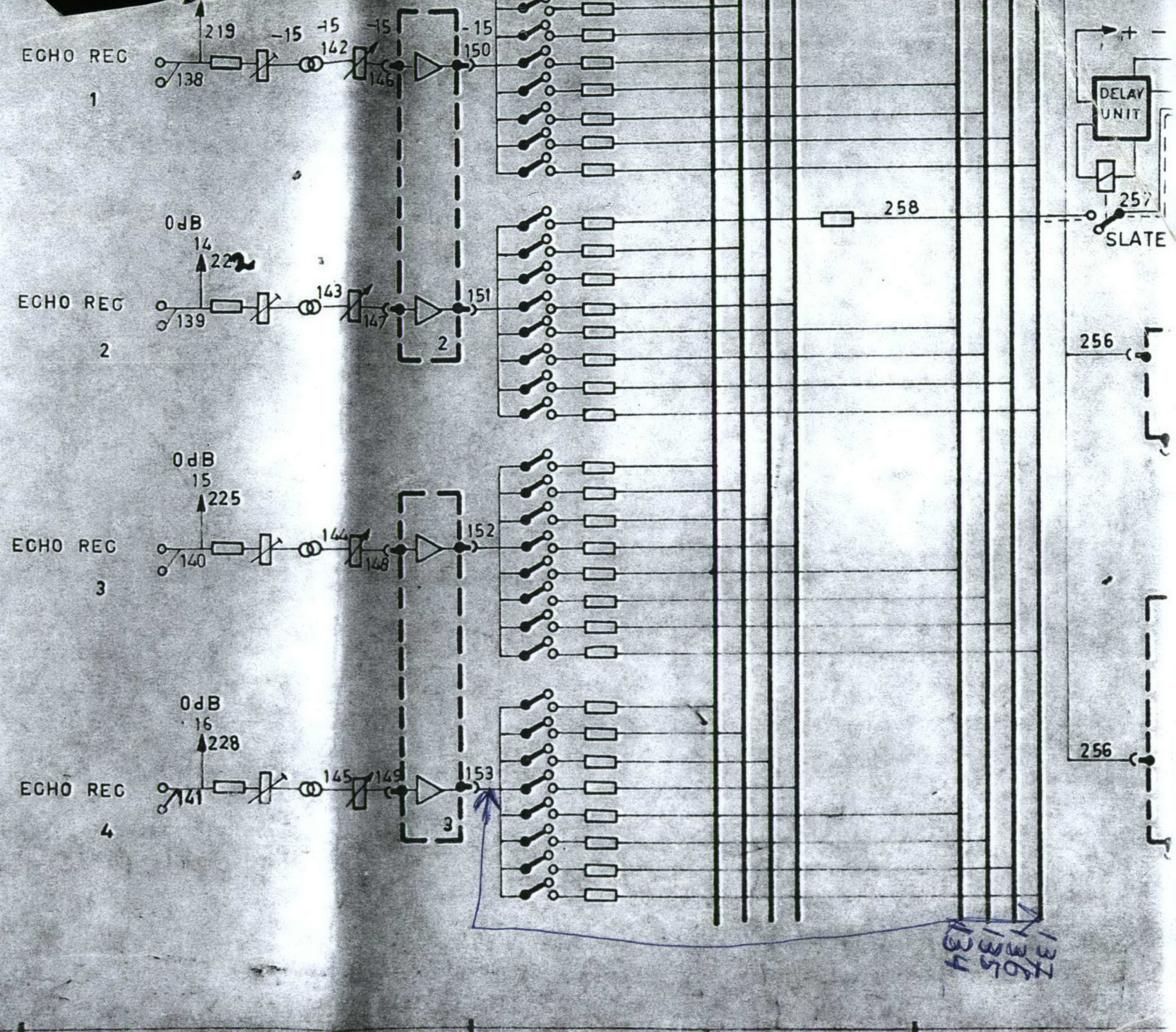
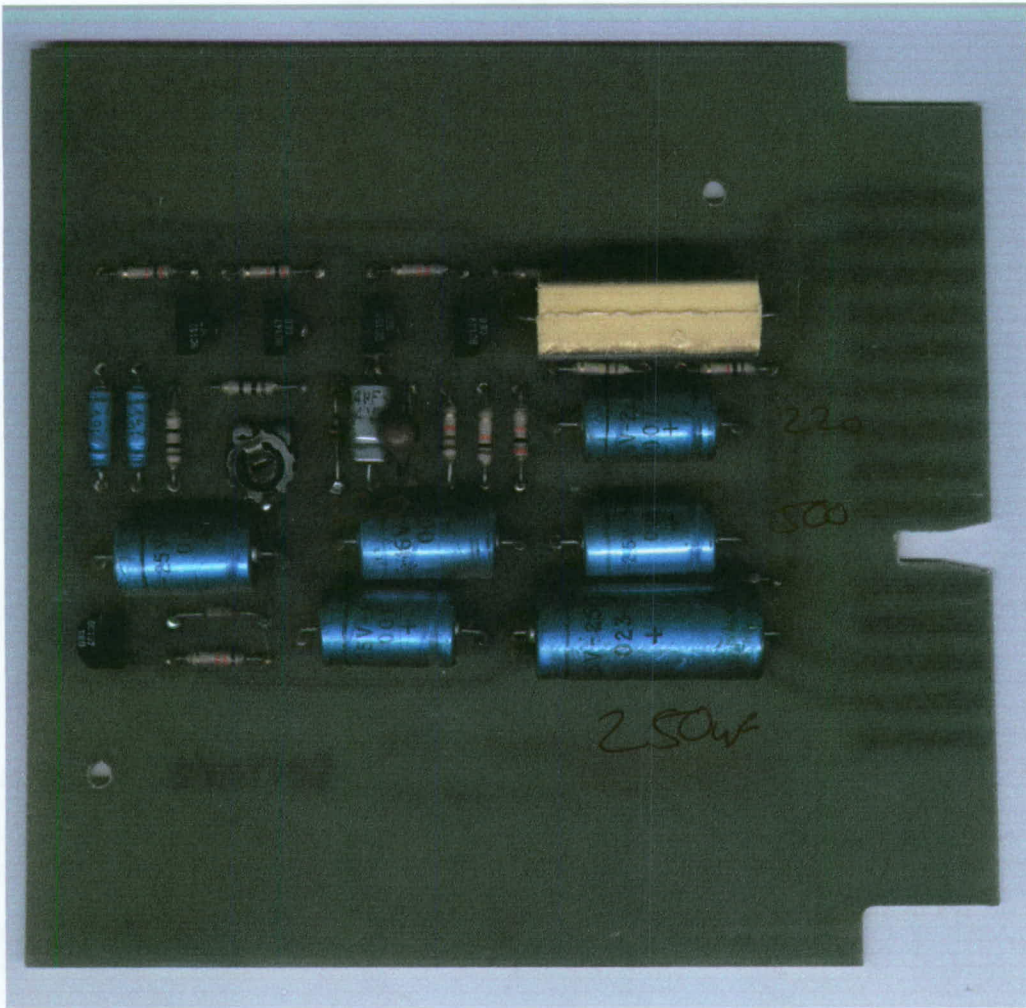


CLASS NO.	SCALE SCHAL.	PROJ. EUBOP	UNIT EENH.	GENERAL ROOCHNESS ALGEMEEN ROUWHEID	UNIT EENH.	GENERAL ROOCHNESS ALGEMEEN ROUWHEID
MD16 RF VIII						
8993 221 13001						
24-4-70						
19-3-71						
17-2-71						



PHILIPS



4.7 + +
4.7

220 +
500 +
250 +

250uF

80 + 220 +

80 +

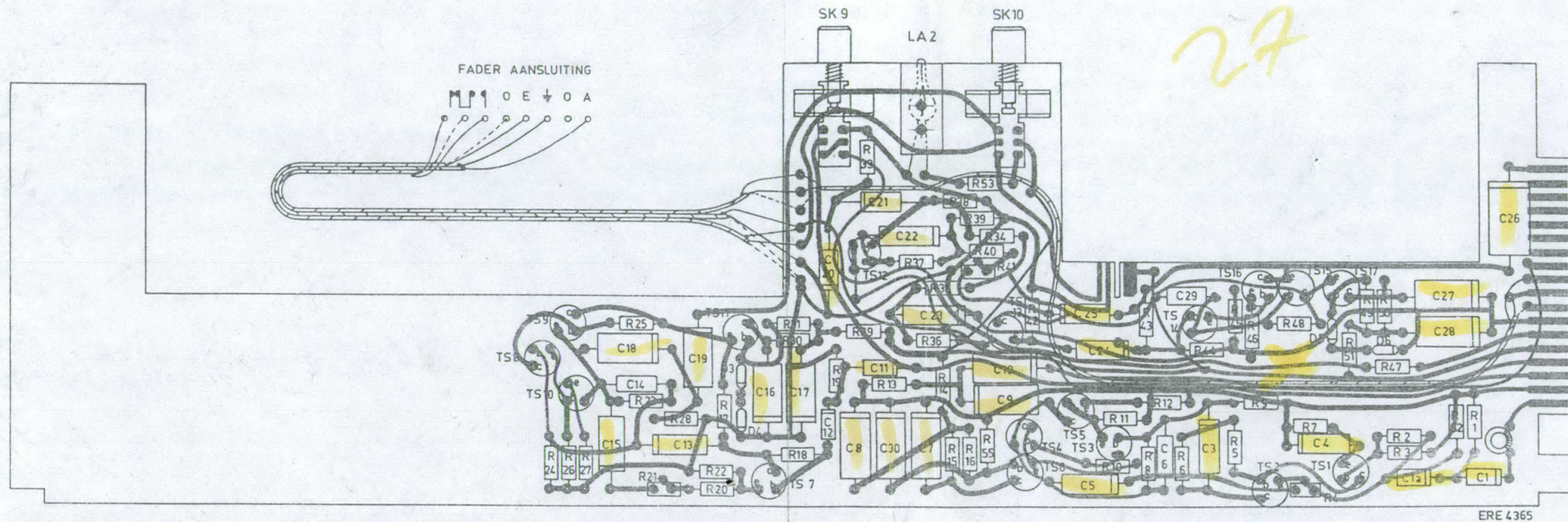


Fig. 35

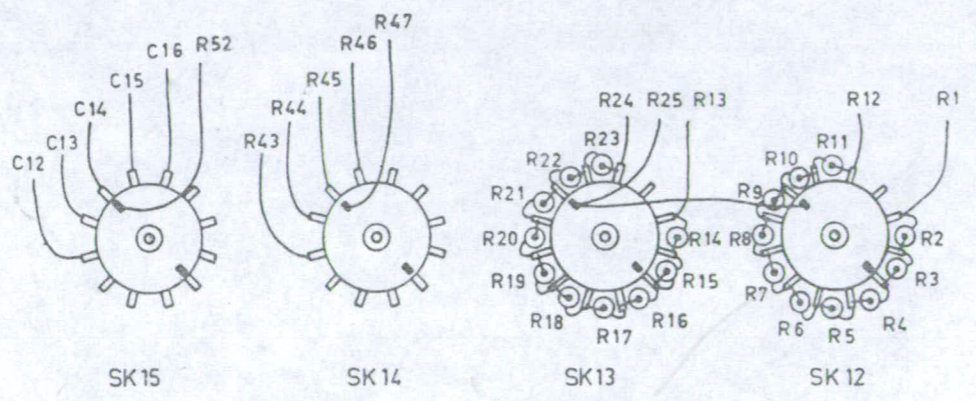
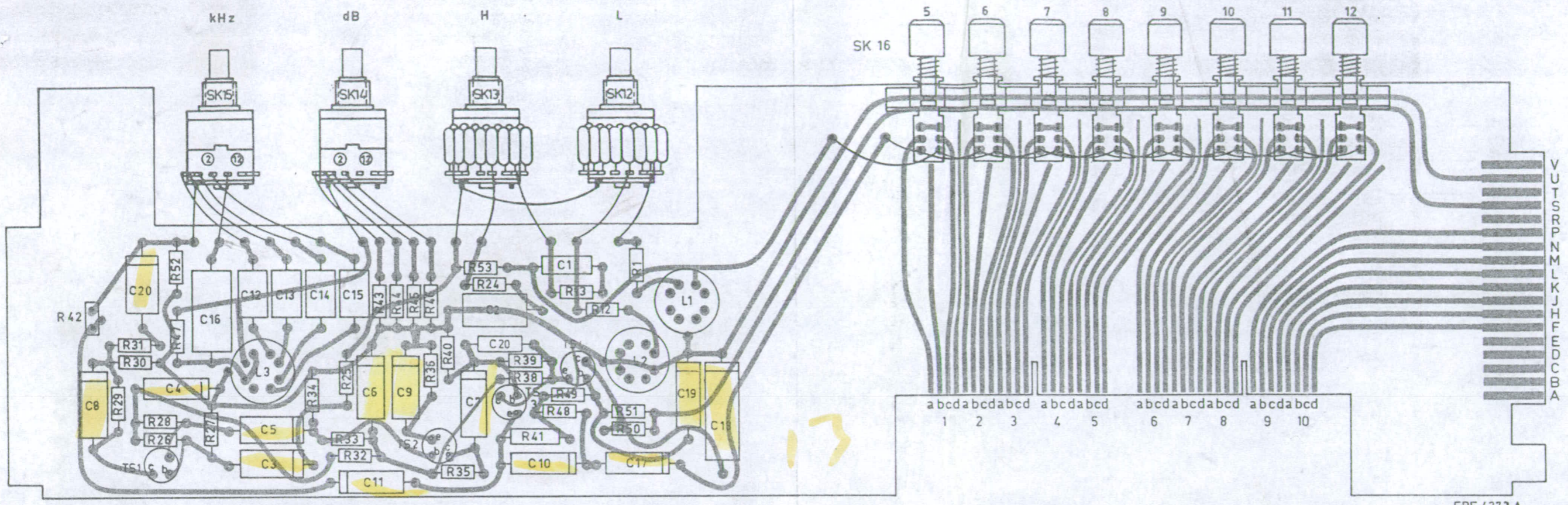
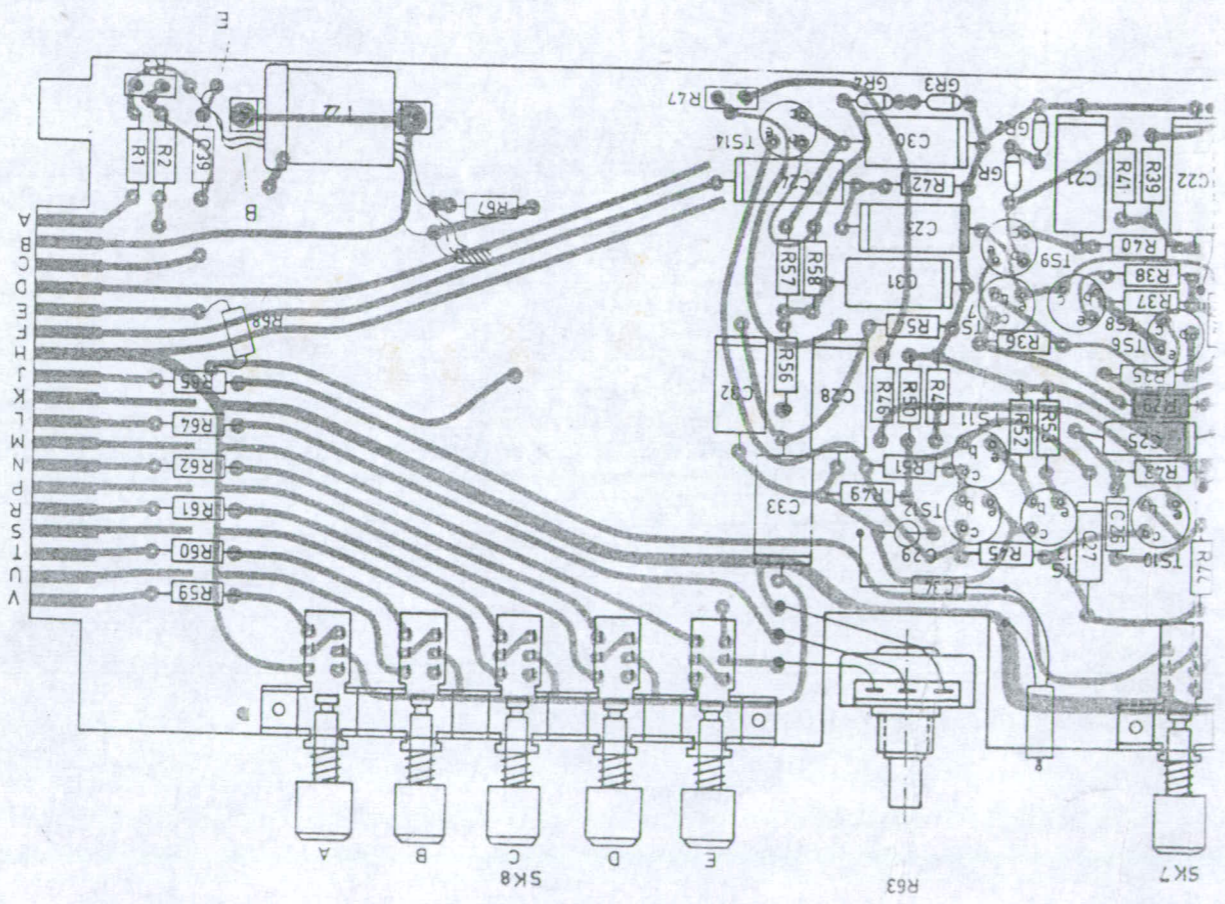
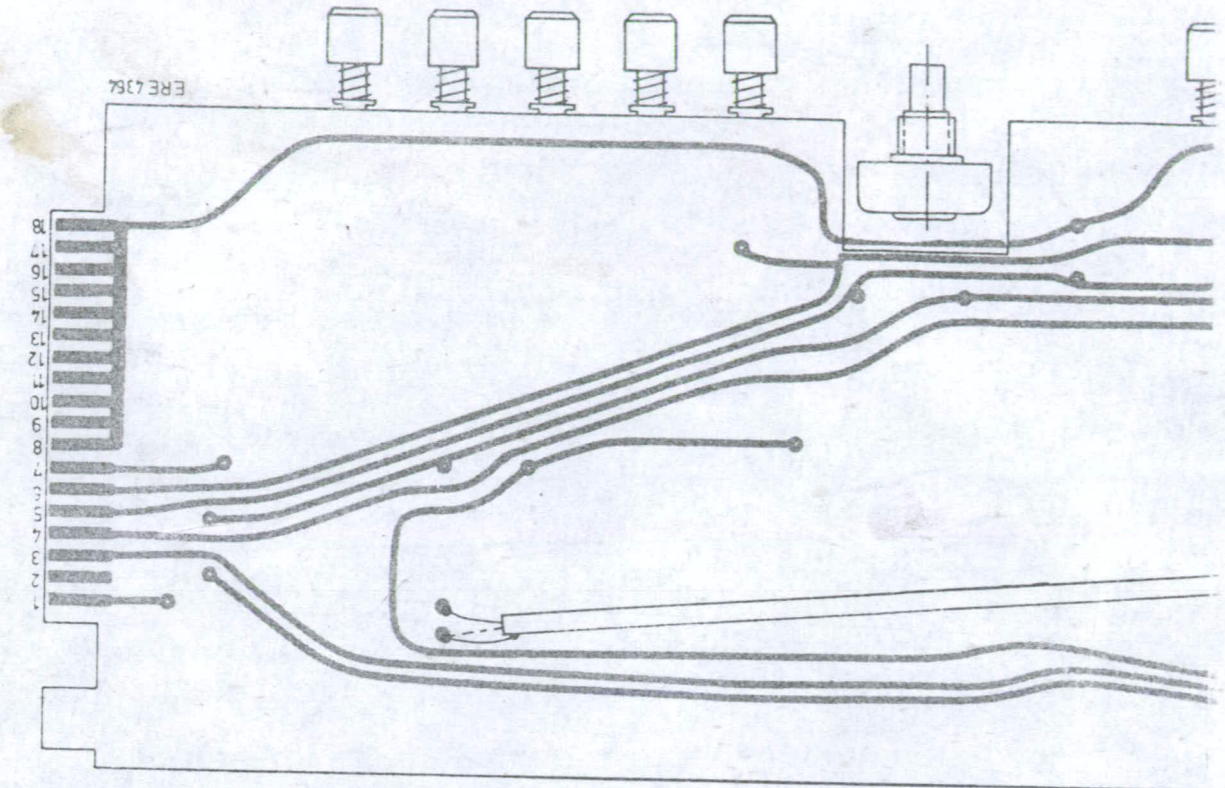


Fig. 54

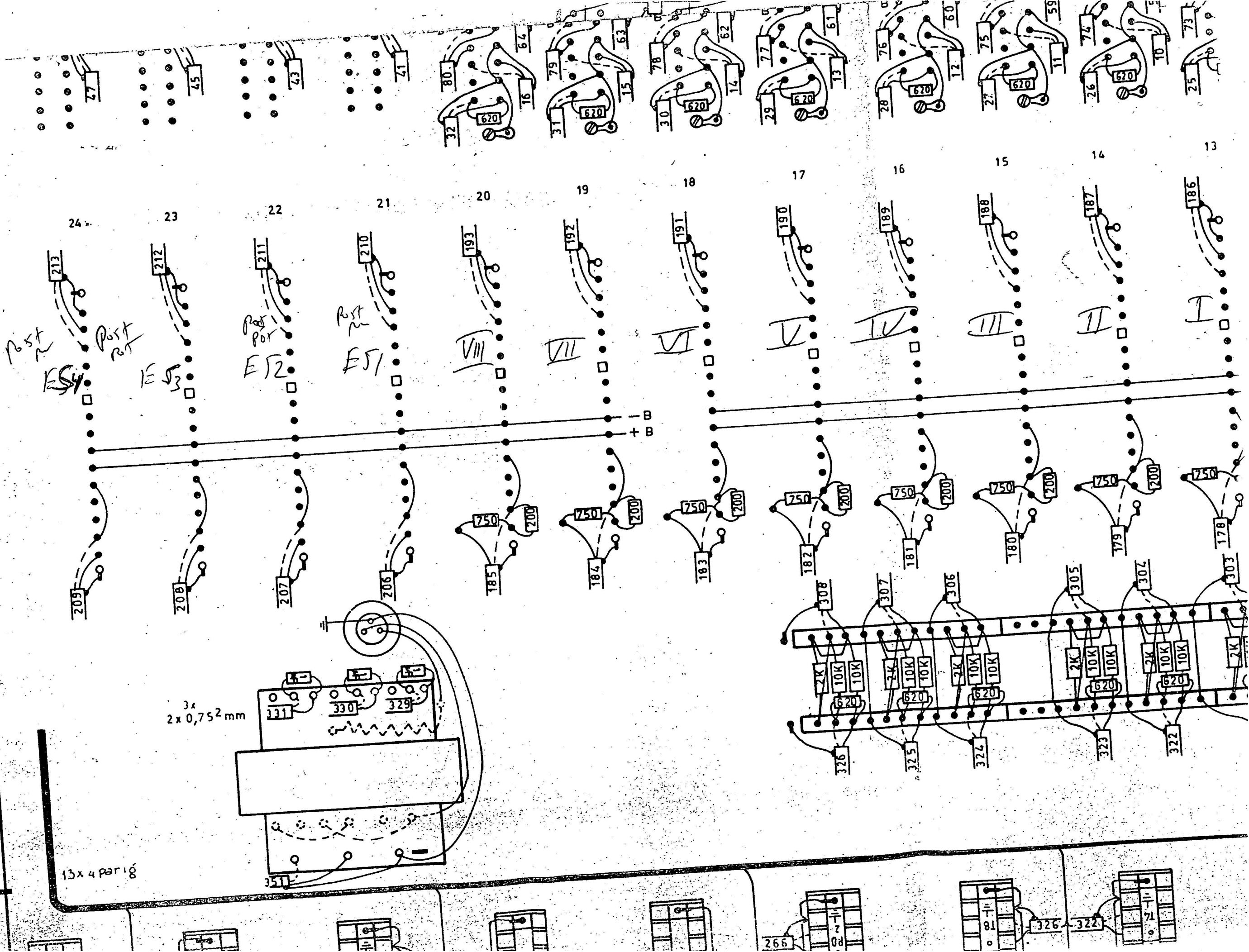
BY ERE 4373



			Page
2N2904	transistor	farnell	817
AC128	transistor	farnell	815
BC107A	transistor	farnell	815
BC147	transistor		
BC149	transistor		
BC157	transistor		
BC159	transistor		
BC177	transistor	farnell	815
BC178	transistor	farnell	818
BC179	transistor	farnell	818
BD124	diode		
BDY20	diode		
BFY55	diode		
BY118	diode		
BZY59	diode	zener	
OA200	diode		

PHILIPS

Approved
specification
for use in third parties
for reference is permitted
without authority from the
Philips Authority from the
date of issue of this
specification.



13x4 per 18

3x
2x 0,75² mm

351

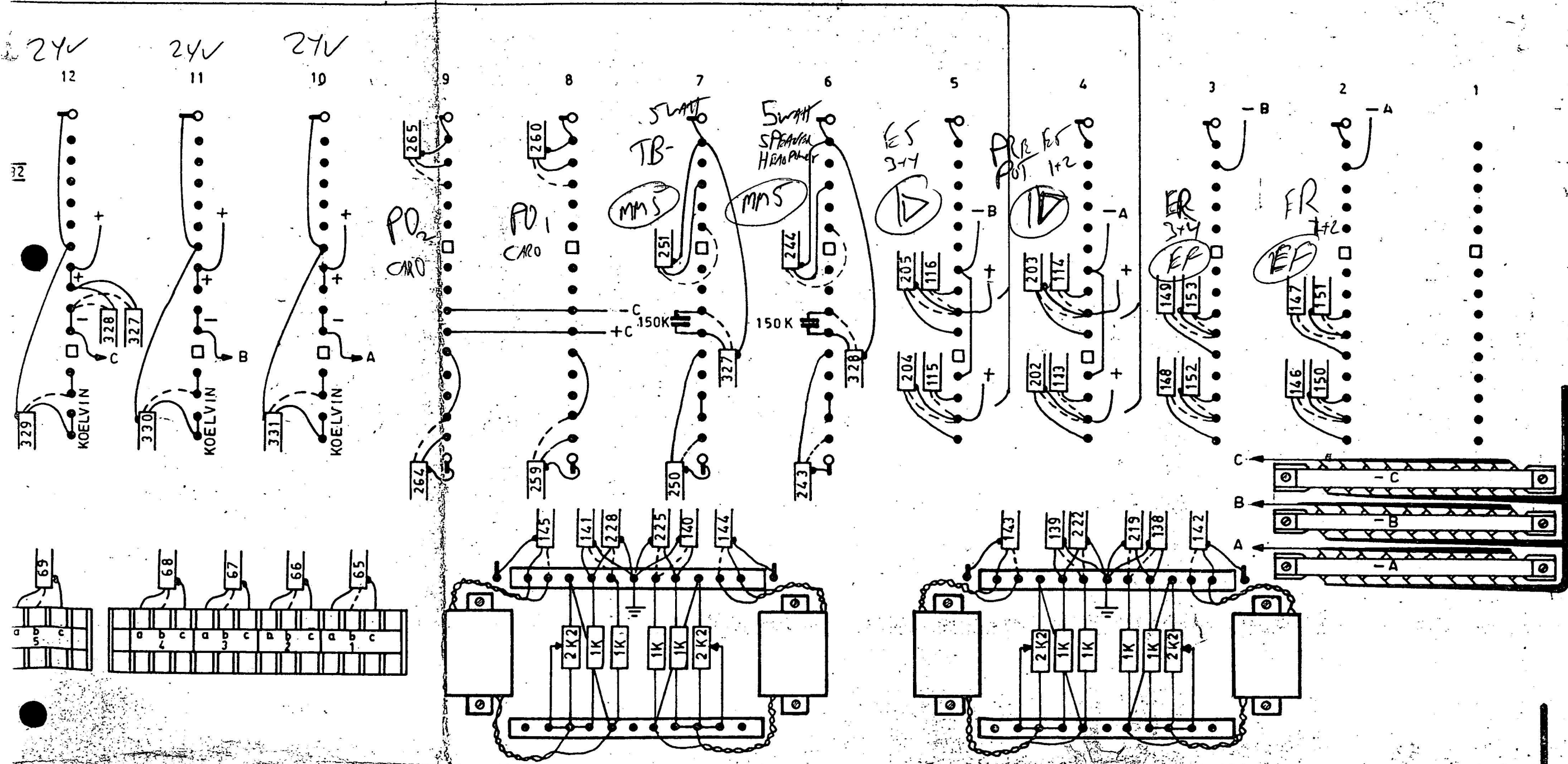
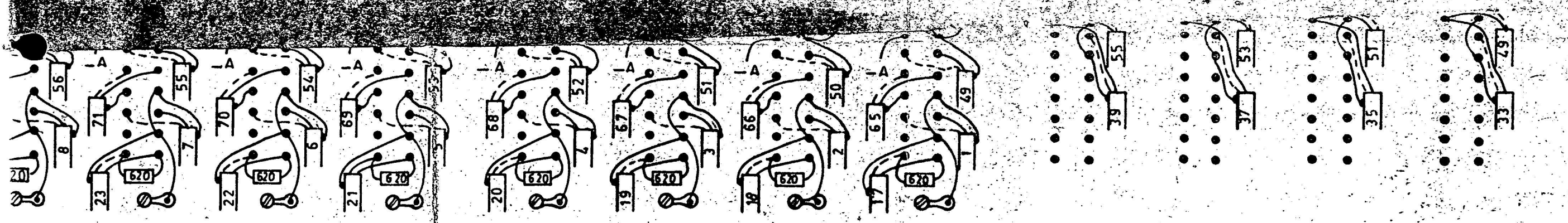
266

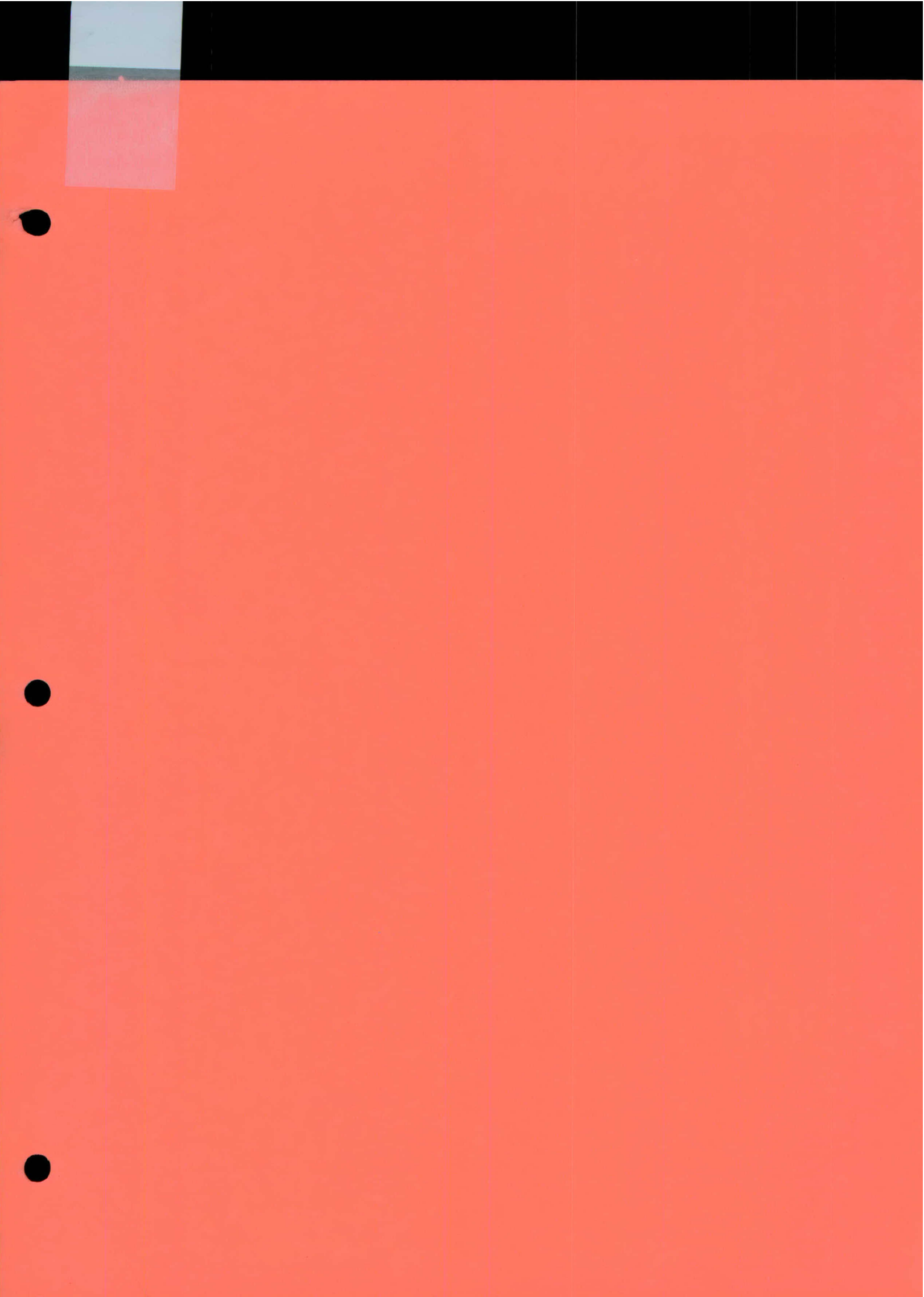
81

326

322

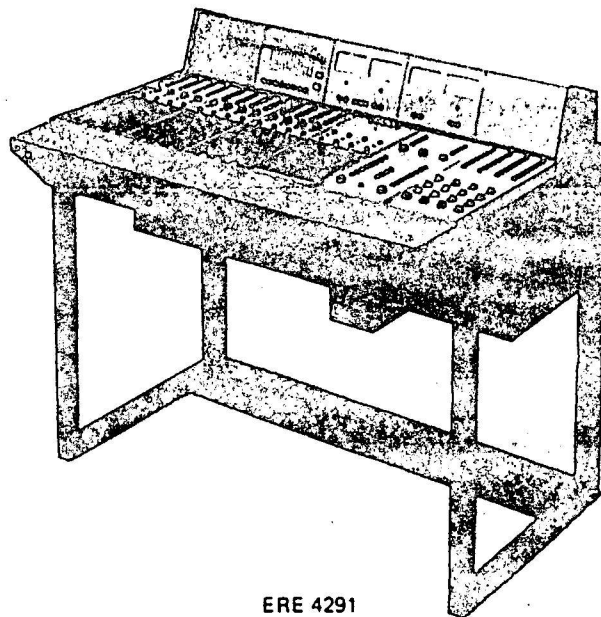
71





PHILIPS

Service



ERE 4291

MD - MIXING DESK

third generation
(delivered after april 1969)

4822 733 21663

1/769

SERVICE INFORMATION									
------------------------	--	--	--	--	--	--	--	--	--

NOTE

The mixing desk is subdivided into a number of blocks.

The first section of this publication is a general description of the complete mixing desk, followed by a description of the individual units.

These sections are marked with coloured tab-cards, viz.:

- Yellow - Chassis
- Red - Input block
- Blue - Output block
- Green - Equaliser block
- Brown - Monitor block
- Orange - 2 W amplifier
- Grey - Supply units

CONTENTS**A. INTRODUCTION**

1. General
2. Technical data

B. INSTALLATION**C. CONTROLS**

1. VU-meter panel
2. Input panel
3. Output panel
4. Equalizer panel
5. Monitor panel

D. DESCRIPTION OF THE BLOCK DIAGRAM**E. ADJUSTMENT****F. MODIFICATION FOR A HIGHER OUTPUT LEVEL****FIGURES**

1. Top view
2. Block diagram
3. General view
4. Front view
5. Level diagram
6. Connecting diagram for EL 3660

A. INTRODUCTION

1. General

The mixing desk is subdivided into the following units

- a. Chassis 8993 200 77011
- b. Input block 8993 200 77111
- c. Output block four channels 8993 200 77241
- or three channels 8993 200 77231
- or two channels 8993 200 77211
- or one channel 8993 200 77251
- d. Equaliser block 8993 200 77411
- e. Monitor block 8993 200 77311
- f. 2 W amplifier 8993 200 23001
- g. Supply unit EL 3670/00 (or 8993 200 67001)

By changing the blocks the following types of mixing desks can be formed:

Type	Chassis	Input block	Output block	Filter block	Monitor block	Input channels
MD4R	1	1	1	0	1	4
MD4RF	1	1	1	1	1	4
MD8R	1	2	1	0	1	8
MD8RF	1	2	1	1	1	8
MD12R	1	3	1	0	1	12
MD12RF	1	3	1	1	1	12

Note: By changing the type of output block the number of output channels can be varied. In each desk a number of VU-meters is fitted, corresponding to the number of output channels. In the type number the number of output channel is indicated by means of an additional figure e.g. MD4RF-4 = Mixing desk with four outputs.

2. Technical data

- . Supply voltage : 110 V, 125 V, 220 V, 245 V/50 - 60 Hz
- . Power consumption : approx. 60 W
- . Input
- (All inputs are symmetrical and floating)
- Microphone (M) : Input impedance > 1200 Ω
- Source impedance 50 Ω or 200 Ω
- Input level -45 dB, -60 dB or -75 dB
- Overload reserve 23 dB
- Line input (L) : Input impedance
- Source impedance
- Input level
- Overload
- Reverberation input (from REV) : Input impedance
- Source impedance
- Input level
- Overload

5. Inputs and outputs
 6. Inputs and outputs

Recorder input (M)	: Input impedance	10 k Ω
	Source impedance	600 Ω
	Input level	+6 dB
Outputs		
(All outputs are symmetrical and floating)		
Line output (I...IV)	: Output impedance	50 Ω
	Load impedance	600 Ω
	Output level	+6 dB
	Overload reserve	6 dB.
Reverberation output (to REV)	: Output impedance	50 Ω
	Load impedance	600 Ω
	Output level	+ 6 dB
	Overload reserve	6 dB
Monitor output (MON)	: Output impedance	50 Ω
	Load impedance	600 Ω
	Output level	+6 dB
Talkback (TB)	: Output impedance	1 Ω
	Load impedance	20 Ω
	Max. output power	2 Watt
Pre-listening output (headphone)	: Output impedance	1 Ω
	Load impedance	200 Ω
	Output level	adjustable
Programme distribution output (PD)	: Output impedance	1 Ω
	Load impedance	200 Ω
	Max. output power	2 Watt
Max. temperature	: 45 $^{\circ}$ C	
. Crosstalk	: 80 dB	
. Noise level	: -120 dB	
. Dimensions	: Width	110 cm
	Depth	73 cm
	Height	80 cm (with VU-meter panel 93,5 cm)

B. INSTALLATION INSTRUCTIONS (Figs. 1a and 1b)

. The following blocks should be fitted in the chassis from left to right (see Fig. 1):

1. Input block, if a total of 12 input channels is required
Blank block, if a total of 4 or 8 input channels is required.
2. Input block, if a total of 12 or 8 input channels is required.
Blank block, if a total of 4 input channels is required
3. Input block
4. Output block
5. Monitor block
6. Equalizer block (When no equalizer block is required a blank block can be fitted instead).

- . Slide the unit into the chassis in the correct position and push it backwards.
- . Remove the front plate underneath the units. (Loosen two screws 1, Fig. 3)
- . Insert the 2 W amplifiers (Fig. 4).
- . Insert the supply unit (Fig. 4).
- . Replace the front plate.
- . Fit front cover 2 (Fig. 3).
- . Remove cover 3 of the connection blocks by hinging it back (Fig. 3).
- . Make the cable connections (Fig. 1a).

1 - microphone input 1

}	• phase dot *
	□
	⊥ screen

1a }
1b } Connection points of microswitch input fader 1.
1c }

Fader closed : 1a, 1c connected
1a, 1b disconnected

Fader open : 1a, 1c disconnected
1a, 1b connected

L1 - Line input 1

}	• phase dot
	L1
	⊥ screen

M1 - Recorder input 1

S4 - Switching points for talkback circuit 4. (When talkback switch 4 is depressed, these contacts are short-circuited)

PD - Programme distribution output

TB4 - Talkback output 4

MON 1 - Monitor output 1

to REV - The input of the reverberation unit should be connected to these points.

from REV - The output of the reverberation unit should be connected to these points.

I - Line output I

}	• phase dot
	I
	⊥ screen

13a }
13b } Connection points of microswitch in output fader I
13c }

Fader closed : 13a, 13c connected
13a, 13b disconnected

Fader open : 13a, 13c disconnected
13a, 13b connected

* Ensure that the points marked with the phase dot correspond, so that the inputs and outputs have the proper phase.



When the red signalling button is depressed this point is negative.



rd

When these points are interconnected the lamp in the red signalling button lights up.



gr

ditto, but for green lamp



Osc

two adjustable oscillator outputs (see also ADJUSTMENT (page 9))

. Connect the mains cable to the mains plug (For the correct mains voltage, see Service Notes of the chassis, Fig. 19).

C. CONTROLS (see Fig. 1)

1. VU-meter panel

SK1A	"I"	Connects the output of line I to VU-meter 2
SK1B	"II"	Connects the output of line II to VU-meter 2
SK1C	"III"	Connects the output of line III to VU-meter 2
SK1D	"IV"	Connects the output of line IV to VU-meter 2
SK1E	"MON 1"	Connects the output of monitor 1 to VU-meter 2
SK1F	"MON 2"	Connects the output of monitor 2 to VU-meter 2
SK1G	"REV"	Connects the reverberation output to VU-meter 2
SK1H	"PL"	Connects the prelistening output to VU-meter 2
SK2A...SK5A	"MUSIC"	To be depressed for normal operation.
SK2B...SK5B	"TEST"	To be depressed for checking.
SK23, SK24		Signalling switch
LA1		Lights up when supply unit is switched on
LA6		Red lamp for signalling
LA7		Green lamp for signalling.

2. Input panel

SK6		Input/sensitivity switch
		In position "0" the line input is connected and the microphone input is switched off.
		In position 45, 60 or 75 the microphone input is connected, the input sensitivity is -45, -60 and -75 dB respectively, and the line input is switched off.
SK7	"Prelisten"	Connects the input channel to the prelistening bus-bar.
SK8A	"IV"	Connects the input channel to mixing bus-bar IV
SK8B	"III"	Connects the input channel to mixing bus-bar III
SK8C	"II"	Connects the input channel to mixing bus-bar II
SK8D	"I"	Connects the input channel to mixing bus-bar I
SK8E	"POST/PRE"	Depressed: reverberation signal is taken from pre-fader Not depressed: reverberation signal taken from post-fader
R63	"REVERBERATION"	Volume control of outgoing reverberation signal
LA5		Lights up when corresponding fader is not in position

3. Output panel

SK9	"PRELISTEN"	Connects the output channel to the pre-listening bus-bar
SK10	"OSCILLATOR"	Connects the output of the oscillator to the output channel (pre-fader).
SK11A	"60"	Switches the oscillator to 60 Hz
SK11B	"125"	Switches the oscillator to 125 Hz
SK11C	"1000"	Switches the oscillator to 1000 Hz
SK11D	"4000"	Switches the oscillator to 4000 Hz
SK11E	"14000"	Switches the oscillator to 14000 Hz
R24	"VOLUME"	Volume control oscillator output
LA2		Lights up when the oscillator output is connected to the output channel.
LA4		Lights up when the oscillator is switched on.

4. Equaliser

SK12		Controls the amplification or attenuation of the lower frequencies
SK13		Controls the amplification or attenuation of the high frequencies
SK14	"PRESENCE"	Controls the amplification of the presence
SK15	"PRESENCE"	Frequency selector of the presence.
SK16A	"5"	Switches in the filter in channel 5
SK16H	"12"	Switches in the filter in channel 12

5. Monitor panel

SK17A...SK17D	"IV"... "I"	Connects the input "from reverberation" to the mixing bus-bar of line outputs IV...I respectively
SK18A	"IV"	Connects output IV to monitor 1
SK18B	"III"	Connects output III to monitor 1
SK18C	"II"	Connects output II to monitor 1
SK18D	"I"	Connects output I to monitor 1
SK18E	"M1"	Connects recorder input M1 to monitor 1
SK18F	"M2"	Connects recorder input M2 to monitor 1
SK18G	"PL"	Connects prelistening output to monitor 1
SK18H		Switches off selectors SK18A...SK18G
SK19A...SK	D "1"... "4"	a. Disconnects the connection between programme distribution output and talkback output 1...4 respectively b. Connects the talkback microphone amplifier to the talkback output 1...4 respectively c. Connects the two p-c, boards of switching points S1...S4 respectively d. Switches in the 20 dB attenuation of the monitors. By depressing SK20 the output levels of the monitors are attenuated 20 dB
SK20	"-20 dB"	
SK21A...SK21D	"IV...I"	Switches the signals from line outputs IV...I respectively to the programme distribution output "PD" and to the talkback circuit
SK22A...SK22H		See SK18A...SK18H, now however for monitor 2
R42(A)	"VOLUME 1"	Level adjustment of the monitor output

R57(C)	"VOLUME 2"	for monitor 1 and monitor 2 respectively
R56(A)	"VOLUME REV"	Level adjustment of the incoming reverberation signal
R30(B)	"VOLUME PL"	Level adjustment of the prelistening signal.
R56(C)	"VOLUME PD"	Level adjustment of the program distribution signal

D. TECHNICAL DESCRIPTION (See Fig. 2, see also diagram in back cover)

Via the line input transformer T22 the line input signals are applied to the combined input/sensitivity switch SK6, when this switch is in position "0".

The microphone signals are applied to the input/sensitivity switch SK6 via a microphone input transformer T21 and a microphone pre-amplifier, when this switch is one of the positions -75, -60 or -45.

The position of the switch corresponds to the sensitivity of the microphone pre-amplifier.

From the switch the selected signal is applied via an amplifier, to the insertion point, to which an equalising filter can be connected. When no equaliser block is used these insertion points are interconnected by means of a connection in the blank unit.

When a equaliser block has been installed and all switches SK16 are released the filters are short-circuited. The block contains four filters. Each filter can be chosen for insertion into the circuitry of input channels 5 to 12 by depressing the button of the relevant channel.

From the insertion point the signal is applied to the selector switches SK8 via the sliding fader and the intermediate amplifier.

By depressing one or more of these switches SK8 it is possible to connect the selected channel to one or more of the four mixing bus-bars.

The signal is taken off before the sliding fader and is applied, via prelistening switch SK7, to the prelistening bus-bar.

Via the reverberation selector switch SK8 the same signal is applied to the reverberation bus-bar, when the reverberation switch is depressed.

When the reverberation switch is released the input signal is applied to the reverberation unit after the intermediate amplifier unit.

The level of the outgoing reverberation signals can be adjusted with the aid of a potentiometer.

The mixed signal from a mixing bus-bar is fed to an intermediate amplifier via a pre-amplifier and the insertion points.

Normally, these insertion points are interconnected at the print connector in the chassis.

After the intermediate amplifier the signals are applied to the line output of the mixing desk via an oscillator selector switch SK10, a sliding fader, a line output amplifier and a line output transformer.

The signal is taken off after the insertion point and it is fed to the pre-listening bus-bar via prelistening switch SK9.

In the output block an oscillator with five frequencies is built in.

By depressing oscillator switch SK10 the output of this oscillator is connected to the input of the line output amplifier via the sliding fader and the mixing bus-bar is disconnected.

By means of the oscillator signal it is possible to check the output amplifiers.

The line output is connected to the input of the VU-meter amplifier, selector switches SK18 and SK22 in the monitor block and the VU-meter selector switch SK1 in the chassis.

With the VU-meter selector switch it is possible to connect VU2 to the line outputs, the monitor outputs, the pre-listening output.

With the monitor selector switch SK18 or SK22 the signals of the line outputs, the recorder inputs (M1, M2 or M3, M4) or the pre-listening output can be fed to the monitor output via a switchable 20 dB attenuator, a potentiometer and a line output amplifier.

The reverberation bus-bar is connected to the reverberation output via an intermediate amplifier, a line output amplifier and an output transformer.

The output of a reverberation installation can be connected to the reverberation input ("FROM REV"). The signals are then applied to the mixing bus-bars via an input transformer, a potentiometer, an amplifier and the reverberation return switch SK17.

The prelistening bus-bar is connected to a potentiometer via two amplifiers. The signals are taken off before this potentiometer, and applied to the monitor selector switches SK10 and SK22. The signals taken from the potentiometer are fed to a loudspeaker and a headphone output via a transformer, a 1 W output amplifier and an output transformer. When the headphone is plugged in, the loudspeaker is switched off.

The mixing desk has four talkback outputs.

The microphone on the mixing desk is connected to these outputs via a pre-amplifier, a limiter a potentiometer, a 1 W output amplifier and selector switches SK19. When these switches are released the line outputs can be connected by means of the program and distribution switch SK21.

E. ADJUSTMENT

Each unit consists of p.c. boards.

Each p.c. board is adjusted individually. For the adjustment, see the Service Notes of the relevant unit.

The desk contains an oscillator with the additional adjustable outputs (extreme right connecting block of Fig. 1a).

When one of these outputs (Osc \square) is adjusted to 0,775 mV/1000 Hz (-60 dBm) the output can be used for checking the microphone input channels.

When the second of these outputs (Osc L) is adjusted to 775 mV/1000 Hz 0 dBm these output can be used for checking the line input channels.

F. MODIFICATIONS FOR A HIGHER OUTPUT LEVEL

With the aid of amplifier LDC 0850 and transformer LDC 0860 it is possible to modify the mixing desk in such a way that the output level is increased.

For an output level of +18 dB with a 600 Ω - load or +24 dB unloaded, modify as indicated in Fig. 6a. For an output level of +30 dB, modify as indicated in Fig. 6b. In that case change also the values of the following resistors:

R40 on the output print should be changed into 470 Ω .

R2 on monitor print A should be changed into 2000 Ω .

R3 on monitor print C should be changed into 2000 Ω .

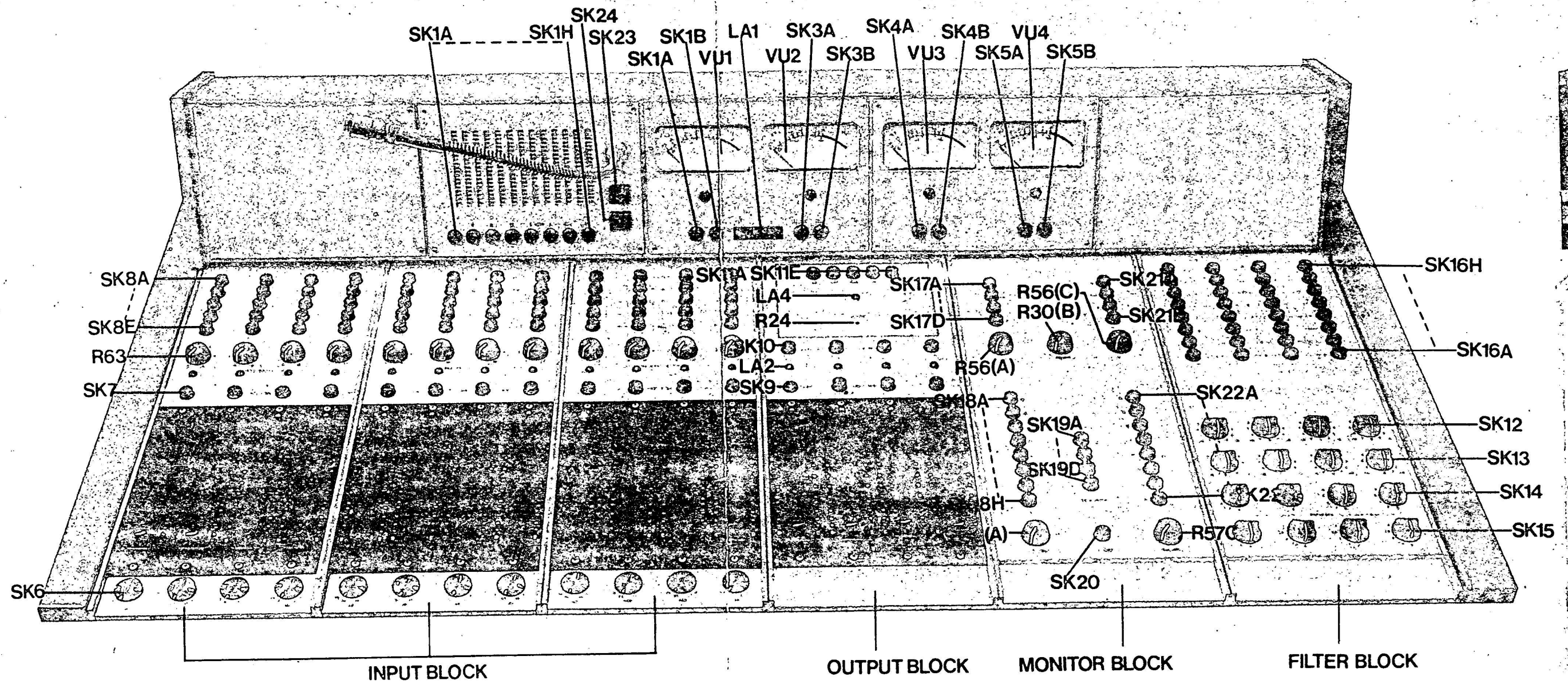


Fig. 1

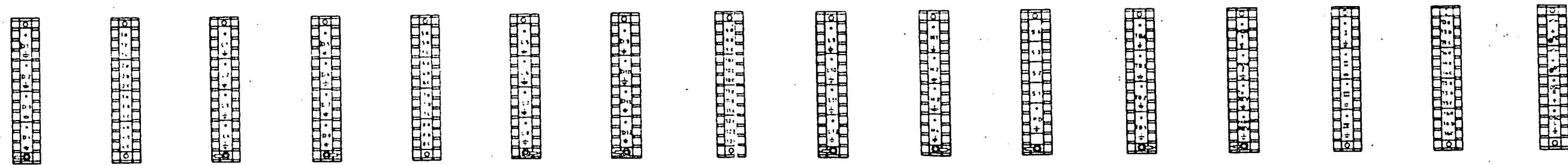


Fig. 1a

ERE 4346

ERE 4379

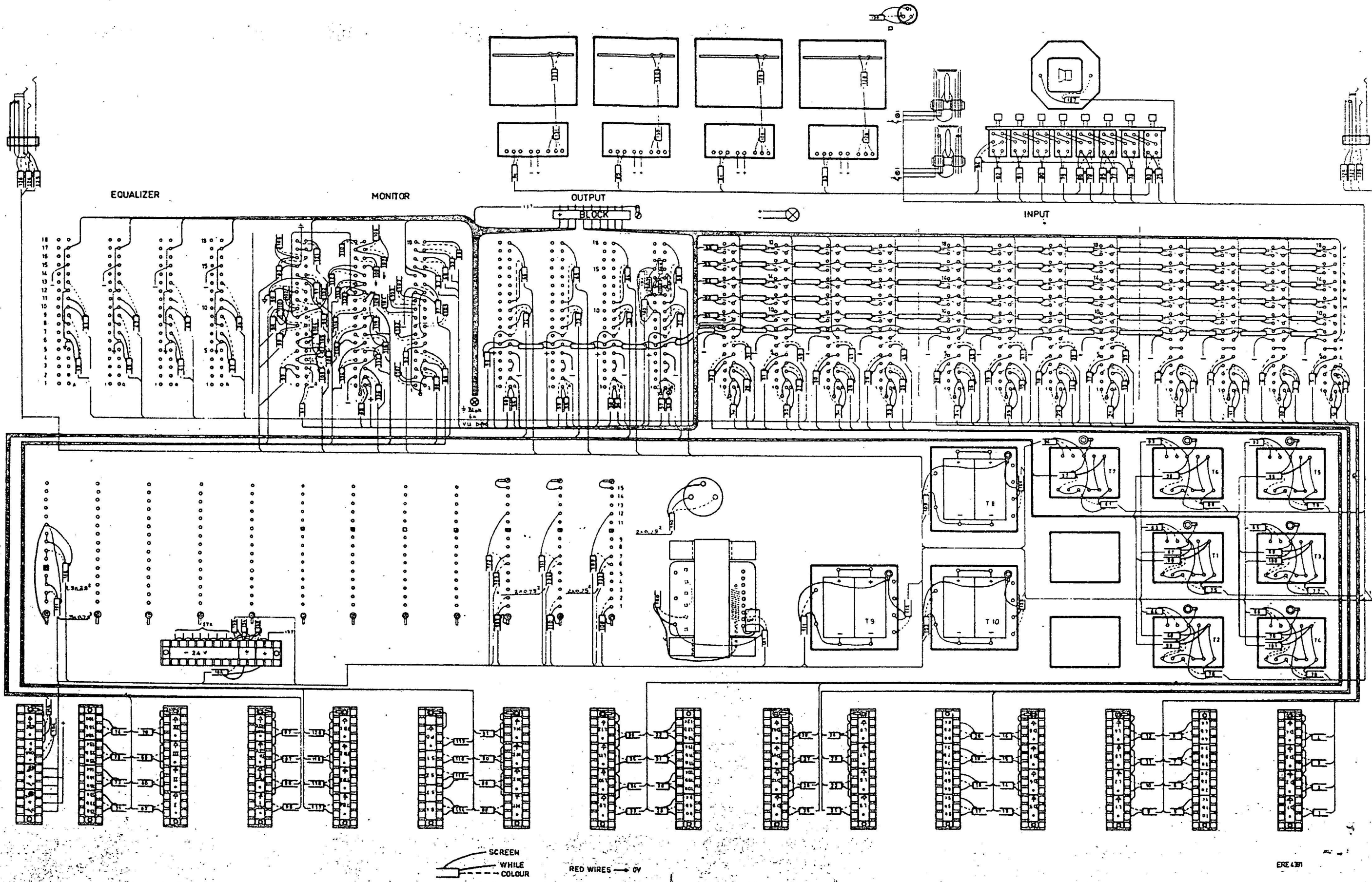
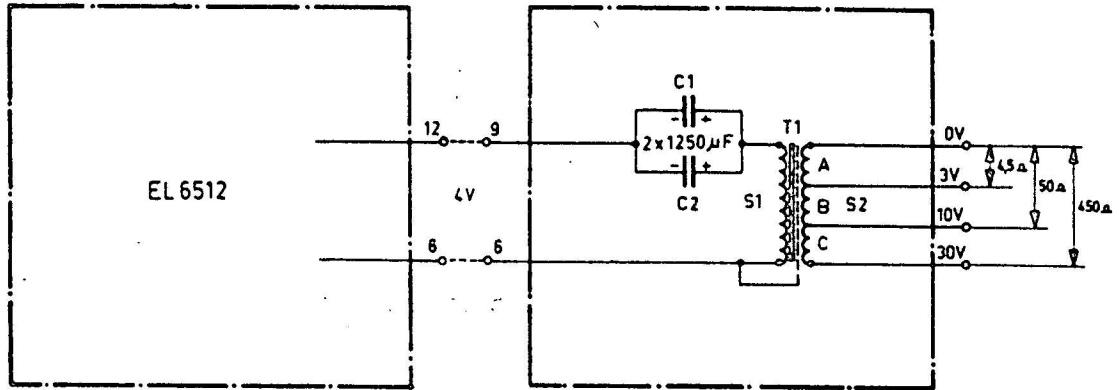


Fig. 15



EVE 1078

Fig. 16

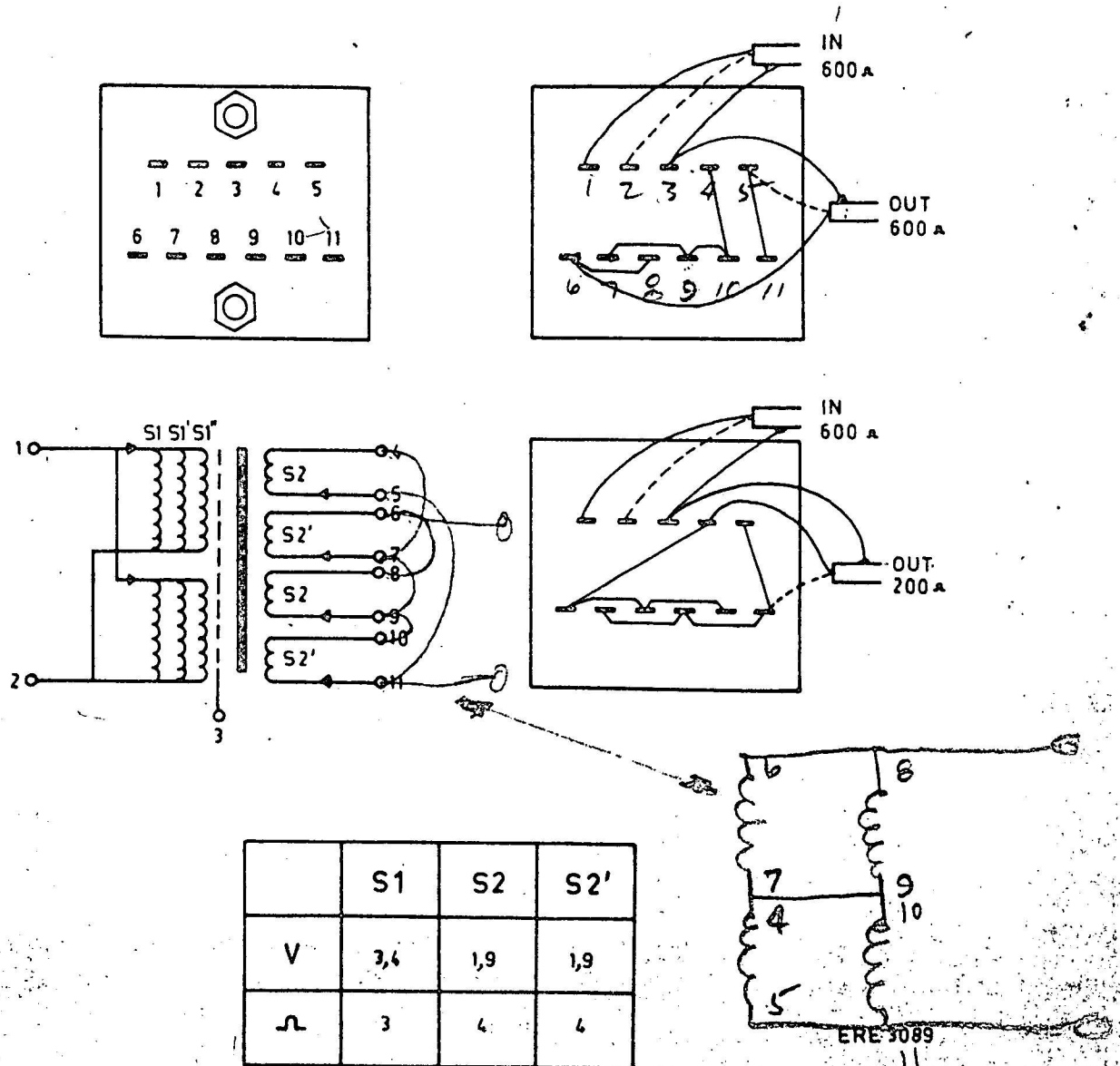


Fig. 17

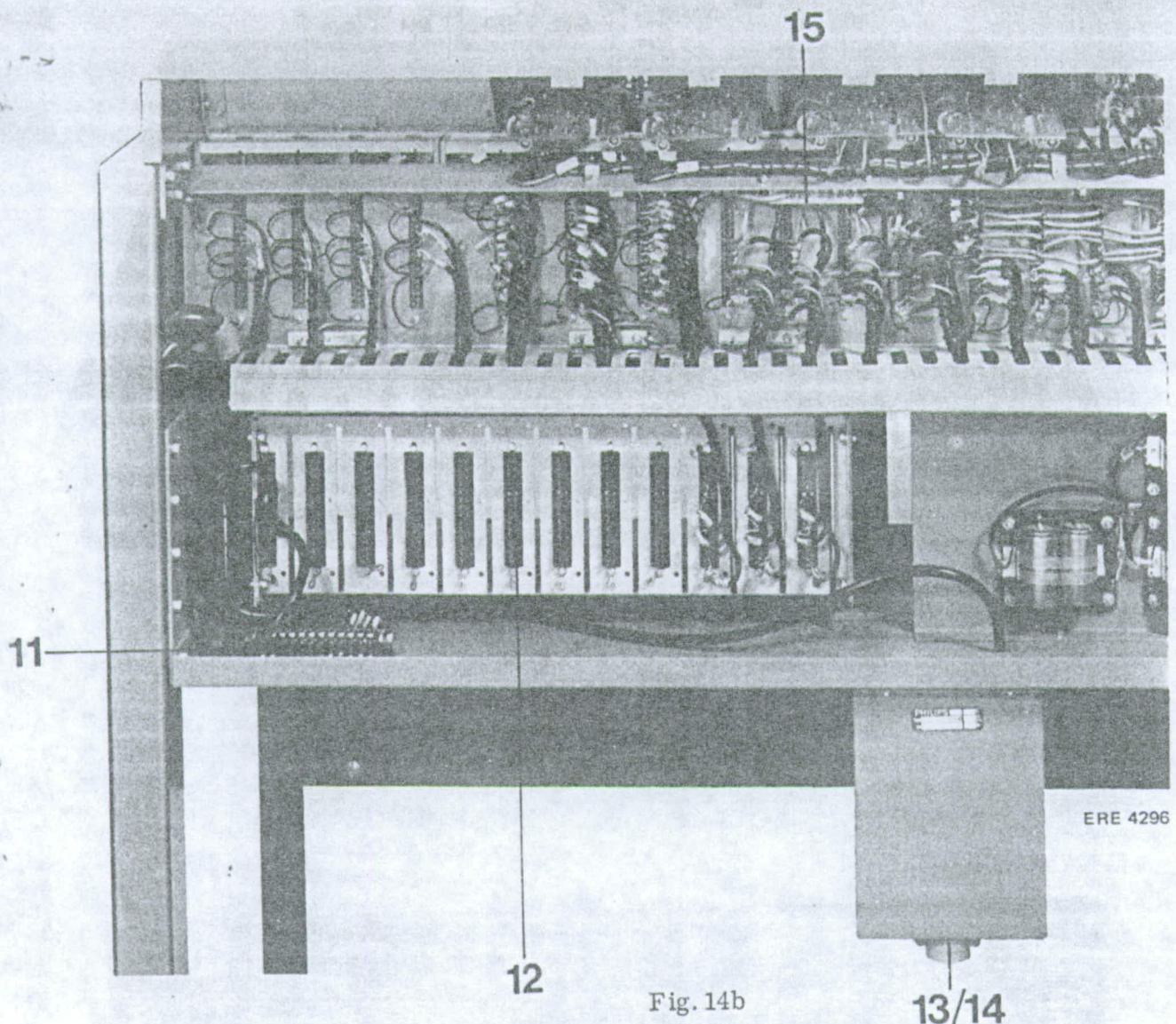
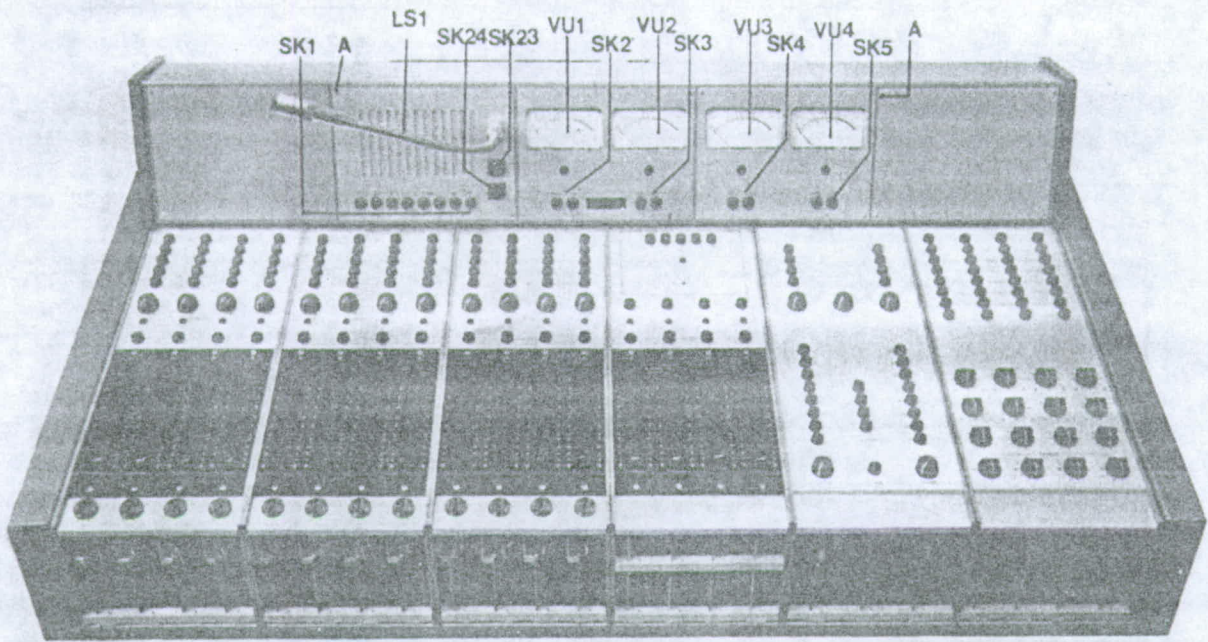
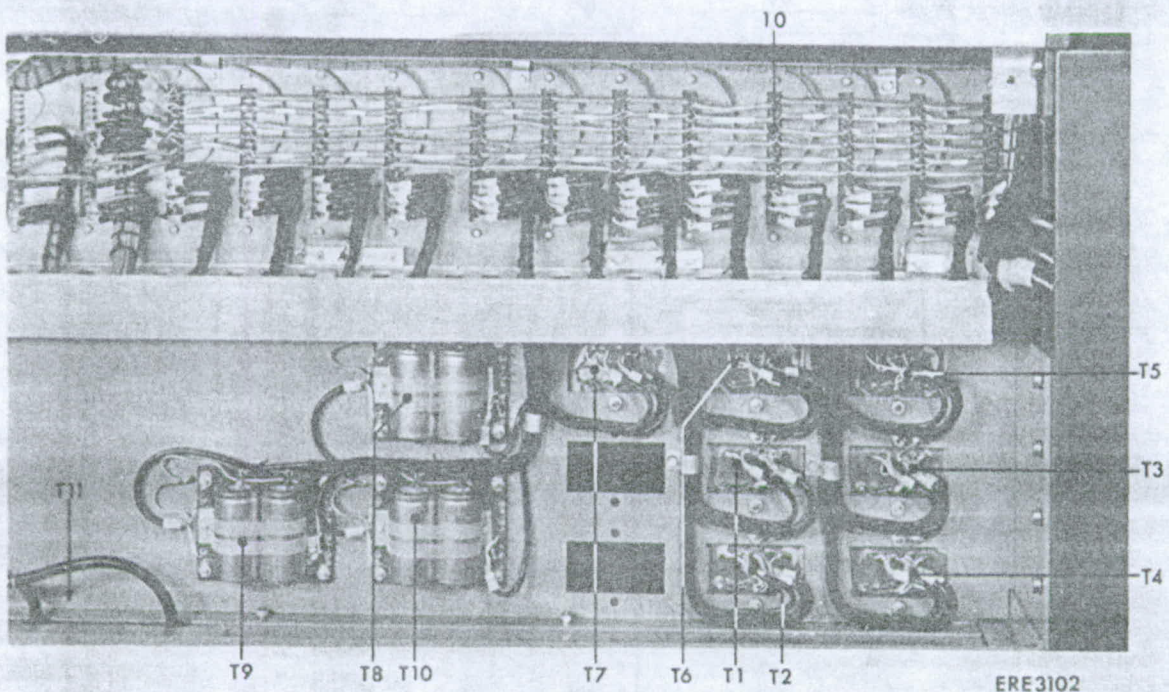


Fig. 14b



ERE4295

Fig. 13



ERE3102

Fig. 14a

VU Meter Amp

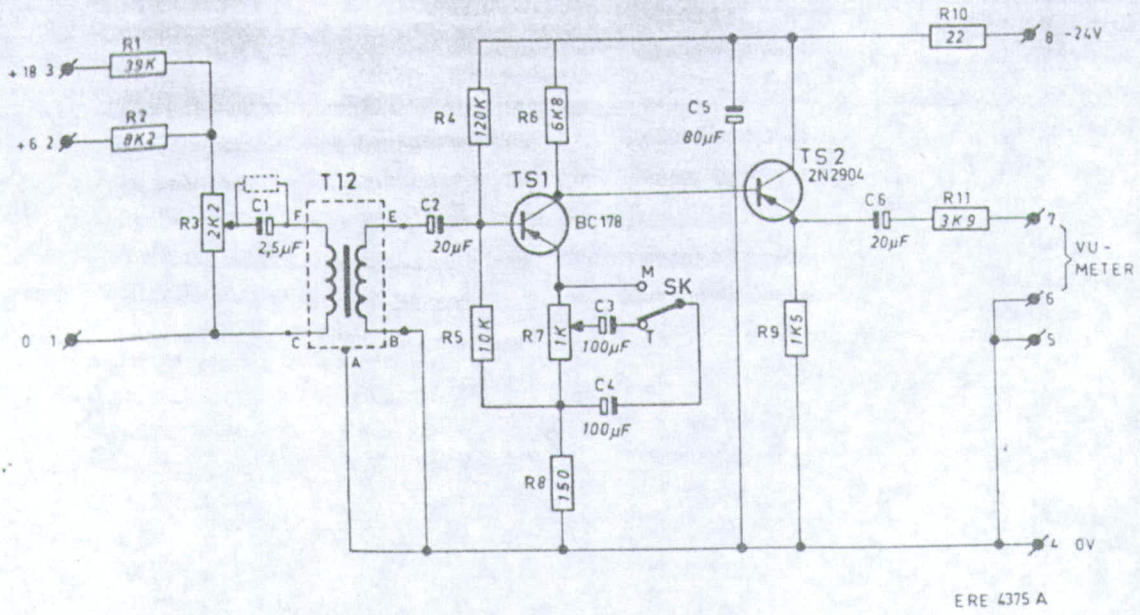


Fig. 11

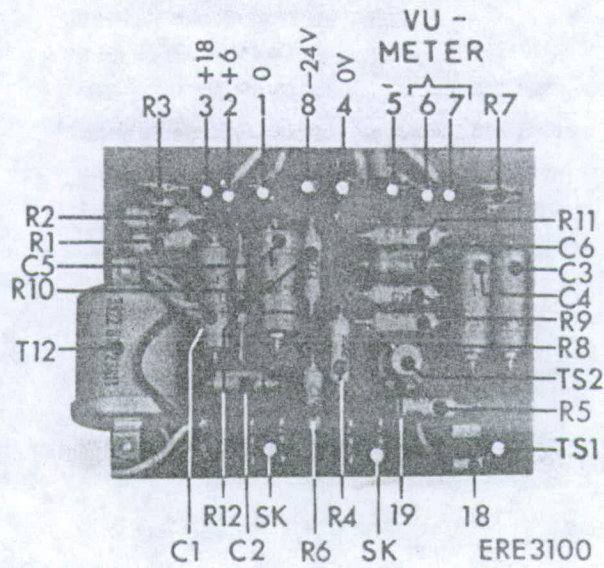


Fig. 12

F. LIST OF PARTS

Item	Code number	Description	Fig.
VU1...VU4	4822 347 20036	VU-meter	13
SK1 t/m SK5	4822 347 20036	Switch in VU-meter amplifier	13
SK23, SK24	4822 276 10316	Switch red/green	
LS1	4822 276 10059	Loudspeaker	13
T1...T7	4822 140 40098	Output transformer	14
T8...T10	EL 6815	2-W-transformer	14
T11	4822 146 40175	Supply transformer	14
T12	4822 142 50055	Transformer	12
TS1	4822 130 40355	Transistor BC 178	12
TS2	4822 130 40388	Transistor 2N2904	12
LA1	4822 134 40127	Pilot lamp	13
10	4822 267 50095	Print socket, 18-pole	14
11	4822 290 60056	Terminal block	14
12	4822 267 70043	Print socket, 15-pole	14
13	4822 267 40108	Socket	14
14	4822 264 40062	Plug	14
15	4822 290 60027	Mounting block	
16	4822 462 30028	Rail, black (for amplifier units)	13
17	4822 267 30098	Telephone socket	
	4822 264 30004	Telephone plug	
18	4822 492 60063	Clamp for TS1	12
19	4822 255 40006	Transistor socket	
	4822 410 50005	Red lens for SK23	
	4822 410 50004	Green lens for SK24	
	4822 265 20084	Grounding/guide pin.	
<u>Resistors</u>			
R1	4822 110 30149	Carbon 39 k Ω 1/8 W 2 %	12
R2	4822 110 30132	Carbon 8200 Ω 1/8 W 2 %	12
R3	4822 100 10027	Potentiometer 2200 Ω	12
R4	4822 110 30163	Carbon 120 k Ω 1/8 W 2 %	12
R5	4822 110 30134	Carbon 10 k Ω 1/8 W 2 %	12
R6	4822 110 30129	Carbon 6800 Ω 1/8 W 2 %	12
R7	4822 100 10021	Potentiometer 1000 Ω	12
R8	4822 110 30085	Carbon 150 Ω 1/8 W 2 %	12
R9	4822 110 30112	Carbon 1500 Ω 1/8 W 2 %	12
R10	4822 110 30063	Carbon 22 Ω 1/8 W 2 %	12
R11	4822 110 30123	Carbon 3900 Ω 1/8 W 2 %	12
<u>Capacitors</u>			
C1	4822 124 20079	Electrolytic 2.5 μ F 16 V	12
C2	4822 124 20081	Electrolytic 20 μ F 16 V	12
C3, C4	4822 124 20046	Electrolytic 100 μ F 6.4 V	12
C5	4822 124 20016	Electrolytic 80 μ F 25 V	12
C6	4822 124 20081	Electrolytic 20 μ F 16 V	12

3. Adjusting

- . Connect the plus pole of the 24 V supply to point 4 and the minus pole to point 8.
- . Connect points 1 and 2 to a signal generator (see Fig. 12).
- . Connect points 6 and 7 to a VU meter 4822 347 20036 or to a valve voltmeter.
- . Depress push-button "MUSIC" (SK1...SK4).
- . Adjust the signal generator to 1000 HZ/300 mV.
- . The VU-meter should indicate 0 VU.
- . The valve voltmeter should indicate 1.23 V.

Note: If the VU-meter has been connected in parallel with the valve voltmeter, the latter will indicate 0.775 V.

If necessary, adjust with R3 (see Figs. 11 and 12).

- . Depress push-button "TEST".
- . Adjust the signal generator to 1000 Hz/1.55 V.
- . The VU-meter should then indicate 0 VU.
- . The valve voltmeter should indicate 1.23 V.

Note: If the VU-meter has been connected in parallel with the valve voltmeter, the latter will indicate 0.775 V.

If necessary, adjust with R7 (see Figs. 11 and 12).

C. SUPPLY UNIT

The supply unit is identical to supply unit EL 3670.

For description, etc. see the relevant Service Notes.

D. TRANSFORMERS

The chassis houses two different kinds of transformers, viz.:

3 x EL 6815	2-W transformer (see Fig. 16)
7 x 3922 509 00030	Output transformer (see Fig. 17)
1 x 4822 146 40175	Supply transformer (see Fig. 18)

E. CONNECTIONS FOR USING A 8993 200 67001 SUPPLY UNIT

In some mixing desk a 8993 200 67001 supply unit is used.

The mixing is changed as follows:

- . The AC current to point 4 should be fed via a resistor of 16 Watt. The value of this resistor should be in that way that the voltage between the point 2 and 4 is 28 V (Resistor value about 3 Ω).

A. GENERAL

A mixing desk with 4, 8 or 12 input channels and 2, 3 or 4 output channels can be formed with the aid of separate blocks and this chassis.

The chassis contains the wiring, interconnecting the blocks and, moreover, the following parts and units.

- a. a supply unit + supply transformer
- b. output transformers
- c. a pre-listening loudspeaker
- d. VU-meters + VU-meter amplifiers
- e. selectors for the VU-meters
- f. two connections for a headphone
- g. a talk-back microphone
- h. terminal blocks
- i. 2-W output amplifiers

for a description of the working, see Service Notes 4822 733 21663 (MD-mixing desk)

weight	: 84 kg
width	: 110 cm
depth	: 73 cm
height	: 80 cm (with VU-meter panel 93,5 cm)

B. VU-METER AMPLIFIER

A separate VU-meter amplifier has been built in for each VU-meter.

The VU-meter amplifier can be removed from the desk as follows:

- a. Remove the text plate. Loosen screws A (see fig. 13).
- b. Remove rear cover plate.
- c. Loosen the screws at either side of the knobs.

2. Circuit description (see Fig. 11)

The signal can be applied to two different points.

If the desk is adjusted so that 0 VU on the meter corresponds to an output signal of the mixing desk of -6 dB (with respect to 0 dB = $0.775/600 \Omega$), the input signal should be applied to points 1 and 2 (see Figs. 11 and 12). The sensitive side should be connected to point 2.

If the desk is adjusted so that 0 VU on the meter corresponds to an output signal of the mixing desk of $+18$ dB, the input signal should be applied to points 1 and 3; the sensitive side should be connected to point 3. With the aid of R3 the attenuation of the signal can be varied.

Via transformer T11 the signal is applied to the input of the amplifier consisting of TS1 and TS2. The output of this pre-amplifier can be connected to VU-meter 4822 347 20036.

By means of SK1 the feedback of TS1 can be varied. During normal operation the switch is in position "MUSIC". During adjustment the switch is in position "TEST". The difference in amplification can thus be controlled with the aid of potentiometer R7.

Consequently, if during normal operation the VU-meter indicates 0 VU, there is a reserve of a few dB's, because the VU-meter cannot indicate short peaks. Normally, this reserve is adjusted to 10 dB by means of R7. (For adjustment see Chapter B.3).

CONTENTS

A. GENERAL	3
B. VU-METER AMPLIFIER	3
C. SUPPLY UNIT	4
D. TRANSFORMERS	4
E. CONNECTIONS FOR USING A 8993 200 67001 SUPPLY UNIT	4
F. LIST OF PARTS	5

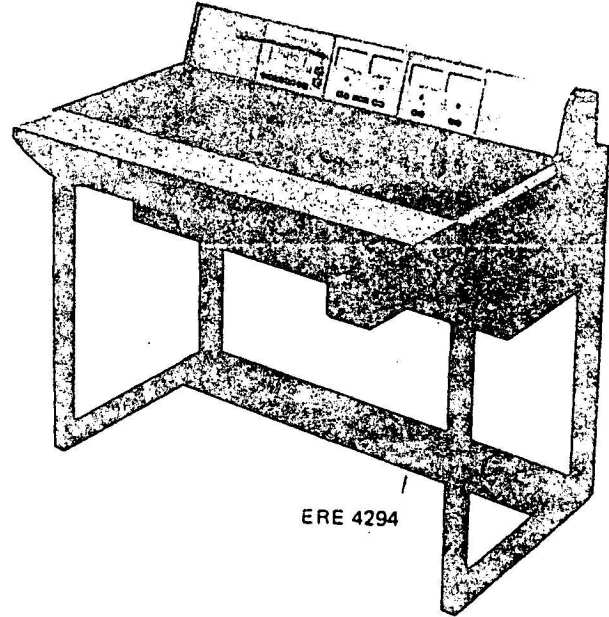
FIGURES

11. Circuit diagram VU-meter amplifier
12. View of VU-meter amplifier
13. VU-meter panel
14. Rear of the chassis
15. Wiring diagram
16. Transformers T8...T10
17. Transformers T1...T7
18. Transformer T11
19. Transformer T12
20. Wiring in case of a 8993 200 67001 supply unit



PHILIPS

Service



ERE 4294

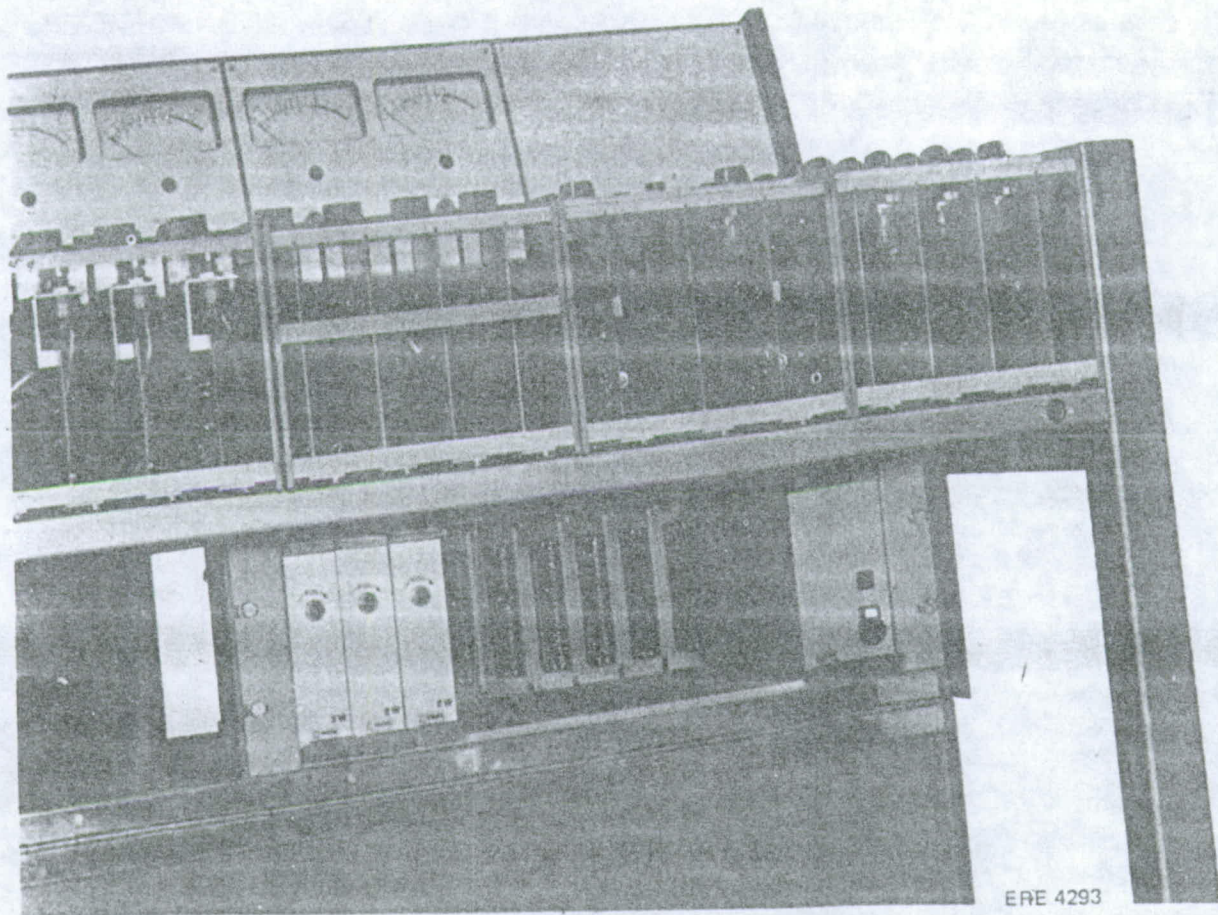
CHASSIS
for a mixing desk of the MD-range (third generation)

8993 200 77011

4822 733 21664

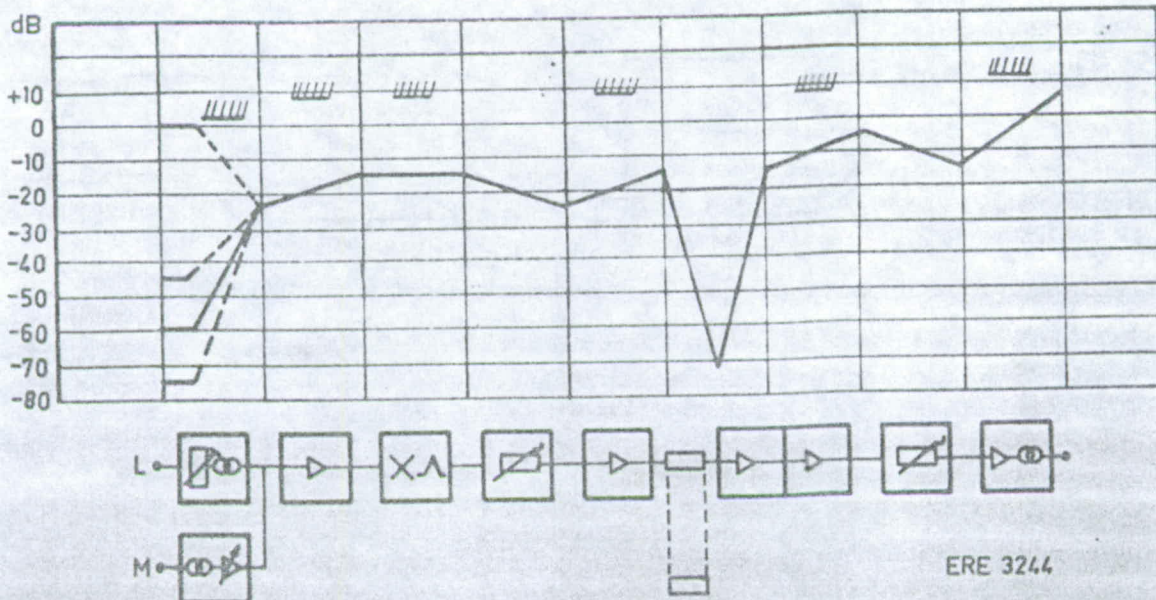
1/769

SERVICE INFORMATION										
------------------------	--	--	--	--	--	--	--	--	--	--



ERE 4293

Fig. 4



ERE 3244

Fig. 5

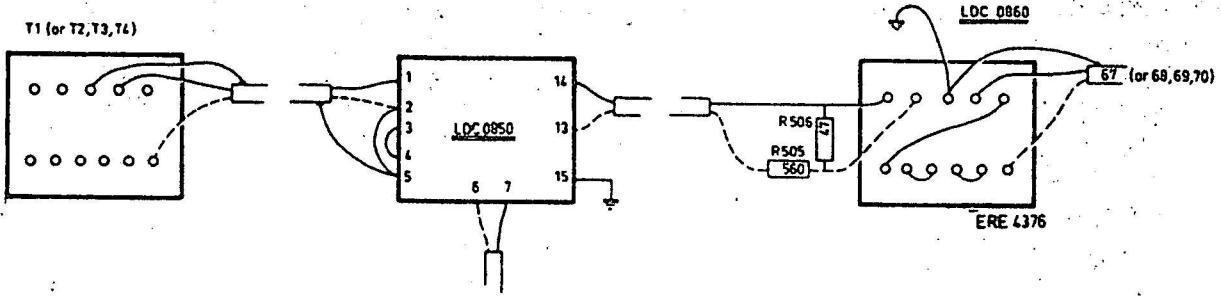


Fig. 6a

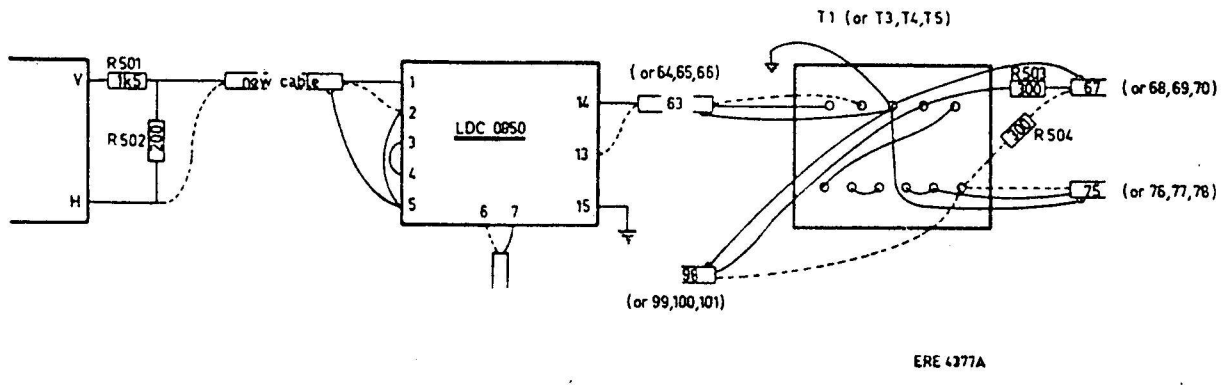


Fig. 6b

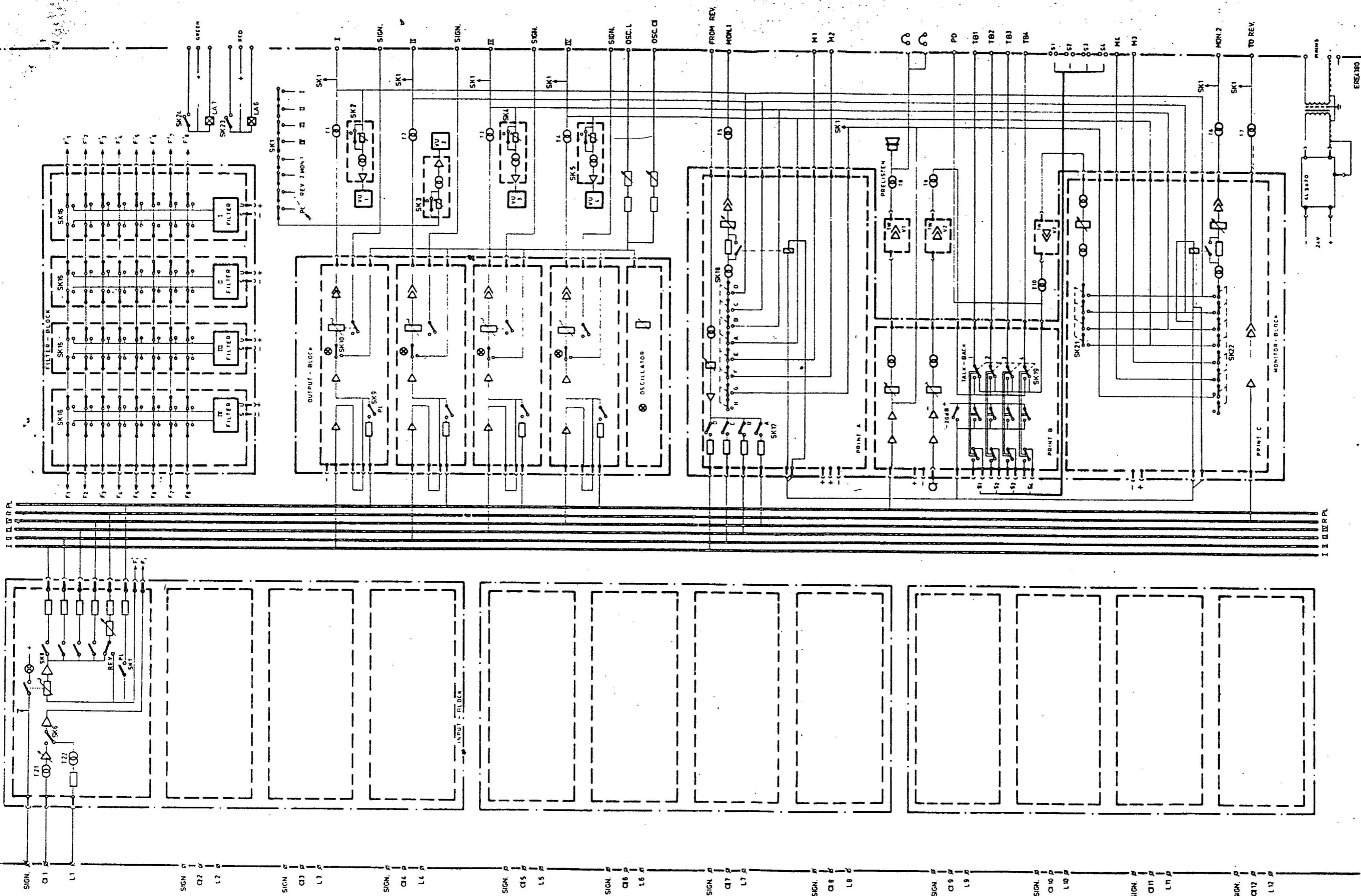
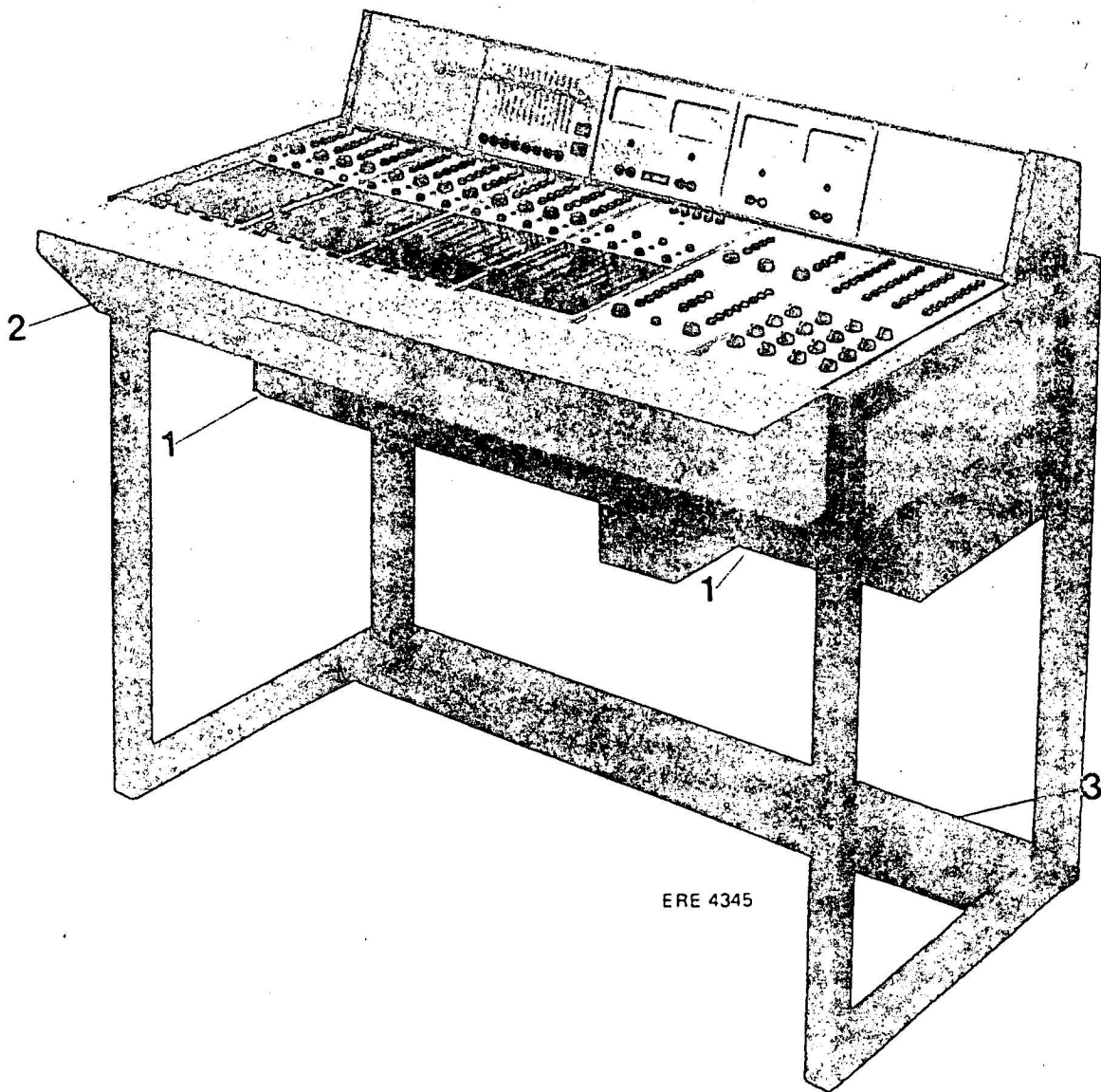


Fig. 2



ERE 4345

Fig. 3

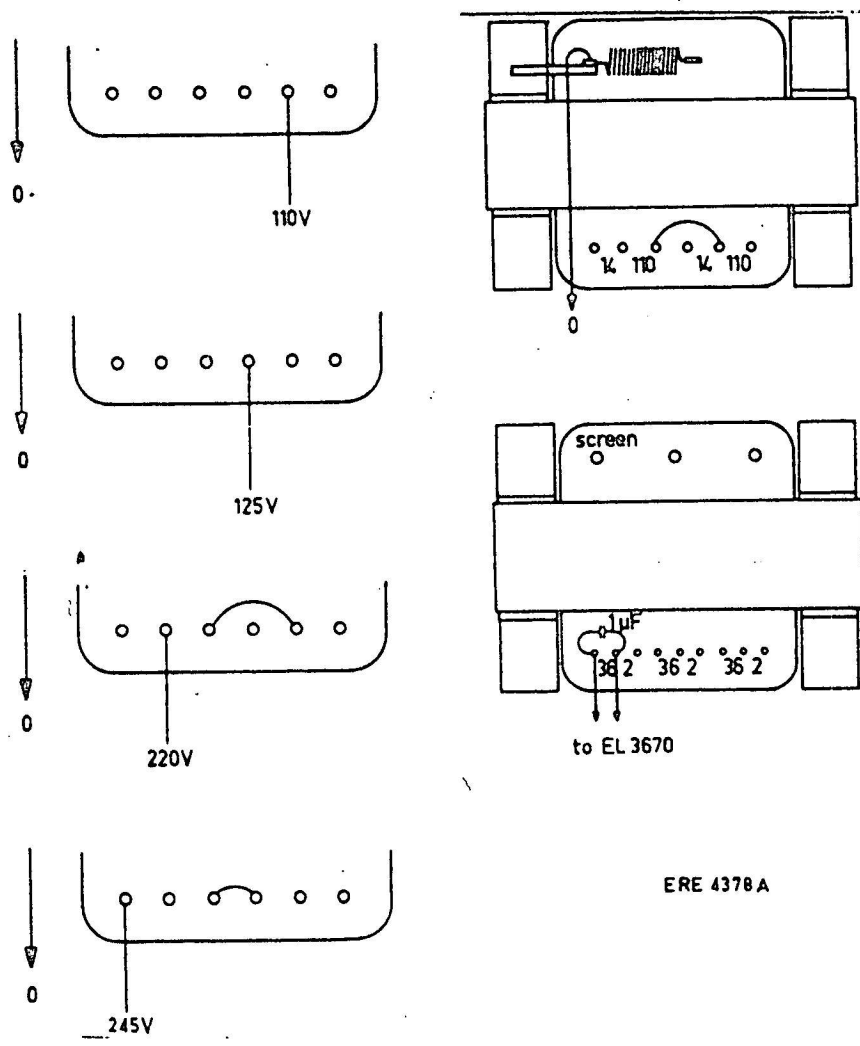
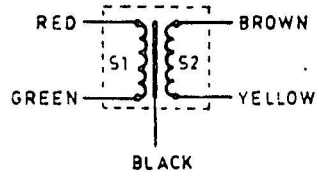


Fig. 18



S1	581 Ω
S2	804 Ω

ERE 2825

Fig. 19

see also page 4

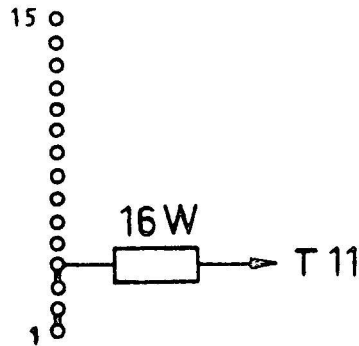
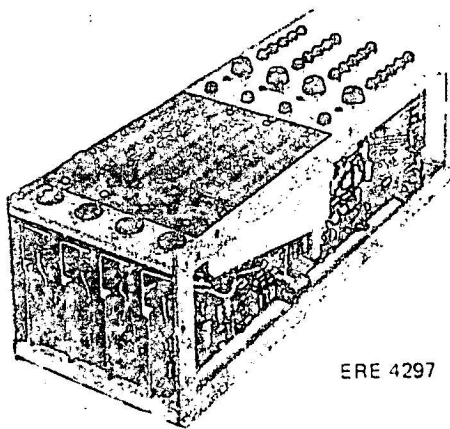


fig. 20



PHILIPS

Service



ERE 4297

INPUT BLOCK
for a mixing desk of the MD-range (third generation)

8993 200 77110

4822 733 21665

1/769

SERVICE INFORMATION										
------------------------	--	--	--	--	--	--	--	--	--	--

CONTENTS**A. GENERAL INFORMATION**

1. Technical data
2. Removing the printed circuit board from the input block
3. Mounting the amplifier board in the output block

B. CIRCUIT DESCRIPTION**C. CHECKING AND ADJUSTING**

1. Recommended measuring equipment
2. Checking
3. Adjusting

D. LIST OF PARTS**FIGURES**

21. Connection diagram for checking and adjusting
22. Top view
23. Bottom view
24. Input circuit board
25. Circuit diagram
26. Transformer T21
27. Transformer T22

A. GENERAL INFORMATION

This input block has been designed for use in conjunction with a MD- mixing desk (third generation).

The unit contains four identical printed circuit boards. Each circuit board contains the amplifiers for one input channel.

1. Technical data

. Microphone	: Symmetrical Input impedance > 1200 Ω Source impedance 200 Ω , 50 Ω ; see Fig. 26 Input level first input: -75 dB second input: -60 dB third input: -45 dB Permissible overload: 23 dB
. Line input	: Symmetrical Input impedance 20 k Ω Source impedance \leq 600 Ω Input level 0 dB Permissible overload 23 dB
. Output to bus-bars	: Output impedance 2400 Ω Output level -15 dB ^x Permissible overload 23 dB
. Reverberation and pre-listening	: Output impedance 2400 Ω ^x Output level -25 dB
. Insertion point	: Output impedance 5 Ω Load impedance \geq 600 Ω Output level -15 dB
. Supply voltage	: 24 V d.c. max. ripple \leq 1 mV
. Power consumption	: 32 mA (per input channel)
. Fader damping	: Max. 90 dB
. Crosstalk (5000 Hz)	: \geq 80 dB
. Distortion	: \leq 0.5 %
. Noise level	: \leq 6 dB according to DIN 45405 \geq -120 dB according to RMA, referred to output
. Frequency response	: 40-15000 Hz (+ 0.5...-1.5 dB)
. Ambient temperature	: -10 $^{\circ}$ C - +45 $^{\circ}$ C
. Max. relative humidity	: 95 %
. Dimensions	: 170 x 136 x 460 mm
. Weight	: 4.9 kg

^x Note: In the MD-MIXING DESK (3rd generation) the outputs are loaded with 5 Ω to obtain current dependent mixing.

2. Removing the printed circuit board from the input block (see Figs. 22 and 23)

- . Remove knob 21 (pull up).
- . Remove knob 22 (pull top section upwards, loosen screw, pull bottom section upwards).
- . Turn the unit.
- . Loosen screws 25.
- . Turn plates 26 so that the printed circuit board comes loose.
- . Pull out the circuit board in vertical direction.

Note: Mind the connection wires between the fader and the circuit board.

- . Place the unit on its side.
- . Remove the fader (depress the tags at the top and bottom of the fader inside the unit).
- . The printed circuit board can now be removed through the hole for the fader.

3. Mounting the amplifier board in the input block

- . See I.b, however, proceed in the reverse order.

B. CIRCUIT DESCRIPTION (see Fig. 25)

The microphone signal is applied to the base of TS1 via transformer T21.

Via the microphone amplifier, consisting of TS1, TS2 and TS3, the signal is fed to the base of TS5. From the emitter of TS3 the signal is fed back to the base of TS2 via C15 and R11. Via C15 and R23 the signal is fed back to the base of TS1. The degree of feedback is adjusted by including resistors R25, R26 or R27 in the circuit by means of SK6.

By means of SK6 it is also possible to interrupt the connection between the microphone amplifier and TS5. In that case a signal can be applied to the base of TS5 via line input transformer T22.

After amplification by TS5...TS8 the signal is applied to the output of the insertion point. The signal across TS8 is fed back to the base of TS6 via R34 and C20 and to the emitter of TS5 via C19, R32 and R31. Via an identical amplifier the signal reaches the output of the input channel via selector switches SK8A...SK8D.

It is possible to connect an equaliser between points 6 and F. Without equaliser these points are interconnected. By means of SK8E a signal can be applied to the reverberation output. This signal may be taken off before or after the fader.

The level of this signal can be adjusted with R63.

Via SK7 a signal taken off before the fader is applied to the pre-listening output. The supply voltages for each amplifier are stabilised separately.

If a fader is not in position ∞ , the corresponding lamp LA5 lights up.

C. CHECKING AND ADJUSTING (see Figs. 24, 25)

1. Recommended measuring equipment

- a. Signal generator GM 2317
- b. Valve voltmeter GM 6012
- c. Multimeter PM 2411

2. Checking

- Connect the printed circuit board as follows:

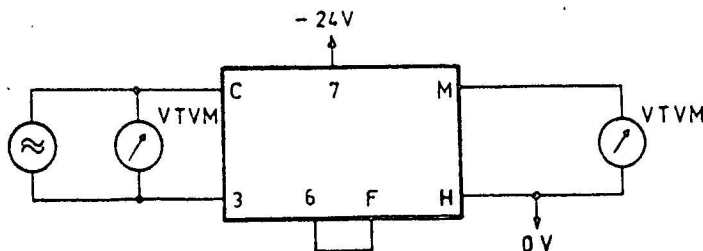


Fig. 21

- The total load impedance of the input should be 200 Ω .
- Set SK6 to position -60 dB (turn the switch fully clockwise and switch it one step back).
- Set the fader to position 0 dB.
- Depress SK8 (4th button from the printed circuit connector).
- Apply a signal of 0.775 mV/1000 Hz (-60 dB) to points 3 and C.
If required, use an attenuator.
- The output voltage across points H and N should be 440 mV.

3. Adjusting

- Connect the printed circuit board as shown in Fig. 21. (Note: the total load impedance of the input should be 200 Ω).
- Set SK6 to position -60 dB (fully clockwise and then one step anti-clockwise).
- Apply a signal of 0.775 mV/1000 Hz (-60 dB) to points 3 and C.
If required, via an attenuator.
- The voltage across points H and F should be 140 mV. Adjust with R32 (see Figs. 23 and 24).
- Set the fader to position 0 dB.
- Depress SK8 D (4th button from printed circuit connector).
- The voltage across points H and N should be 440 mV (-5 dB). Adjust with R47 (see Figs. 23 and 24).
- Set SK6 to position 0 dB (fully anti-clockwise).
- Apply a signal of 775 mV/1000 Hz (0 dB) to points 1 and A.
- The voltage across points H and N should be 440 mV (-5 dB).
Adjust with R3 (see Figs. 23 and 24).

D. LIST OF PARTS

Item	Code number	Description	Fig.
18	4822 492 60063	Transistor clamp	24
21	4822 413 40117	Knob	23
22	4822 413 40115	Knob	23
23	4822 413 30303	Knob	23
24	4822 105 10008	Fader	23
27	4822 255 40006	Transistor holder	25
T21	4822 268 14009	Microphone input transformer EL 6814	25
T22	4822 142 50055	Line output transformer	25
LA5	4822 134 40127	Signalling lamp	24, 25
SK6	4822 273 40142	Switch	22, 25
SK7	4822 276 10265	Switch	22, 25
SK8A...SK8E	4822 276 10265	Switch	22, 25
TS1	4822 130 40353	Transistor BC 179	25
TS2, TS3	4822 130 40355	Transistor BC 178	25
TS4	4822 130 40354	Transistor BC 177	25
TS5	4822 130 40353	Transistor BC 179	25
TS6	4822 130 40354	Transistor BC 177	25
TS7, 8, 9	4822 130 40388	Transistor 2N2904	25
TS10	4822 130 40353	Transistor BC 179	25
TS11	4822 130 40354	Transistor BC 177	25
TS12, 13, 14	4822 130 40388	Transistor 2N2904	25
GR1...GR4	4822 130 30132	Zener diode BZY 59	25
R3	4822 100 10027	Print potentiometer 2K2	25
R25	4822 112 10038	Resistor 2.7 Ω , 0.25 W, 2 %	25
R32, R47	4822 100 10023	Print potentiometer 470 Ω	25
R63	4822 101 30189	Potentiometer, 5000 Ω	25
	4822 532 20158	Spindle for R63	
All other resistors		Carbon 1/8 W, 2 %, code number 4822 110 30...	
C1, C2	4822 120 60116	Capacitor, 2K2, pF	25
C3	4822 124 20075	Electrolytic capacitor, 64 μ F, 10 V	25
C4	4822 121 40015	Polyester capacitor, 820 k μ F	25
C5	4822 124 20075	Electrolytic capacitor, 64 μ F, 10 V	25
C6	4822 124 20072	Electrolytic capacitor, 200 μ F, 10 V	25
C7, C8	4822 124 20075	Electrolytic capacitor, 64 μ F, 10 V	25
C9...C12	4822 124 20016	Electrolytic capacitor, 80 μ F, 25 V	25
C13, 14, 16	4822 124 20181	Electrolytic capacitor, 20 μ F, 16 V	25
C15	4822 124 20187	Electrolytic capacitor, 1000 μ F, 10 V	25
C17	4822 124 10036	Electrolytic capacitor, 0.64 μ F, 25 V	25
C18, C19	4822 124 20046	Electrolytic capacitor, 100 μ F, 6.4 V	25
C20	4822 120 60096	Mica capacitor, 390 pF	25
C21...C24	4822 124 20016	Electrolytic capacitor, 80 μ F, 25 V	25
C25	4822 124 20081	Electrolytic capacitor, 20 μ F, 16 V	25
C26	4822 124 10036	Electrolytic capacitor, 0.64 μ F, 25 V	25
C27, C28	4822 124 20046	Electrolytic capacitor, 100 μ F, 6.4 V	25

Item	Code number	Description	Fig.
C29	4822 120 60096	Mica capacitor, 390 pF	25
C30...C33	4822 124 20016	Electrolytic capacitor, 80 μ F, 25 V	25
C34	4822 121 40015	Polyester capacitor, 470 kpF	25

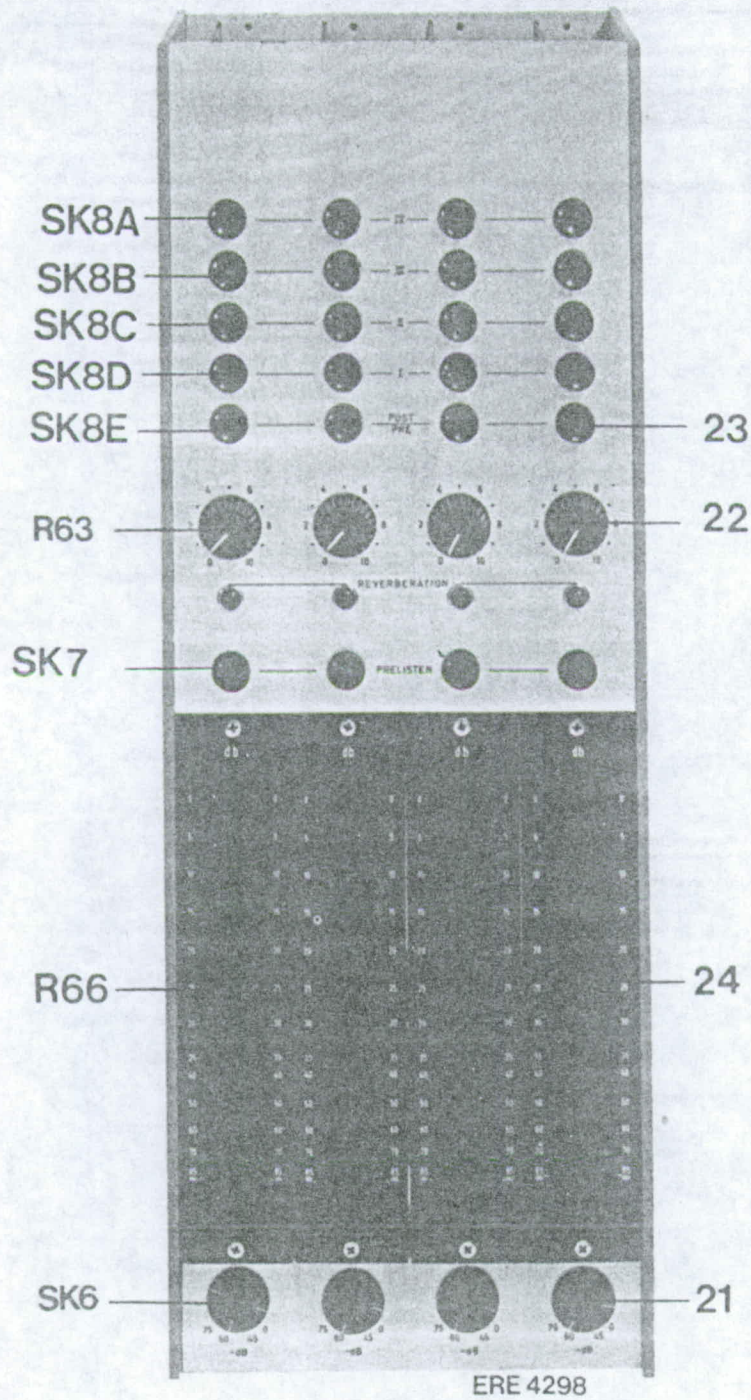


Fig. 22

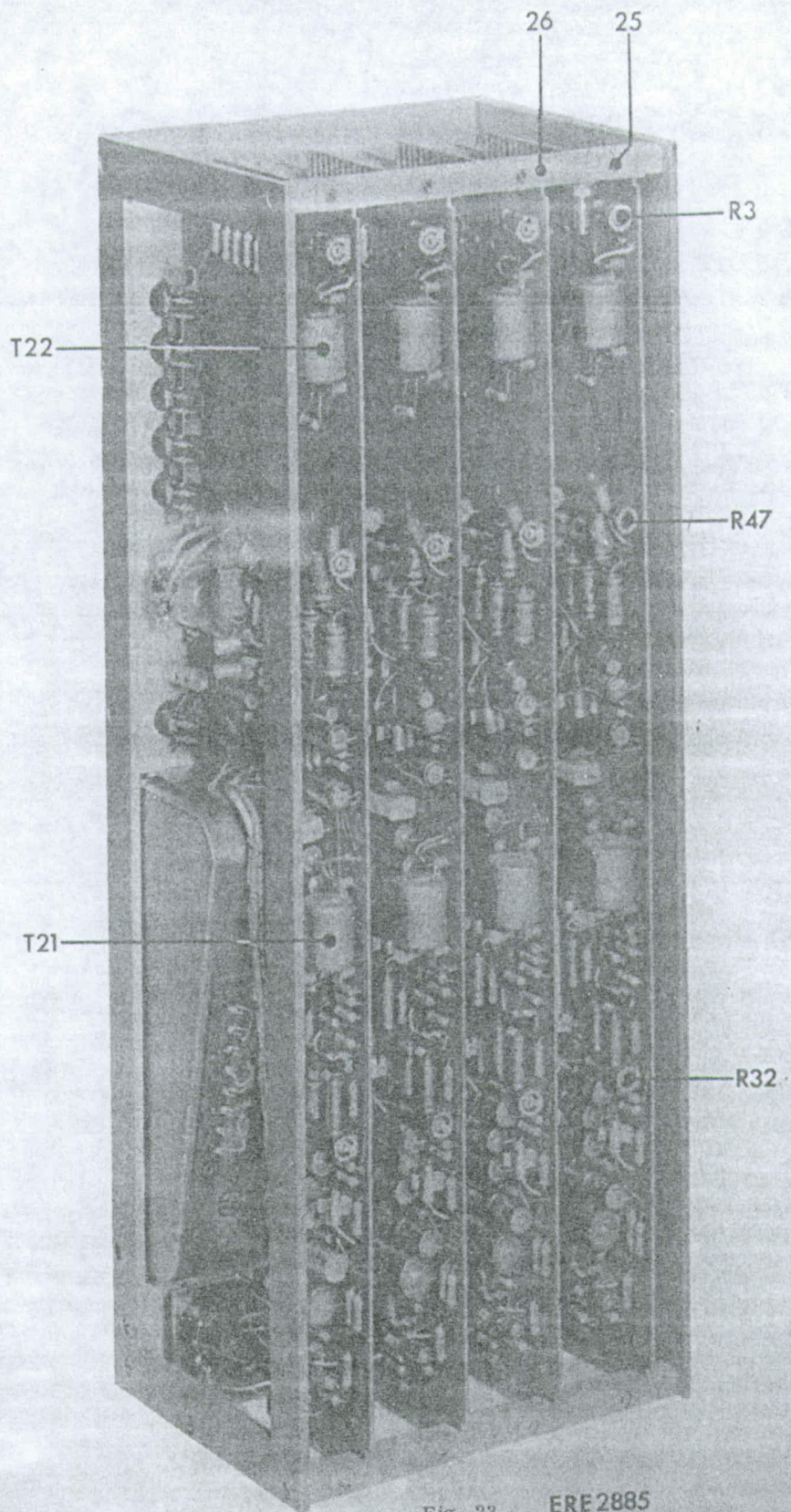
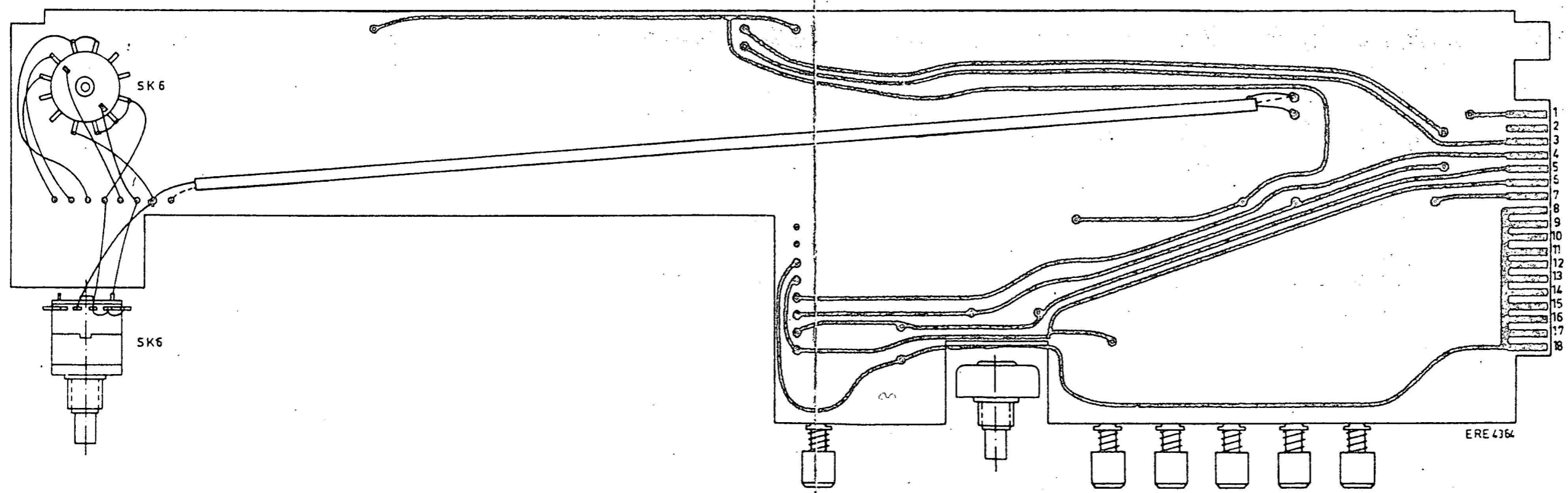
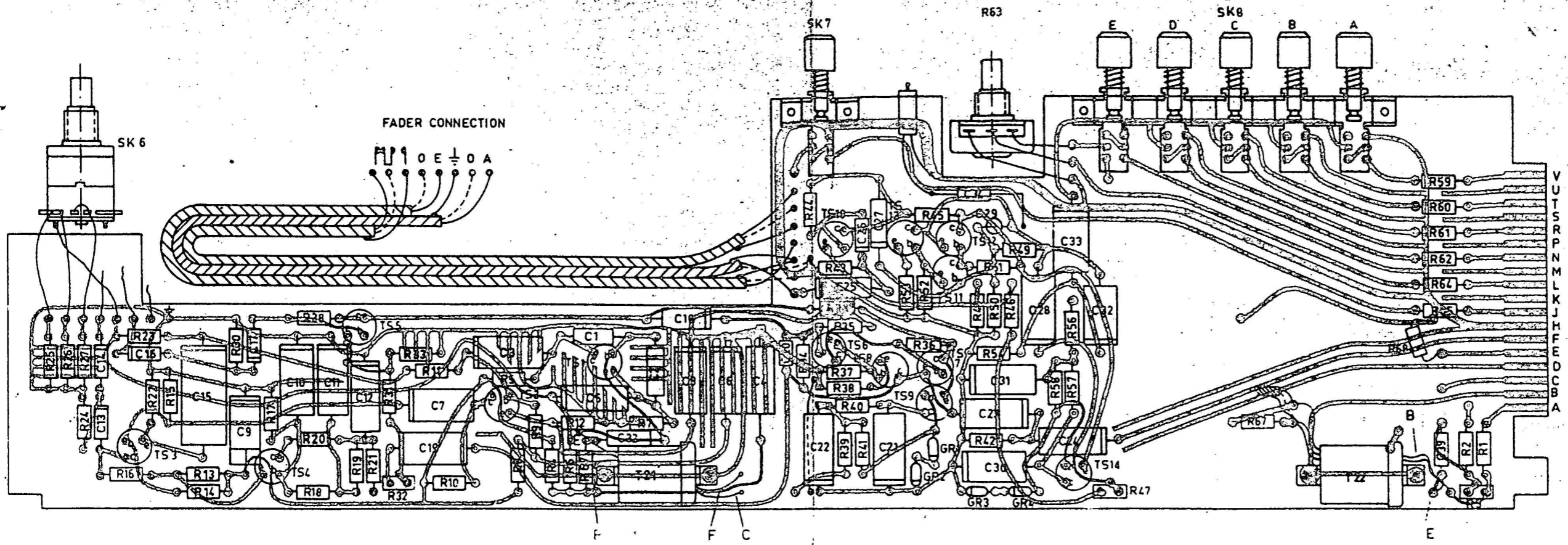


Fig. 23 ERE 2885



SCREEN
 TRANSPARENT
 COLOUR

Fig. 24

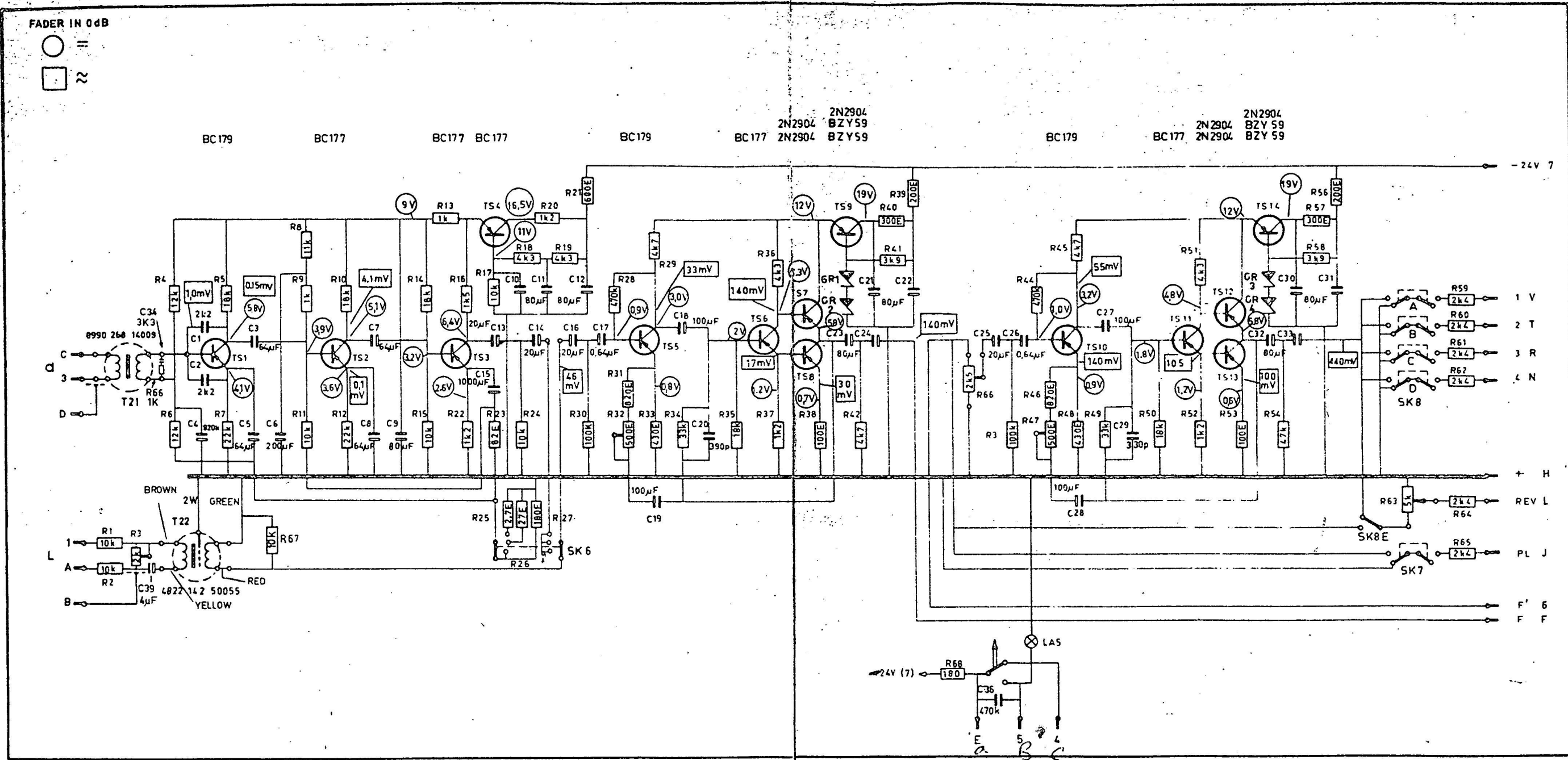
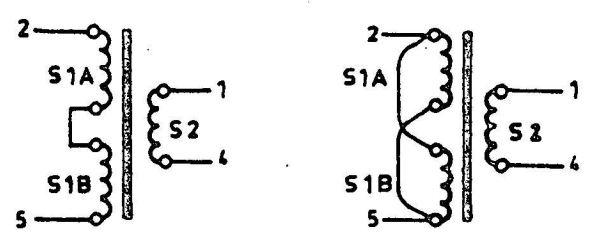
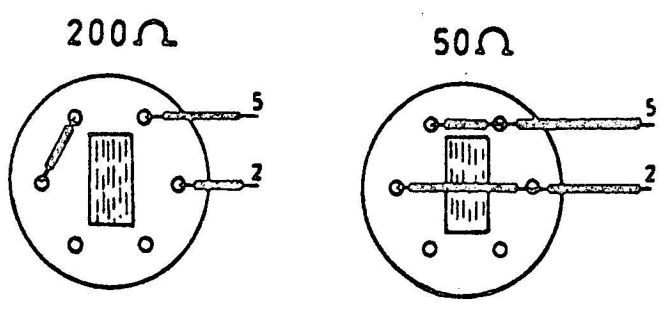


Fig. 25

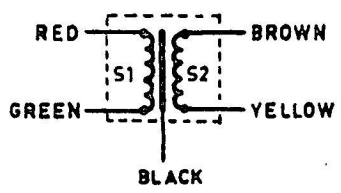
ERE 4363A



1 BROWN, 2 RED, 4 YELLOW, 5 GREEN.

ERE 2089

Fig. 26



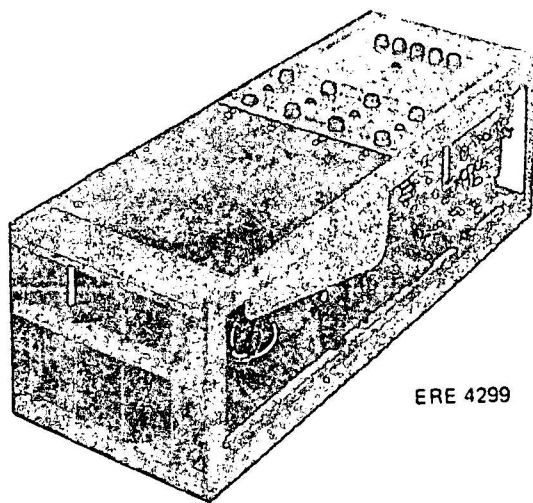
S1	501 Ω
S2	806 Ω

ERE 2025

Fig. 27

PHILIPS

Service



ERE 4299

8993 200 77211

8993 200 77241

8993 200 77231

8993 200 77251

OUTPUT BLOCK
of a Mixing Desk of the MD-range (third generation)

4822 733 21666

1/769

SERVICE INFORMATION										
------------------------	--	--	--	--	--	--	--	--	--	--

CONTENTS**A. GENERAL**

1. Technical data
2. Removing the printed circuit board
3. Removing the oscillator unit

B. CIRCUIT DESCRIPTION

1. Output amplifier
2. Oscillator

C. CHECKING AND ADJUSTING

1. Recommended measuring equipment
2. Checking the amplifier
3. Adjusting the amplifier
4. Checking the oscillator
5. Adjusting the oscillator

D. LIST OF PARTS**FIGURES**

31. Connection diagram for checking and adjusting the amplifier.
32. Connection diagram for checking and adjusting the oscillator.
33. Top view of the output block
34. Bottom view of the output block
35. Output circuit board
36. Circuit diagram output amplifier
37. Oscillator circuit board
38. Circuit diagram oscillator unit

A. GENERAL

This output block has been designed for use in conjunction with the other electronic circuitry of an MD mixing desk (3rd generation).

The block consists of a metal housing which contains the printed circuit boards (channel prints), faders and an oscillator unit.

The following versions of the output block are available:

8993 200 77251	one output channel
8993 200 77211	two output channels
8993 200 77231	three output channels
8993 200 77241	four output channels

Conversion of one version into another is possible by adding or removing one channel print and one fader for each channel.

1. Technical data

Input from bus-bars	Input impedance approx. 4 Ω Source impedance 2.4 k Ω Nominal input level approx. -70 dB Permissible overload 23 dB
Input from insertion point	Input impedance approx. 600 Ω Source impedance 5 Ω Input level -15 dB
Line output	Output impedance 50 Ω Load impedance 600 Ω Output level +6 dB Permissible overload 6 dB
Output insertion point	Output impedance 5 Ω Load impedance approx. 600 Ω Output level -15 dB
Output oscillator	Output impedance 50 Ω Load impedance 600 Ω Output level -5 dB Frequency 60, 125, 1000, 4000 and 14000 Hz
Supply voltage	24 Vdc, max. ripple 1 mV
Current consumption	45 mA (per output channel) 50 mA (oscillator unit)
Max. fader damping (1000 Hz)	90 dB
Cross-talk attenuation (5000 Hz)	80 dB
Distortion	0.5 %
Noise level	6 dB according to DIN 45405 -120 dB according to RMA, relative to output
Frequency response	40-15,000 Hz (+ 0.5/-0.5 dB)
Ambient temperature	-10 $^{\circ}$ C - +45 $^{\circ}$ C
Max. relative humidity	95 %

Dimensions	170 x 136 x 460 mm
Weight	1 output channel 3.1 kg 2 output channels 3.8 kg 3 output channels 4.5 kg 4 output channels 5.2 kg

2. Removing the amplifier board (see Fig. 34)

- . Loosen screws 25.
 - . Turn plates 26 so that the printed circuit board comes loose.
 - . Pull out the circuit board in the vertical direction.
- Note: Mind the connection wires between the fader and the circuit board.
- . Remove the fader (depress tags 32 at the top and bottom of the fader inside the unit).
 - . The printed board can now be removed through the hole of the fader.
 - . For re-inserting the amplifier board proceed in the reverse order.

3. Removing the oscillator unit (see Fig. 34)

- . Remove the printed circuit boards of the amplifiers (see A. 2).
- . Remove six screws 33.
- . Remove five screws 34.
- . Remove the mounting plate with potentiometer and switches and the printed board from the block.
- . For re-inserting the oscillator unit, proceed in the reverse order. (Make sure that the lamp LA4 is in the metal tube!)

B. CIRCUIT DESCRIPTION

1. Output amplifiers (Fig. 36)

$\frac{IN}{V}$
The ~~output~~ circuit of the output circuit board is formed by transistors TS1 and TS2 by means of which a very low input impedance is obtained.*

When the drive source has a relatively high impedance this results in automatic matching of the signal amplification of this output circuit in case of a variation of the number of channels connected.

The signal is further amplified by the amplifier stage consisting of TS3, TS4 and TS5 and is applied to the output of insertion point D (PP). Via R8, R9 and C6 the signal across TS5 is fed back to the base of TS3 and via C5, R4 and R54 to TS1 and TS2. The degree of feedback can be adjusted with the aid of R4. The following amplifier stage consists of TS7... TS10 and amplifies this signal to a level of -5 dB (relative to 0 dB = 0.775 V/600 Ω). Via C15, R21 and R20 the signal from TS10 is fed back to the emitter of TS7 and via R23, C14 the signal is fed back to the base of TS8. The degree of feedback can be adjusted with R21.

Via SK10 and fader R32 which permits of attenuation of the signal from 0-90 dB, the signal reaches the base of TS12. The signal is amplified by 10 dB by the amplifier stage consisting of TS12-TS16 and is then fed to the output (V).

Via C25, R41, R40 the signal is fed back to the emitter of TS12 and via R43 to the base of TS14. The degree of feedback can be adjusted with R41.

Each amplifier stage is supplied via a separate stabilising/decoupling circuit. By depressing SK10 a connection is established between fader R32 and point ≈. In the output block an oscillator has been fitted. As soon as a frequency is selected at this oscillator unit the signal is applied to point ≈. This offers the possibility of fast alignment and checking.

* Patent pending!

SK10 will also close the circuit for LA2 in the case that the output channel is connected to the oscillator. Normally points C and D (PP) are interconnected, but it is also possible to include an external element between these points (e.g. filter, compressor, limiter). By depressing SK9 the input of the second amplifier stage is connected to points F. The pre-listening circuit is usually connected to this point, so that the signal can be monitored before the fader.

2. Oscillator (Fig. 38)

The oscillator operates according to the RC-principle (Wien bridge), the frequency being determined by fixed capacitors C2 and C3 and by selection of resistors R3-R7, R10-R14. The circuit of TS4 and LA1 serves for stabilising the Wien bridge. Level control is effected by means of R24 after which the signal becomes available via emitter follower TS5. TS6 serves for decoupling the supply voltage. The supply voltage is switched on by depressing one of the frequency buttons, which also causes lamp LA2 to light up.

C. CHECKING AND ADJUSTING

1. Recommended measuring equipment

- a. Signal generator GM 2317
- b. Valve voltmeter GM 6012
- c. Frequency counter or oscilloscope
- d. Multimeter PM 2411

2. Checking the amplifier

- . Connect the printed board as follows.

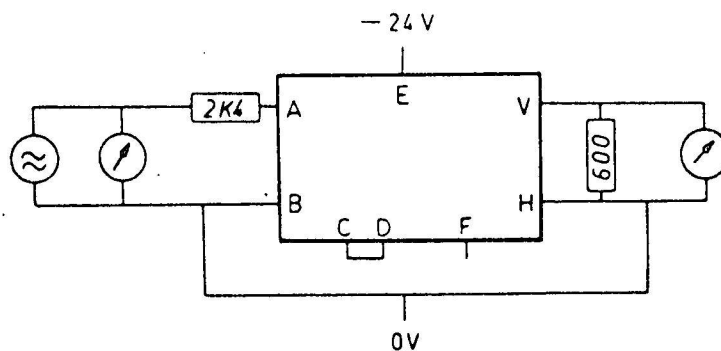


Fig. 31

- . The measuring instrument and generator should be high ohmic.
- . Set the fader to position 0 dB.
- . Check that SK10 is not depressed.
- . Adjust the signal generator to 44 mV/1000 Hz (-25 dB).
- . The output voltage across V and H should be 1.55 V (+6 dB).

3. Adjusting the amplifier

- . Connect the printed circuit board of the amplifier as shown in Fig. 31 (page 5). Set the signal generator to 44 mV (-25 dB).
- . Depress SK9.
- . The output voltage across points F and H should be 44 mV (-25 dB). Adjust with R4 (see Fig. 34).

- . Check that SK10 is not depressed.
- . The output voltage across H and point E of the fader should be 139 mV (-15 dB). Adjust with R21 (see Fig. 34).
- . Set the fader to positions 0 dB.
- . The voltage across V and H should be 1.55 V (+6 dB). Adjust with R41 (see Fig. 34).

4. Checking the oscillator

- . Connect the printed circuit board as follows.

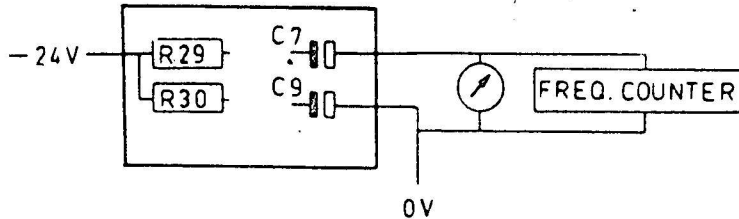


Fig. 32

- . Successively depress switches SK11A... SK11E.
- . The corresponding frequencies should be measured with a frequency counter ($\pm 10\%$).
- . The output voltage at all frequencies should be 440 mV (± 0.1 dB).

Note: It is also possible to check the frequency with the aid of an oscilloscope and a test generator by means of the Lissajous figure.

5. Adjusting the oscillator

- . Connect the oscillator as shown in Fig. 32.
- . Connect a valve voltmeter and a frequency counter to the oscillator output (terminal blocks).
- . Turn volume control R24 fully clockwise.
- . Depress button "1000 Hz" and adjust the output voltage to approx. +13 dB at 1000 Hz by alternately turning R5 and R12.
- . Note: Turning R5 and R12 in the same direction mainly affects the output voltage, turning in opposite direction mainly affects the frequency.
- . The other frequencies are adjusted in a similar way but attention should be paid that the output level is as far as possible equal to that at 1000 Hz.
- . After all frequencies have been adjusted the output level of the oscillator unit is adjusted to -5 dB with R24.
- . Adjust R3/R10 for 60 Hz
- . Adjust R4/R11 for 125 Hz
- . Adjust R5/R12 for 1000 Hz
- . Adjust R6/R13 for 4000 Hz
- . Adjust R7/R14 for 14000 Hz

D. LIST OF PARTS

Item	Code number	Description	Fig.
18	4822 492 60093	Transistor clamp	34
23	4822 413 30303	Knob	33
24	4822 105 10008	Fader	33
27	4822 255 40006	Transistor holder	34
30	4822 381 10158	Lens, red	33
31	4822 267 70023	Print socket	34
SK9, SK10	4822 276 10265	Switch	33, 35
SK11	4822 276 10327	Switch	33, 37
<u>Amplifier</u>			
TS1, TS2	4822 130 40355	Transistor BC 178	35
TS3	4822 130 40354	Transistor BC 177	35
TS4, TS5, TS6	4822 130 40388	Transistor 2N2904	35
TS7	4822 130 40355	Transistor BC 178	35
TS8	4822 130 40354	Transistor BC 177	35
TS9, TS10, TS11	4822 130 40388	Transistor 2N2904	35
TS12, TS13	4822 130 40355	Transistor BC 178	35
TS14	4822 130 40354	Transistor BC 177	35
TS15, TS16, TS17	4822 130 40388	Transistor 2N2904	35
GR3...GR6	4822 130 30132	Zener diode BZY 59	35
LA2	4822 130 40127	Lamp	35
L1	4822 158 10286	Coil	35
R4	4822 100 10025	Potentiometer 4700 Ω	35
R21	4822 100 10023	Potentiometer 470 Ω	35
R32	4822 105 10008	Fader	35
R41	4822 100 10023	Potentiometer 470 Ω	35
All other resistors carbon 1/8 W, 2 %, code number 4822 111 30...			
C1, C2	4822 124 20378	Electrolytic capacitor 80 μ F	35
C3...C5	4822 124 20078	Electrolytic capacitor 125 μ F 10 V	35
C6	4822 120 20094	Mica capacitor 330 pF	35
C7...C10	4822 124 20016	Electrolytic capacitor 80 μ F 25 V	35
C11	4822 124 20081	Electrolytic capacitor 20 μ F 16 V	35
C12	4822 124 10036	Electrolytic capacitor 0.64 μ F 25 V	25
C13	4822 124 20078	Electrolytic capacitor 125 μ F 10 V	35
C14	4822 120 20094	Mica capacitor 330 pF	35
C15	4822 124 20078	Electrolytic capacitor 125 μ F 10 V	35
C16...C19	4822 124 20016	Electrolytic capacitor 80 μ F 25 V	35
C20, C21	4822 124 20081	Electrolytic capacitor 20 μ F 16 V	35
C22, C23	4822 124 20078	Electrolytic capacitor 125 μ F 10 V	35
C24	4822 124 20156	Electrolytic capacitor 100 μ F 16 V	35
C25	4822 124 20078	Electrolytic capacitor 125 μ F 10 V	35
C26	4822 124 20116	Electrolytic capacitor 1000 μ F 10 V	35
C27, C28	4822 124 20016	Electrolytic capacitor 80 μ F 25 V	35
C29	4822 121 50235	Polyester capacitor 3300 pF	35

Item	Code number	Description			Fig.
C30	4822 124 20016	Electrolytic capacitor	80 μ F	25 V	35
C31	4822 120 60103	Electrolytic capacitor	680 pF		35
C32					35
<u>Oscillator</u>					
TS1, TS2, TS3	4822 130 40355	Transistor BC 178			37
TS4, TS5, TS6	4822 130 40388	Transistor ZN 2904			37
GR1	4822 130 30132	Zenerdiode BZY 59			37
LA3	4822 134 49137	Lamp			37
LA4	4822 134 40058	Stabilising lamp			37
R3, R4	4822 100 10051	Potentiometer	22 k Ω		37
R5	4822 100 10024	Potentiometer	10 k Ω		37
R6	4822 100 10027	Potentiometer	2200 Ω		37
R7	4822 100 10021	Potentiometer	1000 Ω		37
R10, R11	4822 100 10051	Potentiometer	22 k Ω		37
R12	4822 100 10024	Potentiometer	10 k Ω		37
R13	4822 100 10027	Potentiometer	2200 Ω		37
R14	4822 100 10021	Potentiometer	1000 Ω		37
R21	4822 112 20096	Wire wound resistor	390 Ω		37
R24	4822 101 20061	Potentiometer	5000 Ω		37
R27	4822 110 30112	Carbon resistor	1500 Ω	2 % 1/4 W	37
C1	4822 124 20081	Electrolytic capacitor	20 μ F	16 V	37
C2, C3	4822 121 50232	Polyester capacitor	20 kpF	2 %	37
C4	4822 120 60087	Mica capacitor	180 pF		37
C5	4822 124 20016	Electrolytic capacitor	80 μ F	25 V	37
C6	4822 124 20081	Electrolytic capacitor	20 μ F	16 V	37
C7, C8	4822 124 20016	Electrolytic capacitor	80 μ F	25 V	37
C9	4822 124 20082	Electrolytic capacitor	250 μ F	25 V	37

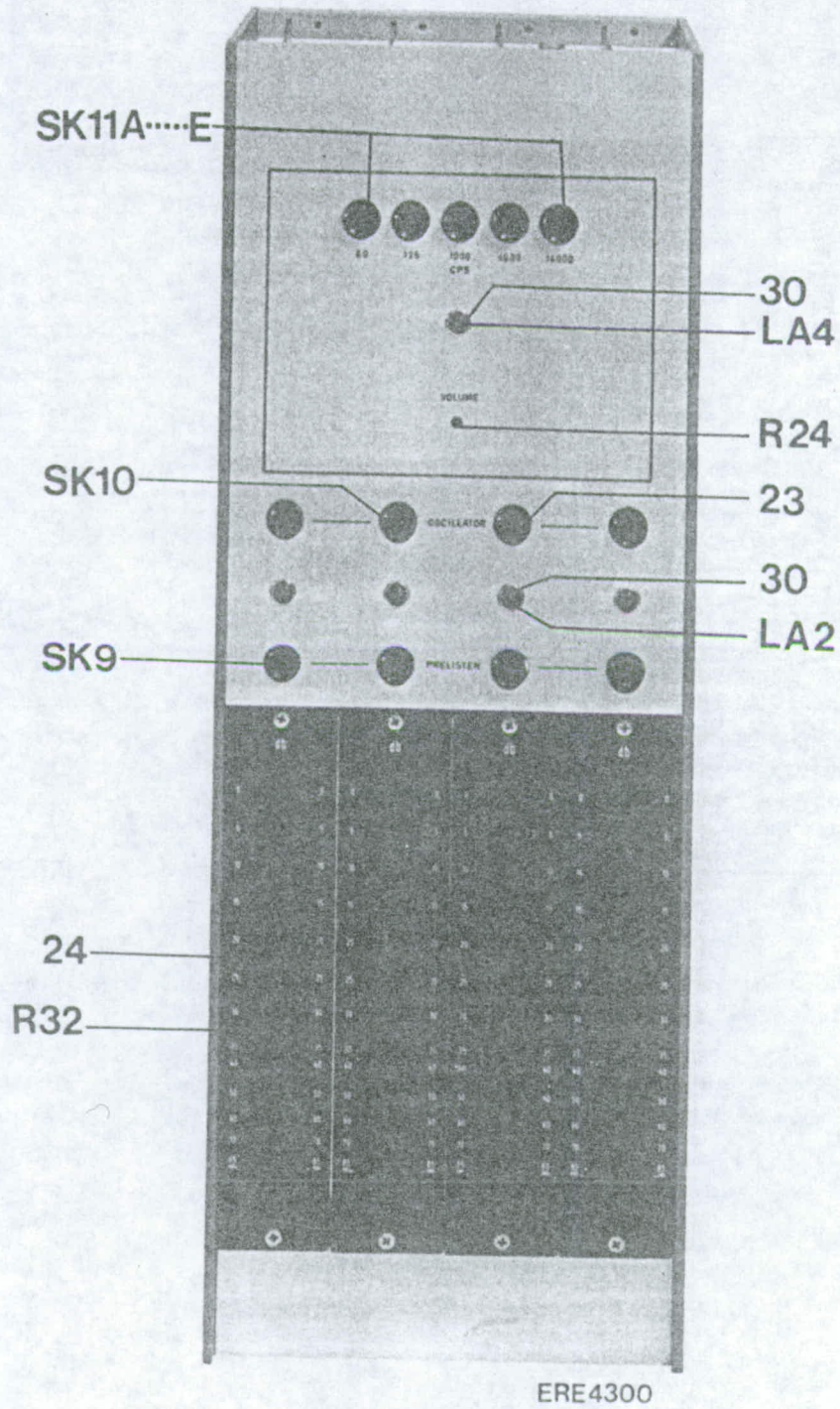


Fig. 33

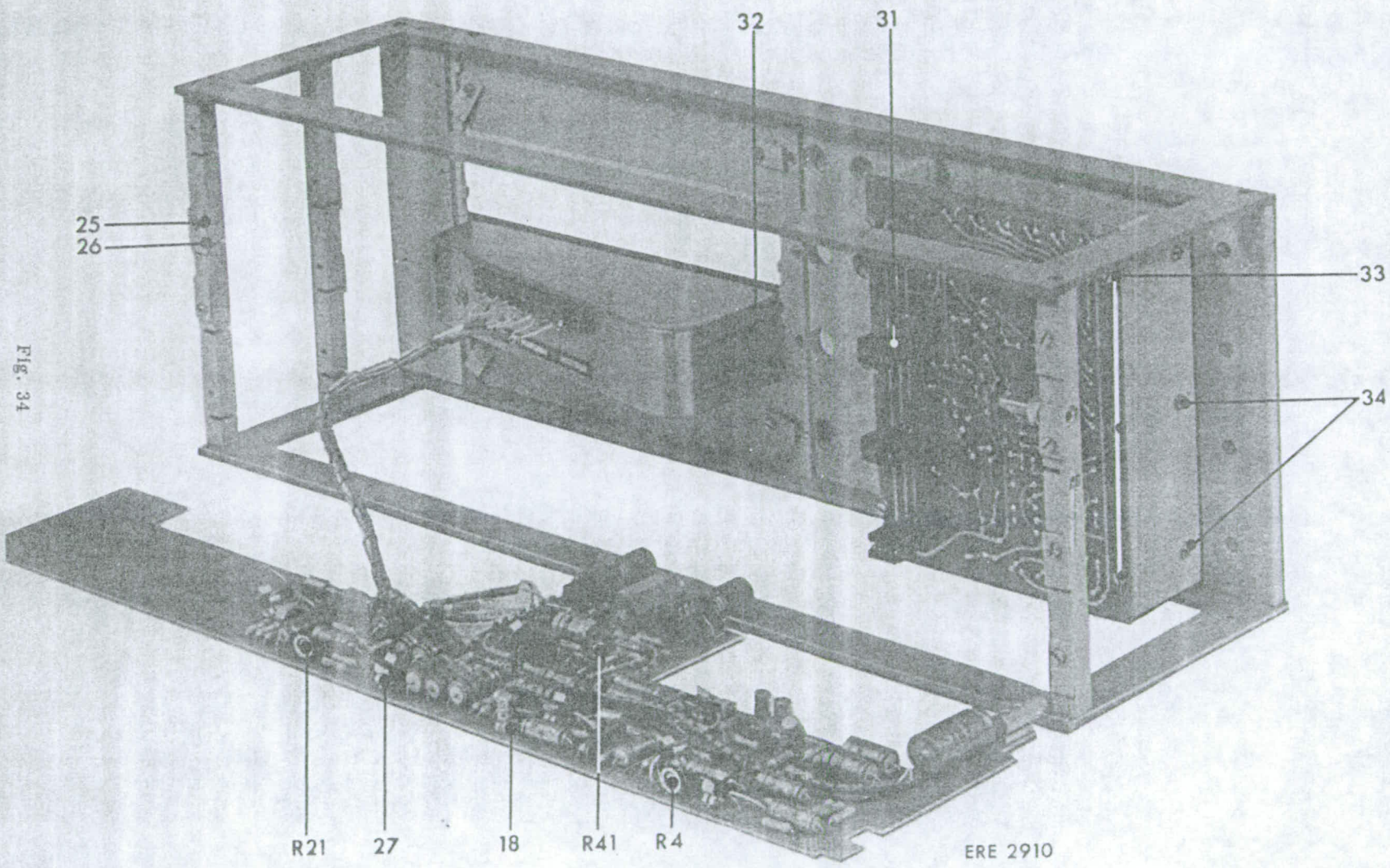


FIG. 34

ERE 2910

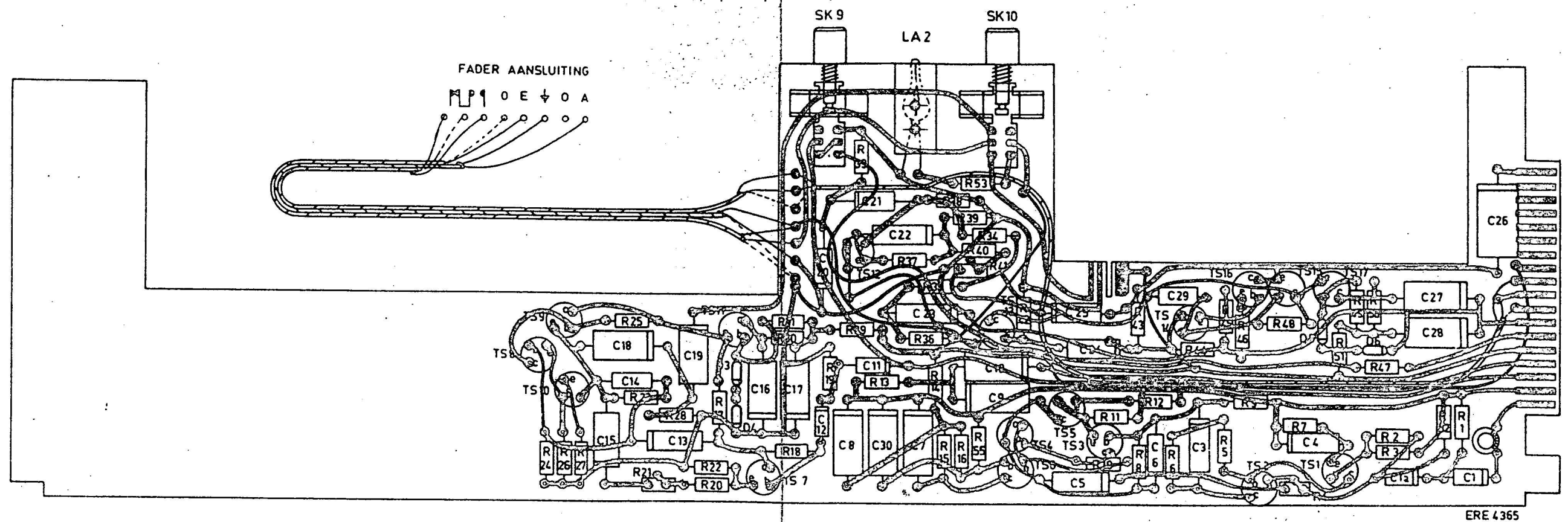


Fig. 35

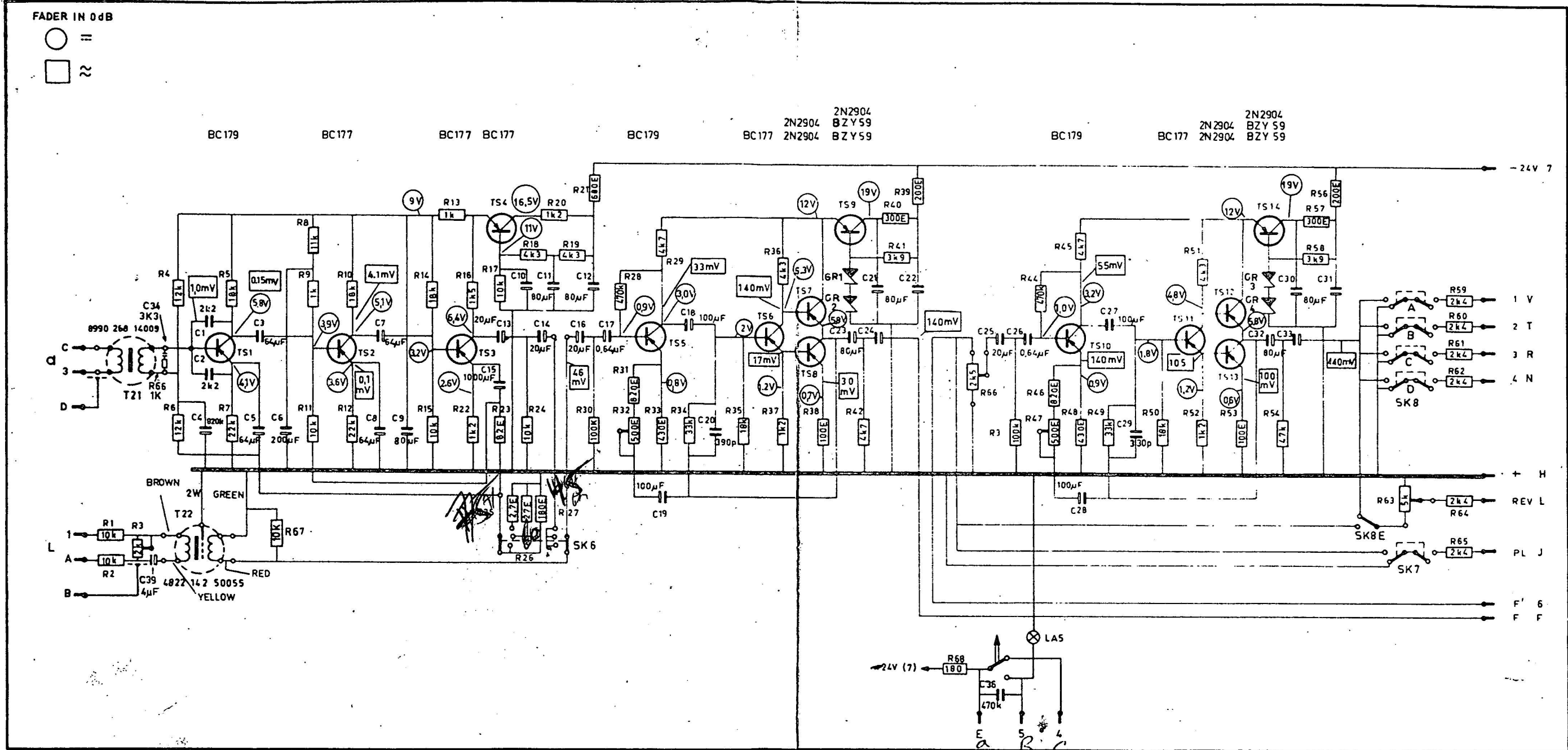


Fig. 25

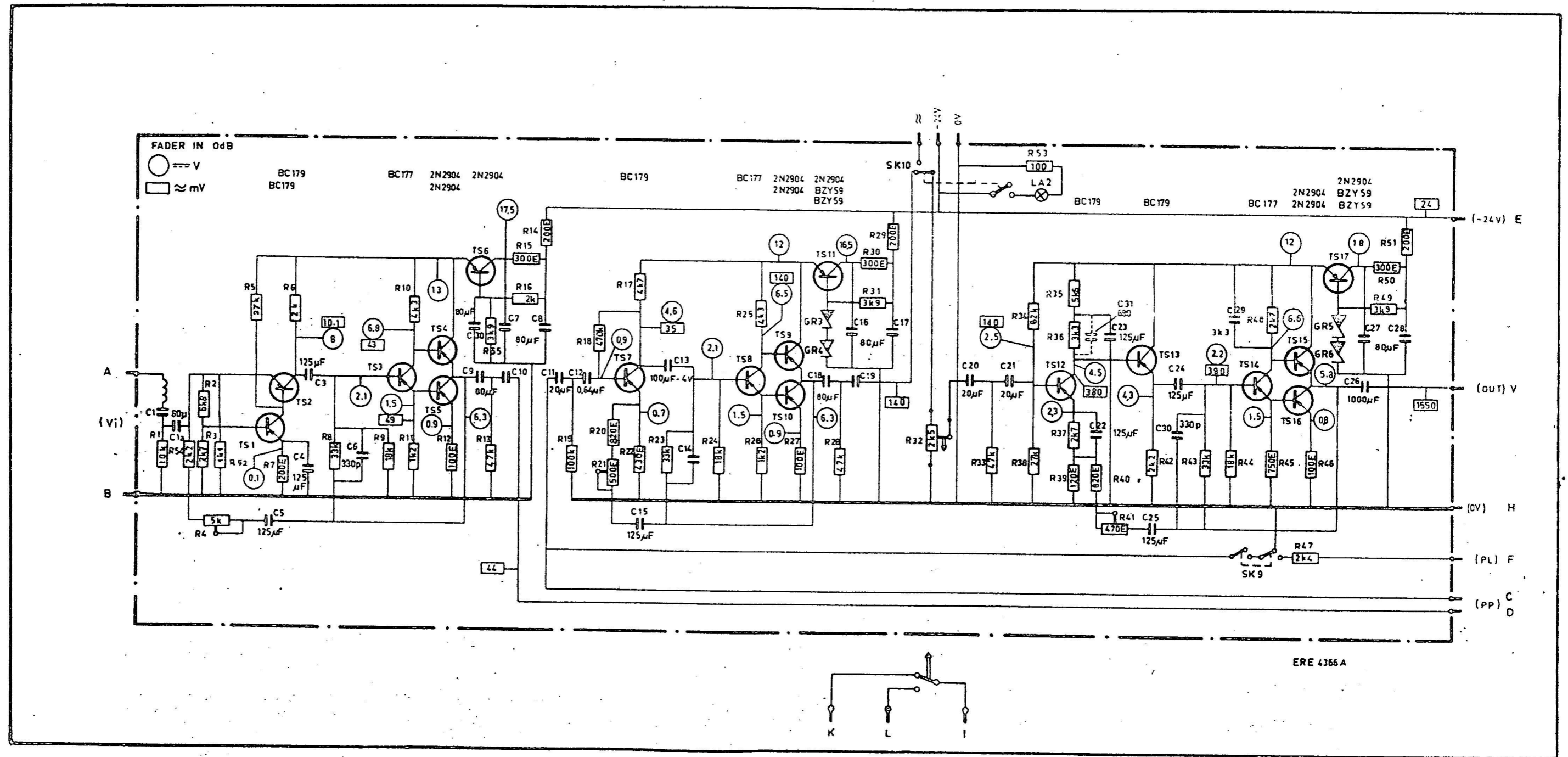
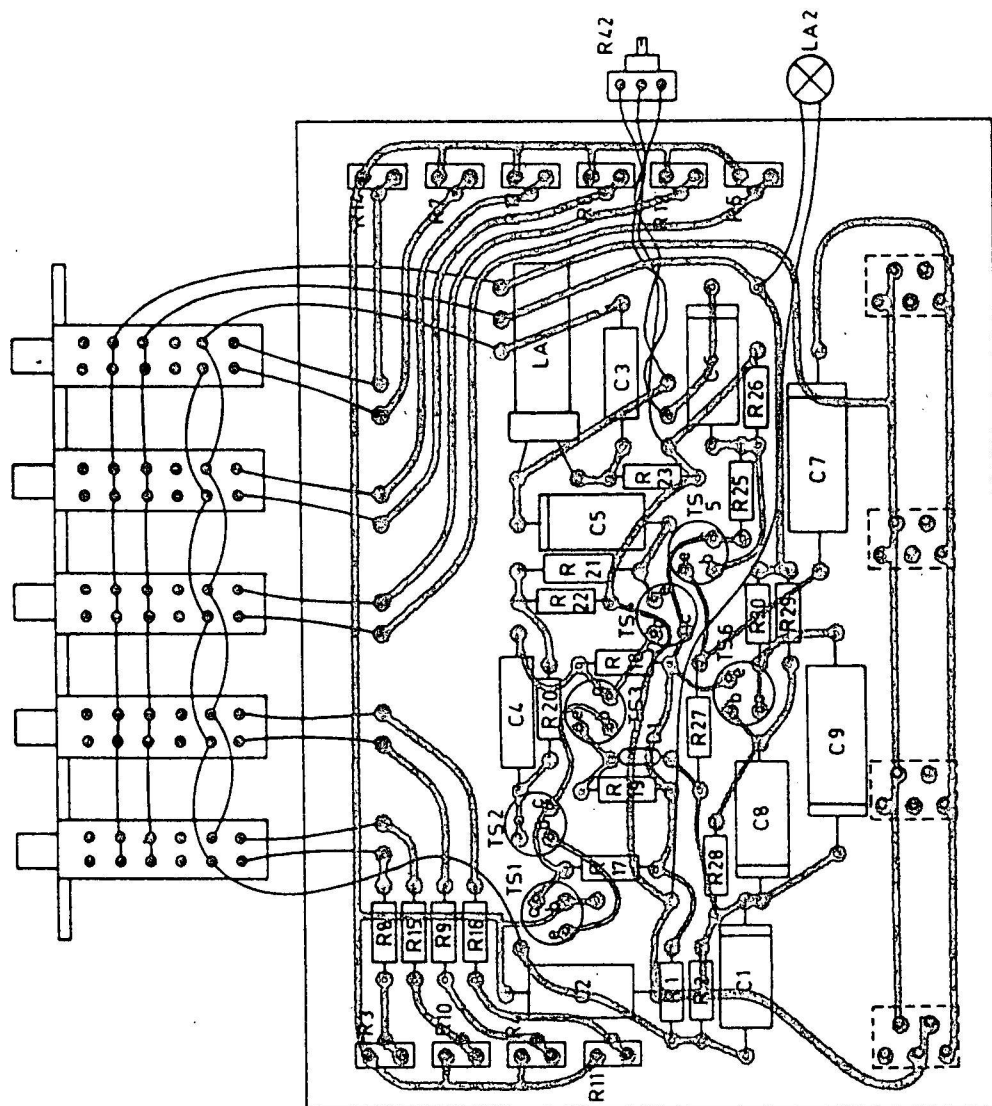


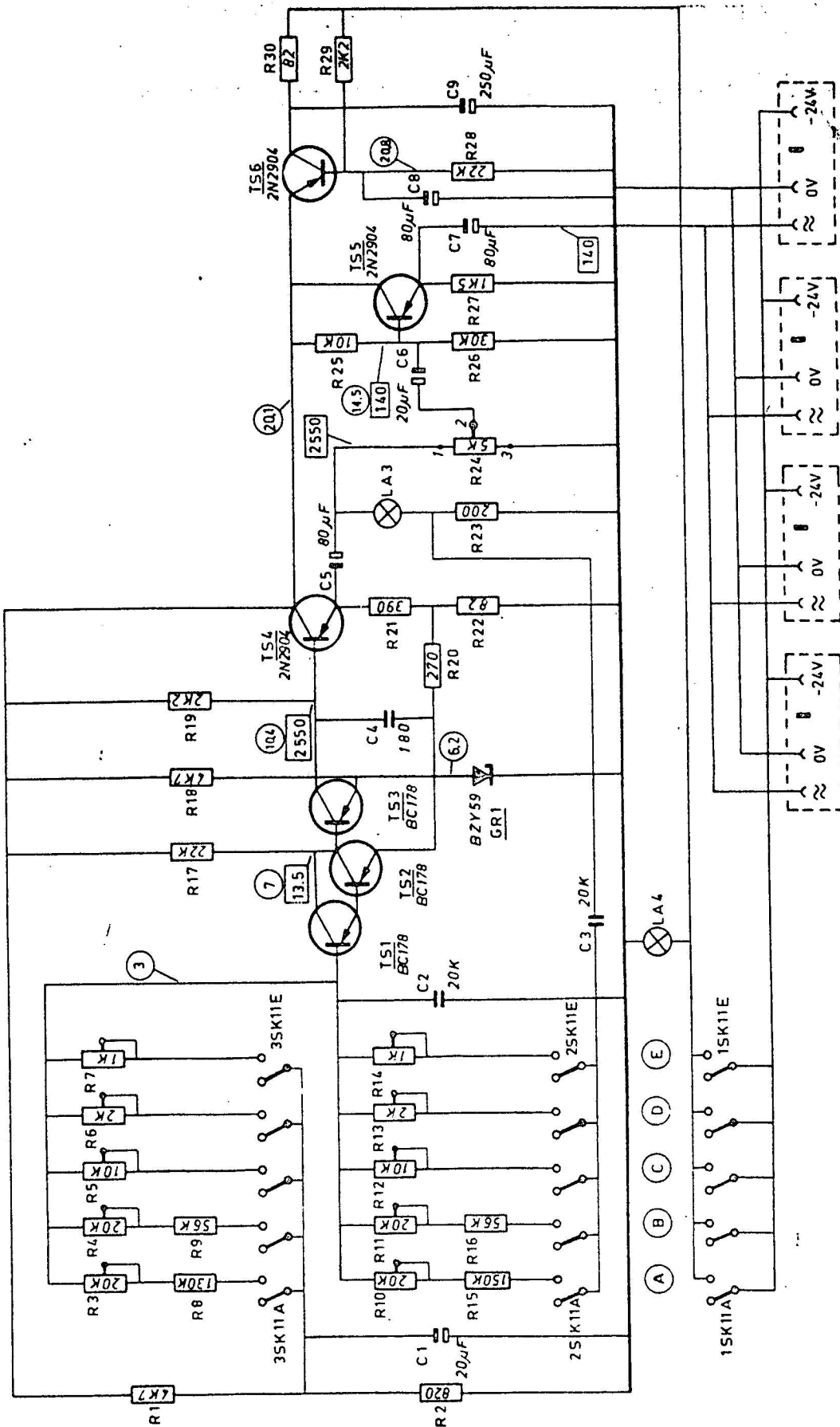
Fig. 36



ERE 4372

Fig. 37

 V
 mV

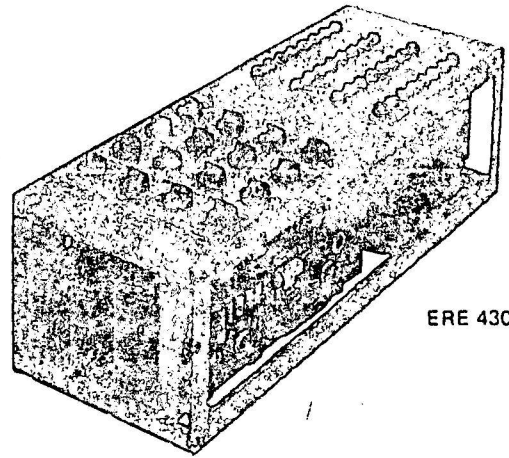


ERE 4371A

Fig. 38



PHILIPS *Service*



ERE 4301

EQUALIZER BLOCK
for a mixing desk of the MD-range (third generation)
8993 200 77411

4822 733 21667

1/769

SERVICE INFORMATION																				
------------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

CONTENTS**A. GENERAL INFORMATION**

1. Technical data
2. Removing the printed circuit board

B. CIRCUIT DESCRIPTION**C. CHECKING AND ADJUSTING**

1. Recommended measuring equipment
2. Checking and adjusting

D. LIST OF PARTS**FIGURES**

51. Connection diagram for checking and adjusting
52. Top view
53. Bottom view
54. Circuit board
55. Circuit diagram
56. Frequency response
57. Interconnecting board

A. GENERAL

This equalizer block has been designed for use in conjunction with the other electronic circuitry of an MD-mixing desk (third generation).

The block consists of a metal housing which contains four printed circuit boards. Each board contains an audio amplifier, bass filter, treble filter, presence filter and their controls and push-buttons for inserting the filter circuit into a channel (max. eight channels).

1. Technical data

Input

Input impedance	: approx. 5000 Ω
Source impedance	: approx. 5 Ω
Level	: -15 dB
Overload reserve	: 23 dB

Output

Output impedance	: $\leq 5 \Omega$
Load impedance	: approx. 600 Ω
Bass control (in 10 steps of 2 dB)	: -10 dB/+10 dB
Treble control (in 10 steps of 2 dB)	: -10 dB/+10 dB
Presence selector	: 1 kHz, 1.4 kHz, 2 kHz, 2.8 kHz, 4 kHz.
Presence boost (in 4 steps of 2 dB)	: 0...8 dB
Supply voltage	: 24 Vdc, max. ripple 1 mV
Current consumption	: 80 mA
Ambient temperature	: -10...+45 $^{\circ}\text{C}$
Max. relative humidity	: 95 %
Dimensions	: 170 x 136 x 460 mm
Weight	: 4.2 kg

2. Removing the printed circuit board (see Figs. 52 and 53)

- . Remove the interconnecting board by pulling it upwards.
- . Remove knobs 50 (pull top section upwards, loosen screw, pull bottom section upwards).
- . Loosen screws 25.
- . Turn plates 26 so that the printed circuit board comes loose.
- . Pull out the circuit board in the vertical direction.
- . For re-inserting the circuit board, proceed in the reverse order.

B. CIRCUIT DESCRIPTION

The incoming signal, selected by means of one of the switches SK16A...SK16H, is applied to the amplifier unit via correction filter L1, L2 and R1...R12 for the bass frequencies and correction filter C1, C2 and R13...R24 for the treble frequencies.

After amplification by TS1 and TS2, the signal is applied to the output stage.

From the emitter of TS3 the signal is fed back to the emitter of TS1 via R41, C15, R30 etc.

This feedback circuit is shunted by the presence filter consisting of C16...C20 and R47...R50.

By means of SK15, a circuit can be selected which is tuned to one of the presence frequencies. Since every time a different tapping of the coil is used, the Q of every L-C circuit remains practically constant. The damping of the selected circuit can be altered by selecting one of the resistors R47... R50 by means of SK14.

C. CHECKING AND ADJUSTING

1. Recommended measuring equipment

- a. Signal generator GM 2317
- b. Valve voltmeter GM 6012
- c. Multimeter PM 2411

2. Checking and adjusting

- . Remove the printed board from the block (see A.2)
- . Connect the printed board as follows (see also Fig.54):

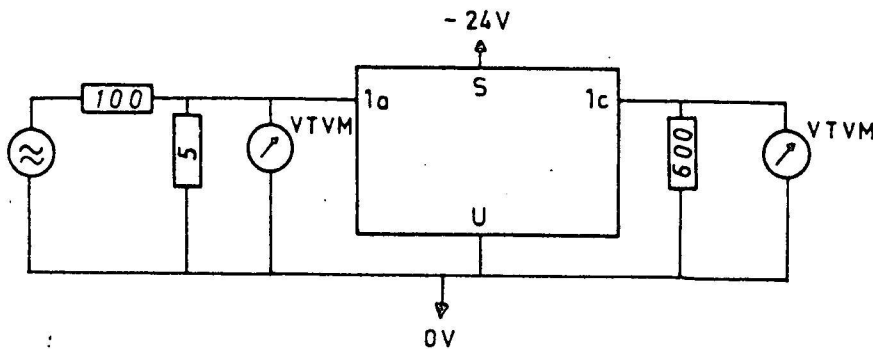


Fig. 51

- . Set SK12 and SK13 to position "0" (fully clockwise and then five steps anti-clockwise).
- . Apply a signal of 139 mV/1000 Hz (-15 dB) to points 1a and U (see Fig.51).
- . Depress SK16A.
- . The output voltage across points 1c and U should be 139 mV (-15 dB); adjust with R41, see Fig.53 and Fig.54.
- . The transistor settings and the AC voltage should be measured as shown in Fig.55.
- . Vary the frequency of the output signal of the generator from 50 Hz to 15 kHz.
- . The frequency response should be as shown in Fig.56.
- . Repeat this for each position of SK12...SK14.

Note: It may occur that an ASY26/83 is applied instead of an AC107. These two types can simply be exchanged without altering the circuitry.

Sometimes, a large noise increase may occur in the filter. In that case it is advisable to replace TS1.

D. LIST OF PARTS

Item	Code number	Description	Fig.
SK12,SK13	4822 273 30255	Switch	52/54
SK14,SK15	4822 273 30019	Switch	52/54
SK16A...SK16H	4822 276 10316	Switch	52/54
L1	4822 158 20214	Coil 4.4 H	54
L2	4822 158 20213	Coil 0.44 H	54
L3	4822 158 20215	Coil 0.66 H	54
TS1	4822 130 40353	Transistor BC 179	54
TS2	4822 130 40355	Transistor BC 178	54
TS3,TS4	4822 130 40388	Transistor 2N2904	54
19	4822 255 40006	Transistor holder	53
23	4822 413 30303	Knob	52
50	4822 413 40116	Knob	52
51	4822 267 70023	Print socket	53

Resistors

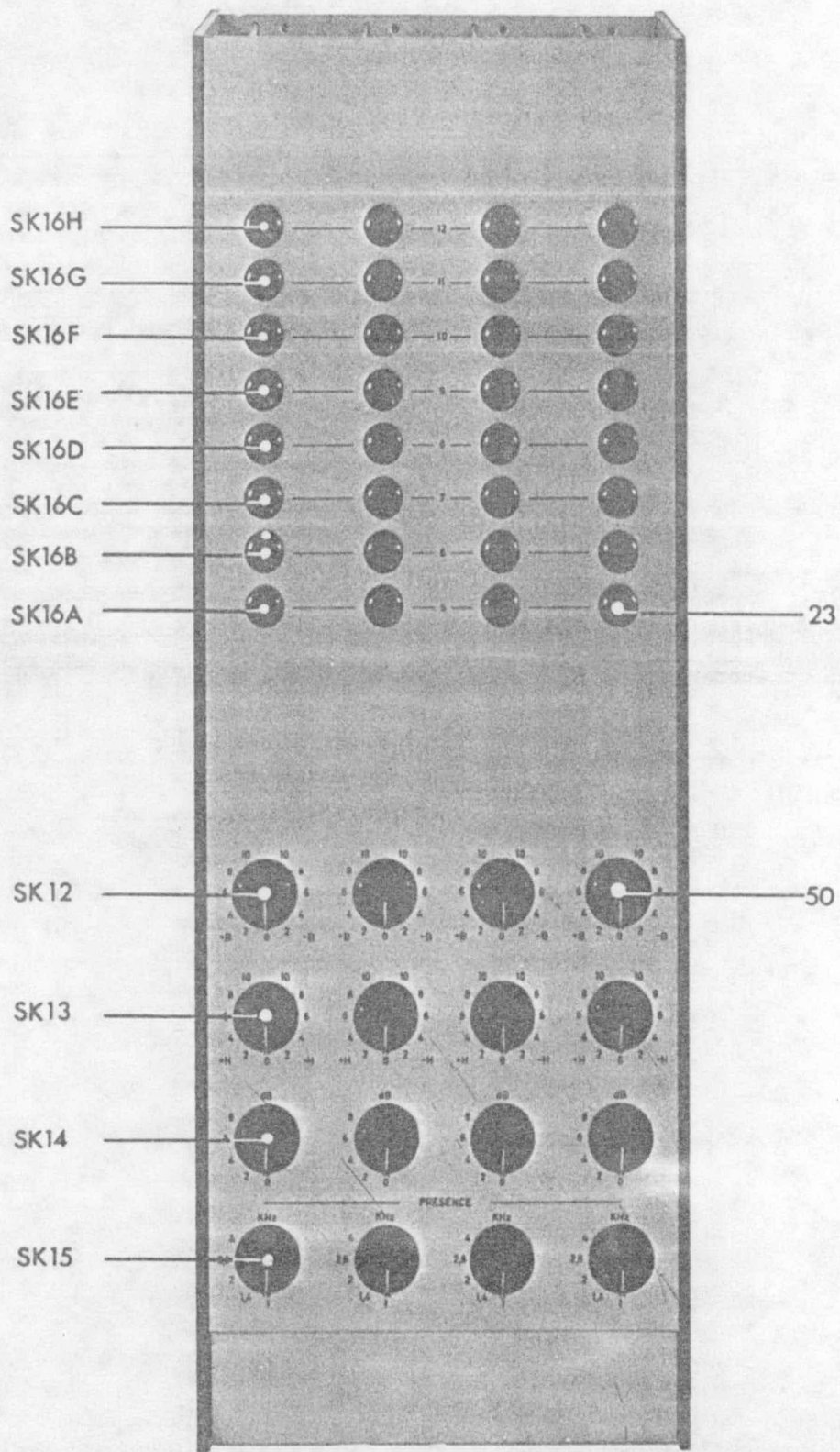
All resistors are of the carbon type 1/8 W, 2 %, except:

R41	4822 110 40109	Carbon $\frac{1}{2}$ W 5 %	1200 Ω
R42	4822 100 10025	Potentiometer	4700 Ω

Capacitors

The capacitors are of the polyester type, 2 % > 50 V

C4, C5, C7, C8	4822 124 20078	Electrolytic	125 μ F	16 V
C9, C10, C27	4822 124 20073	Electrolytic	32 μ F	10 V
C3	4822 124 20016	Electrolytic	80 μ F	25 V
C6, C18	4822 124 20081	Electrolytic	20 μ F	16 V
C11, C10	4822 124 20082	Electrolytic	250 μ F	25 V
C6	4822 124 20292	50 μ F	40 V	
C7	4822 120 60098	470 μ F	5 %	
C8	4822 124 20409	560 μ F	10 V	
C9	4822 124 20409	560 μ F	10 V	
C10	4822 124 20217	32 μ F	64 V	
C11	4822 120 41127	5600 pF	400 V	10 %
C12	4822 124 20286	640 μ F	16 V	
C13	4822 121 40036	0.1 μ F	160 V	10 %
C14	4822 124 20218	32 μ F	64 V	
C15	4822 124 20222	64 μ F	40 V	
C16	4822 124 20217	32 μ F	64 V	



ERE3236

Fig. 52

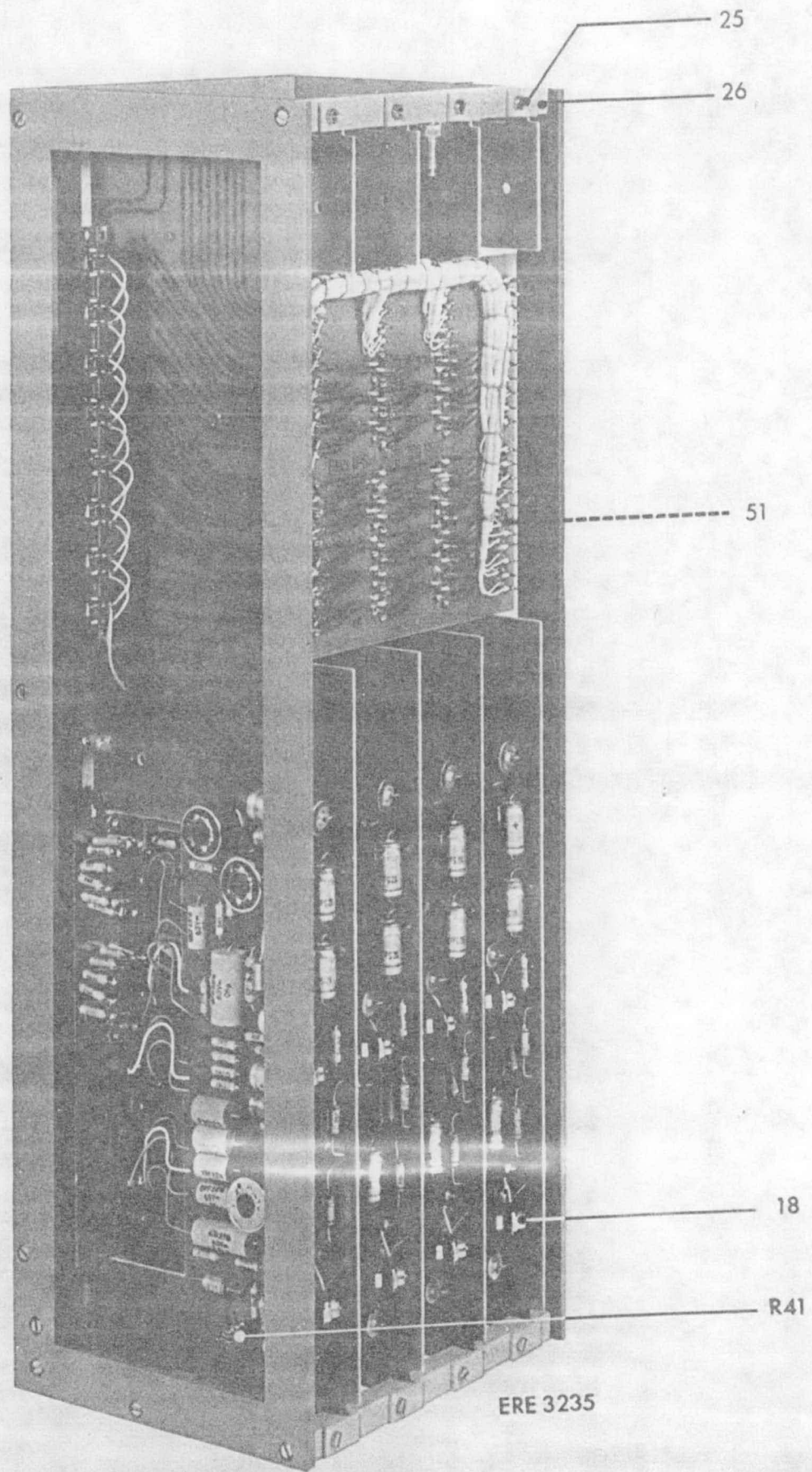


Fig. 53

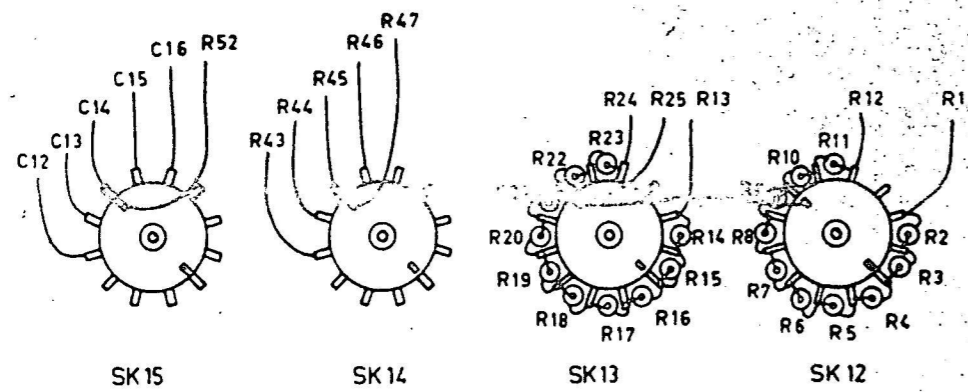
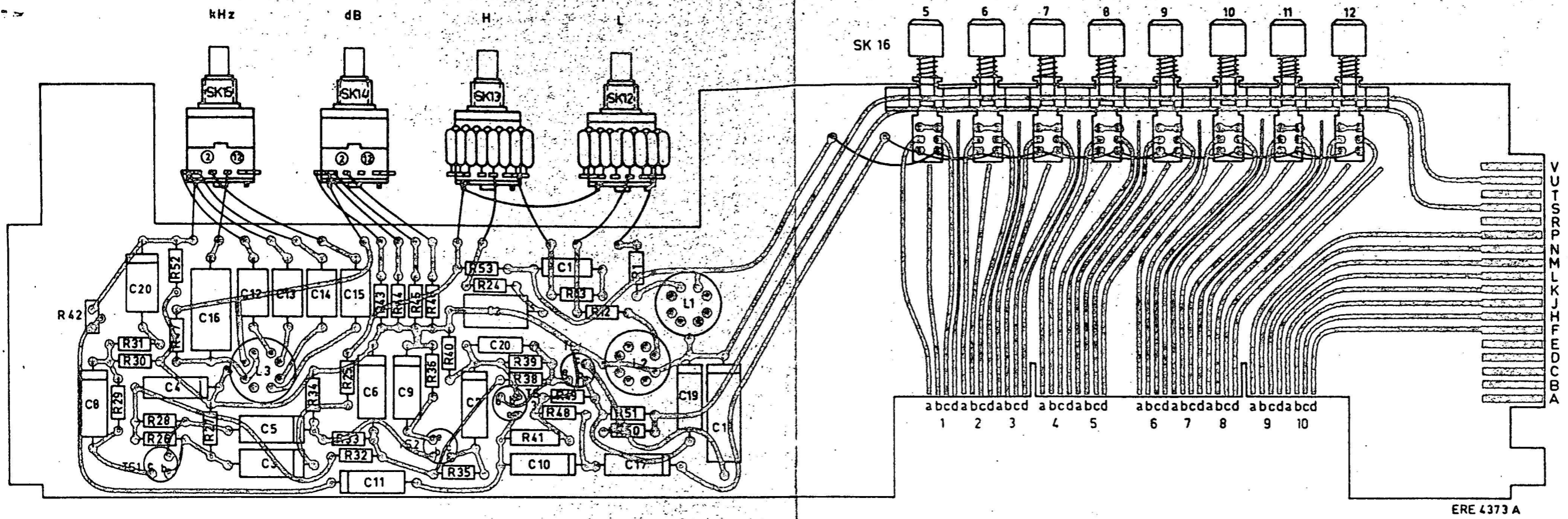


Fig. 54

BY ERE 4373

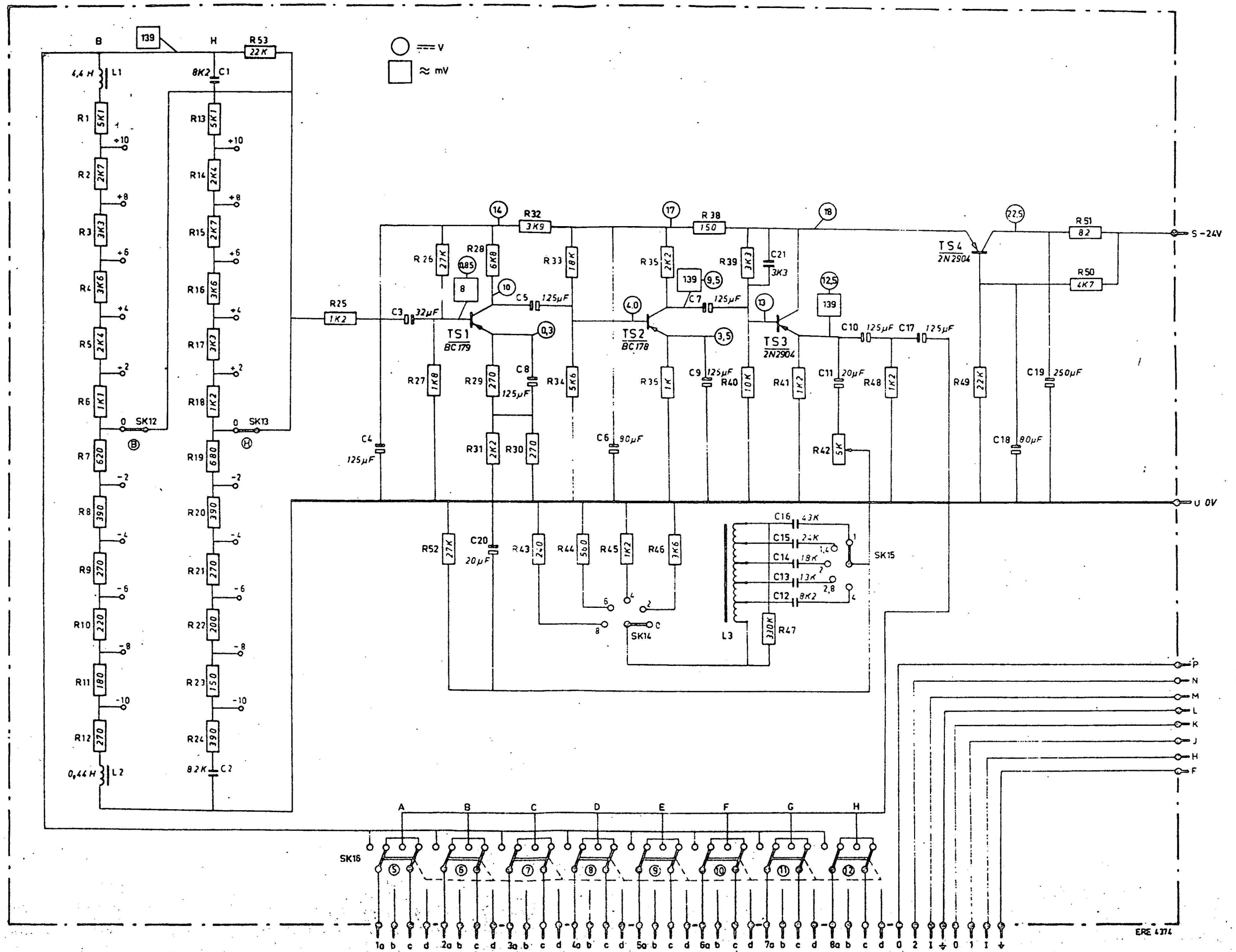


Fig. 55

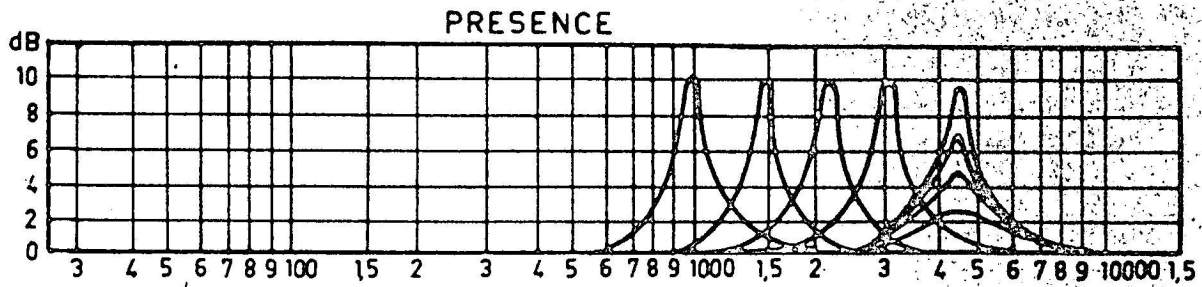
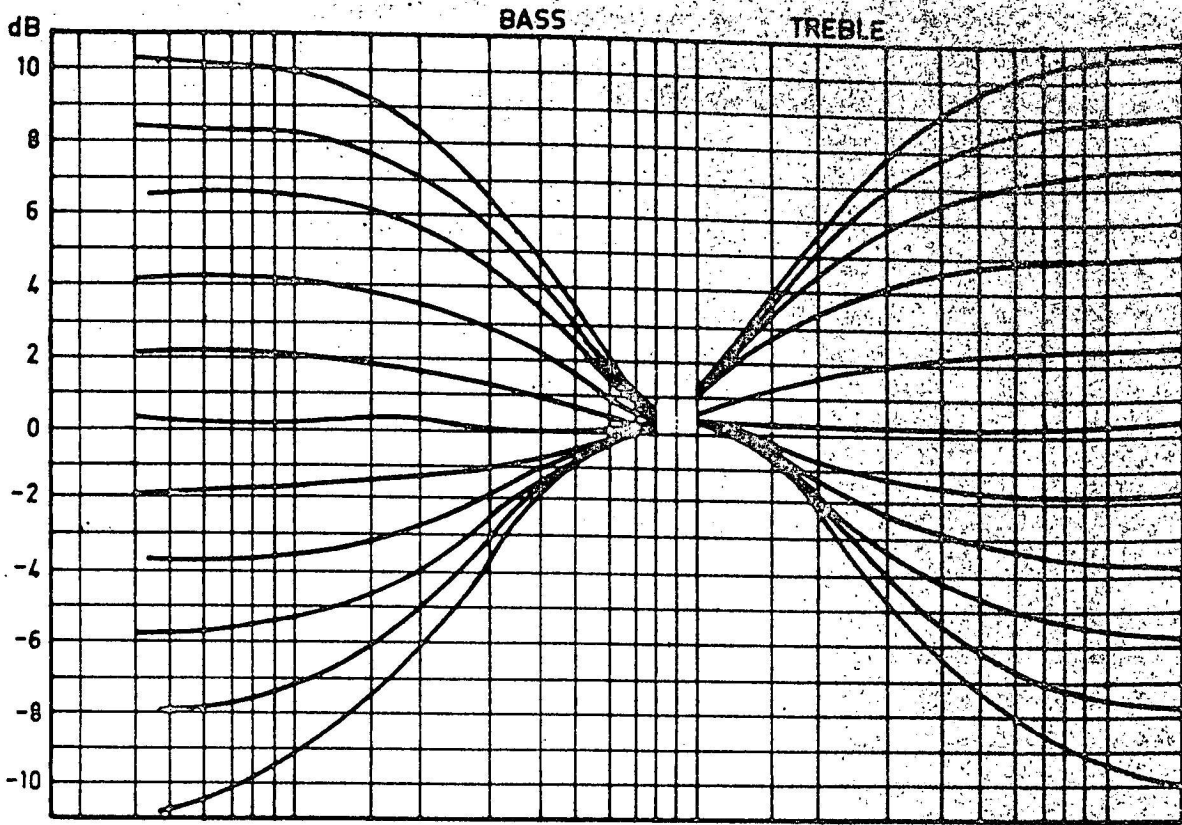
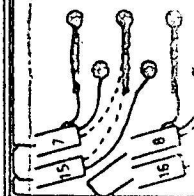
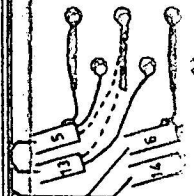
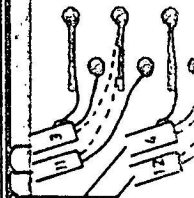
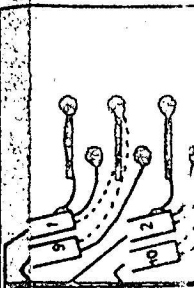
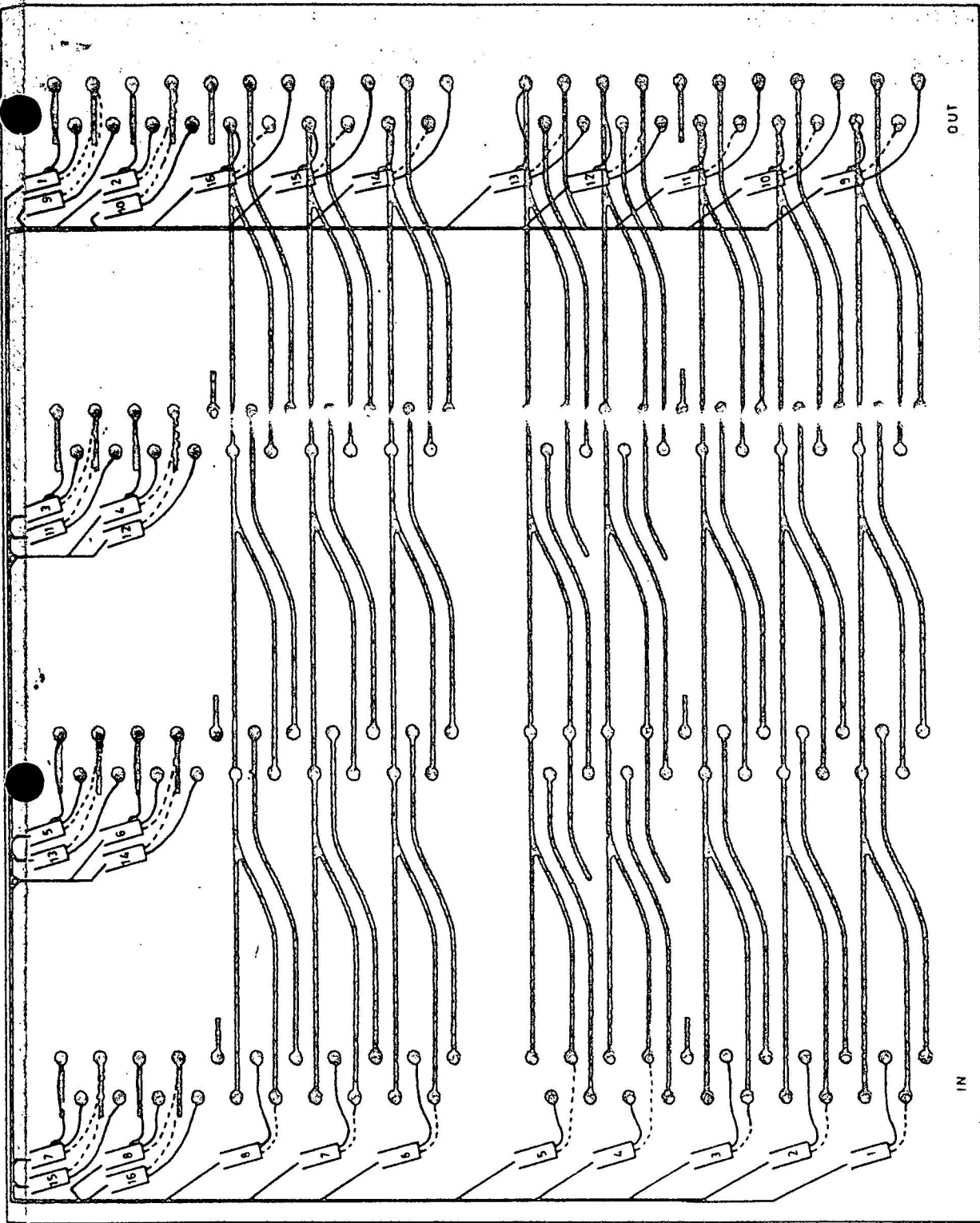


Fig. 56

ERE 3243



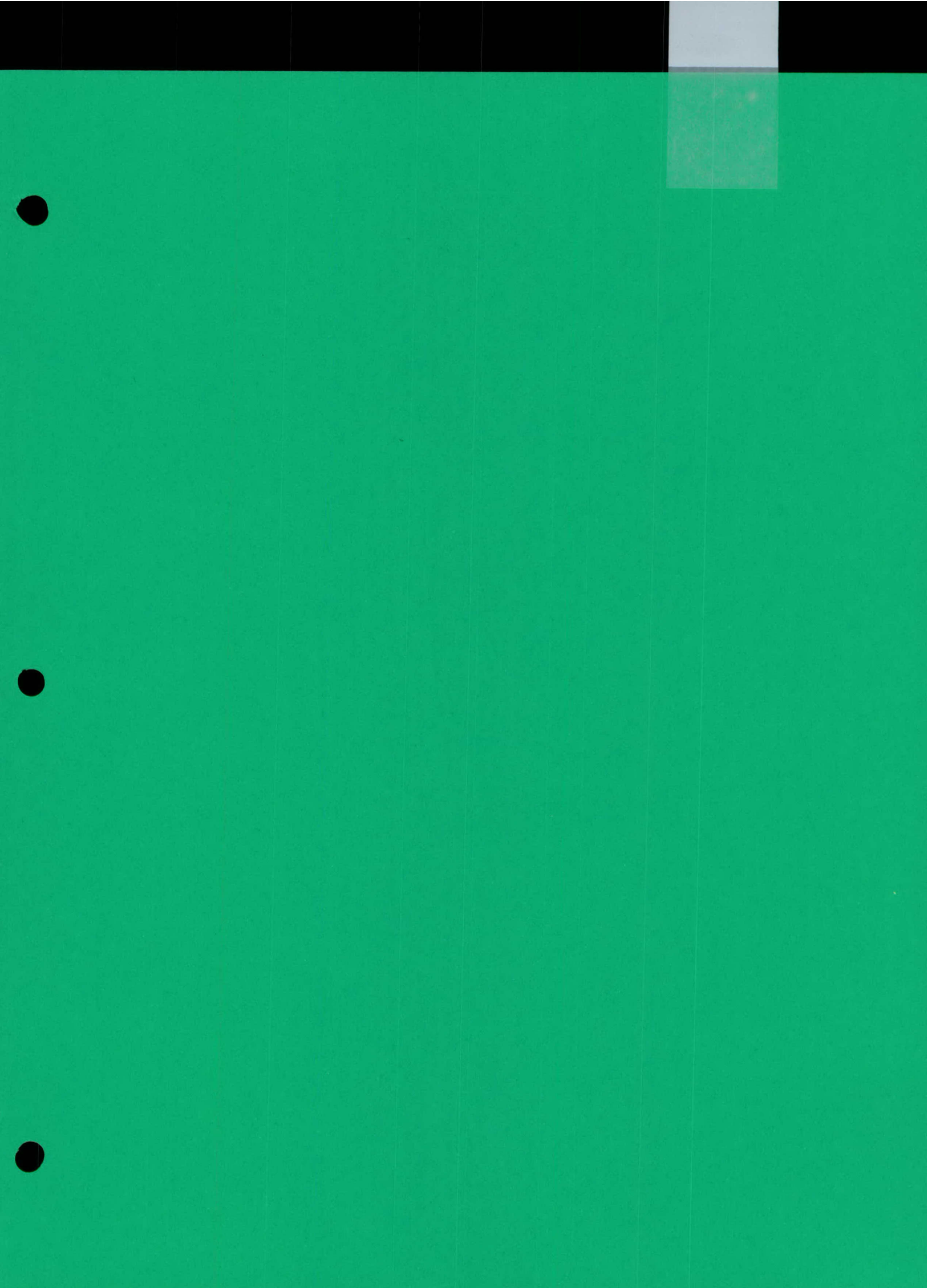


OUT

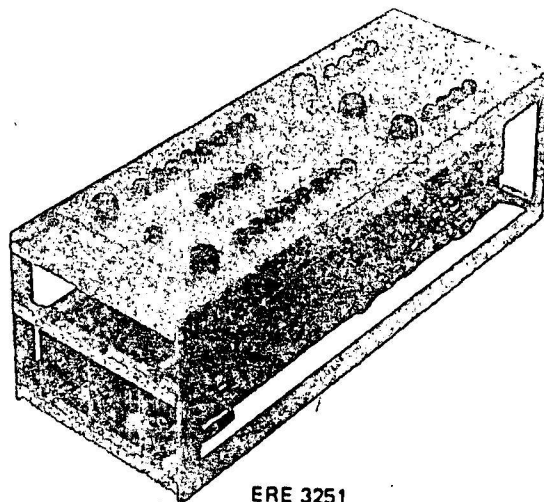
IN

WHITE
--- COLOUR
SCREEN

Fig. 57



PHILIPS *Service*



ERE 3251

MONITOR BLOCK
for a mixing desk of the MD-range (third generation)

ø993 200 77311

4822 733 21668

1/769

SERVICE INFORMATION											
------------------------	--	--	--	--	--	--	--	--	--	--	--

CONTENTS

A. GENERAL INFORMATION

1. Technical data
2. Removing the printed circuit boards

B. CIRCUIT DESCRIPTION

1. Amplifier board A
2. Amplifier board B
3. Amplifier board C

C. CHECKING AND ADJUSTING

1. Recommended measuring equipment
2. Checking and adjusting board A
3. Checking and adjusting board B
4. Checking and adjusting board C

D. LIST OF PARTS

FIGURES

- 40a. Connection diagram for checking board A
- 40b. Connection diagram for checking board B
- 40c. Connection diagram for checking board C
41. Top view
42. Bottom view
- 43a. Circuit board A
- 43b. Circuit diagram board A
- 44a. Circuit board B
- 44b. Circuit diagram board B
- 45a. Circuit board C
- 45b. Circuit diagram board C
46. Transformers T23...T29
47. Block diagram

A. GENERAL INFORMATION

This monitor block has been designed for use in conjunction with the other electronic circuitry of the MD-mixing desk (third generation).

The block consists of a metal housing which contains three different circuit boards.

Board A (on the left in the block) contains the control knobs and electronics for monitor channel 1 and reverberation return.

Board B (in the middle of the block) contains the control knobs and electronics for pre-listening, talk-back and 20 dB monitor attenuator.

Board C (on the right in the block) contains the control knobs and electronics for monitor channel 2 and program-distribution.

1. Technical data (see also Fig.47)

Inputs:

A. Monitor

Input impedance	10 k Ω
Source impedance	600 Ω
Level	+6 dB

B. From reverberation unit

Input impedance	10 k Ω
Source impedance	approx. 600 Ω
Level	0 dB
Overload reserve	15 dB

C. Pre-listening in

Input impedance	4 Ω
Source impedance	2.4 k Ω
Drive current	58 μ A

D. Talk-back microphone

Input impedance	5 k Ω
Source impedance	200 Ω
Level	-60 dB

E. Reverberation output

Input impedance	4 Ω
Source impedance	2.4 k Ω
Drive current	58 μ A

Outputs:

F. Monitor output

Output impedance	50 Ω
Load impedance	approx. 600 Ω
Level	+6 dB

G. From reverberation unit

Output impedance	50 Ω
Load impedance	600 Ω
Level	-15 dB

H. Pre-listening (to VU-meter)

Output impedance	50 Ω
Load impedance	approx. 10 k Ω
Level	-5 dB

J. Pre-listening (to loudspeaker)

Output impedance	50 Ω
Load impedance	1200 Ω
Level	-5 dB

K. Talk-back (when EL6512 is used as 2 W-amplifier)

Output impedance	10 Ω
Load impedance	20 Ω
Output power	2 Watt

L. Reverberation output

Output impedance	50 Ω
Load impedance	600 Ω
Level	+6 dB
Overload impedance	6 dB

Supply voltage 24 V D.C., max. ripple 1 mV

Current consumption 130 mA

Ambient temperature $-10^{\circ} \dots +45^{\circ} \text{C}$

Max. relative humidity 95 %

Dimensions 170 x 136 x 460 mm

Weight 3.7 kg

2. Removing a printed circuit board (Figs. 41 and 42)

- . Remove the knobs 22 (pull top section upwards, loosen screw, pull bottom section upwards).
- . Loosen screws 25.
- . Turn plates 26 to release the printed circuit board.
- . Pull out the circuit board in vertical direction.
- . For re-inserting the circuit board, proceed in the reverse order.

B. CIRCUIT DESCRIPTION

1. Amplifier board A (Fig. 43)

The board contains an amplifiers for the monitor circuit and an amplifier for the signal coming from a reverberation unit.

a. Monitor circuit

The signals from the line output I...IV, prelistening circuit or the incoming signals via connections M1 and M2, selected by means of SK17A...SK17G, are applied to the base of TS1 via T23 and volume control R42. The signal goes to Monitor output F via TS2, TS3 and TS4. From this output the signal is fed back to the base of TS2 via R12 and C4 and to the emitter of TS1 via C5, R10 and R9. The degree of feedback is adjustable with the aid of potentiometer R10. Between the base of TS1 and earth, potentiometer R5 and contact 1re of relay RE are connected. When 1re is closed the input signal can be attenuated. The attenuation is adjustable to 20 dB with the aid of R5.

b. Reverberation circuit

The signal is first applied to the base of TS6 via T24 and volume control R23 and subsequently to TS7, TS8 and TS9. After amplification the signal is passed on to the output-channel(s) I...IV, depending on the selection made by means of SK18A...SK18D.

From the collector of TS9 the signal is fed back to the base of TS7 via R30 and C12 and to the emitter of TS6 via C13, R27 and R28. The degree of feed back is adjustable with the aid of adjusting potentiometer R28.

2. Amplifier board B (Fig. 44)

Amplifier board B contains an amplifier for the talk-back circuit and an amplifier for the pre-listening circuit.

a. Talk-back circuit

The signals from the microphone are amplified by TS1, TS2 and TS3. From the collector of TS3 the signal is fed back to the emitter of TS2 via R11. The signal from the collector of TS3 is applied to the base of TS4 via C5, R14, R16 and C9.

After amplifying by TS4 and TS5 the signal goes to the output terminals via T25.

From the output the signal is fed back via R25.

The signal of the collector of TS5 is also applied to the base of TS6 and to bridge circuit D5...D8 via C35 and C36.

The d.c. voltage coming from the bridge circuit is smoothed by C14 and C15 and fed to a second bridge circuit via R32 and R33.

An increase of the direct current through the second bridge circuit causes a deviation of the impedance between junction D1-D4 and junction D2-D3. As a result of this, the input signal at C9 will decrease simultaneously. Consequently, the amplification of transistor TS4 will be reduced, so that the output voltage will decrease to the set value.

b. Pre-listening circuit

The input circuit of the output circuitry is formed by transistors TS8 and TS9 by means of which a very low input impedance is obtained. *)

Owing to this low input impedance, parallel connection of two or more signal sources causes a negligible load variation for the input circuitry. Any change occurring alters the amplification of the complete stage in such a way that the ratio between the input signal and the output signal at C22 remains constant.

The signal is further amplified by the amplifier stage consisting of TS10, TS11 and TS12 and is applied to the base of TS14 via C22 and C25. Via R43, R44 and C22 the signal across TS12 is fed back to the base of TS10 and via C18 and R39 to TS1 and TS2. The degree of feedback can be adjusted with the aid of R39.

The signal on the base of TS14 is amplified by the amplifier stage consisting of TS14...TS17 and is fed to output 17 (to VU2) and, via R30 and T26, to another output T and 16 (to 2W PL).

c. Further circuitry

Further, the p.c. board contains a switch for 20 dB attenuation of the monitor circuit. By depressing SK20 point 1 (RE) is connected to earth when the board is placed in a monitor block; on boards A and C the relays RE will be energised and the levels of the monitor outputs are attenuated by 20 dB.

The p.c. board also contains the selector switches for the talk-back circuit. When switches SK19A...SK19D are not depressed the signals from points 14 and R10 (normally the signals from points 18 and V, (which are amplified by a power amplifier) are applied to outputs 5 and E (TB1)...11 and M (TB4).

When buttons SK19A...SK19D are depressed the signals from points 13 and P (normally the signals from the program-distribution which are amplified by means of a power amplifier) are applied to the outputs 5 and E (TB1)...11 and M (TB4).

* Patent pending

When one of buttons SK19A...SK19D is depressed, point 12 is connected to earth and the levels of the monitor are 20 dB attenuated.

Each switch SK19A...SK19D contains a switching element, which can make a connection between D and 4 (S1)...L and 10 (S4). These elements can be used for additional purposes.

3. Amplifier board C (Fig. 45)

Amplifier board C contains an amplifier for the monitor circuit and an amplifier for driving an external reverberation unit.

a. Monitor circuit

See B1. a.

b. Program-distribution circuit

The signals of outputs I...IV (points L and 10...D and 4) are applied to points V and 18 via T28, R56 and T29 for driving a program-distribution system.

The level of the outgoing signal can be adjusted with the aid of volume control R56.

c. Reverberation drive amplifier

See B2. b.

C. CHECKING AND ADJUSTING

1. Recommended measuring equipment

- | | |
|---------------------|---------|
| a. Signal generator | GM 2317 |
| b. Valve voltmeter | GM 6012 |
| c. Multimeter | PM2411 |

2. Checking and adjusting board A (see Fig. 43)

- . Remove the printed board from the block.
- . Connect the printed board as follows.

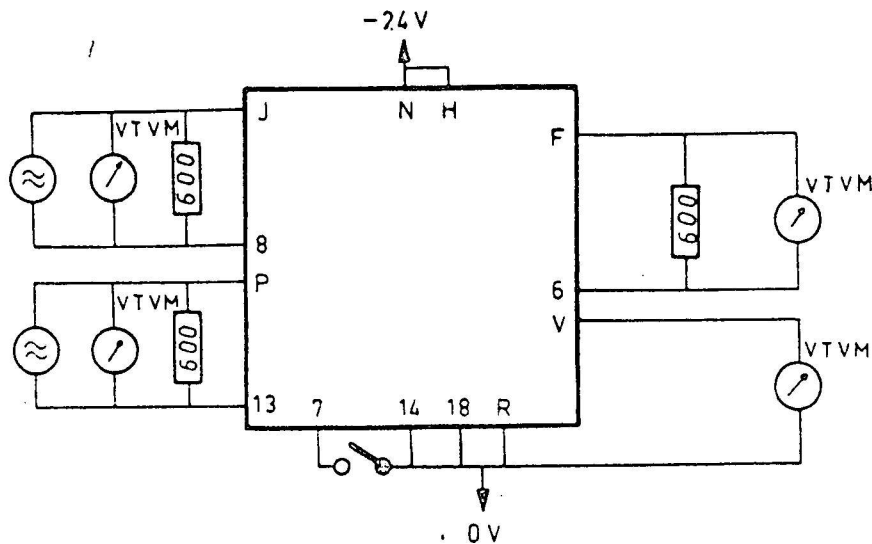


Fig. 40a

- . Turn volume control R42 to maximum.
- . Depress SK17A.
- . Apply a signal of 1000 Hz/1.55 V (+6 dB) to points 8 and J.
- . The output voltages across points 6 and F should be 1.55 V (+6 dB).
Adjustable with the aid of print potentiometer R10.
- . The d. c. and a. c. voltages have to be measured as indicated in Fig. 43b.
- . Connect point 7 to earth.
- . The output voltage across points 6 and F should be 155 mV (-14 dB).
Adjustable with the aid of print potentiometer R5.
- . Apply a signal of 1000 Hz/1.55 V (+6 dB) to points 13 and P.
- . Turn volume control R23 to maximum.
- . Depress SK18A.
- . The output voltage across points V and 18 should be 440 mV (-5 dB).
Adjustable with the aid of print potentiometer R28.
- . The d. c. and a. c. voltages have to be measured as indicated in Fig. 43b.

3. Checking and adjusting board B (Fig. 44)

- . Remove the printed board from the block.
- . Connect the printed board as follows.

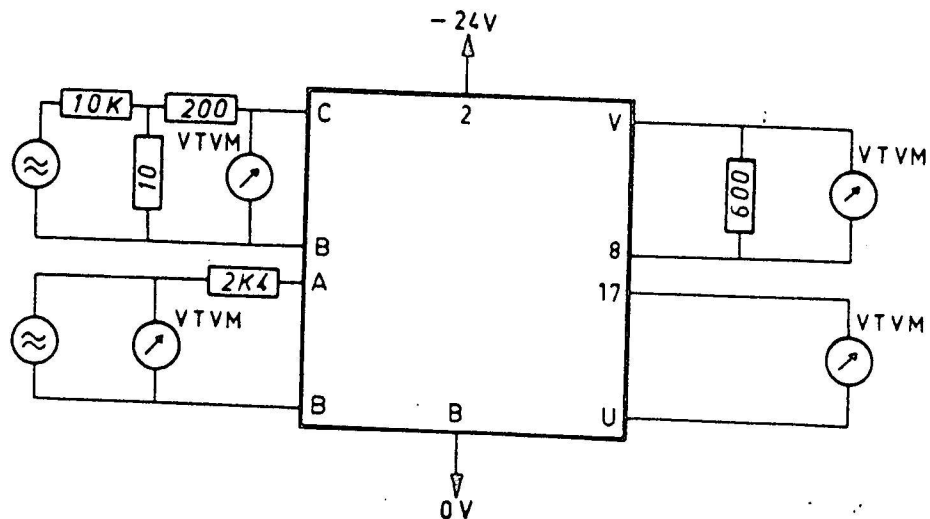


Fig. 40b

- . Apply a signal of 0.775 mV/1000 Hz (-60 dB) to points C and B.
- . The output voltage across points V and 18 should be 245 mV.
- . The a. c. and d. c. voltages have to be measured as indicated in Fig. 44b.
- . Vary the input voltage from 0.2 mV...2mV/1000 Hz.
- . The following output voltages have to be measured.

V_i (mV)	V_o (mV)
0.2	61
0.25	88
0.3	110
0.35	134
0.4	153
0.5	191
0.6	222
0.7	238
0.775	245
0.8	247
0.9	252
1	258
2	284

- . Apply a signal of 139 mV/1000 Hz (-15 dB) to points A and B.
- . The output voltage across points 17 and U should be 440 mV (adjustable with the aid of R55).
- . The a. c. and d. c. voltages have to be measured as indicated in Fig. 44b.

4. Checking and adjusting board C (Fig. 45)

- . Remove the printed circuit board from the block.
- . Connect the printed circuit board as follows.

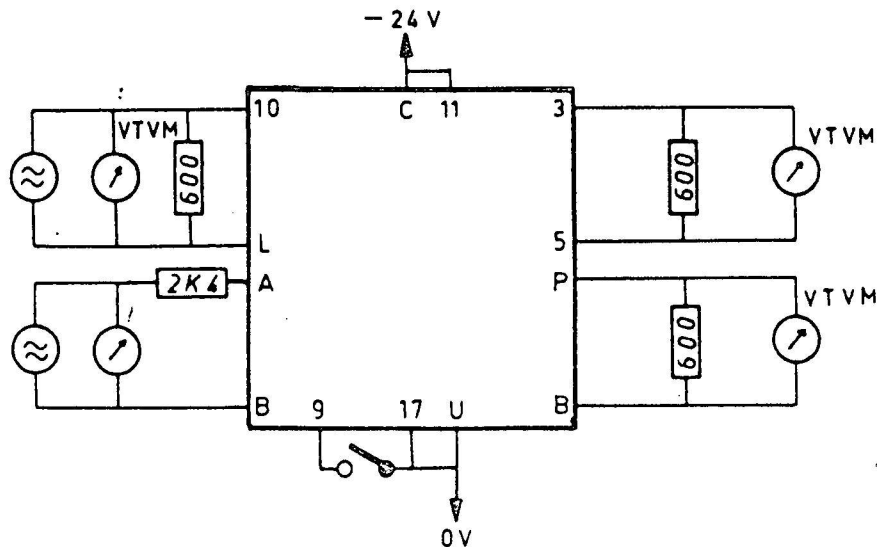


Fig. 40c

- . Turn volume control R57 to maximum.
- . Depress SK18A.
- . Apply a signal of 1000 Hz/1.55 V (+6 dB) to points 10 and L.
- . The output voltage across points 3 and 5 should be 1.55 V (+6 dB).
(Adjustable with the aid of R10, see Fig. 45a).
- . The d. c. and a. c. voltages have to be measured as indicated in Fig. 45b.
- . Connect point 9 to earth.
- . The output voltage across points 3 and 5 should be 139 mV (-14 dB).
(Adjustable with the aid of potentiometer R5, see Fig. 45a).

- . Adjust the generator connected to point A via a $2400\ \Omega$ resistor to $44\ \text{mV}/1000\ \text{Hz}$.
- . The output voltage across points P and B should be $1.55\ \text{V}$ (+6 dB).
(Adjustable with the aid of R42, see Fig. 45a).
- . The a. c. and d. c. voltages have to be measured as indicated in Fig. 45b.

D. LIST OF PARTS

1. General

Item	Code number	Description	Fig.
18	4822 492 60063	Transistor clamp	42
19	4822 492 40006	Transistor holder	42
22	4822 413 40115	Knob	41
23	4822 413 30303	Knob	41

2. Board A

SK17	4822 276 10265	Switch	41/43a
SK18	4822 276 10316	Switch	41/43a
T23, T24	4822 142 50055	Transformer	43a
RE1	4822 280 20025	Relay	43a
TS1	4822 130 40353	Transistor BC 179	43a
TS2	4822 130 40354	Transistor BC 177	43a
TS3, TS4, TS5	4822 130 40388	Transistor 2N2904	43a
TS6	4822 130 40353	Transistor BC 179	43a
TS7	4822 130 40354	Transistor BC 177	43a
TS8, TS9, TS10	4822 130 40388	Transistor 2N2904	43a
D1...D4	4822 130 30132	Zener diode BZY 59	43a
D5	4822 130 30239	Diode OA 202	43a

Resistors

R5, R10	4822 100 10029	Potentiometer	2200 Ω	43a
R23, R42	4822 100 30189	Potentiometer	4700 Ω	43a
	4822 332 20185			
R28	4822 101 10038	Potentiometer	470 Ω	43a

All other resistors Carbon 1/8 W 2% Code number 4822 111 30...

Capacitors

C1	4822 124 20081	Electrolytic	20 μ F	16 V	43a
C2	4822 124 10036	Electrolytic	0.64 μ F	25 V	43a
C3	4822 124 20046	Electrolytic	100 μ F	4 V	43a
C4	4822 120 60107	Mica	1K		43a
C5	4822 124 20046	Electrolytic	100 μ F	4 V	43a
C6	4822 124 20187	Electrolytic	1000 μ F	10 V	43a
C7, C8	4822 124 20016	Electrolytic	80 μ F	25 V	43a
C9	4822 124 20081	Electrolytic	20 μ F	16 V	43a
C10	4822 124 10036	Electrolytic	0.64 μ F	25 V	43a
C11	4822 124 20046	Electrolytic	100 μ F	4 V	43a
C12	4822 120 60096	Mica	390 pF		43a
C13	4822 124 20046	Electrolytic	100 μ F	4 V	43a
C14...C17	4822 124 20016	Electrolytic	80 μ F	25 V	43a

Item	Code number	Description	Fig.
3. Board B			
SK19	4822 276 10266	Switch	41/44a
SK20	4822 276 10265	Switch	41/44a
TS25, TS26	4822 142 50055	Transformer	44a
TS1	4822 130 40353	Transistor BC 179	44a
TS2	4822 130 40355	Transistor BC 178	44a
TS3	4822 130 40388	Transistor 2N2904	44a
TS4, TS5	4822 130 40355	Transistor BC 178	44a
TS6	4822 130 40388	Transistor 2N2904	44a
TS7	4822 130 40388	Transistor 2N2904	44a
TS8, TS9	4822 130 40353	Transistor BC 179	44a
TS10	4822 130 40354	Transistor BC 177	44a
TS11, TS12, TS13	4822 130 40388	Transistor 2N2904	44a
TS14	4822 130 40353	Transistor BC 179	44a
TS15	4822 130 40354	Transistor BC 177	44a
TS16, TS17, TS18	4822 130 40388	Transistor 2N2904	44a
D1...D8	4822 130 30139	Diode OA200	44a
D9...D12	4822 130 30132	Zener diode BZY59	44a
R30	4822 535 20158	Potentiometer	44a
	4822 101 30189	5 k Ω	
R39	4822 100 10025	Print potentiometer	44a
R55	4822 100 10023	Print potentiometer	44a
		4K7	
		470 Ω	

All other resistors: Carbon 1/8 W 2% Code number 4822 111 30...

Capacitors

C1...C6	4822 124 20077	Electrolytic	10 μ F	16 V
C7	4822 124 20016	Electrolytic	80 μ F	25 V
C8, C9, C10	4822 121 40036	Polyester	100 kpF	
C11	4822 124 20077	Electrolytic	10 μ F	16 V
C12	4822 124 20046	Electrolytic	100 μ F	6.4 V
C13, C14, C15	4822 124 20077	Electrolytic	10 μ F	16 V
C16...C20	4822 124 20046	Electrolytic	100 μ F	6.4 V
C21	4822 120 60096	Mica	390 pF	
C22, C23, C24	4822 124 20016	Electrolytic	80 μ F	25 V
C25	4822 124 10036	Electrolytic	0.64 μ F	25 V
C26, C27	4822 124 20046	Electrolytic	100 μ F	6.4 V
C28	4822 120 60107	Mica	1 kpF	
C29...C32	4822 124 20016	Electrolytic	80 μ F	10 V
C33	4822 124 20082	Electrolytic	250 μ F	25 V
C34	4822 124 20016	Electrolytic	80 μ F	10 V
C35, C36	4822 124 20093	Electrolytic	10 μ F	64 V
C37	4822 121 40013	Polyester	1 μ F	

Item	Code number	Description	Fig.
4. Board C			
SK21, SK22	4822 176 10316	Switch	41/45a
T27, T28, T29	4822 142 50055	Transformer	45a
RE2	4822 280 20025	Relay	45a
TS1	4822 130 40354	Transistor BC 179	45a
TS2	4822 130 40388	Transistor BC 177	45a
TS3, TS4, TS5	4822 130 40353	Transistor 2N2904	45a
TS6, TS7	4822 130 40354	Transistor BC 179	45a
TS8	4822 130 40388	Transistor BC 177	45a
TS9, TS10, TS11	4822 130 40353	Transistor 2N2904	45a
TS12, TS13	4822 130 40353	Transistor BC 179	45a
TS14	4822 130 40354	Transistor BC 177	45a
TS15, TS16, TS17	4822 130 40388	Transistor 2N2904	45a
D1	4822 130 30239	Diode OA202	45a
D2...D5	4822 130 30132	Zener diode BCY 59	45a

Resistors

R5, R10	4822 100 10027	Potentiometer	2200 Ω	45a
R23	4822 100 10025	Potentiometer	4700 Ω	45a
R42	4822 100 10023	Potentiometer	470 Ω	45a
R56, R57	{ 4822 101 30189 } { 4822 532 20158 }	Potentiometer	4700 Ω	45a

All other resistors: Carbon 1/8 W 2% Code number 4822 111 30...

Capacitors

C1	4822 124 20081	Electrolytic	20 μ F 16 V	45a
C2	4822 124 10036	Electrolytic	0.64 μ F 25 V	45a
C3	4822 124 20046	Electrolytic	100 μ F 6.4 V	45a
C4	4822 120 60107	Mica	1 kpF	45a
C5	4822 124 20046	Electrolytic	100 μ F 6.4 V	45a
C6	4822 124 20187	Electrolytic	1000 μ F 10 V	45a
C7, C8	4822 124 20016	Electrolytic	80 μ F 25 V	45a
C9, C10, C11, C12, C13	4822 124 20046	Electrolytic	100 μ F 6.4 V	45a
C14	4822 120 60096	Mica	390 pF	45a
C15, C16	4822 124 20016	Electrolytic	80 μ F 25 V	45a
C17, C18	4822 124 20081	Electrolytic	20 μ F 16 V	45a
C19, C20, C21, C22	4822 124 20046	Electrolytic	100 μ F 6.4 V	45a
C23	4822 124 20187	Electrolytic	1000 μ F 10 V	45a
C24, C25	4822 124 20016	Electrolytic	80 μ F 25 V	45a
C26	4822 121 50235	Polyester	3300 pF	45a
C27	4822 124 20016	Electrolytic	80 μ F 25 V	45a

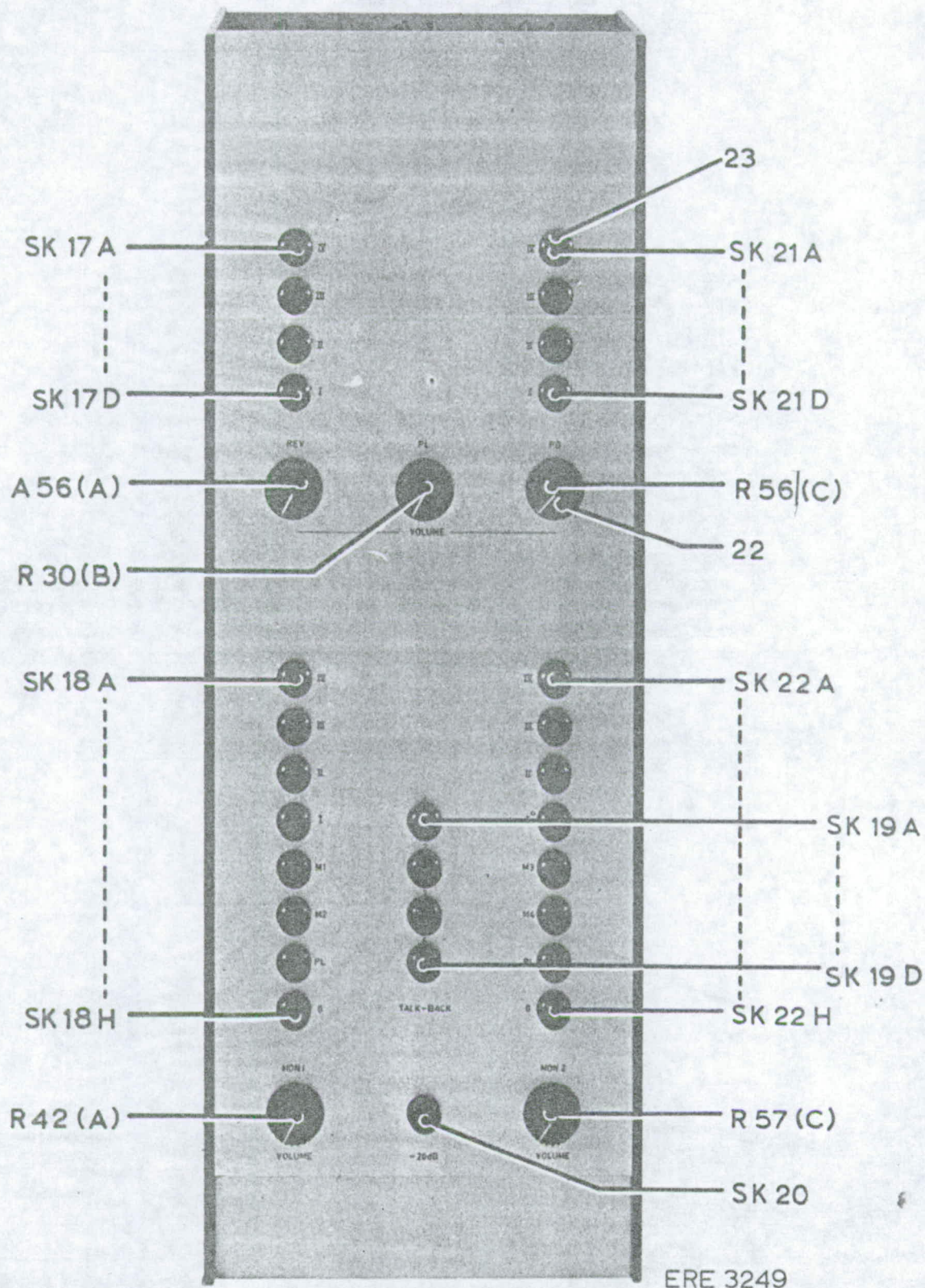


Fig. 41

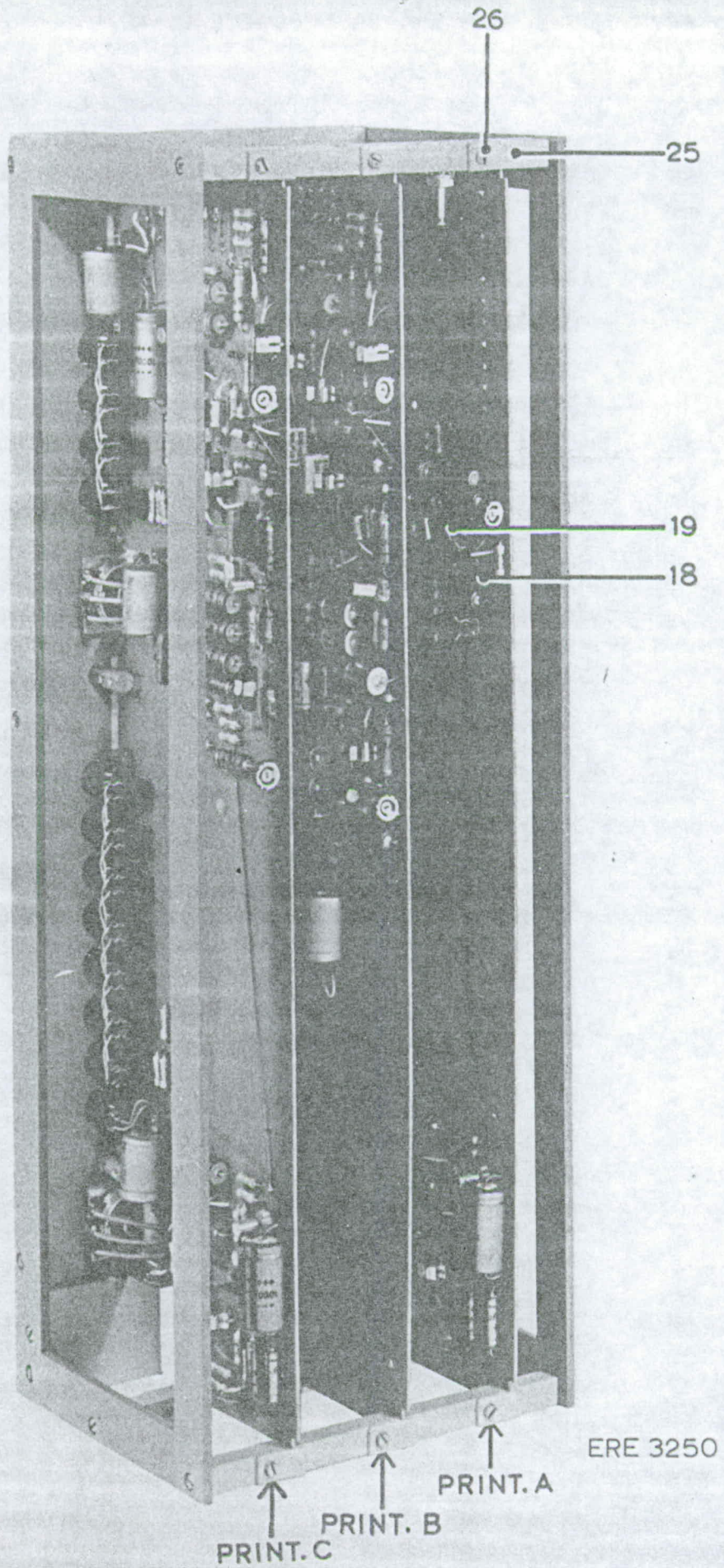


Fig. 42

CIRCUIT BOARD A

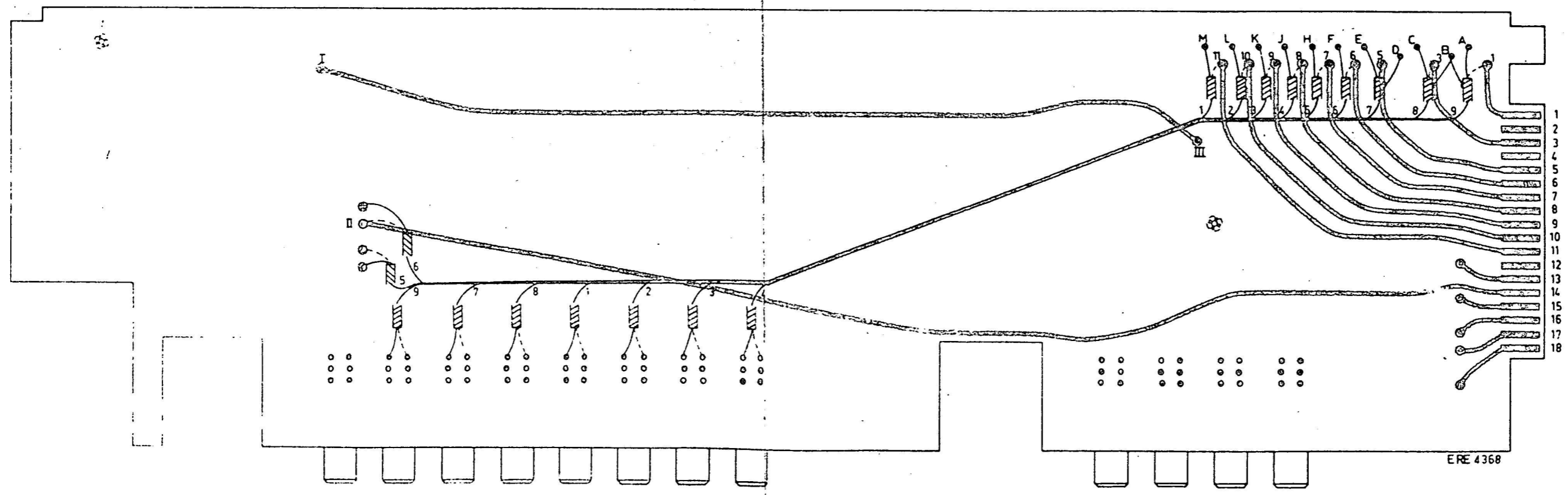
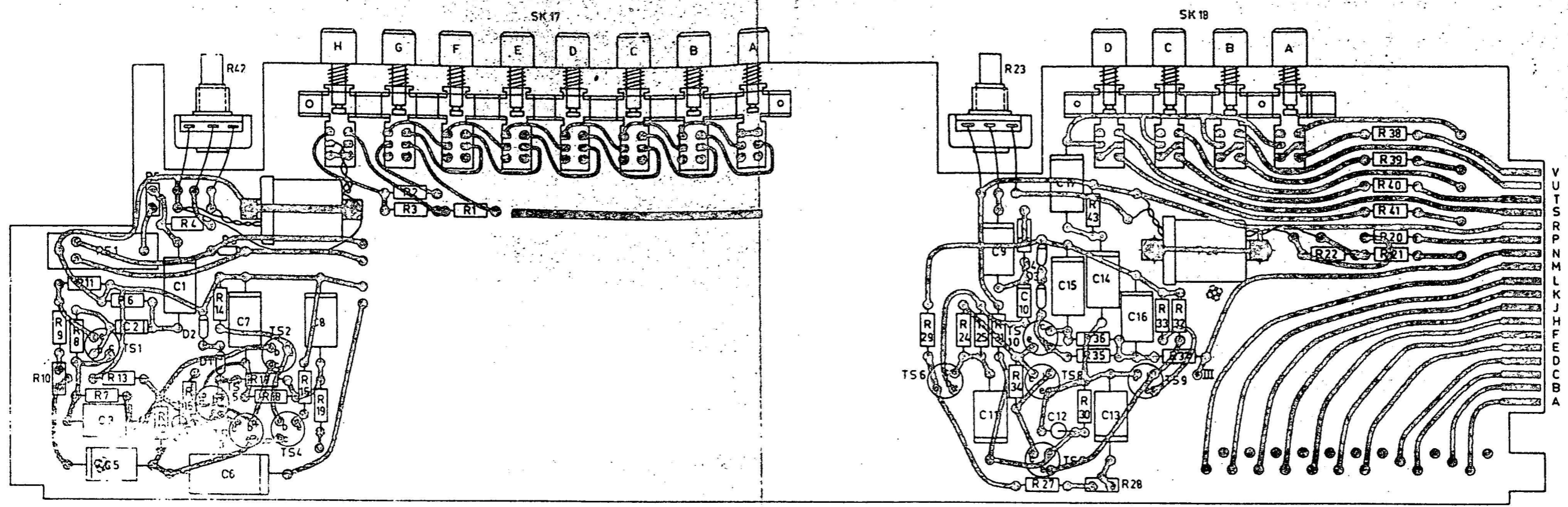
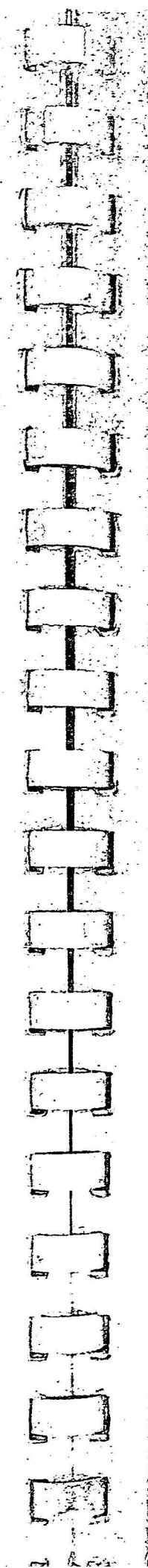


Fig. 43a



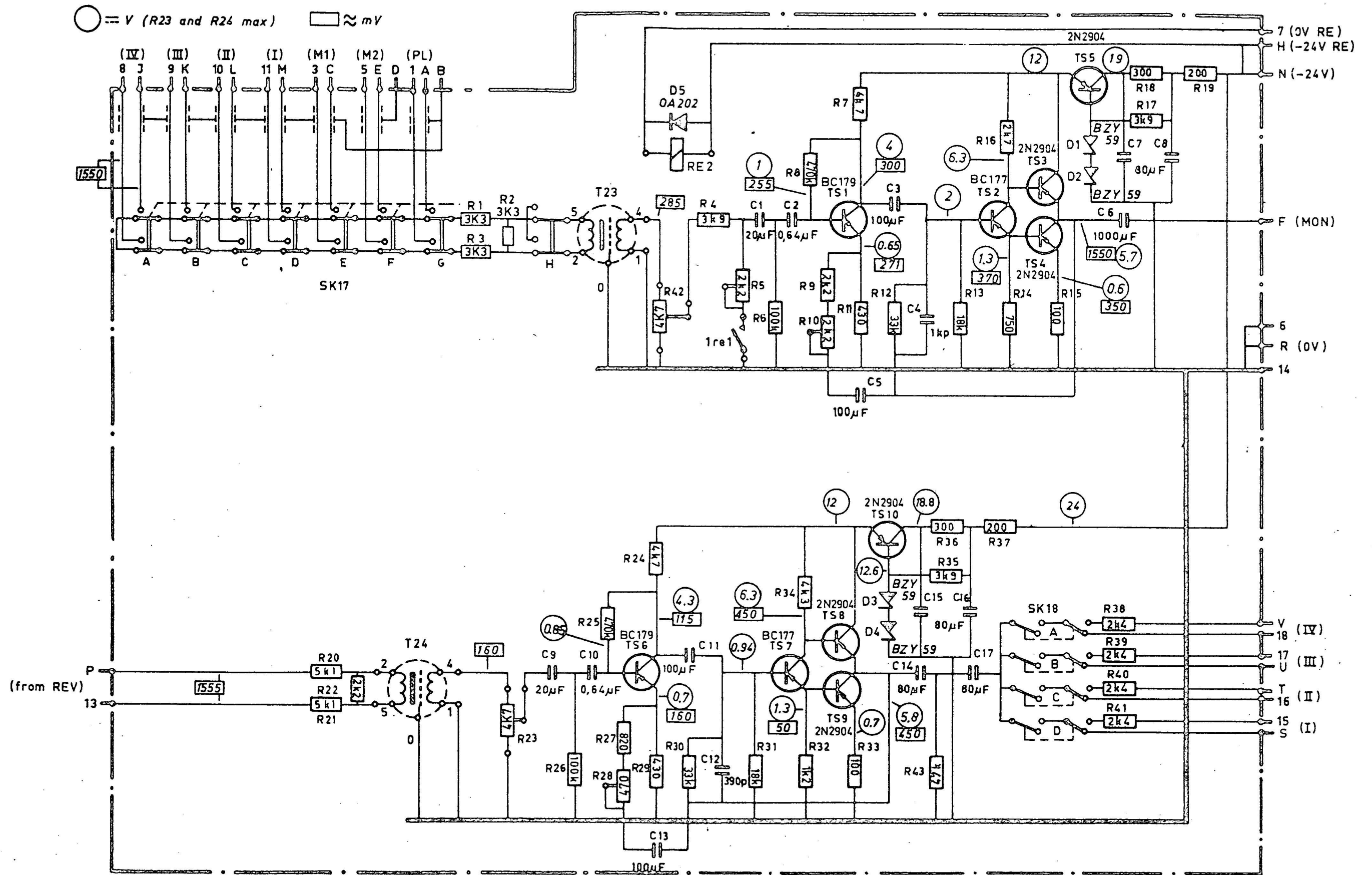


Fig. 43b

ERE 4367 A

CIRCUIT BOARD B

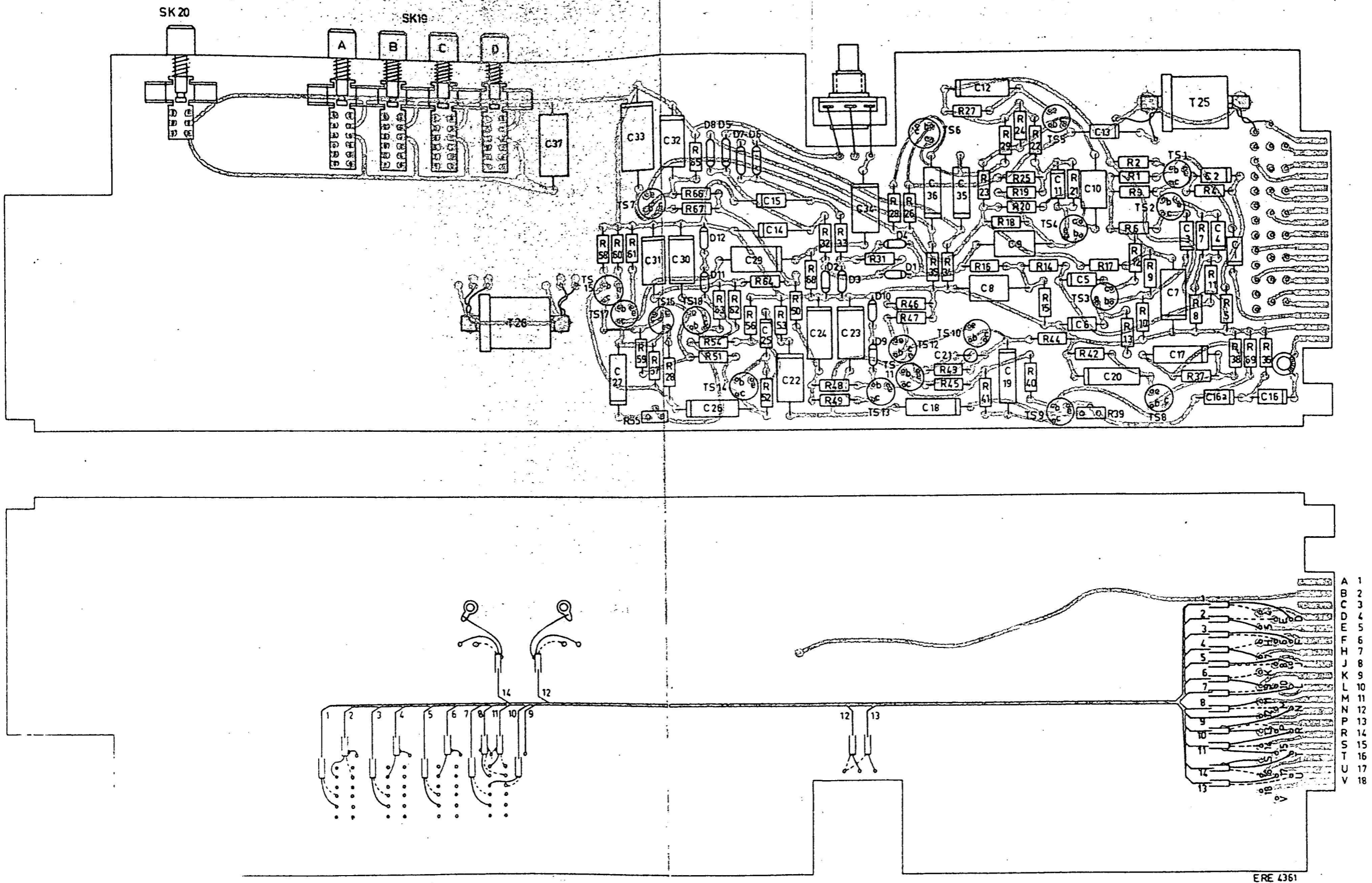


Fig. 44a

ERE 4361

- A 1
- B 2
- C 3
- D 4
- E 5
- F 6
- H 7
- J 8
- K 9
- L 10
- M 11
- N 12
- P 13
- R 14
- S 15
- T 16
- U 17
- V 18

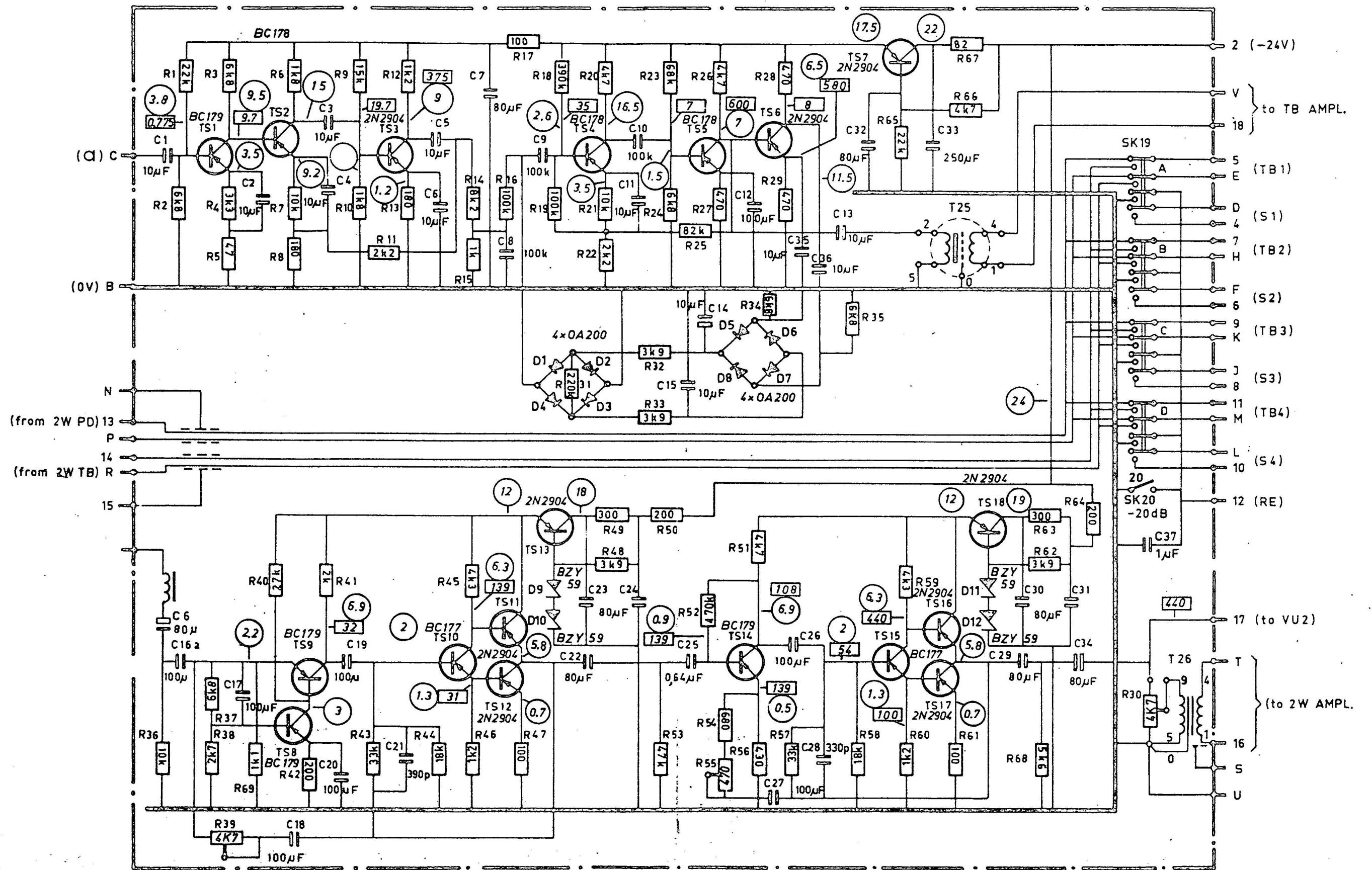


Fig. 44b

ERE 4362A

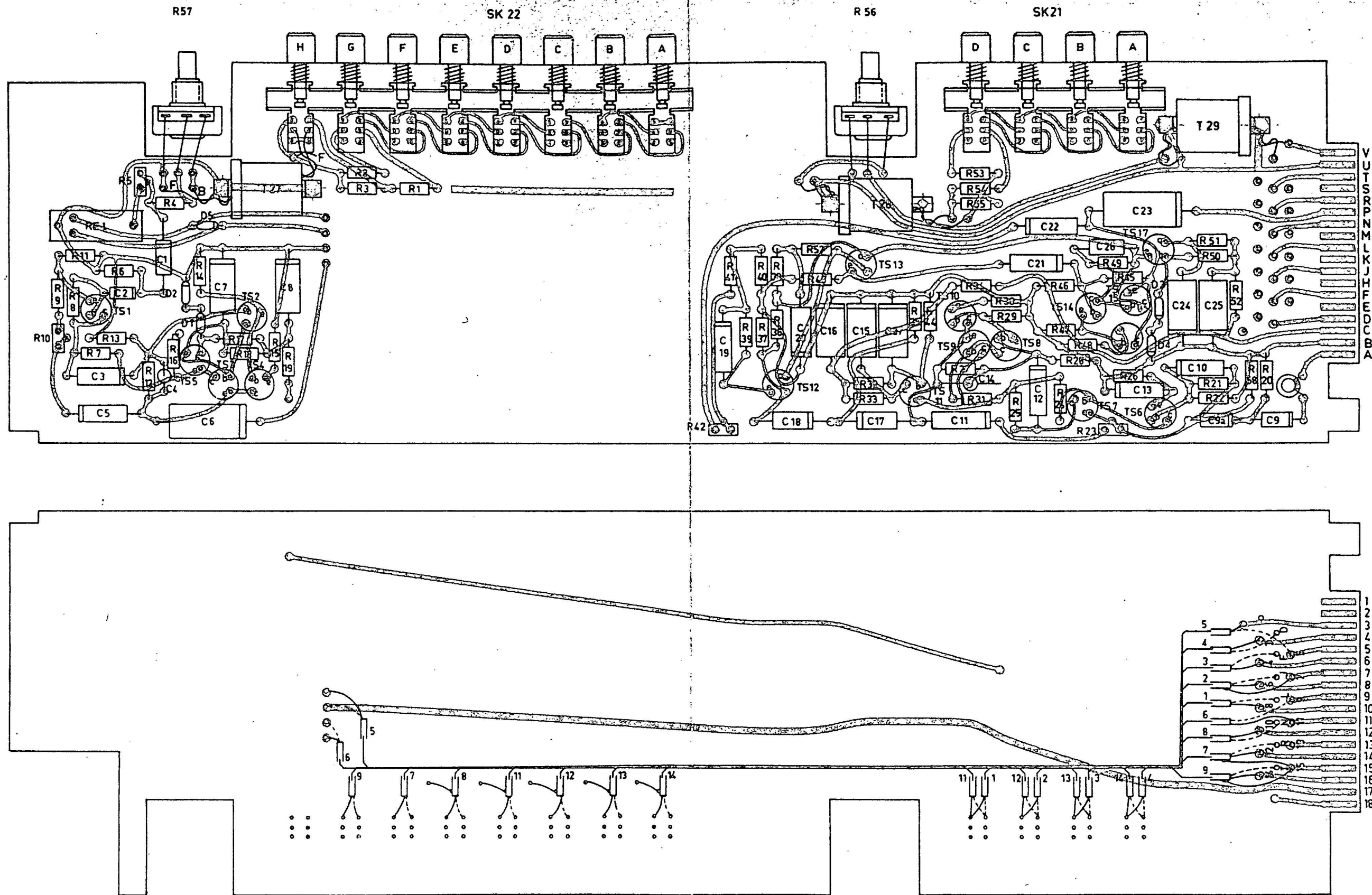


Fig. 45a

ERE 4369A

CIRCUIT BOARD C

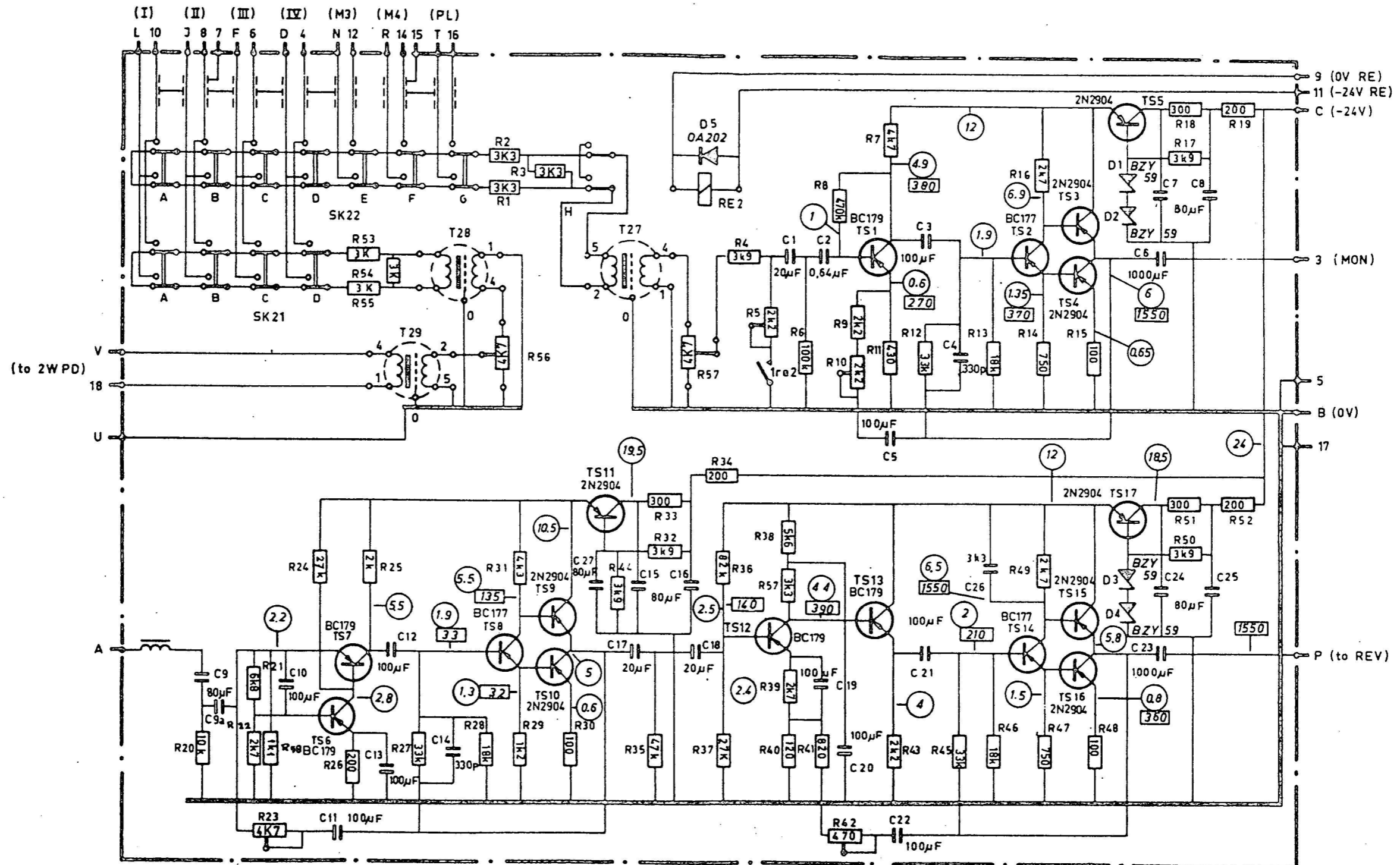
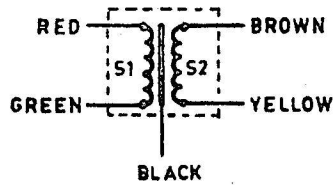


Fig. 45b

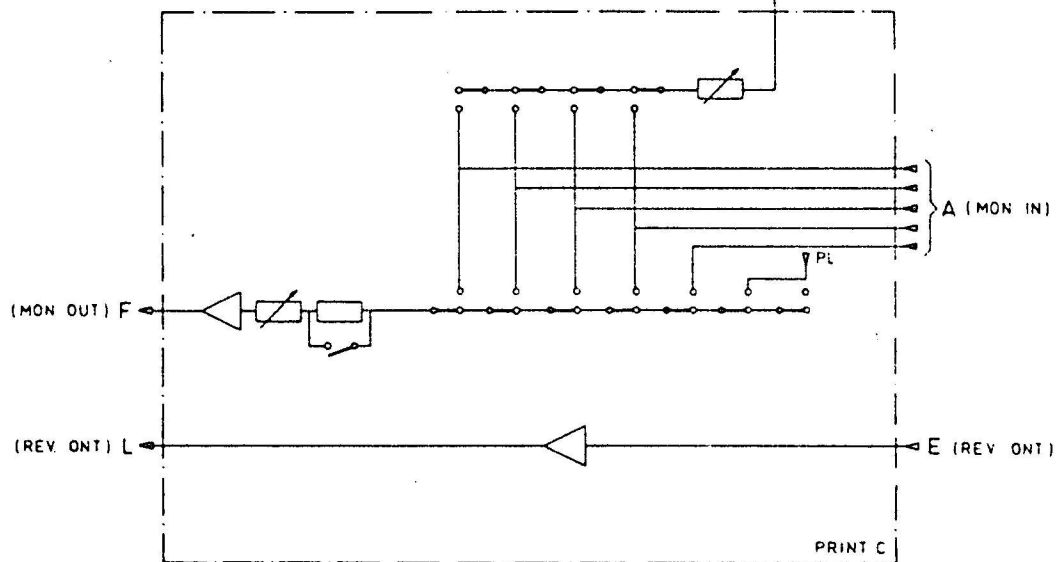
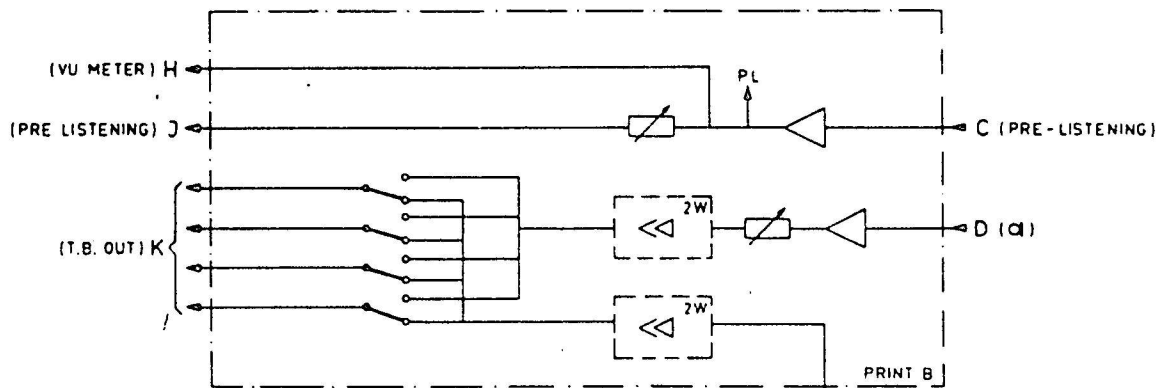
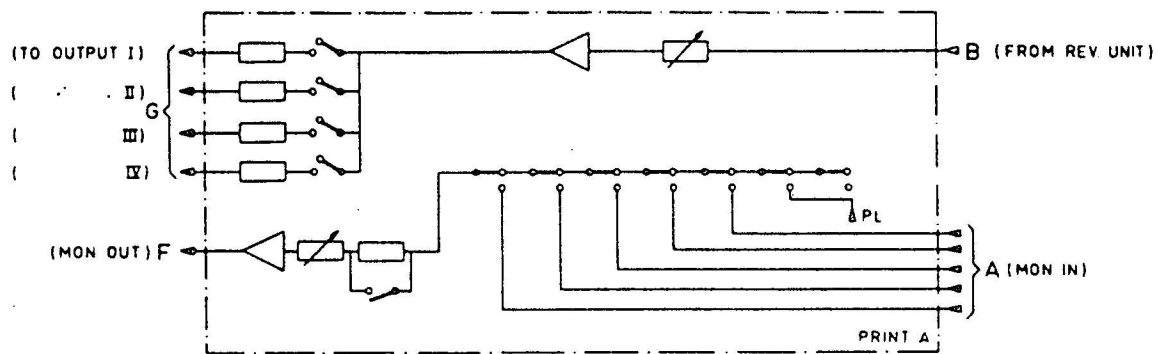
ERE 4370A



S1	501 Ω
S2	804 Ω

ERE 2825

Fig. 46

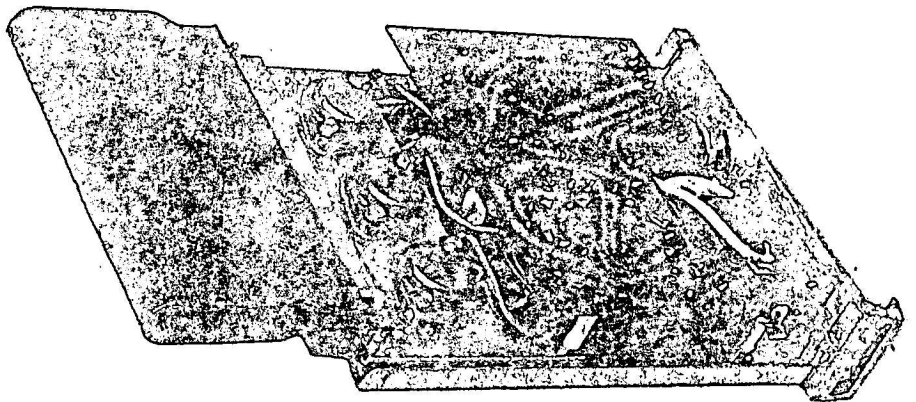


ERE 3399

Fig. 47

PHILIPS *Service*

ELA
AUDIO PRODUCTS



EVE 240

AMPLIFIER

EL 6512
8990 265 12009

93.736 85.2.10

15/968

SERVICE INFORMATION										
------------------------	--	--	--	--	--	--	--	--	--	--

A. GENERAL

The EL 6512 is a 2 Watt transistor amplifier with a unit-width of 34.5 mm = 1³/₈".
 The amplifier EL 6512 can be adapted for building-in by means of kit EL 6519.
 Kit EL 6519/00 serves for mounting to desk EL 6542.
 Kit EL 6519/05 serves for mounting to sliding panel EL 6540.
 Kit EL 6519/10 is identical to EL 6519/05, but in metal box.

B. TECHNICAL DATA

Dimensions : width 34 mm
 height 124 mm
 depth 220 mm

Weight : 900 gr. 2 lb.

Power supply : 22 - 32 V and a maximum ripple of 1 V

Power consumption : no signal - average value 70 mA
 with signal - at 200 mW output approx. 30 mA
 at 1 W output approx. 175 mA
 at 2 W output approx. 240 mA

Speech/music signal : 2 W ampl. approx. 110 mA.

Internal resistance : a. input: pot. meter fully clockwise: 1200 Ω
 pot. meter in the middle: 4500 Ω
 b. output: without transformer: ≤1 Ω
 with built in transformer: 100 Ω

Interference level : -74 dB

Distortion : 0.5 % rejection limit 0.6 %

Frequency response : +1 dB - 40 - 15000 c/s

Input sensitivity : a. for application 1 = 27 mV ± 15 %
 b. for application 2 = 20 mV ± 15 %

APPLICATIONS

<u>Possibilities</u>	Connections	Power	Load	Volt.
1. Monitor amplifier without built-in transformer	point 9-6	2 W	12 Ω	4.9 V
2. Line amplifier, without built-in transformer	point 9-6	200 mW	100 Ω	4.5 V
3. Monitor amplifier with built-in transformer	point 13-14 (interconnect 9+11)	1 W	200 Ω	14.5 V
4. Line amplifier with built-in transformer	point 13-14 (interconnect 9+11)	200 mW	600 Ω	11 V
5. Monitor amplifier with additional transformer	point 12-16	2 W	4,5 Ω 50 Ω 450 Ω	3 V 10 V 30 V

CONNECTIONS

The connections from above to below are:
 15 - mechanical earth
 14 } output when apparatus is used as in application 1 and 4
 13 }
 12 - sensitive side of the output when 8990 268 15009 is used.

11 - see connections number 9.

9 - sensitive side of the output when apparatus is used as in application 1 and 2; to be connected with 11, when used as in application 3 and 4.

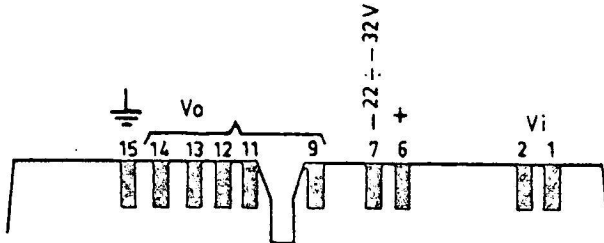
7 - negative side of the voltage supply.

6 - positive side of the voltage supply.

2 - non sensitive of the input (connected with 6).

1 - sensitive side of the input.

Remark: The electrical earth can be connected to point 6 or 2.



DESCRIPTION OF THE DIAGRAM

The strength of the input signal is to be controlled by the potentiometer R1. Then the signal is amplified by transistor TS1. The amplified signal comes across R5 and is applied to the base of TS2 via C2.

Transistor TS2 amplifies the signal, after which it comes across R10 and is applied to the base of TS3 via C5. The transistor TS3 is used as phase converter. Equal signals are developed across R15 and R16.

When the emitter and the collector of TS3 are connected to the bases of TS5 and TS4 respectively, the input signals of these transistors are in phase opposition.

The amplified signals of the emitter followers TS4 and TS5 are applied to the base-emitter circuits of the output transistors TS6 and TS7.

Diode GR2 supplies the correct base-emitter voltage for biasing TS7.

Diode GR1 serves as limiter: a greater signal will provide a higher bias voltage.

The capacitors C8 and C9 form a feed-back with phase shift in order to avoid that the Class-B setting of the amplifier changes in the case of a high-ohmic load.

H. F. oscillation is avoided by C7, C11 and C13+R23. The circuit of TS8 and TS9 serves for voltage stabilisation.

The circuit of TS10 provides the reference voltage. The voltage stabilisation works as follows:

When more current is taken from the amplifier the voltage at the emitter of TS8 becomes less negative. The voltages across R24 and R25 will decrease. The base of TS10 becomes more positive with respect to the emitter, which is kept at a constant voltage by the Zener diode GR3.

The current through TS10, and also that through R28 and R29 decreases.

Consequently the voltage across R26 and R29 decrease. As a result the base of TS9 will become more negative. The current through TS9 will increase, in other words the d. c. resistance of TS9 becomes smaller. The voltage between base and collector of TS8 decreases.

The base becomes more negative and the current increases. This means the additional current for the amplifier is supplied and the voltage will remain constant.

Checking measurements

- Put the volume control R1 into the maximum position (clockwise).
- Short-circuit the points 9+11.
- Connect a resistor of 200 ohms (2 W) across the points 13 and 14.
- Connect the positive and negative pole of the voltage supply to the points 6 and 7 respectively.

- Apply an input signal of 11 mV (1000 c/s) to the points 1 and 2.
- Carry out all measurements with respect to the positive pole.
- Measure an a. c. voltage of 13 V at point 13.
- The stage sensitivities are shown in fig. 1.
- Measure the stabilised voltage at the collector of TS6; this voltage should amount to 20.5 V, tolerance +0.5 V.

This can be adjusted with R25 (coarse adjustment) and R26 (fine adjustment).

The maximum permissible variation of the stabilised voltage is 0.4 V for a supply voltage variation from 32 V to 22 V.

- Measure the following Vce voltages ($\pm 20\%$).

TS1 - 2.5	TS6 - 9.4
TS2 - 4.5	TS7 - 10.8
TS3 - 11	TS8 - 11
TS4 - 9.0	TS9 - 10.5
TS5 - 10.8	TS10 - 11.5

Remarks

The modification set EL 6519/00 contains:

- 1 Contact block (for connection)
- 2 Brackets
- 2 Screws
- 2 Washers
- 1 Frame

The modification set EL 6519/05 contains:

- 1 Handle
- 1 Ornamental block for upper side of the apparatus
- 2 Counter sunk screws
- 2 Nylon rails for sliding into sliding panel
- 1 Contact block (for connection)
- 2 Brackets
- 2 Screws } For mounting contact block
- 2 Washers }

The modification set EL 6519/10 contains:

- 1 Metal box
- 1 Bracket (protection of printed plug)
- 2 Screws } For affixing bracket to metal box
- 2 Washers }
- 1 Ornamental block for upper side of apparatus
- 2 Counter sunk screws
- 2 Counter sunk screws
- 2 Nylon rails for sliding into a sliding panel
- 1 Contact block (for connection)
- 2 Brackets
- 2 Screws } For mounting the contact block
- 2 Washers }

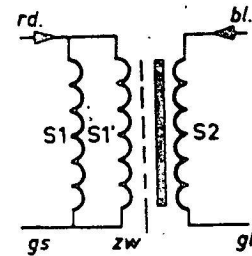
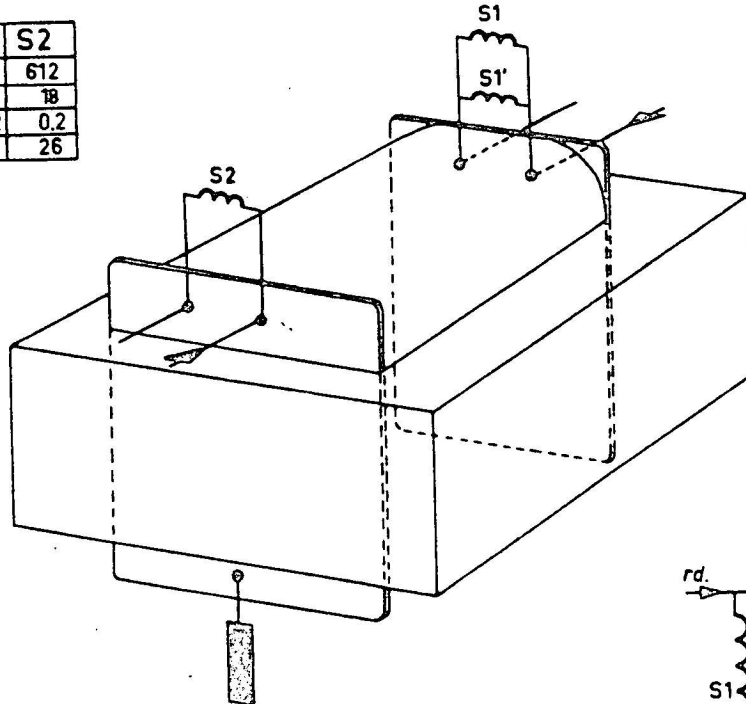
LIST OF PARTS

T1	4822 140 60057			
TS1, 2, 3, 4 and 5	OC44	use AC107	4822 130 40238	
TS6, 7 and 8	OC44		4822 130 40275	
TS9 and TS10	OC71		4822 130 40241	
GR1	OA200	use OA202	4822 130 30239	
GR2	OA210	use BY100	4822 130 30124	
GR3	OAZ207		4822 130 30249	
R1	4822 101 20061	5000 Ω	pot lin.	
R2	4822 110 30109	1200 Ω	$\frac{1}{4}$ W	5 %
R3	4822 110 30136	12000 Ω	$\frac{1}{4}$ W	5 %
R4	4822 110 30136	12000 Ω	$\frac{1}{4}$ W	5 %
R5	4822 110 30138	15000 Ω	$\frac{1}{4}$ W	5 %
R6	4822 110 30143	22000 Ω	$\frac{1}{4}$ W	5 %
R7	4822 110 30156	68000 Ω	$\frac{1}{4}$ W	5 %
R8	4822 110 30143	22000 Ω	$\frac{1}{4}$ W	5 %
R9	4822 110 30123	3900 Ω	$\frac{1}{4}$ W	5 %
R10	4822 110 30127	5600 Ω	$\frac{1}{4}$ W	5 %
R11	4822 110 30118	2700 Ω	$\frac{1}{4}$ W	5 %
R12	4822 116 30023	47000 Ω	6/10 W	20 % (NTC)
R13	4822 110 30132	8200 Ω	$\frac{1}{4}$ W	5 %
R14	4822 110 30129	6800 Ω	$\frac{1}{4}$ W	5 %
R15	4822 110 30106	910 Ω	$\frac{1}{4}$ W	5 %
R16	4822 110 30106	910 Ω	$\frac{1}{4}$ W	5 %
R17	4822 110 30154	56000 Ω	$\frac{1}{4}$ W	5 %
R18	4822 110 30096	390 Ω	$\frac{1}{4}$ W	5 %
R19	4822 110 30096	390 Ω	$\frac{1}{4}$ W	5 %
R20	4822 110 30103	680 Ω	$\frac{1}{4}$ W	5 %
R21	4822 110 30054	10 Ω	$\frac{1}{4}$ W	5 %
R22	4822 110 30063	22 Ω	$\frac{1}{4}$ W	5 %
R23	4822 110 30054	10 Ω	$\frac{1}{4}$ W	5 %
R24	4822 110 30125	4700 Ω	$\frac{1}{4}$ W	5 %
R25 0.30x	4822 110 30123	3900 Ω	$\frac{1}{4}$ W	5 %
R25 0.10x	4822 110 30121	3300 Ω	$\frac{1}{4}$ W	5 %
R25 0.25x	4822 110 30122	3600 Ω	$\frac{1}{4}$ W	5 %
R25 0.25x	4822 110 30124	4300 Ω	$\frac{1}{4}$ W	5 %
R25 0.10x	4822 110 30125	4700 Ω	$\frac{1}{4}$ W	5 %
R26	4822 110 30158	82000 Ω	$\frac{1}{4}$ W	5 %
R27	4822 110 30116	2200 Ω	$\frac{1}{4}$ W	5 %
R28	4822 110 30116	2200 Ω	$\frac{1}{4}$ W	5 %
R29	4822 110 30116	2200 Ω	$\frac{1}{4}$ W	5 %
C1	4822 124 20211	16 μ F	40 V	
C2	4822 124 20211	16 μ F	40 V	
C3	4822 124 20288	6.4 μ F	40 V	
C4	4822 124 20281	400 μ F	16 V	
C5	4822 124 20222	64 μ F	40 V	

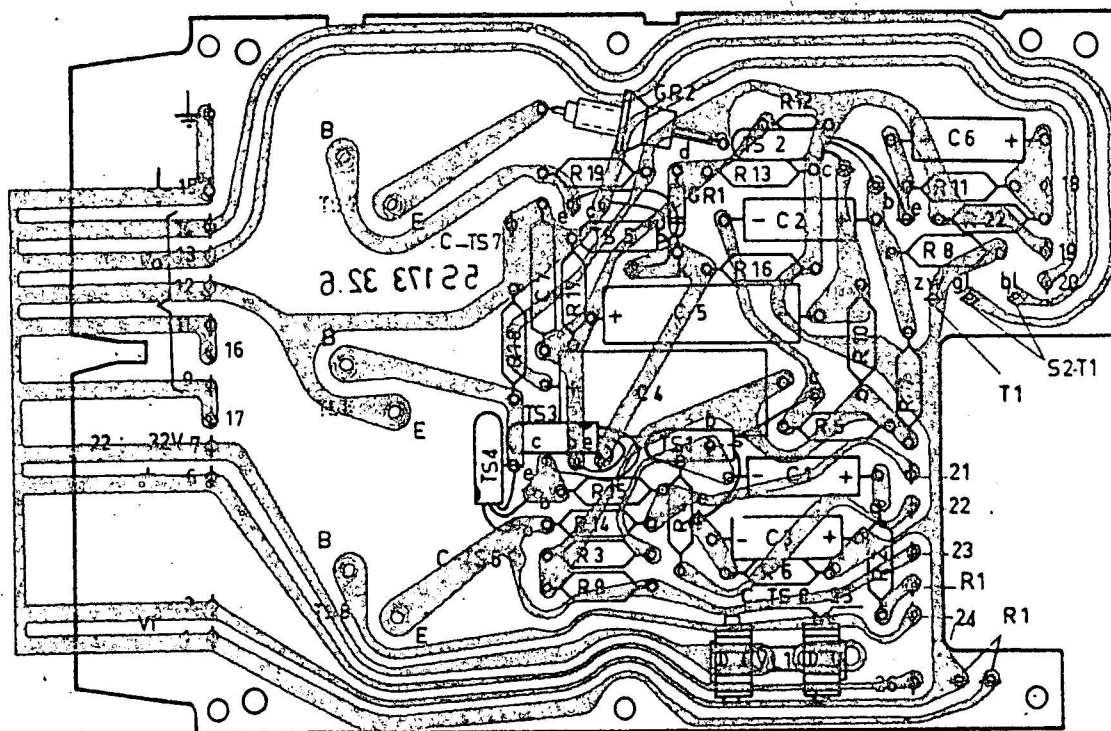
8990 265 12009

C6	4822 124 20292	50 μ F	40 V	
C7	4822 120 60098	470 pF	5 %	
C8	4822 124 20409	560 μ F	10 V	
C9	4822 124 20409	560 μ F	10 V	
C10	4822 124 20217	32 μ F	64 V	
C11	4822 120 41127	5600 pF	400 V	10 %
C12	4822 124 20286	640 μ F	16 V	
C13	4822 121 40036	0.1 μ F	160 V	10 %
C14	4822 124 20217	32 μ F	64 V	
C15	4822 124 20222	64 μ F	40 V	
C16	4822 124 20217	32 μ F	64 V	

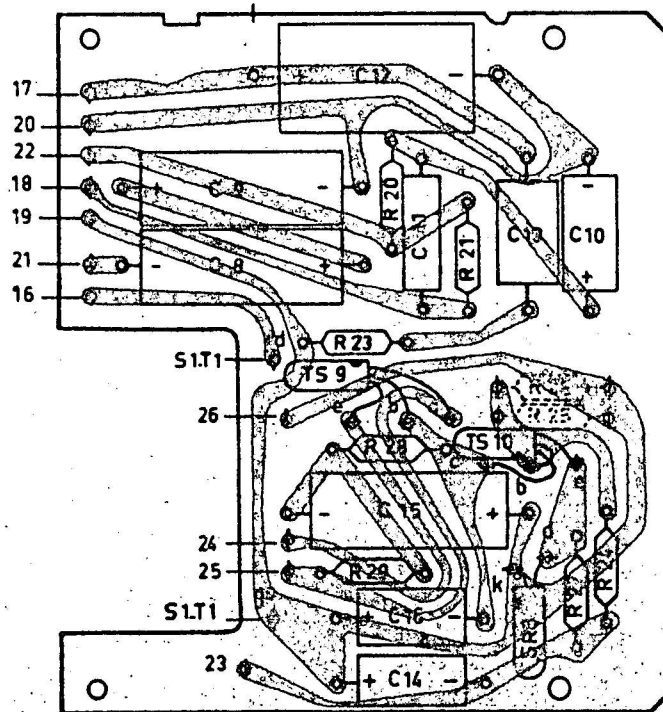
	S1	S1'	S2
N	122	122	612
V	3.6	3.6	18
\emptyset	2x0.22	2x0.22	0.2
Ω	1.1		26



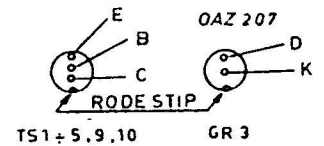
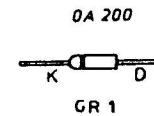
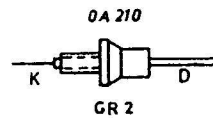
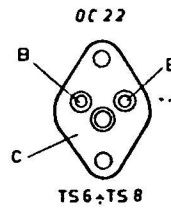
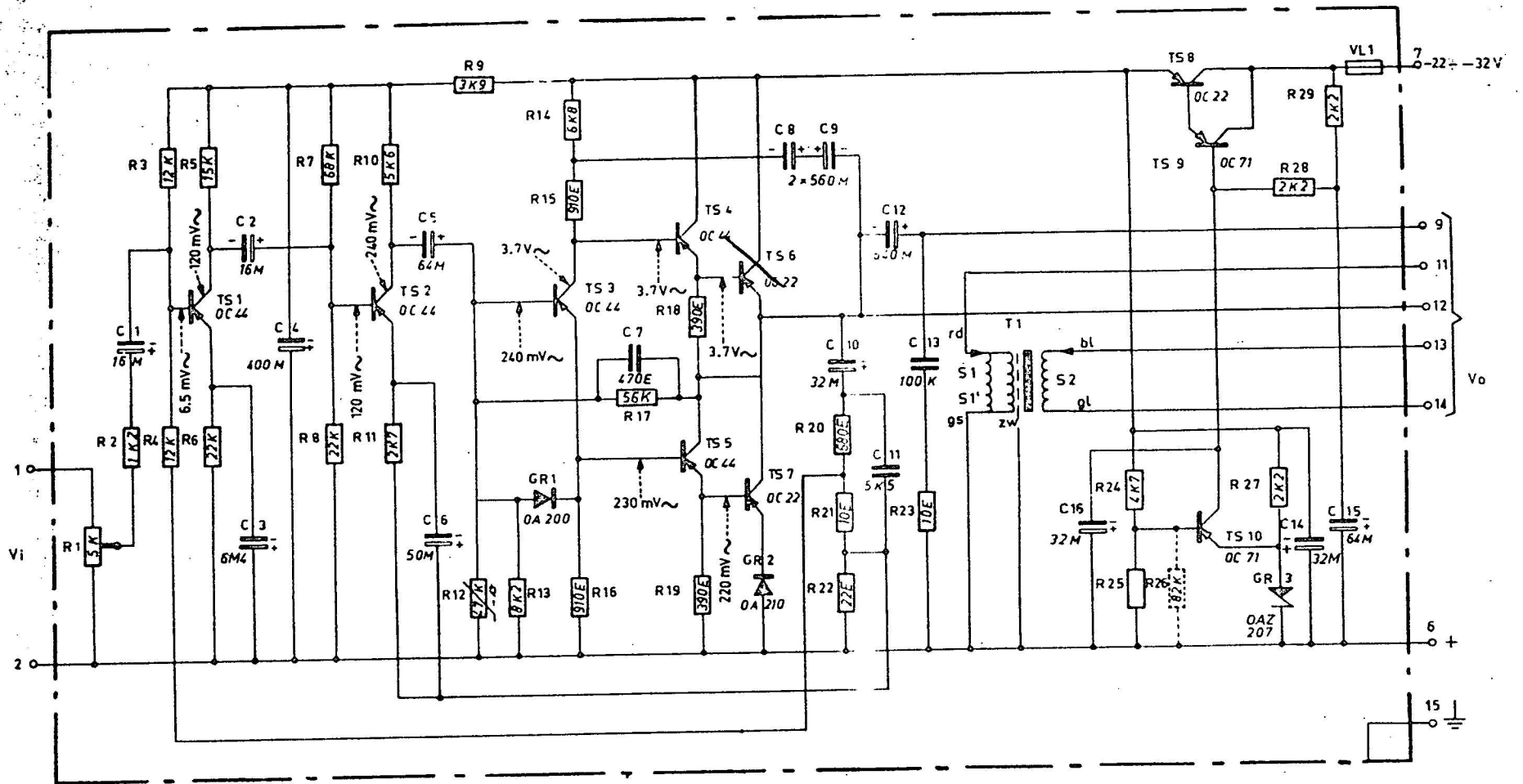
EVE 197

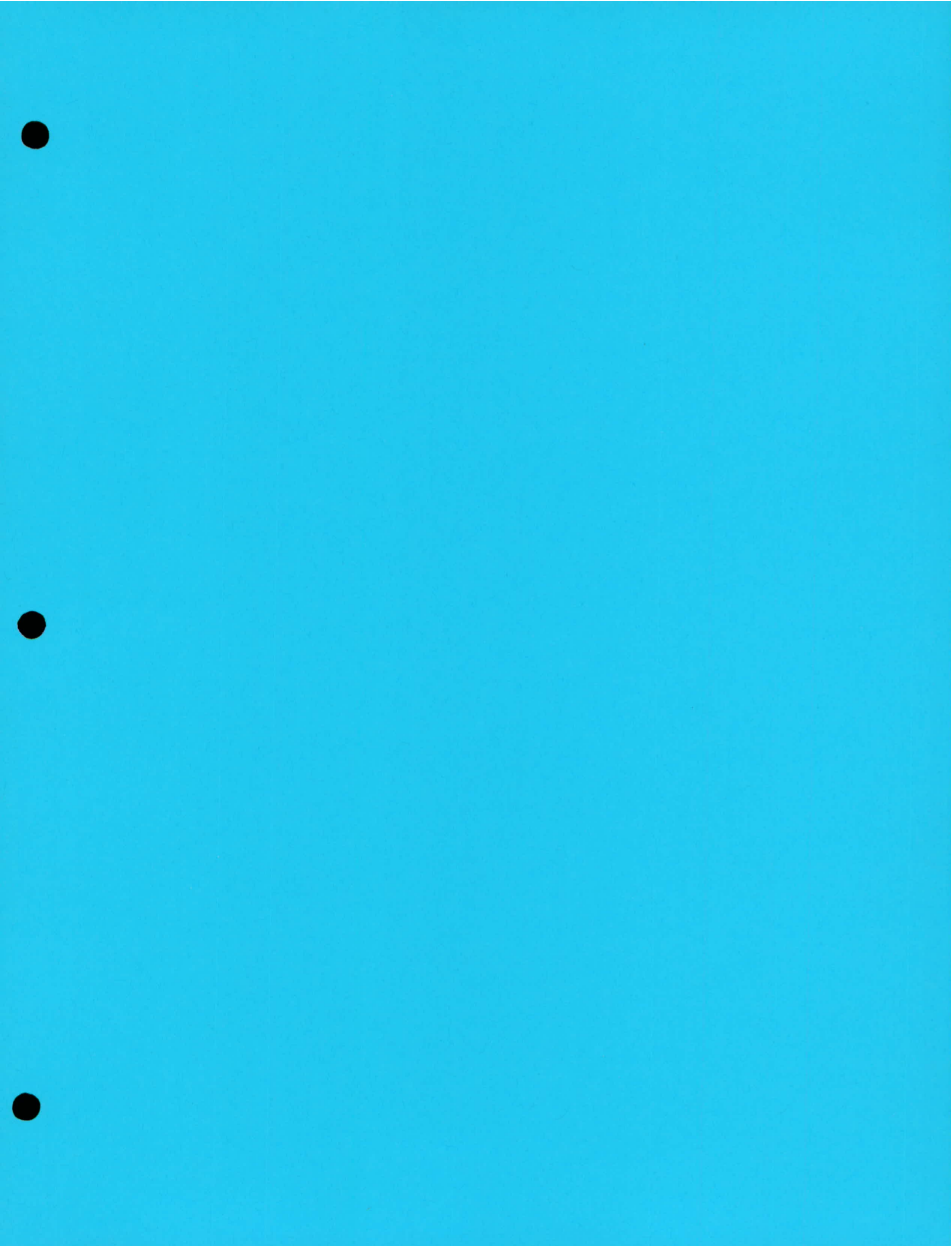


EVE 198



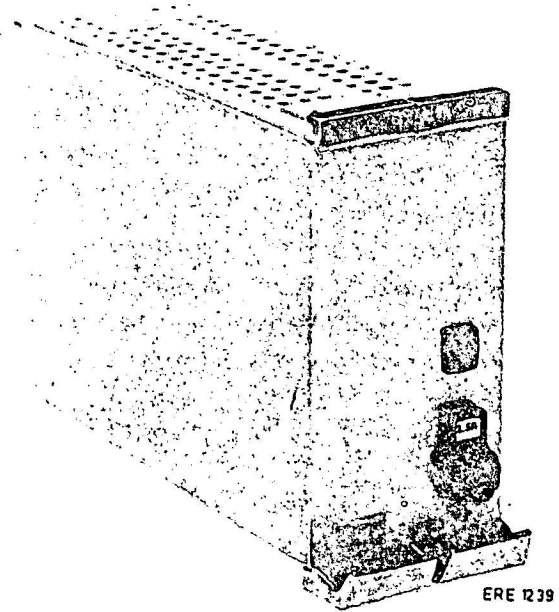
EVE 199





PHILIPS

Service



ERE 1239

In a number of desks also supply unit 8993 200 67001 is used. See relevant Service Notes in this chapter and Fig. 20 of chapter "CHASSIS".

POWER SUPPLY UNIT

EL 3670/00

93 785 83.2-10

1/768

SERVICE INFORMATION	EA65									
---------------------	------	--	--	--	--	--	--	--	--	--

CONTENTS

- A. GENERAL INFORMATION
- B. CIRCUIT-DIAGRAM DESCRIPTION
- C. CHECKING MEASUREMENTS
- D. LIST OF PARTS

FIGURES

- 1. Wiring diagram for checking measurement
- 2. Circuit diagram
- 3. Inner view
- 4. Print lay-out

A. GENERAL INFORMATION

The EL 3670/00 is a supply unit delivering a stabilised -24 Vd.c. voltage. A terminal strip for the connections is located at the rear.

Viewed from the print side, the connections from right to left have the following functions:

1/2 - 3/4	supply voltage 35 Va.c.	} output
6/7	negative d.c. voltage	
8/9	0 Vd.c. voltage	
10	mechanical earth	

Dimensions	: length	240 mm (9 2/3")
	height	130 mm (5 1/4")
	width	70 mm (2 5/6")

Weight : 2 kg

Ambient temperature : max. +45 °C
min. -10 °C

B. CIRCUIT-DIAGRAM DESCRIPTION

The supply unit includes a bridge circuit consisting of diodes, the output voltage of which is smoothed and stabilised with the aid of transistors TS1...TS3.

Input : the input voltage is 35 Va.c.

Output : the output voltage is -24 Vd.c.

The maximum power consumption is 1.95 A.

C. CHECKING MEASUREMENTS

Connect the supply unit according to Fig. 1. The resistance of the ammeter and R combined should be 12.35 Ω.

Adjust the input voltage from 0 V to 35 V (with the aid of a variable transformer and an isolating transformer).

Adjust the output voltage to 24 V with the aid of R4 when the input voltage is 35 Va.c. The output current then will be 1.95 A.

Solder the value of R4 then found into the circuit.

The ripple voltage should be ≤ 2 mV at an output current of 1.95 A.

When no load resistor is connected, the voltages measured on the transistors should have the following values:

	TS1	TS2	TS3
Vce	4.5	4.5	16

D. LIST OF PARTS

Item	Code number	Description	Fig.	
1	4822 381 10042	Lens	3	
2	4822 255 10007	Signallamp holder	3	
3	4822 256 40012	Fuse holder	3	
L1	4822 152 20284	Choke	3	
LA1	4822 134 40065	Signallamp 24 V, 25 mA	3	
TS1	9330 118 30112	Transistor 2N174	3	
TS2	4822 130 40095	Transistor AC128	4	
TS3	4822 130 40236	Transistor AC126	4	
GR1, GR3	9330 235 70112	Diode BYX28-200	3	
GR2, GR4	4822 130 30308	Diode BYX28-200R	3	
GR5, GR6	4822 130 30239	Diode OA202	4	
GR7, GR8	4822 130 30249	Diode OAZ207	4	
R1	4822 112 20132	Carbon resistor	8200 Ω 5 % 4.7 W	4
R2	4822 112 30089	Wire wound resistor	220 Ω 5 % 8.5 W	3
R3	4822 110 50132	Carbon resistor	8200 Ω 5 % 1/4 W	4
R4	See checking measurements			4
R5	4822 110 30115	Carbon resistor	2000 Ω 5 % 1/4 W	4
R6	4822 110 50112	Carbon resistor	1500 Ω 5 % 1/4 W	4
R7	4822 110 50116	Carbon resistor	2200 Ω 5 % 1/4 W	4
R8	4822 110 40083	Carbon resistor	120 Ω 5 % 1/2 W	3
R9	4822 110 50134	Carbon resistor	10 k Ω 5 % 1/4 W	4
R10	4822 110 50085	Carbon resistor	150 Ω 5 % 1/4 W	4
C1	4822 124 20248	Electrolytic capacitor	64 μ F 64 V	4
C2	4822 124 20187	Electrolytic capacitor	1000 μ F 10 V	4
C3	4822 124 70012	Electrolytic capacitor	4000 μ F 40 V	3
C4	4822 124 20082	Electrolytic capacitor	250 μ F 16 V	4
C5, C6	4822 124 70009	Electrolytic capacitor	1250 μ F 25 V	3

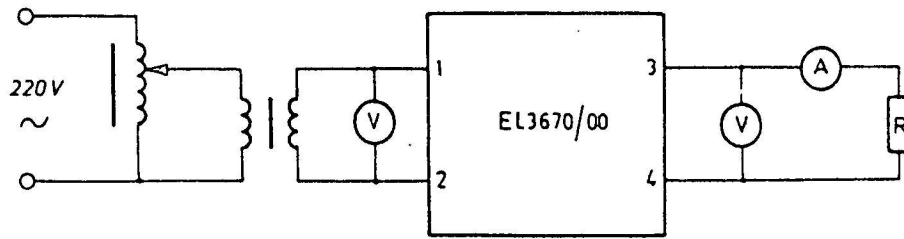


Fig. 1

ERE 1238

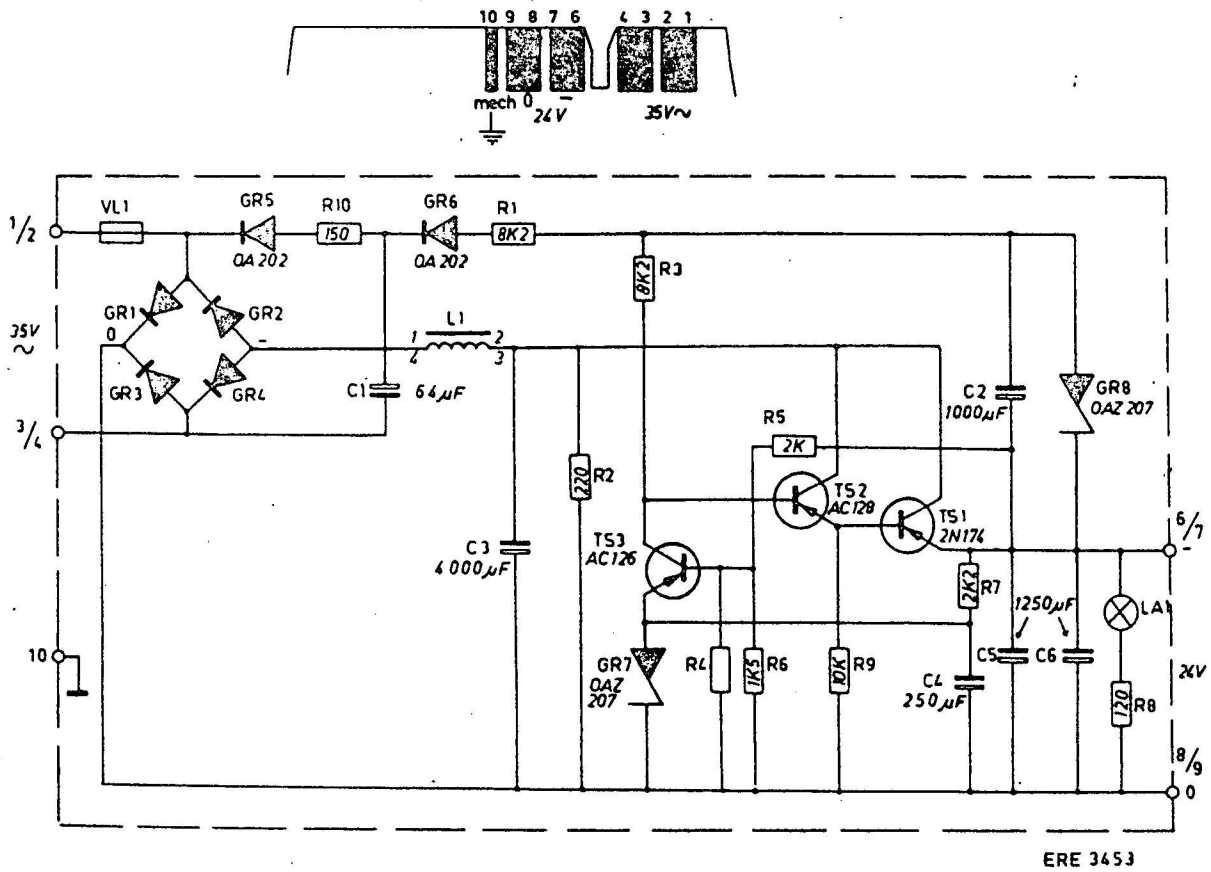


Fig. 2

ERE 3453

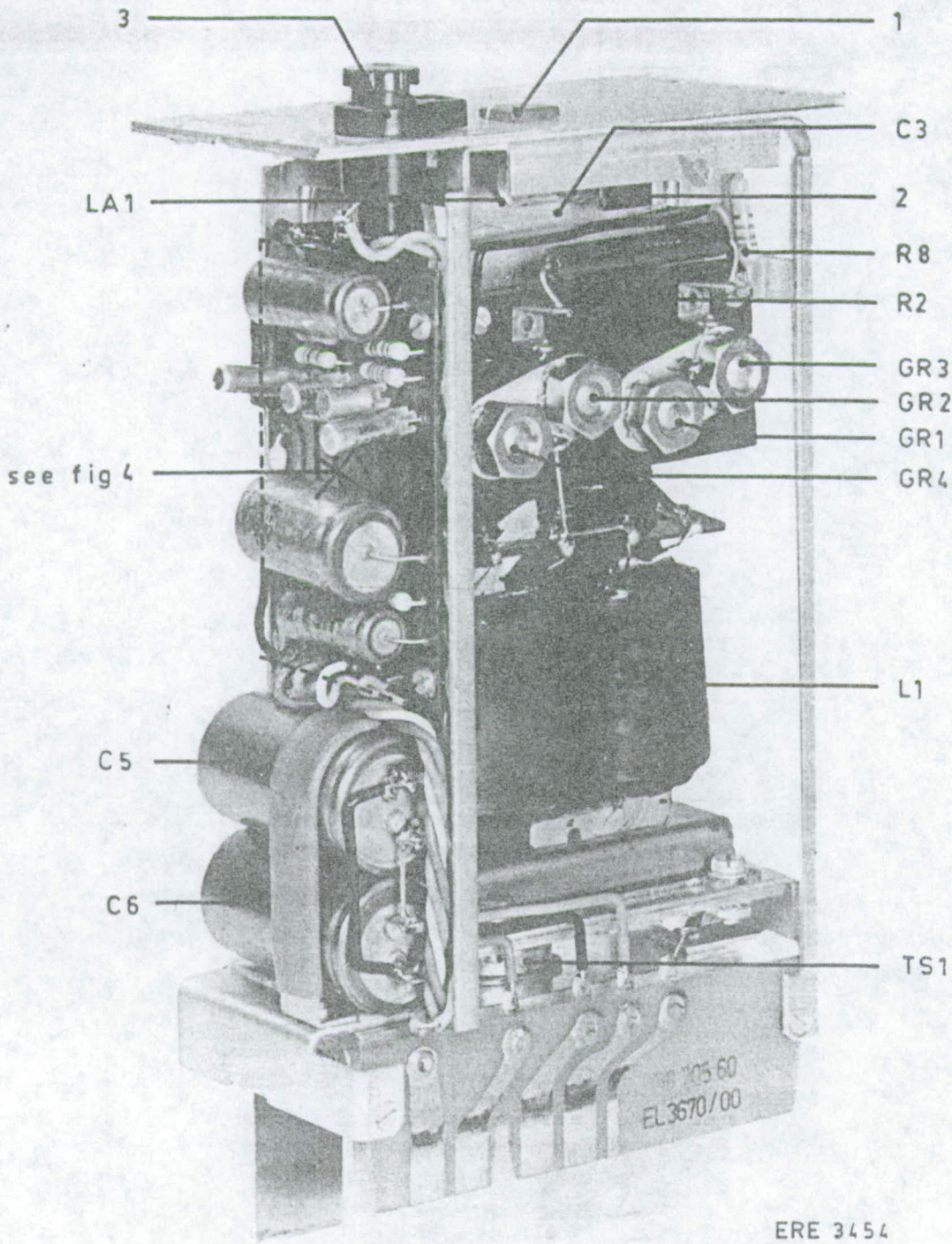
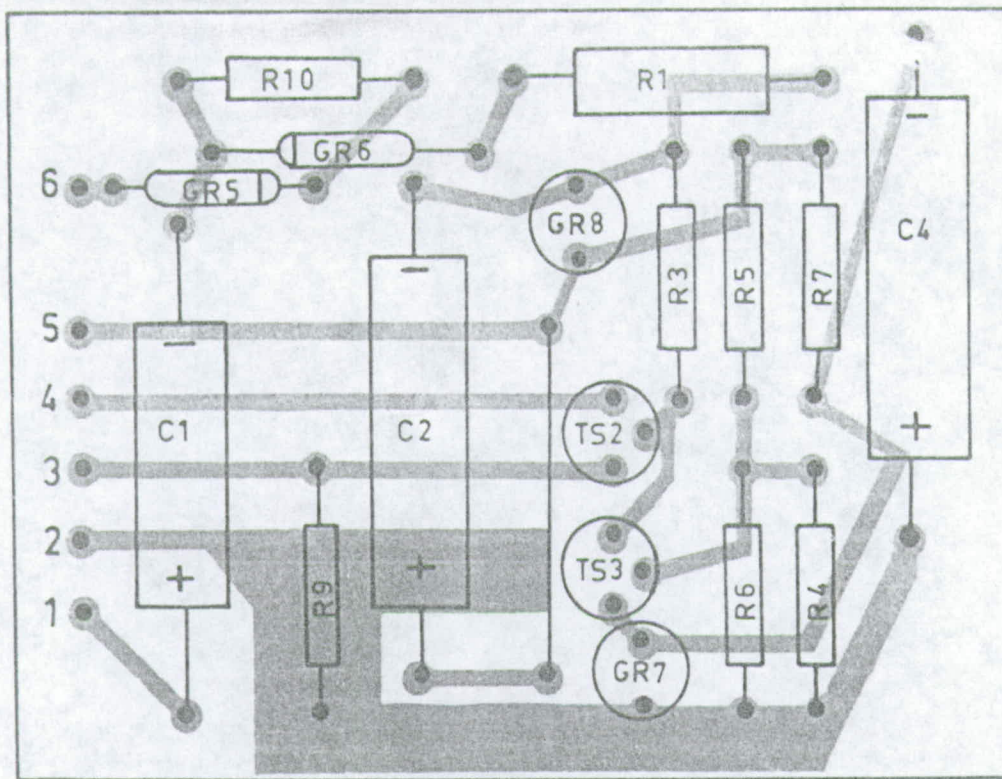


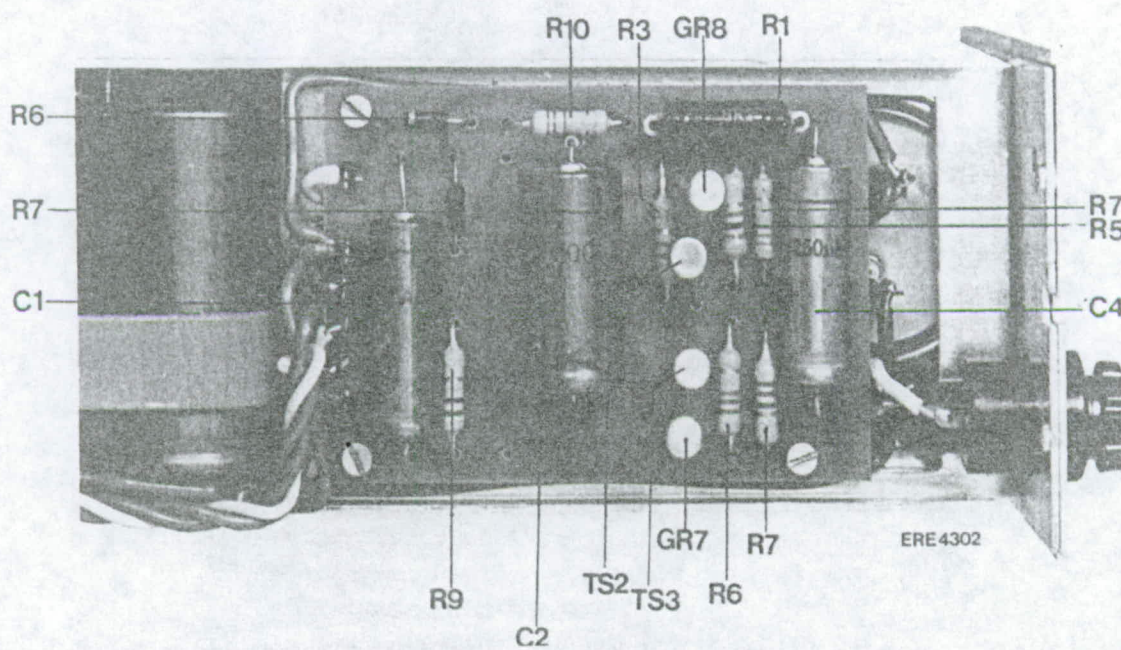
Fig. 3



ERE 3455

Fig. 4a

Delivered after April 1969

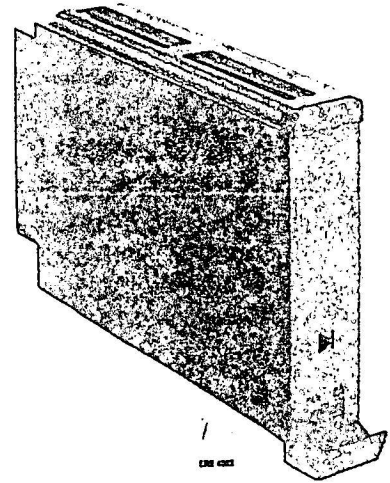


ERE4302

Fig. 4b

PHILIPS

Service



POWER SUPPLY

8993 200 67001

4822 733 21617

1/569

SERVICE INFORMATION										
------------------------	--	--	--	--	--	--	--	--	--	--

Copyright Control Service Division N.V. PHILIPS' GLOEILAMPENFABRIEKEN, Eindhoven
Confidential information for Philips Service Dealers

CONTENTS

- A. GENERAL
- B. CONNECTIONS
- C. CIRCUIT DIAGRAM
- D. CHECKING
- E. LIST OF PARTS

A. GENERAL

The power supply is accommodated in a standard unit and is suitable for supplying MD and MMD mixing desks.

1. Technical data

. Output voltage	18 V, 20 V, 22 V, or 24 V
. Max. current 2 A	2 A
. Ripple (at 2 A)	< 1 mV
. Input voltage	26 V (50-60 Hz)
. Power consumption	
Unloaded	2.5 W
Loaded	52 W
. Dimensions	34.5 x 125 x 200 mm

2. Adjustment for various output voltages

The output voltage can be adjusted by connecting point A to point B, C, D or E.

24 V: interconnect A-B

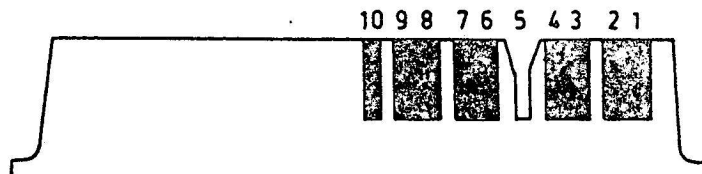
22 V: interconnect A-C

20 V: interconnect A-D

18 V: interconnect A-E

B. CONNECTIONS

1/2	
3/4	26 V a.c.
5	not used (locating key)
6/7	-d.c.
8/9	+d.c.
10	mechanical earth



C. CIRCUIT DESCRIPTION

The alternating voltage from points 1/2 and 3/4 is rectified by D1...D4 and smoothed by C1, C2/R21. The current then flows to 8/9 via R1 and TS1...TS3.

When the current consumption increases the voltage across R14...R20 will decrease. The base voltage of TS6 will then decrease with respect to the emitter voltage which is stabilised by D5.

As a result TS6 will become less conductive. Consequently, the parallel connected transistors TS4 and TS5 will become less conductive so that the base voltage of TS1, TS2 and TS3 increases.

The collector-emitter resistance of TS1, TS2 and TS3 is then reduced so that the current increases and the voltage across points 6/7 and 8/9 is restored to its original value.

D. CHECKING**Measuring equipment:****Multimeter Philips PM 2411****Load resistor 12 ohms, 50 W**

- . Connect the load resistor across points 6/7 and 8/9.
- . Adjust the unit for 24 Vd.c. (see A.2, pag.5).
- . Apply 26 Va.c. to points 1/1 and 3/4.
- . The output voltage should be 24 V d.c.

E. LIST OF PARTS

Item	Description	Code number
1	Transistor support	4822 255 40006
D1...D4	Diode BY 118	4822 130 30295
D5	Zener diode BZY 59	4822 130 30132
TS1...TS3	Transistor ASZ 15	4822 130 40091
TS4...TS6	Transistor BFY 55	4822 130 40323
C1, C2	Electrolytic capacitor 400 μ F, 40 V	4822 124 20407
C3, C4	Electrolytic capacitor 40 μ F, 16 V	4822 124 20371
R1	Wire-wound resistor 270 Ω 5.5 W	4822 112 20092
R2...R4	Wire-wound resistor 1 Ω 0.5 W	4822 112 10027
R5, R6, R7	Carbon resistor 120 Ω 1/8 W	4822 110 60083
R8, R9	Wire-wound resistor 270 Ω 5.5 W	4822 112 20092
R10	Carbon resistor 2200 Ω 1/8 W	4822 110 60116
R11	Carbon resistor 3300 Ω 1/8 W	4822 110 60121
R12, R13	Wire-wound resistor 270 Ω 5.5 W	4822 112 20092
R14	Carbon resistor 4700 Ω 1/8 W	4822 110 60125
R15	Carbon resistor 620 Ω 1/8 W	4822 110 60102
R16, R17	Carbon resistor 300 Ω 1/8 W	4822 110 60093
R18	Carbon resistor 240 Ω 1/8 W	4822 110 60091
R19	Carbon resistor 560 Ω 1/8 W	4822 110 60101
R20	Carbon resistor 2000 Ω 1/8 W	4822 110 60115
R21	Wire-wound resistor 1.2 Ω 8 W	4822 115 40137

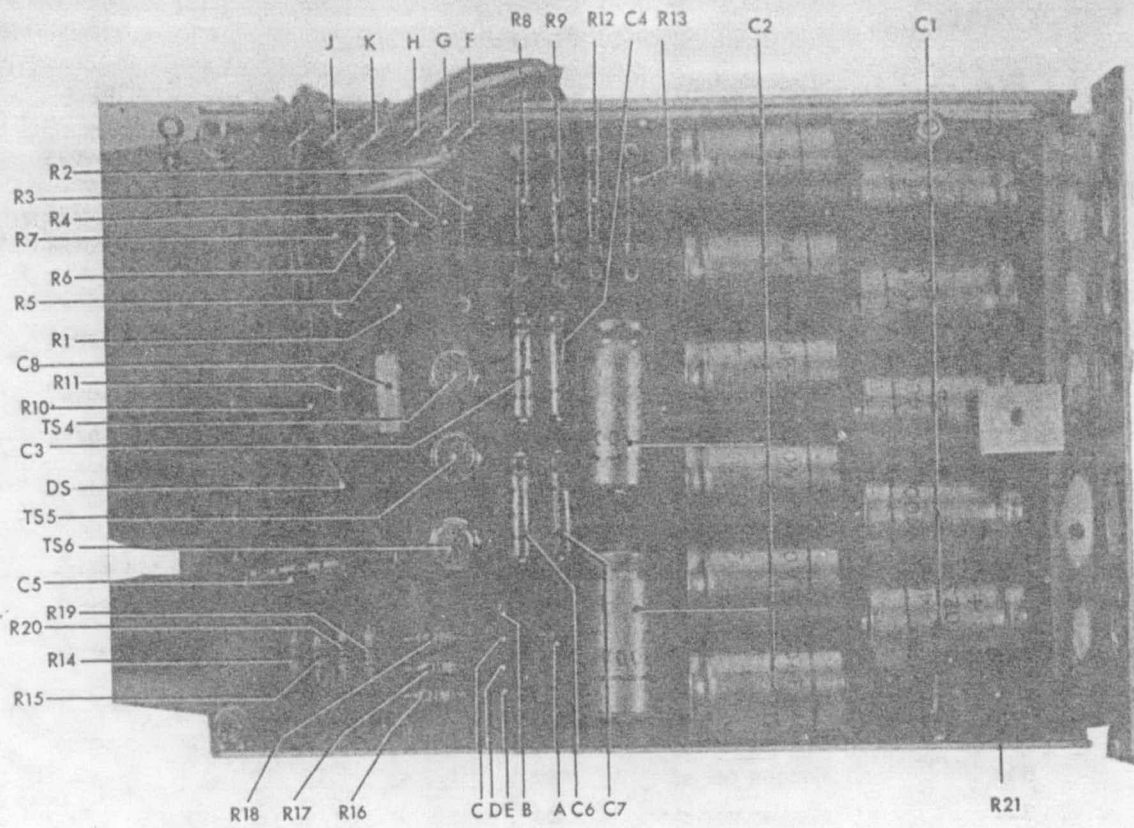


Fig. 1

ERE 4083

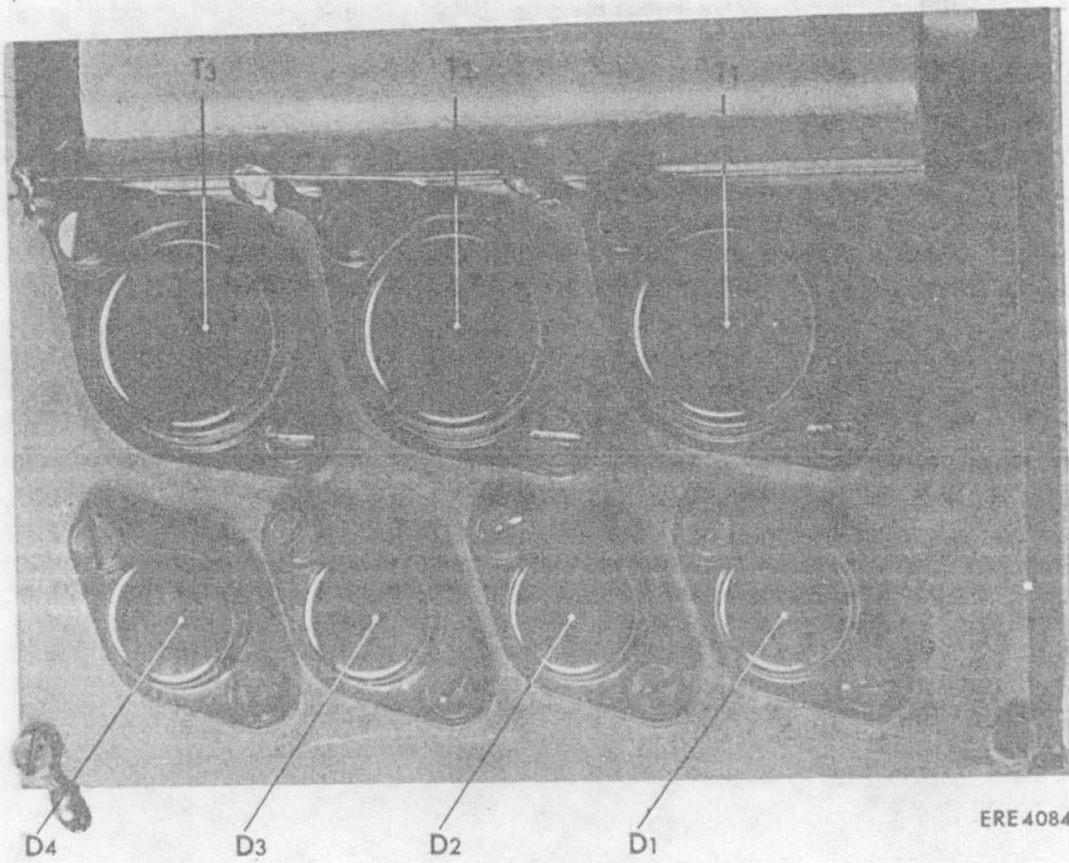


Fig. 2

ERE 4084

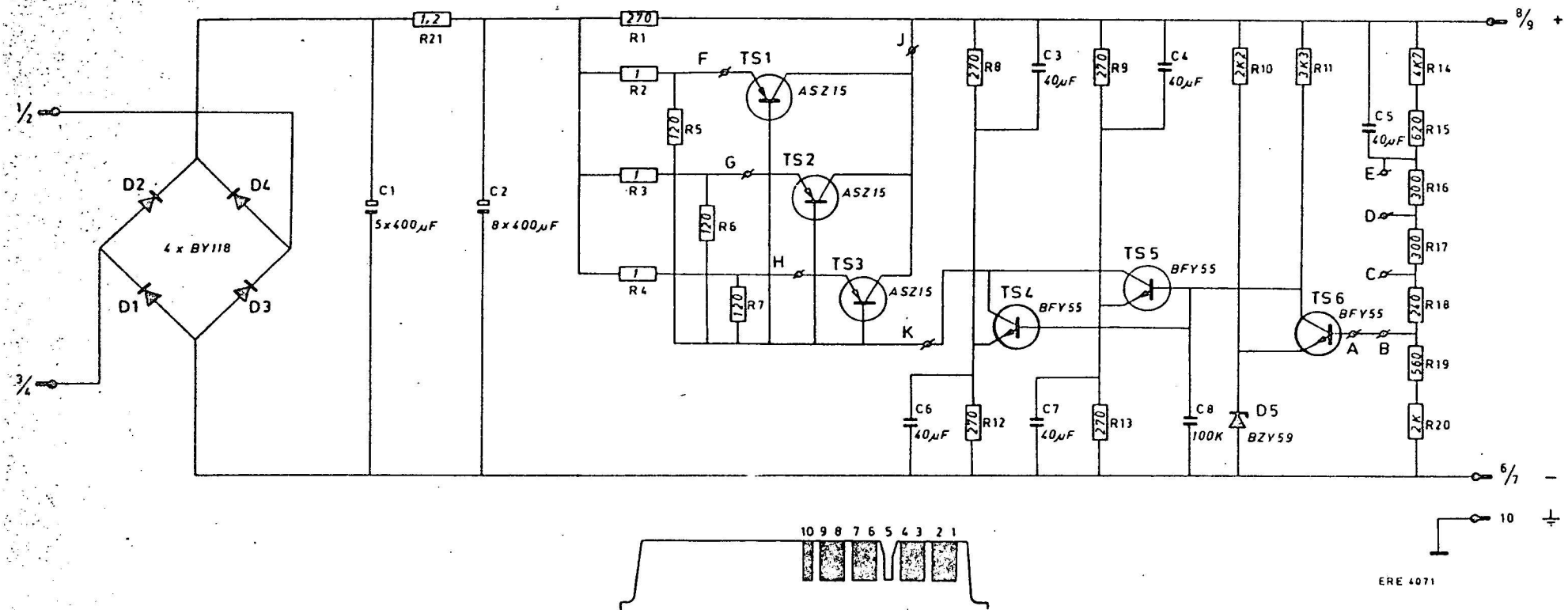


Fig. 3

ELA SERVICE INFORMATION

PHILIPS

18-8-1971	MD - MIXING DESK (THIRD GENERATION)	Ea 164

Diodes BYX 28 - 200 and BYX 28 - 200R are not available anymore.

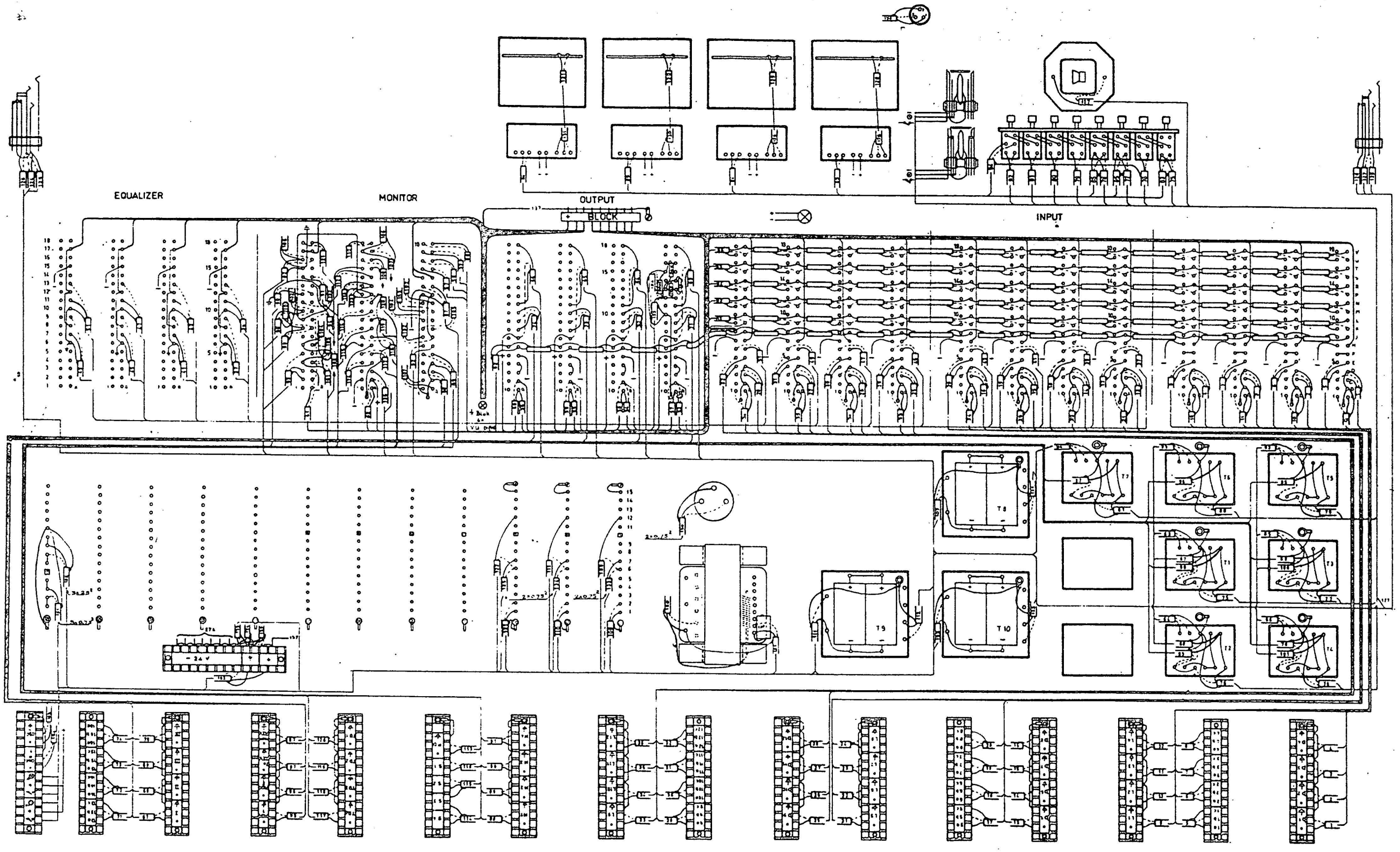
In the recommended spare parts list they are replaced by:

5322 130 30541 Diode SSIE - 1120 and

5322 130 30542 Diode SSIE - 1220

In the monitor block the code number of switch SK12/SK13 has to be: 5322 273 30225





EQUALIZER

MONITOR

OUTPUT BLOCK

INPUT

SCREEN WHILE COLOUR
 RED WIRES - 0V

Fig. 15

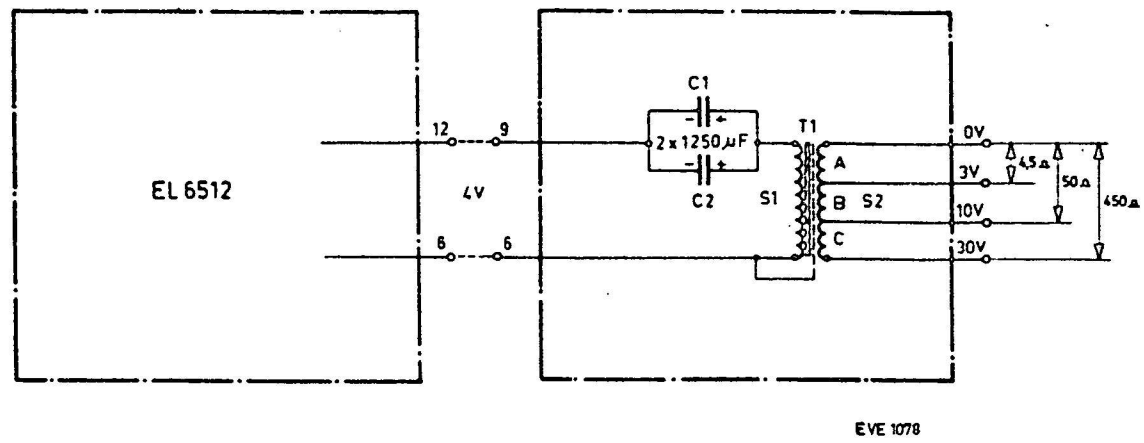
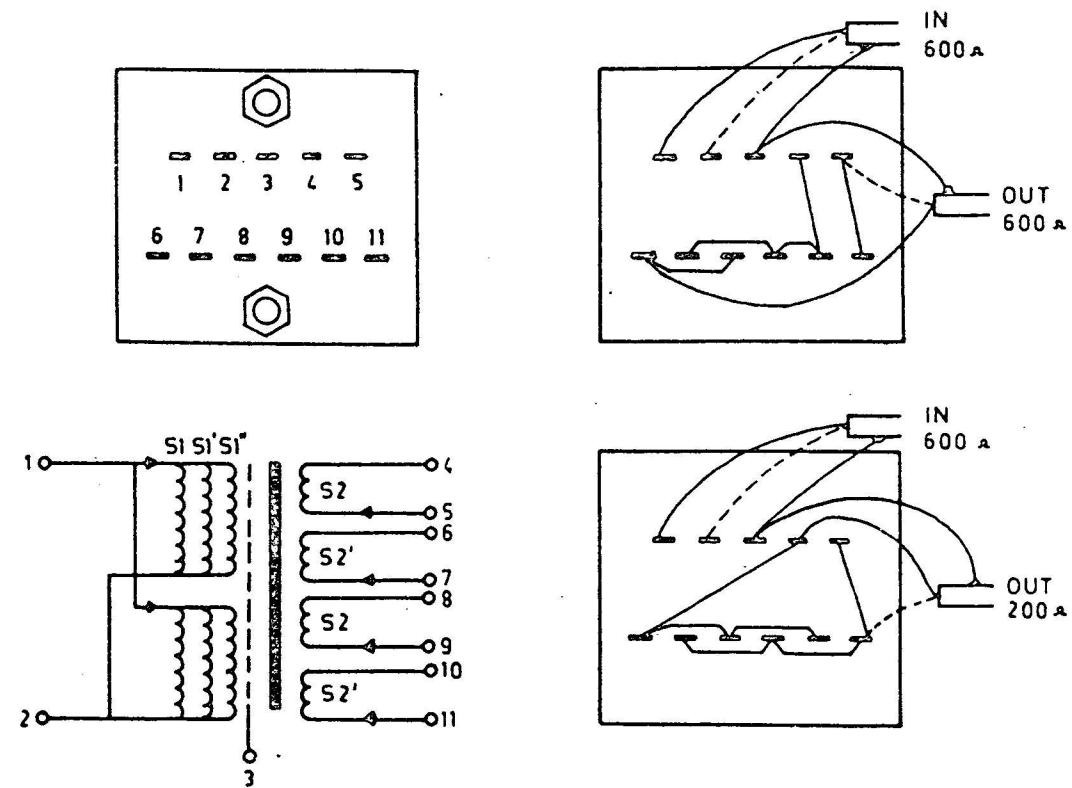


Fig. 16



	S1	S2	S2'
V	3,4	1,9	1,9
Ω	3	4	4

Fig. 17

ERE 3089

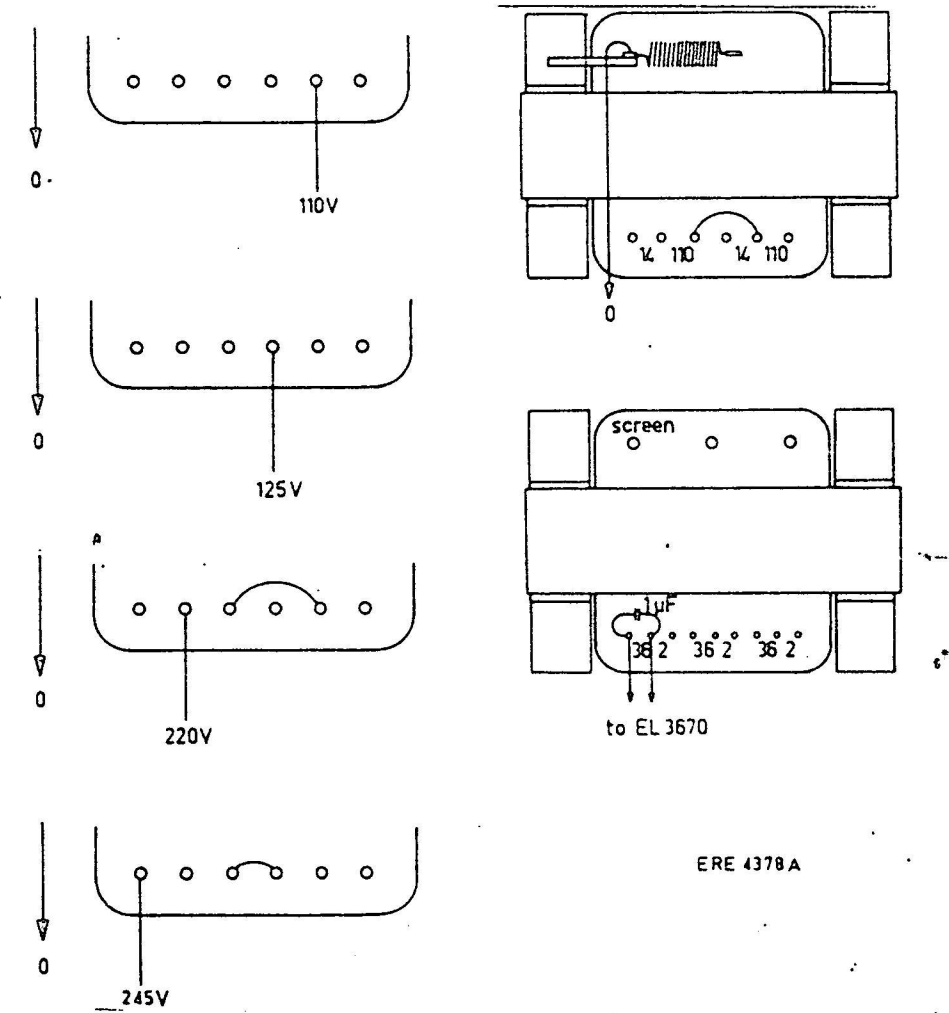


Fig. 18

ERE 4378A

