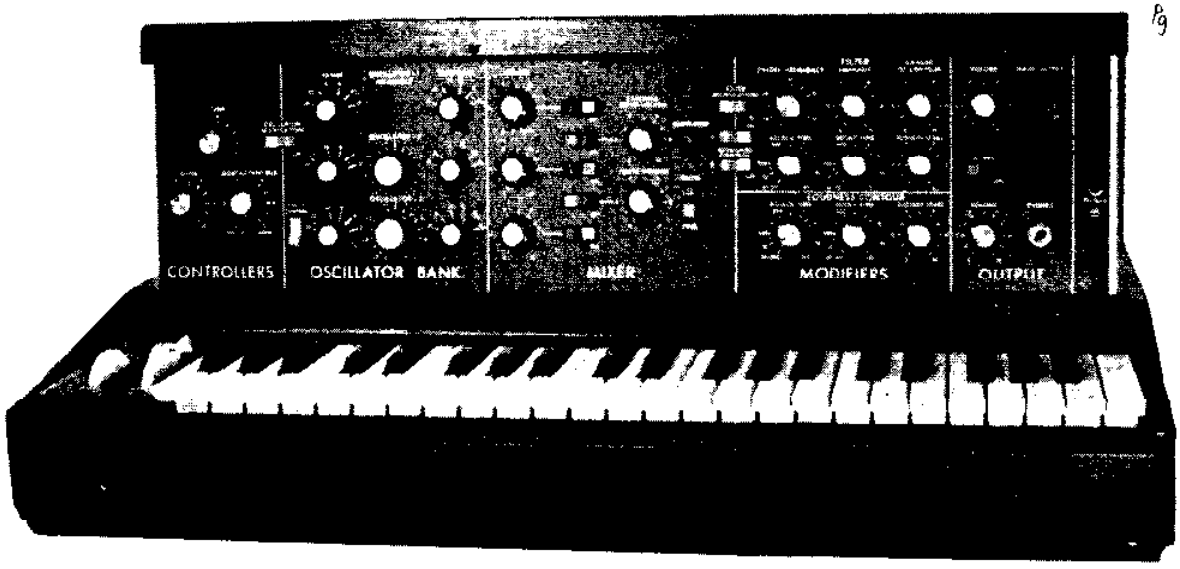
EXPANDING THE PATCHABILITY OF THE MINI-MOOG

By Marvin Jones



Anyone who works with electronic music in any way can't help but respect the Mini-Moog. Robert Moog and his concept of modular voltage controlled sound generation elements really threw the musical world for a loop. When acceptance of these "far out" gadgets came to the popular music market, it was primarily because of the development of the Mini-Moog. Finally, the progressive musician could have one of these goodies without having to worry about patch cords or large boxes of separate modules. No wonder it was so popular. But, as with public utilization of any form of new technology, it was hard to envision what consumers would want to do with a unit like this in the distant future. Well, here we are in the future, a great number of musicians bought Mini-Moogs during their initial appearance on the market, and now those musicians are well acquainted with the Mini and want to expand. That's where some of the problems begin to occur.

The rear of the Mini has jacks to provide for external control voltage for the VCO bank, VCF, and for the VCA. When you get right down to business, these are the only three expansion jacks which are really compatible with most other gear. Also available on the rear panel is a Moog-style "S-trigger", which requires that one contact be shorted to the other (either via a transistor switch, or mechanical switch or relay). This turned out to be a rather non-standard feature, as most synthesizers went with the step-type gate trigger which features a voltage output to indicate a trigger signal. Additionally, the S-trigger is accessible only through a two prong Cinch-Jones type plug. This definitely precludes use of most standard audio patch cords. The remaining jacks on the rear panel allow external signal input, Mini-Moog output, and two power jacks to provide power for outboard devices. This is actually a rather limited array of expansion jacks by today's standards. And, in fact, this is one of the most common questions from Mini-Moog owners who wish to expand their systems; "How can I hook it up to do this?"

There are a great number of patch points in the circuitry where jacks could be added to facilitate future expansion or "re-patching" of the Mini's normalization scheme. For this article, we will discuss two of the most needed and most useful expansion jacks: Keyboard Control Voltage Output, and Standard Gate Trigger Input/Output. We'll discuss the other modifications in later issues.

After adding these two jacks, you will be able to use the Mini to trigger and control additional external banks of modules such as more VCOs, or triggered effects such as single-sweep flanging or single-pass sequencing. Also, you will be able to interface a sequencer with the Mini to operate as a free running sequencer system. Because of the use of the "S-trigger", the best you could do before was to have the sequencer control voltage output feed the VCO and trigger the effect by playing a note on the keyboard. Now you will be able to have the step trigger output of the sequencer trigger the Mini by itself! The only time you need to touch the keyboard is to change keys (if desired). It's always handy to have a machine that will run itself! The Gate input jack will also be helpful in interfacing external instruments or signals. As was mentioned, the Mini already has an external signal input. Now you can use an envelope follower which has a trigger output to trigger the Mini from the guitar, OZ organ, Bionic Trumpet, or whatever.

For you Mini-Moog owners who have never attempted any of your own

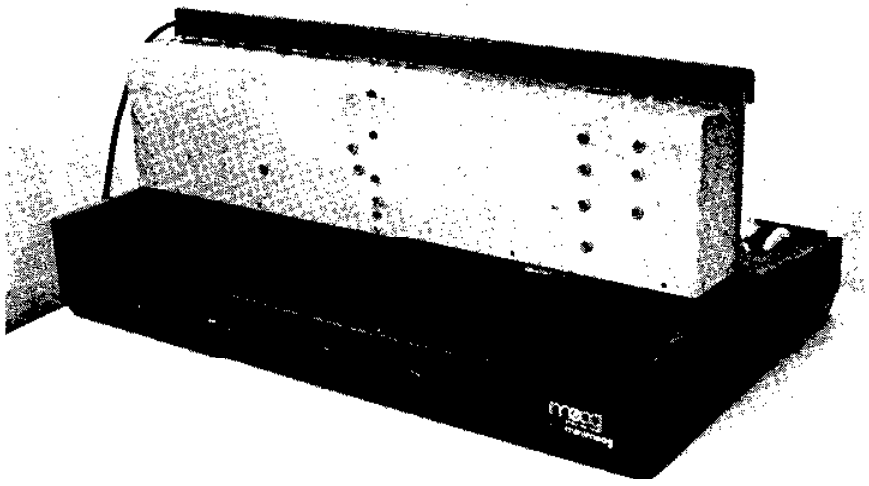


Figure 1

Figure 2

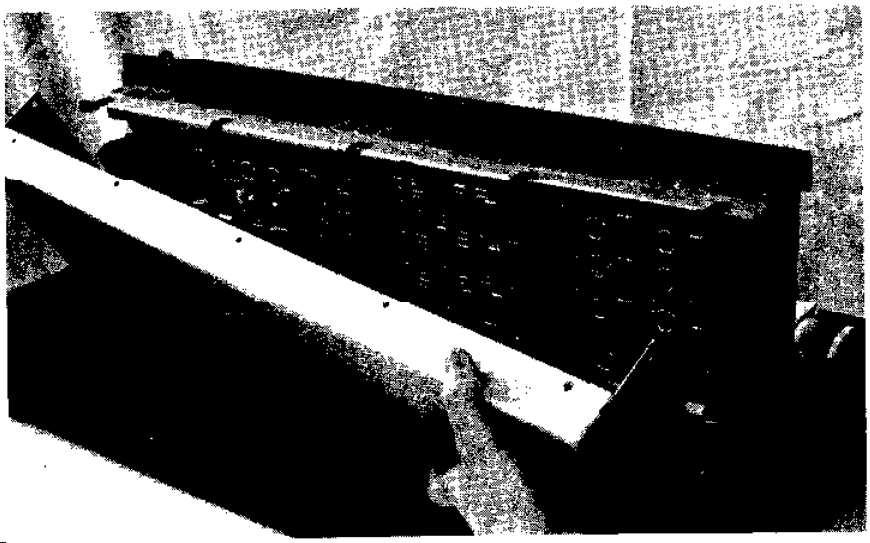
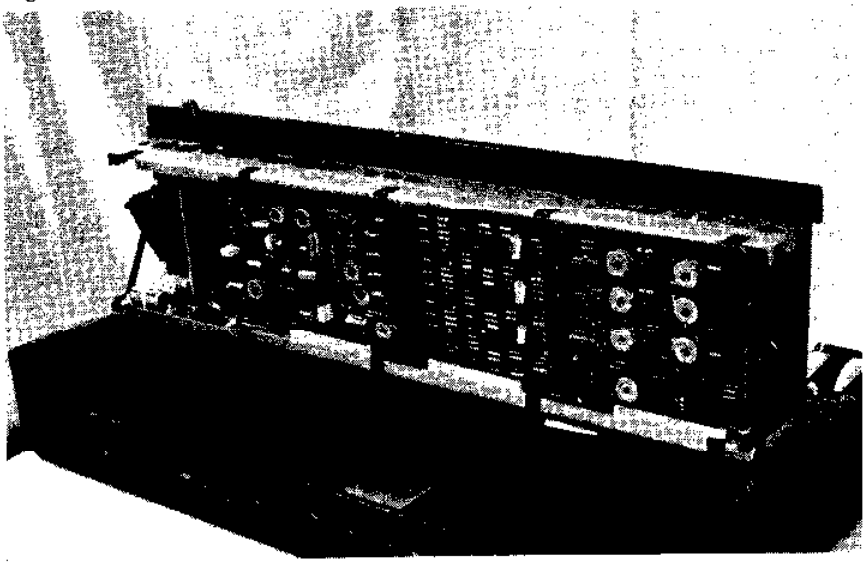


Figure 3



repairs or modifications, we have attempted to make the modification process as painless as possible with lots of pictures and step-by-step instructions. NOTE that the original manufacturers warranty will probably be voided, unless you have a lenient or understanding local service center.

With all the warnings out of the way -- Here we go!

1) Remove the rear panel. There are 18 Phillips head screws holding the rear panel in place: 5 along the top, 5 along the bottom, and 4 on each end. See figures 1 and 2. Once the cover is removed, you will not be able to use the Mini's device which props up the electronics box, so it would probably be helpful at this point to look around your workbench for something to set under the chassis to prop it up in as vertical a position as possible.

2) With the cover removed, note that there are two circuit boards visible at the rear plane of the chassis. The circuit board at the far right (when looking at the rear of the unit) is board #1 and contains the oscillator bank. There are two screws which mount the top edge of this board to the top panel of the chassis. Remove these screws, making sure you don't lose the fiber washers which act as standoffs between the circuit board and chassis. See figure 3. Once the screws are removed, use a wide blade screwdriver to VERY CAREFULLY pry the circuit board from its two sockets. The sockets are very tight, so you will need the screwdriver to wedge between the socket and the edge of the circuit board. Twist the screwdriver, and move to the other end of the board repeating the procedure until the board is far enough out of the socket to pull it free. See figure 4.

3) With the oscillator board removed, you will see board #2 which contains the envelope generators and keyboard output circuitry. Like the VCO board, board #2 has two screws holding the top edge in place. Remove the two screws, and use the prying screwdriver technique to remove this circuit board. See figure 5. With this board removed, half of the front panel and controls should be visible from behind.

4) On the top panel of the chassis, mark the two points where holes will be drilled to mount the expansion jacks. Both holes will be on a line which runs through the center of all the other jacks. One of the holes should be located 11 inches (27.94 cm) from the

right edge of the case. (The right edge should be the one nearest the S-trigger jack) The second hole should be at a point 12 inches (30.48 cm) from the right end of the chassis. When drilling these holes, it is advisable to use a small drill to start a pilot hole (about 1/8 inch), followed by an intermediate drill (1/4"), and finally the 3/8" drill for the final hole. ALSO, in an attempt to keep the drill from hitting any of the internal circuitry, be sure to support the body of the drill as it finally cuts through the panel. Metal shavings from the drilling are difficult to remove from the circuit board sockets, so it would also be advisable to cover as much of the circuitry as possible with a rag. After drilling, inspect the sockets and circuitry for any shavings which may cause shorts or problems. See figures 6 and 7.

5) Install the two 1/4" open circuit phone jacks such that the connection lugs of the jacks are facing the rear opening of the chassis. See figure 8. Note that the rightmost jack should be turned slightly to avoid any interaction with the nearby potentiometer. After mounting, the jacks will need to be labelled on the outside of the chassis in some manner. I used dry transfer lettering covered with a layer of clear vinyl tape, such as Scotch Magic Transparent tape. The leftmost jack should be labelled "Gate In/Out", or designated with a gate symbol, ⎍. The right jack should be labelled "KBD CV Out" or similar.

6) Using a 2 inch (5 cm) length of insulated wire, connect the ground lug of each jack. Solder at the right jack only. Using a 2 inch (5 cm) length of wire, connect the ground lug of the left jack to the bare wire ground buss which runs along the three adjacent output/input jacks. Solder both ends of this wire.

7) Select the #2 circuit board which was previously removed. We will now attach two wires to the foil side of this board which will later connect to the jacks we just installed. Lay the circuit board on your workspace such that you are looking at the foil side of the board, and the "fingers" of the edge connector are facing you. The left set of contacts is designated Section A, and should consist of 14 contacts. Look closely at the etched copper designations near the "fingers", and you will see that the left end is contact #1A, while the right end is designated #14A. The larger set of contacts which is near the center of

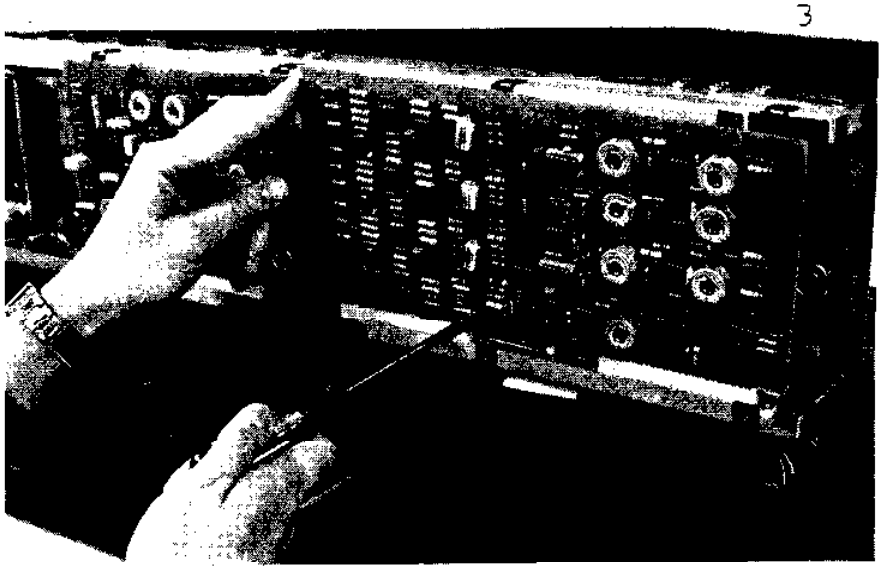


Figure 4

Figure 5

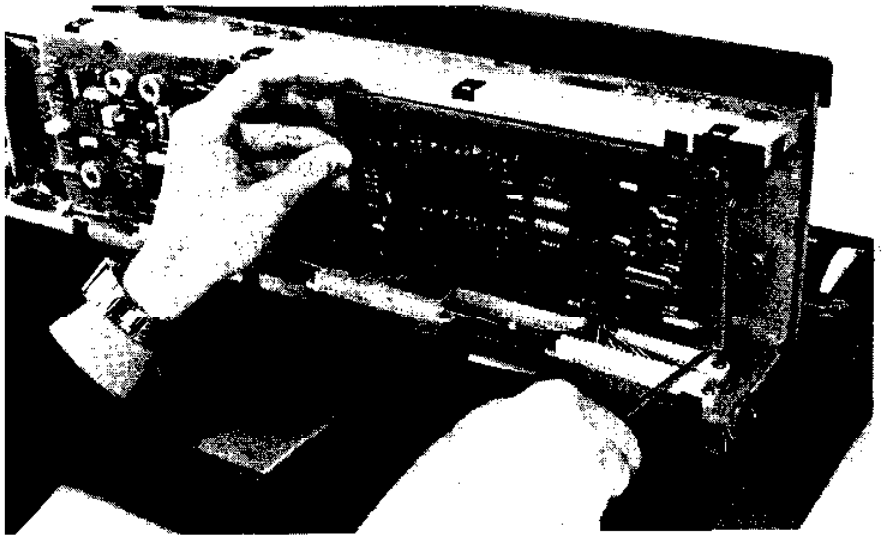
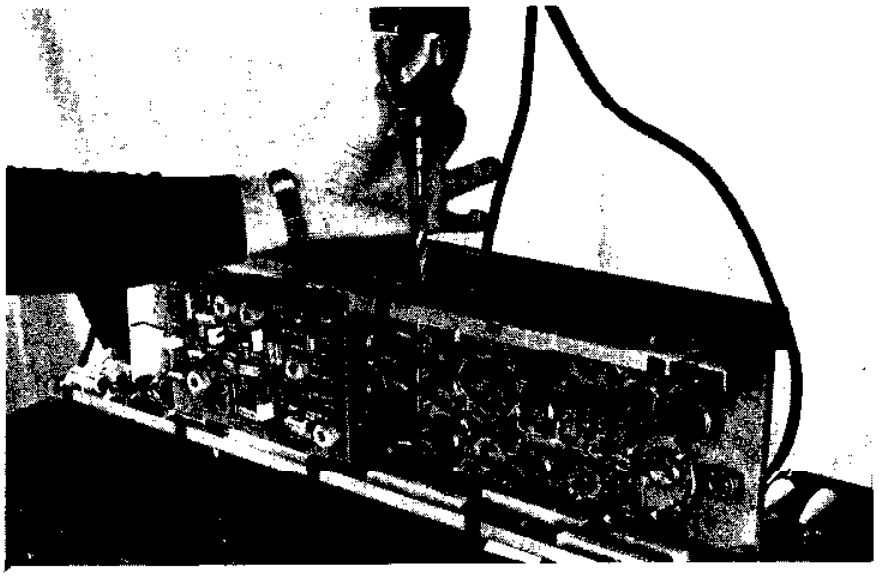


Figure 6



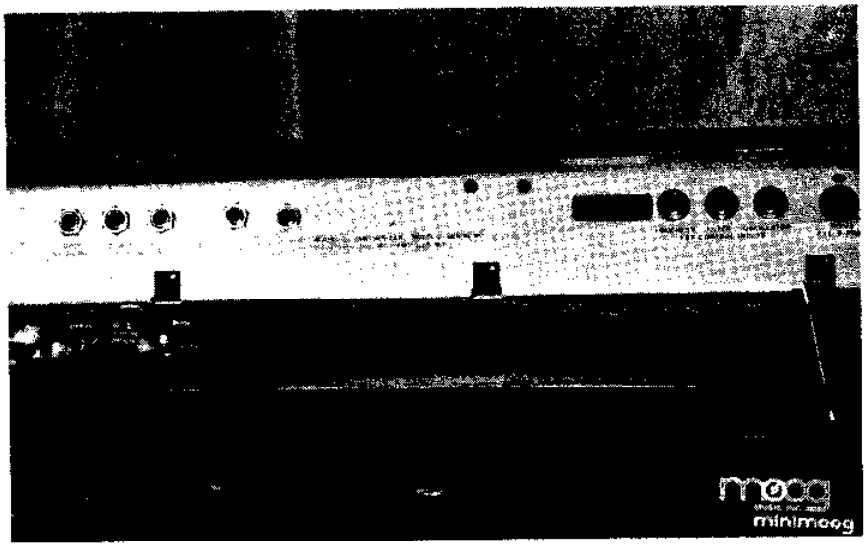


Figure 7

Figure 8

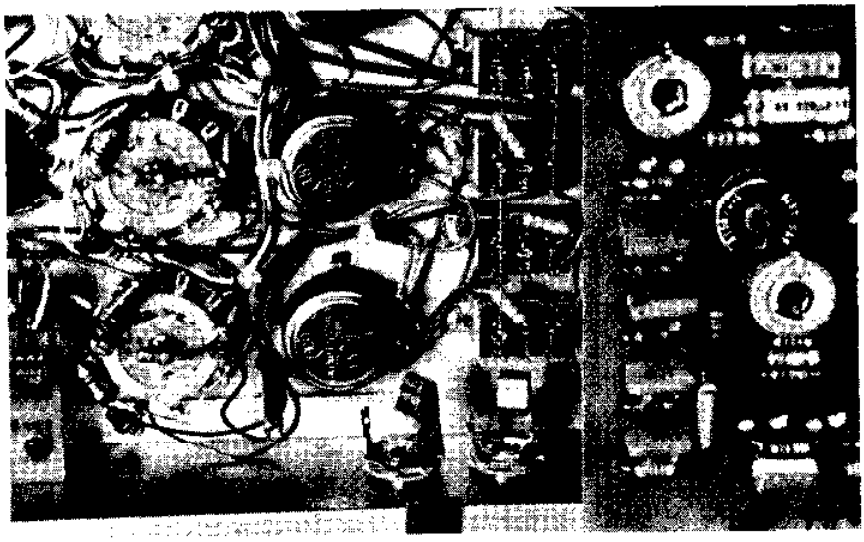
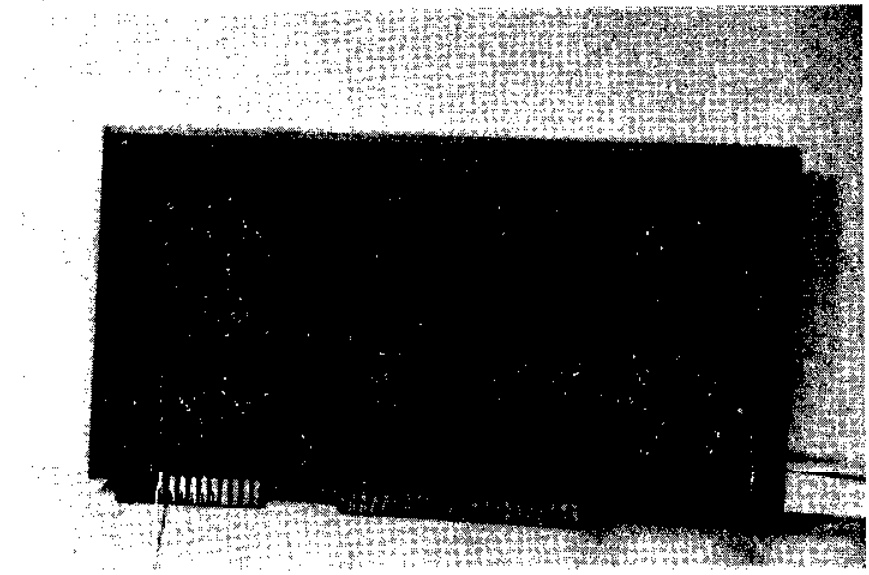


Figure 9



the board is the B socket section. This section consists of 22 contacts, once again designated on the circuit board from left to right as #1B through #22B. See figure 9.

In the left "A" connector, locate fingers #4 and #5. These two should be connected by a trace directly above the fingers. Using a screwdriver or knife, carefully scrape away the green anti-oxidant coating on this trace. Tin the trace by flowing a small amount of solder on the now exposed trace. Cut a 15 inch (38 cm) length of insulated hookup wire, and prepare by stripping 1/4" (7mm) of insulation from each end. "Tin" the exposed ends of the wire by flowing a small amount of solder into the strands of the wire. Lay one of the prepared ends of this wire on the pretinned trace above fingers #4 and 5. Heat this connection until solder flows around the wire, remove the iron and let the connection cool. See figure 9.

In a similar manner, cut and prepare a 7 inch (18 cm) length of insulated wire. Locate finger #20 of the Section B connector and trace the copper foil pattern which leads from this finger. The first component (and the only one) to which this path leads is the anode of a 1N34A signal diode. At the other end of this diode (the banded cathode) there should be a short trace which leads to a 100K resistor (color coded brown-black-yellow). On this short trace, once again scrape away a section of the green coating and 'tin' the exposed section of the copper. Lay one of the prepared ends of the 7 inch (18 cm) length of wire against this area and heat the joint to allow the solder to flow smoothly. Remove the iron and allow to cool. See figure 9.

8) The wire connected to finger 4/5A is the keyboard control voltage output. Connect the prepared free end of this wire to "hot" lug of the rightmost jack on the top panel of the Mini. This jack should be the one labelled "Kbd CV Out" or similar. Solder the connection at the jack lug.

9) The remaining wire originating at the diode/resistor junction is to be connected to the remaining (Gate Input/Output) jack which you installed. Solder this connection.

10) This completes the installation of the modification. Reassemble the Mini-Moog by following the disassembly steps in reverse. Replace board #2. Replace board #1. DON'T FORGET the screws and fiber washers when reinstalling these boards. Finally, replace the rear chassis cover, bow-

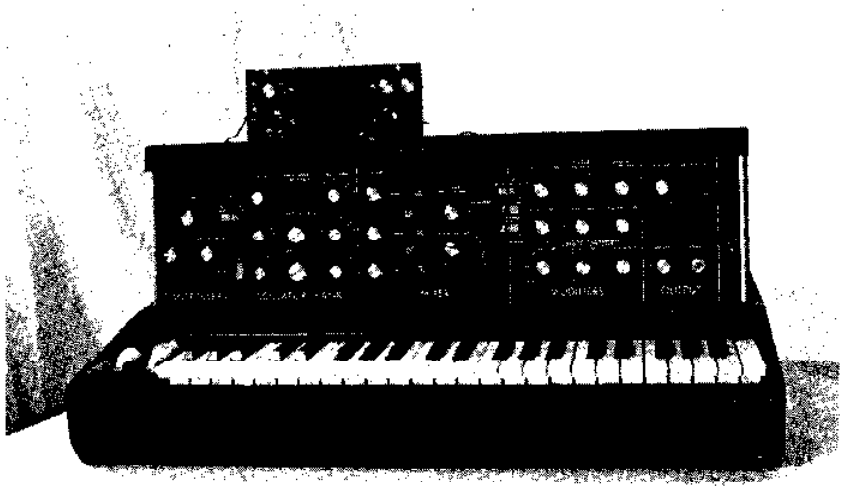


Figure 10. Sequencing is but one of the possibilities for the expanded Mini-Moog.

ever, you may want to play with the expansion jacks for a while to make sure all is well before closing the case.

As mentioned earlier, this simple inexpensive modification can open up quite a few possibilities for the Mini owner. Any of the many standard controllers available will now easily interface with the Mini. Envelope followers can be used to trigger the Moog from guitars, mikes, prerecorded signals, click tracks, or any other audio signal. Joysticks could be used to feed control voltage to two of the three control inputs available, and (if you should perhaps choose to use the Paia joystick) the joystick trigger output could also be used via the new trigger jack. Using an instrument like the OZ mini-organ through the Mini-Moog external input can produce a very powerful polytonic instrument. Previously, you would have had no easy way to interface the trigger from the OZ. But now, ... it's just a patchcord away! Sequencers are always fun, and with a Mini-Moog to control you can get some dynamite effects. Using the added trigger jack, you can now have the sequencer trigger the Mini for each note of the sequence ... the way the sequencer was designed to be used. Alternatively, you could use the sequencer as a single pass effect - perhaps for high speed arpeggiation. To get this effect, the sequencer is set to produce a non-repeating pattern with the new Mini gate jack used as an output from the keyboard to trigger the initiation of the sequencer pattern. Now, whenever a note is played on the keyboard, the sequencer will cycle through the pattern once and return to the note being played on the keyboard. And remember that with the sequencer being used to control the exponential VCOs in the Mini-Moog, the sequencer pattern will transpose from key to key, as different notes are played on the keyboard. Using the trigger jack as an output, you can also trigger external envelope generators to be used to sweep an external flanger, filter, or even perhaps to be fed back into the Mini-Moog VCF control input to generate a more complex envelope pattern [illegible] could be done with the original [illegible]SR built into the instrument.

The keyboard output jack which has been added is a source of 1 volt per octave control voltage governed by the keyboard. This voltage can be used to drive external banks of exponential type VCOs and VCFs. For the advanced experimenter, this output could easily be quantized, stored, and processed digitally for memory sequencing, control voltage delay or cascading, and many other special effects. This jack will turn out to be very handy as you will see in future articles.

Go Moogsters .... play with your newest toy.

For more information on the stock Mini-Moog, contact:

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