



# A laboratory standard function and pulse generator

## Part 4

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This instalment covers the preparation of the chassis and installation of the power supply and output amplifier modules. Do the chassis preparation carefully and you'll be assured of a 'professional' result, with no hassles during assembly. The front panel is particularly critical in this regard, the rear panel and chassis bottom, less so. A fully-dimensioned drawing for all the front panel holes has been prepared and is reproduced elsewhere in this article.

The case I have used is made by the Victorian firm, K&W. It is case No. C1066, the same as used in the ETI-163 Lab-standard Power Supply. In fact, I have designed that

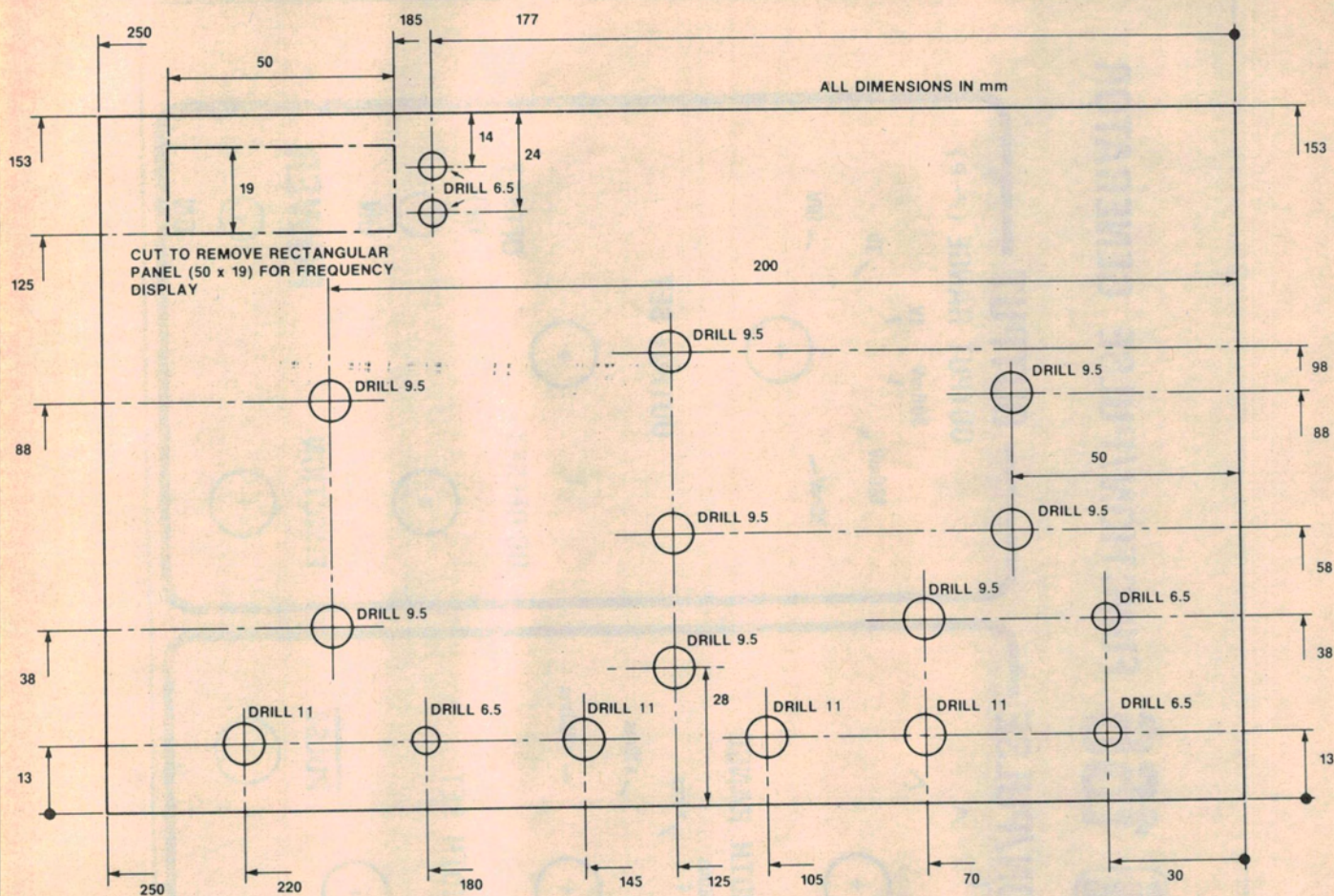
power supply and this generator to have a compatible appearance. The chassis of this case is of aluminium, while the lid is steel, having a number of ventilation slots and painted hammertone blue.

The place to start is the rear panel of the chassis. As layout here is generally non-critical, no dimensional drawing has been done. The power supply and the mains transformer are mounted on the rear panel and the mains cable enters at the lower right, when viewed from the front. A drawing of the general layout and wiring diagram of the power supply module and mains shows the details. Mark out the panel with a soft lead

pencil, using the components as templates, where applicable. The power supply pc board artwork (reproduced in the last part) can be used as a template to mark the position of this module's mounting holes.

When you've marked all the hole centres, centre punch them before attempting to drill the panel. Drill a pilot hole first where large diameter holes have to be drilled (e.g. for the fuse and cable clamp). When the holes have been drilled, check that everything will fit without fouling anything or being cramped. Remove all burrs from the hole rims. Don't assemble anything yet.





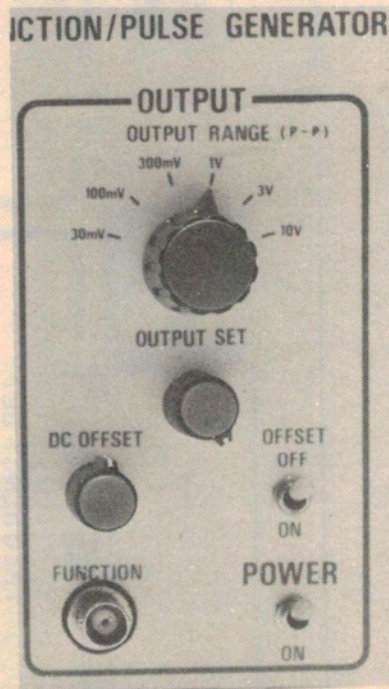
Now mark out the bottom of the case to take the mounting holes for the output amplifier module and the main generator pc board. The main artwork for the ETI-1520 module (reproduced in the article on the '1520) can be used to mark its mounting hole positions. The template drawing for the main generator pc board, reproduced here, can be used to mark out its mounting hole positions. Again, use a soft pencil to mark the hole positions and centre punch them before drilling. Check it after drilling and de-burr the holes.

Now for the front panel. I have to stress that this should be done with the *utmost care*. Follow the accompanying drawing carefully and you should have no difficulty. There is an option, though, that I should point out, with regard to the mounting of the 4-digit LED frequency display. This board, ETI-166c, is mounted with four long screws. The panel could be drilled and countersunk screws employed, but I found that, owing to the thinness of the chassis material, this was not going to be very satisfactory as the screw heads would not sit flush with the panel and thus would show beneath the Scotchcal front panel. Instead, I mounted the screws to the board so that the displays were held a millimetre or so back from the panel cutout and actually *glued* the screw heads to the front panel after carefully siting the display board. The choice I leave to you.

Mark out all the holes very carefully, measuring only from the bottom edge and the bottom right-hand corner, to ensure consistent accuracy. Centre punch all the holes before drilling. Drill a pilot hole first for all the holes, then the correct size drill. De-burr all the holes when you're finished. The LED display slot can be cut out in a number of ways. One way is to drill a series of holes around the inside edge of the hole, a millimetre or so from the marked edges. Break out the centre piece when you've completed the series and then file the edges smooth and straight. Alternatively, drill one large hole for a 'hole nibbler' and cut around the edge with that tool. Some filing will be necessary in this case too.

When you're satisfied the panel's finished, you can install the Scotchcal label. I used a plastic one - blue on a white background to match my ETI-163 Lab Supply - but an aluminium one can be used too. If you're using a plastic Scotchcal, paint the panel white first, as the Scotchcal is translucent. Let the paint dry thoroughly before proceeding.

Whether you've made your own or purchased one, the Scotchcal panel should be installed carefully. Start by cutting it carefully to size, then remove a 10 mm strip off the backing from the left-hand edge. Carefully line up the edge of the Scotchcal and the edge of the panel, ensuring that it will lay



This bit. The assembly of this section and the power supply is covered in this instalment.



# eti 166 FUNCTION/PULSE GENERATOR

Hz  kHz

### FREQUENCY

FREQUENCY SET

FREQUENCY RANGE

x10 x100 x1k x10k x100k

EXT SWEEP  MANUAL  SWEEP

### FUNCTION/PULSE

PULSE WIDTH RANGE

x10us x1ms x10ms x100ns

PULSE WIDTH SET

PULSE  PULSE

### OUTPUT

OUTPUT RANGE (P-P)

100mV 300mV 1V 3V 10V

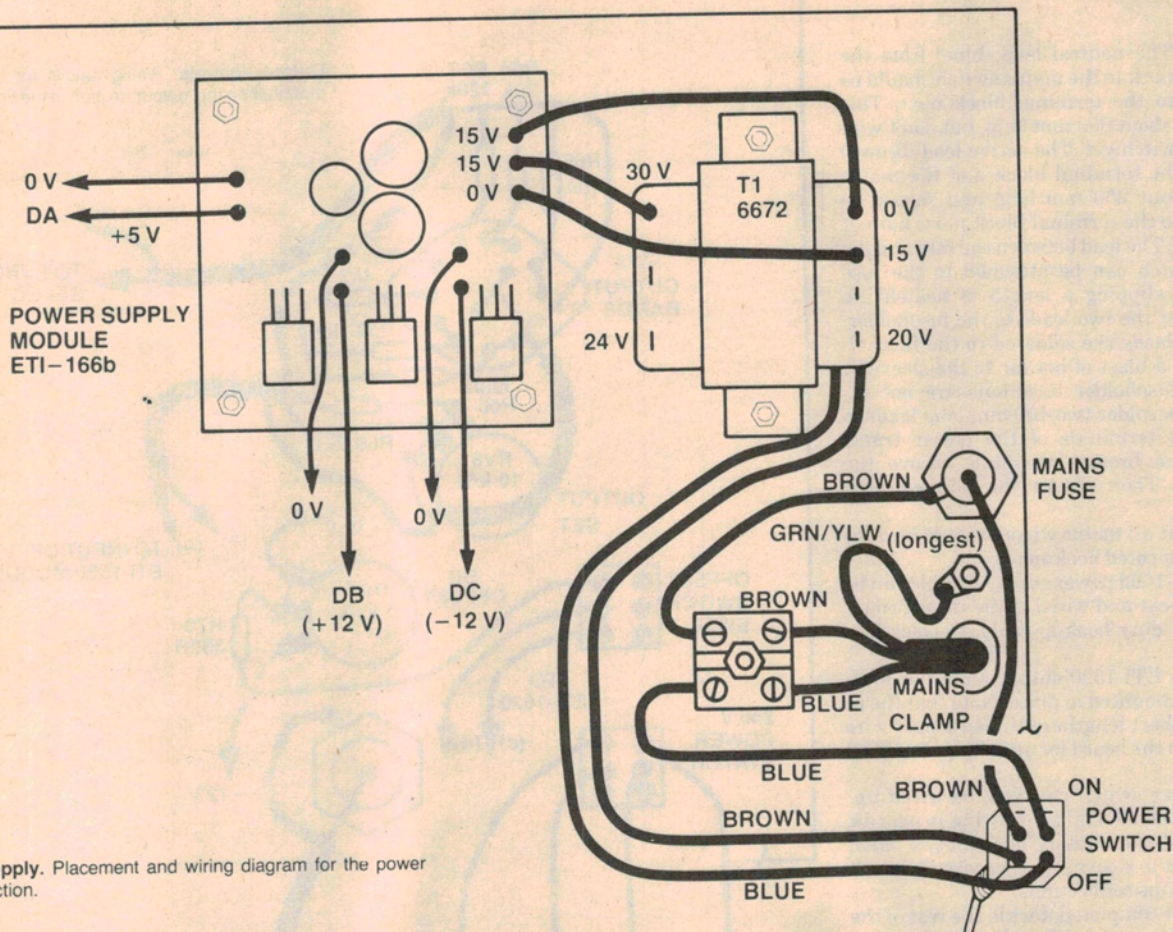
OUTPUT SET

DC OFFSET  OFFSET OFF  ON

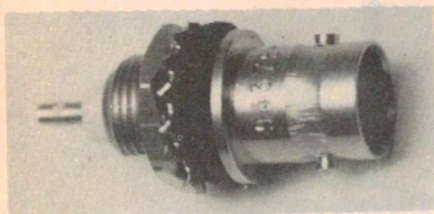
FUNCTION  POWER  ON



## TOP, REAR PANEL OF CASE



Power supply. Placement and wiring diagram for the power supply section.



Start with the BNC socket. This has to be installed from the front panel. What I did was to take a 6 mm i.d. rubber grommet and force (roll) it onto the socket's thread after removing the nut, washer and earth lug. This then slips neatly in the 11 mm mounting hole marked FUNCTION. Secure it by putting the washer on first, then the earth lug, followed by the nut. Check that it isn't shorted to the chassis. Then mount the power

switch (DPDT), followed by the two pots and the rotary switch. Take care not to scratch the Scotchcal.

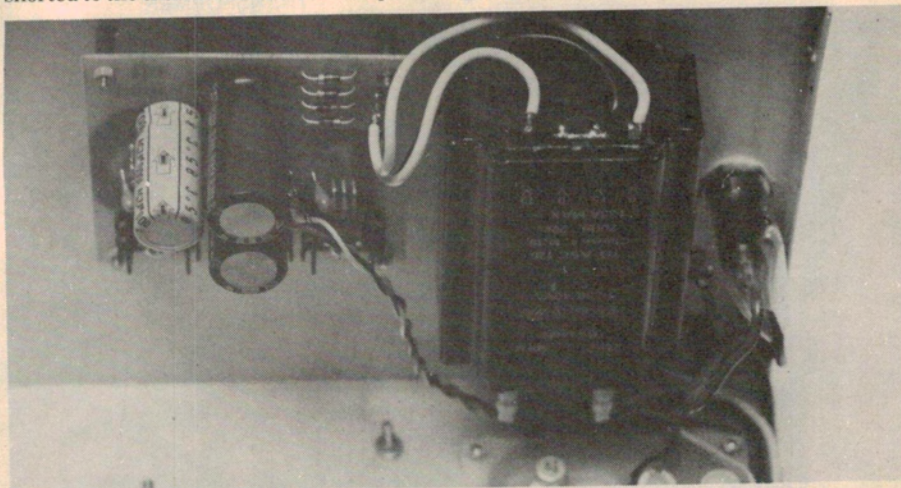
Now tackle the rear panel. Mount the terminal block and earth lug, then the mains cable. Strip the end of the mains cable so that the active (brown) and neutral (blue) leads are about 40 mm long and the earth lead (green with yellow stripe) is about 60-70 mm long. Terminate the leads as per the wiring

straight, and rub down firmly along the edge. Then, carefully peeling off the backing and rolling it under, rub the Scotchcal down, moving across the panel. This way, you should get no, or very few, bubbles under it. Any you may get can be rubbed away towards one edge as they occur.

Using a sharp knife point or modeller's scalpel, cut the Scotchcal away from all the holes, being careful not to make any slips or you'll spoil your panel. Tsk, tsk.

Now you can mount the controls in the OUTPUT section of the front panel. There are two toggle switches, two pots and a rotary switch. Here's what you'll need:

- 1 x BNC socket, panel-mount, with earth lug.
- 1 x two-pole, 6-position rotary switch.
- 1 x 1k/A (lin.) pot.
- 1 x 10k/A (lin.) pot.
- 1 x SPDT miniature toggle switch.
- 1 x DPDT 240 Vac/1.5 A min. toggle switch.



Rear panel assembly. View of the rear panel showing placement of the various pieces of the power supply. I used a different transformer from the 6672 specified as I had one on hand but no 6672. Note the rear edge of the ETI-1520 output amplifier module.



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diagram. The neutral lead (blue) from the terminal block to the mains switch should be attached to the terminal block next. This should be about 300 mm long, but don't wire it to the switch yet. The active lead (brown) between the terminal block and the mains fuse is about 200 mm long and should be attached to the terminal block next, but not to the fuse. The lead between the fuse and the mains switch can be attached to the fuse now, first slipping a length of heatshrink tubing over the two leads to the fuseholder. After the leads are soldered to the fuseholder, apply a blast of hot air to the sleeve so that the fuseholder terminals are not exposed. Now solder two 400 mm long leads to the mains terminals of the power transformer, one brown, one blue. Sleeve the terminals. Then mount the power transformer.

Note that all mains wiring should be done with mains-rated hookup wire.

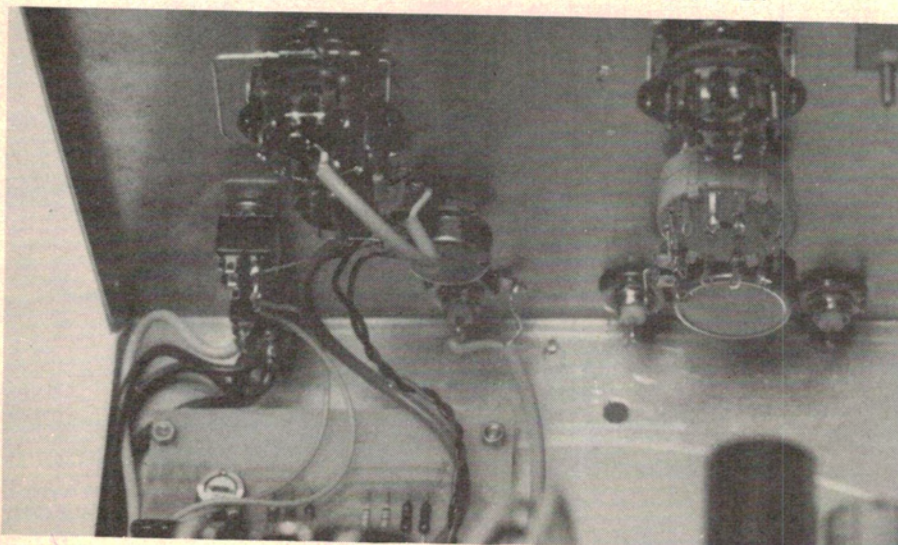
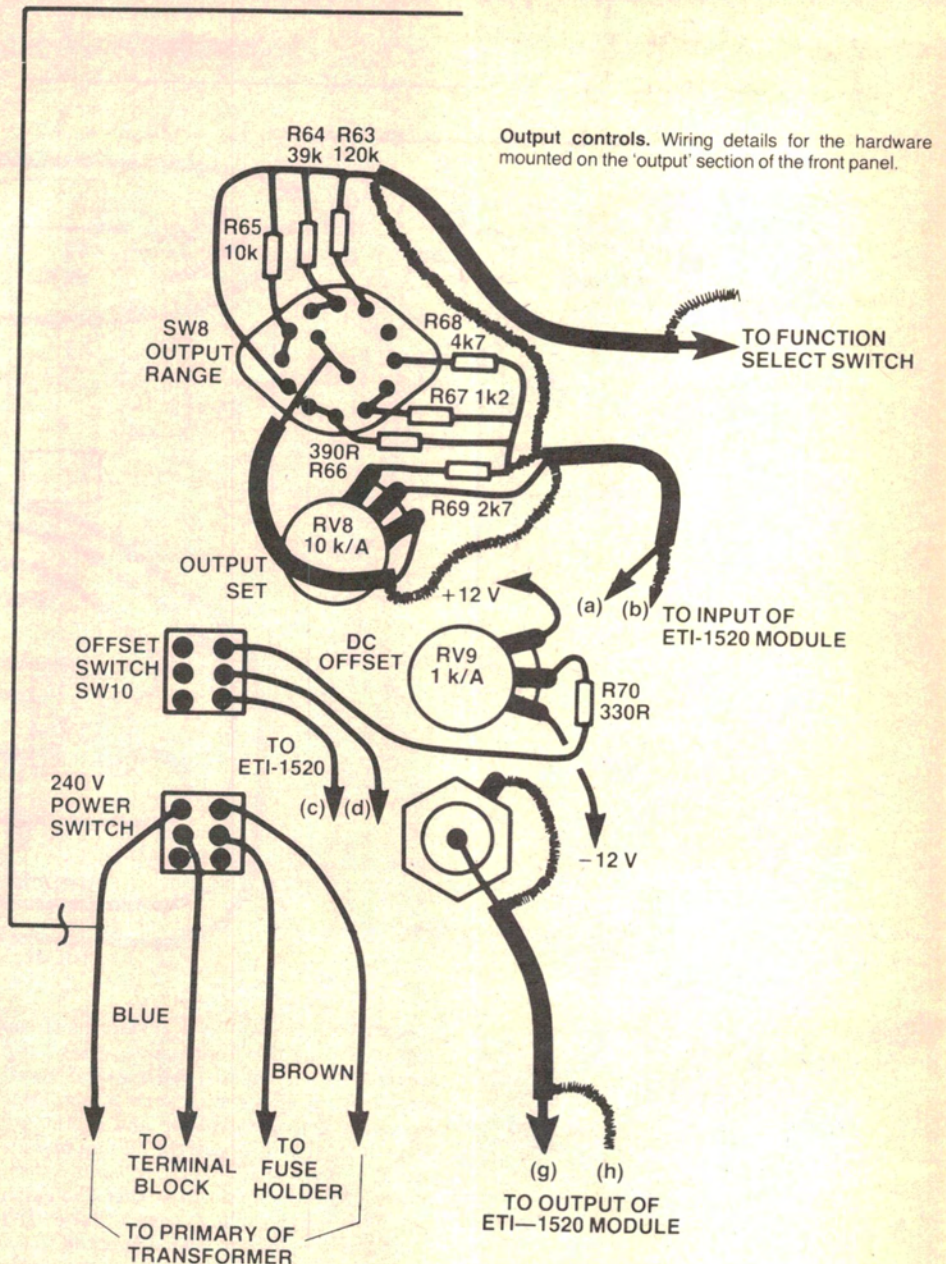
The ETI-166d power supply module can be mounted next and wired to the transformer. Use heavy duty hookup cable, at least 24 x 0.2 mm.

Now the ETI-1520 output amplifier module can be mounted in place. Note that the pc stakes or short lengths of tinned copper wire are used on the board for attaching the external wiring.

The power switch can now be wired up. Note that the neutral side wiring is nearest the edge of the chassis, for safety's sake. Don't forget to sleeve, or otherwise cover, all exposed mains connections.

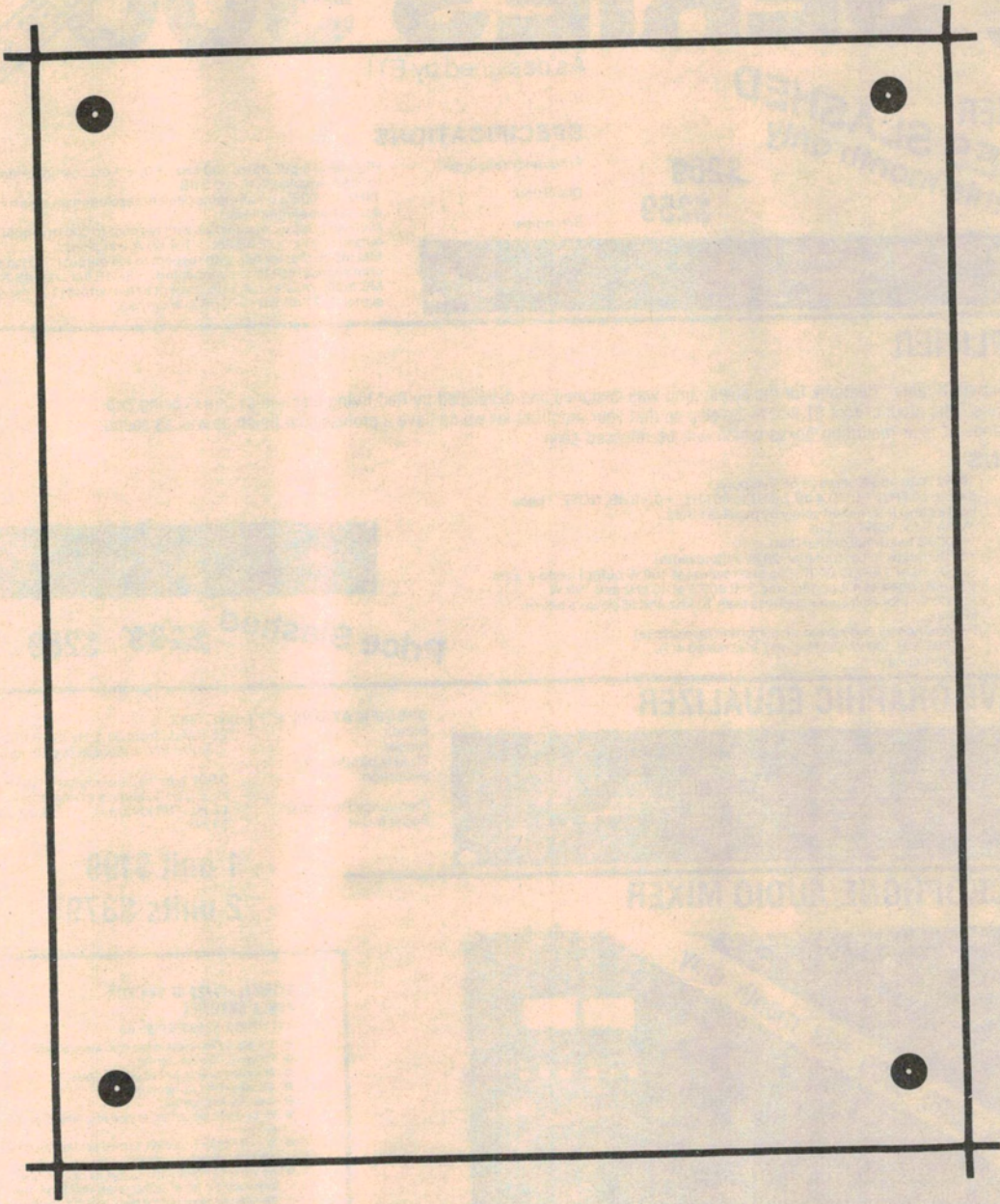
With that completed, tackle the rest of the output stage wiring. The details are clear from the accompanying wiring diagram. The components you need are shown there. Don't worry about the numbering at the moment, all that will come together with the next instalment. The resistors are all 1/4 W, 5% types. Note the use of shielded cable on the ETI-1520 input and output lines.

That's as far as you can go for the moment — but that lot should keep you occupied for some time.



Behind the front. General view of the hardware mounted behind the front panel.





**Template.** This is a full-size template to enable you to locate the drilling positions for the main generator board mounting holes.

