

NOVA * MUSIK

C O D E

PATCH RAM D 3
THE WATCHERS BET

STUDIO ELECTRONICS

C O D E



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Introduction

Welcome to the **Studio Electronics Omega series!** The world's first completely programmable discrete analog synthesizer.

What to expect

Phat, Commanding, Dimension Building, TRUE ANALOG SOUND, in spine tingling stereo. For entire songs worth of processing, use *each voice's* auto triggering external input; and each voice capable of having up to four selectable filters, that's a lot of processing. Just the beginning. Heaps of modulation, a user loving operating system, arpeggiating, and multi-timbrality. Enjoy.

About Tuning

For the **Omega series**, we developed a very accurate, but not perfect, software routine of computer corrected oscillator tuning. It looks at each note and corrects it to a pre-defined value. The goal was to keep all 16 oscillators in near perfect tune over the wide range of the keyboard but not so perfect as to eliminate the element of randomness, which is the nature, and beauty of analog synthesis. There is to be expected some tempering at the very low and high pitch ranges. Tune as needed.

The tuning of the filters is done in hardware and is not part of the *accu-tune* routine. You may hear with each voice a very slight difference in timbre or tone; this is not wrong, or poor design. On the contrary, we have chosen to be faithful and follow the chosen path blazed by our history shaping predecessors, manufacturers of the classic mono/polyphonic analog synthesizers of the past. It is precisely this slight variance from voice to voice that gives discrete and Curtis chip based analog synthesizers their vibrancy and soul pleasing warm sound.

Voice Architecture

Discrete Analog Hardware Per Voice

Two voltage-controlled oscillators

Up to four selectable voltage controlled filters (standard units come with the classic Moog, and four mode Oberheim S.E.M.)

One dynamic gain stereo voltage controlled amplifier

One auto triggering external input

Software Generated Per Voice

3 multi stage exponential curve envelopes

3 low frequency oscillators

1 arpeggiator

Features

8 REAL *stereo panning analog synthesizers* each with its own auto triggering external input

Multi-timbral for layering, splitting, and channelizing with up to 8 separate parts

Audio frequency modulation, oscillator sync, multiple triggering, envelope inverting

Up to 30+ simultaneous modulations, numerous continuous controller assignments

Exponential polyphonic glide and dynamic sensitive auto glide

Midi transmission of front panel knobs and switches

256 patches in ROM, 256 patches in RAM, 128 Multi patches

Specs

Dimensions: weight 24 lbs, 4 rack spaces

Power requirements: accepts 90 - 250 volts AC 50-60 Hz (auto switching)

Individual stereo outputs: tip - right side, ring - left side, sleeve - ground

Operating System

The operating system of the Omega 8 is easy to use and simple to program. It gives the user complete control of the numerous functions and features quickly and efficiently. The front panel knobs give you instant access to all major parameters and the edit switches in each section allow access to over 30 on screen edit pages. However, with the Omega 8 you are never more than four button presses away from any edit page, quite unlike other synthesizers with multiple edit pages. This allows in depth patch programming without the tedious routine of continuously scrolling through on screen displays.

Known Bugs

We have spent countless hours in designing this instrument to be near perfect in hardware and software operation and we are almost there, but there are a few small bugs that still exist. They should not cause you much trouble, if any, and we have indicated ways to avoid them.

1. Occasionally, after the *accu-tune* procedure, some of the voices may return in pitch a half step off. The tuning procedure works best when performed in a ROM sound. We have created a special patch for this procedure, B128. Set to patch B128, press a low note on the keyboard and do the tune again. This should take care of the problem.

Hopefully, that is it for bugs, but it is impossible for us to test under every playing condition and user setup. If you experience any trouble, please feel free to contact us.

Common Functions - where they are and how to perform them

Changing midi channel: **utility** switch edit page 2

Master Tune: oscillator section **edits** switch edit page 1

Change patch banks: when on main page press **up/down** cursor switch

Get to Multi bank: press and hold **bank** switch then press **left arrow** switch

Save patch: press **save** switch, select location in RAM banks, press **save** again

X10 value moves (pan pages only for now): press and hold **solo** switch, then rotate encoder

System exclusive Dump: **utility** switch edit page 4

Tuning: **accu-tune** switch.

Upload RAM into ROM: global edit page 3, follow instructions

Set number of voices: global edit page 1

Sound Programming - The Sections

The Edit Pages

Words or abbreviations in brackets [] indicate top line of display. Cursor moves along the bottom line to edit selected parameter. On certain Pan, LFO, and envelope pages, the cursor will also move along the top row to edit parameters.

Two asterisks** indicate a voice board function planned for later implementation.

Multi/Midi

Knobs

volume: master volume control.

glide: glide and auto glide rate.

Switches

Multi

Note: to get to multi bank, press and hold bank switch, then press the left arrow switch.

set up

page 1: select type – prepared, split, layer, or multi. Prepared allows for programming different patches on each voice with midi reception on a single channel. **Note:** if the first patch in a “prepared” multi patch is a unison patch, the “prepared” multi will be in unison. The number of voices played by the multi will also be determined by the [UNI] (quantity) parameter of that same first patch. You will still be able to assign each voice a different patch. Use this “unison” multi for creating thick and intricate layered sounds.

page 2: set split point.

edit

page 1: part editing, use the bank/part switch to cycle through the multi parts, [BANK], bank select, [PTCH] patch number, [VCS] number of voices [TYPE] mono or poly, [VOL] part volume.

page 2: remove voices (per each part) from master outputs.

Pan positions in a multi: The multi preset stores its own pan position, pan rate, and pan depth for each voice. Waveform, key trigger, and midi sync information is carried into the multi preset from the patches used in the multi preset.

Note: edits made to patches while in the multi bank are savable. The multi part you are in determines which patch you are editing and saving. Edits made to the patch must be saved before you go to another multi part otherwise the edits are lost. Press save and select RAM location you want to save the patch to.

Determining midi channels in a channelized multi patch: the first multi part is received on the current midi channel that the Omega is set to, additional parts receive on successive midi channels. Example: if the unit is set to midi channel 3, multi part 2 receives on channel 4, multi part 3 receives on channel 5, etc., etc.

glide

page 1: [ON] glide on / off, **[TYP] linear or exponential glide response, [MDE] in regular mode glide is active with every key trigger, in legato mode, glide is active only between legato notes, [DST] destinations for glide.

page 2: [GLS] glissando or quantized glide on / off, [AUT] auto glide on / off, [INT] auto glide interval, [DYN] dynamic sensitivity to auto glide interval.

pan (the x10 value moves for these pages are helpful - hold solo then rotate encoder)

page 1: The position of each voice in the stereo field, minus- left, plus+ right.

page 2: The rate of each voice's pan LFO.

page 3: The depth of each voice's pan LFO.

page 4: [WAVE] waveform of all pan LFOs, [KEY] key trigger modes for pan LFOs, [CLK] midi clock synchronization times for pan LFOs.

keyboard

page 1: [UNI] quantity of voices triggered when unison mode is on, [VMODE] first available voice or voice cycle mode, [PRIOR] note priority modes.

page 2: [OCT] overall pitch transpose, [MTRIG] multiple trigger response for the envelopes.

unison: unison mode on / off. Number of voices triggered selected on keyboard edit page 1.

The unison button also sends an all notes off message when pressed.

midi

Press to cycle through the midi controllers. Dynamics, modwheel, and pressure have two destinations and depths. Bender modulates oscillator frequency and filter cutoff frequency.

Cont1 allows an additional two destinations for modwheel pressure, or breath

Controller. Cont2 allows an additional two destinations for dynamics and key tracking.

Note: Cont2 allows for positive and negative modulation.

(midi) - edit

page 1: [CON1] modulator assignment for cont1, [CON2] modulator assignment fro cont2.

utility

page 1: name patch page.

page 2: [CHAN] midi channel assignment, [TUNE] accu-tune percentage (100% is full strength lesser settings randomize tuning or intentional out of tuneness), [INIT] sets current patch to basic default settings, **will not** erase over current patch unless save procedure is carried out.

page 3: [MPRO] memory protect, ON1 knobs will not respond, ON2 no editing can be done, **[KNOB] knob response modes, [LCD] sets display contrast, "0" being most sharp.

page 4: initiates system exclusive dump procedure, select individual patch or entire bank.

NOTE: Regarding dynamics modulation of a given parameter. When using dynamics to modulate any destination the last dynamic value played will stay with that destination unless a zero dynamic value is sent or the selected destination is edited from the front panel or at its on screen cursor location. Changing the destination or setting the amount to 0 does not send a zero dynamics value to the parameter. This only applies if after selecting a dynamics destination a dynamic value is sent via your keyboard or sequencer. If you are playing while you are scrolling through the destinations dynamic values will be sent to those parameters affecting their values in the edit buffer. Scrolling through the destination list while no dynamics value is being sent does not affect the parameters. This will also occur with the mod wheel if you do not move the wheel to the zero position before you change destinations.

NOTE: Cont1 and Cont2 modulation depths override duplicate assignments in the dedicated dynamics, modwheel, and after touch edit pages. Confusing, yes, because you can assign the same destination to any modulator. Keep track of your modulators when programming.

Modulation destinations for modwheel, dynamics, and pressure:

FRE1 - osc 1 frequency	FRE2 - osc 2 frequency	1&2F - osc 1&2 frequency
LEV1 - osc 1 level	LEV2 - osc 2 level	PW1 - osc 1 pulse width
PW2 - osc 2 pulse width	1&2P - osc 1&2 pulse width	FILT - filter frequency
RESO - filter resonance	LEVN - noise level	XMOD - xmod depth
EA1 - envelope 1 amount	EA3 - envelope 3 amount	EXT - external input mix level
LF1R - LFO 1 rate	LF2R - LFO2 rate	LF1D - LFO 1 depth
LF2D - LFO 2 depth	1&2D - LFO 1&2 depth	1&2R - LFO 1&2 rate
PAND - pan depth	PANR - pan rate	PAN - pan position

Modulation

Knobs

rate x2: rate of LFO.

depth x2: depth of LFO. Front panel knob controls amount of destination 1 only. You can also use the Q dial to edit this parameter as well. Value is displayed on LFO edit page 1. Depths for destinations two and three are done via the Q dial.

depth (xmod): depth of oscillator 2 frequency modulating oscillator 1 or filter frequency.

Each LFO can modulate up to three different destinations. If a same destination is selected in more than one location, the location furthest left will override and determine the ultimate depth.

NOTE: Destinations 1&2 are assignable to midi controllers, destination is 3 is modulated by envelope 3.

Switches

LFO edit (Both LFO 1 and LFO 2 edit pages are the same.)

page 1: destination assignments and amounts.

page 2: [WAVE] waveform, [MODE] mono or polyphonic, [SYNC] midi clock synch times.

page 3: [KEY] key trigger modes, [QUAN] quantized LFO modulation.

Xmod: selects the destination for oscillator 2 audio frequency modulation. The front panel LEDs will indicate the routing.

Modulation destinations for LFO 1 and 2:

FRE1 - osc 1 frequency	FRE2 - osc 2 frequency	1&2F - osc 1&2 frequency
LEV1 - osc 1 level	LEV2 - osc 2 level	PW1 - osc 1 pulse width
PW2 - osc 2 pulse width	1&2P - osc 1&2 pulse width	FILT - filter frequency
RESO - filter resonance	LEVN - noise level	XMOD - xmod depth
EXT - external in mix level	VOL – volume	

Programmer

Knobs

Q dial: use for changing patches and editing on screen parameters.

Switches

left arrow: moves the cursor left.

right arrow: moves the cursor right.

up down arrows, bank / part: moves the cursor up and down, changes patch banks when the display is on the main page.

compare: compares edited patch to programmed patch.

exit: returns display to main page.

save: saves current patch to same or chosen location. Patches from either bank can be saved to either bank at any location.

X10 for edits to the pan page, makes numbers increment in multiples of 10.

tune: tunes the oscillators, procedure takes about 23 seconds.

global:

page 1: set to the corresponding number of voices in your Omega

page 2: uploads RAM banks to ROM banks, rotate encoder after “are you sure?” to initiate.

page 3: set number of filters in unit. Standard units set to 2 for SEM and Moog.

Oscillators

Knobs

frequency: adjusts oscillator frequency.

pulse width: adjusts width of square wave.

oscillator level: adjusts oscillator mix level.

noise: adjusts noise mix level.

Switches

triangle, saw tooth, square: oscillator waveforms on / off.

sub: oscillator 1 sub waveform.

sync: syncs frequency of oscillator 2 to oscillator 1 frequency.

edit

page 1: master tune, oscillator 1 and 2 frequency. When in this page the Q dial may also be used to edit oscillator frequencies.

page 2: [FINE] oscillator 2 fine tuning, [MODE] oscillator 2 pitch modes, [ENV1] amount of oscillator 2 frequency modulated by envelope 1.

Filter

Knobs

frequency: filter cutoff frequency.

resonance: filter resonance level.

tracking: filter tracking amount, application of keyboard CV added to filter frequency as you play up the keyboard.

Switches

edit

page 1: [TYPE] filter type selection - Oberheim 12 db low pass, Oberheim 12 db band pass, Oberheim db high pass, Oberheim db band reject, Moog 24db minimoog, AUX1, AUX2 [INVT] inverting of envelopes 1 and 3. The CS80 filter is always is the AUX2 position, the high pass frequency and resonance are controlled by two of the external input parameters, mix level for the frequency and trigger level for the resonance.

External Input

page 2: (external input parameters) [IN] input level, [MIX] mix level, [TRG] envelope trigger level, [WIN] envelope trigger window. You can also control the external input parameters from the front panel. Press and hold the filter edit button, then press the envelope edit button, this switches the envelope 3 knobs to the external input parameters. The envelope edit button will blink to indicate this function is enabled. Repeat the procedure to return to normal operation.

Filter Control

Knob mode 1: F table, sweeps through filter types.

Knob mode 2: Same as above.

Knob mode 3: Envelope 1 delay, [DLAY1]

Mode switch: selects what the knob and filter control switches do.

Left switch mode 1, freq down: decreases filter frequency.

Right switch mode 1, freq up: increases filter frequency.

Left switch mode 2, env1 up: increases envelope 1 amount.

Right switch mode 2, res up: increases filter resonance.

Left switch mode 3, invert: inverts filter envelope.

Right switch mode 3, d down: decreases filter (env 1) decay time.

Envelopes

Knobs

attack x3: attack time, the first stage in the envelope in which the initial rise in filter frequency (env1), volume (env2), or as assigned (env3) rises to peak at the adjusted rate.

decay x3: decay time, second stage in the envelope in which peak levels of filter frequency (env1), volume (env2), or assigned (env3) falls from peak to the sustain level.

sustain x3: level to which the filter frequency (env1), volume (env2), or assigned (env3) falls to at the end of the decay time.

release x3: release time, the final stage in the envelope in which after the key is released, the rate at which the sustain level falls to zero.

env 1 amnt: the amount or depth of envelope 1 applied to the filter frequency.

env 3 amnt: the amount or depth of envelope 3 (destination one only) applied to the selected destination. Destinations two and three are adjusted via the Q dial.

edit

page 1: envelope 3 destinations and amounts.

page 2: [DKY2] x3 envelopes 1,2 &3 (from left to right) decay 2 time. Decay 2 is an additional stage only active if a value greater then zero is set, it determines the time it takes while holding a note, for the sustain level to reach zero.

page 3: [DYN] x3 dynamic sensitivity amounts for envelopes 1,2 & 3 (from left to right).

page 4: [DLAY1] delay time to the start of env 1, [DLAY3] delay time to the start of envelope 3.

Envelope 3 can modulate up to three different destinations. If a same destination is selected in more than one location, the location furthest left will override and determine the ultimate depth.

Envelope 3 destinations:

FRE1 - osc 1 frequency

FRE2 - osc 2 frequency

1&2F - osc 1&2 frequency

LEV1 - osc 1 level

LEV2 - osc 2 level

PW1 - osc 1 pulse width

PW2 - osc 2 pulse width

1&2P - osc 1&2 pulse width

FILT - filter frequency

RESO - filter resonance

LEVN - noise level

XMOD - xmod depth

EXT - ext input mix level

LF1R - LFO 1 rate

LF2R - LFO2 rate

LF1D - LFO 1 depth

LF2D - LFO 2 depth

1&2D - LFO 1&2 depth

1&2R - LFO 1&2 rate

Current Continuous Controller Assignments

# (DECIMAL)	PARAMETER	SENT	RECEIVED
54	OSC1 FREQ	Y	Y
55	OSC1 TRI WAVE ON/OFF	Y	Y
56	OSC1 SAW WAVE ON/OFF	Y	Y
57	OSC1 PULSE WAVE ON/OFF	Y	Y
58	OSC1 SUB OSC ON/OFF	Y	Y
59	OSC1 PULSE WIDTH	Y	Y
60	OSC2 FREQ	Y	Y
61	OSC2 TRI WAVE ON/OFF	Y	Y
62	OSC2 SAW WAVE ON/OFF	Y	Y
63	OSC2 PULSE WAVE ON/OFF	Y	Y
70	OSC2 PULSE WIDTH	Y	Y
71	LFO1 RATE	Y	Y
72	LFO1 DEPTH	Y	Y
73	LFO2 RATE	Y	Y
74	LFO2 DEPTH	Y	Y
75	FREQ DOWN (1/2 current value)	Y	Y
76	ENV 1 UP	Y	Y
77	INVERT	Y	Y
78	FREQ UP (value = 100)	Y	Y
79	RES UP (value = 100)	Y	Y
80	D DOWN (1/2 current value)	Y	Y
81	DELAY 0-127 (mode 3)	Y	Y
84	OSC1 MIX	Y	Y
85	OSC2 MIX	Y	Y
86	NOISE MIX	Y	Y
87	XMOD MIX	Y	Y
88	VCF FREQ	Y	Y
89	VCF RESONANCE	Y	Y
90	VCF KEYBOARD TRACK	Y	Y
* 98	EXTERNAL IN MIX	N	Y
* 99	EXTERNAL TRIG LEVEL	N	Y
102	ENV1 AMOUNT	Y	Y
103	ENV1 ATTACK	Y	Y
104	ENV1 DECAY	Y	Y
105	ENV1 SUSTAIN LEVEL	Y	Y
106	ENV1 RELEASE	Y	Y
107	ENV2 ATTACK	Y	Y
108	ENV2 DECAY	Y	Y
109	ENV2 SUSTAIN LEVEL	Y	Y
110	ENV2 RELEASE	Y	Y
111	ENV3 AMOUNT	Y	Y
112	ENV3 ATTACK	Y	Y
113	ENV3 DECAY	Y	Y
114	ENV3 SUSTAIN LEVEL	Y	Y
115	ENV3 RELEASE	Y	Y
116	F TABLE	Y	Y
118	OSC2 SYNC ON/OFF	Y	Y

* NOTE - 98 & 99 ARE USED FOR FREQ & RESO RESPECTIVELY FOR THE HIPASS SECTION OF THE CS80-TYPE DUAL VCF - THIS REQUIRES A MODIFICATION TO THE VOICE BOARD



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