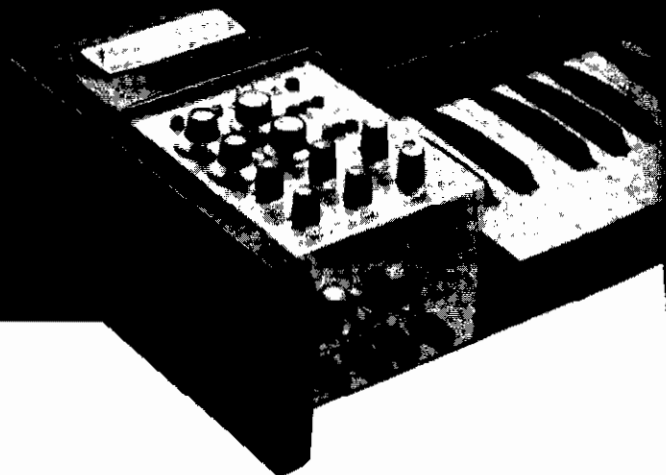


PE Sound Synthesiser 12

KEYBOARD

By G.D. SHAW



LAST month circuits for the keyboard unit divider network, hold circuits, modulation amplifiers and mixer were included. In Fig. 12.1 assembly details are given for these. The envelope shapers are mounted on a separate board shown in Fig. 12.2 which is, in turn, mounted on a small sub-chassis below the control panel. Constructional details of the control panel and envelope shaper sub-chassis are given in Figs. 12.4/3 respectively, while Fig. 12.5 shows the component and wiring arrangement of the control panel.

ADJUSTING THE MAIN CIRCUIT BOARD

Power supply links are fitted only to IC1 and IC2 of the divider circuit then this procedure should be followed.

Temporarily connect VR1 (Tune) and VR2 (Span) potentiometers and S1. With power on the board set S1 to bring VR2 into circuit and, monitoring the output of IC1, check that full rotation of VR1 gives an output voltage swing of about 8 volts. Note that the position of VR2 will affect the actual value of the maximum and minimum voltages monitored but will have no effect on the range of VR1.

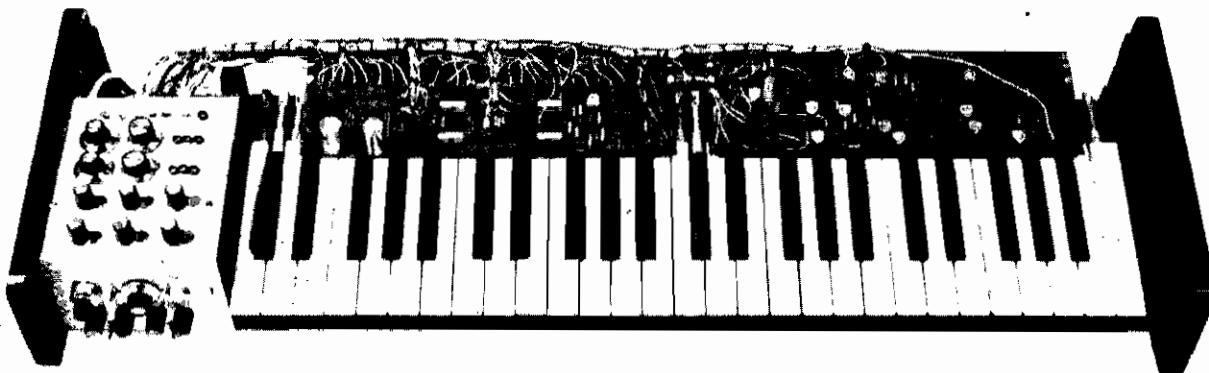
Next, monitor the output of IC2 whilst swinging VR2 through its full range. Here again the output voltage swing should be of the order of 8 volts. Set

S1 to the fixed span position and adjust VR1 so that the voltage at the junction of R51-R52 is 6 volts. Transfer the voltmeter leads so that they are now measuring the potential between the junctions of R3-R4 and R51-R52 and adjust VR3 so that a reading of 4 volts is obtained. Adjustment of VR1 should have no effect on this latter reading. The final tuning of the divider network will be described later in this article.

Setting up the hold circuits should follow the pattern described in Part 11 of the series after first connecting the power supply links to the i.c.s concerned. The relative simplicity of the modulation amplifiers and mixer is such that no particular setting up is required.

Note that VR1 is specified as being a semi-precision wirewound potentiometer. For the majority of purposes this type of control will be found to be quite adequate but when the keyboard is to be matched with other musical instruments of the acoustic type it will be found that the ease of matching is greatly facilitated by the substitution of a ten-turn potentiometer for the specified type.

Prototype keyboard unit with cover removed. The circuit board to the left is that detailed in Fig. 12.1, and to the right the v.c.o. assembly



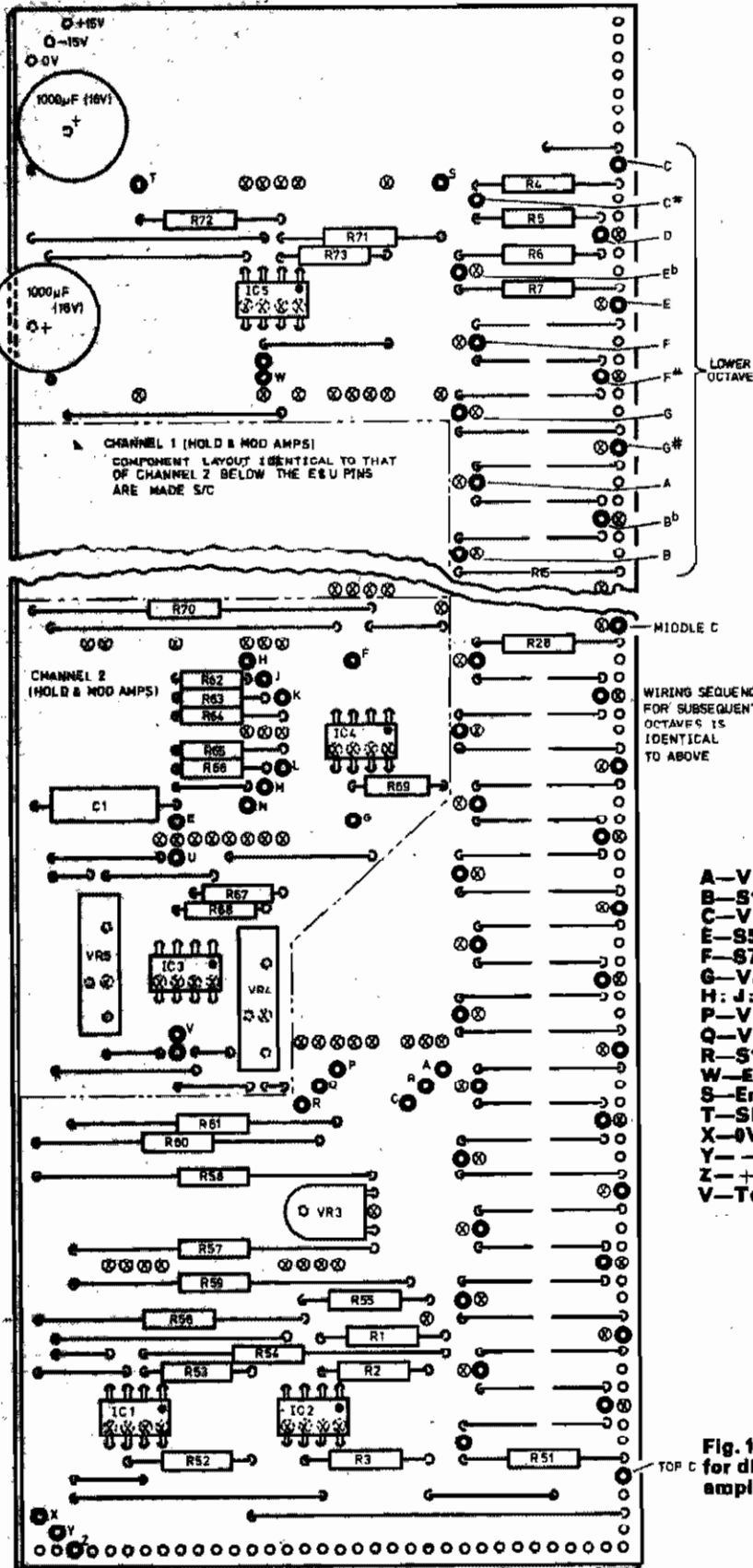


Fig. 12.1. Circuit board layout for divider; hold; modulation amplifiers and mixer

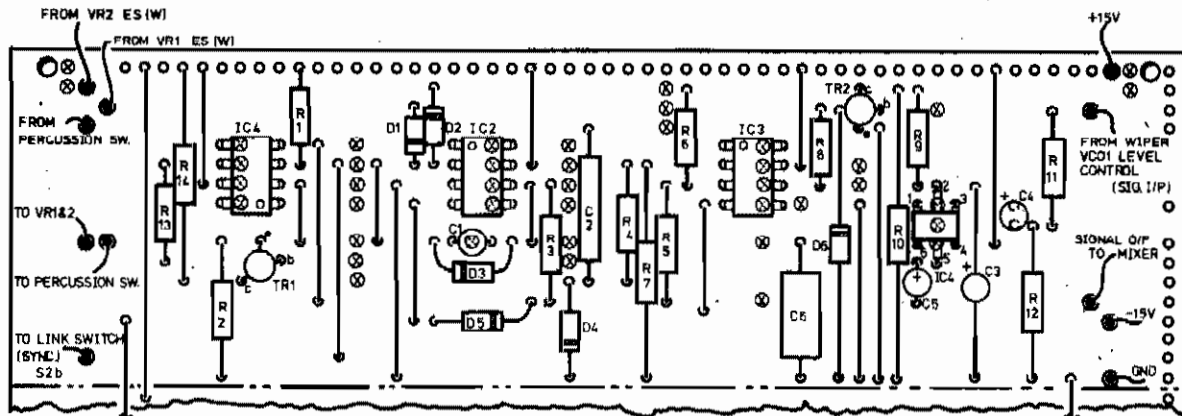


Fig. 12.2. Circuit board layout for keyboard envelope shaper and v.c.a. Only one channel is shown. The second channel is identical

ENVELOPE SHAPER ADJUSTMENT

On completion of assembly of the envelope shaper components make temporary connections to VR1, VR2 and S1, and, with power applied, measure the voltage at pin 2 of the MFC6040. This should be +6V under quiescent conditions, and, with S1 off and -15V applied to the non-inverting input of IC4, will fall to about 4.3V. Monitor pin 2 of the MFC 6040 on the oscilloscope, set VR2, the attack control, to maximum and close S1.

The transient application of -15V to the non-inverting input of IC4 will now result in a negative going pulse at IC4 control input. The pulse width should be about 37.5mS and depth about 2.3V.

With both envelope shapers operating satisfactorily the circuit board may be assembled into its sub-chassis and permanent wire links made with the attack and decay controls.

CONTROL PANEL AND MAIN WIRING HARNESS

Position the control panel components as shown in Fig. 12.5 and complete the component inter-wiring.

Making up and connecting the main harness requires the manipulation of a considerable number of wires and it is perhaps best to try and complete the operation at one sitting. Failing this it will be necessary to make a meticulous record of connections/colour codings in order to avoid the possibility of error.

The wiring operation is simplified if the main harness is broken down into a number of sub-harnesses. It was found expedient to have all the wires one metre in length and then to trim them as and when final connections were made. Connect all the wiring to the control panel first of all and bind

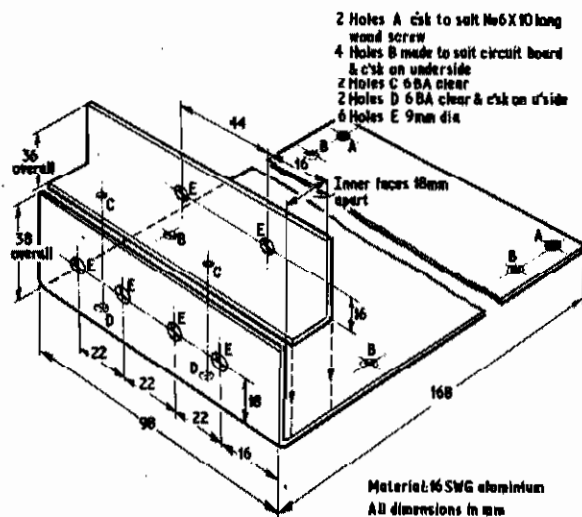
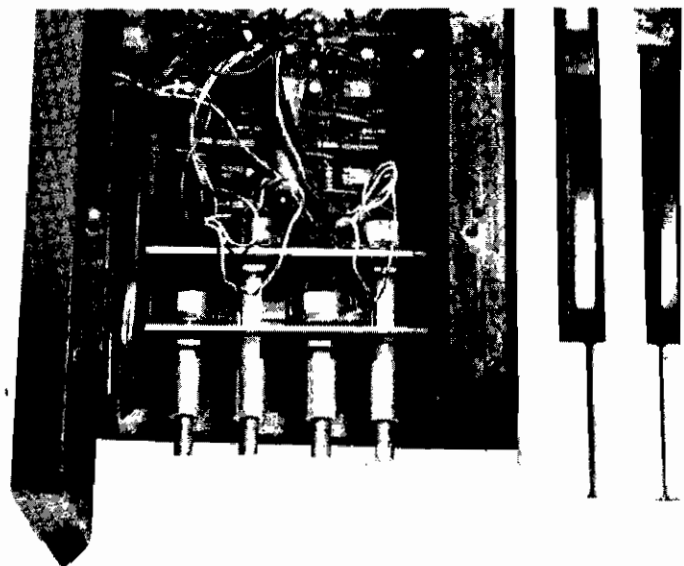


Fig. 12.3. Drilling details of envelope shaper sub-chassis



Showing how the potentiometers are arranged on envelope shaper sub-chassis

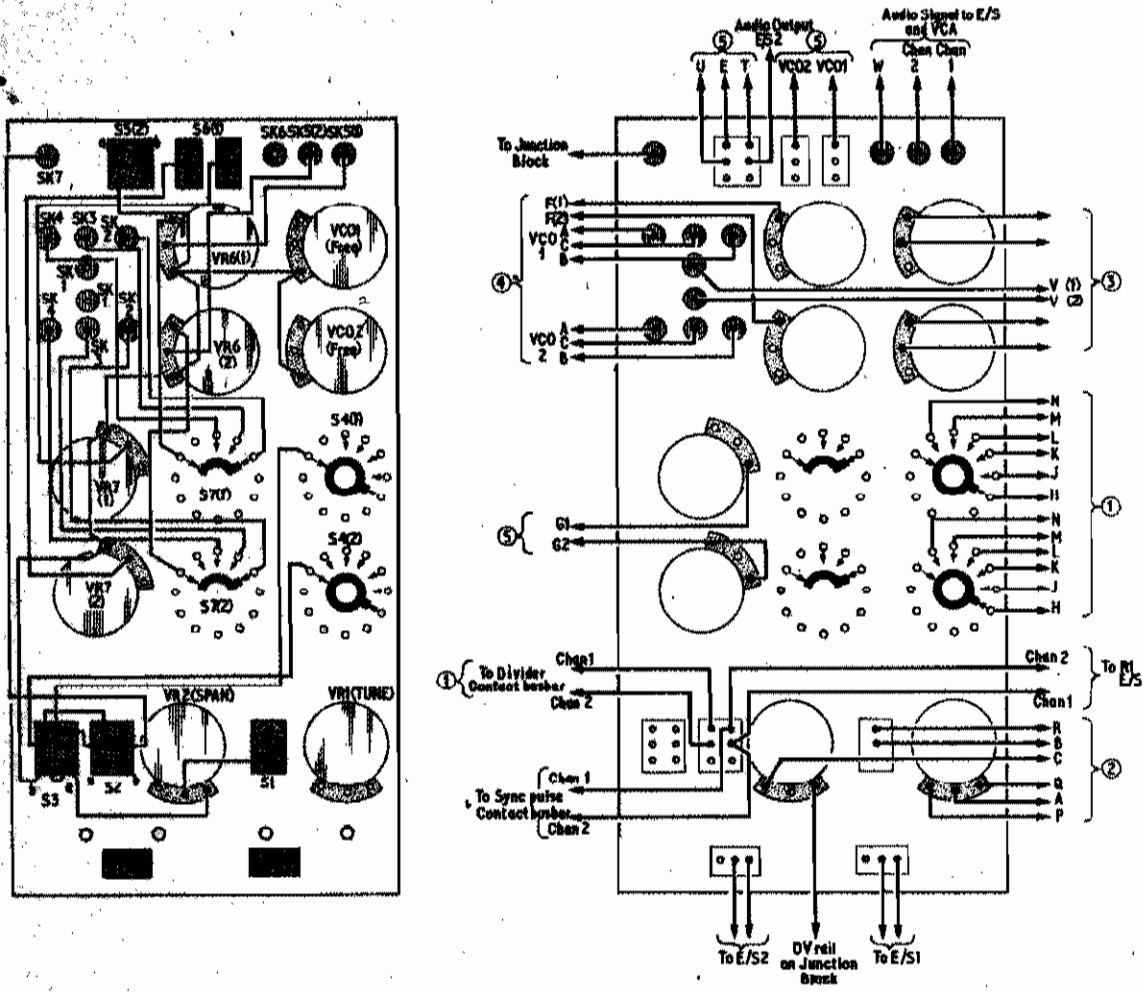


Fig. 12.5. Component layout and wiring of keyboard control panel

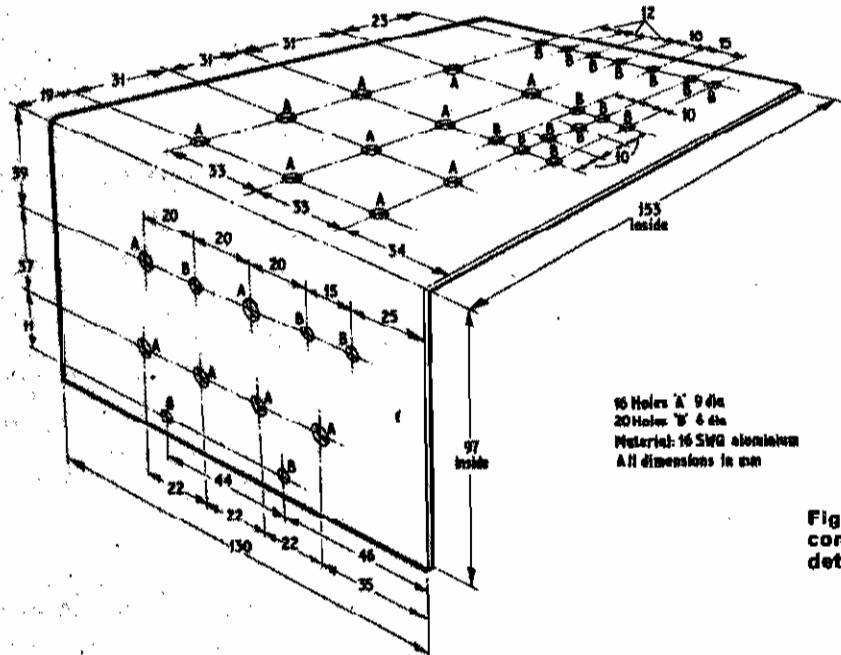


Fig. 12.4. Keyboard control panel drilling details

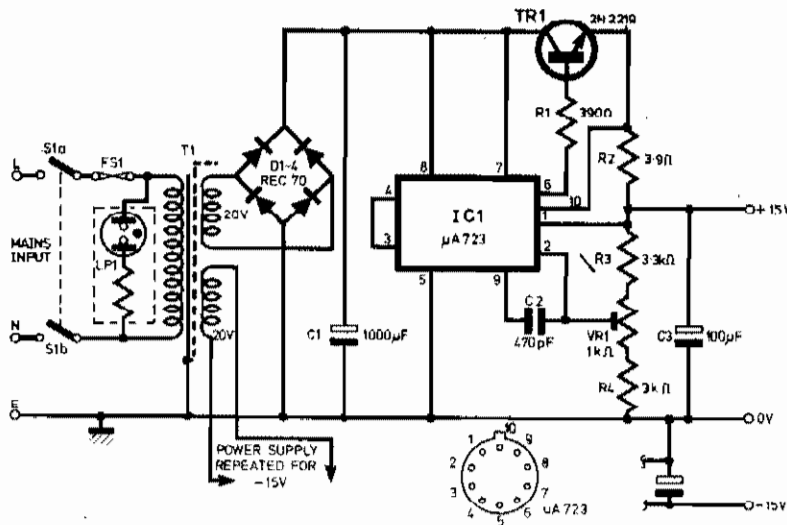
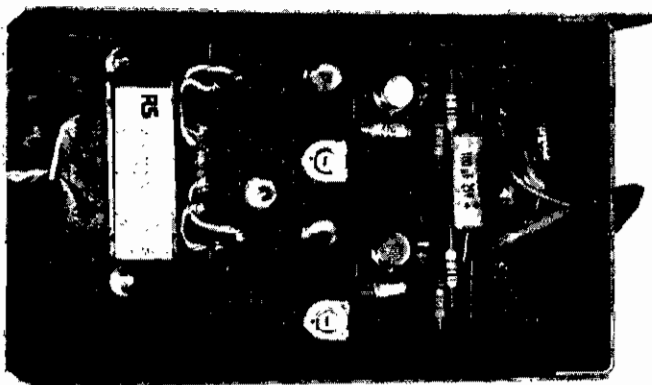


Fig. 12.6. Circuit diagram of one half of keyboard p.s.u. The negative rail half is identical. T1 is a miniature mains transformer with two separate 20V secondaries each rated at 3VA. Resistors are $\frac{1}{4}$ W 5% carbon film and the electrolytics at 50V



The completed power supply unit. The metal surround should be grounded to obviate hum pick-up

POWER SUPPLY UNIT

Where it is decided to operate the keyboard as a unit independent of or separate to the modular unit a small power supply unit may be installed within the keyboard housing. In this latter case the output signal from the keyboard may be taken from SK6.

The circuit of the power supply unit is shown in Fig. 12.6. Because there is nothing critical about layout board wiring details are omitted.

The power supply unit, in its casing, should be mounted to the rear of the envelope shaper sub-chassis so that its associated mains plug will be shielded by the casing and thus reduce the possibility of inducting hum into the keyboard circuitry.

Next month: Keyboard housing and final tuning

them loosely into the groups shown. Try to ensure that there are no two wires of the same colour in any one group.

The wiring groups should be brought out of the control panel on the long axis and passing over S6 (1) and (2). With the control panel upside down and with the front face away from the constructor, bend the wire groups at the near edge of the control panel so that they run to the right, and place the assembly to the rear of the keyboard housing with the control panel edge against the baseboard and directly in line with its normal position. In other words the control panel should present the appearance of having been hinged back from its normal, fixed position, and laid on the table. Starting with sub-group 1 the wiring may now be trimmed and soldered individually to its respective pins.

When all groups have been dealt with carefully check each connection and when satisfied of the correctness of each, bind them tightly together into a common harness. Wiring to the envelope shapers should be grouped with the signal input and output leads separate from those carrying the sync pulse and percussive attack signal.

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