TRACE ELLIOT

SERVICE MANUAL

DATE : December 29, 1999
Product Code: N/A
Model Number : V-Type 300 watt Head & Combo

Issued by:
Trace Elliot Limited
Blackwater Trading Estate
The Causeway
Maldon
Essex
England
CM4 4GG

ISSUE CHANGE NOTE DATE	ISSUE CHANGE NOTE DATE	ISSUE CHANGE NOTE DATE
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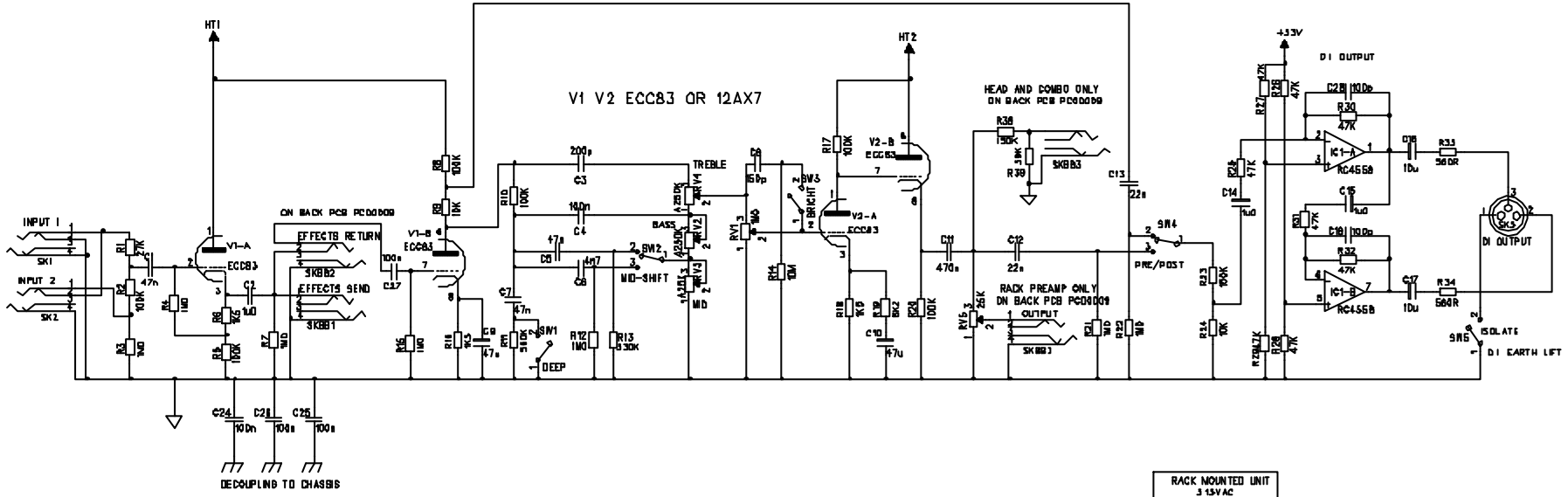

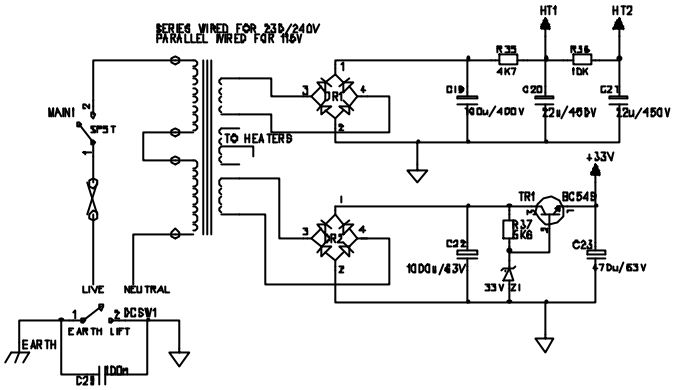

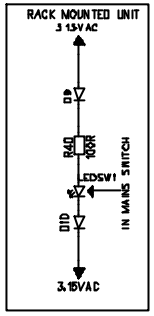

CIRCUIT DESIGN BY A. EWEN

TITLE	VALVE PREAMP CIRCUIT V-TYPE BASS SERIES CD0008	TRACE ELLIOT LTD
PROJECT		BLACKWATER TRADING ESTATE
DRAWING No		MALDON ESSEX CM9 4GG
ISSUE	2	GREAT BRITAIN
DATE	21/4/1995	TEL (01621) 851851
DRAWN BY	J B RECKLESS	FAX (01621) 857575

V-Type

V TYPE PREAMPLIFIER

V Type preamplifier is used in the following units:-

V-type head - 220 watt all valve amp. head.

V-type combo - 250 watt hybrid 15" combo.

V-type rack mount 1u all valve preamplifier.

TECHNICAL SPECIFICATIONS

Inputs	Passive bass	Impedance 1M OHM Input range 25mV to 1.5V (peak-peak)
	Active bass	Impedance 100K OHMS Input range 25mV to 6.0V (peak-peak)
	Effects return	Impedance greater than 1M OHM Nominal input level 0dBu (0.775VRMS)
Outputs	Effects send	Impedance less than 1K OHM Nominal level 0dBu
	Line output (Head and combo)	Impedance 8K OHMS Nominal level 0dBu (0.775VRMS) Maximum level +4dBu (3V RMS)
	Line output (Rack mount)	Impedance 25K OHMS Nominal level 0dBu (0.775V RMS) Maximum level + 20dBu (14VRMS)
	DI output	600ohms balanced Nominal level 0dBu (pins 2 and 3)
Frequency response		-3dB at 22Hz and 25kHz
Sensitivity	Passive input	13mV
	Active input	56mV

FACTORY DIRECT TECHNICAL HOTLINE TEL: (44) 621 840959 FAX: (44) 621 851932

V-Type

V TYPE CIRCUIT DESCRIPTION

Input SK1/SK2

SK1 and SK2 are the instrument inputs to the V type pre-amplifier. A signal entering SK1 is passed to the first stage via R1 with R2 in parallel. Resistor R3 is to decouple any D.C. appearing on the input to ground.

A signal entering SK2 is passed to the first stage via R2, again with R3 as a D.C. path to ground. This time, however, R1 has one end connected to ground via the switched contract on SK1. This provides a high degree of attenuation to input 2 for use with active or high output basses, with the combination of R2 and R1 acting as a potential divider across the input.

First stage (effects loop).

The first stage consists of one half of V1 which is a "cathode follower" stage to provide a low impedance output to feed the effects loop. R7 is there to decouple any D.C. to ground. SKBB1 and SKBB2 form a serial effects loop with the switching contacts on SKBB2 (effects return) providing the "break" into the circuit. Therefore SKBB2 can also be used as a "line in".

The signal from the effects return is passed via C27 (D.C. blocking) to the second half of V1.

Second stage (Tone network).

The tone circuit forms the anode load for the second half of V1. C3 and RV4 form the treble circuit, C4 and RV2 form the bass circuit and C5 and RV3 form the mid range circuit. RV3 incorporates a pull switch which switches C6 into the mid circuit and C5 out. This alters the point at which the mid range circuit works, upwards to about 2kHz. R12 and R13 provide D.C. paths to ground from the mid-shift contacts to reduce switching noise.

V-Type

Deep and bright switches.

The deep switch (SW1) provides a MID and TREBLE cut to accentuate the bass response by shorting out R11 and bringing C7 into the tone network.

The bright switch (SW3) brings C8 into circuit placing it in parallel with the top half of the gain control RV1. This creates a high-pass filter with a shallow roll off to accentuate the high frequency response. This function is disabled when the gain control is at a maximum as the capacitor is then by-passed. R14 is used to decouple any D.C. on the switch to ground.

Third stage.

The output from the tone network is fed from RV4 to RV1 (gain control) and then directly into the first half of V2. This is a gain stage to bring the signal up to a suitable level to drive a power amplifier.

The signal is then fed directly into the second half of V2 which is a "cathode follower" stage. this provides slightly less than unity gain but is designed to give a low impedance output to drive a power amplifier. The output signal is passed via C11 to the volume control RV5 and then onto the output jack socket SKBB3. This is only true for the rack mount version. In the head and combo the signal from RV5 pin 2 is passed directly to the power-amp. section, and a fixed level signal is taken from RV5 pin 3 to the line out socket. This is attenuated by a potential divider network of R38 and R39 to give a line level signal output.

D.I. output

A pre-eq D.I. signal is taken from the junction of R8 and R9 in the anode circuit of the second half of V1 before the signal is passed through the tone network, via C13.

The post-eq D.I. signal is passed via C12 from the output (cathode) of V2.

SW4 selects each of these signals with R21 and R22 providing a D.C. path to ground. The signal is then attenuated by the potential divider of R23 and R24 to provide a suitable level for the I.C.. The signal enters the inverting input of I.C. 1 via C14 and R25. The output on pin 1 of this half of the I.C. is passed via C16 and R33 to provide the negative or anti-phase D.I. signal on pin 3 of the XLR (SK5). The signal from pin 1 also enters the inverting input of the second half of I.C 1 which re-inverts it to give the inphase (positive) D.I. signal on pin 2 of SK5. C18 is present for high frequency stability.

D.C. biasing for I.C. 1 comes from the potential dividers of R29 an R27 and R8 with R26 which halve the +33V supply to provide the reference points for the signals. SW5 isolates the ground connection pin 1 on SK5 to eliminate earth loops when connected to external equipment.

V-Type

Pre-amp power supply.

In the rack mount version all supplies are derived from a single torroidal transformer. This provides 250V A.C. for the HT lines, bridge rectified and smoothed by C19, C20 and C21. R36 is present to stop any signal from HT2 getting onto HT1 which could cause feedback problems. It also provides 6.3V AC for the valve heaters and 40V A.C rectified and smoothed by C22 for the I.C. supply. This is regulated by a BC549 transistor, a 33v zener diode and a 5K6 resistor with C23 for smoothing purposes.

The same transformer is used in the combo version in conjunction with a larger torroidal to supply power to the output stage.

In the Head version the large mains transformer used for the phase splitter and output valves is also used for all the pre-amp. supplies.

Mains on indication

For the head and combo versions a 6.5V A.C. lamp is used for "mains on" indication. Power for this is derived directly from the 6.3V heater supply.

For the rack mount version, the 6.3V heater supply is rectified by D9 and D10 to supply a D.C. voltage to the LED built into the mains on switch. R40 is used as the current limiting resistor.

C12-PCB-VTYP-C/Hx1.

V-TYPE COMBO/HEAD PREAMP MAIN BOARD.
ISSUE 1 INSERTION LIST. ANDY EWEN 11/8/98.

DESCRIPTION	PART CODE	QTY	WHERE USED
PCB PC00008 ISSUE 2	73-PCB-PC00008	1	
ZENER DIODE 27V	72-D-BZX55C27V	1	ZD1
DIODE	72-D-IN4007	10	D1-D10
RES 2.5W 4K7	72-RWW4K7-2.5W	1	R35
RES 2W 100K	72-RC100K-2W	4	R8 R10 R17 R20
RES 1/2W 10K	72-RC10K-.5W	2	R9 R36
ZERO OHM LINK	72-RCZERO	28	AS MARKED
RES 1/4W 100K	72-RM100K	2	R2 R5
RES 1/4W 100R	72-RM100R	1	R40
RES 1/4W 10K	72-RM10K	1	R24
RES 1/4W 10M	72-RM10M	1	R14
RES 1/4W 150K	72-RM150K	1	R23
RES 1/4W 1K5	72-RM1K5	3	R6 R16 R18
RES 1/4W 1M	72-RM1M	7	R3 R4 R7 R12 R15 R21 R22
RES 1/4W 27K	72-RM27K	1	R1
RES 1/4W 330K	72-RM330K	1	R13
RES 1/4W 47K	72-RM47K	8	R25-R32
RES 1/4W 560K	72-RM560K	1	R11
RES 1/4W 560R	72-RM560R	2	R33 R34
RES 1/4W 5K6	72-RM5K6	1	R37
RES 1/4W 8K2	72-RM8K2	1	R19
CAP 1uF POLY BOX	72-C1-250VP	1	C2
CAP 1uF ELEC RADIAL	72-C1-63VER	2	C14 C15
CAP 10uF ELEC RADIAL	72-C10-35VER	2	MOD ACROSS R28 & R29 +ve legs nearest IC1.
CAP 10uF ELEC RADIAL	72-C10-63VER	2	C16 C17
CAP 1000uF ELEC RAD.	72-C1000-63VER	1	C22
CAP 100N POLY BOX	72-C100N-250VP	5	C4 C24 C25 C26 C27
CAP 100P CER DISC	72-C100P-100VCD2	2	C18 C28
CAP 150P CER DISC	72-C150P-50VCD	1	C8
CAP 200P Polystyrene	72-C200P-630VPA	1	C3
CAP 22uF ELEC AXIAL	72-C22-450VEA	2	C20 C21
CAP 22N POLY BOX	72-C22N-400VP	2	C12 C13
CAP 47uF ELEC RADIAL	72-C47-63VER	2	C9 C10
CAP 470uF ELEC RAD.	72-C470-63VER	1	C23
CAP 470N POLY BOX	72-C470N-250VP	1	C11
CAP 47N POLY BOX	72-C47N-100VP	1	C1
CAP 47N POLY BOX	72-C47N-400VP	2	C5 C7
CAP 4N7 POLY BOX	72-C4N7-400VP	1	C6
CAP 100uF ELEC RAD.	72-CAP-100400V	1	C19

TRANSISTOR BC549C	**72-TBC549C**	**1**	**TR1**
8-WAY SOCKET	**72-SOCKET-8W**	**1**	**FOR IC1**
IC RC4558P	**72-IC-RC4558P**	**1**	**IC1**
POT A 1MEG	**73-POT-A1M**	**1**	**P1**
POT A 250K	**73-POT-A250K**	**2**	**P2 P4**
POT A 25K	**73-POT-A25K**	**1**	**P5**
POT A25K PULL SWITCH	**73-POT-A25K-PS**	**1**	**P3**
MINI TOGGLE SWITCH	**73-SWT-M-TGL-PCB**	**4**	**SW1 SW3 SW4 SW5**
2-WAY HEADER 0.1”	**72-HEAD-2W**	**4**	**HP1-HP4 (SEE NB1)**
8-WAY HEADER 0.2”	**72-HEAD-8W**	**1**	**PL1**
VALVE BASE 9-WAY	**73-VAL-SOCKET**	**2**	**VT1 VT2**
XLR PLUG NEUTRIK	**73-XLR-PCB-M-N**	**1**	**XLR1**
JACK SOCKETS	**72-SKT-JCKBNBG**	**2**	**SK1 SK2**
FLYLEAD	**C00-FLY-HEATER**	**1**	**ACROSS HP1-HP4**
SIGNAL LEAD	**LOOM-00275**	**1**	**From L/0(F) to PC00009**
SIGNAL LEAD	**LOOM-00276**	**1**	**From send/return to PC00009**
LEAD FOR LAMP	**LOOM-00277**	**1**	**From PL3 to 6.3V lamp**

N.B.1 The four 2-way headers are fitted with their small face to the left. This is with the pots facing you.

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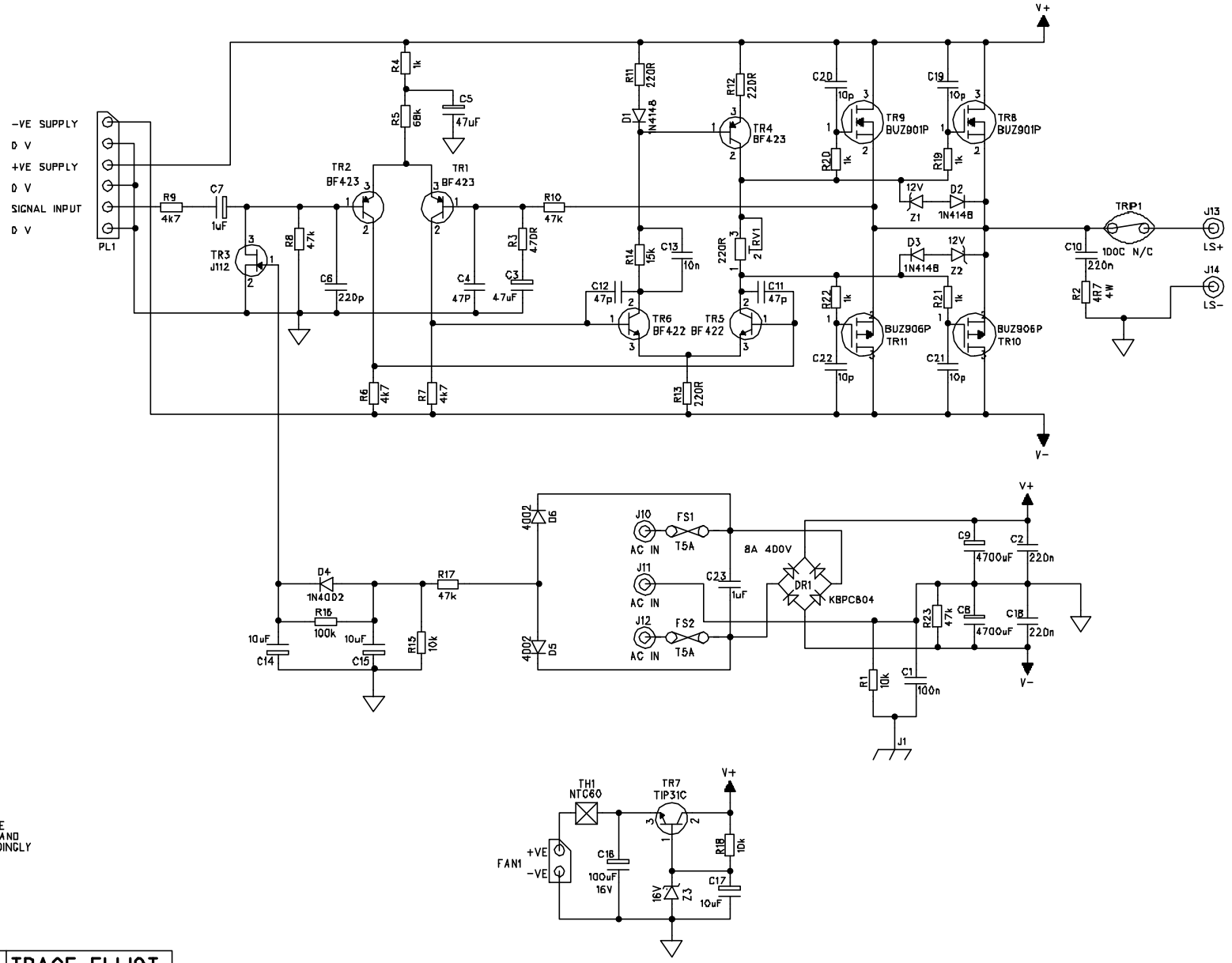

COMPONENTS USED ARE
OF AN APPROVED TYPE AND
MUST BE REPLACED ACCORDINGLY

PCB = PCB0082

TITLE	300 WATT MOSFET OUTPUT
PROJECT	BIPOLAR BEAR REPLACEMENT
DRAWING No	CD0086
ISSUE	4
DATE	6/5/99
DRAWN BY	CLIVE BUTTON

TRACE ELLIOT
TRACE ELLIOT LIMITED
MALDON ESSEX CM9 7GG
ENGLAND
TEL (01621) 855266
FAX (01621) 851975

cd0086x4.sch-1 - Sat Dec 11 11:04:47 1999

C11-MOD-K300Bx4.

PARTS LIST FOR 300 WATT MOSFET BASS POWER STAGE
PC00082x3-C BUTTON-21/7/97 UP-ISSUED-8/1/98 A EWEN.
UP-ISSUE 5/2/98 R18 TO 1WATT. ISSUE 4 REFERENCE TO CD0086X4

Description	Part Code	Qty	Where Used
ZENER1,12V	72-D-BZX55C12V	2	Z1-2
ZENER1,16V	72-D-BZX55C16V	1	Z3
DIODE1,1N4002	72-D-1N4002	3	D4-6
DIODE1,1N4148	72-D-1N4148	3	D1-3
R-1watt 10K	72-RM10K-1WATT	1	R18
R1/4W,100k	72-RM100K	1	R16
R1/4W,10k	72-RM10K	3	R1 R15
R1/4W,15k	72-RM15K	1	R14
R1/4W,1k	72-RM1K	5	R4 R19-22
R1/4W,220R	72-RM220R	3	R11-13
R1/4W,470R	72-RM470R	1	R3
R1/4W,47k	72-RM47K	3	R8 R10 R17
R1/4W,4k7	72-RM4K7	3	R6-7 R9
R1/4W,68k	72-RM68K	1	R5
R4W,4R7	72-RWW4R7-4W	1	R2
	There is no R23 on the PCB		R23
PRESET,220R	72-PRESET-220R	1	RV1
ZERO OHM LINK	72-RCZERO	19	
CAPCER,10p	72-C10P-500VCD	4	C19-22
CAPCER,47p	72-C47P-100VCD2	3	C4 C11-12
CAPCER,220p	72-C220P-100VCD	1	C6
CAPP1,10n	72-C10N-100VP	1	C13
CAPP1,100n	72-C100N-100VP	1	C1
BF422	72-TBF422	2	TR5-6
BF423	72-TBF423	3	TR1-2 TR4
J112	72-FET-J-112	1	TR3
CAPE2,1uF	72-C1-63VER	1	C7
CAPE2,10uF	72-C10-63VER	3	C15 C17 C14
CAPE2,47uF	72-C47-63VER	2	C3 C5
CAPE2,100uF	72-C100-16VER	1	C16
CAPP5,220n	72-C220N-250VP	3	C2 C10 C18
CAPP6,1uF	72-C1-250VP	1	C23
PCB TERMINAL 2 WAY	73-TERM-PCB-2WAY	1	FAN1
HEADER 2 WAY 0.2"	72-HEAD-2W-2	1	LS1

HEADER 3 WAY 0.2"	72-HEAD-3W-3	1	PL2
HEADER 6 WAY 0.1"	72-HEAD-6W-2	1	PL1
PCBFUSECLIP,	72-FUS-HLD-PCB-4	4	FS1-2
20MM FUSE T5A	72-FUS-5AT	1	FS1-2
CAPE6,4700uF 80V	72-CAP-470080V	2	C8-9
SB104	72-BRIDGE-4	1	DR1
BUZ901P	72-MOS-BUZ901P	2	TR8-9
BUZ906P	72-MOS-BUZ906P	2	TR10-11
TRANSISTOR CLIP	71-HS-KR70-CLIP1	4	fit to output devices
THERMISTOR	72-THERMISTER-4 Mount against heatsink with plenty of thermal compound between the thermistor and the heatsink.	1	TH1
TIP31C	72-TIP31C (or 72-TSM2178)	1	TR7
SMALL HEATSINK	71-HS-CLO5-45	1	FIT TO TR7 WITH THERMAL COMPOUND
BRIDGE HEATSINK	71-HS-TEG	1	FOR BRIDGE RECT
LARGE HEATSINK	71-HS-KR180	1	FOR OUTPUT DEVICES
TRIP,100C N/C	73-SWT-THERM-2	1	FIT TO HEATSINK WIRE TO TRIP1
FIXINGS	71-SCR-M3X8PP/TT	7	FOR HEATSINK & TRIP

ISSUE CHANGE NOTE DATE	ISSUE CHANGE NOTE DATE	ISSUE CHANGE NOTE DATE
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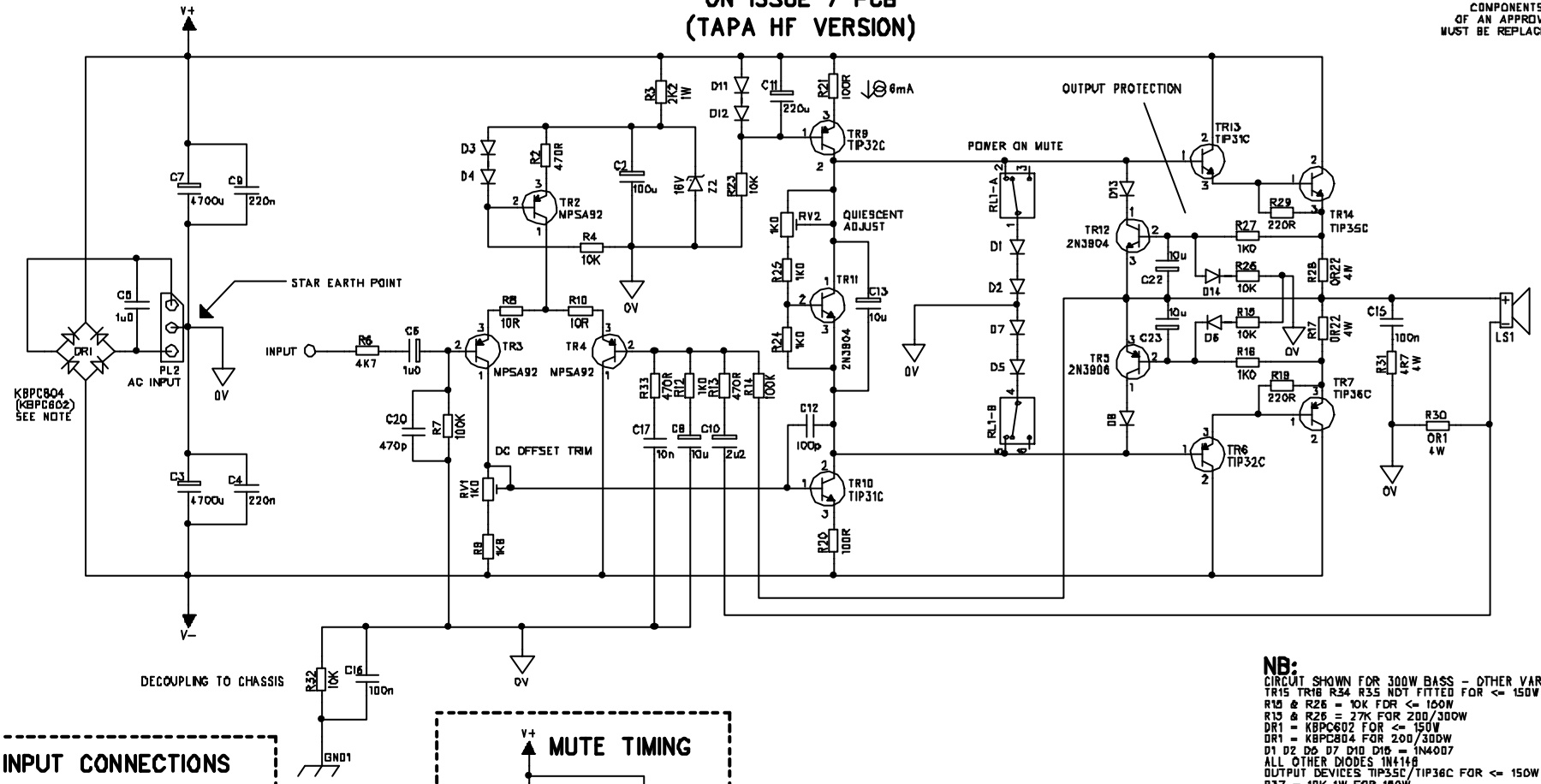
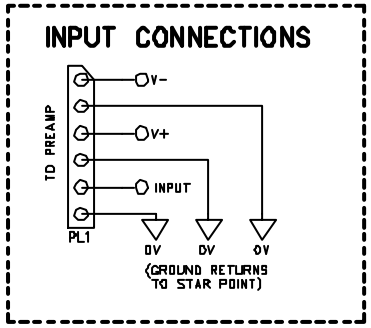
THE BIPOLAR BEAR OUTPUT STAGE CIRCUIT DIAGRAM
ON ISSUE 7 PCB
(TAPA HF VERSION)

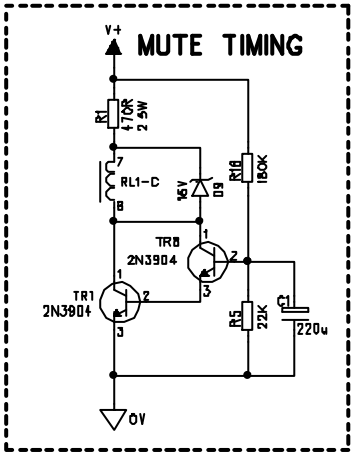
COMPONENTS USED ARE
OF AN APPROVED TYPE AND
MUST BE REPLACED ACCORDINGLY



INPUT CONNECTIONS



MUTE TIMING



NB:
CIRCUIT SHOWN FOR 300W BASS - OTHER VARIANTS BELOW.
TR15 TR16 R34 R35 NOT FITTED FOR <= 150W
R15 & R26 = 10K FOR <= 150W
R15 & R26 = 27K FOR 200/300W
DR1 = KBPC602 FOR <= 150W
DR1 = KBPC804 FOR 200/300W
D1 D2 D6 D7 D10 D15 = 1N4007
ALL OTHER DIODES 1N4148
OUTPUT DEVICES TIP35C/TIP36C FOR <= 150W
R37 = 10K 1W FOR 150W

TAPA LF:
R13 = 470R
C10 = 10u
Z1 = 27V ZENER
C19 = 47u 63V

TEK150:
R30 = S/C LINK
R13 C10 NOT FITTED
R12 = 3K3
C8 = 2u2
R33 = 1K0
C17 = 10n

TAPA HF:
ONE PAIR OF TIP35C/TIP36C FOR OUTPUTS
FAN DRIVE CIRCUIT NOT FITTED
R3 = 2K2 1W
R23 = 10K
R1 = 470R 2.5W
R16 = 180K
R13 = 470R
R33 = 470R
C17 = 10n
C20 = 470p

TITLE	THE BIPOLAR BEAR
PROJECT	TAPA HF
DRAWING No	CD00025
ISSUE	1
DATE	7/10/1996
DRAWN BY	J B RECKLESS

TRACE ELLIOT
TRACE ELLIOT LIMITED
MALDON ESSEX CM9 7XD
ENGLAND
TEL (01621) 851851
FAX (01621) 851932

BIPOLAR BEAR - PC00026
CIRCUIT DESCRIPTION

The Bipolar Bear is a general purpose bipolar junction transistor power amplifier PCB that has been designed for use in bass, lead guitar and acoustic amplifiers. It is fairly straightforward in design, and includes voltage and current feedback so that the frequency response and output damping factor can be adjusted to suit each particular application. The damping factor is a measure of how much the output amplitude varies as the load impedance is changed. A high damping factor means that the output voltage remains constant regardless of load impedance; a low damping factor means that the load impedance plays a major part in the overall output amplitude.

The unit has been designed for use in amplifiers of up to 300 watts rms output. For power output of up to 150 watts, one pair of output transistors is used; for greater power output a second pair of devices is required.

INPUT STAGE

TR3 and TR4 form a 'long tail pair' - their purpose is to compare the input signal with the output voltage and current, and produce a 'difference' signal that is used to drive the following stage. TR2, in conjunction with D3, D4, R2 and R4, provides a 'constant current source' that maintains a current of approximately 6mA into the emitters of TR3 and TR4. The purpose of R3, C2 and Z2 is to 'decouple' the supply voltage ripple, so as to minimise the 100Hz 'hum' into the rest of the amplifier.

The collector load resistor of TR3 and TR4 - R9, can be 'balanced' using preset RV1 so that any differences in gain between the two transistors can be tuned out to give an overall zero DC offset in the output.

Capacitor C20 (across R7) sets the high frequency rolloff of the input stage. C6 (in series with R7) sets the low frequency rolloff of the input stage.

VOLTAGE AMPLIFICATION STAGE

Transistor TR10 is the main voltage amplification stage of the amplifier. It takes the small signal swing from the long tail pair and amplifies it to the full amplitude of the power amplifier output stage. Capacitor C12 is known as the

'compensation capacitor' - its purpose is to prevent the amplifier from becoming unstable at high frequencies.

TR9, in conjuntion with R21, D11, D12, R23 and C11, is a 'constant current source' load for the collector of TR10. It ensures that as the collector of TR10 swings from rail to rail, there is always sufficient current to drive the following stages of the amp.

The purpose of TR11 is to control the quiescent or 'bias' current of the output stage. When a bipolar junction transistor becomes hot (i.e. when power is being dissipated) the current though the device increases for a given applied bias voltage. TR11 is mounted on the heatsink and thermally coupled to the output transistors. Its temperature tracks those of the output devices and it therefore keeps the bias current (almost) constant as temperature varies.

Preset RV2 can be used to adjust the bias voltage so that any crossover distortion can be accurately trimmed out. **This is far more important in bipolar power amps than their MOSFET equivalent.**

DRIVER STAGE

The purpose of driver transistors TR13 and TR6 is to increase the current available to drive the base junction of the output transistors - they are emitter followers.

OUTPUT STAGE

Transistors TR14, TR16, TR7 and TR15 are also emitter followers - they pass the voltage from the driver stage through to the output and dissipate most of the heat in the amplifier.

Emitter resistors R17, R28, R34 and R35 are to ensure that each transistor shares an equal part of the current output, and to provide stable biasing in conjuntion with TR11.

ZOBEL NETWORK

C15 and R31 ensure that the amplifier 'sees' a suitable load at high frequencies, as many loudspeaker systems act as an 'open circuit' at very high frequencies.

VOLTAGE FEEDBACK

R14, R12 and C8 comprise the voltage feedback of the amplifier. These components set the overall gain and improve consistency from one amp to another.

CURRENT FEEDBACK

R30, R13 and C10 comprise the current feedback of the amplifier. These components determine the overall damping factor of the amplifier.

SHORT CIRCUIT PROTECTION

Transistors TR12 and TR5 play no part during normal amplification. Their purpose is to protect the output transistors from a possible short circuit. A high positive current will produce a voltage across R28 which, when the current reaches a cetain amount, will 'turn on' TR12 and short out the base drive to TR13.

Under normal conditions, most of the current that would turn on TR12 is shorted to ground via D14 and R26. However, when the output is shorted out, there is no voltage across D14, so all the current flows into TR12.

This method of short circuit protection is known as 'foldback current limiting' - the maximum current allowed into a normal load is higher than the maximum current allowed into a short circuit.

Transistor TR5 and its associated components provide similar protection for output transistors TR7 and TR15.

POWER ON MUTE

The purpose of relay RL1 and its associated components is to limit the swing of the output stage while the amp is powering up or down, and thus prevent any large 'bangs' being sent into the loudspeaker.

Transistors TR1 and TR8 in conjuntion with R18 and C1 set the timing constant for the power on / off muting.

SWING LIMITING

Zener diodes Z3 and Z4 in conjuntion with diodes D10 and D15 limit the maximum output swing, to prevent the output transistors from over-volting when the amp is used 'off load'.

FAN DRIVE CIRCUIT

Transistor TR17 passes current to the cooling fan, whilst dropping the voltage from the rails to a more appropriate 12 - 16Vdc. Zener Z1 and resistor R37 set the fan voltage. Transistor TR18 and resistor R36 act to limit the maximum current into the fan - this prevents the destruction of TR17 should the fan become short circuit, or be forced to stop.

Jonny Reckless, 6 December 1995

PARTS LIST FOR 300W BASS AMP
USING PC00026 ISSUE 7
Please label the pcb '300W BASS'

Description	Part Code	Qty	Where Used
DIODE 1N4007	72-D-1N4007	14	D1.....D8 D10....D15
ZENER DIODE 16 VOLT	72-D-BZY88C16V	3	Z1 Z2 D9
ZENER DIODE 51 VOLT	72-D-BZY88C51V	2	Z3 Z4
ZERO OHM LINKS	72-RCZERO	14	
RES 1/4W 2R7	72-RM2R7	1	R36
RES 1/4W 10R	72-RM10R	2	R8 R10
RES 1/4W 100R	72-RM100R	4	R2 R9 R20 R21
RES 1/4W 220R	72-RM220R	2	R19 R29
RES 1/4W 1K0	72-RM1K	5	R12 R16 R24 R25 R27
RES 1/4W 4K7	72-RM4K7	2	R6 R13
RES 1 WATT 4K7	72-RM4K7-1WATT	1	R3
RES 1/4W 10K	72-RM10K	2	R4 R32
RES 1 WATT 22K	72-RM22K-1WATT	1	R37
RES 1/4W 22K	72-RM22K	2	R5 R23
RES 1/4W 27K	72-RM27K	2	R15 R26
RES 1/4W 100K	72-RM100K	2	R7 R14
RES 1/4W 470K	72-RM470K	1	R18
CAP RADIAL 1u0 63V	72-C1-63VER	1	C6
CAP RADIAL 2u2 63V	72-C2.2-63VER	1	C10
CAP RADIAL 10u 63V	72-C10-63VER	5	C8 C13 C18 C22 C23
CAP RADIAL 100u 16V	72-C100-16VER	2	C2 C19
CAP RADIAL 220u 25V	72-C220-25VER	2	C1 C11
CAP CERAMIC 100p 100V	72-C100P-100VCD	1	C12
CAP BOX POLY 2n2 100V	72-C2N2-100VP	1	C20
CAP BOX POLY 100n 100V	72-C100N-100VP	2	C15 C16
CAP BOX POLY 220n 250V	72-C220N-250VP	2	C4 C9
CAP BOX POLY 1uF 250V	72-C1-250VP	1	C5
TRANSISTOR MPSA92	72-TMPSA92	3	TR2 TR3 TR4
TRANSISTOR 2N3904	72-T2N3904	5	TR1 TR8 TR11 TR12 TR18
TRANSISTOR 2N3906	72-T2N3906	1	TR5
TRANSISTOR TIP31C	72-TIP31C	2	TR10 TR13
TRANSISTOR TIP32C	72-TIP32C	2	TR6 TR9

PRESET 1K0	72-PRESET-1K	2	RV1 RV2
RELAY 47W/6 12V DPCO	73-RELAY-47W	1	RL1
PCB TERMINAL 2 WAY	73-TERM-PCB-2WAY	1	FAN OUTPUT
HEADER 6 WAY 0.1"	72-HEAD-6W-2	1	PL1
HEADER 3 WAY 0.2"	72-HEAD-3W-3	1	PL2
HEADER 2 WAY 0.2"	72-HEAD-2W-2	1	LS1
RES W/W 0R22 4W	72-RWW0R22-4W	4	R17 R28 R34 R35
RES W/W 4R7 4W	72-RWW4R7-4W	1	R31
RES W/W 0R1 4W	72-RWW0R1-4W	1	R30
RES W/W 1K0 2.5W	72-RWW1K-2.5W	1	R1
CAP 4700u 80V SNAP IN	73-CAP-470080V	2	C3 C7
RECTIFIER KBPC804	73-BRIDGE-3	1	DR1 (fit to heatsink)
HEATSINK FINNED	71-HS-TEG	1	fit to DR1
TRANSISTOR 2SC4468	72-T2SC4468	2	TR14 TR16
TRANSISTOR 2SA1695	72-T2SA1695	2	TR7 TR15
TRANSISTOR BUW11A	72-TBUW11A	1	TR17
HEATSINK KR70	74-HS-KR70-1	2	fit to output devices
TRANSISTOR CLIP	74-HS-KR70-CLIP1	5	fit to output devices
THERMAL TRIP 100C	73-SWT-THERM-2	1	fit to heatsink, wire to TRIP1
FIXINGS:	71-SCR-M3X8PP/TT	10	for heatsinks and trip
	71-SCR-M3X16PP	1	for KBPC602
	71-NUT-M3ZINC	1	for KBPC602
	71-WAS-M3AZINC	1	for KBPC602
	71-WAS-M3SCOIL	1	for KBPC602
	71-WAS-M3NYL	8	for heatsinks under PCB

Important Notice

To make the bi-polar 300 watt bass board reliable the following guidelines must be adhered to.

When a board need to be serviced it is advisable to replace both the Output Transistors and TIP31 and TIP32. Also it is advisable to replace TR11 which is situated under the rear of the heatsink.

The Output device should only be T2SC4468 and T2SA1695's
The Drivers should be of the same manufacturer as each other to ensure stability.
And TR11 is a T2N3904 as listed on the parts list.
TR11 need to be completely covered in Heat Transfer Compound (HTC)
This is to ensure that it keeps the unit biased correctly even when the unit gets hot. If TR11 is not covered then the fan can cool this component down and give the board a fault reading of temperature and provide and inappropriate bias.

When adjusting the bias on the scope, make sure that the crossover distortion is just not visible. Too far beyond this point will over bias the unit.

Use a Shake-proof washer under the pcb earth point to ensure a permanent connection and prevent crackling noises in the future.

Paul Mathews

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