

# **TRACE ELLIOT**

## **SERVICE MANUAL NO. SM00034**

### **ISSUE 2**

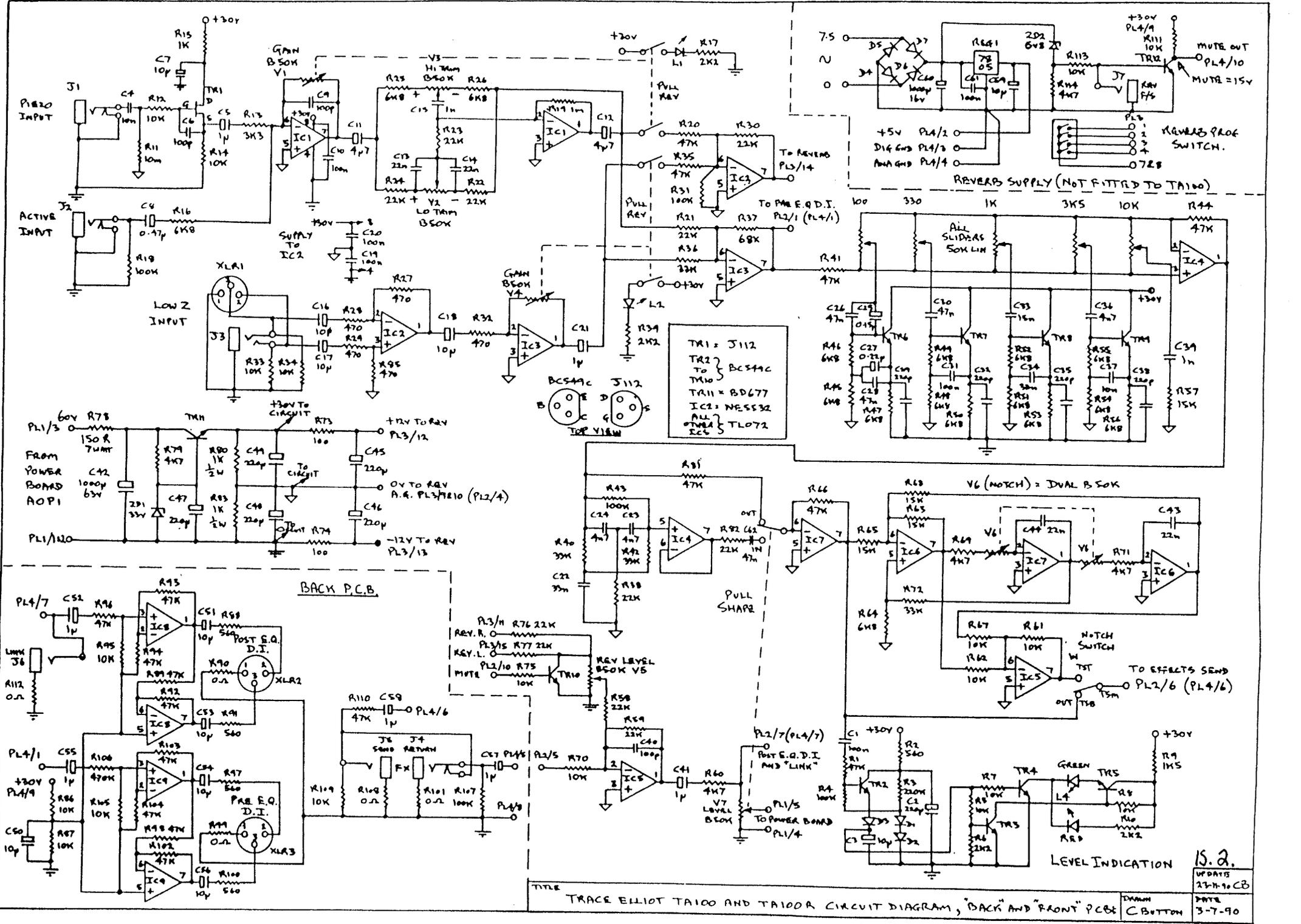
**Date:** June 5th, 1997  
**Product Code:** T2145/2150/2155/2160/2165

**Model No :** TA100/50R  
TA-CON

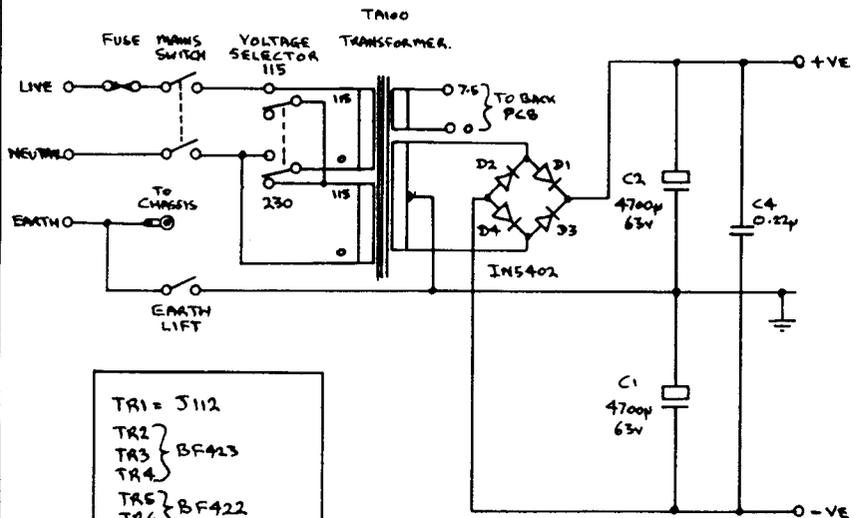
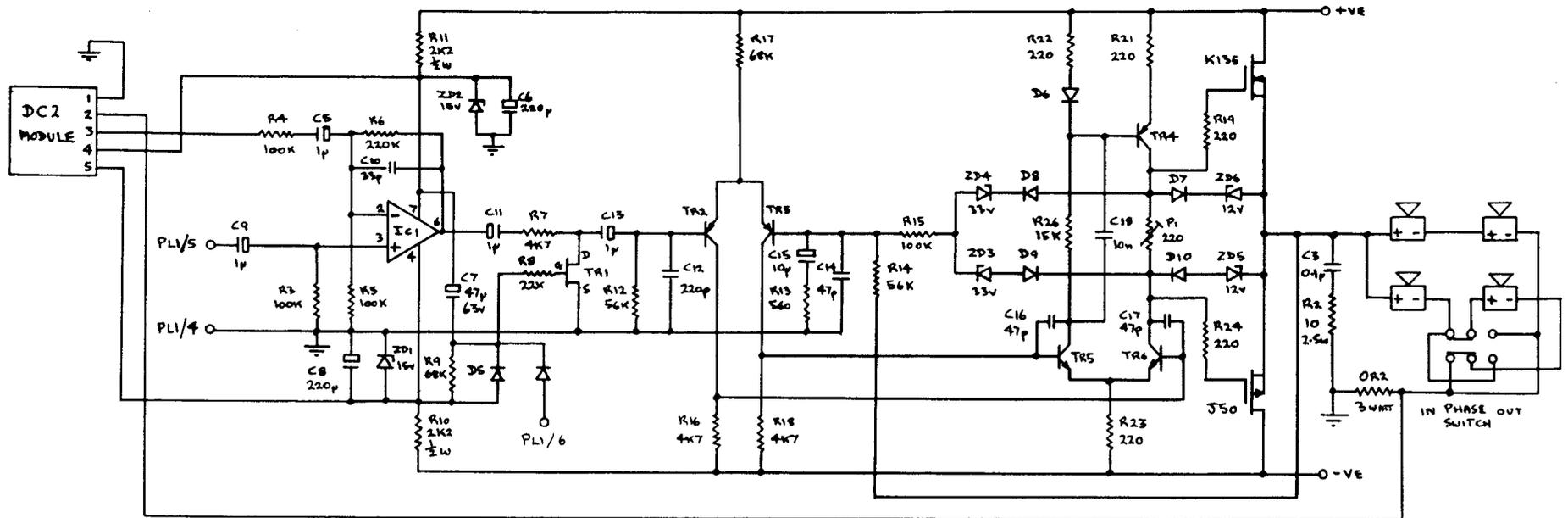
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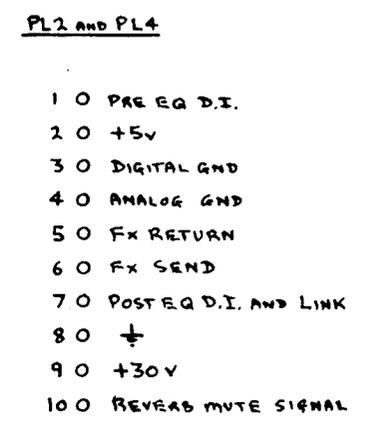
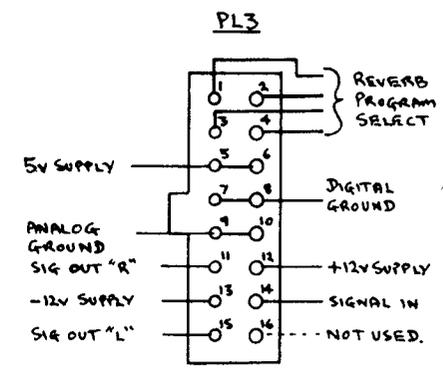


TITLE TRACE ELLIOT TA100 AND TA10A CIRCUIT DIAGRAM, "BACK" AND "FRONT" PCBs



TR1 = J112  
 TR2 } BF423  
 TR3 }  
 TR4 }  
 TR5 } BF422  
 TR6 }  
 IC1 = TL071  
 D5 to D10 = 1N4148  
 D1 to D4 = 1N5402

C13  
 C14  
 C9  
 C11  
 C5  
 TR1  
 IC1



TOP VIEW

# TA100R CIRCUIT DESCRIPTION

March 10, 1997

## PRE-AMPLIFIER

### Power Supply

The supply voltage for the pre-amp PCB comes in on pin 3 of PL1 from the output stage rectifier diodes and reservoir capacitor C2 at a level of 60 volts. This is dropped to 42 volts for the TA100R or 46 volts for the TA100 by resistor R78, any residual ripple is then further reduced with smoothing capacitor C42.

TR11 ( BD677 ) is used as a series regulator with its output voltage set with the 33 volt zener diodes ZD1 connected to its base, current is passed through ZD1 via R79 to reverse bias it to its zener voltage and C47 is used to smooth out any noise around the knee voltage of the zener.

The regulated 32.4 volts provided at the emitter of TR11 is divided in half with resistors R80 and R81 to provide suitable supply requirements for the IC's with C48 and C49 de-coupling these supplies. R73 and R74 drop these supplies to + and - 12 volts ( with reference to the centre point voltage ) for the reverb PCB's analogue circuits, de-coupling being provided by C45 and C46.

### Input Circuit ( Channel 1 )

J1 is a very high impedance input with R11 setting the impedance to 10M ohms, C4 is an input coupling capacitor that feeds the signal via R12 to the gate of TR1. The drain of TR1 is fed by R15 and de-coupling capacitor C7 to isolate the sensitive input stage of TR1 from any supply voltage noise. C6 prevents any RF interference from being passed through TR1 to the following stages and R14 is the source resistor connected down to the zero volts line. TR1 is biased up from the mid-point voltage through R11 to allow sufficient negative swing for the input signal. C5 and R13 feed the input signal to the inverting input of IC1.

J2 is a much lower input impedance input with less sensitivity than J1, C8 and R16 feed the signal from this input to the inverting input of IC1.

V1 is the channel one gain control and adjusts the gain Around IC1 which then feeds the tone control network. C9 is for stability and also prevents high frequency interference from passing through IC1.

The high and low trim controls are active tone controls based around the second half of IC1. V3 the high trim has its frequency set by R25, R26 and C15. V2 the low trim control uses R24, R22, C13 and C14 to set its frequency of operation, R23 provides a degree of isolation between the effects of the two controls while R19 sets the maximum gain around the op-amp, C12 coupled the AC signal to the following stages.

### **Input Circuit ( Channel 2 )**

Both XLR1 and J3 are balanced input connections to channel two, the positive input being via C17 and R29 to the non-inverting input of IC2 ( and NE5532 for low noise ) and the negative input via C16 and R28 to the inverting input, these are low impedance inputs to suit most microphones.

R27 sets the gain of the stage while R85 balances the impedance seen by the non-inverting input to maintain a good common mode rejection ratio. C18 couples the input signal to the variable gain stage IC3.

V4 is the channel two gain control with R32 setting the maximum gain available, C21 couples the signal to the following stages.

### **Reverb Drive**

R20, R30 and R35 form a mixer stage around the second half of IC2 to send the signals from channels one or two to the reverb PCB. Pull switches on V1 and V4 determine which signals are directed to the reverb. R30 determines the gain of IC2 and thus the level of the signal sent to the reverb PCB.

### **Graphic Equaliser**

R21 and R36 balance the signals around one half of IC4, with TR6, TR7, TR8 and TR9 being resonant circuits at the specific centre frequencies of the graphic. These circuits have a low impedance at their centre frequencies and therefore moving a slider up will reduce the amount of feedback around IC4 at the centre frequency of the resonant circuit and thus increase the gain of IC4 at that frequency. Moving a slider down will reduce the amount of signal fed to the non-inverting input of IC4 via R41 and thus reduce the level of signal available at the centre frequency. The 10kHz slider is connected to C39 and R57 and will boost or cut all frequencies above 10kHz.

The output of the graphic is fed to the shape circuit formed around the second half of IC4.

## **The Shape Circuit**

The shape circuit provides a fixed EQ to the signal, this comprises of a mid-cut combined with a bass and treble boost. Components C22, C23, C24, R38, R40 and R42 are the frequency determining part of the circuit, with R43 setting the depth of the mid-cut. IC4 is used as a buffer with R81 and R82 setting the balance between shape in and shape out i.e. IC7 with its feedback resistor R66 provides a gain of 2 for shape in and unity gain for shape out. C62 limits the amount of bass boost.

## **Signal Level Indication**

The output of IC7 feeds both the notch filter and the signal level indicating circuits. C1 and R1 pass the signal to the base of TR2 which is already biased up via R4 to a fixed DC voltage of 1.2 volts developed across a pair of forward biased diodes D1 and D2 fed from the positive supply via R3. The emitter of TR2 charges up C3 through diode D3 to a DC level dependent on the input signal amplitude, this is fed to the resistor chain R5 and R6 which as the voltage increases firstly turns on TR4 via R7 lighting the green LED and as the voltage increases further turns on TR3 which turns off TR5 causing the green LED to go out and the red LED to show. R9 is a current limiting resistor for both LED's and R10 a series resistor for the red LED ensuring it stays off while the green LED is lit. R8 biases TR5 on when TR3 is off.

R2 and C2 de-couple the supply to TR2 to prevent any signal clipping ( caused by D3 ) getting back onto the supply lines.

## **Notch Filter**

The notch filter is a state variable filter formed around three op-amps, two in IC6 and one in IC7. These provide a high pass output from pin 7, IC6 and low pass output from pin 1, IC6, these are summed together by IC5 to produce a sharp band reject or notch filter response which is tuneable with the dual gang pot V6. The range of tuning is set by the values of the pot in series with R69 and R71 and the capacitors C43 and C44, R64 and R72 set the 'Q' of the circuit to 5.

The notch is selected by taking the signal from either before or after the notch filter circuit.

## **Effects Send / Return**

The output from the notch filter switch is taken via PL2 pin 6 to the back PCB where after its AC coupling with C58 it is reduced in level by the

potential divider R110 and R109 to a suitable level ( 600mV ) for the effects send, this is switched through the effects return jack and via C57 to return to the main PCB on pin 5 of PL2.

### **Output Op-amp**

From pin 5 on PL2 the signal is passed to the mixing op-amp IC5 which combines this signal with the reverb return signal from the reverb PCB. R59 sets the gain of this stage while C40 limits the range of high frequencies passed to the output. R41 AC couples the output from IC5 via R60 to the output level pot V7, the wiper of which feeds the signal to pin 5 of PL1 and onto the output stage.

### **Link Socket**

R60 feeds the signal to the link socket, this when linked via a jack to jack cable, connects together the tops of the output level pots in both amps i.e. both pre-amps feed both power stages with resistor R60 in both units preventing the output of the other unit driving signal back up the output of IC5.

A slight drop in level will be experienced when connecting two units together in this way, but this can be compensated for by increasing the output level control settings slightly.

### **Reverb Return Signal ( TA100R only )**

The stereo return signals from the reverb PCB are summed together with R76 and R77 and feed the top of the reverb level pot. TR10 across the pot is the reverb mute transistor and a DC voltage via R75 to its base will mute the reverb output.

This DC mute voltage is provided by R111 and TR12 on the back PCB, this can be controlled by a foot switch into J7 taking the base of TR12 to ground, thus turning it off and allowing the collector to be pulled high by R111 i.e. reverb is muted.

The reverb is also automatically muted when the unit is turned off by the circuit of ZD2, R114 and R113, this senses the presence of the input to the regulator for the 5 volt supply to the reverb unit. This is normally at a voltage of about 10 volts and this in turn will mean that the other side of ZD2 is 6.8 volts less than this i.e. 3.2 volts which is enough to keep TR12 biased on, when the unit is turned off this supply is the first to drop which means that the reverb will be muted when the 10 volts has dropped by 3.2 volts which will be before the 5 volt supply to the reverb PCB has dropped at all, thus muting any strange noises produced by the reverb PCB as it powers down.

### **5 Volt Supply to the Reverb ( TA100R only )**

A 7.5 volt winding on the mains transformer is bridge rectified on the back PCB by D5 and D7 and smoothed by C60, this voltage is passed to a 7805 fixed voltage regulator to produce the regulated 5 volt supply for the reverb PCB. C61 de-couples the input to the regulator at high frequencies while C59 de-couples the output.

### **Reverb Program Switch ( TA100R only )**

The reverb program switch is a 16 way binary switch that pulls pins 1 to 4 on the reverb PCB to ground to select the various reverb programs. These pins are held normally high by pull up resistors on the reverb PCB itself.

### **DI Outputs**

IC8 and IC9 drive the two balanced DI XLR outputs, the signal into C52 is attenuated by R96 and R95 and fed to pin 3 the non-inverting input of IC8 which is fixed at unity gain with R93 and R94. Its output signal drives the positive side of the balanced output via C51 and R88 to pin 2 of XLR2. The output signal from pin 1 is inverted by the second half of IC8 also fixed at unity gain by R89 and R92 feeding the negative side of the balanced output XLR2 pin 3 via C53 and current limiting resistor R91.

IC9 drives XLR3 balanced output in a similar way. Both IC's use the voltage divider of R86, R87 and C50 to provide correct biasing to set up the IC's DC working conditions.

## TA100R Reverb Selection

March 10, 1997

1.	MEDIUM ROOM	1.2 SECONDS	WARM
2.	MEDIUM ROOM	1.5 SECONDS	WARM
3.	PLATE	1.5 SECONDS	WARM HARD ATTACK
4.	MEDIUM HALL	2.0 SECONDS	DARK
5.	MEDIUM HALL	2.5 SECONDS	BRIGHT
6.	PLATE	2.0 SECONDS	DARK SOFT ATTACK
7.	LARGE HALL	7.0 SECONDS	WARM
8.	MULTI TAP REGENERATIVE OUTWARD PAN		
9.	SHORT DELAY		70 MILLISECONDS
10.	MEDIUM DELAY		125 MILLISECONDS
11.	LONG DELAY		330 MILLISECONDS
12.	MEDIUM DELAY REGENERATIVE		125 MILLISECONDS
13.	MEDIUM DELAY REGENERATIVE		250 MILLISECONDS
14.	3 TAP REGENERATIVE PAN		
15.	LONG REGENERATIVE DELAY		400 MILLISECONDS
16.	LONG REGENERATIVE DELAY		500 MILLISECONDS

## PARTS LIST FOR TA100R PRE-AMP

Description	Part Code	Qty	Where Used
RESISTORS			
ZERO OHM LINK	72-RCZERO	23	
1K ½ WATT	72-RC1K-.5W	1	R83
100K ¼ WATT	72-RM100K	4	R4 R18 R31 R43
100R ¼ WATT	72-RM100R	2	R73 R74
10K ¼ WATT	72-RM10K	10	R5 R7 R8 R12 R14 R61 R62 R67 R70 R75
10M ¼ WATT	72-RM10M	1	R11
15K ¼ WATT	72-RM15K	4	R57 R63 R65 R68
1K ¼ WATT	72-RM1K	2	R15 R115
1K5 ¼ WATT	72-RM1K5	1	R9
1M ¼ WATT	72-RM1M	1	R19
220K ¼ WATT	72-RM220K	1	R3
22K ¼ WATT	72-RM22K	9	R21 -24 R38 R59 R76 R77 R82
2K2 ¼ WATT	72-RM2K2	5	R6 R10 R17 R39 R84
33K ¼ WATT	72-RM33K	6	R36 R40 R42 R72 R30 R58
3K3 ¼ WATT	72-RM3K3	1	R13
470R ¼ WATT	72-RM470R	5	R27-29 R32 R85
470R 1 WATT	72-RM470R-1WATT	1	R80
47K ¼ WATT	72-RM47K	7	R1 R20 R35 R41 R44 R66 R81
4K7 ¼ WATT	72-RM4K7	4	R60 R69 R71 R79
560R ¼ WATT	72-RM560R	1	R2
68K ¼ WATT	72-RM68K	1	R37
6K8 ¼ WATT	72-RM6K8	18	R16 R25 R26 R33 R34 R45-56 R64
150R 4 WATT	72-RWW150R-4W	1	R78
100R 4 WATT	72-RWW100R-4W	1	R78 TARP ONLY
CAPACITORS			
0.15µF 35V TANT	72-C0.15-35VT	1	C25
0.22µF 35V TANT	72-C0.22-35VT	1	C27
0.47µF 35V TANT	72-C0.47-35VT ,	1	C8
1µF 35V TANT	72-C1-35VT	1	C5
1µF 63V RADIAL	72-C1-63VER	2	C21 C41
10µF 63V RADIAL	72-C10-63VER	2	C11 C12
1000µF 63V RADIAL	72-C1000-63VEA	1	C42
100nF 100V MYLAR	72-C100N-100VE	5	C1 C10 C19 C20 C31
100pF 100V CER/DISC	72-C100P-100VCD2	3	C6 C9 C40
10nF 100V MYLAR	72-C10N-100VE	2	C4 C37

15nF 100V MYLAR	72-C15N-100VE	1	C33
1nF 100V MYLAR	72-C1N-100VE	2	C15 C39
22µF 63V RADIAL	72-C22-63VER	4	C16 C17 C63 C64
220µF 35V RADIAL	72-C220-35VER	6	C2 C45-49
220pF 100V CER/DISC	72-C220P-100VCD2	4	C29 C32 C35 C38
22nF 100V MYLAR	72-C22N-100VE	4	C13 C14 C43 C44
33nF 100V MYLAR	72-C33N-100VE	2	C22 C34
10µF 63V RADIAL	72-C10-63VER	3	C3 C7 C18
470µF 63V RADIAL	72-C470-63VER	1	C65
47nF 100V MYLAR	72-C47N-100VE	4	C26 C28 C30 C62
4n7 100V MYLAR	72-C4N7-100VE	3	C23 C24 C36
SEMI-CONDUCTORS			
33V ZENER	72-D-BZX55C33V	1	ZD1
47V ZENER	72-D-BZX55C47V	1	ZD3
IN4148 DIODE	72-D-IN4148	3	D1-3
J112 FET	72-FET-J-112	1	TR1
NE5532 OP-AMP	72-IC-NE5532	1	IC2
TL072 OP-AMP	72-IC-TL072	6	IC1 IC3-7
RED LED	72-LED-L-HOUSE	3	L1 L2 L3
BC549C TRANSISTOR	72-TBC549C	9	TR2-10
BD677 TRANSISTOR	72-TBD677	1	TR11
OTHERS			
SMALL HEATSINK	71-HS-TEG	1	TR11
6MM PLASTIC SPACER	71-SPA-6MM	3	L1 L2 L3
16 WAY HEADER	72-HEAD-16W	1	PL3
6 WAY HEADER	72-HEAD-6W	1	PL1
LED CLIP	72-LED-CLIP-RING	1	LED 4
STEREO JACK SOCKET	72-SKT-JCKBBBG	1	J3
MONO JACK SOCKET	72-SKT-JCKBNBG	2	J1 J2
8 WAY SOCKET	72-SOCKET-8W	1	IC2
50K DUAL GANG POT	73-POT-50K-DG	1	V6
50K POT	73-POT-50KB	3	V2 V3 V5
50K POT WITH SWITCH	73-POT-50KB-PS	3	V1 V4 V7
SLIDER BANK	73-SLIDER-5WAY	1	JL1
16 WAY ROTARY SWITCH	73-SWT-ROT-16WS	1	SW1
XLR SOCKET	73-XLR-PCB-F	1	XLR1
LED WITH LEAD	C00-LED-WIRE-TRI	1	L4
SWITCH WITH LEAD	C00-SWT-TOGGLE	1	YE ( TST ) RE ( TSB ) BK ( TSM )

Rik Daniels

March 5, 1997

## PARTS LIST FOR TA100 BACK

Description	Part Code	Qty	Where Used
<b>RESISTORS</b>			
ZERO OHM LINK	72-RCZERO	5	
100K ¼ WATT	72-RM100K	1	R107
10K ¼ WATT	72-RM10K	6	R86 R87 R95 R105 R111 R113
470K ¼ WATT	72-RM470K	1	R106
47K ¼ WATT	72-RM47K	10	R89 R92 R93 R94 R96 R98 R102 R103 R104 R110
4K7 ¼ WATT	72-RM4K7	2	R109 R114
560R ¼ WATT	72-RM560R	4	R88 R91 R97 R100
<b>CAPACITORS</b>			
1µF 63V RADIAL	72-C1-63VER	4	C52 C55 C57 C58
10µF 63V RADIAL	72-C10-63VER	6	C50 C51 C53 C54 C56 C59
1000µF 16V RADIAL	72-C1000-16VER	1	C60
100nF 100V MYLAR	72-C100N-100VE	1	C61
<b>SEMI-CONDUCTORS</b>			
6.8 V ZENER DIODE	72-D-BZX55C6V8	1	ZD2
IN4002 DIODE	72-D-IN4002	4	D4-7
7805 REGULATOR	72-IC-7805-REG	1	REG1
TL072 OP-AMP	72-IC-TL072	2	IC8 IC9
BC549C TRANSISTOR	72-TBC549C	1	TR12
<b>OTHERS</b>			
10 WAY QUICK RELEASE	72-CON-10W-QR	1	PL4
MONO JACK SOCKET	72-SKT-JCKBNBG	4	J4-7
XLR SOCKET	73-XLR-PCB-M	2	XLR2-3

Rik Daniels  
March 5, 1997

## PARTS LIST FOR TA50 BACK

Description	Part Code	Qty	Where Used
RESISTORS			
ZERO OHM LINK	72-RCZERO	1	
100K ¼ WATT	72-RM100K	1	R1
10K ¼ WATT	72-RM10K	2	R3 R6
47K ¼ WATT	72-RM47K	1	R4
4K7 ¼ WATT	72-RM4K7	2	R2 R5
CAPACITORS			
1µF 63V RADIAL	72-C1-63VER	2	C4 C5
10µF 63V RADIAL	72-C10-63VER	1	C1
1000µF 16V RADIAL	72-C1000-16VER	1	C3
100nF 100V MYLAR	72-C100N-100VE	1	C2
SEMI-CONDUCTORS			
6.8V ZENER DIODE	72-D-BZX55C6V8	1	ZD1
IN4002 DIODE	72-D-IN4002	4	D1-4
7805 5V REGULATOR	72-IC-7805-REG	1	REG1
BC549C TRANSISTOR	72-TBC549C	1	TR1
OTHERS			
10 WAY QUICK RELEASE	72-CON-10W-QR	1	PL1
MONO JACK SOCKET	72-SKT-JCKBNBG	4	J1-4

Rik Daniels  
March 12, 1997

## PARTS LIST FOR AOP POWER MODULE

Description	Part Code	Qty	Where Used
RESISTORS			
ZERO OHM LINK	72-RCZERO	3	
100K ¼ WATT	72-RM100K	4	R3 R4 R5 R15
15K ¼ WATT	72-RM15K	1	R26
220K ¼ WATT	72-RM220K	1	R6
220R ¼ WATT	72-RM220R	5	R19 R21 R22 R23 R24
22K ¼ WATT	72-RM22K	1	R8
2K2 1 WATT	72-RM2K2-1WATT	2	R10 R11
4K7 ¼ WATT	72-RM4K7	3	R7 R16 R18
560R ¼ WATT	72-RM560R	1	R13
56K ¼ WATT	72-RM56K	2	R12 R14
68K ¼ WATT	72-RM68K	2	R9 R17
0.2R 2.5 WATT	72-RWW0R2-2.5W	1	R1
10R 2.5 WATT	72-RWW10R-2.5W	1	R2
CAPACITORS			
0.2µF 250V POLY	72-C0.22-250VP	1	C4
1µF 35V TANT	72-C1-35VT	4	C5 C9 C11 C13
10µF 63V RADIAL	72-C10-63VER	1	C15
100nF 250V POLY	72-C100N-250VP	1	C3
10nF 100V MYLAR	72-C10N-100VE	1	C18
220µF 35V RADIAL	72-C220-35VER	2	C6 C8
220pF 100V CER/DISC	72-C220P-100VCD2	1	C12
33pF 100V CER/DISC	72-C33P-100VCD	1	C10
47µF 63V RADIAL	72-C47-63VER	1	C7
47pF 100V CER/DISC	72-C47P-100VCD	3	C14 C16 C17
4700µF 63V RADIAL	72-CAP-470063	2	C1 C2
SEMI-CONDUCTORS			
12V ZENER	72-D-BZX55C12V	2	ZD5 ZD6
15V ZENER	72-D-BZX55C15V	2	ZD1 ZD2
33V ZENER	72-D-BZX55C33V	2	ZD3 ZD4
IN4148 DIODE	72-D-IN4148	6	D6-11
IN5402 DIODE	72-D-IN5402	4	D1-4
J112 FET	72-FET-J-112	1	TR1
TL071 OP-AMP	72-IC-TL071	1	IC1
BUZ901P MOS-FET	72-MOS-BUZ901P	1	
BUZ906P MOS-FET	72-MOS-BUZ906P	1	
BF422 TRANSISTOR	72-TBF422	2	TR5 TR6
BF423 TRANSISTOR	72-TBF423	3	TR2 TR3 TR4

OTHERS			
6 WAY HEADER	72-HEAD-6W	1	PL1
MOS-FET PAD	72-MOS-PAD-T03P2	2	
220R PRESET POT	72-PRESET-220R	1	P1
DC2 MODULE	C22-PCB-DC-2	1	

**Rik Daniels**  
**March 3, 1997**