



OPERATION MANUAL

**SEQUENTIAL
CIRCUITS INC**

MODEL 100
S/N 1811 and up
Manual No. CM100C

**PRO-ONE SYNTHESIZER
OPERATION MANUAL**

by Stanley Junglieb

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**NOTE. Write Pro-One serial number (on back panel) here:
Refer to this number in all correspondence with the factory.**

Please return your warranty card!

About the Pro-One

The Pro-One is a monophonic (one-voice) keyboard synthesizer. Its principal sound sources are two voltage-controlled oscillators (VCOs), referred to as OSC A and OSC B. OSC A, OSC B, and a white noise source can be mixed into the resonant low-pass filter (VCF). The filter modifies the voice timbre under control of its four-stage envelope generator. The filter may also serve as a sound source. This stage is followed by a voltage-controlled amplifier (VCA), which shapes the voice amplitude also under control of a four-stage envelope generator. The keyboard provides frequency control voltage (KYBD CV) for the oscillators and filter, and generates a GATE which controls the envelope generators.

In addition to this basic voice, the Pro-One has extensive modulation provisions. Three modulation sources are available: the filter envelope generator (FILT ENV), OSC B, and a separate low-frequency oscillator (LFO). Each can be mixed and routed for either DIRECT or WHEEL-controlled modulation of five destinations: OSC A frequency (FREQ), OSC A pulse-width (PW), OSC B FREQ, OSC B PW, and filter frequency (FILTER).

This complement of analog synthesizer modules and the routings provided for their interconnection have been well-proven in the Pro-One's ancestors, the Prophet-5 and Prophet-10 polyphonic synthesizers. Besides allowing the synthesist to play up to five or ten notes at one time, these two instruments contain microcomputers which program all the control settings comprising a sound. The Pro-One is neither preset nor programmable: you always "patch" the precise sound you want with the knobs and switches on the control panel. But the Pro-One voice itself is identical to a single Prophet voice, so it is capable of as much range and expression.

Possessing the Prophet's sound and all standard monophonic synthesizer features, the Pro-One's own microcomputer makes possible innovations unheard of on a low-cost synthesizer; a 40-note sequencer, an arpeggiator, keyboard modes such as single- or multiple- triggering, and the unique automatic glide feature. An audio input with preamplifier and automatic GATE generator allows synthesizer processing of low-level inputs such as a microphone or electric guitar. The audio output can drive a monophonic or stereo amplifier, or stereo headphones. Of special interest to computer enthusiasts, the Pro-One readily interfaces for control by an external microcomputer.

This manual contains all the information you'll need to fully explore this outstanding instrument.

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SECTION I

BASIC OPERATION

1-0 INTRODUCTION

This section contains instructions for Pro-One set-up and basic operation. After unpacking, read paragraph 1-1 and connect the instrument as described. To quickly learn how to use the Pro-One, read also paragraph 1-2. This explains use of the factory-provided patch diagrams in Section 7. Paragraphs 1-3 through 1-6 present additional performance information on the keyboard modes, triggering, the arpeggiator, and the sequencer.

The Pro-One synthesizer offers extraordinary capabilities for spontaneous control of pitch, timbre, and loudness. To exploit these capabilities fully, learn as much as you can about it with this manual and the books listed in Section 6. Additional references can be obtained from the more extensive bibliographies contained in the sources listed. Thus prepared, you will no doubt create many interesting sounds. Be advised that the best patches tend to disappear if not documented. Panel blanks for this purpose are provided at the back of this manual.

Remember the Pro-One is a sophisticated instrument. It should be handled with as much care as you would give a violin. Shock or vibration can damage the keyboard, wheels, knobs, and can loosen socketed integrated circuits (ICs). If you expect to transport the Pro-One regularly, we recommend that you invest in a professional "road" case for it. These are made by several manufacturers and should be carried by your music dealer. If you can't find a case, please contact the SCI Sales Department.

1-1 CONNECTIONS

The Pro-One has a switch on its back panel for selecting between a 115- or 230-Vac power source. Pro-Ones shipped in the U.S. and to Japan are usually switched to 115V, and those destined for Europe are usually switched to 230V. WARNING: Check this switch and set to match your line voltage before plugging the instrument in. Don't change this switch when the line cord is connected. If you do switch the line voltage selector, you will have to change the fuse also. For directions, see paragraph 1-7.

As with most electronic equipment, the Pro-One comes with a three-prong power plug to insure safe grounding with other equipment. The ground prong is connected directly to the metal chassis. It is up to you to check the power and ground interconnections of the Pro-One and all other instruments and equipment you use to prevent potentially lethal shocks. As you probably know, many older buildings and clubs are notorious for their poor quality AC wiring. We therefore urge you to use one of the several "ground-checking" devices available on the market to verify AC connections.

Because of the AC ground, a "ground loop" will often be created when the audio cable is connected between the Pro-One and its amplifier. As a result, low-level hum may occur. Defeating the AC ground with a two-prong adapter will usually defeat the hum but this practice can set up a shock hazard between the units. The hum level will depend on how the two units are connected to the AC. For minimal hum, use the same AC outlet for the Pro-One and its amplifier. This should reduce the hum to an acceptable level.

In short, we recommend the following steps when connecting the Pro-One:

1. Plug the Pro-One into a three-prong outlet. Don't defeat the AC ground.
2. Plug all other equipment such as amplifiers, volume pedals, and effects devices into the same outlet. Don't overload. When in doubt, consult an electrician.
3. Verify all equipment grounding with a ground tester.

Sequential Circuits, Inc. is not responsible for any equipment failure due to incorrect AC power connections, and is not liable for any personal injury due to electrical shocks as a result of poor grounding.

This is an excellent time to think about your amplifier and speaker system. By converting the synthesizer's electrical output to the potent vibrations you hear, your sound system becomes part of the instrument. Of course you can use anything you like. But if your speakers are muddy and weak, so will be your sound. Using your home stereo will generally give you good high-frequency range, but if you go this route be careful. The Pro-One has much more dynamic range than the typical stereo source. It can generate powerful transients which can damage component speakers if the volume is set too high. Therefore, you might consider using amplifiers and speakers specifically designed for electronic instruments.

The AUDIO OUT is a standard stereo phone jack, but it accepts a stereo or mono plug. For single-channel use with instrument amplifiers, a mono cable with mono plugs at both ends should suffice. For playing through both channels of a stereo amplifier, you will probably need a stereo cable with a stereo phone plug at one end and two phono plugs at the other. These will connect to the amplifier AUX or TAPE inputs. (To protect speakers, it is customary to switch off the amplifier when making these connections.)

Stereo headphones can be plugged directly into the AUDIO OUT jack. The headphones should have a minimum impedance of 600 Ohms.

When power and audio output connections have been made, first switch Pro-One power on with back panel switch, then switch amplifier power on. If you think the Pro-One may not be operating, see paragraph 1-7.

For other back panel connections, see Section 3.

1-2 PLAYING

At this point (after unpacking) the Pro-One is probably not ready to play. As a non-preset synthesizer, the knobs and switches on the control panel have to be set purposefully. Certain minimum conditions such as mixer volumes, filter cutoff frequency and envelope sustain level need to be established. You can learn about the controls by reading Section 2. But if you are like most people, you'll want to play the Pro-One before studying it. To do this, simply turn to Section 7 and select a factory patch. Set the Pro-One's controls as closely as possible to the diagram while playing on the keyboard. Patching is a fine art: be patient. Note that there is inherent error in the diagrams and some degree of subjective preference as to exactly where the knobs should be set. For completeness, all control positions are diagrammed even though some may have no effect (for example, PULSE WIDTH when the pulse wave shape is switched off.) When oscillator intervals are harmonically related, the FREQUENCY knob(s) will have to be tuned by ear, usually for a minimum of "beating."

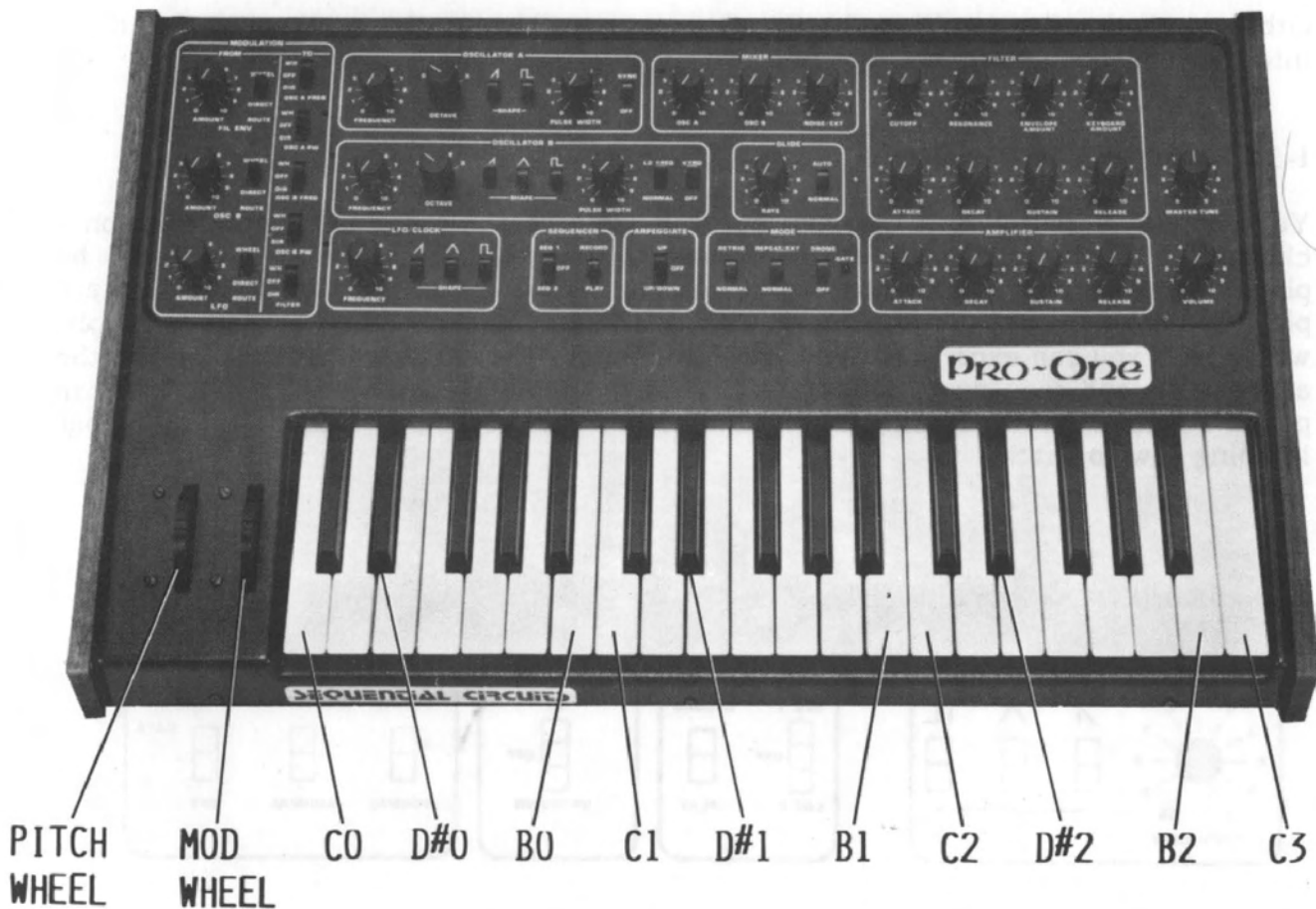


Figure 1-0
WHEELS and KEYBOARD

The MOD and PITCH wheels are at the left of the keyboard, as shown in Figure 1-0. The MOD wheel sets the modulation level. When not in use the wheel is left "down" and no modulation will occur. When the wheel is advanced fully "up," modulation is maximum. The PITCH wheel is normally left in its center-detent position, from which it is possible to simultaneously "bend" OSC A and OSC B pitch up or down by about a fifth. An integral part of playing is using the wheels and the module controls (e.g. GLIDE and FILTER ENVELOPE AMOUNT) for expression through dynamic and timbral variations.

The diagrams don't indicate VOLUME and MASTER TUNE knob settings because these are set as required. VOLUME, of course, sets the audio output level to the amplifier or headphones. For optimum signal-to-noise ratio, the Pro-One's VOLUME knob should be set as high as possible (without overdriving your amplifier or speakers, of course). MASTER TUNE simultaneously adjusts OSC A and OSC B pitch over a four-semitone range. It is used to easily tune the Pro-One to another instrument, such as a piano. Once set, MASTER TUNE is not usually adjusted during performance. If no other instrument is in use, the MASTER TUNE knob should be centered.

Other methods of controlling the Pro-One are possible via the back panel. For more information, see Section 3.

1-3 KEYBOARD CONTROLS

You can't play chords on a Pro-One for the same reason you can't play chords on a clarinet or trumpet: they are all monophonic instruments. So you will most often be playing solo lines on the keyboard. But you have some options as to how the keys are played, and when you can play more than one key. These are the keyboard controls, with which you can experiment on almost any patch. The keyboard controls include the arpeggiator and sequencer, which are keyboard "memory" devices of great utility in performance. And by freeing both hands from the keyboard, these tools aid your learning how to patch.

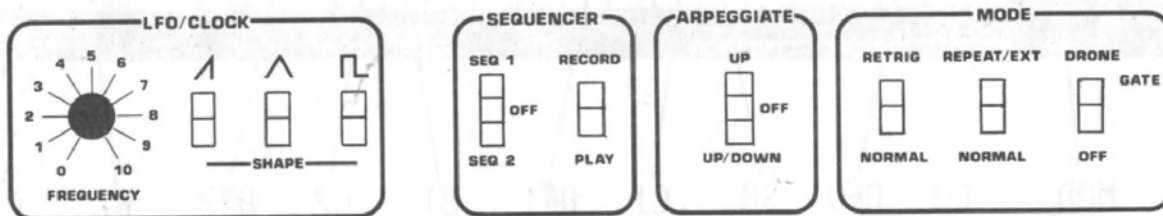


Figure 1-1
KEYBOARD CONTROLS

To understand the keyboard controls you first need to know that inside the Pro-One a GATE signal is produced when a key is played, which controls the envelope generators. The initial appearance of the GATE "triggers" the envelope generators to proceed through their ATTACK and DECAY periods. After the ATTACK and DECAY periods set for each envelope generator have elapsed, it will produce a steady control voltage (CV) at the level set by the SUSTAIN knob for as long as the GATE is present. When the GATE goes off, indicating the key has been released, the envelope generator output voltage decays to zero at a rate set by the RELEASE knob. (For more information, see page 2-7.)

1-4 MODE

The MODE module contains a GATE indicator light-emitting diode (LED) to clarify operation in the various keyboard modes. And it eases adjustment of the external audio input GATE generator. (For more information, see paragraph 3-1.)

The NORMAL-RETRIG switch selects the envelope generator triggering mode. NORMAL means low-note priority with single triggering. That is, if you play more than one note at a time, the lowest note on the keyboard will be the one you will hear. Furthermore, all keys must be completely released before a new GATE (initiating new envelopes) will be produced. This allows you to selectively retrigger by touch. When switched to RETRIG (retriggering mode) a GATE will be produced whenever a new key is hit, regardless of its position on the keyboard or of the number of keys simultaneously held. In other words, the last key played will be the one you hear.

When switched up, the NORMAL-REPEAT/EXT switch repeatedly gates the envelope generators at a rate set by the LFO/CLOCK FREQUENCY knob. Activating this switch also enables the back-panel GATE/CLK IN input. When an external GATE is plugged into this jack, the LFO/CLOCK is overridden and the envelopes will be gated by the external GATE/CLK IN input. This signal will also clock (advance) the arpeggiator or sequencer (see below).

The DRONE switch simply forces the GATE on, holding the envelope generators at their SUSTAIN level. DRONE overrides REPEAT. With REPEAT or DRONE on, hitting keys will not retrigger the envelope generators, but it will change the frequency of both oscillators (providing OSC B KYBD is switched up), and of the FILTER, (providing the KEYBOARD AMOUNT knob is advanced).

1-5 ARPEGGIATE

The arpeggiator automatically sequences between any depressed keys either UP (ascending only), or UP/DOWN (ascending and descending) the keyboard. ARPEGGIATE speed is set by the LFO/CLOCK FREQUENCY knob. To arpeggiate, select UP/DOWN or UP and hold the desired keys. There is no limit to the number of keys which can be arpeggiated. Set LFO/CLOCK FREQUENCY as you wish. To stop the arpeggiator, return the direction switch to OFF.

The arpeggiator can be "latched," which means it continues to play keys even when you remove your hand(s) from the keyboard. To latch the arpeggiator, first turn it on, hold the desired keys, then switch SEQUENCER PLAY-RECORD to RECORD. After all held keys have sounded at least once, you can remove your hand--the Pro-One will continue to arpeggiate. To "unlatch" the arpeggiator, switch from RECORD to PLAY.

You can't change directions in the middle of an arpeggiate sequence. If you do switch from UP to UP/DOWN or vice versa, the Pro-One will wait until all held or latched notes have been arpeggiated in one direction before it recognizes the change of direction.

While the arpeggiator is latched, you can hold additional keys which will sound as part of the arpeggiate sequence only as long as they are held. These additional notes remain "unlatched." Note: even though the SEQUENCER RECORD switch is used to latch the arpeggiator, the SEQUENCER memory banks are not affected (see also paragraph 1-6).

1-6 SEQUENCER

The Pro-One's 40-note sequencer allows you to record themes, riffs, walking bass lines or the like. All sequenced notes and rests are single-step recorded with the same duration. (Unlike "real-time" sequencers like SCI Models 800, 1005, and 1015, the Pro-One sequencer does not record notes of varying duration.) No matter how unevenly you record a Pro-One sequence, it will always play-back with all notes and rests evenly timed. The playback speed is controlled by the LFO/CLOCK FREQUENCY knob. The 40-note memory capacity is divisible in any proportion between two "banks," referred to as SEQ 1 and SEQ 2.

When the Pro-One is switched on, its sequencer is preprogrammed with a 20-note ascending scale in SEQ 1 and a 20-note descending scale in SEQ 2. Provided the PLAY-RECORD switch is down, you can now hear these two sequences by just switching the bank selector to SEQ 1 or SEQ 2.

To record, first switch PLAY-RECORD up, then select SEQ 1 or SEQ 2. Simply play the notes on the keyboard, inserting rests by switching from RECORD to PLAY, then back to RECORD. Rhythmic variations can only be arranged by inserting rests. All notes must be played detached, as you would in NORMAL--as opposed to RETRIG--mode (see paragraph 1-4). A sequence cannot begin with a rest.

Be sure to not exceed the 40-note capacity, or the sequence will be destroyed. When the 41st note or rest is entered, the first 40 notes are cleared. The bank then contains one note.

When finished recording, first switch the bank selector OFF, then switch from RECORD to PLAY.

When switched to PLAY, the Pro-One will sequence the notes and rests you recorded in the selected bank at a rate set by the LFO/CLOCK FREQUENCY knob. (Or, the sequencer can be advanced by pulses at the GATE/CLK IN jack. See paragraph 3-5.) The sequence will play continuously ("loop") until the bank selector is switched OFF.

When both memory banks are being used, care must also be taken to not exceed the 40-note limit. The Pro-One assigns memory priority to the bank which is currently being recorded, and will "steal" notes from the other bank once the 40 total note limit is reached. For example, if SEQ 1 already has a 25-note sequence recorded in it, you will erase SEQ 1 if you attempt to record more than 15 notes in SEQ 2. (SEQ 2 then retains the additional notes.)

As shown in Figure 1-0, the Pro-One's keys are named C0, C#0, D0...through C3. In playback, the entire sequence can be transposed over a two-octave range by just hitting a key between C0 and C2. The transposition is equal to the interval between C1 and the key played. For example, to transpose down a fifth, hit F0. To transpose up a major seventh from the original key, hit B1. To transpose back to the original key, hit C1.

The sequencer memory banks will retain their contents until power is switched off (or interrupted). Any transposition is cleared as well.

1-7 IN CASE OF DIFFICULTY

To check that the Pro-One is receiving power, switch DRONE on. The GATE LED should light. If it doesn't, either power is not reaching the unit or the fuse has blown. First check the power source by plugging in other equipment. Examine the Pro-One's power cable for damage. To check fuse, first unplug power cable then press the red fuseholder cap. For 115V, use 1/4A SLO-BLO. For 230V, use 1/8A SLO-BLO.

If the GATE LED lights but no sound can be obtained, check the front panel controls--including VOLUME--carefully against a factory patch in Section 7.

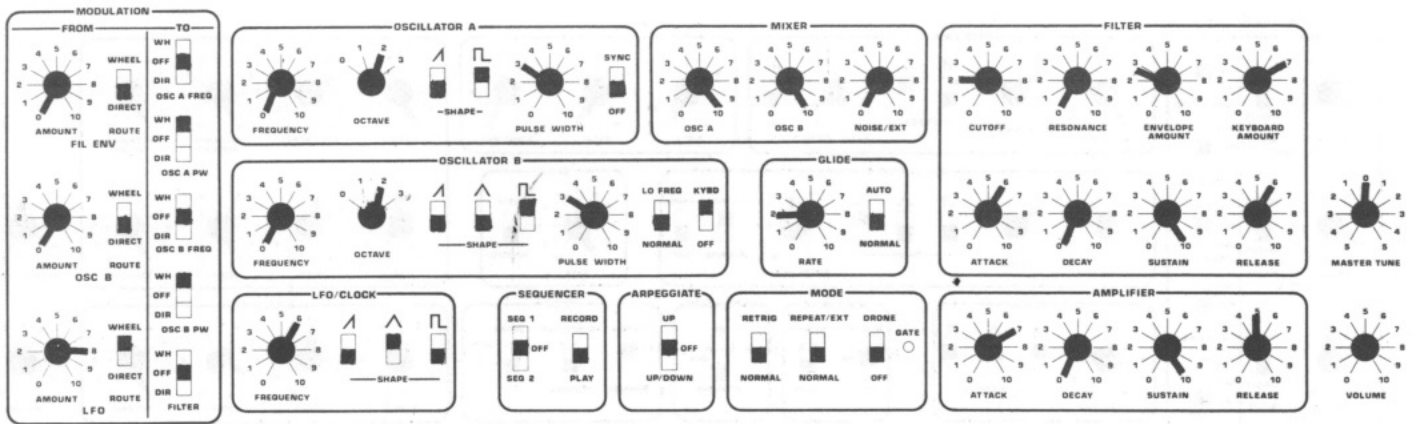
If still no sound can be heard, try substituting the audio output cable with one known to be good.

Check your amplifier by trying a high-level audio input such as another synthesizer or an FM tuner.

Check headphones by trying them with a standard headphone output from a stereo amplifier.

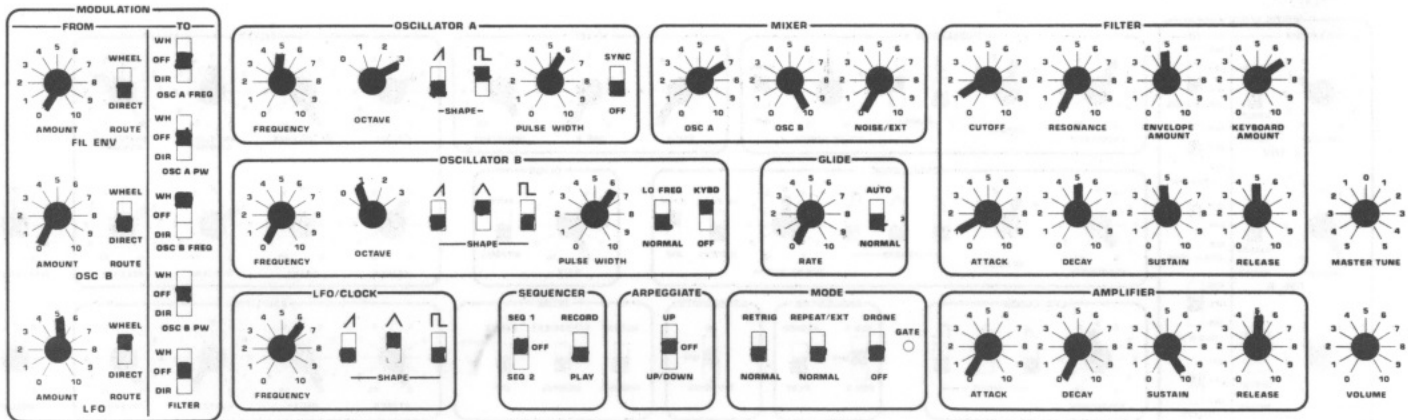
If the SEQUENCER won't record, check that you didn't leave ARPEGGIATE on.

If you are having trouble recording or playing sequences or arpeggiating, it may help to reset the internal microcomputer by switching power off then back on after a moment. Note this will erase any sequences which you have recorded.



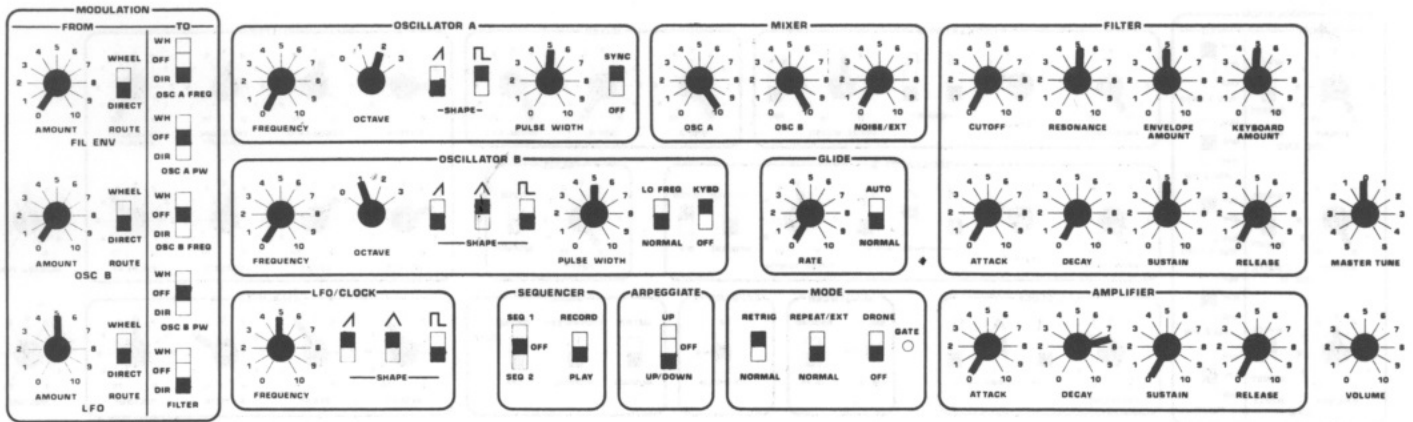
String

Adjust OSC A and OSC B FREQ knobs to match the frequency of the string you wish to imitate. Adjust OSC A and OSC B FREQ knobs to match the frequency of the string you wish to imitate. Adjust OSC A and OSC B FREQ knobs to match the frequency of the string you wish to imitate.



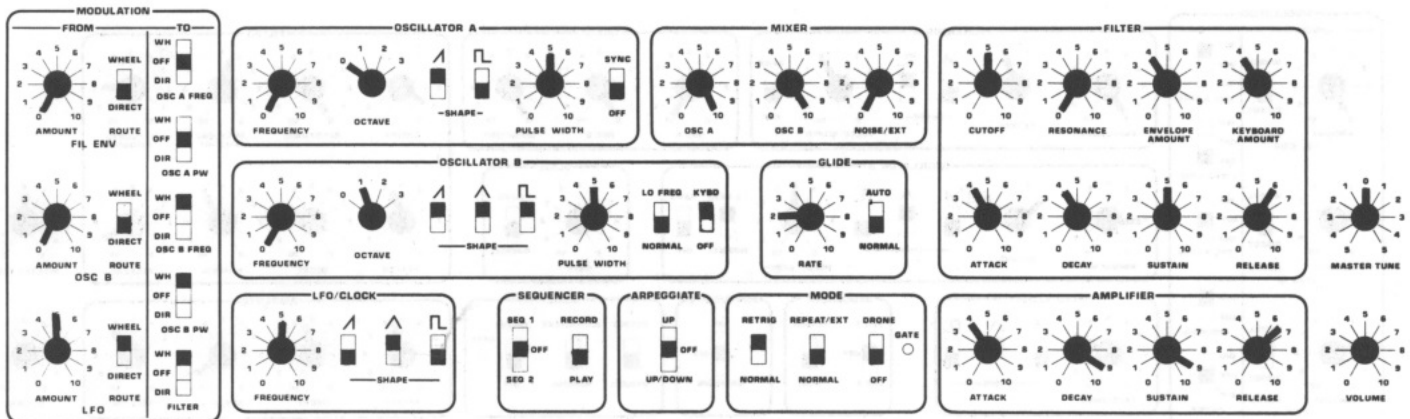
Percussive Organ

Tune OSC A 2 octaves plus a perfect fifth above OSC B. For proper effect, adjust OSC A PULSE WIDTH for square wave by listening for disappearance of the octave overtone. FILTER ENVELOPE AMOUNT adjusts brightness of percussive effect. Mod-wheel provides vibrato.



"Delayed" Envelope

Uses LFO as an envelope generator. (LFO is reset by keyboard trigger when ARPEGGIATE is switched on.)



Bass Synth Sustain

Tune OSC A 1 octave below OSC B.

