P9700S Overview

In a P9700S, the 9700K MIDI2CV8 is the power source for the other modules in the kit. A separate power supply is not needed.

The wall-mount transformer for the 9700K is an ac power source which is converted to dc supplies for the circuits on the MIDI2CV8 and sent out to the other modules via the four-circuit dc power connection points (a rectangular area with a group of four solder areas (+) (G) (SG) (-).

The power connector kits in each of the panel accessories for the 9710, 9720 and 9730 have a four-pin header and the wires, terminals, and cover for a 'pig-tail' with the header placed on the module to the left for a daisy-chained buss. The order of the modules across the chassis is 9700 MIDI2CV8, 9720 VCO, 9730 VCF, and 9710 VCA. Notice there is a variation in the direction the header is installed on the 9700K (it faces opposite the way the ones do on the other three modules. The important thing is to get plus to plus, minus to minus, G to G, and SG to SG.

The unregulated dc supplies from the 9700K are on-board regulated to dual 12v supplies on each of the VCO, VCF, and VCA modules.

( ) On page 17 of the MIDI2CV8 manual, for the step describing the preparation of the wall-mount transformer, make a mark or note to put a rubber grommet over the wires before knotting them. This grommet is in the FR-7 chassis hardware package (and/or the 9700FRM package). This grommet will slot into the rear panel of the FR-7 as the modules are assembled into the chassis.

Patch Cords

When making the patch cord set, consider making one or two that are multiples, or ones with two or three wires branching from one connector. This is particularly useful for patches from the Gate-trigger output of the MIDI2CV8.

MIDI2CV8 Pitch CV and VCO Scaling Adjustment (procedural supplement)

Assert Low-key Transpose for 0V Pitch CV from the keyboard controller low key (reference the MIDI2CV8 kit manual insert). This is the default, or automatic action with v3.0 firmware.

The DAC Tune trim is first set by connecting the pitch cv output to a multitester set to measure dc volts in a 0-10V range and then pressing octave spaced keys on the connected MIDI controller while adjusting the trim for 1V changes.

Later the VCO will be adjusted with this calibrated MIDI2CV8 output.

While a tuner can be useful, it can throw you off if the input is overloaded, clipping the wave and introducing harmonics. It is only necessary to hear octaves as the adjustments are made.

The VCA L and R sections can be used to mix the VCO A and B and the output from the VCA L + R output for monitoring.

Begin with the setting for a linear, volt/octave pitch CV from the MIDI2CV8. A dvm can be used to check that octave spaced key presses are outputting a 1V pitch cv change (down to a hundredth of a volt or so) as set by the trim on the MIDI2CV8. The most accurate setting will be obtained if you press octaves that start a few notes above the lowest key, ie if your low key is a C, press D or higher for the lowest octave reading.

The usual tuned setting for the VCO scale trims is about a 1:00 setting for the pointer of the disk which covers a cw range from about 7:00 (ccw) to 5:00 (cw). Start with the trim at 1 o'clock.

After having been powered for a minute or two patch the pitch CV over to the VCOA P2 input. Set the two pitch controls so they are both in-tune at unison at about a mid-rotation setting for the low key pressed on the controller. Play an octave higher and readjust the A panel pitch control for an octave relationship with B. Go back to the low note and adjust the A Scale trim control for unison and then, again, press an octave higher and adjust the A panel Pitch control for an octave relationship with B. After going back and forth like this another time or two, you should find the scale is about as close as is possible. Then, do this all again pressing some note a few keys higher than the lowest key (with VCO B adjusted to match at this new low pitch) and confirm/tweak the scale to match for higher pressed octave relationships with B (using the A Scale trim to realign A with B after adjusting the A panel Pitch control). When the A Scale adjustment is complete, move the pitch control voltage over to VCO B P2 and make the panel Pitch and B Scale trim adjustments to get unison and octaves referencing the pitch of VCO A.

After the B Scale trim is set, move the Pitch CV over to the VCOA P1 input and listen to the two vcos tracking across the keyboard range after aligning their pitch while a higher note is pressed, say the third or fourth octave. Confirm they track as you press keys going down towards the low key. You should be able to turn up the sound of the controller or some other MIDI Sound Module and hear that the tones made from the VCOs can be aligned using the panel pitch controls and follow as you play different ranges on the keyboard (make the alignment between the two when a key pressed in the middle C to A 440 range is pressed--its easier to hear the beating slow as they are tuned).

A general, monophonic synthesizer patch:

A common configuration is to start with the vc oscillators as the tone generator, to the L and R VCAs for a mix, run through the vc filter for emphasis or de-emphasis of parts of that tone, and then through the vc amplifier to 'frame' the sound. On the FatMan, two sawtooth (ramp) waves from the VCOs go to a LowPass VCF and then to the VCA. Envelope generators modulate the VCF and VCA in response to the Gate trigger which indicates the key pressed/released state. A Pitch CV amount according to the note pressed sets the VCO pitch.

A simple way to implement this lead, mono synth patch on your P9700S is to make the following connections (patches). You may need to make some new cords along the way.

First, we'll make the connections from the MIDI2CV8 operating in mode 1 for a mono voice complement of outputs (power-up with the low note pressed on the MIDI controller and release it a couple of seconds later to put the pitch cv in the best range). Use a single patch cord to go from the Pitch CV output on the MIDI2CV8 to the P1 control on VCO A. This allows you to control both oscillators and the Glide control setting can be adjusted to set the amount of time it takes for the oscillator frequency (pitch) to change for a Pitch CV change. The Pitch control of each oscillator can be adjusted so they are in unison or other relationship (the rest of the patch will need to be made to hear this).

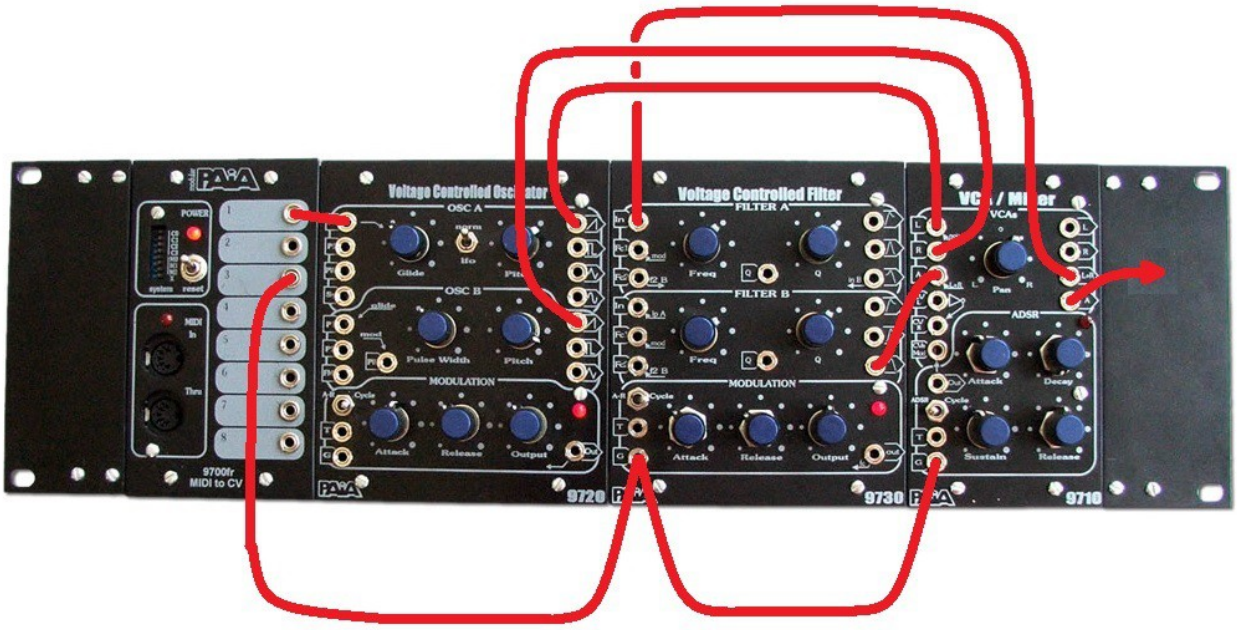
A 'Y' cord or one plug with two wires and plugs on it can be used to connect the Gate trigger output from the MIDI2CV8 to the Gate trigger (G) inputs on the VCF and VCA modules. This will cause their envelope generator modulators to start when a key is pressed.

Connect the two sawtooth waves from the VCOs to the L and R VCA inputs. The mix of the two waves is set with the pan control and the L+R output is the output of this mix and goes to VCF A In. We'll take the output from VCF B LowPass, or the bottom of the six connectors on the right-hand side with the graphic response symbols. Its best to keep the Q controls at midway or so and the Frequency controls slightly different till you develop a feel for the way the filter can accentuate or provide a boost on the signal. This boost can kick the filter into oscillation or overdrive the VCA. The more the Q the more the boost, the less the Q, the less 'dramatic' the filter effect. The more similar the settings of the two series connected filters, the more critical the Q setting. A cyclic VCF modulation is a neat effect too (instead of just an envelope generator sweep in response to the Gate). A Gate plus the cycle setting gives a cycle sync'ed to the key presses.

The VCA A section takes the VCF LowPass output with a single patch cord The VCA A output could patch to a mixer or amp/speaker, etc.

The ADSR controls set the dynamics of the sound as the keys are pressed and the envelope is generated and 'opens' the VCA.

Note the VCO waveform outputs are high level and you may need to set input levels lower than for usual stuff, or, a special patch cord to attenuate the output can be made. I have one that puts a couple of fixed resistors in series from the tip to sleeve circuits on the plug at 9700 end of the cable and the signal is tapped at the junction of the resistors for a more typical 'line-level'. The two resistors are a 10k and a 1k and the 10k attaches a the tip and the 1k at the sleeve. The tap for the signal that wires on to the tip of the plug for the mixer, amp/speaker, etc is from the junction of the two resistors. The ground circuit is as usual--sleeve terminal to sleeve terminal. The reason its needed here but not on module to module patches is that the modules all share a ground already--the power supply ground circuit--but the synth and the external device don't until one connection is made between them establishing a common ground.

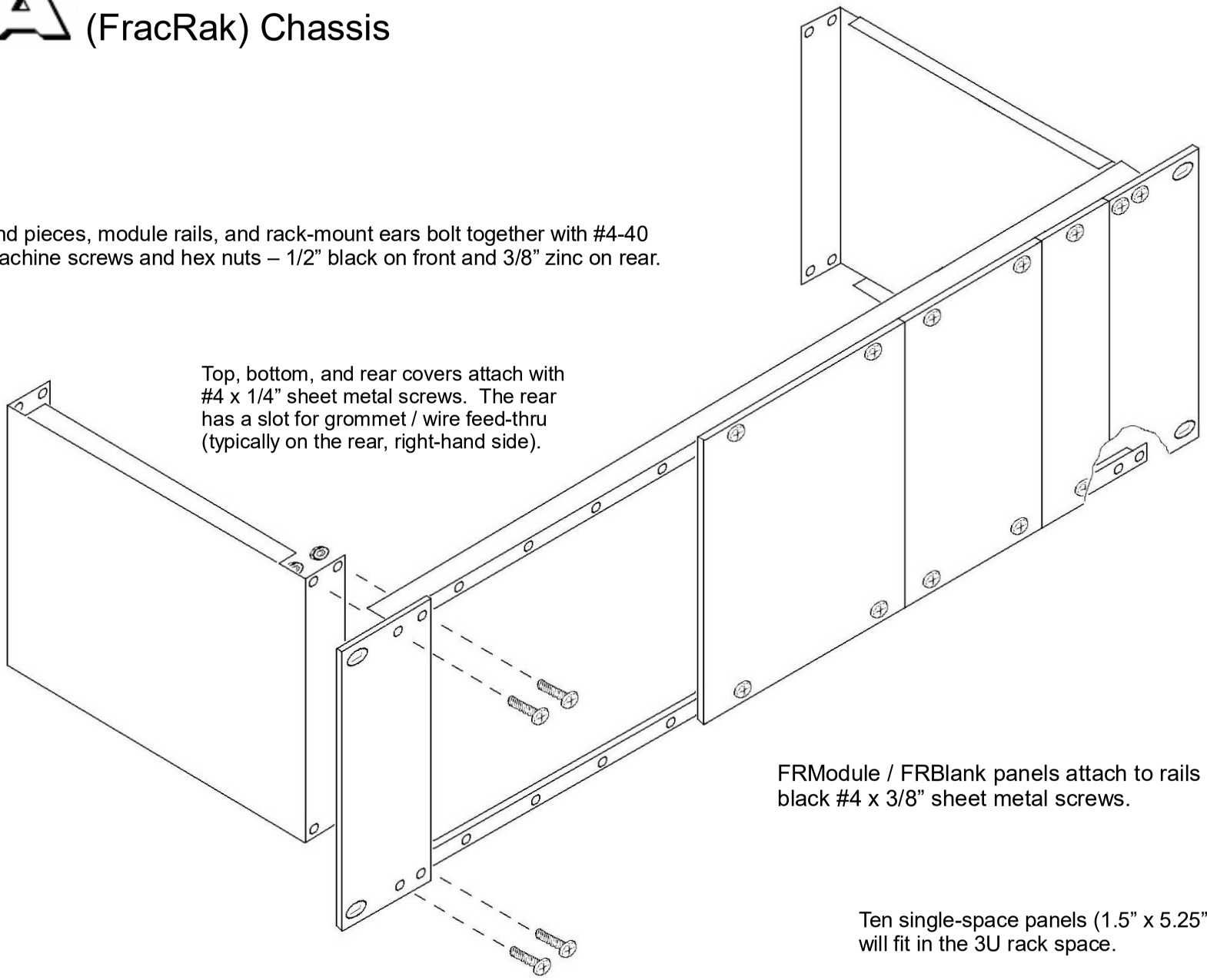


General Monophonic Synthesizer Patch

FR7 Fractional Rack (FracRak) Chassis

End pieces, module rails, and rack-mount ears bolt together with #4-40 machine screws and hex nuts – 1/2” black on front and 3/8” zinc on rear.

Top, bottom, and rear covers attach with #4 x 1/4” sheet metal screws. The rear has a slot for grommet / wire feed-thru (typically on the rear, right-hand side).



FRModule / FRBlank panels attach to rails with black #4 x 3/8” sheet metal screws.

Ten single-space panels (1.5” x 5.25”) will fit in the 3U rack space.

Note: The end pieces have additional holes which may be used for pots, jacks, or other purposes as desired. Be aware that power connectors can have one terminal common to the chassis and this can be a conflict when bringing in AC power where one wire is used as a neutral, circuit-common/ground. Remove any finish protecting film before assembly. For best alignment, hand-tighten nuts and bolts until all in place, then fully tighten.

FR7 contents:

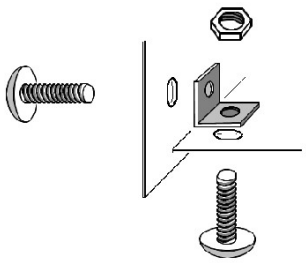
2	End Pieces
2	Rack Mount Ears
4	Mounting Rails
8	4-40 x 1/2” Machine Screws, Black (Front Panel/Rails)
8	4-40 x 3/8” Machine Screws (Rear Rails)
16	#4 Nuts
1	Instruction Sheet (This Document)
2	Aluminum Cover Plates (1 Top and 1 Bottom)
1	Aluminum Back Plate
24	#4 x 1/4” Sheet-metal Screws
1	Grommet, 1/4” (In Back Plate)

Single Panel #FRB-1 contents:

1	Single-wide Panel (1.5” x 5.25”)
2	#4 x 3/8” Sheet-metal Screws, Black (Front Panel)
2	#4 ‘L’ Brackets
2	4-40 x 1/4” Machine Screws, Black (Front Panel)
2	4-40 x 1/4” Machine Screws (Board to L Bracket)
2	#4 Nuts (Board to L Bracket)

Double Panel #FRB-2 contents:

1	Double-wide Panel (3.0” x 5.25”)
4	#4 x 3/8” Sheet-metal Screws, Black (Front Panel)
2	#4 ‘L’ Brackets
2	4-40 x 1/4” Machine Screws, Black (Front Panel)
2	4-40 x 1/4” Machine Screws (Board to L Bracket)
2	#4 Nuts (Board to L Bracket)



Use threaded hole of L-Bracket for mounting to FRBlank panel.

Triple Panel #FRB-3 contents:

1	Triple-wide Panel (4.5” x 5.25”)
4	#4 x 3/8” Sheet-metal Screws, Black (Front Panel)
2	#4 ‘L’ Brackets
2	4-40 x 1/4” Machine Screws, Black (Front Panel)
2	4-40 x 1/4” Machine Screws (Board to L Bracket)
2	#4 Nuts (Board to L Bracket)

9791 Patch Cords

The material supplied may be used to make patch cords of lengths that are useful to you. A recommended distribution is:

6 ea.	6" patch cords
4 ea.	12" patch cords
2 ea.	18" patch cords.
1 ea.	4ft. I/O cord.

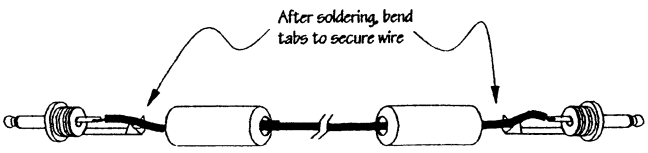
Patch cords are made using the flexible test-lead. Note that no connections will be made between the grounds of the plugs on either end.

High signal levels and low driving impedances of the 9700 series make patch cord shielding unnecessary AND if shielded cords are used the shield should not connect to the plug grounds at both ends. One end should always float. Shielded cords between modules can violate the 9700 series star ground provisions and lead to ground loops and noise.

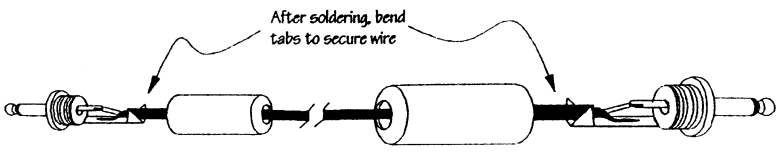
The I/O cord makes connections between modules and outboard equipment such as a mixing board or amp. The RG-174/U coaxial cable should be used for this cord. One end should terminate in a 1/8" Phone Plug and the other end in a larger 1/4" Phone Plug. The Co-ax shield should connect to the plug ground on both ends as shown in the illustration below.

9791 patch cord set packing list

25	1/8" phone plugs
1	1/4" phone plug
10 ft	flex test lead
4 ft	RG-174U co-axial cable



Patch Cords have mini plugs on both ends



Input/Ouput Cords have a 1/4" plug on one end and 1/8" plug on the other.