Concluding this four-part series

LYREBIRD

In this final article in the series on the Lyrebird electronic piano, we describe the cabinet assembly and internal wiring details and the tuning and alignment procedures.

by LEO SIMPSON & GREG SWAIN

Now that you have completed all the printed circuit boards of the Lyrebird, the next step is to complete assembly of the cabinet. This is supplied almost completely assembled, together with a Marviplate top panel. The only assembly work required is to attach the solid timber end-pieces and the dummy key pieces which are positioned at each end of the keyboard.

The two solid timber end-pieces are screwed on from inside the cabinet using 25mm countersunk woodscrews. The holes for these screws need to be drilled and countersunk before this task can be done. Position the end-pieces so that they are flush with the front of the cabinet and about 6mm below the bottom surface of the cabinet. The two dummy keys are glued to the front and the ends with the top surface 15mm above the top of the front rail.

We suggest that all the major components should now be temporarily mounted inside the cabinet, their positions marked and all screw holes marked and drilled. Then, when all drilling and other woodwork is complete, all components can be removed and the cabinet stained and finished in a gloss polyester coating such as Estapol. This stage of assembly is quite tedious but the amount of work put in will certainly be reflected in the final appearance.

Fill all surface imperfections in the cabinet with a suitable wood filler which will take stain. Then carefully sand all the cabinet using successively finer grades of abrasive paper. It is best not to use an orbital sander for this task as these machines leave fine spiral scratches which are almost invisible but which are all too obvious once the stain and finishing coats are applied. You will probably have to apply three or more coats of Estapol and light sanding will be required between coats.

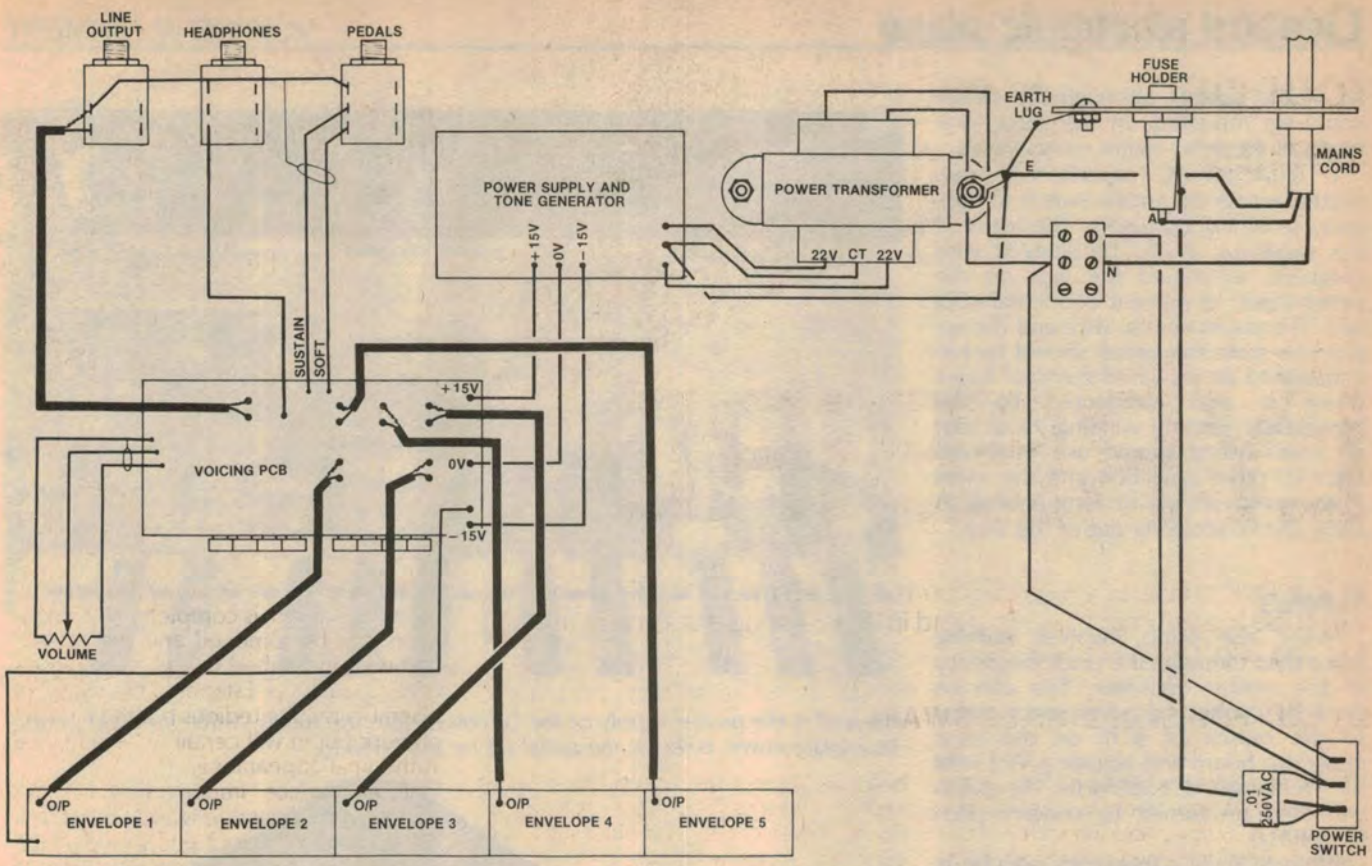
It is also a good idea to give all the interior, underside and rear panel of the cabinet a couple of coats of this gloss polyester to seal the surfaces and prevent them from becoming grubby.

With all this cabinet finishing work finally completed, you can finish the internal assembly and wiring but remember that you will now have to take care not to scratch the exterior of the cabinet.

Mount the two small metal panels on the rear of the cabinet using the PK screws provided and mount the three 6.5mm jack sockets and fuseholder. The transformer and master oscillator board should be positioned as shown in the diagram (and photo). The master oscillator board should be hard up against the rear of the cabinet otherwise the actuators on the keyboard may foul the PC board. This board is held in position by four 19mm x 6BA countersunk bolts with 6mm spacers between the board and base. The transformer is held in position with 12mm x 4BA countersunk nuts and bolts.

To install the keyboard, fit the four butt hinges supplied to the keyboard chassis. Holes for these hinges will have already been drilled according to the diagram of

The Lyrebird is supplied with pedals (not shown here) and an optional chrome stand.



This diagram shows how all the PC boards are wired together. Note particularly the details of the mains wiring.

Fig. 9 in the November 1981 issue. Place the keyboard in the cabinet and carefully align it so that there is a gap of approximately 2mm between the front of the keys and the inside of the front rail and the gaps between the ends of the keyboard and the dummy keys are equal. The hinges are attached to the keybar using 12mm No. 4 woodscrews. (See Fig. 10 of the November issue).

Seventy-three wires should be connected to the master oscillator board and for ease of identification use a different coloured wire for each group of notes. For example, you might use red wire for all the E note outputs from IC9 on the master oscillator board. This would mean that all connections to outputs 12, 24, 36, 48, 60 and 72 would be red. Each wire should be long enough to reach the envelope board furthest from the tone generator board, ie, envelope board one. You will end up with 12 groups of six or seven same-coloured wires.

INTERWIRING

The majority of the wiring within the cabinet consists of the connections between the tone generator PC board and envelope circuits. The tone generator board has 73 outputs, one for each note on the keyboard and these are labelled in the diagram on page 47 of the October 1981 issue. Similarly, refer to the diagrams of Figs. 7 and 8 in the November issue to see how the envelope boards are connected.

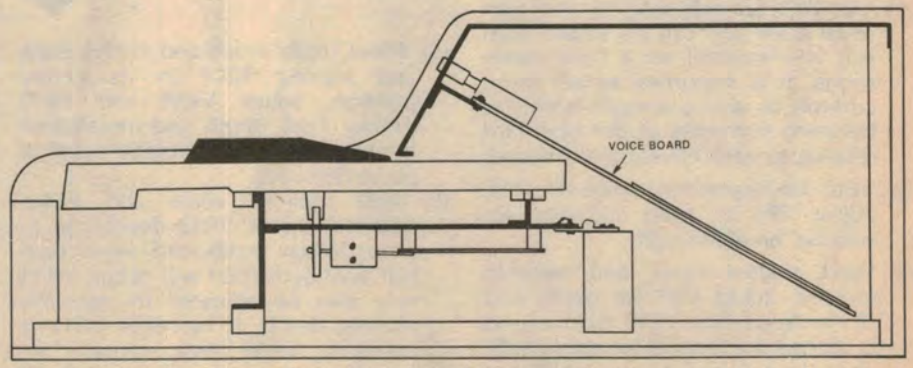
The wiring diagram included with this article shows how all the boards are connected together. Points VT, ED and G on the envelope boards are connected to the corresponding points on the tone generator board (see the diagram for this board in the October issue).

On the keyboard, the busbar closest to the chassis is connected to 0V while the other busbar is connected to the 30V rail. Both of these connections are on the tone generator board.

The five inputs to the Voicing PC board from the envelope boards should be of shielded cable with the shield connected at the voice board end only. The cable to the output socket should have its shield connected at both ends. Two core shielded cable is used to connect the pedal socket and volume control. All wires connecting to the voice board should be long enough to allow the board to be removed to allow the keyboard to be hinged up.

Special note should be taken of the mains wiring details. The mains cordgrip grommet and fuseholder are installed on a separate small panel adjacent to the power transformer. The mains earth wire is terminated to a solder lug which is secured by one of the transformer mounting bolts.

The mains active wire is terminated to the end connection (not the side connection, otherwise a shock hazard is created) of the fuseholder while the side connection runs to the mains switch which has an integral neon lamp and limiting resistor. We installed this switch on the righthand side of the Marviplate



This diagram shows how the voicing board is oriented with respect to the keyboard chassis.

lid of the cabinet although the switch could be mounted on the same rear panel as the other mains components.

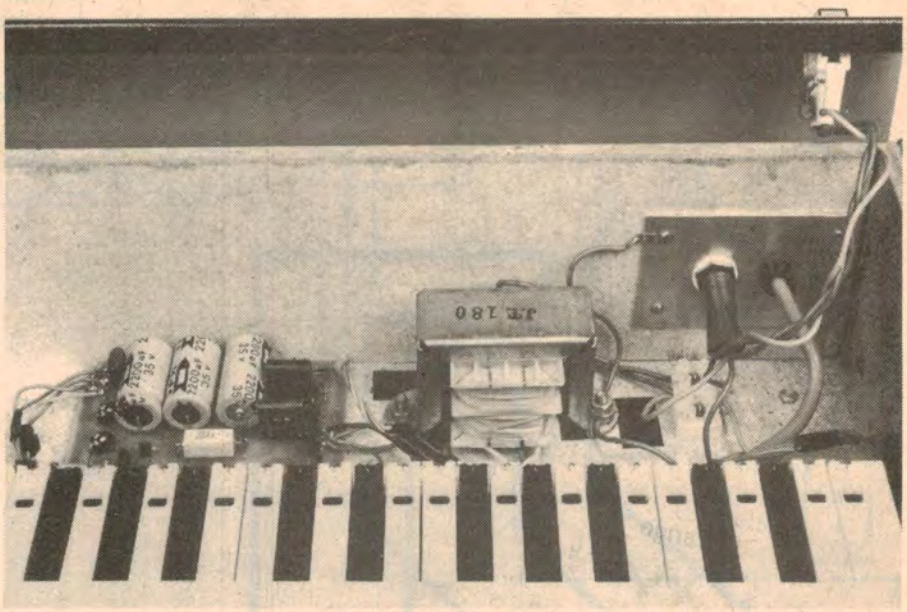
A .01μF/250VAC capacitor is connected across the mains switch to suppress switching transients. The leads of this capacitor should be sleeved with spaghetti, as should the lugs on the switch itself, to prevent accidental contact. The mains neutral wire and the active wire from the switch should be terminated to an insulated terminal block which is also connected to the transformer primary winding. Note that all mains wiring should use wire with 250VAC rated insulation and the wires to the switch should be long enough to allow the lid to swing out of the way.

TUNING

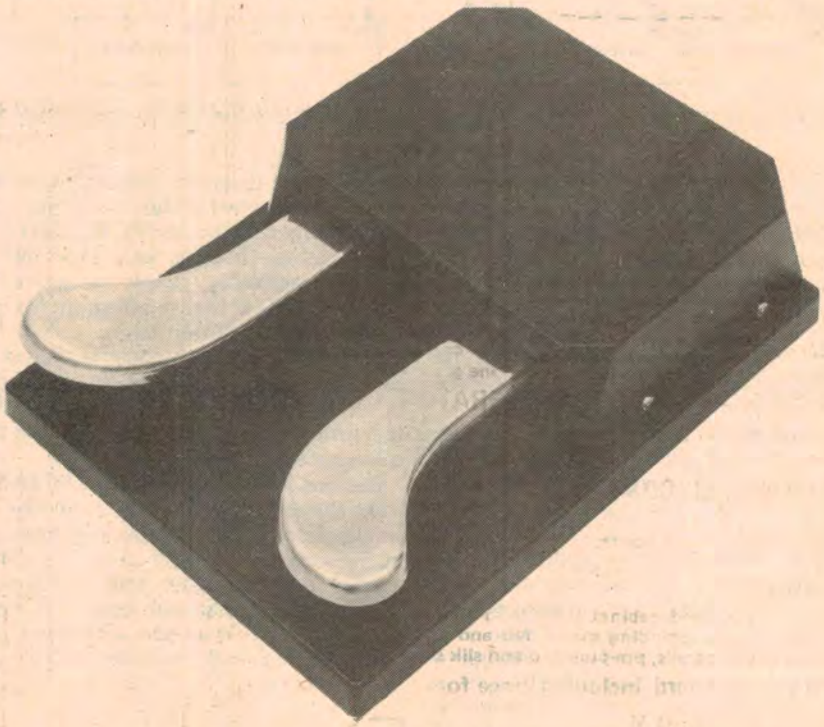
Tuning the piano involves nothing more than trimming the clock frequency of the master oscillator. This can be done by connecting a frequency meter to the output of IC1F on the tone generator board and adjusting VR2 until the frequency is 1.588MHz. The piano will then be turned to concert pitch (A=440Hz).

Alternatively, if a frequency counter is not available then the piano can be tuned to another instrument or by using a tuning fork.

This exact tuning procedure is not absolutely necessary for normal use. Since the outputs of the tone generator are locked to the clock oscillator, the relative tuning is always correct, ie, all notes are correctly tuned relative to one another, even though the overall absolute tuning may be slightly sharp or flat.



Pictured is the power supply of the Lyrebird. Note the mains switch installed on the Marviplate cover. Below is the pedal set for the Lyrebird.



VOICE ALIGNMENT

Start with all trimpots set to the mid position, Effects off, and mellow voice selected.

(1) Measure the voltage at the sustain output, and adjust VR16 to give zero volts when the pedal is not depressed. A positive voltage should appear when the pedal is depressed.

(2) VR1-VR5 are adjusted to suit personal taste and can be varied from soft and muffled to a hard steely sound. It is important to set these controls to give a smooth transition between segments of the keyboard relating to each envelope PC board.

(3) With the harpsichord voice selected, adjust VR6 to taste and also for minimal breakthrough.

(4) With mellow voice and tremolo selected, adjust VR8 for depth and VR9 for frequency. VR10 may be used to change the relative tremolo depth when the soft pedal is operated, but need not normally be adjusted

(5) Select bright voice and Honky Tonk and leaving TR14 in its centre position, adjust VR15 and VR13 (Honky Tonk depth and modulation frequency) to an acceptable level of piano detuning.

(6) With mellow voice and Phase selected, adjust VR12 (feedback) to taste. When positioned more than half way oscillation will occur. VR14 may also be adjusted to vary the phasing depth. If however VR14 is changed, VR15 may require re-adjustment with Honky Tonk selected, since both VR14 and VR15 are operative in this position.

(7) VR11 should be adjusted to give the same output level from the bright voice whether Honky Tonk or Effects off are selected.

Finally, the 1kΩ trimpot on the tone generator board for Early Decay should be set to give a percussive characteristic to the piano, particularly when the Sustain Pedal is depressed.

As all the above settings are subjective, experimentation with different settings should be done to obtain the most satisfactory sound to your liking.