, then Pin 11 will go low, Pins 8 and 9 will go low and Pin 10 will go high, holding Pin 12 high and maintaining the conditions. The circuit has now changed state and LED 4 will go out as TR6 turns off.

Pins 8 and 9 are now low so C15 will be discharged via R33. Pin 8 on IC2 will also be low so that when the analog switch is again closed, the circuit will change back to its initial state.

The analog switch is operated by transistor TR4, the base of which is held high by R23. Its collector will therefore be low. However, when push button SW1 is closed, this pulls the base of TR4 down via D4 to 0.6 volts – the same as the voltage set on its emitter by diode D1, thus turning TR4 off. The collector of TR4 will go high closing the analog switch and, as we have previously seen, this will change the state of the circuit. The same will occur if the foot switch is operated.

The LEDs in the foot switch and on the front panel of the GP12 are in fact in parallel and have 220 Ohm resistors in series with them to ensure even brightness.

TRACE ELLIOT

GP12 MAIN BOARD – COMPONENT PARTS LIST

REF	PART NUMBER		VALUE		REF	PART NUMBER		VALUE	
R1	1610-RM10K	10K	1/4W	MF	R61	1610-RM4K7	4K7	1/4W	MF
R2	1610-RM10K	10K	1/4W	MF	R62	1610-RM4K7	4K7	1/4W	MF
R3	1610-RM220K	220K	1/4W	MF	R63	1610-RM4K7	4K7	1/4W	MF
R4	1610-RM1M	1M	1/4W	MF	R64	1610-RM4K7	4K7	1/4W	MF
R5	1610-RM560R	560R	1/4W	MF	R65	1610-RM4K7	4K7	1/4W	MF
R6	1610-RM100K	100K	1/4W	MF	R66	1610-RM4K7	4K7	1/4W	MF
R7	1610-RM27K	27K	1/4W	MF	R67	1610-RM4K7	4K7	1/4W	MF
R8	1610-RM1K5	1K5	1/4W	MF	R68	1610-RM4K7	4K7	1/4W	MF
R9	1610-RM6K8	6K8	1/4W	MF	R69	1610-RM4K7	4K7	1/4W	MF
R10	1610-RM3K3	3K3	1/4W	MF	R70	1610-RM4K7	4K7	1/4W	MF
R11	1610-RM1M	1M	1/4W	MF	R71	1610-RM4K7	4K7	1/4W	MF
R12	1610-RM1M	1M	1/4W	MF	R72	1610-RM4K7	4K7	1/4W	MF
R13	1610-RM33K	33K	1/4W	MF	R73	1610-RM4K7	4K7	1/4W	MF
R14	1610-RM6K8	6K8	1/4W	MF	R74	1610-RM4K7	4K7	1/4W	MF
R15	1610-RM10K	10K	1/4W	MF	R75	1610-RM4K7	4K7	1/4W	MF
R16	1610-RM33K	33K	1/4W	MF	R76	1610-RM4K7	4K7	1/4W	MF
R17	1610-RM2K2	2K2	1/4W	MF	R77	1610-RM4K7	4K7	1/4W	MF
R18	1610-RM33K	33K	1/4W	MF	R78	1610-RM4K7	4K7	1/4W	MF
R19	1610-RM1K	1K	1/4W	MF	R79	1610-RM4K7	4K7	1/4W	MF
R20	1610-RM10K	10K	1/4W	MF	R80	1610-RM4K7	4K7	1/4W	MF
R21	1610-RM10K	10K	1/4W	MF	R81	1610-RM4K7	4K7	1/4W	MF
R22	1610-RM10K	10K	1/4W	MF	R82	1610-RM4K7	4K7	1/4W	MF
R23	1610-RM10K	10K	1/4W	MF	R83	1610-RM4K7	4K7	1/4W	MF
R24	1610-RM10K	10K	1/4W	MF	R84	1610-RM4K7	4K7	1/4W	MF
R25	1610-RM100K	100K	1/4W	MF	R85	1610-RM4K7	4K7	1/4W	MF
R26	1610-RM1M	1M	1/4W	MF	R86	1610-RM4K7	4K7	1/4W	MF
R27	1610-RM1K	1K	1/4W	MF	R87	1610-RM4K7	4K7	1/4W	MF
R28	1610-RM1M	1M	1/4W	MF	R88	1610-RM4K7	4K7	1/4W	MF
R29	1610-RM1M	1M	1/4W	MF	R89	1610-RM22K	22K	1/4W	MF
R30	1610-RM4K7	4K7	1/4W	MF	R90	1610-RM47K	47K	1/4W	MF
R31	1610-RM1K	1K	1/4W	MF	R91	1610-RM1M	1M	1/4W	MF
R32	1610-RM4K7	4K7	1/4W	MF	R92	1610-RM1K	1K	1/4W	MF
R33	1610-RM1M	1M	1/4W	MF	R93	1610-RM22K	22K	1/4W	MF
R34	1610-RM6K8	6K8	1/4W	MF	R94	1610-RM47K	47K	1/4W	MF
R35	1610-RM6K8	6K8	1/4W	MF	R95	1610-RM4K7	4K7	1/4W	MF
R36	1610-RM560R	560R	1/4W	MF	R96	1610-RM100K	100K	1/4W	MF
R37	1610-RM220K	220K	1/4W	MF	R97	1610-RM560R	560R	1/4W	MF
R38	1610-RM6K2	6K2	1/4W	MF	R98	1610-RM47K	47K	1/4W	MF
R39	1610-RM100K	100K	1/4W	MF	R99	1610-RM22K	22K	1/4W	MF
R40	1610-RM100K	100K	1/4W	MF	R100	1610-RM47K	47K	1/4W	MF
R41	1610-RM56K	56K	1/4W	MF	R101	1610-RM47K	47K	1/4W	MF
R42	1610-RM56K	56K	1/4W	MF	R102	1610-RM180K	180K	1/4W	MF
R43	1610-RM100K	100K	1/4W	MF	R103	1610-RM180K	180K	1/4W	MF
R44	1610-RM56K	56K	1/4W	MF	R104	1610-RM15K	15K	1/4W	MF
R45	1610-RM100K	100K	1/4W	MF	R105	1610-RM10K	10K	1/4W	MF
R46	1610-RM100K	100K	1/4W	MF	R106	1610-RM100K	100K	1/4W	MF
R47	1610-RM100K	100K	1/4W	MF	R107	1610-RM22K	22K	1/4W	MF
R48	1610-RM100K	100K	1/4W	MF	R108	1610-RM22K	22K	1/4W	MF
R49	1610-RM47K	47K	1/4W	MF	R109	1610-RM33K	33K	1/4W	MF
R50	1610-RM47K	47K	1/4W	MF	R110	1610-RM22K	22K	1/4W	MF
R51	1610-RM10K	10K	1/4W	MF	R111	1610-RM10K	10K	1/4W	MF
R52	1610-RM10K	10K	1/4W	MF	R112	1610-RM10K	10K	1/4W	MF
R53	1610-RM4K7	4K7	1/4W	MF	R113	1610-RM1K	1K	1/4W	MF
R54	1610-RM4K7	4K7	1/4W	MF	R114	1610-RM10K	10K	1/4W	MF
R55	1610-RM4K7	4K7	1/4W	MF	R115	1610-RM3K3	3K3	1/4W	MF
R56	1610-RM4K7	4K7	1/4W	MF	R116	1610-RM3K3	3K3	1/4W	MF
R57	1610-RM4K7	4K7	1/4W	MF	R117	1610-RM10K	10K	1/4W	MF
R58	1610-RM4K7	4K7	1/4W	MF	R118	1610-RM220R	220R	4W	WW
R59	1610-RM4K7	4K7	1/4W	MF	R119	1610-RM100K	100K	1/4W	MF
R60	1610-RM4K7	4K7	1/4W	MF	R120	1610-RM10K	10K	1/4W	MF

TRACE ELLIOT

GP12 MAIN BOARD – COMPONENT PARTS LIST

REF	PART NUMBER		VALUE		REF	PART NUMBER		VALUE	
R121	1610-RM560R	560R	1/4W	MF	C54	1610-C4N7-100VE	4n7	50v	M
R122	1610-RM4K7	4K7	1/4W	MF	C55	1610-C33N-100VE	33nF	50v	M
R123	1610-RM4K7	4K7	1/4W	MF	C56	1610-C3N3-100VE	3n3	50v	M
R124	1610-RM6K8	6K8	1/4W	MF	C57	1610-C22P-50VCD	220pF	50v	DC
R125	1610-RM180K	180K	1/4W	MF	C58	1610-C22N-100VE	22nF	50v	M
R133	1610-RM100K	100K	1/4W	MF	C59	1610-C2N2-100VE	2n2	50v	M
					C60	1610-C220P-50VCD	220pF	50v	DC
C1	1610-CO.47-35VT	0.47uF	35v	T	C61	1610-C10N-100VE	10nF	50v	M
C2	1610-C1-35VT	1u5	35v	T	C62	1610-CIN-100VE	1nF	50v	M
C3	1610-CIN-100VE	1nF	50v	M	C63	1610-C220P-50VCD	220pF	50v	DC
C4	1610-C10-35VER	10uF	35v	RE	C64	1610-C6N8-100VE	6n8	50v	M
C5	1610-C100N-100VE	100nF	50v	M	C65	1610-C680P-63v	680pF	100v	P
C6	1610-C10N-100VE	10nF	50v	M	C66	1610-C100N-100VE	100nF	50v	M
C7	1610-C10N-100VE	10nF	50v	M	C67	1610-C100P-50VCD	100pF	100v	P
C8	1610-C1-35VT	1u5	35v	T	C68	1610-C10-35VER	10uF	35v	RE
C9	1610-C10-35VER	10uF	35v	RE	C69	1610-C10-35VER	10uF	35v	RE
C10	1610-C100N-100VE	100nF	50v	M	C70	1610-C10-35VER	10uF	35v	RE
C11	1610-C100N-100VE	100nF	50v	M	C71	1610-C3N3-100VE	3n3	50v	M
C12	1610-C22N-100VE	22nF	50v	M	C72	1610-CIN-100VE	1nF	50v	M
C13	1610-C1-35VT	1uF	35v	T	C73	1610-C22-35VER	22uF	35v	RE
C14	1610-C1-35VT	1uF	35v	T	C74	1610-C1-35VER	1uF	35v	RE
C15	1610-C22N-100VE	22nF	50v	M	C75	1610-C1-35VER	1uF	35v	RE
C16	1610-C220-35VER	220uF	35v	RE	C76	1610-C4N7-100VE	4n7	50v	M
C17	1610-C100N-100VE	100nF	50v	M	C77	1610-C1-35VER	1uF	35v	RE
C18	1610-C100N-100VE	100nF	50v	M	C78	1610-C330P-50VCD	330pF	50v	DC
C19	1610-C100N-100VE	100nF	50v	M	C79	1610-C1-35VER	1uF	35v	RE
C20	1610-C47P-50VCD	47pF	50v	DC	C80	1610-C1-35VER	1uF	35v	RE
C21	1610-C47P-50VCD	47pF	50v	DC	C81	1610-C1-35VER	1uF	35v	RE
C22	1610-C100N-100VE	100nF	50v	M	C82	1610-C10-35VER	10uF	35v	RE
C23	1610-CO.47-35VT	0.47uF	35v	T	C83	1610-C220-35VER	220uF	35v	RE
C24	1610-CO.47-35VT	0.47uF	35v	T	C84	1610-C220-35VER	220uF	35v	RE
C25	1610-C220P-50VCD	220pF	50v	DC	C85	1610-C220-35VER	220uF	35v	RE
C26	1610-C2.2-35VT	2u2	35v	T	C86	1610-C470P-160V	470pF	100v	P
C27	1610-C1-35VT	1u5	35v	T	C87	1610-C100N-100VE	100nF	50v	M
C28	1610-C22N-100VE	22nF	50v	M	C88	1610-C2.2-35VT	2u2	35v	T
C29	1610-CO.33-35VT	0.33uF	35v	T	C89	1610-C2.2-35VT	2u2	35v	T
C30	1610-C220P-50VCD	220pF	50v	DC	C90	1610-C22-35VER	22uF	35v	RE
C31	1610-C2.2-35VT	2u2	35v	T	C91	1610-C220-35VER	220uF	35v	RE
C32	1610-CO.33-35VT	0.33uF	35v	T	C92	ON FRONT BOARD			
C33	1610-C220P-50VCD	220pF	50v	DC	C93	1610-C100N-100VE	100nF	50v	M
C34	1610-C1-35VT	1u5	35v	T	C94	1610-C1000-63VEA	1000uF	63v	AE
C35	1610-CO.22-35VT	0.22uF	35v	T	C95	1610-C1-35VER	1uF	35v	RE
C36	1610-C220P-50VCD	220pF	50v	DC	C96	1610-C4N7-100VE	4n7	50v	M
C37	1610-C1-35VT	1uF	35v	T	C97	1610-C100N-100VE	100nF	50v	M
C38	1610-C100N-100VE	100nF	50v	M					
C39	1610-C220P-50VCD	220pF	50v	DC	TR1	1610-TBC549C	BC549C		
C40	1610-CO.47-35VT	0.47pF	35v	T	TR2	1610-TBC549C	BC549C		
C41	1610-C100N-100VE	100nF	50v	M	TR3	1610-TBC549C	BC549C		
C42	1610-C10N-100VE	10nF	50v	M	TR4	1610-TBC549C	BC549C		
C43	1610-C47-100VE	47nF	50v	M	TR5	1610-TBC549C	BC549C		
C44	1610-C220P-50VCD	220pF	50v	DC	TR6	1610-TBC549C	BC549C		
C45	1610-CO.33-35VT	0.33uF	35v	T	TR7	1610-TBC549C	BC549C		
C46	1610-C33N-100VE	33nF	50v	M	TR8	1610-TBC549C	BC549C		
C47	1610-C220P-50VCD	220pF	50v	DC	TR9	1610-TBC549C	BC549C		
C48	1610-CO.22-35VT	0.22uF	35v	T	TR10	1610-TBC549C	BC549C		
C49	1610-C15N-100VE	15nF	50v	M	TR11	1610-TBC549C	BC549C		
C50	1610-C220P-50VCD	220pF	50v	DC	TR12	1610-TBC549C	BC549C		
C51	1610-C100N-100VE	100nF	50v	M	TR13	1610-TBC549C	BC549C		
C52	1610-C6N8-100VE	6n8	50v	M	TR14	1610-TBC549C	BC549C		
C53	1610-C220P-50VCD	220pF	50v	DC	TR15	1610-TBC549C	BC549C		

TRACE ELLIOT

GP12 MAIN BOARD – COMPONENT PARTS LIST – FRONT BOARD

REF	PART NUMBER	VALUE
TR16	1610-TBC549C	BC549C
TR17	1610-TBC549C	BC549C
TR18	1610-TBC549C	BC549C
TR19	1610-TBC549C	BC549C
TR20	1610-TBC549C	BC549C
TR21	1610-TBC549C	BC549C
TR22	1610-TBC549C	BC549C
TR23	1610-TBC549C	BC549C
TR24	1610-TBC549C	BC549C
D1	1610-D-1N4148	1N4148
D2	1610-D-1N4148	1N4148
D3	1610-D-1N4148	1N4148
D4	1610-D-1N4148	1N4148
D5	1610-D-1N4148	1N4148
D6	1610-D-1N4148	1N4148
D7	1610-D-1N4148	1N4148
D8	1610-D-1N4148	1N4148
D9	1610-D-1N4148	1N4148
D10	1610-D-1N4148	1N4148
D11	1610-D-1N4148	1N4148
D12	1610-D-1N4148	1N4148
D13	1610-D-1N4148	1N4148
D14	1610-D-1N4148	1N4148
ZD1	1610-D-BZY88C15	BZY88C15
ZD2	1610-D-BZY88C33	BZY88C33
T1	1612-TRANS-DI	D.I. TRANSFORMER
IC1	1610-IL-TL072	TL072
IC2	1610-IC-4066BPC	CD4066B
IC3	1610-IC-4011BPC	CD4011B
IC4	1610-IC-4066BPC	CD4066B
IC5	1610-IL-TL072	TL072
IC6	1610-IL-TL072	TL072
IC7	1610-IL-TL072	TL072
SW1	1610-SWF2UEE	LATCH PUSH SWITCH
SW2	1610-SWF2UEE	LATCH PUSH SWITCH
SK1	1610-HEADER-6W	PIN HEADER 6 WAY
J1	1611-JCK-BNBG	MONO JACK-BNB
J2	1611-JCK-BNBG	MONO JACK-BNB
J3	1611-JCK-BNBG	STEREO JACK-BBB
J4	1611-JCK-BNBG	MONO JACK-BNB
J5	1611-JCK-BNBG	MONO JACK-BNB
J6	1611-JCK-BNBG	MONO JACK-BNB
J7	1611-JCK-BNBG	MONO JACK-BNB
J8	1611-JCK-BNBG	STEREO JACK-BBB
JL1	1610-LINK-10W	JUMPER LINK 10 WAY
JL2	1610-LINK-10W	JUMPER LINK 10 WAY
JL3	1610-LINK-10W	JUMBER LINK 5 WAY (CUT IN 2 PIECES)
JL4	1610-HEADER-3W	PIN HEADER 3 WAY

REF	PART NUMBER		VALUE
R126	1610-RM6K8	6K8	1/4W
R127	1610-RM15K	15K	1/4W
R128	1610-RM4K7	4K7	1/4W
R129	1610-RM15K	15K	1/4W
R130	1610-RM220R	220R	1/4W
R131	1610-RM220R	220R	1/4W
R132	1610-RM1K5	1K5	1/4W
C92	1610-C1035VEA	10uF	35v
P1	1610-PRESET-4K7	4K7	PRESET
SL1 - SL13	1611-SLIDER-S	100K LIN	SLIDER
TR25-TR29	1610-TBC549C	BC549C	
L1	1610-LED GREEN	LED 5MM	GREEN
L2	1610-LED-YELLOW	LED 5MM	YELLOW
L3	1610-LED-RED	LED 5MM	RED
L4	1610-LED-RED	LED 5MM	RED
L5	1610-LED-RED	LED 5MM	RED
SW1	1610-SW-D6	D6 PLUNGER SWITCH	
SW2	1610-SW-D6	D6 PLUNGER SWITCH	

MISCELLANEOUS PARTS

SLIDER CAP WHITE	1605-CAP-SLIDE-W
SLIDER CAP RED	1605-CAP-SLIDE-R
COLLET KNOB BLACK	1611-RITEL-KNOB
COLLET KNOB CAP RED	1611-RITEL-CAP-R
COLLET KNOB CAP GREEN	1611-RITEL-CAP-G
X.L.R. CHASSIS PLUG	1611-XLR-PM
FRONT OVERLAY	1614-OLAY-GP12
PUSH SWITCH CAP WHITE	1605-CAP-SWT-6
INPUT GAIN POT 500K	1611-POT-500K
OUTPUT LEVEL POT 50K	1611-POT-50K
I.C. SOCKET 8 PIN	1600-SOCKET-8W
I.C. SOCKET 14 PIN	1600-SOCKET-14W
LED REFLECTOR	1605-LED-REFLECT
BD677 HEATSINK	1611-MS-GP12

SYMBOLS USED IN PARTS LIST

MF	METAL FILM RESISTOR
WW	WIRE WOUND RESISTOR
M	MYLAR CAPACITOR
T	TANTALUM CAPACITOR
DC	DISC CERAMIC CAPACITOR
P	POLYESTER CAPACITOR
RE	RADIAL ELECTROLYTIC
AE	AXIAL ELECTROLYTIC

PARTS LIST FOR PA300L / 500R

Description	Part Code	Qty	Where Used
RESISTORS			
100K ¼ WATT	72-RM100K	1	R8
10K ¼ WATT	72-RM10K	5	R22 R28 R29 R31 R35
15K ¼ WATT	72-RM15K	2	R33 R16
1K ¼ WATT	72-RM1K	1	R30
220R ¼ WATT	72-RM220R	9	R9-15 R23 R24
22K ¼ WATT	72-RM22K	1	R27
2K2 ¼ WATT	72-RM2K2	1	R20
33K ¼ WATT	72-RM33K	1	R32
470K ¼ WATT	72-RM470K	1	R34
47K ¼ WATT	72-RM47K	1	R25
560R ¼ WATT	72-RM560R	1	R6
56K ¼ WATT	72-RM56K	2	R7
68K ¼ WATT	72-RM68K	1	R4
10R 2.5 WATT	72-RWW10R-2.5W	1	R17
1K 6 WATT	72-RWW1K-6W	1	R18
4K7 ¼ WATT	72-RM4K7	3	R2 R3 R5
10K ½ WATT	72-RC10K-.5W	2	R19 R21
CAPACITORS			
0.22µF 250V POLY	72-C0.22-250VP	1	C9
1.5µF 35V TANT	72-C1.5-35VT	1	C1
10µF 63V RADIAL	72-C10-63VER	2	C11 C12
100nF 250V POLY	72-C100N-250VP	1	C8
220pF 100V CER/DISC	72-C220P-100VCD2	1	C2
10nF 100V MYLAR	72-C10N-100VE	1	C7
47µF 16V RADIAL	72-C47-16VER	1	C10
47µF 63V RADIAL	72-C47-63VER	2	C4 C13
47pF 100V CER/DISC	72-C47P-100VCD	3	C3 C5 C6
SEMI-CONDUCTORS			
12V ZENER DIODE	72-D-BZX55C12V	2	ZD3 ZD4
6.2V ZENER DIODE	72-D-BZX556V2	1	ZD6
51V ZENER DIODE	72-D-BZX55C51V	3	ZD5 ZD1 ZD2
IN4002 DIODE	72-D-IN4002	2	D6 D7
IN4148 DIODE	72-D-IN4148	5	D1-5
* BUZ900 MOS-FET	* 72-MOS-BUZ900	2	NEAREST RELAY
* BUZ905 MOS-FET	* 72-MOS-BUZ905	2	NEAREST D7
BC182L TRANSISTOR	72-TBC182L	1	TR9
BD679 DARLINGTON	72-TBD679	1	TR7
BF422 TRANSISTOR	72-TBF422	5	TR4-8 TR10

BF423 TRANSISTOR	72-TBF423	3	TR1-3
OTHERS			
10K PRESET POT	72-PRESET-10K	1	P2
220R PRESET POT	72-PRESET-220R	1	P1
NTC THERMISTOR	72-TH-KED472CY	1	TH1
30 AMP RELAY	73-RELAY-176590	1	RL1
MAIN HEATSINK	71-HS-300/500	1	UNDER MOS-FETS
BD679 HEATSINK	71-HS-TEG	1	TR7
MOS-FET FITTINGS	72-MOS-BUSH-WHT	8	UNDER HEATSINK
MOS-FET FITTINGS	72-MOS-KOOL-PAD	4	UNDER MOS-FETS

* THE PPA 1200 POWER UNITS ARE FITTED WITH DOUBLE DYE MOSFETS. THE PART NUMBERS FOR THESE ARE THE SAME BUT HAVE THE LETTER ' D ' ON THE END.

Rik Daniels
February 24, 1997