



Midi Analog Performance Sequencer (MAPS) Manual

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Important Safety Instructions

Declaration of Conformity

This product conforms to electrical safety standards when used only with the approved Signal Arts Technologies AC power supply adapter, supplied with the product.

Signal Arts AC power adapters are UL listed and CSA approved.



DANGER! **INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS.**

READ THESE INSTRUCTIONS:

When using electric products, basic precautions should always be adhered to, including the following:

1. Read all instructions before using the Signal Arts Sequencer.
2. To reduce the risk of fire or electric shock, refer all servicing to qualified service personnel. There are no user serviceable parts inside the unit. The Signal Arts Sequencer should be serviced by qualified service personnel when it does not operate normally or exhibits a marked change in performance.
3. Do not expose the Signal Arts Sequencer to rain, moisture, drips or splashes. Do not use this product near water for example near a bathtub, washbowl, kitchen sink, in a wet basement, on a wet bar, or near or in a swimming pool.
4. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure of the Signal Arts Sequencer through openings.
5. The Signal Arts Sequencer should be situated so that its location or position does not interfere with its proper ventilation. Ventilation holes are located on the bottom and rear panel.
6. The Signal Arts Sequencer should be located away from heat sources such as radiators, heat registers, fireplaces, stoves or ovens.
7. The Signal Arts Sequencer should be connected only to a power supply and AC power adapter of the type described in the instruction manual, as supplied with the sequencer.
8. Protect the power adapter cord from being walked on, pulled or pinched, particularly at adapter, convenience receptacles, and the point where it is plugged into the unit.
9. Unplug the Signal Arts Sequencer power adapter from the power outlet during lightning storms or when left unused for a long period of time.
10. Only use attachments recommended in the instruction manual.
11. The Signal Arts Sequencer should be kept clean and dust free. Periodically wipe the unit with a clean, lint free cloth. Do not use solvents or cleaners.

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INTRODUCTION

Congratulations! You have just purchased the ultimate composer's tool.

With over a dozen new features added to MAPS core design, expect to use a sequencer that is more robust, versatile, intuitive and user-friendly than any other comparable sequencer. Which other sequencer allows you infinite virtual tracks, modulations or multiple, REAL-TIME versions of one sequence? Which other step sequencer allows polyphony with only one sequence?

24 Banks
of 8 Sequences
of 8 Steps
of 7 Parameters
And Multiple Virtual Sequences
Per-Step Note, Pitch, Velocity, Controller Value
Per-Step Duration and Note Duration
Per-Step Slew Rate
A Full-Featured Three Channel Polyphonic MIDI to CV Converter

How To Use This Manual

This manual is organized into four sections:

- * Basic Operation Start quickly with manufacturer presets
- * MIDI Use
- * Analog Use
- * Programming Tap into the full potential of this product

If you are not using analog synthesizer gear with this sequencer, you may skip the *Analog Use* section of this manual. If you are using analog gear with this sequencer, you may want to review the *MIDI Use* chapter for important information on how this sequencer is set up using MIDI channel numbers.

These conventions are followed throughout the manual:

- * **BOLD** upper-case letters refer to front panel controls.
- * CAPITALS refer to physical input or output jacks at the rear of the sequencer enclosure.
- * *Italics* refer to LCD display menu items and general headings in this manual.

The MIDI/Analog Performance Sequencer is ready to operate out of the box. For a quick start, read *Basic Operation* and you will be sequencing in seconds!

In addition to this manual you may also refer to the Signal Arts web-site (URL is listed in appendix F) for operating system and manual updates. Check out helpful user Tricks & Tips on the web site's FAQs page.

Sequencer Features

Real-time Interface

Real-time Flexibility

- * Continuous turn encoder knobs and LCD display for instantaneous access to any parameter
- * Displays step parameters using bar graphics, octaves, en-harmonics, or numbers
- * Perform from the sequencer using its panel keys to trigger sequences or...
- * Perform the sequencer remotely using MIDI

Sequence Step Matrix

Moves beyond a simple MIDI Tracker

- * Real-time sequence step modes:
note, scale, detune, velocity, controller, step duration, note duration, slew rate
- * Force step note to one of 50 musical scales
- * Step notes are tuneable to 3.125 cents un-quantized resolution
- * Sequences output MIDI controller numbers 0 to 99
- * Per-step slew rate for MIDI pitch-bend slew or portamento output
- * Sequence Loop and Link for long patterns up to 1536 steps
and multiple instances thereof
- * Sequencer cross-modulation:
A sequence may modify another sequence's pitch, velocity, controller and event times
Modulation routes by channel allow additive, global and recursive sequence modulation
- * Random step advance and pendulum modes
- * Per-bank and global BPM tempos
- * 32 channel MIDI output
- * Control Voltage modulation input for sequence transposition, velocity or step time

Variable Event Times and Durations

Moves beyond the traditional Analog Sequencer

- * Internal sequencer resolution is 96ppq
- * Per-step step and note durations:
Note off and step skip to 64th to dotted whole note durations
- * Ability to create polyphonic sequences with any combination of chord and single note
- * Sync triggers to beat or free-time, independent to each sequence
- * Bar Sync syncs sequence loop to bar length, independent to each sequence
- * Poly-rhythms are easily generated using Bar Sync
- * Step fractional time-shift modulation via sequence modulator or CV input
- * Programmable external clock sources and timing resolution

Dynamic Sequence Triggering

Makes this *the* Performance Sequencer

- * Concurrent triggering of each bank group of 8 sequences,
with multiple virtual sequence iterations
- * Additive or global sequence modulation
- * Recursive sequence modulation
- * Sequencer trigger sources:
Sequences are panel key assignable and MIDI channel or note assignable
Sequence iterations track MIDI trigger note, velocity, note duration, and note instances
- * Triggers sync to beat or free-time; create MIDI echo

- * Sequencer trigger modes:

Multiple	sequences follow all trigger instances
Single	sequence follows monophonic trigger
Duration Follow	sequence note duration follows trigger duration
Loop Hold	sequence loops while trigger is held
Run/Stop	trigger play; trigger stop
Seq Reset	trigger play; trigger reset sequence
Release	trigger sequence_n, sequence_n+1 on trigger release
Step Play	trigger plays the next successive step
Step Record	trigger sets step value
Step Randomize	trigger sets random step values

Polyphonic MIDI to Control Voltage Converter Features (MCV)

Superb Analog Voice Control

- * 3 channels of full-featured MIDI to Control Voltage conversion
- * Authentic mono synth emulation with 8 finger note buffer
- * Configurable output ports
- * 10 octave linear note range
- * Volts/Octave or Volts/Hertz output scaling
- * Low / High / Last note priority
- * Re-trigger and Recycle note modes
- * Linear or Exponential portamento slew
- * Mono and polyphonic pitch bend modes with variable pitch bend width
- * Velocity and MIDI controller support with 16 curve modifiers, inversion and scaling
- * Three programable MIDI input channel zones

Other Analog Ports

Flexible Analog or MIDI Sync

- * Analog Clock in at 4ppq and 24ppq
- * Analog Clock out at 2ppq (48ppq available by jumper select)
- * Analog Drum Sync out at 24ppq
- * MIDI clock in and out at 24ppq
- * External Foot Switch input for remote bank changes
- * External Foot Pedal/CV input for sequence modulation

File Data Exchange

- * MIDI file dump data
- * Flash upgradeable OS

BASIC OPERATION

Quick Start

1. Plug the supplied 15VDC power adapter into the power jack at the rear of the sequencer. This power jack lies beside the POWER switch. Plug the adapter mains into an AC outlet. Users outside of North America may have to slide the appropriate AC plug attachment onto the power adapter first.

2. To Connect with MIDI Gear:

Plug the sequencer MIDI OUT 1 into the MIDI input of a MIDI keyboard or sound module music synthesizer. See *MIDI Use* for detail. Set your sound module to receive on MIDI channel 1.

To Connect with Analog Gear:

Using 1/4 inch phone plugs, connect the sequencer CV1 to the note CV input of your analog synthesizer's oscillator. Connect the sequencer GATE1 to the gate input of your synthesizer. See *Analog Use* for detail.

Optionally, plug a MIDI keyboard, MIDI computer or other sequencer into the MIDI/Analog Performance Sequencer MIDI IN for remote triggering of sequences.

3. Powering On:

Turn on the power switch at the right rear of the sequencer. The sequencer has booted up when the front panel display reads *Signal Arts Sequencer..*, followed by bar graphs representing step note values.

4. Pressing the panel trigger keys 1-8 will start sequences 1 to 8 which will now drive your synthesizer. Alternatively, sequences may be triggered by MIDI IN notes coming from your external MIDI source.

Powering Off:

Before turning the sequencer off all changes should be saved, otherwise your data will be lost the next time you use your sequencer. See the *Programming DATA Save as Bank* chapter heading on how to save your sequence data.

Factory Configuration

Out of the box, this MIDI/Analog sequencer is factory preset to behave like a traditional analog sequencer. A traditional sequencer continuously plays note pitches from a row of knobs representing the steps of a musical sequence.

The MIDI/Analog Performance Sequencer has many such sequences. They are preset to infinite loop on *Single* trigger mode: upon a MIDI note or panel key trigger press, a sequence will loop indefinitely until the next trigger is received, whereupon a new sequence will begin to play at the end of the last sequence's loop. Note that only one sequence can play at a time in this mode.

The MIDI/Analog Performance Sequencer however, goes far beyond the traditional. The key to the power of Signal Arts MIDI/Analog Performance Sequencer is its trigger modes, which allow multiple, simultaneous, virtual sequence generation. To make the most exciting use of this sequencer explore these trigger modes! To do this, refer to the *Programming* chapter, *TRIGGER Mode*.

MIDI Factory Pre-Configuration

Global and base MIDI channel parameters are all set to 1 except for the *MIDI SlewBaseChan*. *SlewBaseChan* is set to enable MIDI portamento and disable slew employing MIDI pitch bend.

All sequences will output to MIDI channel 1, on MIDI OUT1. All sequences will also output to the analog CV output ports.

The trigger keys are set so that panel keys 1-8 will trigger bank sequences 1-8. The trigger channels are set so that MIDI channels 1-8 note events will trigger bank sequences 1-8.

Sequence controller events are set to send MIDI Modulation Controller events, one per step.

All trigger times are set to lock-sync. Refer to the *Programming* chapter, *TrigSync* and *BarSync* to learn how individual sequences may be played in free-time or lock-sync.

Analog Factory Pre-Configuration

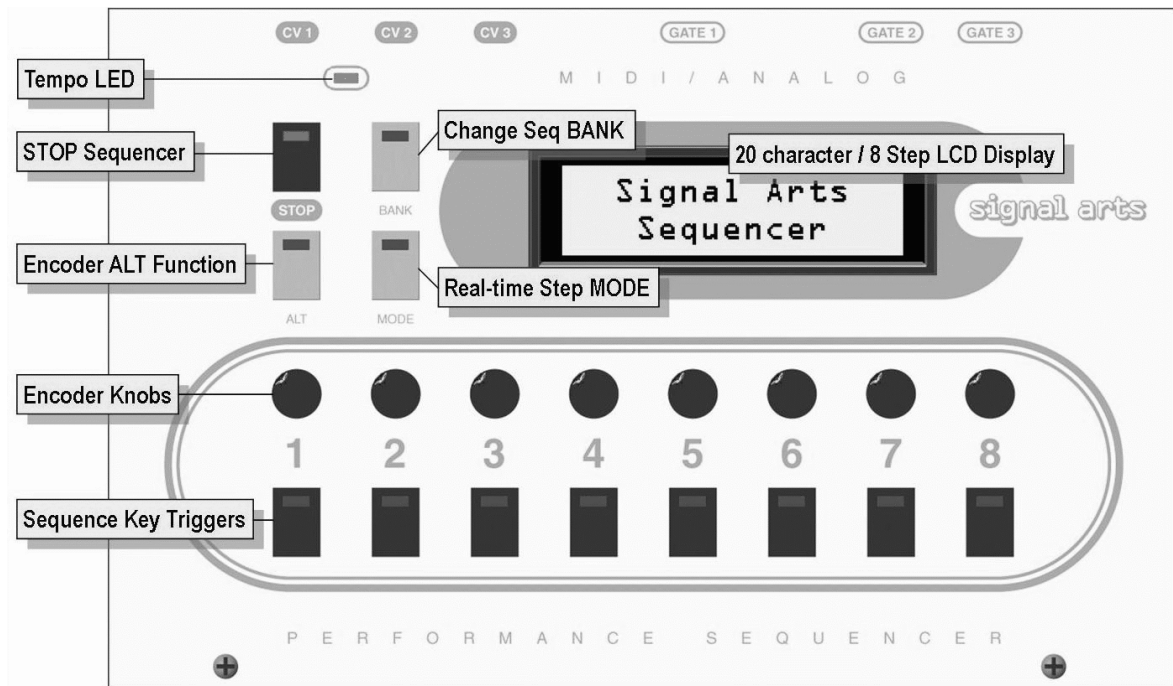
Three analog control voltage (CV) outputs and their associated GATEs are located on the rear panel. A CV port is defined as a CV and GATE output pair or a grouping of more than one CV/GATE output pairs. The CV ports are factory-configured as *mono vel mod* : CV1 note, CV2 note velocity and CV3 modulation controller.

These ports correspond to a sequence set to channel number 1. That sequence will output its note, velocity, and controller values to the analog CV outputs when triggered.

The following table illustrates how the analog ports are factory-configured. A trigger event causes a sequence to play, the output of which drives the CV port.

Trigger	Seq 1 Step Mode	CV Ports
Panel Key 1 OR a note on MIDI channel 1	- SC - Note	CV1, GATE1
note s velocity	VL - Velocity	CV2, GATE2
modulation controller on MIDI channel 1	CT - Controller	CV3, GATE3
	SL - Slew Rate	CV1
porta mento tim e contr oller on MIDI channel 1		CV1, CV2, CV3

Front Panel Sequencer Controls



Tempo LED

The tempo LED indicates beats per minute tempo.

It flashes green when activity is being output to the CV ports or when recognized MIDI data is received from the MIDI IN. The LED flashes amber when activity over-flow or any other error condition occurs.

Encoder Knobs

The encoder knobs change variable parameters in the sequencer.

An encoder is a dial which may be changed continuously in either direction. This means that an encoder can make relative changes to the value represented. While in performance, the **MODE** button selects the different step parameters which the encoders may act on.

STOP

The **STOP** button halts the sequencer.

Press it momentarily to stop sequences. Hold **STOP** for a few seconds, or hold **STOP** and press **BANK** to clear all activity. This sends MIDI All Notes Off and All Controller Reset message commands to both MIDI outs. Use this in a panic situation to cancel hung notes, reset controllers and reset the clock down-beat.

The **ALT-STOP** button combination stops all running sequences which were NOT triggered from the current bank.

BANK

The **BANK** button advances to the next bank of sequences. Use the button combination **ALT-BANK** to go to the previous bank.

Letters A to X represent one of 24 banks of 8 sequences each. Banks may be advanced remotely by the FOOT SWITCH input or MIDI controller commands. (See *MIDI Use*)

ALternate Encoder Functions

Pressing the **ALT** button changes the function of the encoders while the **ALT** button is held. The following alternate functions are then displayed:



ALT Prg Disply Tempo
A01 v Mode Seq# 120

There are five encoder alternate functions: **Program**, **Mode**, **Display**, **Sequence#** and **Tempo**. Remember to hold the **ALT** button until the desired function is selected.

Prg

Encoder 1 enters the programming mode and selects the program menu page. To exit program mode, press **STOP** or **ALT**. **ALT** will exit program mode without stopping sequences. Saving data automatically exits program mode as well. Sequences will still trigger while in program mode.

Mode

Encoder 2 is a short-cut for the **MODE** button which selects one of eight real-time step modes. See *Step Modes and Global Tempo* for detail.

Disply

Encoder 3 selects the display for step modes. There are six different display formats and combinations of displays for step values. Note pitch may be displayed as a bar graphic, keyboard letter accidentals, or MIDI numbers. Other step parameters may be displayed as numbers or bar graphics.

Seq#

The active sequence is normally the displayed sequence. Encoder 4 selects another bank and encoder 5 selects another bank sequence for display until a new sequence trigger.

Tempo

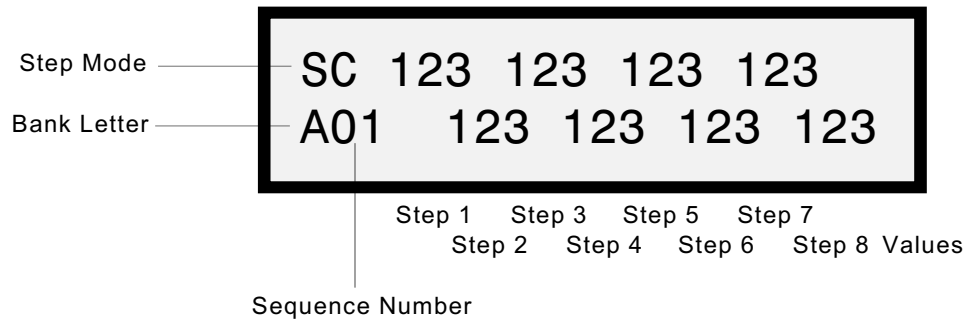
Encoders 7 or 8 set the bank tempo. However, changing the global tempo over-rides individual bank tempos.

ALternate Key Trigger Function

Pressing a trigger key while holding the **ALT** button stops all sequences which were triggered in the current bank, from that key. (This feature is available on revision C hardware only.)

Step Modes and Global Tempo

LCD Real-time Step Display



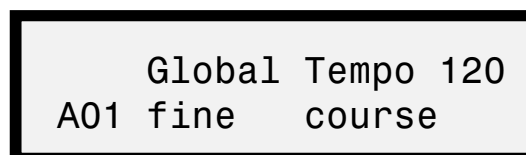
The **MODE** button selects one of nine modes. Eight are step modes with the remaining mode being *Global Tempo*. Each step mode represents one (vertical) parameter of a sequencer step. All step mode parameters may be accessed in real-time by the encoders. The following prefix characters indicate these step modes:

- S C** Note and Scale defined as a MIDI keyboard note pitch. Select notes chromatically or force to a scale value in SC mode.
- DT** Detune each step is tuneable to 1/32nd (3.125 cents) of a semi-tone.
- VL** Velocity a control output associated with the note.
- CT** An additional control output defined as a MIDI controller number. The step value is the MIDI controller number's value. This output may be disabled in the program menu.
- SD ND** Two step modes are given to duration times defined as step values:
SD - Step Duration and *ND* - Note Duration.

The duration values range from off (step and/or note skip) to dotted whole note. These two durations are independent of each other but the note duration follows the step duration value set. **Therefore a note duration must be set AFTER its step duration when you want to keep the note duration independent of the step duration.**

- SL** Per-step note slew pitch-glides note pitches from one step to the next. This is also known as portamento. The rate may be set from 0 (no slew) to 15.

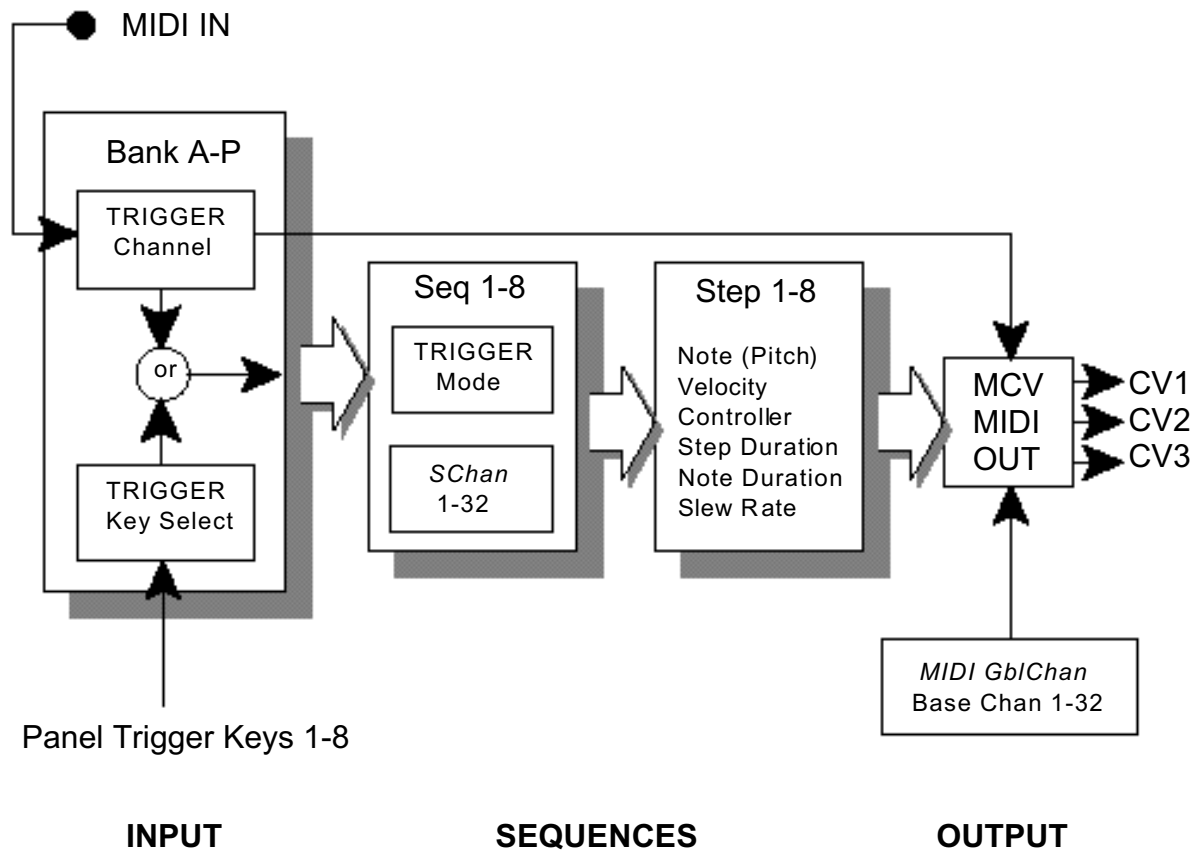
Global Tempo



Global tempo is selected by the mode button. Tempo is in beats per minute which can be adjusted in fine or course increments. When the global tempo is changed, all of the bank tempos are made uniform to the global tempo.

Overview How the Sequencer Works

Block Architecture



Banks

At the core of the MIDI/Analog Performance Sequencer is a matrix of sequencer step note parameters. These sequence steps are organized into 24 banks of 8 sequences of 8 steps of 7 parameters each. Each bank is given a letter name, A to X and contains sequences, numbers 1 to 8. Each sequence step is represented by the numbers 1 to 8 on the sequencer panel, and controlled by the associated encoder knob.

Multiple virtual sequences exist over and above this matrix! Multiple sequences within the current bank may be played or triggered by the sequencer panel keys or by MIDI IN note events.

Input

There are two sources of sequence triggers. Sequences may be triggered by the front panel trigger keys or by external MIDI note events.

These triggers are sent to the bank's trigger parameter block. The bank trigger parameters determine the trigger source for each sequence. *TRIGGER Key* parameters assign sequences to panel key triggers, *TRIGGER Channel* parameters assign sequences to MIDI channel triggers and *TRIGGER Note* parameters assign sequences to MIDI note numbers. See *Programming* chapter,

TRIGGERS.

Each sequence carries the unique properties of its trigger. A sequence triggered by a MIDI note will inherit, or track, the MIDI note properties such as note transposition, velocity and time duration (*DurationFollow* trigger mode). Re-triggering the same sequence can generate many sequences at the same time, all with different properties, depending on the sequence's trigger mode!

Sequences

Each sequence has its own trigger mode which determines its response to a trigger. These powerful modes are detailed in the *Programming* chapter, *TRIGGER Mode*.

The display screen normally reflects the step values of the current bank's last triggered sequence. These steps may then be altered by the corresponding encoder knobs 1-8. The steps have one of eight parameter values displayed, as determined by the **MODE** button.

Each sequence has a MIDI output channel, *SChan*. This channel parameter is critical: it directs a sequence's output to the desired MIDI channel and to the sequencer's analog outputs.

Output

Sequence data is sent on its output channel *SChan*, to the MIDI outputs as well as to the internal MIDI to Control Voltage converter (MCV). The sequencer data is then sent to the analog port(s) whose MCV configuration channel is aligned with the sequence's *SChan*. This channel alignment is determined by the sequence *SChan* value and the *GblChan* base channel value. See *MIDI Use - MIDI Channels* for details.

Analog outputs CV1, CV2, CV3 and their respective GATEs, then output the appropriate control voltages.

The MCV may be used independently of the sequencer since it also receives data from MIDI IN.

MIDI USE

The MIDI/Analog Performance Sequencer is a powerful MIDI performance tool. Unlike traditional computer or stand-alone sequence boxes which regurgitate pre-composed MIDI tracks, the MIDI/Analog Performance Sequencer is designed to interact with its performer in real-time. This sequencer is capable of creating spontaneous musical flow using simple techniques. Get ready to create the simplest or most complex pieces yet!

MIDI Ports

The sequencer has one MIDI input and two MIDI output ports.

MIDI IN

The MIDI IN port receives and uses MIDI messages from other sequencers, computers, or MIDI keyboard controllers to trigger sequences. These messages are then fed to the internal MCV so that the CV ports may also be driven directly by MIDI and used independently of the sequencer.

MIDI OUTs

The two output ports are MIDI OUT 1 and 2 which send generated sequence information. MIDI OUT1 also sends user data MIDI file dump messages.

MIDI OUT2 doubles as a MIDI THRU port which echos the MIDI IN information to its output. The function of MIDI port 2 is set by the MIDI OUT2 / THRU slide switch on the rear of the sequencer. There are 16 MIDI channels per MIDI port. When MIDI port 2 is set to MIDI OUT2, the sequencer makes available 32 MIDI output channels. MIDI OUT2 also passes certain MIDI in messages received but not used by the sequencer or its MCV.

MIDI Input Control

MIDI Triggers

Sequences may be triggered by external MIDI note events as well as the front panel keys.

Each sequence carries the properties of its trigger. A sequence triggered by a MIDI note will inherit, or track, the MIDI note properties. This means that the triggered sequence will take the note pitch as a sequence transposition and its velocity as a sequence velocity offset. For the *DurationFollow* trigger mode, a sequence will also inherit the note duration of the MIDI note. This is the length of time the trigger note is held on. These properties are also propagated to linked sequences.

The order in which MIDI in data is processed is important. Received messages are directed to the bank's trigger parameter block. The *TRIGGER Channel* parameters determine the sequence(s) triggered by the message. When no sequence is assigned to the trigger message, the message is passed to the MCV. MIDI note messages are passed to MIDI OUT2 when there is no MCV matching note event found. MIDI controller messages are passed to MIDI OUT2 regardless.

MIDI Remote Control

The *GblChan* parameter acts as the sequencer global MIDI channel. This special channel receives MIDI messages which act globally on the sequencer.

MIDI program change and controller numbers received on the global channel may be used to change sequencer banks, sequence numbers, and encoder step values. An external foot switch plugged into the FOOT SWITCH input will also remotely advance sequencer banks.

MIDI messages and their function are detailed below:

MIDI Command	Ctl #	Ctl Values	Function
bank lsb controller	32	0..23	bank letters A..X
program change	n/a	0..7	sequences 1..8
NRPN lsb controller	98	0..7	sequence steps 1..8
data inc controller	96	0	encoder value +1
data dec controller	97	0	encoder value -1
NRPN lsb controller	98	127 (>7)	7F NULL terminates inc / dec action

Other MIDI controllers such as Sustain, Portamento Time and Portamento Switch are received on MCV note channels.

MIDI Channels

The sequencer is configured using MIDI channel numbers. The sequencer has four channel parameters which are accessed in the programming menus.

SEQ SChan

Sequencer *SChan* is a sequence's output MIDI channel. Sequence step values will output on this MIDI channel.

TRIGGER Channels

These are the sequence's trigger receive MIDI channels. A *TRIGGER Channel* is the MIDI channel on which a specific sequence will receive its trigger. Each of the eight sequences in a bank may be triggered by a different MIDI channel note.

MIDI GblChan

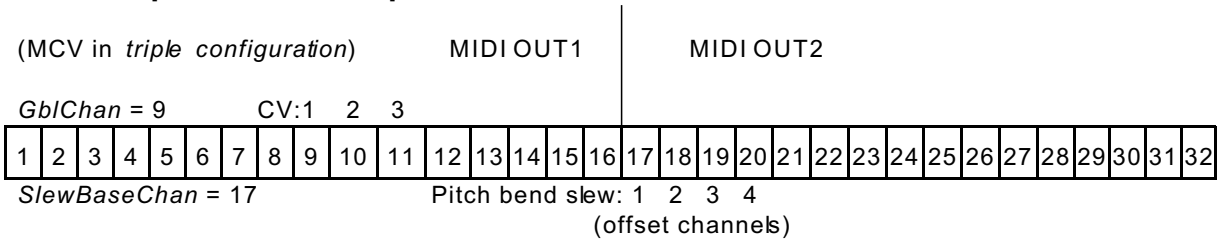
GblChan is a base channel offset. *GblChan* positions the MCV in the sequencer's channel map space, channels 1 through 16. This allows the MCV to receive sequencer data or external MIDI IN messages in the channel space that it occupies. The MCV has up to three receive channel offsets, added to the *GblChan* base. (See *Programming* chapter, *MCV CVout Configuration*)

MIDI SlewBaseChan

The *SlewBaseChan* is also a base channel offset. The *SlewBaseChan* positions MIDI pitch bend slew channels in the sequencer's 32 channel map space. This enables the use of either MIDI pitch bend or MIDI portamento commands for step MIDI slew. MIDI pitch bend slew uses four offset channels, added to the *SlewBaseChan* base. (See *Programming* chapter, *MIDI Pitch Bend Slew*)

The following illustrates an example channel configuration:

MIDI Output Channel Map



ANALOG USE

The Signal Arts Sequencer has an internal MIDI to Control Voltage (MCV) converter with three analog Control Voltage (CV) and associated GATE outputs. This gives the MIDI/Analog Performance Sequencer superior analog synthesizer voice control and features typically found only in stand-alone MIDI to CV converters.

The MCV receives messages from the MIDI IN and from the internal sequences. Therefore the MCV may be used independently, or in combination with sequences. This is configured by the *GblChan* channel parameter. (See the previous section, *MIDI Use* *MIDI Channels*)

Analog Ports

The MCV has a programable output port configuration. One of eight presets are available under the programming menu *CVout Configuration*. This preset determines what appears at the CV and GATE outputs of the sequencer.

Out of the box, the sequencer CV ports are factory-configured as *mono vel mod*: CV1 monophonic note (on MIDI channel 1), CV2 note velocity, CV3 modulation. For this configuration, sequences with *SChan* set to 1 will output their note, velocity and controller values to these ports. As you review the *Analog Factory-Configuration*, note that triggering more than one sequence on the same channel will create modulating patterns on the CV outputs!

CV Outputs

A Control Voltage (CV) determines the pitch of an analog synthesizer's oscillator. Connect the sequencer's CV output to the control voltage input of your analog synth using a 1/4 inch phone plug.

The CV outputs may be programmed as either Volts per Octave or Volts per Hertz under the *Cvscale* program menu. To interface to a Korg or Yamaha analog synthesizer, you may need to set the CV scale to *V/Hz*. Most other synths require a *V/Oc* setting.

CV outputs configured for use as controllers, for example velocity or controller value, should be set to *V/Oc*. You can connect these CV modulation outputs to analog synth modulation input points such as filter cut-off. **Note that sequences make flexible LFO modulators.**

Gate Outputs

A gate provides the signal which triggers your analog synthesizer's envelope generator. Without a gate there will be no note articulation. Connect the sequencer's GATE output to the gate input of your analog synth using a 1/4 inch phone plug.

Gate outputs 1 and 2 are switchable from either a normal (positive) gate or a Moog S-trig (open-collector, inverted) type. This is done by the two slide switches on the rear panel marked S-TRIG / NORMAL. Unless you are interfacing to a Moog synth, the switch(es) would ordinarily be left in the NORMAL position. Switch position (and gate polarity) takes effect upon power-up. The sequencer should be off to change the switch position, and then powered on.

The sequencer's gate outputs also respond to controller values. When the CV port is being used as a controller output, its gate will turn off for controller values 0-63 and on for values 64-127.

Typical analog synth gate inputs have a wide voltage tolerance as long as sufficient current is present. If your synth requires a higher gate current, the internal gate pull-up resistor values may be changed. This is done by adding header jumpers for the required gate(s) inside the sequencer. Please contact the manufacturer if this is required. Low voltage gates may be selected by changing JP7 jumper to the 5V position. This jumper is located on the main circuit board near to the ANALOG connector.

Sync Output

SYNC is an analog drum (din) sync output which interfaces to analog drum machines.

The drum sync 5-pin DIN-jack output has these control signals: pin 1 control, pin 2 ground, and pin 3 clock. When the sequencer is slaved to MIDI clock, MIDI IN system real-time commands will drive these signals directly. MIDI Clocks, defined as 24 pulses per quarter-note (ppq), drive the clock signal. MIDI Start and Continue commands set the control line to high, and MIDI Stop resets it.

(Drum Sync is not available on the Modcan modular Signal Arts Sequencer.)

Analog Clock

The CLOCK port is a tip/ring/sleeve (TRS) stereo jack. The TRS tip is clock out and the ring is clock in. Sleeve is common ground. Clock in may be accessed by using a stereo plug or insert cable which separates the tip and ring signal paths into two mono plugs.

Clock In

The CLOCK in port slaves on the positive-edge of an analog clock signal. The MIDI/Analog Performance Sequencer will slave to external clocks at a rate of either 4ppq or 24ppq. External clock source and time resolution is programmed in the *CLOCK Source* program menu.

Note that low ppqs have less duration and time resolution, causing smaller note and dotted time values to disappear.

You may need to synchronize the down-beat when slaving the sequencer to an external analog or MIDI clock. This is done by halting the external clock and then pressing **STOP - BANK** (panic reset). At panic reset, the sequencer resets the tempo down beat so that the next clock pulse will be taken as the down-beat pulse.

Clock Out

The sequencer outputs a clock pulse when a sequence is running. The CLOCK jack tip sends one clock pulse for every sequencer step at a rate of 2ppq.

CLOCK will output a (high-speed) 48ppq continuous clock train when the JP17 jumper is changed to the CLKHI position. JP17 is located on the main circuit board near to the ANALOG connector.

Pedal/CV Input

This input serves as an additional modulation source. Its function is programmed in the *CVin* program menu. This is a tip/ring/sleeve (TRS) stereo jack which accommodates a generic foot expression (potentiometer-type) pedal. Alternatively, an external control voltage from 0 to 5.7 volts, may be input to the tip of the TRS jack through either a mono or stereo phone plug.

PROGRAMMING

Overview

Knowing how to program the MIDI/Analog Performance Sequencer will give you control over the major architectural components previously described. This chapter is divided into four sections:

Sequencer

These menu pages give you individual control of each sequence for looping, linking, synchronization and sequence mode. This is also where you select the all-important trigger mode for each sequence.

Bank

The bank menu pages give you control over what triggers your sequences.

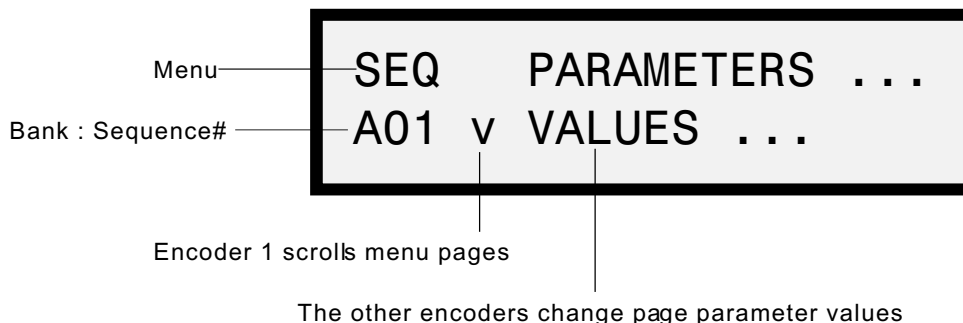
MIDI to CV Converter

The MCV menu pages configure the analog ports for the sequencer, critical in properly interfacing analog synthesizers.

Global

While the MCV parameters are also global, these menu pages include tempo clock interface and sequencer data management. Sequencer data is exchanged using MIDI file dump messages, detailed at the end of this chapter.

LCD Program Display



The bank and sequence number you will be programming is the current bank and sequence displayed, upon entering programming mode.

Programming mode is entered by holding **ALT** and then turning encoder number 1. This encoder scrolls through the menu pages. The above *LCD Program Display* is the generic display format for a program menu page.

Sequence

This is the first program menu page. Sequence parameters apply to the current sequence number upon entering this mode. There are three basic sequence parameters: Play, Link and the Sequence Channel.

SEQ	Play	Link	SChan
A01	v 128	B:02	03

Play

Play is the number of times a sequence plays, looping upon itself. A sequence may play to a maximum of 252 times. Link the sequence to itself to create an infinite loop.

Link

Link is the bank sequence number which follows the current sequence after all of its loops finish, thus linking the current sequence to another. Link may be turned off.

SChan

This is the MIDI channel on which sequence data is sent. There are 32 channels in all. Channels 1-16 output to MIDI OUT1 and channels 17-32 output to MIDI OUT2.

SEQ	Scale	Root
A01	v octave	C

Scale

This menu selects the musical scale to which the sequence notes are programmed. Step notes are programmed by chromatic selection in the Note step mode. In the SC - *scale* step mode, programmed note values follow the selected scale values.

The scale selection is either *octave* or a numbered scale. Fifty of the most common scales are available. See appendix B for a listing of the numbered scales.

The selected *Root* is the key signature of the given scale. Once established, all following step changes will follow in the new key.

Changing the scale or root does not affect current step values. Therefore additional scale combinations may be created by changing the scale and/or root in-between setting other step notes. Changing the root key in the midst of setting sequence notes for example, would create a bi-tonal scale.

SEQ Controller # A01 v modulation 01
--

Controller#

The controller number selects the MIDI output controller number for the steps of the sequence. MIDI controller output may be disabled by turning *Controller #* off.

Controller numbers from 0 to 99 may be selected. Encoder 2 selects controllers from a predefined list of common controller numbers. Encoder 8 selects a controller by number which is displayed as *Number* -> controller number xx.

The individual step MIDI controller number **values** are changed in the performance *CT* step mode.

The following lists the predefined controller numbers and options:

off disable sequencer *CT* MIDI controller output

Common MIDI Controller Numbers:

- 1 modulation
- 2 breath
- 4 foot
- 7 volume
- 11 expression
- 12 effect control 1
- 13 effect control 2
- 70 sound controller 1 - sound variation
- 71 sound controller 2 - timbre/harmonic content
- 72 sound controller 3 - release time
- 73 sound controller 4 - attack time
- 74 sound controller 5 - brightness
- 75 sound controller 6 - undefined
- 76 sound controller 7 - undefined
- 77 sound controller 8 - undefined
- 16 general purpose 1
- 17 general purpose 2
- 18 general purpose 3
- 19 general purpose 4
- 80 general purpose 5
- 81 general purpose 6
- 82 general purpose 7
- 83 general purpose 8
- 91 effects 1 (external effects depth)
- 92 effects 2 (tremolo depth)
- 93 effects 3 (chorus depth)
- 94 effects 4 (detune/celeste depth)
- 95 effects 5 (phaser depth)

SEQmod	Source	Dest
A01 v	on	08

Modulation

Recursive and sequence cross-modulation is possible with the Signal Arts Performance Sequencer. Sequence modulation is one or more sequences modifying the output of one or more (other) sequences. Sequence recursion is one sequence modifying both itself and a second sequence, providing the output.

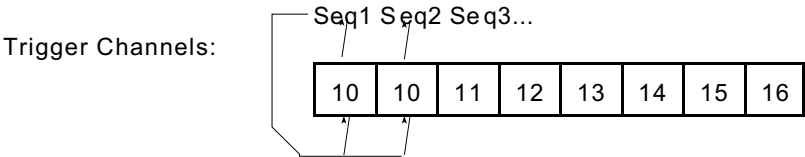
Multiple modulation routes are made by the use of *TRIGGER Channels*. Briefly, each bank has its own trigger channel set, one trigger channel parameter per sequence, 1 through 8. The trigger channel determines the (MIDI) channel on which the respective current bank sequence will receive. This trigger channel receives MIDI note triggers, MIDI modulation controllers and sequence modulators. See *TRIGGER Channels* menu.

A sequence becomes a modulator when you select *SEQmod Dest* equal to any trigger channel number 1 through 16. When a sequence modulation destination is set to "00", the current sequence outputs as usual and does not modulate anything. A sequence whose modulation destination is greater than one will **Not** output any MIDI information. Such a sequence is dedicated as a modulation source on the trigger channel it is set to. *SEQmod Source* enables the current sequence to be modulated by modulation information received on its trigger channel. Set *Source* to *on* to enable modulation from a source.

The following example demonstrates how a recursive sequence patch might be programmed:

Seq 1 *mod Source* = on; *mod Dest* = 10

Seq 2 *mod Source* = on; *mod Dest* = 00 (Seq 2 outputs MIDI)



The modulator sequence step mode values (except slew) then modulate the corresponding values in the modulated sequence. Nominal step mode values have no modulation effect. The nominal step values are: Note=Middle-C5, DT=0, VL=64, CT=0, ND=8.

When using modulation, sequences must not be set to *single trigger mode*. Single trigger mode prevents the modulator and modulated sequences from playing simultaneously. Also remember that a sequence with *SEQmod Dest* greater than zero does not output MIDI.

Sequences also receive modulation input from MIDI IN foot controller (MIDI controller 4) messages and CVin, received on the corresponding trigger channel. See *CVin Modulation* on how to assign the channel and step parameters to the foot controller. This allows sequences to be modulated by external controllers.

For advanced use: The nominal step mode values produce no modulation and may therefore be used as step null modulators. In other words, use these step parameter values when no modulation is desired on a per-step parameter basis. Also note that when more than one sequence modifies a single sequence, the modulation values are the algebraic difference of all the modifying sequence outputs.

SEQ	Mode
A01	v Normal

Mode

The sequence *Mode* determines the sequence step direction. Forward step direction is *Normal*. *RandomStep* plays the sequence steps in a random order. Note that the use of random step mode conflicts with *DurationFollow* trigger mode. (See *DurationFollow*) The *Brownian* mode randomly advances the step either forward, neutral or backward. CVinStep mode translates an external CV input level into a step position; lowest value equal to step one and highest value equal to step eight.

Pendulum mode reverses sequence direction at the end of its loop. *PendulumRepeat* reverses sequence direction and repeats the end steps. Linked sequences inherit the former direction of the previous sequence. Therefore, asymmetric patterns are created by linking multiple sequences with differing loop values. **Note that single sequences must have *Play* loops set to more than 1 for pendulum mode to take effect.**

SEQ	TrigSync	BarSync
A01	v off	off

TrigSync

Trigger sync turned on synchronizes triggers to the tempo beat. When trigger sync is off sequences will trigger in free-time. MIDI echo may be created using fast repeated triggers, with trig sync off, for example.

BarSync

Bar sync on forces a sequencer loop to align itself on bar-beat divisions.

This feature ensures a constant bar time while changing real-time duration values, by subtracting the time difference required for an even bar from the last step duration. With bar sync off, a sequencer loop time is the sum of all eight step durations. **Complex sequencer poly-rhythms are created with bar sync off.**

TRIGGER Mode

The Performance Sequencer has various modes for triggering sequences. Sequence triggers may come from the front panel button keys or from external MIDI notes. Sequences which are triggered by MIDI notes will inherit the properties of the note such as pitch, velocity, and note duration (*DurationFollow*).

SEQ	TRIGGER Mode
A01	v DurationFollow

The following page describes each trigger mode.

Multiple

A sequence fires for each and every trigger event received. Each sequence iteration may have its own uniquely modified values. Critical to unleashing the power of this sequencer!

Single

Single trigger mode plays a sequence in the traditional style of sequencing. Upon a trigger event, a new sequence will replace the current sequence at the end of the current sequence's bar loop. Only one sequence plays at a time. Successive triggers will not trigger a new sequence until the current sequence bar loop has finished.

DurationFollow

Sequence step note durations follow the duration of the trigger (note or key button) being held, until released.

Do not to use *DurationFollow* trigger mode with *RandomStep* sequence mode. This will cause hung notes since random step note offs cannot track random step note ons.

LoopHold

A sequence loops until the trigger (note or key button) is released, for up to *Play* number of times. Sequence *Play* must be set to more than 1 loops for loop hold to take effect.

This trigger mode will not work for an infinite link loop (a sequencer linked to itself). You must set *Play* to a large number, 200 for example.

RunStop

A sequence fires on the first trigger and is stopped, on the second and same trigger.

SeqReset

A sequence fires on the first trigger and is reset to the first step, on the second and same trigger.

Release

A sequence fires on a trigger and a second sequence fires on the trigger's release. The second sequence is the next adjacent sequence number.

For example: if sequence 8 is triggered it will roll-over and fire sequence 1 on the trigger's release. This feature is useful for creating an envelope generator or other two-stage events.

StepPlay

Each step of the sequence is played, one per trigger.

StepRecord

The Step record modes provide a way for trigger events to program sequence values. MIDI note triggers successively set step pitches. **To quickly clear sequence steps, use the panel key trigger to fill steps with middle C and nominal step values.**

StepRandomize

Either MIDI notes or panel key triggers program successive steps with random values.

Bank

Bank menu pages select the trigger source for bank sequences 1 to 8. There are two trigger sources: panel trigger keys and MIDI IN channel note messages. Two menu pages cover sequences 1-4 and 5-8 for each *TRIGGER* parameter menu.

TRIGGER Keys					1 - 4
BNK	v	1	3	4	5

TRIGGER Keys

Set sequence to trigger from panel key number n. Each bank sequence may be triggered by any panel key or by none when set to 0".

In the above *TRIGGER Keys* example display, 1 3 4 5 refers to sequences 1 to 4, respectively. When the first trigger key entry is changed from 1 to 2 for example, sequence 1 will now be triggered from panel key 2. (**Not** panel key 1 triggers sequence 2.) **In this way multiple sequences may be triggered in parallel or polyphonically by a single panel key.**

TRIGGER Channels					1 - 4
BNK	v	01	02	04	04

TRIGGER Channels

Set the sequence trigger MIDI channel number nn. Each bank sequence may be triggered by a note on a MIDI channel or not when set to 00".

In the above *TRIGGER Channels* example display, sequences 3 and 4 will be triggered by any note event received on MIDI channel 4.

Certain MIDI controller numbers used for sequence modulation are also received on these MIDI channels. See *Modulation* for detail.

TRIGGER Notes					1 - 4
BNK	C#5	D#5	E5	F5	

TRIGGER Notes

Set sequence to trigger from MIDI note number nnn.

When *TRIGGER Note* is set to off, **any** MIDI note received on the corresponding trigger channel will trigger a sequence transposed by the received note value. When *TRIGGER Note* is set to a note value, a sequence will trigger on **only** this trigger note, MIDI note value. The sequence plays with no transposition. Velocity and other sequence parameters still track the trigger note's values.

MIDI to CV Converter

The MIDI/Analog Sequencer has an internal MIDI to Control Voltage (MCV) converter which drives the three analog Control Voltage (CV) output ports. The MCV receives data from MIDI IN and internally, from triggered sequences. MCV parameters are global to the entire sequencer. The following menu pages detail the MCV's configuration.

MIDI GblChan Trans
MCV v 09 -12

MIDI GblChan

GblChan is the sequencer's global MIDI channel. This is the MIDI channel which receives special use MIDI controller and program change messages. (See *MIDI Use* chapter, *Remote MIDI Control*)

This MIDI channel also acts as the base channel offset for the MIDI to CV converter. The MCV's MIDI receive channels may be mapped to any MIDI channel space up to channel 16. The preset channel offset(s) in the selected *CVout* configuration are added to the *GblChan* base channel number, yielding the actual MCV receive channel(s). This enables the MCV to receive sequences with the equivalent sequencer *SChan(s)* or external MIDI IN messages on the same channel(s). See *CVout Configuration* and chapter *MIDI Use - MIDI Channels*.

MIDI Trans

The MIDI to CV converter's note pitch(es) may be transposed by this parameter.

CVout Configuration

MCV v mono vel mod

CVout Configuration

This menu page configures the CV and Gate output port function according to the following table:

Configuration	CV 1	CV 2	CV 3
mono vel mod	Note, channel 1	Note Velocity	Modulation Controller
mono vel mono	Note, channel 1	Note one Velocity	Note, channel 2
duo mod (polyphonic)	Note, channel 1	Note, channel 1	Modulation Controller
dual mod	Note, channel 1	Note, channel 2	Modulation Controller
trio (polyphonic)	Note, channel 1	Note, channel 1	Note, channel 1
triple	Note, channel 1	Note, channel 2	Note, channel 3
mod breath exp	Modulation Controller	Breath Controller	Expression Controller
mod1 mod2 mod3	Modulation, channel 1	Modulation, channel 2	Modulation, channel 3

Note that channel is the MIDI channel number offset -1, added to *Gb/Chan*. MIDI controllers are on channel offset 1, unless specified otherwise.

CVscale 1 2 3

MCV v V/Oc V/Oc V/Oc

CVscale

Sequencer CV outputs may be scaled to either Volts per Octave or Volts per Hertz.

Most analog synths have exponential oscillators which require a volts per octave control voltage. The hertz per volt scaling allows analog synths with linear oscillators to be driven by the sequencer's MCV. For example, Korg and Yamaha synths typically require a hertz per volt control voltage.

MCV Mode parameters set the rules which govern dynamic note allocation to the CV ports.

<pre>MODE Trigger Note MCV v retrigger last</pre>
--

MODE Trigger

Re-trigger (*retrigger*) is a legato control applied to monophonic CV ports. Re-trigger functions as a note recycle when applied to polyphonic CV ports. (CV port mono/poly assignment is preset by the CV out configuration.)

When re-trigger is on, the last note played on a monophonic channel, replacing a note already playing, will re-trigger the gate output. When re-trigger is off (*noretrigger*), the last note played will not re-trigger and the gate remains on.

When the CV port is configured for polyphonic note assignment, re-trigger functions as *recycle*. With no recycle (*noretrigger*), the last note received will be assigned to the next port available in sequential order. With recycle on (*retrigger*), the last note will be assigned to any port which is playing, or has already played the same note; otherwise note assignment follows *no recycle* rules. When all ports are used (*retrigger* or *noretrigger*), the last note will steal from the lowest priority one.

MODE Note

Low, High and Last modes determine note priority.

Depending on the note mode, either the lowest, highest, or last note played takes priority over other notes playing. Therefore last note mode is a time priority and low and high note modes are position priority. Notes which are cancelled by a higher priority note are stored in a buffer up to 8 notes deep. When the higher priority note is released, the displaced note will be re-played again, but without a gate re-trigger.

When the CV port is polyphonic and single note pitch-bend is on, MIDI pitch bend will only bend the highest priority note, as determined by the note mode. (See *PITCH BendMode*)

SLEW	Rate	Scale
MCV v	6	exp

SLEW Rate

This is the slew rate given to CV ports.

This is the slew rate in effect for received MIDI IN messages. Instantaneous sequencer step slew rate values assigned to a CV note port, will over-ride this slew rate value. A CV note port slew rate may also be changed by a MIDI IN portamento time controller message.

SLEW Scale

Slew response may be exponential or linear. In an exponential response, the pitch-glide **time** between any two notes is constant. In a linear response, the pitch-glide **rate** between any two notes is constant.

PITCH	Bend	BendMode
MCV v	8	polybend

PITCH Bend

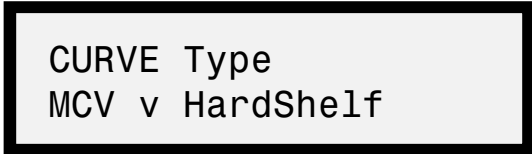
Pitch bend refers to pitch bend width and sets the MIDI pitch bend depth. This is set in semi-tones, from 1 to 12. The total pitch bend range encompasses positive and negative bend. For example: 12 = +/- one octave pitch bend maximum.

PITCH BendMode

Pitch bend mode applies to polyphonic CV ports.

polybend applies MIDI pitch bend normally, to all notes playing.

single pitch bend mode applies MIDI pitch bend only to the highest priority note playing. The note priority is determined by the *MODE Note* low, high, or last. The note being bent is then released from pitch bend control, once pitch bend has returned to zero again. **Thus, an individual note within a chord may be pitch bent.**



CURVE Type

This selects the curve translation applied to CV velocity and controller outputs. One of 16 pre-defined curves may be selected. Note that the curves may be inverted and/or scaled in the following menu page. These curves are illustrated in appendix C.

- | | |
|---------|-----------|
| Linear | SoftLog |
| Switch | MedLog |
| 16-Step | HardLog |
| 32-Step | Soft-Scrv |
| 64-Step | Hard-Scrv |
| SoftExp | SoftShelf |
| MedExp | HardShelf |
| HardExp | Cosine |



CURVE Invert

Curve Invert, inverts the selected translation curve as applied to CV velocity and controller outputs. When curve invert is off, the curve output is normal (as in appendix C) and when curve invert is on, the curve output is inverted. Inversion is useful for inverting the logical output of a (MIDI) controller value. This would allow you to create cross-fading control voltages, for example.

CURVE Scale

CV velocity and controller full-scale output are in the range 0 to ~10 volts. The curve output is scaled by half when set to 5volt, ranging from 0 to ~5 volts.

Global

The global program menus are functions common to all sequence banks.

```
MIDIin Chan Split1-2
GBL v    01    G4    C6
```

MIDI input on one channel may be divided into two or three zones defined by two MIDI keyboard note splits. This gives more control over sequence trigger assignment when a single MIDI channel keyboard is used for sequencer MIDI input.

MIDI input received on the selected *Chan*, may be re-channelled at two split points defined by note split points *Split 1* and *2*. These split points re-channel three MIDI key ranges as follows: keys up to *Split 1* remain the same; keys in-between both splits re-channel to *Chan +1*; keys above *Split 2* re-channel to *Chan +2*. *Split 2* also transposes notes which are above B5, one octave lower. Splits may be selected by the corresponding encoders or by playing a key from your MIDI keyboard.

Therefore, in the above *MIDIin* example display, MIDI notes C1 to F#4 received on MIDI channel one will be taken verbatim. Notes G4 to B6 will be taken as if received on MIDI channel two. Notes C6 to C9 will be taken as if received on MIDI channel three and transposed down one octave.

```
MIDI SlewBaseChan
GBL v      17
```

MIDI Pitch Bend Slew

MIDI SlewBaseChan is the MIDI slew base channel. This is different from the *GblChan* which is the MCV base channel.

The MIDI/Analog Performance Sequencer provides exponential and linear analog CV slew as well as MIDI slew. MIDI slew is accomplished by MIDI portamento or MIDI pitch bend commands. The sequencer step slew values will output either, as determined by the MIDI slew base channel number.

Most modern MIDI receivers will respond to MIDI portamento commands. If your receiver can do so, set the slew base chan to a channel greater than the sequences highest *SChan(s)* you are using. Step slew values greater than 0 will output MIDI portamento commands for each sequence not aligned with the slew base channel.

If your receiver does not respond to MIDI portamento, MIDI pitch bend may be used for pitch slew. To do this align the slew base channel space with the sequences *SChan(s)* you are using. The slew base channel will map MIDI pitch bend messages used for pitch slew to sequencer *SChan* MIDI output channels. The MIDI slew base has 4 channel offsets. Therefore, when slew base channel is 3, for example, sequences with *SChans* 3, 4, 5, or 6 will output MIDI pitch bend for slew. Your receiver should be set to maximum pitch bend sensitivity, usually +/- one octave.

MIDI pitch bend slew has limitations. Slew range is limited to the maximum pitch bend depth of your receiver. Pitch bend slew is restricted to 4 consecutive channels to limit MIDI congestion. MIDI pitch bend applies to all notes on one MIDI channel. Using pitch bend messages for slew does not allow the use of normal pitch-wheel bend on the slew designated MIDI channels.

CVin Function Chan
GBL v velocity 08

CVin Modulation

The PEDAL/CV INPUT port provides an analog input modulation source. This may be an external expression foot pedal or a control voltage input.

The *Function* determines which sequence step parameters are modified by this input. *Function* also assigns the MIDI IN foot controller number 4, to the same parameters. (The MIDI foot controller's MIDI channel is its *Chan* number.)

Chan is the channel number assigned to the *CVin*. This directs its modulation value to the corresponding bank trigger sequence channel(s). Refer to *Programming* chapter, *Modulation* for more detail.

CLOCK Source

Clock source is the tempo source for the sequencer. There are four clock source options.

CLOCK Source
GBL v internal 96ppq

internal

Select *internal* clock when using the sequencer by itself or as a master clock to sync other external devices.

When a sequence is running, the sequencer outputs MIDI clocks on MIDI OUT and analog clock pulses on the CLOCK output. MIDI clocks are defined as 24 pulses per quarter-note (ppq). An analog clock pulse is sent for every sequencer step which is a rate of 2ppq.

external

Select *external* to slave the sequencer to an external clock source.

Three pulse per quarter-note time resolutions are available. *external 24ppq* and *external 4ppq* are analog clock pulses received from the CLOCK input jack at these resolutions. *external midi* is MIDI clock received from MIDI IN at 24ppq. Note that lower ppqs have less duration and time resolution, causing smaller note and dotted time values to disappear.

DATA

Global Data refers to the management of sequencer data generated by the user. **Sequencer changes will be lost unless they are saved before turning the sequencer off.** To do this go to the *Save as Bank* menu page, select *All* and then *yes*.

```
DATA  Send / Receive
GBL v yes
```

Send / Receive

The MIDI/Analog Performance Sequencer is able to upload and download user data using non real-time universal system exclusive MIDI file dump messages. When the *Send-yes* encoder is turned, the sequencer sends its data as MIDI file dump messages on MIDI OUT 1.

While at this menu page, MIDI file dump receive is enabled. The sequencer can receive a data pack in the same format as was sent. (See *MIDI File Dump*) Received data will be temporary unless it is saved.

```
DATA  Copy Seq A:01
GBL v to B:01    yes
```

Copy Sequence

A sequence may be copied to another. The top line source sequence is the sequence in effect upon entering programming mode. Once the desired Copy to sequence is selected, the *yes* encoder makes the copy.

All sequence data and sequence program parameters are copied. Note this action cannot be undone, except by restoring the entire bank of eight sequences using *RestoreBank* **before** saving the bank. Copied sequences are temporary until their bank(s) are saved.

```
DATA  RestoreBank A?
GBL v yes
```

RestoreBank

Restore bank returns the current bank's eight sequences to their previously saved values. Turn encoder *yes* to restore the bank sequence values.

This may be used as an *undo* feature. See *Factory Data Reset* to restore the entire sequencer to its factory-configuration defaults.

DATA	Save as Bank
GBL v A	yes

Save as Bank

The current bank of sequences may be saved under the same, or other bank letter. Thus, *Save as Bank* may be used as a bank copy command. When *All* is selected, all the sequencer banks, sequences and global data are saved.

MIDI File Dump

The MIDI/Analog Performance Sequencer is able to exchange data via non real-time universal system exclusive MIDI file dump messages.

A device or computer program which supports this standard is required to do this. However, two or more Signal Arts sequencers can exchange their data with each other directly.

The non real-time system exclusive user data is comprised of two files: a small header file, followed by a larger data file. When sending data from the sequencer, your system exclusive MIDI utility should receive and save both of these files to be able to transmit them back into the sequencer.

To up-load user data into the sequencer, the sequencer must be in the program menu page *DATA Send / Receive*. Load the small header file first and the larger data file second.

Factory Data Reset

The entire sequencer user data may be reset to factory defaults (factory configuration) by holding **ALT** while the sequencer boots. This data reset is temporary until it is explicitly saved. Use *Save as Bank All* to do this.

Notes

APPENDIX

A OS Upgrade Procedure

By the use of MIDI file dump the Signal Arts sequencer's operating system (OS) is user upgradeable. All that is required is a device or computer program which supports the MIDI file dump standard and the OS file(s).

WARNING This procedure **MAY over-write sequencer user data**. Please refer to the OS revision documentation included with the OS file for details.

1. First turn the sequencer power off. Take precautions to avoid static discharge by first touching an electrically grounded metal power bar, water radiator, computer, or other grounded appliance before touching sequencer circuitry. Unscrew the eight black Phillips-head screws and remove the sequencer face from its bottom. Carefully turn the sequencer face up-side-down onto a soft surface.
2. On the jumper block JP19, move the red-handle jumper from the zero 0" (skipping D) to the T position. JP19 is found on the bottom left-hand corner of the main circuit board.
3. Turn the sequencer face up-right, being sure not to short the circuitry against anything underneath. Connect the sequencer's MIDI IN (and MIDI OUT1) to a computer MIDI port using MIDI cables. Connect the sequencer's power adapter. Now power the sequencer on with the power adapter plugged in. SA Monitor 00 should display on the LCD screen.
4. Using a computer sequencer or MIDI utility which supports (non-real-time) system exclusive MIDI file dumps, first upload the header sysex file SEQFDHDR.SYX into the Signal Arts sequencer. The display should then read, Loading file 1". Next load the OS file SEQvxx.SYX into the sequencer. Wait a few moments for the sequencer to load. Loading file 1 OK will display on the successful completion of an upload.
5. Turn the sequencer off.
6. Now turn the sequencer face over again and move the red jumper from T back to 0".
7. Turn the sequencer up-right and attach to its bottom.
8. Turn the sequencer on once more and observe that the newly installed OS boots ok. Getting to the real-time step display is proof of this.**
9. At this time new sequencer factory preset data may have been loaded, depending on the revision of the OS. If this is true then this new data must be saved. Saving all data is done in the programming menu page *DATA Save as Bank*. (See *Programming DATA*) In this page, turn encoder 2 clockwise all the way to display *Bank All*. Now turn the last encoder until *saving..* is displayed.

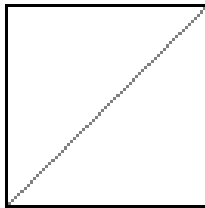
Please contact the manufacturer if you are experiencing difficulties with an upgrade. There are other methods available to upgrade the OS.

** If the Signal Arts Monitor displays boot error message numbers greater than 00, this indicates a problem. Boot error codes 01 or 02 are fatal. Please contact the manufacturer.

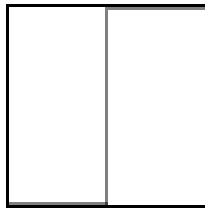
B Scales

Number	Type
octave C C C...	
1 C D E F G A B	Major
2 C D Eb F G A B	Melodic Minor
3 C Db Eb F G A B	Neopolitan Major
4 C Db E F G A B	Rag Arnand Bhairav
5 C Eb E F G A B	
6 C Db D F G A B	
7 C D Eb F# G A B	Lydian Diminished (Rag Madhuvanti)
8 C D E F# G A B	Lydian Mode
9 C D E F G A Bb	Mixolydian Mode
10 C D Eb F G A Bb	Dorian Mode
11 C Db Eb F G A Bb	
12 C Db E F G A Bb	Rag Ahir Bhairav
13 C Eb E F G A Bb	Bebop Minor (Hungarian Blues)
14 C Db D F G A Bb	
15 C D Eb F# G A Bb	Blues (Rag Madhukant)
16 C D E F# G A Bb	Overtone
17 C D E F G Ab Bb	Melodic Major Descending
18 C D Eb F G Ab Bb	Aeolian Mode
19 C Db Eb F G Ab Bb	Phrygian Mode
20 C Db E F G Ab Bb	Rag Basant
21 C Eb E F G Ab Bb	
22 C Db D F G Ab Bb	
23 C D Eb F# G Ab Bb	
24 C D E F# G Ab Bb	Lydian Minor
25 C D E F G Ab B	Harmonic Major
26 C D Eb F G Ab B	Harmonic Minor
27 C Db Eb F G Ab B	Neopolitan Minor
28 C Db E F G Ab B	Double Harmonic (Gypsy) Minor
29 C Eb E F G Ab B	Major Augmented
30 C Db D F G Ab B	Bhairav That
31 C D Eb F# G Ab B	Hungarian Minor
32 C D E F# G Ab B	
33 C D E F G Bb B	Bebop Dominant
34 C D Eb F G Bb B	
35 C Db Eb F G Bb B	
36 C Db E F G Bb B	
37 C Eb E F G Bb B	
38 C Db D F G Bb B	
39 C D Eb F# G Bb B	Saranga
40 C D E F# G Bb B	
41 C D E F G Ab A	Bebop Major
42 C D Eb F G Ab A	
43 C Db Eb F G Ab A	
44 C Db E F G Ab A	
45 C Eb E F G Ab A	
46 C Db D F G Ab A	
47 C D Eb F# G Ab A	
48 C D E F# G Ab A	
49 C D Eb F Gb Ab A B	Diminished
50 C D E F# G# A#	Whole Tone

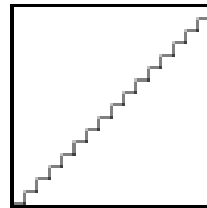
C Curves



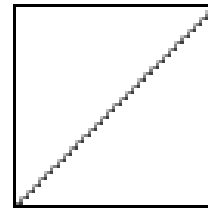
LINEAR



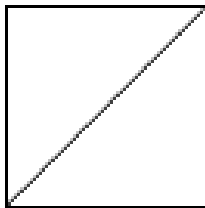
SWITCH



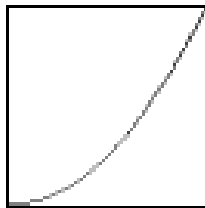
16 STEP



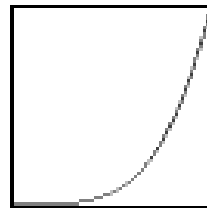
32 STEP



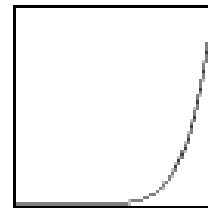
64 STEP



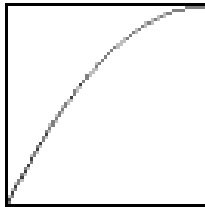
SOFT EXP



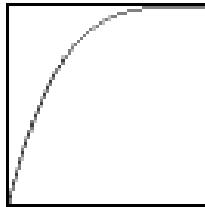
MED EXP



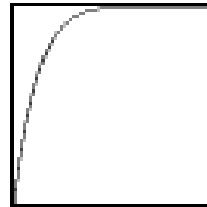
HARD EXP



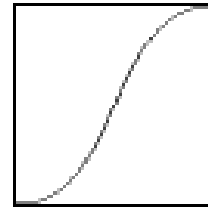
SOFT LOG



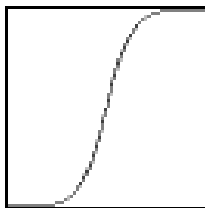
MED LOG



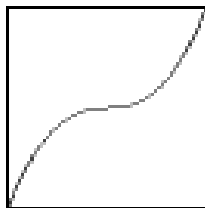
HARD LOG



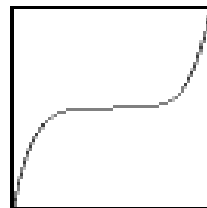
SOFT S-CRV



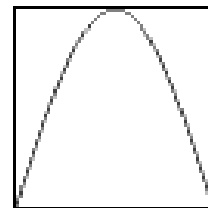
HARD S-CRV



SOFT SHELF



HARD SHELF



COSINE

D MIDI Implementation Chart

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1-16 1-16	1-16 1-16	transmits 32 channels on two ports
Mode	Default Messages	No	Mode 3 or 4 No	program able
Note Number	Sound Range	0-127	0-127 12-115	
Velocity	Note On Note Off	Yes 9n, V = 1-127 Yes 9n, V = 1-127	Yes 9n, V = 1-127 No	
After Touch	Keys Channels	No Yes	No Yes	*1
Pitch Bend		Yes	Yes	
Control Change		Yes	Yes	0-99
Bank Select	Actual Number	Yes	Yes LSB 0-23	Bank Letters A-X *1
Program Change	Actual Number	Yes	Yes 0-7	Seq Number 1-8 *1
All Sounds Off		No	No	
All Notes Off		Yes	Yes	
Reset All Controllers		Yes	Yes	
System Exclusive		Yes	Yes	Non-real-time file dump
System Common	: Song Pos. : Song Sel. : Tune	No No Yes	No No Yes	5V on all note outputs
System Real Time	: Clock : Commands	Yes Yes	Yes Yes	transmits MIDI OUT 1&2
Aux Messages	: Local On/Off : All Notes Off : Active Sense : Reset	No Yes 121, 123-127 No No	No Yes 121, 123-127 No No	

Notes

*1 Transmits to MIDI OUT2

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO

E Specifications

Inputs and Outputs

Control Voltage	3 CV out, 3 Gates out, 1 CV in
MIDI	in, out 1, out 2 or through
Analog Drum Sync 24	clock and trigger out (DIN plug)
Analog Clock Sync	in (TRS ring) and out (TRS tip)
External Foot Switch	input
External Foot Pedal	input (TRS tip doubles for CV in)
Power	15VDC @ 500mA (adapter supplied)
Power Consumption	7 Watts

Graphic Display	2 X 20 character, back-lit LCD
Enclosure Dimensions	27.8 X 18.6 X 8 cm

Voltage Ranges

Controller Output Voltage	0 .. +5.29V / +10.58V
Linear Note Output Voltage	0 .. +10V
Exponential Note Output Voltage	0 .. +8V
Pitch Bend Max Range	± 1V
Gate Output Voltage	0 .. +12V (Adjustable from 5 .. 12V and open collector S-trig)
Control Voltage Input	0 .. +5.7V

F Manufacturer Support

Signal Arts Technologies	Phone
	Email info@signalarts.ca
	Web signalarts.ca

Signal Arts Technologies Limited Warranty

The Signal Arts Sequencer is warranted against functionally defective material or workmanship for a period of one year from date of purchase. This warranty applies to the original purchaser. In the event of product failure, and to conform to this written warranty, please take the following action:

1. Please be certain that the product is actually defective. Email or phone the manufacturer or manufacturer's representative if there are any questions, to avoid unnecessary inconvenience.
2. Do not return your product to the place of purchase unless it has been installed as a circuit or module into an existing product. In this case, return the product to the manufacturer or dealer who made the installation.
3. Carefully package the product with its power adapter. Do not pack any other items. Clearly indicate that the item is being shipped for repair purposes on any customs declarations, Canadian made goods return for repair. Mark the declared value as 0 dollars and the insured value as the purchase price. Return it freight prepaid, along with:
 - a.) A copy of your dated proof of purchase. (Please keep a copy for yourself.)
 - b.) A written statement about the nature of the problem.
 - c.) Your name, address, phone number and email.

Send it to:

Signal Arts Technologies
XXX
XXX

It is recommended that the package be insured against loss in transit or damage, for which Signal Arts cannot be responsible.

EXCLUSIONS

Signal Arts Technologies' liability for the incidental and consequential damages, as well as any liability from the breach of any implied warranty arising by operation of law is expressly excluded.

Un-authorized use of any power supply causing damage, other than the power adapter provided by Signal Arts for this product voids this warranty.

Damage to the product resulting from tampering, accident, abuse, negligence, unauthorized repairs or alterations, unapproved attachments or other causes unrelated to problems with material or workmanship are not covered by this warranty. Physical damage or imperfection to the surface of the product, including cracks, paint blemishes or scratches on the outside casing or LCD bezel and lens. Damage caused by accident, fire, power changes, other hazards, or acts of God.

Signal Arts Technologies warrants to the customer that the sequencer software will perform in substantial conformance to the program specification. Signal Arts Technologies makes no warranty or representation that the operation of the software will be uninterrupted or error free, or that all defects in the software will be corrected.

This warranty becomes void if any serial numbers are defaced or removed. Signal Arts Technologies makes no other warranty of any kind whatever, expressed or implied.

Please fill in the portion on the following page and return or email to Signal Arts. The model / serial number is on the sequencer rear panel.

**SIGNAL ARTS TECHNOLOGIES LIMITED WARRANTY
OWNER S REGISTRATION**

Serial Number:	
Date Purchased:	Dealer:
Your Name:	
Address:	
City:	State:
Postal Zip Code:	Country:
Phone:	
Email:	
