TRACE ELLIOT
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CIRCUIT DESCRIPTION
TA200 ACOUSTIC GUITAR AMPLIFIER
February 27, 1997

PRE-AMPLIFIER

POWER SUPPLY (Refer to drawing 2).

There are two separate power supplies produced for the TA200 pre-amplifier. The +5 volts supply is used only to run the digital circuits on the reverb PCB, and will be described later.
The +15 & -15 volt supplies are used to power the entire pre-amplifier as well as the analogue side of the reverb PCB, and is described below.

A 15-0-15 volt winding on the mains transformer is brought into the TA200/2 PCB via pins 4,5, and 6 of PL5 and bridge rectified by diodes D8 to D11. D8 and D9 feed the positive side smoothing capacitor C33, TR17 is a series regulator with its base held at 16 volts by ZD2, current through ZD2 is maintained by R85 and de-coupled by C60.
C102 is the reservoir capacitor for the regulated 15.4 volts from the emitter of TR17 and this supply feeds all pre-amp circuits.
R102 drops this supply to +12 volts to supply the reverb PCB with C86 de-coupling.

D10 and D11 feed the negative regulator TR16 with the circuit functioning in exactly the same way as for the positive side.

INPUT CIRCUIT (CHANNEL 1)

J1 is a very high impedance input with R6 setting the impedance to 10M ohms, C1 is an input coupling capacitor that feeds the signal via R7 to the gate of TR2.
The drain of TR2 is fed by R10 and de-coupling capacitor C7 to isolate the sensitive input stage of TR2 from any supply voltage noise.
C6 prevents any RF interference from being passed through TR2 to the following stages and R8 is the source resistor connected down to the -15 volt rail.
TR1 is biased up from the mid point voltage through R6 to allow sufficient negative swing for the input signal. C5 and R8 feed the input signal to the inverting input of IC1.

J2 is a much lower impedance input with less sensitivity than J1. C8 and R12 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.
C10 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 R22, R23 and C15. V2 the low trim control uses R19, R21, C13 and C14 to set its frequency of operation, R20 provides a degree of isolation between the effects of the two controls while R14 sets the maximum gain around the op-amp, C12 coupled the AC signal to the following stages.

INPUT CIRCUIT (CHANNEL 2)

This is identical in operation to that of Channel 1.

INPUT CIRCUIT (CHANNEL 3)

Both XLR1 and J5 are balanced input connections to Channel 3, the positive input being via C30 an R46 to the non inverting input of IC3 (an NE5532 for low noise) and the negative input via C29 and R45 to the inverting input, these are low impedance inputs to suit most microphones.

R44 sets the stage gain while R47 balances the impedance seen by the non inverting input to maintain a good common mode rejection ratio. C31 couples the input signal to the variable gain stage of IC3.

V7 is the Channel 3 gain control with R48 setting the maximum gain available, C36 couples the signal to the tone control network that operates in the same way as previously described for Channels 1 & 2.

REVERB DRIVE

R17, R42, R55 and R51 form a mixer stage around one half of IC5 to send the signals from channels 1,2 or 3 to the reverb PCB.
Pull switches on V1, V4 and V7 determine which signals are directed to the reverb. R51 determines the gain of IC5 and thus the level of the signal sent to the reverb PCB.

GRAPHIC EQUALISER

R18, R43 and R56 balance the signals from channels 1,2 and 3 being sent to the graphic equaliser. R54 sets the gain of IC4 and the overall level of signal to the graphic.

The graphic equaliser is based around one half of IC5, with TR7, TR8, TR9 and TR10 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 IC5 at the centre frequency of the resonant circuit and thus increase the gain of IC5 at that frequency.
Moving a slider down will reduce the amount of signal fed to the non-inverting input of IC5 via R52 and thus reduce the level of signal available at the centre frequency. The 10 kHz slider is connected to C55 and R83 and will boost or cut all frequencies above 10kHz.

The output of the graphic is fed to the shape circuit formed around the one half of IC6.

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 C56, C57, C58, R64, R65 and R67 are the frequency determining part of the circuit, with R66 setting the depth of the mid-cut.
The second half of IC6 is used as a buffer with R69 and R68 setting the balance between shape in/out i.e. IC6 with its feedback resistor R63 provides a gain of 2 for shape ' in ' and unity gain for shape ' out '.
C101 limits the amount of bass boost.

SIGNAL LEVEL INDICATION

The output of IC6 feeds both the notch filter and the signal level indicating circuits.

C2 and R1 pass the signal to the base of TR1 which is already biased up via R2 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 or TR1 charges up C4 through diode D3 to a DC level dependant on the input signal amplitude, this is fed to the resistor chain R15 and R16 which as the voltage increases firstly turns on TR3 via R5 lighting the green LED and as the voltage increases further turns on TR4 which turns of TR5 causing the green LED to go out and the red LED to show. R25 is a current limiting resistor for both LED's and R26 a series resistor for the red LED is lit. R24 biases TR5 on when TR4 is off.

R4 and C3 de-couple the supply to TR1 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, 2 in IC17 and one in IC16. These provide a high pass output from pin 7, IC16 and a low pass output from pin 1, IC17, these are summed together by the second half of IC16 to produce a sharp band reject or notch filter response which is tuneable with the dual gang pot in series with R150 and R151 and the capacitors C98 and C99, R143 and R148 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 PL3 pin 6 to the back PCB (TA200/3) where after being AC coupled through C10 it is reduced in level (600mV) for the effects send, the signal is switched through the effects send jack and through the effects return jacks to provide a left/mono return or stereo returns and then via C11 to return right and via C12 to return left back to the main PCB on pins 7 and 8 of PL3.

OUTPUT OP-AMPS

From pins 7 and 8 on PL3 the signal is passed through R154 and R158 to the mixing op-amps of IC18 which combine these signals with the reverb return signals from the chorus section. R156 and R146 set the gain of these stages. C97 AC couples the left output from IC18 via R145 to the output level pot V14, the wiper of which feeds the signal to pin 2 of PL6 and onto the output stage. C100 and R157 do the same for the right output from IC18 with the output connected to pin 5 of PL6.

The wipers from output level pot V14 have relay contacts RL1a and RL1b to short them to ground when the unit is switched off, this prevents any power down noises from occurring.

LINK SOCKETS

R145 feeds the signal to the left link socket and R157 to the right link socket, when two units are linked via jack to jack cables, the tops of the output level pots in both units are connected together i.e. both pre-amps feed both power stages, with the resistors in series with the op-amp outputs in both units preventing the outputs of the second unit driving signals back up the op-amp outputs of the first (the link sockets are both inputs and outputs).

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

The stereo return signals from the reverb PCB are fed through R107 (left) and R108 (right) to the top of the dual gang reverb level pot V10. TR13 and TR14 across the pot are the reverb mute transistors and a DC voltage via R104 and R105 to the base of these transistors will mute the reverb output.

The DC reverb mute voltage will also turn on TR12 via R109, this causes the LED L5 to go out showing the reverb is muted. R106 holds the bases of these three transistors low when no mute voltage is present.

This DC mute voltage is provided by the circuit around one half of IC4 on the TA200/3 back PCB, this can be controlled by a foot switch into J6 tip contact with alternate operations of the foot switch turning the reverb on and off.

FOOT SWITCH SWITCHING CIRCUIT

Both the reverb and the chorus switching circuits operate in the same way, so taking the reverb switching as an example we have two of the NAND gates from IC4, one analogue switch from IC5 and a transistor TR2 that form the actual switching circuit. TR3 is there to turn on and off the status LED in the foot switch.

The circuit is powered from the +15 volt supply, this also powers the analogue switch IC5. On power up C13 will be in a discharged state and will hold the voltage on pin 2 of IC4 low, this will mean that the output on pin 3 is high, this in turn is connected to pins 5 & 6 which means pin 4 will be low, pin 4 is connected back via R30 to pin 1.

Pin 4 (low) is connected via R31 to the base of TR3 keeping this transistor off (the LED in the foot switch will also be off). Pin 3 (high) is the reverb switching voltage and being high will mute the reverb. By the time C13 has charged up the circuit conditions will have stabilised, this ensures that the circuit always comes up in a known condition i.e. with the reverb turned off.

The TA200 will in fact always power up with both the reverb and chorus switched off.

The circuits conditions will flip over every time the analogue switch IC5 (pins 10 and 11) is closed, from our initial conditions pins 5 & 6 of IC4 are high, this will charge up capacitor C14 via R32 making pin 10 on IC5 also high. When the analogue switch is closed this will take pin 1 of IC4 high and as pin 2 is also now high (C13 having charged up) then pin 3 will go low, pins 5 & 6 will go low and pin 4 will go high holding pin 1 high and maintaining the conditions. The circuit has now changed state and the LED in the foot switch will light (switched by TR3).

Pins 4 & 5 are now low and C14 will discharge via R32, pin 10 on IC5 will no be low as well so that when the analogue switch closes again the circuit will change back to its initial state.

The analogue switch is operated by transistor TR2, the base of which is held high by R39, its collector will therefore be low. However when the tip contact of J6 is shorted to ground (by operating the foot switch) this will pull the base of TR2 down via D1 to 0.6 volts, the same voltage as set on its emitter by diode D3 thus turning TR2 off. The collector of TR2 will go high closing the analogue switch and as we have previously seen, this will change the state of the circuit.

The chorus circuit operates in exactly the same way as described for the reverb switching.
The reverb is also automatically muted when the unit is turned off by the circuit of ZD3, R66, R67, TR11 and R88 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 ZD3 is 6.8 volts less than this i.e. 3.2 volts which is enough to keep TR11 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.

The muting voltages from TR11 and pin 3 of IC4 in the switching circuit are OR'd together by two diodes D12 and D13 allowing either one to mute the reverb.

5 VOLT SUPPLY TO THE REVERB PCB

A 7.5 volt winding on the mains transformer is bridge rectified on the TA200/2 board by D4 to D7 and smoothed by C34, this voltage is passed to a 7805 fixed voltage regulator to produce the regulated 5 volt supply for the reverb PCB. C91 de-couples the input to the regulator at high frequencies while C62 de-couples the output from the regulator.

The voltage across C34 is also used to operate the relay that mutes the output from the pre-amp on switch off.

REVERB PROGRAM SWITCH

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.

THE CHORUS CIRCUIT

The chorus circuit is based around the MN3007 Bucket Brigade Delay Line IC or BBD.

A BBD is a MOS LSI having transistors and capacitors arranged alternately and is a device for transferring the quantity of charges corresponding to input signals sequentially along this transistor and capacitor chain according to external clock pulses. That is, it can output signals delayed for a definite time to the input signal, and moreover, it can arbitrarily change the delay time by varying the clock rate.

The MN3007 has 1024 of these transistor / capacitor stages and requires special non overlapping two phase clock pulses to pins 2 and 6 to clock the input signal from pin 3, through the 1024 stages to the two phase output on pins 7 and 8 of the device where they are summed together by resistors R123 and R124 to re-constitute the delayed audio signal. The two phase clock is produced from the MN3101 IC which is driven by the oscillator formed by the circuit around IC13 the 555 timer IC. This drives pin 5 of IC10, with the two phase clock appearing at pins 2 and 4. The two phase clock pulses are half the frequency of the input clock to pin 5.

IC13 the 555, uses C91 as its main timing reference in conjunction with R130 and R131 to produce the basic clock rate of 120kHz. A very low frequency saw tooth wave form produced by the circuit around IC12 is fed into IC13 on pin 5 and this modulates the clock frequency which if observed on TP2 should have a period that varies between 15 and 30μS with the depth set to maximum and the speed set to minimum.

The signal comes into the chorus circuit through C66 and is attenuated in level by R91, part of the signal is tapped off and is mixed in with the output op-amp IC9 (pins 1,2 and 3). The main signal is coupled through C65 and R97 into on half of IC7, this acts as a compressor / expander to help keep the signal through the BBD IC at a consistent level which helps minimise noise problems. The output from IC7 pin 10 is coupled through C75 to a low pass filter formed around IC9, this prevents high frequency components within the signal from interfering with the clock frequency components as this would produce distortion within the signal. The signal going into the BBD IC can be observed on TP1.

The signal output from the BBD passes through two stages of low pass filter formed around IC8 to remove any traces of the clock frequency component from the signal, this would otherwise cause distortion. It is then coupled through C67 to the second half of IC7 in conjunction with IC9 to give a variable time delayed version of the original signal out through C81 and into IC14 a two pole change over analogue switch.

When the voltage from the chorus switching circuit is high (PL3 pin 2) TR15 is turned on via R161 to its base lighting LED L6 to indicate that the chorus is on. This voltage also operates the analogue switch via R140 to allow the time delayed signal to pass through and be mixed with the original signal by the left and right mixer stages of IC18 producing the final chorused sound.

The signal from the analogue switch is fed directly to the right mixer stage via R144 with a degree of top boost added by C96. An inverted version of the delayed signal is fed from pin 7 of IC15 to the left mixer stage via R139. These two out of phase delayed signals when mixed back with the original signal produce the stereo chorus effect.

D.I. OUTPUTS

IC1, IC2 and IC3 on the TA200/3 PCB drive the three balanced DI XLR outputs. Taking the post EQ DI right circuit as an example, the signal into C3 is attenuated by R8 and R7 and fed to pin 3 the non inverting input of IC1 which is fixed at unity gain with R5 and R6. Its output signal drives the positive side of the balanced output output via C2 and R3 to pin 2 of XLR1. The output signal from pin 1 is inverted by the second half of IC1 also fixed at unity gain by R4 and R2 feeding the negative side of the balanced output XLR1 pin 3 via C1 and current limiting resistor R1.

IC2 drives XLR2 balanced output and IC3 drives XLR3 balanced output in the same way as the above circuit description.

Output Stage

POWER SUPPLY

The mains supply live is routed via the fuse holder and fuse to the two pole illuminated mains switch. Both live and neutral then go to the voltage selector switch for selecting either 115 volt for USA or 230 volt for Europe and the UK.
The voltage selector is in turn connected to the torroidal mains transformer.

N.B. One of the split 115 volt windings on the transformer has a 130 volt varistor connected across it to ensure that the fuse blows in the event of the unit being switched to the 115 volt range and connected to 230 volts instead, this is to prevent any severe damage to the unit in this instance.

The earth connection from the mains inlet socket is connected directly to the chassis and all metal parts of the unit, it is also connected to the earth lift switch which allows the earth to be lifted from the signal circuitry to prevent earth loops being formed between interconnected equipment.

WARNING

THE TA200 SHOULD ALWAYS BE CONNECTED TO THE MAINS SUPPLY EARTH.
NEVER DISCONNECT THE EARTH AT THE SUPPLY CORD PLUG.

The 40-0-40 volt supply goes to the output PCB's where it is bridge rectified by D1 to D4 to produce the +60 volt and -60 volt supplies used by the output stages. C2 is the reservoir capacitor for the +60 volt supply and C1 for the 60 volts. C4 is high frequency de-coupling between the power supply rails.

OUTPUT CIRCUIT

The output circuit uses two complimentary MOS-FET transistors and the speakers are driven from the common sources of these two devices connected together, the +VE supply being connected to the drain of the 'N' type MOS-FET and the -VE supply connected to the drain of the 'P' type device.

C3 and R2 form a zobel network to damp out and prevent any high frequency spurious oscillation (MHz range) and R1 is a current sensing resistor in the ground return line of the speaker connection and is used to feed signals to the dynamic correction module DC2. Shorting out this resistor will disable the dynamic correction.

The input signal comes in on pin 5 of PL1 via the AC coupling capacitor C9, R3 provides a DC return path to ground for IC1. The DC supplies for IC1 and the dynamic correction module are provided by zenering down the 60 volt rails via R11, ZD2 and C6 for the positive supply and R10, ZD1 and C8 for the negative supply to 15 volts.

IC1 is working as a comparator combining the input signal with the signal from the dynamic correction module producing a corrected difference signal into the MOS-FET driver circuitry of TR2,3,4,5 and 6.

The output from IC1 is coupled via C11 and R7 to TR1, to provide a switch on mute facility. This circuit mutes the output stage until the units power supply rails have established themselves to prevent the familiar switch on thump or any other extraneous noises. This works by holding the gate of TR1 to the +15 volt supply until C7 has charged up via R9, this takes about 3 seconds. While the gate of TR1 is held positive with respect to its source then TR1's drain to source will act like a very low resistor and will short out any signal appearing through R7, muting the output stage during the switch on period. D5 is there to ensure that C7 discharges quickly when the power supply rails collapse at switch off. Diode D11 allows this mute facility to be assessed externally and is used in the TA200 units to mute the output stages on switch off by being connected to the -15 volt supply from the pre-amp. This supply reduces the 0 volts fairly quickly on switch off and this mutes the output stages until the large reservoir capacitors C1 and C2 discharged, preventing any noises through the speakers after switch off.

C13 couples the signal through to TR1, TR2 and TR3 form a differential amplifier with the non inverting input being the base of TR2 (the signal input) and the base of TR3 being the inverting input (feedback from the output via R14).

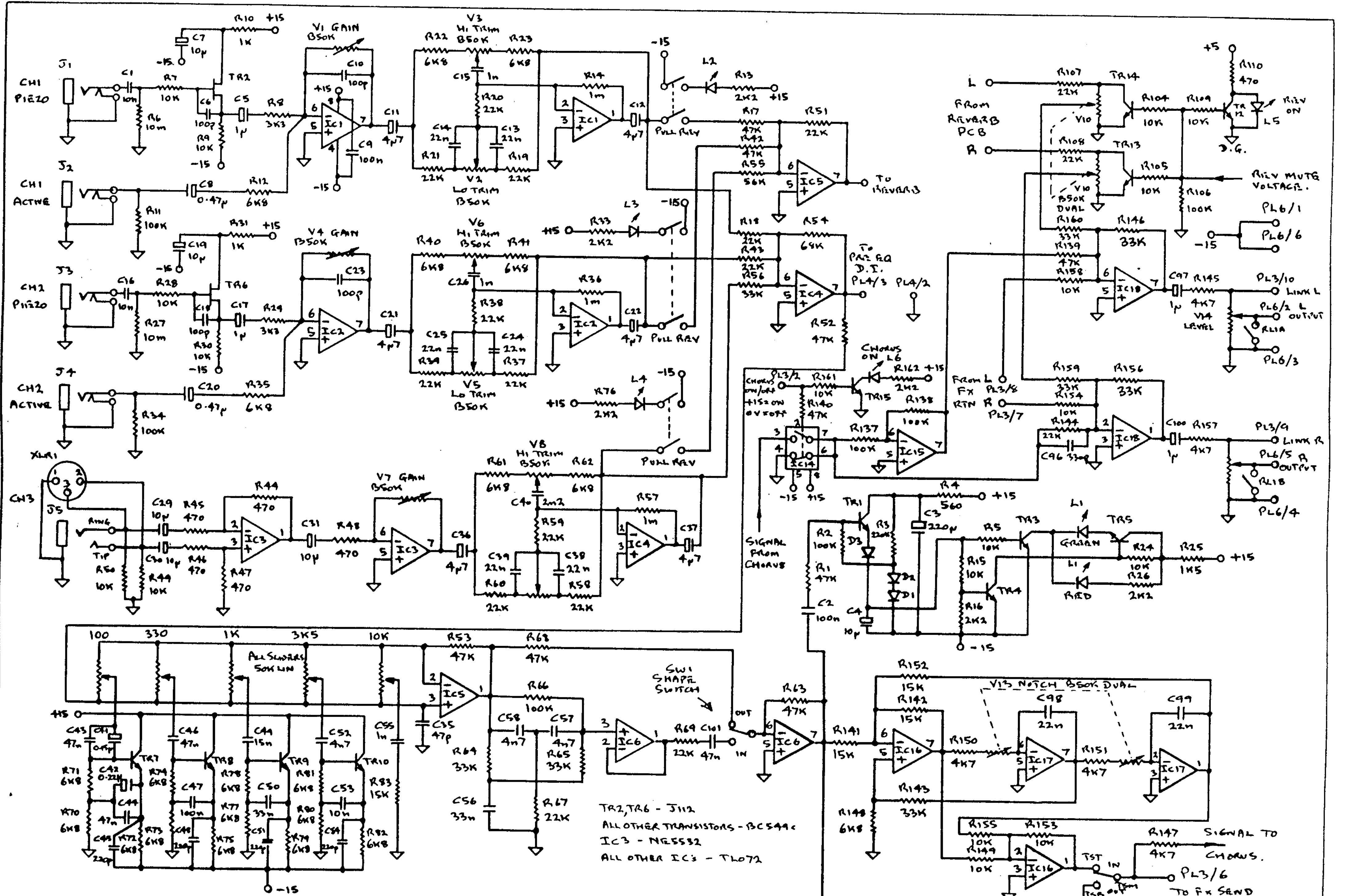
C12 prevents RF frequencies from getting through to the output and R12 is a DC path to ground for the base of TR2.
The gain of the output stage is set by the ratio of R14 to R13 and the low frequency knee of the stage is set by the series combination of R13 and C15. C14 is to prevent positive feedback at very high frequencies (MHz) from causing spurious oscillation.

The common mode outputs from TR2 and TR3 are fed to another differential pair of transistors TR6 and TR5 with a current mirror compromising of TR4, D6, R21 and R22 feeding the collector of TR6, P1 in series with this transistor is adjusted to provide a small DC potential difference between the gates of the output MOS-FET's to bias them up correctly to overcome any crossover distortion. The signal swing developed at the collector of TR6 drives both the output MOS-FET's.

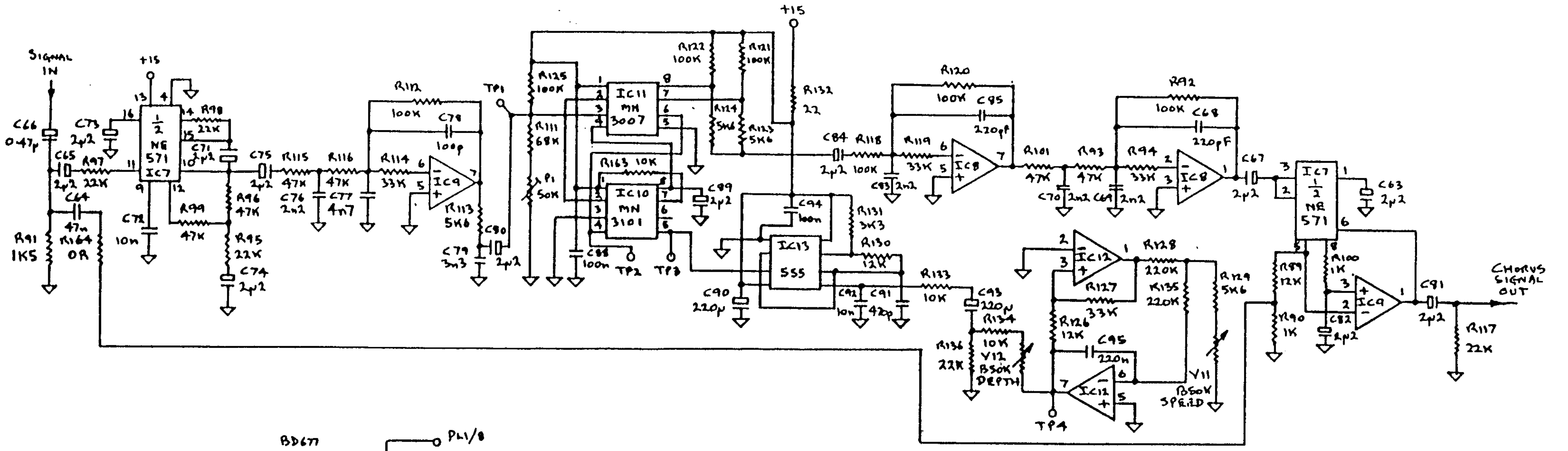
D7 in series with ZD6 and D10 in series with ZD5 prevent the signal from exceeding 12 volts between the gate and source of the N and P channel MOS-FET's respectively.

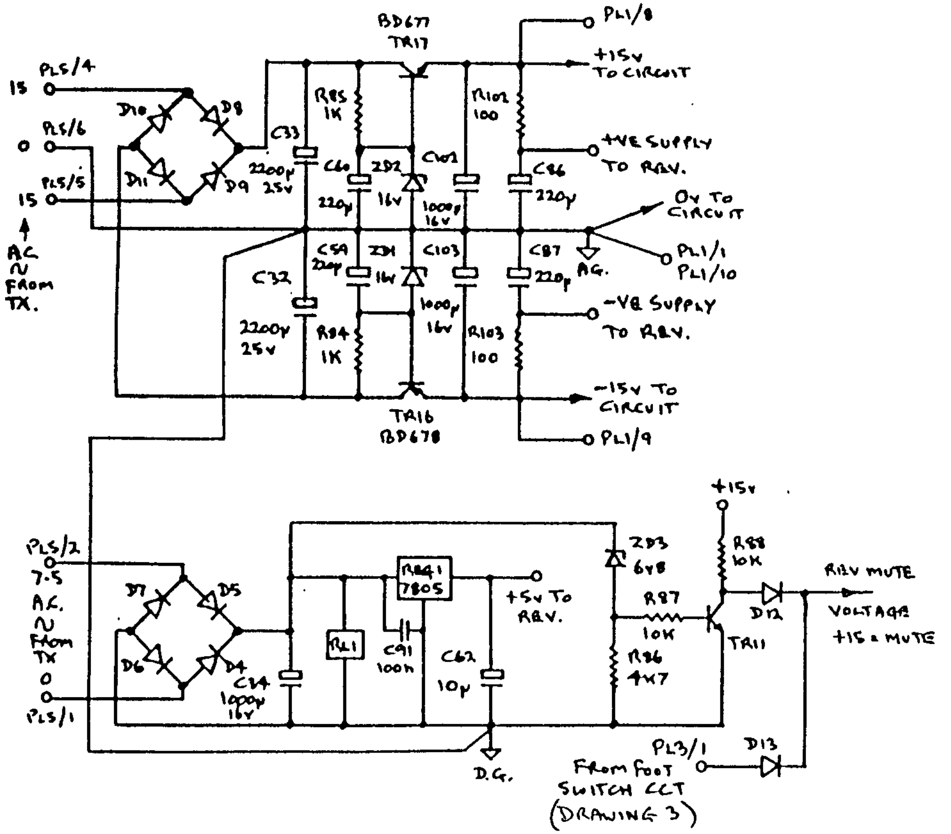
ZD4 in series with D8 and ZD3 in series with D9 provide feedback via R15 to TR3 to give soft clipping when the output has reached its maximum swing.

C16 and C17 are for stability with R26 and C18 for frequency compensation purposes.



TITLE:- TA200S SIGNAL CIRCUIT PCB:- TA200/1 AND TA200/2	DRAWN C BUTTON DATE 16-10-90	DRAWING 1 OF 3	UPDATE 15-5-91 CB





SK1

1 O — 0V
O SIGNAL TO LEVEL INDICATION
O N/C
O SIGNAL TO REVERB
O SIGNAL TO GRAPHIC
O LOW Z GAIN ①
O LOW Z GAIN ②
O +15V
O -15V
10 O — 0V

PL2

1 — PROGRAM SELECTOR SWITCH
— +5V
— DIGITAL GND
— ANALOG GND
"R" OUT — +12V
-12V — AUDIO IN
"L" OUT — N/C
16

PL3

1 O REVERB ON/OFF VOLTAGE
O CHORUS ON/OFF VOLTAGE
O +15V
O -15V
O — 0V
O EFFECTS SEND
O EFFECTS RETURN "R"
O EFFECTS RETURN "L"
O POST E.Q. D.I. "R" / LINK "R"
10 O POST EQ D.I. "L" / LINK "L"

PL4

1 O N/C
O — 0V
3 O PRE EQ D.I.

PL5

1 O O ⎤ A.C.
O 7.5V ⎦
O N/C
O 15V ⎤
O 15V A.C.
6 O O ⎦
FROM MAINS T'FORMER

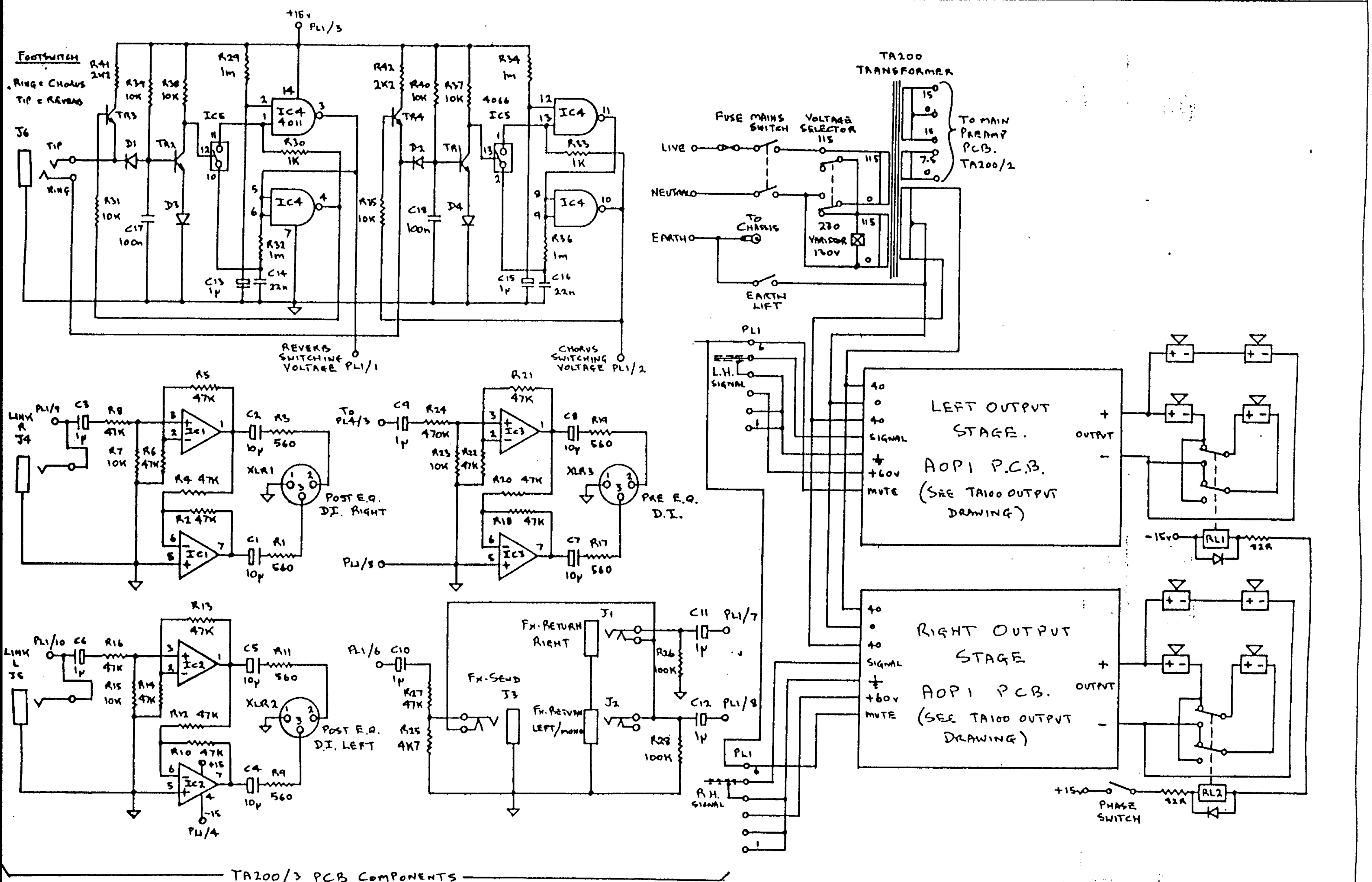
PL6

1 O -15V
O SIG OUT "L"
O — 0V
O — 0V
O SIG OUT "R"
6 O -15V

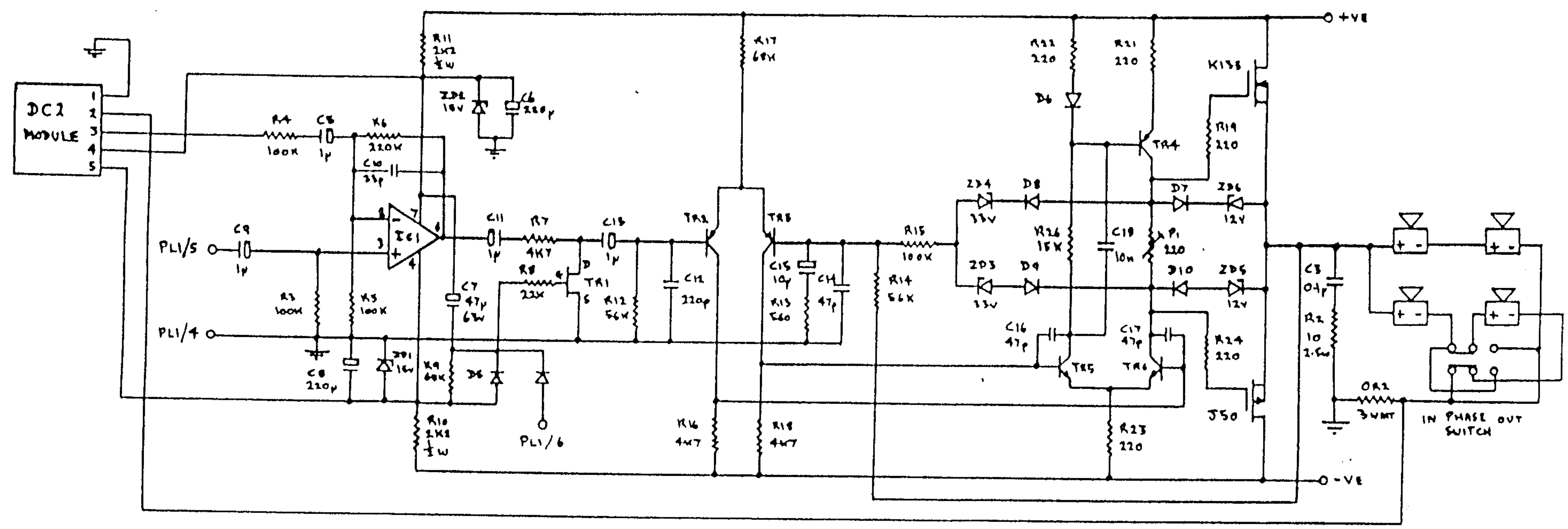
PL7

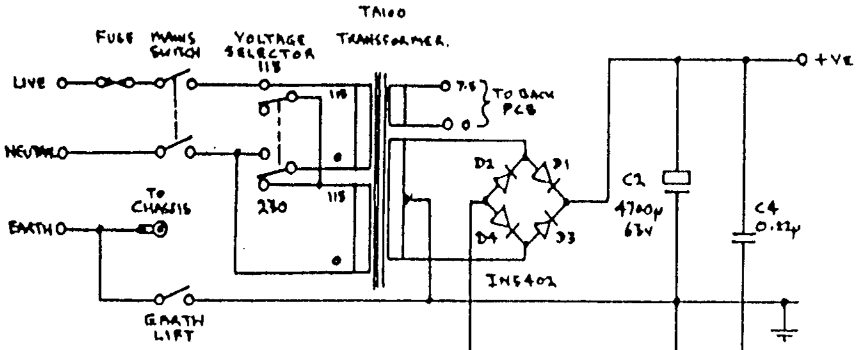
1 O +15V SWITCHED TO SPKR PHASE RELAY.
O N/C
3 O -15V TO RELAY

UPDATE	TITLE	DRAWN:	
15-5-91 CB	TA200S SIGNAL CIRCUIT, CHORUS, SUPPLIES AND PLUG CONNECTIONS PCB TA200/2	C BUTTON. DATE 26-10-90	DRAWING 2 OF 3



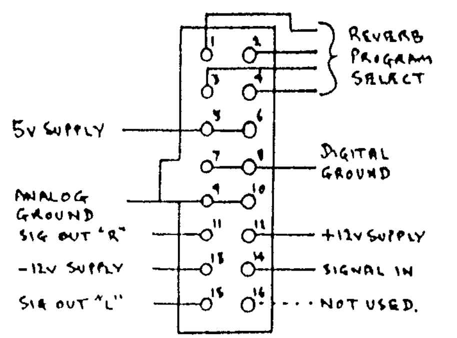
DRAWING 3 OF 3.	TITLE TRACE ELLIOT TA200S "BACK" PCB AND POWER CIRCUIT	DRAWN C BUTTON	DATE 15-5-91





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

PL3



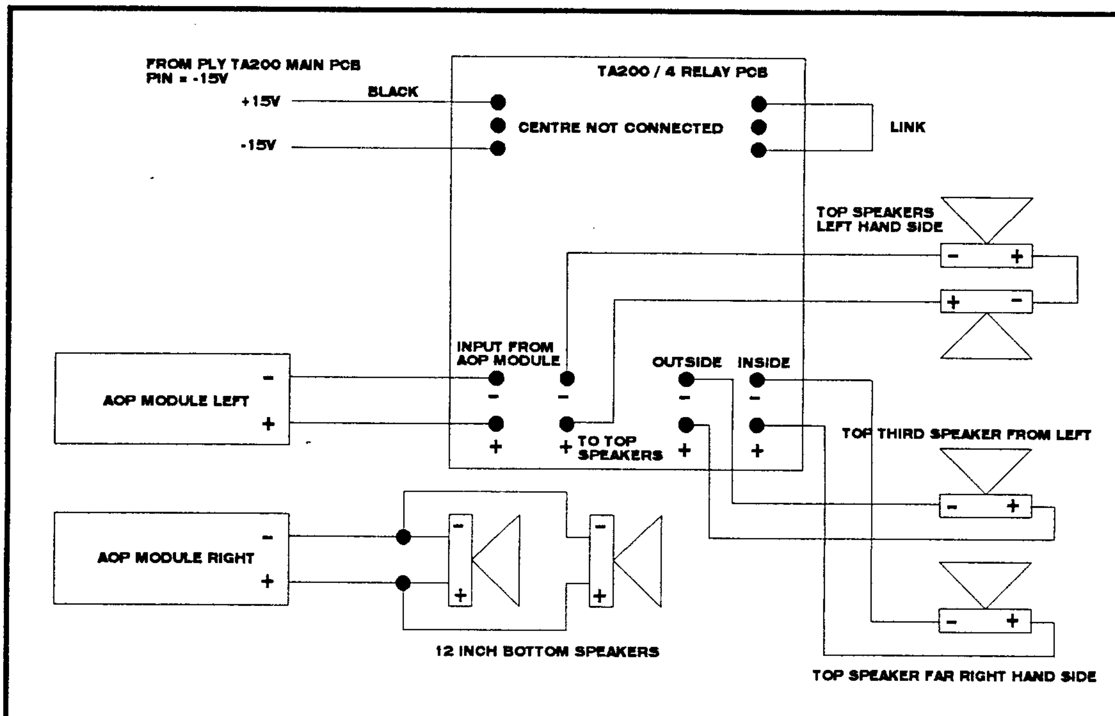
TOP VIEW

PL2 AND PL4

1 O PRE EQ D.I.
2 O +5v
3 O DIGITAL GND
4 O ANALOG GND
5 O FX RETURN
6 O FX SEND
7 O POST EQ D.I. AND LINK
8 O ⏚
9 O +30v
10 O REVERB MUTE SIGNAL

TITLE	DRAWN	DATE	UPDATE
TRACE ELLIOT TA100 AND TA100R CIRCUIT DIAGRAM, OUTPUT STAGE AND SUPPLY.	C BUTTON	3-7-90	23-11-90 CB

TA200 ROCK ACOUSTIC WIRING DIAGRAM
March 3, 1997



Rik Daniels

PARTS LIST FOR TA200 / 1 PCB

Description	Part Code	Qty	Where Used
RESISTORS			
ZERO OHM LINK	72-RCZERO	9	
100K ¼ WATT	72-RM100K	3	R2 R11 R34
10K ¼ WATT	72-RM10K	9	R5 R7 R9 R15 R24 R28 R30 R49 R50
10M ¼ WATT	72-RM10M	2	R6 R27
1K ¼ WATT	72-RM1K	2	R10 R31
1.5K ¼ WATT	72-RM1K5	1	R25
1M ¼ WATT	72-RM1M	2	R14 R36
220K ¼ WATT	72-RM220K	1	R3
22K ¼ WATT	72-RM22K	8	R18-21 R37-39 R43
2.2K ¼ WATT	72-RM2K2	4	R13 R16 R26 R33
3.3K ¼ WATT	72-RM3K3	2	R8 R29
470R ¼ WATT	72-RM470R	5	R44-48
47K ¼ WATT	72-RM47K	3	R1 R17 R42
560R ¼ WATT	72-RM560R	1	R4
6.8K ¼ WATT	72-RM6K8	6	R12 R22 R23 R35 R40 R41
CAPACITORS			
470nF 35V TANT	72-C0.47-35VT	2	C8 C20
1μF 35V TANT	72-C1-35VT	1	C5
1μF 63V RADIAL	72-C1-63VER	1	C17
10μF 63V RADIAL	72-C10-63VER	6	C4 C7 C19 C29 C30 C31
1000μF 16V RADIAL	72-C1000-16VER	2	C102 C103
100nF 100V MYLAR	72-C100N-100VE	4	C2 C9 C27 C28
100pF 100V CER/DISC	72-C100P-VCD2	4	C6 C10 C18 C23
10nF 100V MYLAR	72-C10N-100VE	2	C1 C16
1nF 100V MYLAR	72-C1N-100VE	2	C15 C26
220μF 35V RADIAL	72-C220-35VER	1	C3
22nF 100V MYLAR	72-C22N-100VE	4	C13 C14 C24 C25
4.7μF 63V RADIAL	72-C4.7-63VER	4	C11 C12 C21 C22
SEMI-CONDUCTORS			
IN4148 DIODE	72-D-IN4148	3	D1-3
J112 FET	72-FET-J-112	2	TR2 TR6
TL072 OP-AMP	72-IC-TL072	2	IC1 IC2
BC549C TRANSISTOR	72-TBC549C	4	TR1 TR3 -5
LIGHTHOUSE LED	72-LED-L-HOUSE	2	L2 L3
TRI-COLOUR LED	C00-LED-TRI	1	L1

OTHERS			
6MM SPACER	71-SPA-6MM	2	L2 L3
10 WAY QUICK RELEASE	72-CON-10W-QR	1	PL1
MOUNTING RING	72-LED-CLIP-RING	1	L1
STEREO JACK SKT	72-SKT-JCKBBBG	1	J5
MONO JACK SKT	72-SKT-JCKBNBG	4	J1-4
8 WAY SOCKET	72-SOCKET-8W	1	IC3
50K POT	73-POT-50KB	4	V2 V3 V5 V6
50K PULL SWITCH POT	73-POT-50KB-PS	2	V1 V4
XLR SOCKET	73-XLR-PCB-F	1	XLR1

Rik Daniels
February 28, 1997

PARTS LIST FOR TA200 / 2 PCB

Description	Part Code	Qty	Where Used
RESISTORS			
ZERO OHM LINK	72-RCZERO	66	INCLUDE R164
100K ¼ WATT	72-RM100K	11	R66 R92 R106 R112 R118 R120 R121 R122 R125 R137 R138
100R ¼ WATT	72-RM100R	2	R102 R103
10K ¼ WATT	72-RM10K	14	R87 R89 R104 R105 R109 R133 R134 R149 R153 R154 R155 R158 R161 R163
12K ¼ WATT	72-RM12K	3	R89 R126 R130
15K ¼ WATT	72-RM15K	4	R83 R141 R142 R152
1K ¼ WATT	72-RM1K	4	R84 R85 R90 R100
1.5K ¼ WATT	72-RM1K5	1	R91
1M ¼ WATT	72-RM1M	1	R57
220K ¼ WATT	72-RM220K	2	R128 R135
22K ¼ WATT	72-RM22K	14	R51 R58 R59 R60 R67 R69 R95 R97 R98 R107 R108 R117 R136 R144
22R ¼ WATT	72-RM22R	1	R132
2.2K ¼ WATT	72-RM2K2	2	R76 R162
33K ¼ WATT	72-RM33K	12	R56 R64 R65 R94 R114 R119 R127 R143 R146 R156 R159 R160
3.3K ¼ WATT	72-RM3K3	1	R131
470R ¼ WATT	72-RM470R	1	R110
47K ¼ WATT	72-RM47K	12	R52 R53 R63 R68 R93 R96 R99 R101 R115 R116 R139 R140
4.7K ¼ WATT	72-RM4K7	6	R86 R145 R147 R150 R151 R157
56K ¼ WATT	72-RM56K	1	R55
5.6K ¼ WATT	72-RM5K6	4	R113 R123 R124 R129
68K ¼ WATT	72-RM68K	2	R54 R111
6.8K ¼ WATT	72-RM6K8	15	R61 R62 R70-75 R77-82 R148
CAPACITORS			
0.15µF 35V TANT	72-C0.15-35VT	1	C41
0.22µF 35V TANT	72-C0.22-35VT	1	C42
0.47µF 35V TANT	72-C0.47-35VT	1	C66

1µF 63V RADIAL	72-C1-63VER	2	C97 C100
10µF 63V RADIAL	72-C10-63VER	1	C62
1000µF 16V RADIAL	72-C1000-16VER	1	C34
100nF 100V MYLAR	72-C100N-100VE	4	C47 C61 C88 C94
100pF 100V CER/DISC	72-C100P-VCD2	1	C78
10nF 100V MYLAR	72-C10N-100VE	3	C53 C72 C92
15nF 100V MYLAR	72-C15N-100VE	1	C49
1nF 100V MYLAR	72-C1N-100VE	1	C55
2.2µF 63V RADIAL	72-C2.2-63VER	12	C63 C65 C67 C71 C73 C74 C75 C80 C81 C82 C84 C89
220µF 35V RADIAL	72-C220-35VER	6	C59 C60 C86 C87 C90 C93
2200µF 25V AXIAL	72-C2200-25VEA	2	C32 C33
220nF 63V POLY	72-C220N-63VP	1	C95
220pF 100V CER/DISC	72-C220P-100VCD2	6	C45 C48 C51 C68 C85 C54
22nF 100V MYLAR	72-C22N-100VE	4	C38 C39 C98 C99
2.2nF 100V MYLAR	72-C2N2-100VE	5	C40 C76 C83 C69 C70
330pF 100V CER/DISC	72-C330P-100VCD2	1	C96
33nF 100V MYLAR	72-C33N-100VE	2	C50 C56
3.3nF 100V MYLAR	72-C3N3-100VE	1	C79
4.7µF 63V RADIAL	72-C4.7-63VER	2	C36 C37
470pF 160V POLY/S	72-C470P-160VPA	1	C91
47nF 100V MYLAR	72-C47N-100VE	5	C43 C44 C46 C64 C101
47pF 100V CER/DISC	72-C47P-100VCD	1	C35
4.7nF 100V MYLAR	72-C4N7-100VE	4	C52 C57 C58 C77
SEMI-CONDUCTORS			
16V ZENER DIODE	72-BZX55C16V	2	ZD1 ZD2
6.8V ZENER DIODE	72-BZX55C6V8	1	ZD3
IN4002 DIODE	72-D-IN4002	9	D4-11 D14
IN4148 DIODE	72-D-IN4148	2	D12 D13
5V REGULATOR	72-IC-7805-REG	1	REG1
555 TIMER	72-IC-M7555IPA	1	IC13
3007 CHIP	72-IC-MN3007	1	IC11
3101 CHORUS	72-IC-MN3101	1	IC10
571 OP-AMP	72-IC-NE571N	1	IC7
TL072 OP-AMP	72-IC-TL072	10	IC4-6 IC8-9 IC12 IC15-18
TL604CP ANALOGUE SW	72-IC-TL604CP	1	IC14
BC549	72-TBC549C	9	TR7-15
BD677	72-TBD677	1	TR17
BD678	72-TBD678	1	TR16
RED LIGHTHOUSE LED	72-LED-L-HOUSE	3	L4 -6

POTS & SWITCHES			
47K PRESET POT	72-PRESET-47K	1	P1
50K DUAL GANG POT	73-POT-50K-DG	3	V10 V13 V14
50K POT PCB MOUNT	73-POT-50KB	4	V8 V9 V11 V12
50K POT/PULL SWITCH	73-POT-50KB-PS	1	V7
12V RELAY	73-RELAY-47W	1	RL1
SLIDER BANK	73-SLIDER-5WAY	1	JL1
PUSH SWITCH	73-SWT-F2UEE	2	SW1 SW2
16 WAY ROTARY SWT	73-SWT-ROT-16WS	1	SW3
OTHERS			
7 WAY 50MM LENGTH	72-LK-7W50L	1	JL1
8 WAY SOCKET	72-SOCKET-8W	3	IC10 IC11 IC13
WIRE WRAP PINS	73-TERM-PIN	4	TP1-4
HEATSINK	71-HS-TEG	2	TR16-17
6MM SPACER	71-SPA-6MM	3	L4-6
16 WAY HEADER	72-HEAD-16W	1	PL2
3 WAY HEADER	72-HEAD-3W-1	2	PL4 PL7
6 WAY HEADER	72-HEAD-6W	2	PL5 PL6
16 WAY JUMP LEAD	C00-LEAD-REVERB	1	PL3
10 WAY 100MM LINK	72-LK-100L	1	SK1
TOGGLE SWITCH	C00-SWT-TOGGLE	1	TSB/TSM/TST

PARTS LIST FOR TA200 / 3 PCB

Description	Part Code	Qty	Where Used
RESISTORS			
ZERO OHM LINK	72-RC-ZERO	9	
100K ¼ WATT	72-RM100K	2	R26 R28
10K ¼ WATT	72-RM10K	9	R7 R15 R23 R31 R35 R37-40
1K ¼ WATT	72-RM1K	2	R30 R33
1M ¼ WATT	72-RM1M	4	R29 R32 R34 R36
2.2K ¼ WATT	72-RM2K2	2	R41 R42
470K ¼ WATT	72-RM470K	1	R24
47K ¼ WATT	72-RM47K	15	R2 R4-6 R8 R10 R12-14 R16 R18 R20 R21 R22 R27
4.7K ¼ WATT	72-RM4K7	1	R25
560R ¼ WATT	72-RM560R	6	R1 R3 R9 R11 R17 R19
CAPACITORS			
1µF 63V RADIAL	72-C1-63VER	8	C3 C6 C9-13 C15
10µF 63V RADIAL	72-C10-63VER	6	C1 C2 C4 C5 C7 C8
100nF 100V MYLAR	72-C100N-100VE	2	C17 C18
22nF 100V MYLAR	72-C22N-100VE	2	C14 C16
SEMI-CONDUCTORS			
IN4148 DIODES	72-D-IN4148	4	D1-4
TL072 OP-AMP	72-IC-TL072	3	IC1-3
BC549C	72-TBC549C	4	TR1-4
OTHERS			
10 WAY QUICK RELEASE	72-CON-10W-QR	1	PL1
STEREO JACK	72-SKT-JCKBBBG	1	J6
MONO JACK	72-SKT-JCKBNBG	5	J1-5
14 WAY SOCKET	72-SOCKET-14W	2	IC4 IC5
XLR SOCKET	73-XLR-PCB-M	3	XLR1-3

Rik Daniels
February 28, 1997

PARTS LIST FOR TA200 / 4 PCB

Description	Part Code	Qty	Where Used
82R ¼ WATT	72-RM82R	1	R1
IN4002 DIODE	72-D-IN4002	1	D1
3 WAY HEADER	72-HEAD-3W-1	2	PL1-2
12V RELAY	73-RELAY-12VDPCO	1	RL1

Rik Daniels
February 28, 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			
O.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	

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March 3, 1997