



I066 Channel Amplifier

Technical Manual

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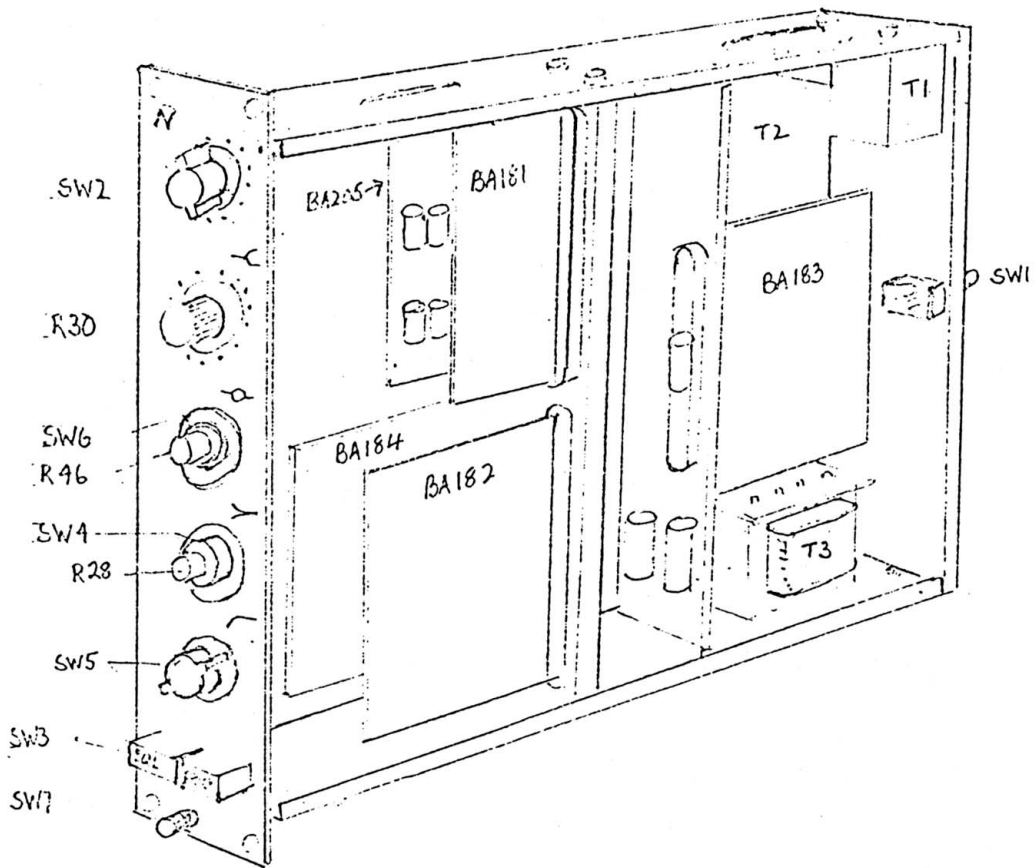
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Circuit References

Module general	-	1066 Channel Amplifier
Board BA183	-	Amplifier
Board BA184	-	Amplifier
Board BA181	-	Signal processing ("presence")
Board BA182A	-	Signal processing (high pass filter)
Board BA205	-	Signal processing H.F. and L.F. Cut/Boost

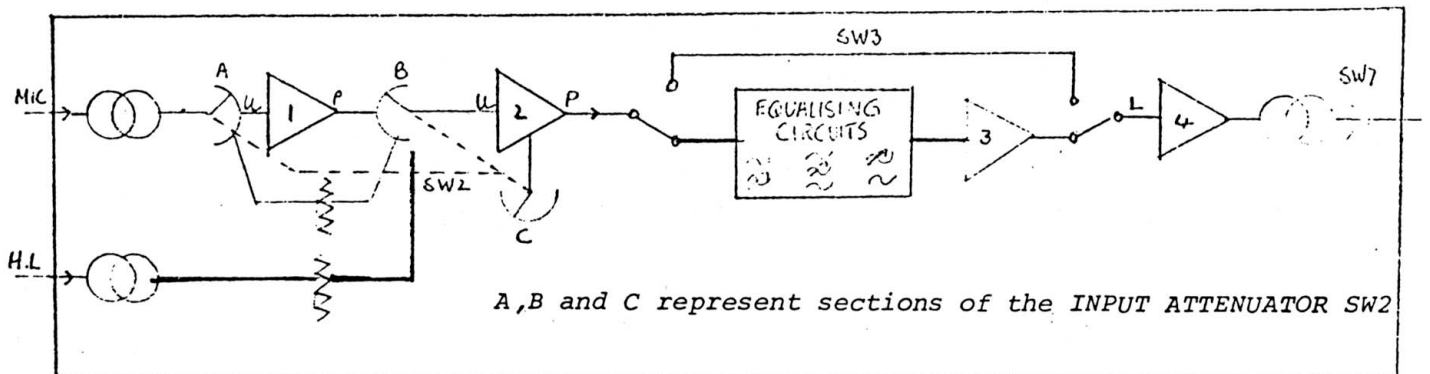
GENERAL DESCRIPTION

The Channel Amplifier operates from a microphone or a line source and raises the level of the incoming signal to 0 dBm for feeding into a 600 ohm load. The following signal processing operations are also carried out and controlled by the channel amplifier.

- (1) High frequency boost/cut.
- (2) Presence (mid-frequency boost/cut).
- (3) Low frequency boost/cut.
- (4) High pass filter.

The level of incoming signal can be between -80 dBm and -20 dBm for a microphone input, or between -20 dBm and +10 dBm for a line input. After performing the various signal processing requirements the signal output is 0 dBm.

The unit contains a printed circuit board microphone amplifier B183, an operational amplifier B184, an output amplifier (part of board B183), and the filter circuits. The functional arrangement of these circuits is shown on the block schematic of Channel Amplifier 1066. The sections of the attenuator are arranged so that when the low level input is used, the high level input is disconnected and the gain of amplifier 2 is raised by section C of the attenuator. When the unit is switched to receive a high level input, amplifier 1 is disconnected and the signal is routed via section B of the attenuator to the input of amplifier 2, the gain of which is automatically reduced.



Switch SW1 is located beside the main Amphenol 18- way connector on the rear panel of the unit. The switch is wired so that the primaries of T1 (Microphone Input) may be adjusted to suit either of the two types of microphone in most general use.

The input transformer T2 connects a line input at a higher level via a separate section of the Line/Microphone input selector and switched attenuator SW2. This switch is divided into two sections separated by OFF positions. The microphone input is connected to the first stage, TR1 at pin U of Board BA184 (A). The output from the emitter follower TR3 (board connector P) is taken via the switched attenuator SW2 to the input U of a similar amplifier on Board BA183.

The resistor R1 connects the output from the emitter follower TR2 on Board BA184 to the input at the junction of C1 and R1. This feedback modifies the overall gain of the amplifier and also lowers the input impedance to match that of the transformer T1. Gain is also modified by R6 which is connected across contacts T and V, thereby altering the amplitude of the signal developed across R10 which forms the emitter load of TR1 and is common with R9 as the emitter load of TR3. Note the intermediate OFF position dividing the two sections of the microphone switched attenuator occurring between the -50 dBm and -45 dBm positions. At the -50 dBm position the gain of the first amplifier board on the B184 (a) is no longer required and the output from T1 is switched directly to the input U of a similar amplifier on the board BA183. At the -50 dBm and -45 dBm positions R25 and R26 are switched across the feedback gain control points T and V on the BA183 (a) amplifier. At the -40 to -20 dBm positions gain is progressively reduced by the effects of R2 to R5 in series with the 'live' pin of the microphone input transformer T1 and shunted by R9 - R13 connected across T1 secondary.

A second OFF position isolates the microphone positions of the switched attenuator from the alternative line input provided by T2. In this case the attenuator action is not complicated by variations of feedback, and the amplifier of board BA183 acts as the initial amplifier with fixed overall feedback applied by R27.

The output from contact P of board BA183 is taken to the switch SW3 which enables the signal processing circuits to be switched in or by-passed as required. The switch is shown in the by-pass position on the overall schematic, Fig. 3. The signal is taken via the link K to L and applied to the input contact L of board BA183 (B). The output from the amplifier at contacts B and M is taken to pins 1 and 3 of the output transformer T3. Switch SW7 enables the phase of the output from T3 to be reversed, if desired.

The signal processing circuits comprise Board B205, an amplifier (B) on Board BA184, Board BA181 followed by Board BA182. The output from BA182 via SW4 is taken to SW3 for routing to the output via the link K and L. The functions of the signal processing boards and their associated switches and potentiometers are as follows:-

Board	Function	Associated Switch	Potentiometers
BA205	H.F. and L.F. Cut/Boost	SW4 - Turnover frequency select	R30 (L.F. Cut/Boost) R28 H.F. Cut/Boost
BA181	Presence	SW6 - Centre frequency select	R46 - Boost - Cut
BA182	High pass filter 45, 70, 160, 360 Hz	SW5 - Turnover select	-

In order to boost the gain of the BA183 B output amplifier (Fig. 3), R44 in series with the 80 μ F capacitor C6 are effectively connected across R4 in the emitter circuit of TR1 thereby providing 18 dB of gain. (See circuit notes on board BA183). Contacts A and J which boost the current through the power transistor TR3 are linked externally in this application.

The 10M resistors wired between the contacts of SW4 and SW5 and SW6 suppress clicks when adjustments are made.

SPECIFICATION

Inputs

1. Microphone.
2. Line - Both inputs are balanced and earth free. R.F. isolated, electrostatically screened, astatically wound transformers used for each input.

Input Impedance

1. Microphone - 300 or 1200 ohms termination, switchable.
2. Line - 10,000 ohms line, bridging from 600 ohms or lower source impedance.

Sensitivity

1. Microphone - from -80 dBm to -20 dBm in 5 dB steps for 0 dBm output.
2. Line - from -20 dBm to +10 dBm in 5 dB steps for 0 dBm output.

Noise

- (a) Better than -125 dBm E.I.N. between -80 and -40 dBm referred to 600 ohms input impedance.
- (b) Better than -83 dBm between -35 and +10 dBm sensitivity. R.M.S. values, 20 Hz to 20 kHz, unweighted with filters and controls either "flat" or switched out.

Output

Balanced and floating to feed a 600 ohms load.

A second unbalanced output is also available.

Maximum output +26 dBm into 600 ohms, or +20 dBm into 150 ohms.

Output Impedance

600 ohms, balanced (source impedance 75 ohms). May be adjusted internally to feed a 150 ohm load (source impedance 20 ohms).

Frequency Response

15 Hz - 20 kHz $\pm$ 0.5 dB

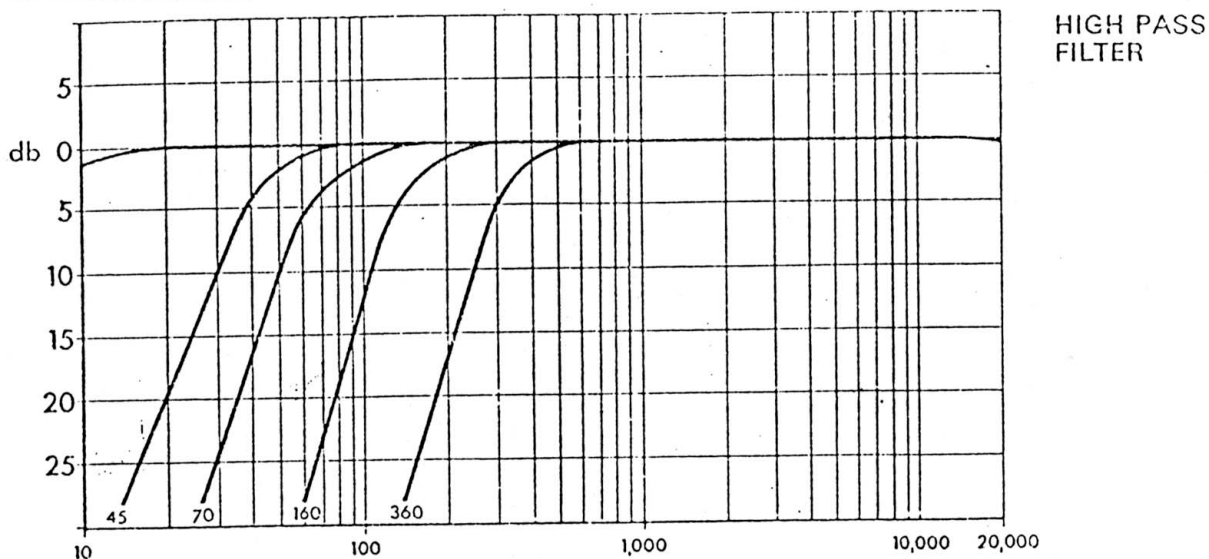
7 Hz - 35 kHz - 3 dB

Reactive component less than 20% between 50 Hz and 10 kHz.

Measured with filter and response controls switched "out" from 200 ohms source into 1200 microphone input at -60 dBm sensitivity, or from a 600 ohm source into 10,000 ohm line input.

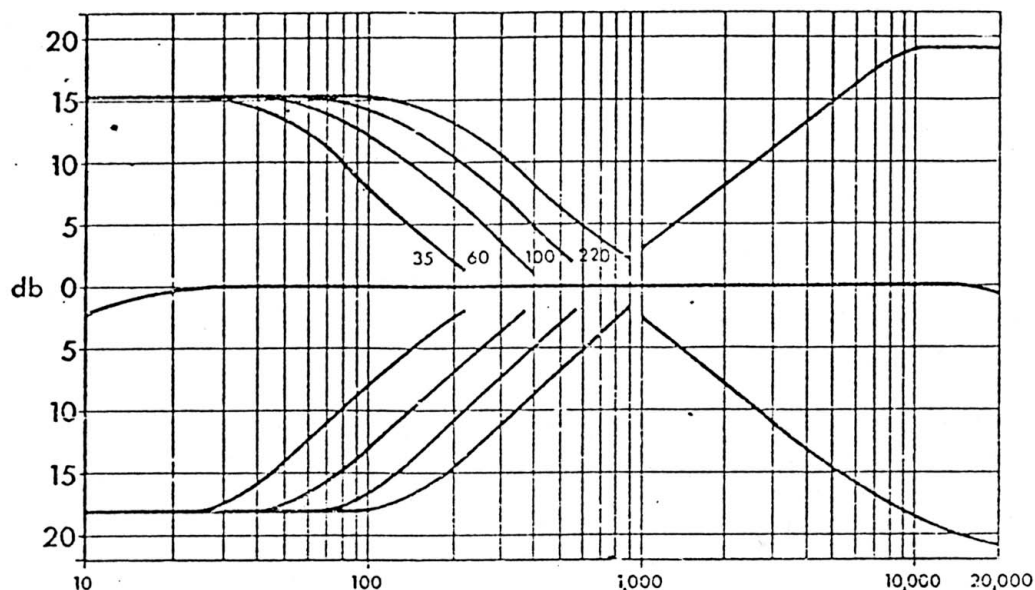
With conditions as above, a square wave of 1 microsecond rise time and 10 kHz repetition rate shows ringing and overshoot not exceeding 1% of the peak amplitude, the output rise time being strictly consistent with amplifier band width.

High Pass Filter



* Provides 4 switched responses with -3 dB points at 45 Hz, 70 Hz, 160 Hz and 360 Hz. Slope - 18 dB per octave.

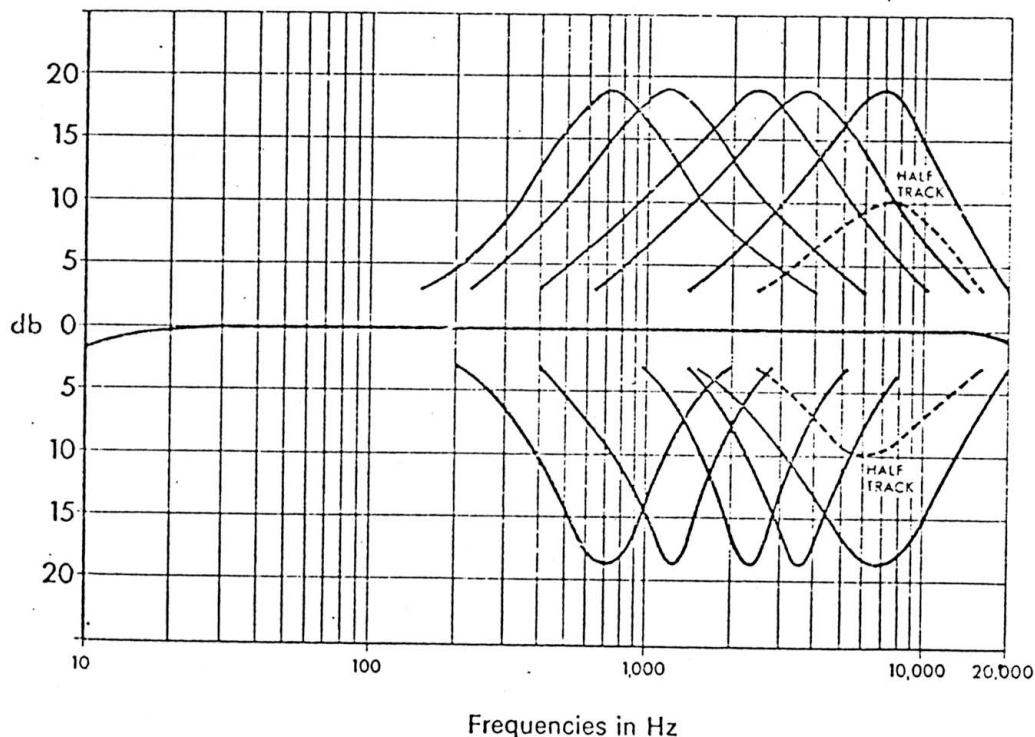
L.F. and H.F. Cut or Boost



L.F. and H.F.
CUT/BOOST

L.F. Control - continuously variable, ± 16 dB. Switched maximum boost and cut frequencies - 220 Hz, 100 Hz, 60 Hz and 35 Hz. "Shelf" type curve shape.

Presence (Mid-Frequency) Cut/Boost



PRESENCE
(MID-FREQUENCY)
CUT/BOOST

Continuously variable to a maximum of ± 16 dB. Switched maximum boost and cut frequencies peaking at 7.0, 3.6, 2.4 and 0.7 kHz.

Push Buttons

1. Equalisation IN/OUT
2. Phase Reverse (output)

PARTS LIST IO66

Ref.	Description	Part No.
R1	22K TR5 5%	R5 22K
R2	2K2 TR4 5%	R4 2K2
R3	3K3 " "	R4 3K3
R4	3K9 " "	R4 3K9
R5	4K3 " "	R4 4K3
R6	91 TR5 5%	R5 91
R7	2K7 TR4 5%	R4 2K7
R8	18K " "	R4 18K
R9	12K " "	R4 12K
R10	3K9 " "	R4 3K9
R11	1K8 " "	R4 1K8
R12	1K " "	R4 1K
R13	510 " "	R4 510
R14	33 " "	R4 33
R15	2K2 " "	R4 2K2
R16	3K9 " "	R4 3K9
R17	3K3 " "	R4 3K3
R18	2K7 " "	R4 2K7
R19	27 " "	R4 27
R20	47 " "	R4 47
R21	82 " "	R4 82
R22	150 " "	R4 150
R23	270 " "	R4 270
R24	430 " "	R4 430
R25	120 TR5 5%	R5 120
R26	330 TR4 "	R4 330
R27	18K " "	R4 18K
R28	47K Potentiometer	POO20
R29	10M B.T.T.	RBT 10M
R30	10K Potentiometer	POO15
R31	10M B.T.T.	RBT 10M
R32	39K TR5 5%	R5 39K
R33	10M B.T.T.	RBT 10M
R34	10M B.T.T.	RBT 10M
R35	12K TR5 5%	R5 12K
R36-39	10M B.T.T.	RBT 10M
R40	270 TR4 5%	R4 270
R41	120 TR5 5%	R5 120
R42	2K7 TR4 2K7	R4 2K7
R43	10M B.T.T.	RBT 10M
R44	1K5 TR5	R5 1K5
R45	10M B.T.T.	RBT 10M
R46	10K Potentiometer	POO16
R47	10M B.T.T.	RBT 10M
R48	1K2 TR5	R5 1K2
R49	10M B.T.T.	RBT 10M
R50	10M B.T.T.	RBT 10M
R51	12	RBT 12
R52	10M B.T.T.	RBT 10M
R53	1K5 TR5 5%	R5 1K5

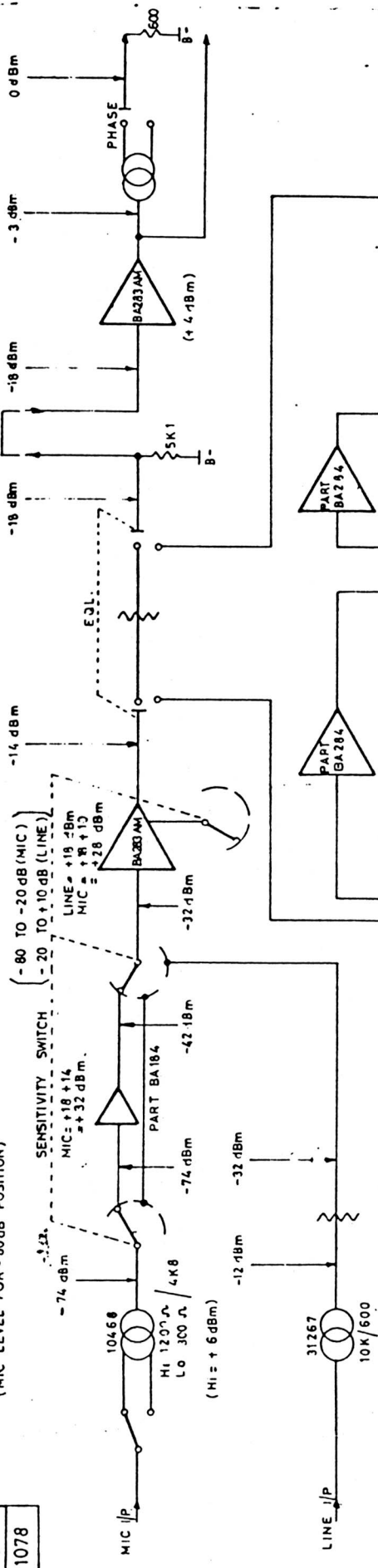
PARTS LIST IO66 (CONT'D)

Ref.	Description	Part No.
R54	10M B.T.T.	RBT 10M
R55	10M B.T.T.	RBT 10M
R56	5.1K TR5 5%	R5 5K1
R57-R66	10M B.T.T.	RBT 10M
R67,68	12K TR5	R5 12K
R69	1K5 "	R5 1K5
R70	12K "	R5 12K
R71	220 "	R5 220
R72,73	10K "	R5 10K
R74	4K7 "	R5 4K7
C1	180p Suflex H5 10%	COO40
C2	640μF C437 AR/F640	COO32
C3	640μF C437 AR/F640	COO32
C4	470pF Suflex H5 10%	COO44
C5	180pF Suflex H.S. 10%	COO40
C6	80μF	COO29
C7	640μF C437 AR/F640	COO32
C8	640μF C437 AR/F640	COO32
C9	.01μF C296 AA/A1OK	COO09
C10	3300pF	CO186
T1	Microphone input 10468	TOO04
T2	Line input 31267	TOO06
T3	Main Output LO1166	TOO07
	BA184/BA284 Printed Circuit Boards	
	BA183/BA283 " " "	
	BA205A	
	BA181	
S1	Attenuator - input	SO120
S2	Equalisation	SO142
S3	Switch 2 x 6	SO114
S4	Switch 2 x 6	SO106
S5	Switch 2 x 6	SO114
S6	Phase	SO132

1066
1073
1078

E/10006

(MIC LEVEL FOR -80dB POSITION)



(LINE LEVEL FOR 0dB POSITION)

1066	1073	1078
AS ABOVE	AS ABOVE	AS ABOVE
10 KHz	12 KHz	10 KHz
1066	1073	1078

OFF	45	70	160	350 Hz
3.7	1.2	2.4	3.6	7.0 KHz
1.6 dB	1.6 dB	1.6 dB	1.6 dB	1.6 dB

OFF	50	80	160	300 Hz
0.35	0.75	1.60	3.2	7.2 KHz
0.35	0.75	1.60	3.2	7.2 KHz

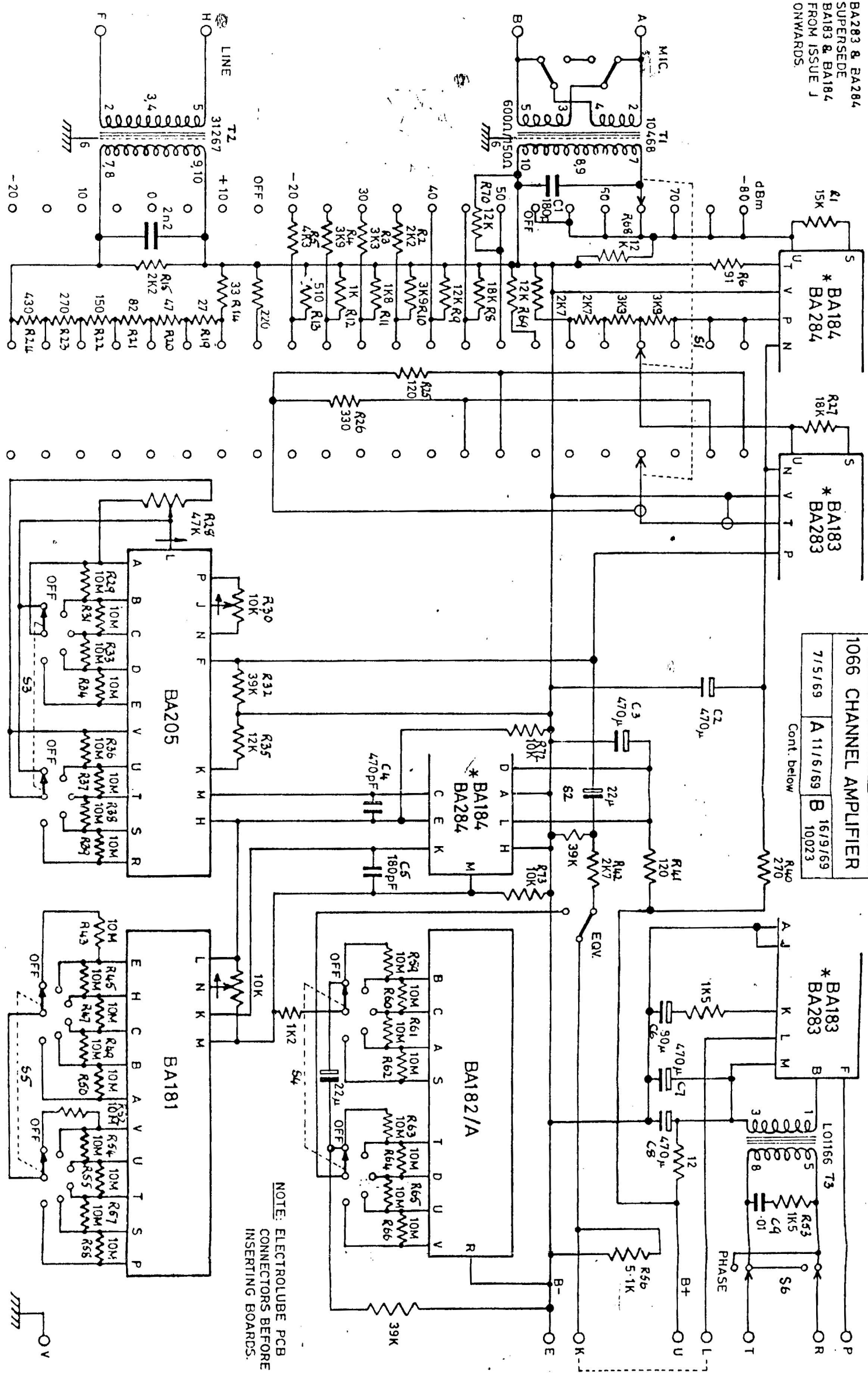
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TITLE CHANNEL AMPLIFIERS 1066, 1073, 1078

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3. REDRAWN	2 NOV 1971			

* BA283 & BA284
SUPERSEDE
BA183 & BA184
FROM ISSUE J
ONWARDS.

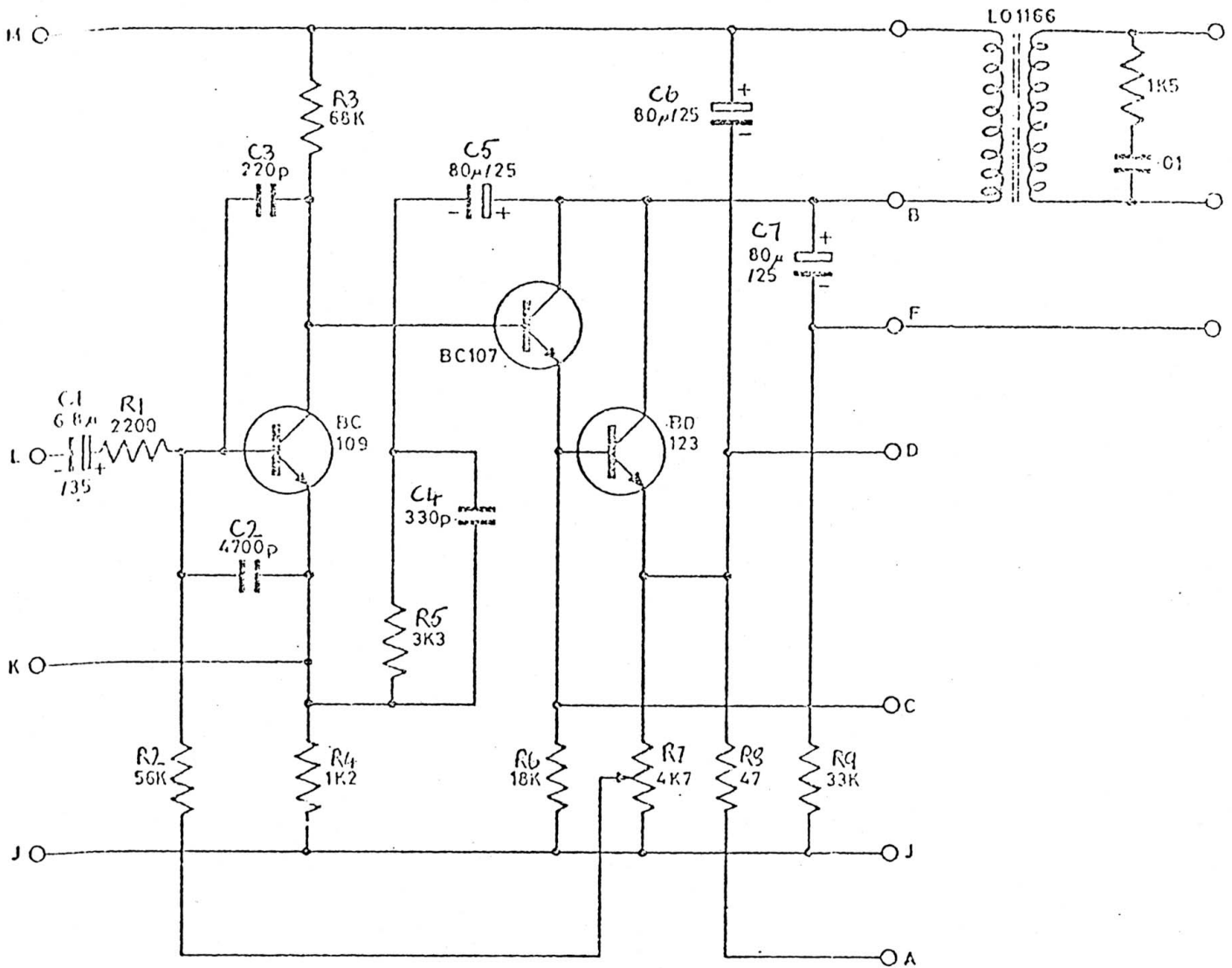
RUPERT NEVE & Co. Ltd.
1066 CHANNEL AMPLIFIER
7/5/69 A 11/6/69 B 16/9/69
10023
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NOTE: ELECTROLYTE PCB
CONNECTORS BEFORE
INSERTING BOARDS.

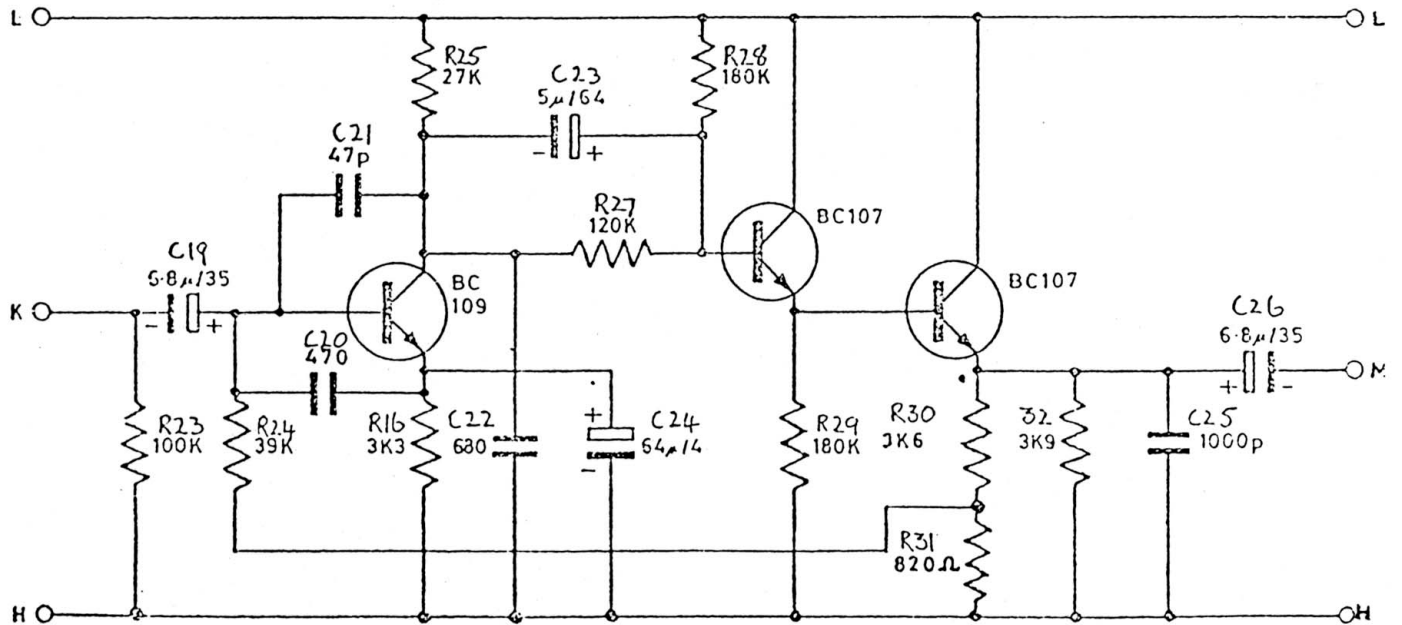
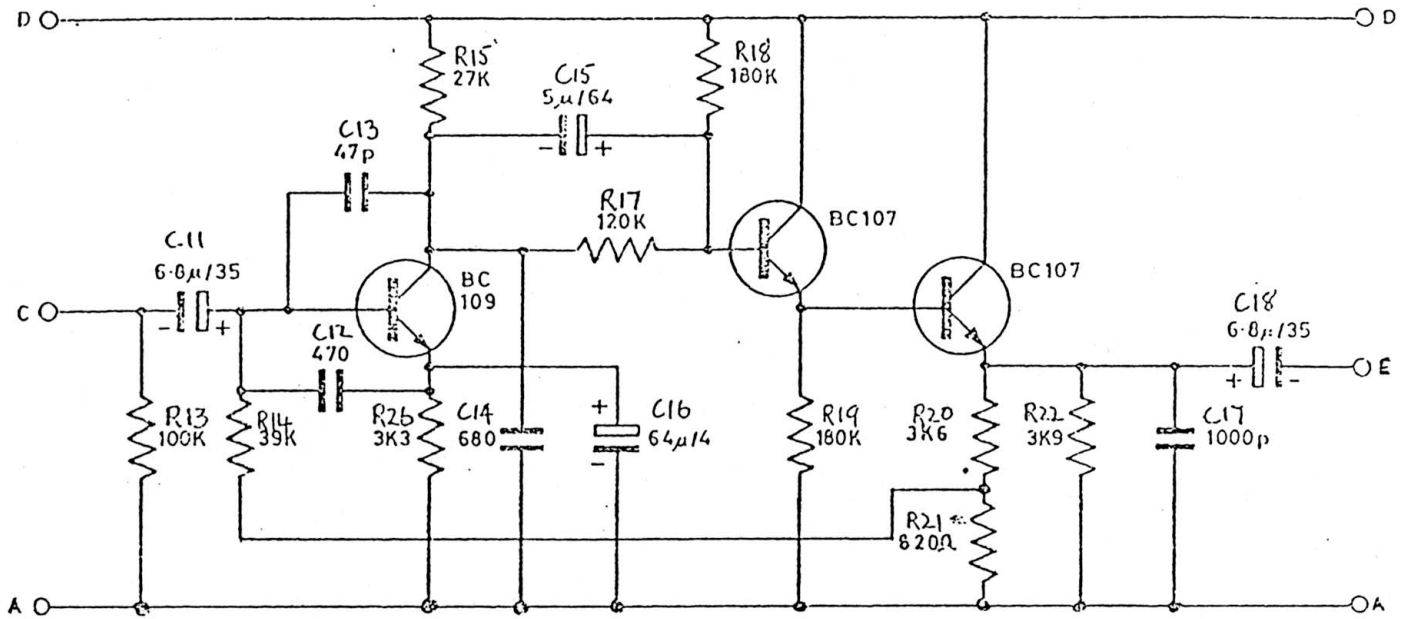
C	10/2/70	D	10/8/70	E	7/12/70	F	20/5/71	G	16-8-71	H	31-8-71	J	9/11/71	K	11-1-72	L	12-7-72	M	17-5-74	N	10/9/74
	10064		10125		10180		10218		10316		10320		10360		10429&10435		10477		10507		

BI83 OUTPUT (IO66/IO73)

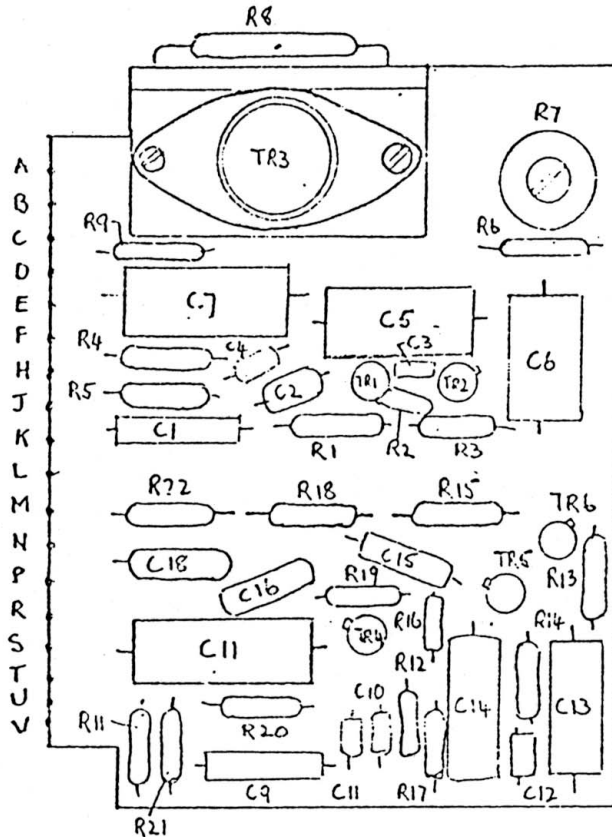


Gain dB Balanced	15	20	25	30	35
Gain dB Unbalanced	11	16	21	26	31
Value of Rx	-	1K2	470	220	110
Value of Cy	-	80μF	80μF	80μF	80μF

BOARD BI83 IO66/IO73

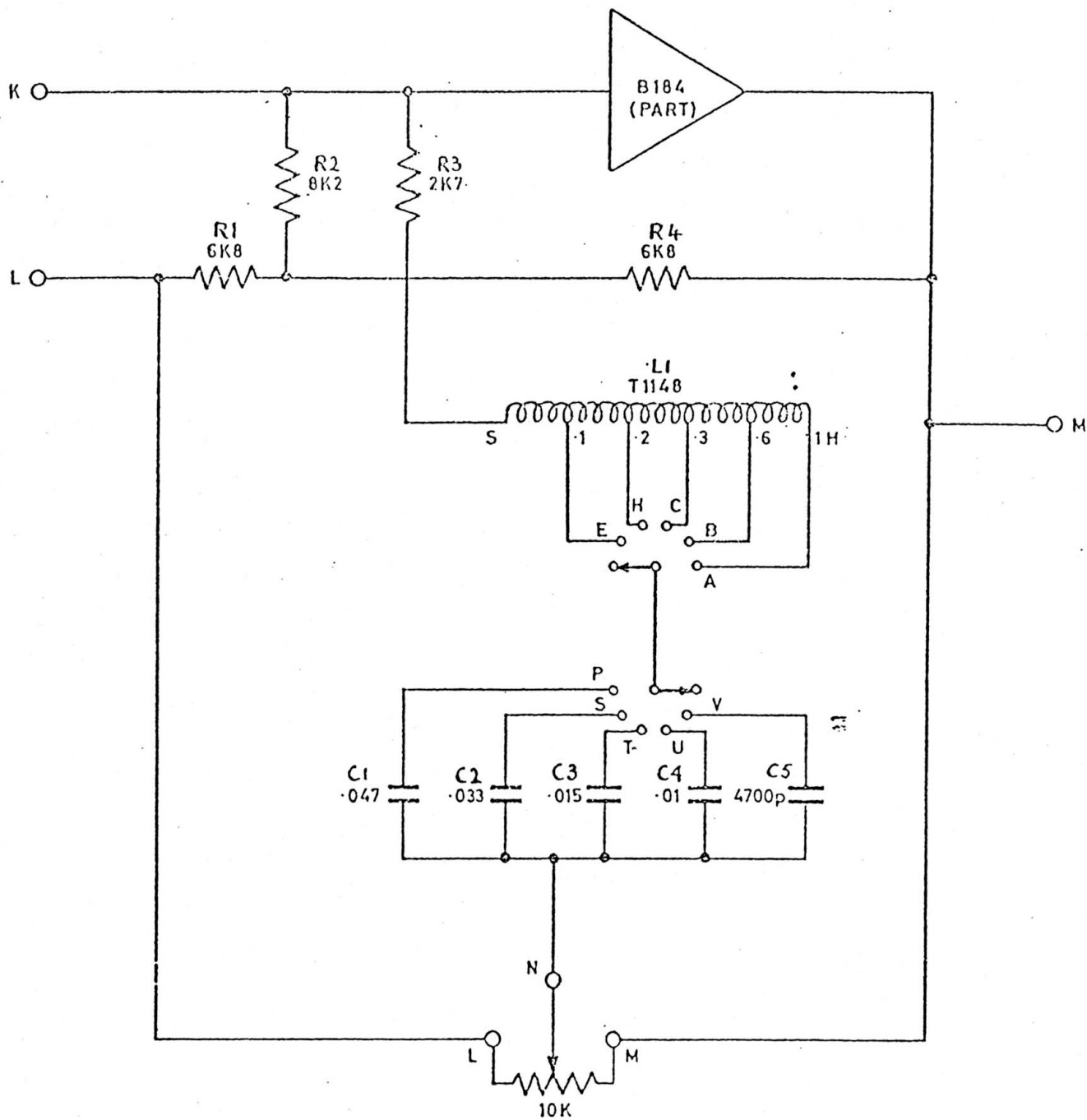


Printed Circuit Board, B183 AVA



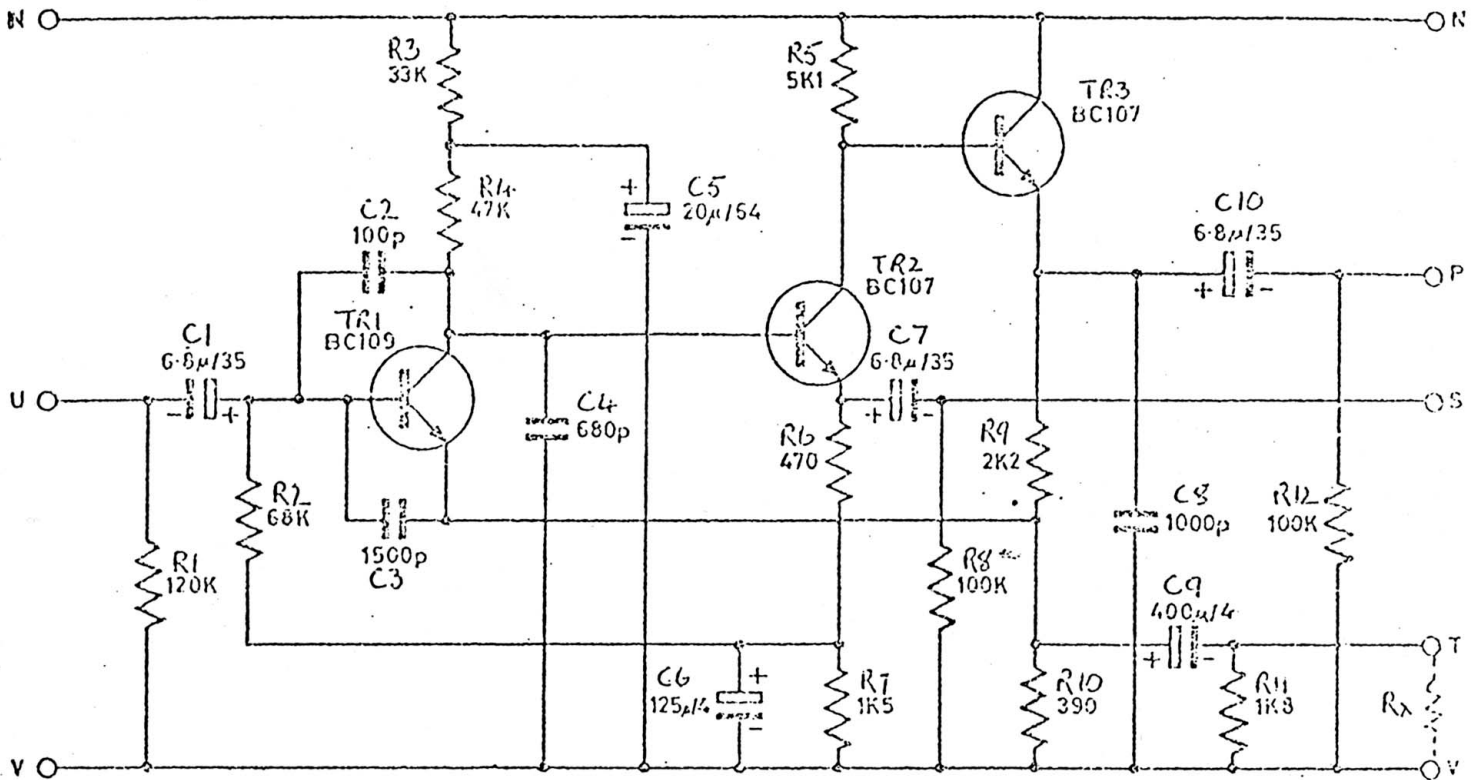
Ref	Description				Part No.
R1	2K2	TR5	5%		R5 2K2
R2	56K	"	"		R5 56K
R3	68K	"	"		R5 68K
R4	1K2	"	"		R5 1K2
R5	3K3	"	"		R5 3K3
R6	18K	"	"		R5 18K
R7	Potentiometer	4K7 Miniature			P0032
R8	47	TR6	5%		R6 47
R9	33K	TR5	5%		R5 33K
R10	1K5	"	"		R5 1K5
R11	120K	TR5	5%		R5 120K
R12	68K	"	"		R5 68K
R13	33K	"	"		R5 33K
R14	47K	"	"		R5 47K
R15	5K1	"	"		R5 5K1
R16	470	"	"		R5 470
R17	1K5	TR5	5%		R5 1K5
R18	100K	"	"		R5 100K
R19	2K2	"	"		R5 2K2
R20	390	"	"		R5 390
R21	1K8	"	"		R5 1K8
R22	100K	"	"		R5 100K

Ref.	Description	Part No.
C1	6.8 μ F electro 35V	C0175
C2	4700pF Suflex H.S. 10%	C0051
C3	220pF " " "	C0041
C4	330pF " " "	C0042
C5	80 μ F electro C426 AR/F80	C0029
C6	80 μ F " " "	C0029
C7	80 μ F " " "	C0029
C8	.01 μ F	
C9	6.8 μ F electro 35V	C0175
C10	100pF Suflex H.S. 10%	C0039
C11	1500pF " " "	C0131
C12	680pF " " "	C0045
C13	20 μ F 64V electro C426 AR/H20	C0035
C14	125 μ F 4V " C426 AR/B125	C0024
C15	6.8 μ F 35V " 35V	C0175
C16	1000pF Suflex H.S. 10%	C0047
C17	400 μ F 4V electro C426 AR/B400	C0025
C18	22 μ F 15V Tant	C0056
TR1	BC109	T0043
TR2	BC107	T0042
TR3	BD123	
TR4	BC109	T0043
TR5, TR6	BC107	T0042



B181 (IO66)

MICROPHONE PREAMPLIFIER
(Part of Boards BA 183, BA 184)



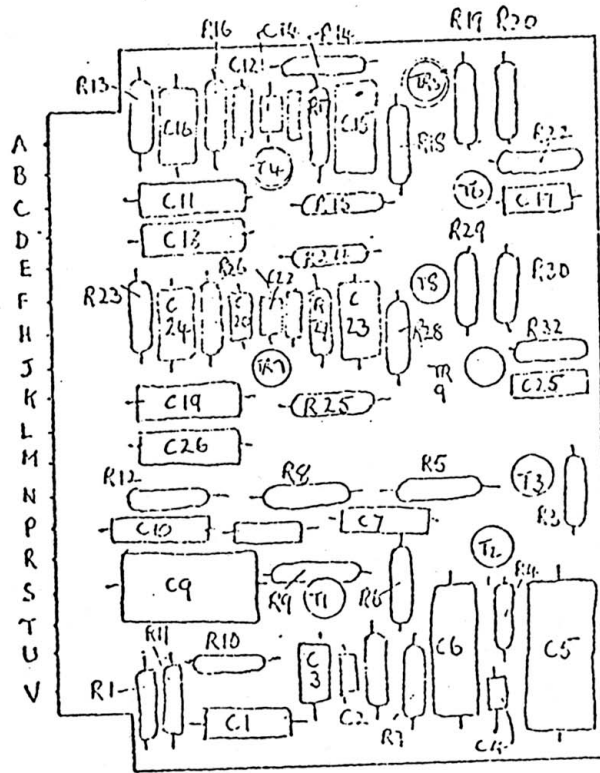
The input amplifier is common to Boards BA183 and BA184 (Amplifiers (1) and (2) on block schematic, Fig. 1).

The gain may be changed by the external connection of a resistor between contacts T and V which decouples R10 more effectively, thereby increasing the gain of the amplifier. Gain is increased in 5 dB steps according to the table :-

Gain dB	18	23	28	33	38	43	48
Rx	-	330	120	56	27	15	8.2

Feedback connections are made externally by connecting a resistor between the emitter follower output from TR2 at contact S on the printed circuit board and the input contact U.

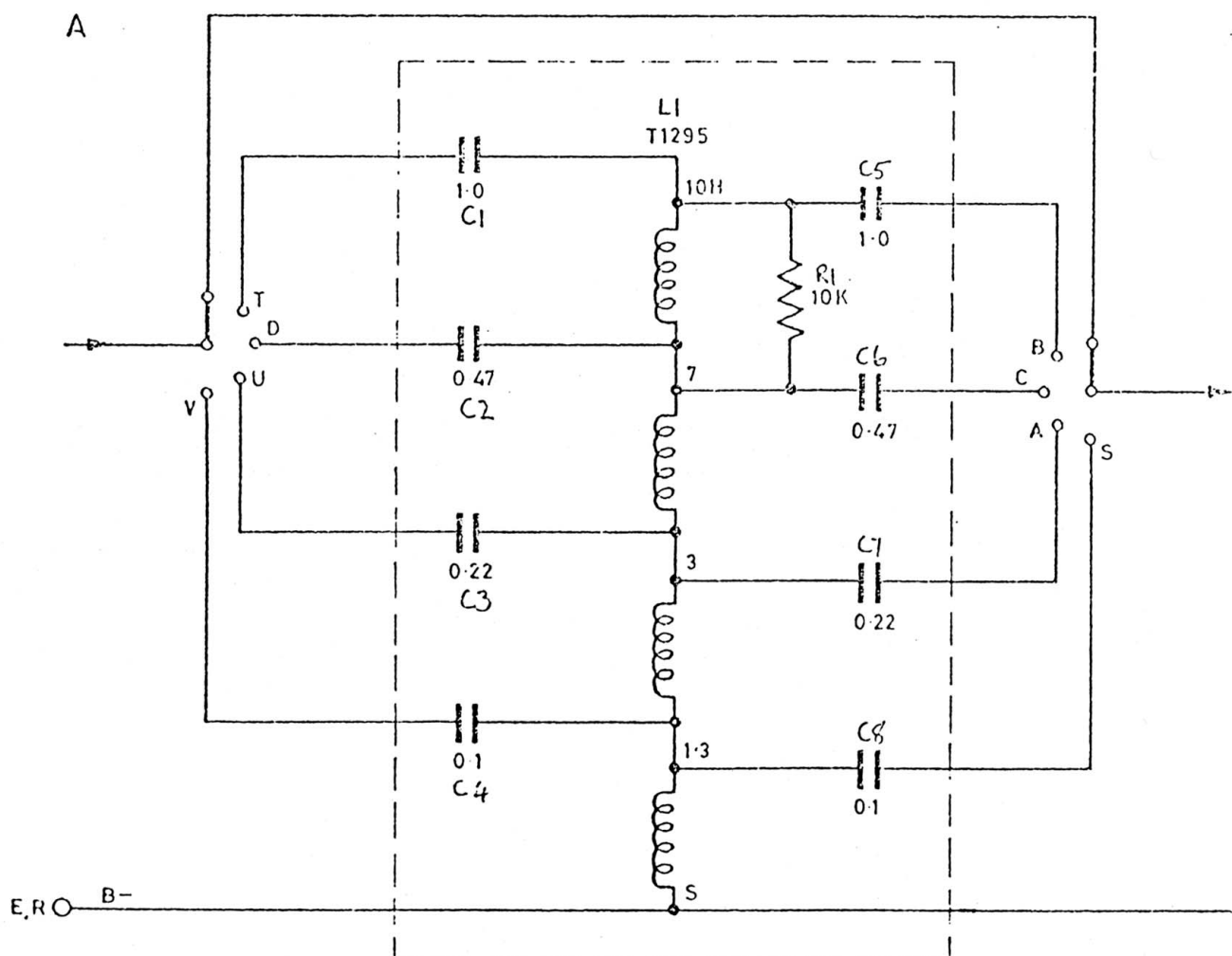
The value of the resistor used in this loop varies according to the system requirements as gain is also affected.



PARTS LIST

Ref.	Description				Part No.
R1	120K	TR5	5%		R5 120K
R2	68K	"	"		R5 68K
R3	33K	"	"		R5 33K
R4	47K	"	"		R5 47K
R5	5K1	"	"		R5 5K1
R6	470	"	"		R5 470
R7	1K5	"	"		R5 1K5
R8	100K	"	"		R5 100K
R9	2K2	"	"		R5 2K2
R10	390	"	"		R5 390
R11	1K8	"	"		R5 1K8
R12	100K	"	"		R5 100K
R13, R23	100K	"	"		R5 100K
R14, R24	39K	"	"		R5 39K
R15, R25	27K	"	"		R5 27K
R16, R26	3K3	"	"		R5 3K3
R17, R27	120K	"	"		5K 120
R18, 28	180K	"	"		R5 180K
R19, 29	180K	"	"		R5 180K
R20, 30	3K6	TR4	"		R4 3K6
R21, 31	820	TR4	"		R4 820
R22, 32	3K9	TR5	"		R5 3K9

Ref.	Description	Part No.
C1	6.8 μ F 35V Tant	C0175
C2	100p Suflex H.S. 10%	C0039
C3	1500p " " "	C0131
C4	680p " " "	C0045
C5	20 μ F 64V C426AR/H20	C0035
C6	125 μ F 4V C426AR/B125	C0024
C7	6.8 μ F 35V Tant	C0175
C8	1000p Suflex H.S. 10%	C0047
C9	400 μ F C426AR/B400	C0025
C10,18,26	6.8 μ F 35V Tant	C0175
C11,19	6.8 μ F 35V "	C0175
C12,20	470p Suflex H.S. 10%	C0044
C13,21	47p " " "	C0038
C14,22	680p " " "	C0045
C15,23	5 μ F 64V C426AR/H5	C0034
C16,24	64 μ F 4V C426AR/B64	C0023
C17,25	1000p Suflex H.S. 10%	C0047



BI82 (1066)

