

CMOS Switched Preamp

A versatile unit designed with our 480 power amplifier modules in mind.

THIS PREAMPLIFIER incorporates rumble and scratch filters, and something new in audio amplifiers, at least in magazine projects in solid-state switching of the audio inputs and filters. This simplifies wiring, as the only wires connected to the selector switches are control wires — not shielded cables as before.

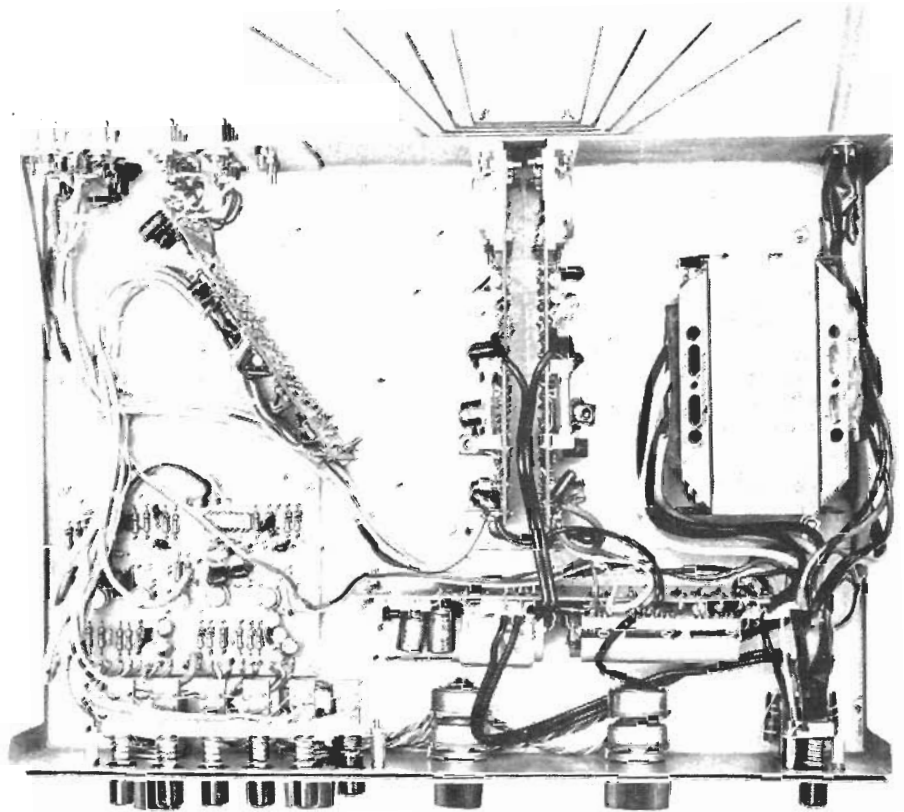
In this design we have used a bank of push-buttons, but there is no reason why touch sensitive circuitry cannot be used. Indeed it is a simple matter to use a remote switch bank with multi-core cable, for armchair selection of input or filter.

CONSTRUCTION.

The ETI 480 power amplifiers are described in detail in the April 1977 issue of ETI Canada. If you are missing this issue do not despair! The modules are also described in our Canadian Projects Book No. 1. Of course other commercially available modules can also be used.

The preamplifier is built on two boards, one being the 'mag' preamp and selector board; the other being the tone control and filter board. These can be assembled with the aid of the appropriate overlay drawing. Note that the mag preamp board has tracks on both sides and must be soldered on both sides where applicable. If you use a small soldering iron and fine solder, this should not prove any problem. Use pc board pins for all external wires as this makes wiring much easier later.

Commence assembly of the chassis with the 12mm spacers for the selector switches and the power switch.



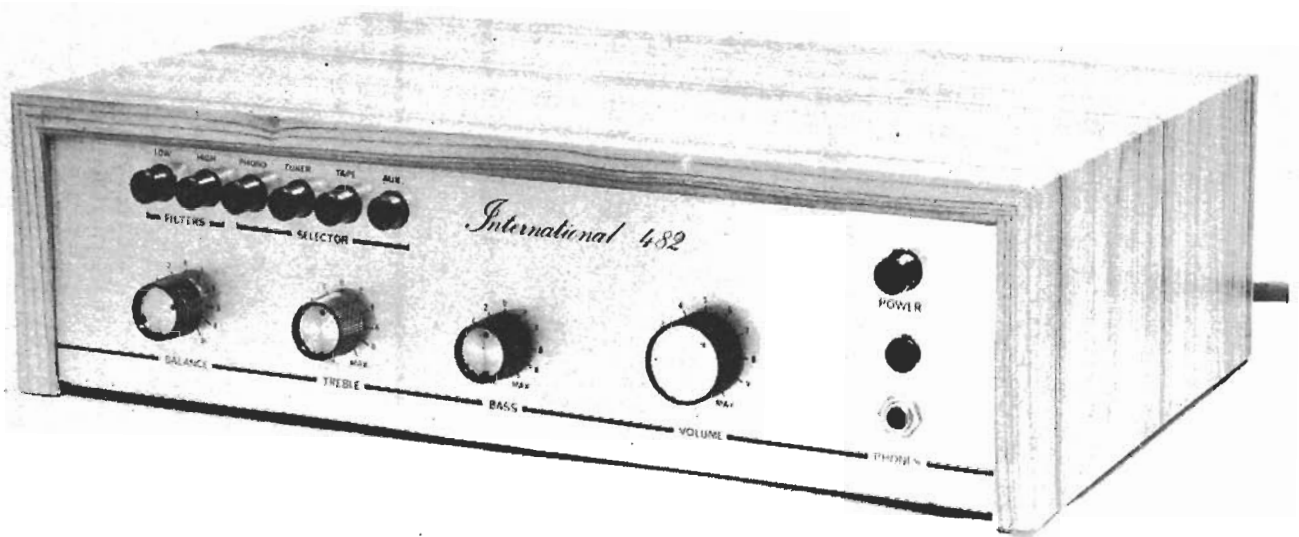
Internal view showing preamp board pivoted forward to allow access to the rear

Although the switches should not be fitted yet, the countersunk screws used to mount them are covered by the front panel and these will not be accessible later. The potentiometer and tone control board can now be installed and interconnected. The small rear panel can be assembled and fixed to the chassis.

Add wires about 40 mm long to each of the 10 inputs to the mag preamp board (it is neater if these are soldered to the rear of the board) and connect

them to the appropriate phono sockets. Also add an earth link from this board to a lug under one of the phono input sockets. Connection of all the commons of the phono input sockets is via the chassis itself. The preamplifier board can now be installed.

Before fitting the amplifier modules they should have the bias current adjusted. While this can be set later, if anything is wrong it is easier to fix before installation. Provided no load is

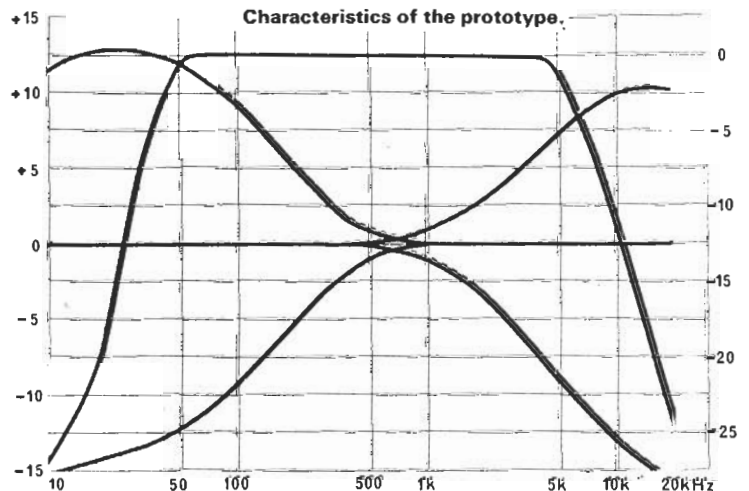


SPECIFICATIONS

Output power	50 watts into 8 ohms	Total harmonic distortion at 1 kHz.	
Frequency response	± 0.5 dB	at 1 kHz	
20Hz–20kHz		50 watts out	0.3%
Signal to noise ratio		10 watts out	0.08%
with 50 W output		1 watt out	0.08%
Tape, tuner and aux inputs	-79 dB	Tone controls	see graph
Disc input (re 10mV)	-63 dB	Filters	see graph
Input sensitivity		Damping factor	25
Tuner and aux inputs	180 mV into 100k	Channel separation	45 dB
Tape input	180 mV into 47k		
Disc input	2.5 mV into 47k		
Main amp input	500 mV into 10k		

connected, no heatsink is required at this stage. The module can now be fitted, along with the heatsink on the rear of the chassis. The chassis goes between the modules and the heatsink, but the heat loss is not great. While the heatsink used in the 480 modules is not the only one which can be used, it must be about this size — and be capable of being clamped against the rear panel, to ensure adequate cooling.

The power supply board and the selector switches can now be added and the complete amplifier wired with the aid of the diagram in Figure 4. We left the transformer out until this stage to keep the weight down. It can now be added and the wiring completed.



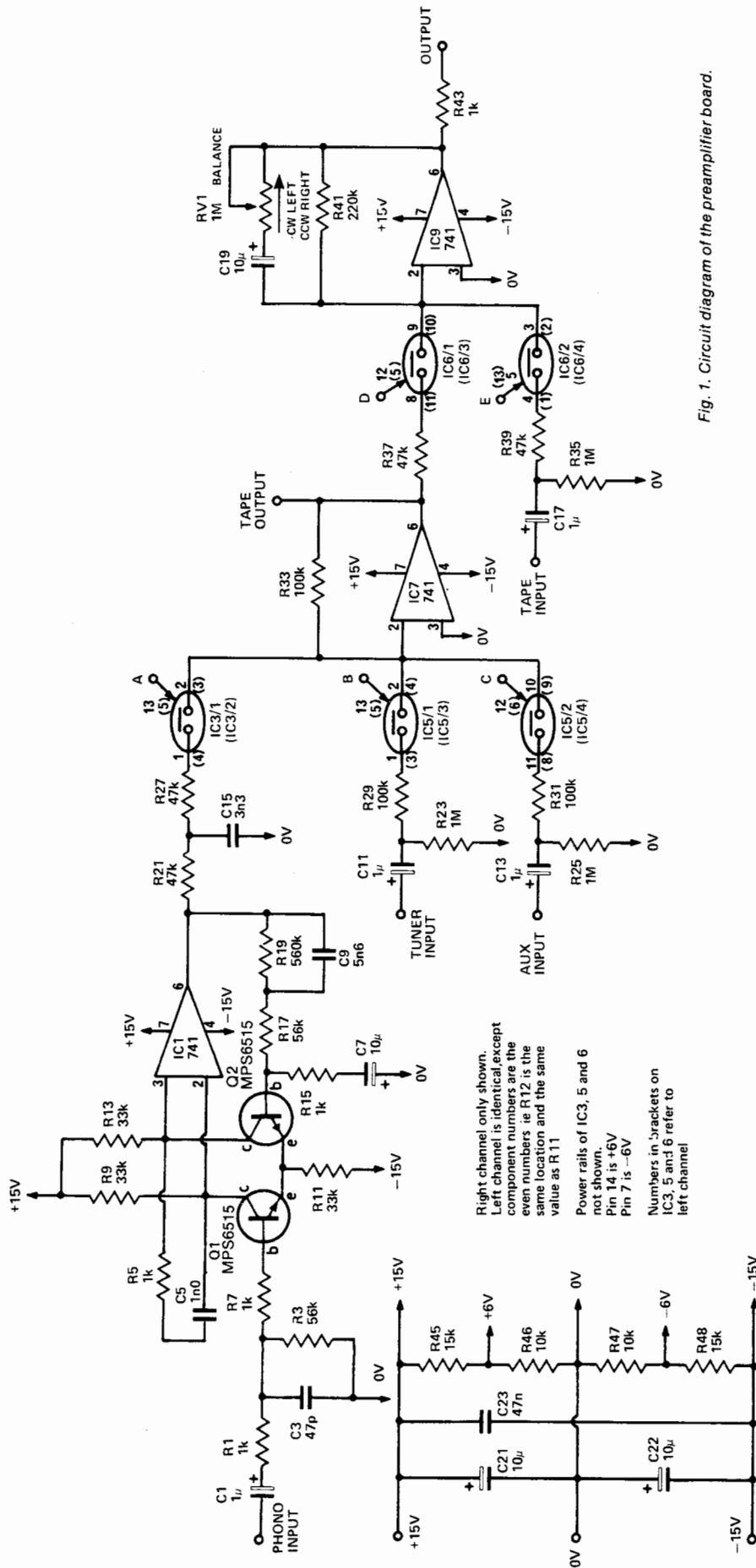


Fig. 1. Circuit diagram of the preamplifier board.

ETI 482

The output from a magnetic pickup has to be amplified and equalised before it can be used. This is achieved using Q1, 3 and IC1 to provide a gain of about 40 dB at 1 kHz and using C9 and C15 to provide the equalisation required to meet the RIAA curve. The transistors are used to reduce the noise of the 741 amplifier to acceptable levels. Selection of the inputs is done by IC3, 5 and 6, which are CMOS analogue switches. If the control input to these devices is high (+6V) the

HOW IT WORKS

switch appears as a 300 ohm resistor and if it is low (-6V), it appears as an open circuit. Therefore, IC3/1, IC5/1 and IC5/2 can select phono, tuner or aux inputs and IC7 buffers the one selected.

The output of IC7 is used as tape output for recording purposes. The tape input is fed with a second buffer, IC9, and IC6/1 disconnects IC7 when this is to allow monitoring (when recording) and this is selected by depressing both the tape button and the input required. The gain of the second buffer, IC9, is variable by means of RV1, which is the balance

control. The two channels are wired to the opposite way around on RV1, so that increasing gain on one channel decreases the gain on the other.

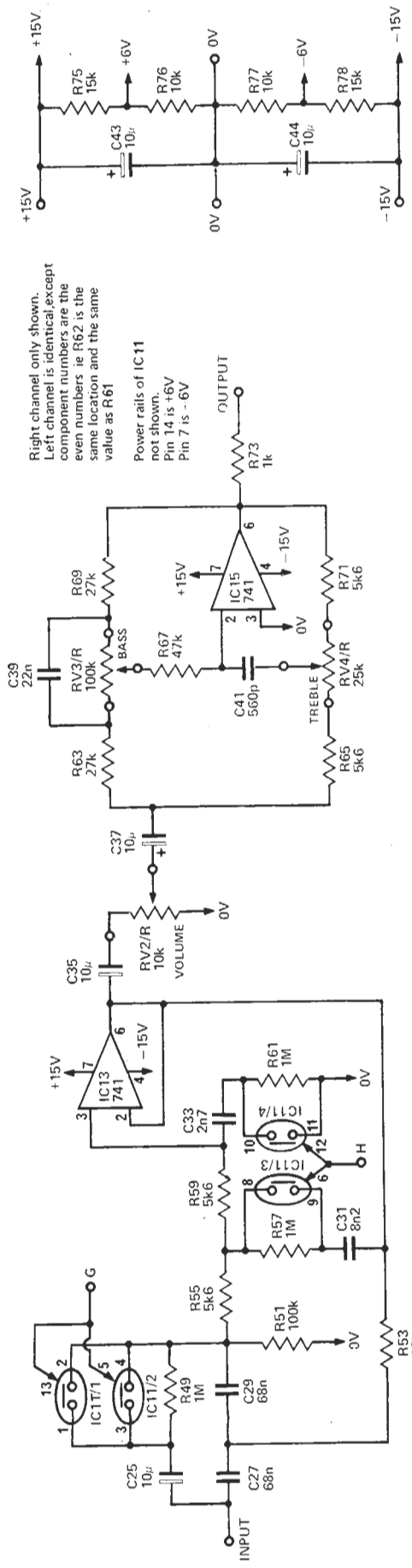
The filters used are two-pole active type and CMOS switches are used to enable or inhibit the circuits. C27 and C29 determining the low filter cutoff frequency and the value can be varied to suit your requirements. The values given give a cutoff at about 50 Hz and increasing the capacitance decreases the cutoff frequency, and vice versa. In the high cut filter C31 and C33 determining the frequency and these

values can also be varied if required. The approximate ratio between these capacitors should be maintained.

The tone controls are conventional. To reduce the effective-noise level, the volume control is wired between the filter section and the tone control stage. This does mean, however, that the input levels are more critical than they would be if the control was further back in the circuit. Input levels should be kept below about 2 volts.

Right channel only shown. Left channel is identical, except component numbers are the even numbers ie R12 is the same location and the same value as R11

Power rails of IC3, 5 and 6 not shown. Pin 14 is +6V Pin 7 is -6V Numbers in brackets on IC3, 5 and 6 refer to left channel



Right channel only shown. Left channel is identical, except component numbers are the even numbers, ie R62 is the same location and the same value as R61

Power rails of IC11 not shown. Pin 14 is +6V Pin 7 is -6V

Fig. 2. Circuit diagram of the filter and tone control board.

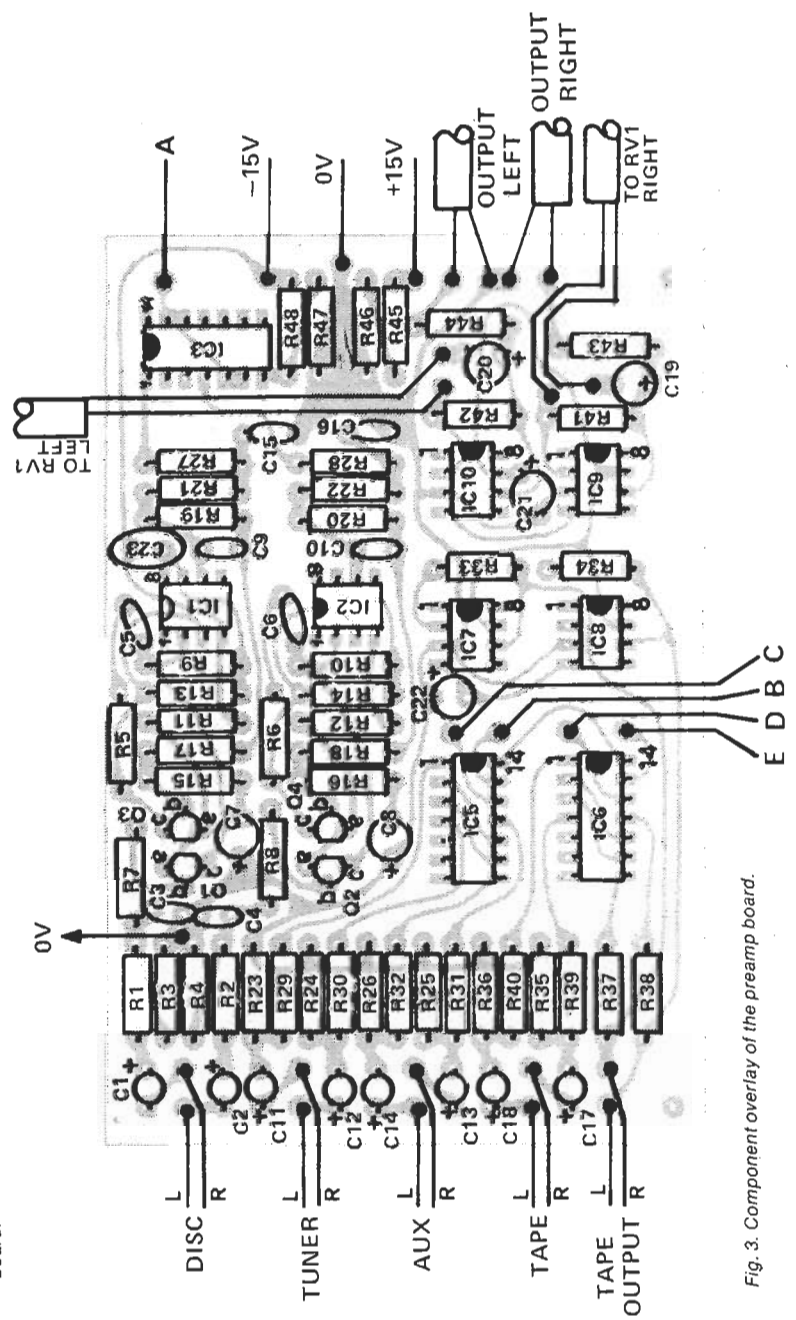


Fig. 3. Component overlay of the preamp board.

PARTS LIST

ETI 482A

RESISTORS all 1/2W 5%

- R1, 2, 5, 8, 15, 16, 43, 44 1 k
- R3, 4, 17, 18 56 k
- R9, 14 33 k
- R19, 20 560 k
- R21, 22 47 k
- R23, 26, 35, 36 1M
- R29, 34, 37, 40 100 k
- R41, 42 220 k
- R45, 48 15 k
- R46-47 10 k

CAPACITORS

- C1, 2, 1 μ , 35 V Tantalum
- C3, 4 47p ceramic
- C5, 6 1n polyester
- C7, 8, 19, 22 10 μ , 16 V electrolytic
- C9, 10 5n6 polyester
- C11-14, 17, 18 1 μ , 35 V electrolytic
- C15, 16 3n3 polyester
- C23 47n polyester

SEMICONDUCTORS

- Q1, Q2 MPS6615
- IC1, 2 741
- *IC3, 5, 6 4016
- IC7-IC10 741
- *The number IC4 is not used

PC Board ETI 482A

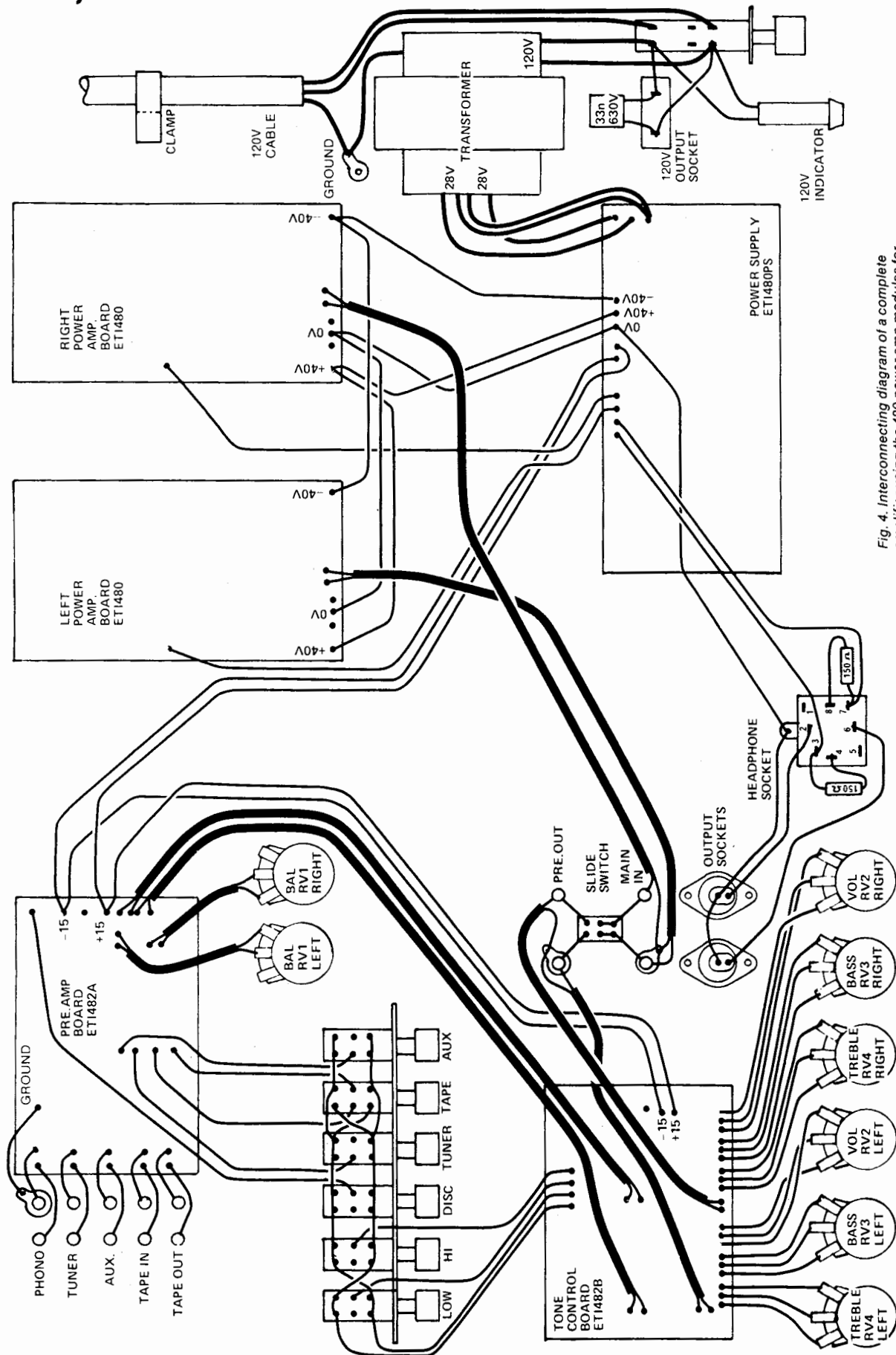


Fig. 4. Interconnecting diagram of a complete amplifier using the 480 power amp modules for output.

PARTS LIST

ETI 482B

RESISTORS all 1/4W 5%

- R49 50,57,58,61,62
- R51,52 100 k
- R53,54,63,64,69,70 27 k
- R55,56,59,60,65,66,71,72 5 k 6
- R67,68 47 k
- R73,74 1 k
- R75,78 15 k
- R76,77 10 k

CAPACITORS

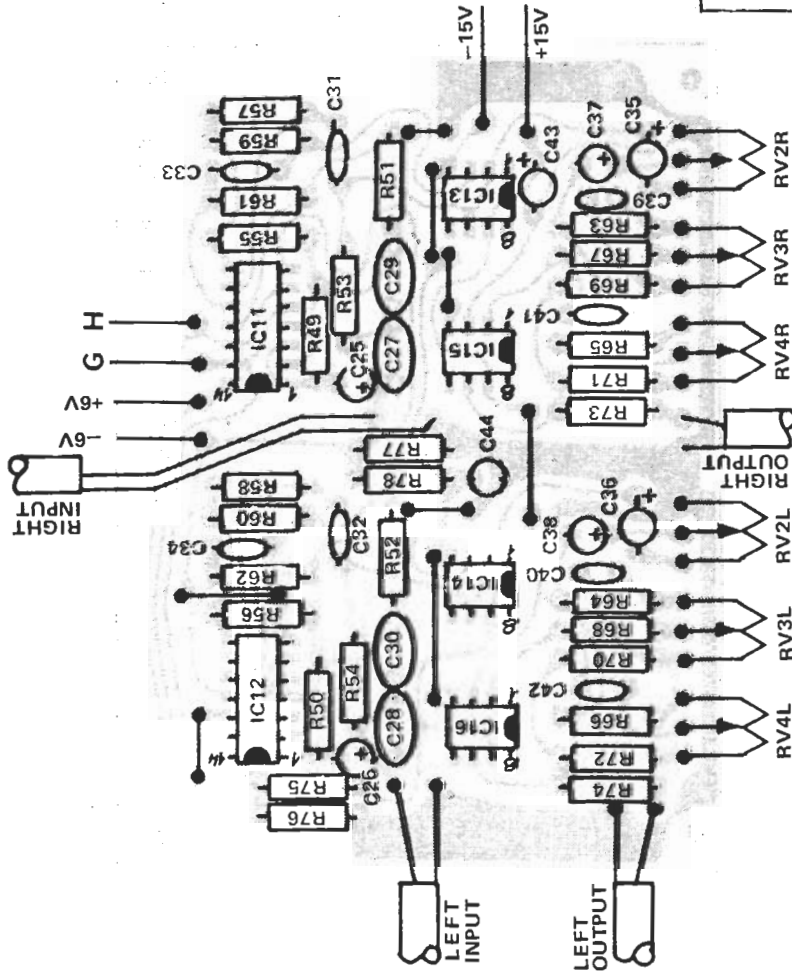
- C25,26,35-38, 43,44 10 μ 16 V electro
- C27-C30 68 n polyester
- C31,32 8n2 polyester
- C33,34 2n7 polyester
- C39,40 22 n polyester
- C41,42 560 p ceramic

POTENTIOMETERS

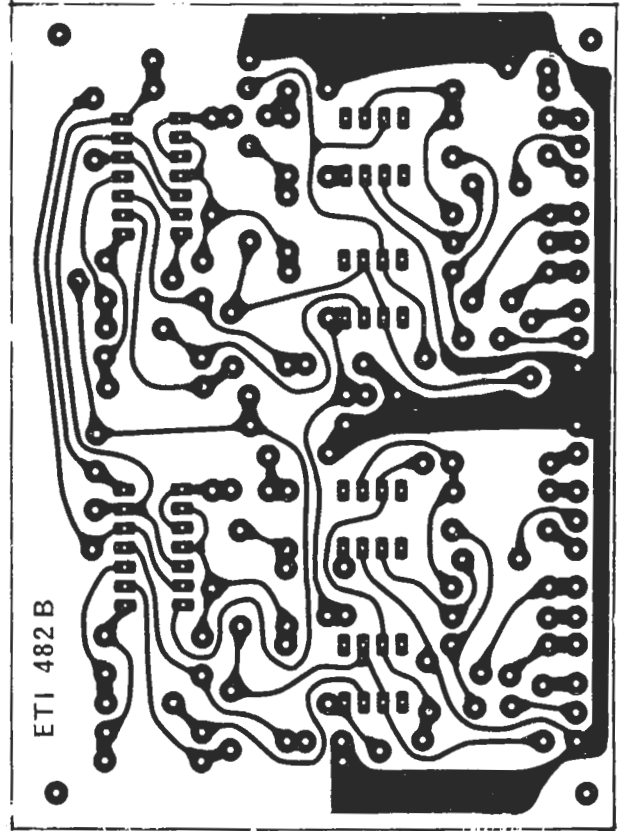
- RV2 10 k log dual rotary
- RV3 100 k lin dual rotary
- RV4 25 k lin dual rotary

INTEGRATED CIRCUITS

- IC11,12 4016 or 4066
- IC13-IC16 741
- PC board ETI 482 B



Foil pattern for 482B pcb.



PARTS LIST

ETI 482 GENERAL

- 2 50 W ETI 480 Amplifier modules
- 1 ETI 480 P Power supply module
- chassis cover
- Front panel
- Heatsink
- Rear panel
- 5 brackets
- 4 knobs
- 1 Selector switch bank
- 1 Power switch
- 1 2 pin power socket
- 1 33 n 630 V capacitor
- 1 120V power indicator
- 1 Power cord, grommet and clamp
- 1 Stereo headphone socket
- 14 Single phono sockets
- 1 Small double pole slide switch
- 2 2 pin DIN socket
- 8 12mm spacers
- nuts, bolts, washers etc.

Foil patterns for the printed circuit boards. Note that 482A is double sided — all artwork is correct size.

