HAWK-800

Programmable Polyphonic Synthesizer Upgrade Kit

Owners Manual

HAWK-800 Programmable Polyphonic Synthesizer Upgrade Kit

Thank you and congratulations on your choice of the HAWK-800 upgrade kit. This kit has been engineered for highest quality sounds and superb reliability. To obtain optimum performance from your new HAWK-800, please read this manual carefully before using.

Features of the HAWK-800

1. New "Global" mode allows setting up many new MIDI parameters and operational configurations.

2. New "Extended" parameter editing mode allows editing numerous new sound parameters.

3. Flash software upgrade capability allows new software to be uploaded to the synthesizer via SYSEX.

4. The sequencer now has 7 individual sequencer memories and any one of the sequences can be chosen for playback in real time while the sequencer is in operation.

5. Portamento Mono and Unison modes.

6. An arpeggiator.

7. Local control mode selection for both the Keyboard and Sequencer.

8. Sequencer note follow mode allows the sequencer to shift notes to match latest played note.

9. In advanced sequencer mode, you can edit up to seven different sequences and each one can be selected to play in real time. Sequences can be locked to protect them from accidental editing. The sequencer edit display shows the number of quarter notes per bar rather than the original impossibly difficult counter.

10. There are now two general purpose LFO's (LFO1 and LFO2) and two SLFO's (SLFO3 and SLFO4). All LFO's have triangle, sawtooth, sine, square (with PWM) and random sample and hold waveforms. All waveforms can be inverted. LFO1 and SLFO4 can have their phases shifted through 0,90,180 and 270 degrees.

11. All four LFO's can be set to free running modes.

12. Both LFO1 and LFO2 can be set to modulate until the delay time expires.

13. Per patch SYSEX dump send and receive, bulk patch dump.

14. You can edit parameters using the joystick.

15. A sustain pedal can be used in the Step Up jack along with three different sustain modes.

16. MIDI note velocity sensitivity!

17. And many more...

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Customer Support

You can obtain support by email to support@hawk800.com

Also check the website www.hawk800.com for notifications and information about product updates.

You can also subscribe to the Hawk800 project sourceforge user mailing list. See https://sourceforge.net/projects/hawk800/lists/hawk800-user.

Many HAWK customers are members of the korgpolyex Yahoo group. The moderator of that group is also Mike, the designer of the HAWK. Mike makes announcements about software updates and other useful information and help in that group. We strongly recommend joining!

Obtaining Software and Documentation

Software releases and discussion and support for ongoing development of the HAWK and AtomaHawk is hosted on sourceforge at http://sourceforge.net/p/hawk800. Many additional supporting documents, patch banks, software, wiki, help and forums are available at the HAWK800 sourceforge site. We hope to see you there!

<div align="center">

www.hawk800.com – support@hawk800.com

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Functions and Operations

Before You Begin – What's Different

This owner's manual applies to the Korg Poly-800 MK1, the Korg Poly-800 MK2 or the Korg EX-800 synthesizer module where those instruments have been upgraded to include the HAWK-800 retrofit hardware kit. If you are not sure if your Poly-800 or EX-800 has the kit installed you can test this by observing the display when you turn the synthesizer on.

At power on, a HAWK-800 upgraded Poly-800 will show various messages depending upon the boot software that is installed in the HAWK-800.

Boot ROM Software Version	Power Up Messages
Boot software versions 1.1 - 1.4	The display will briefly show "P1 X" where X is the minor version number.
Boot software version 1.5	The display will briefly show "P1 5E XX" where XX is the flash software version number.
Boot software version 1.6 and higher	The display will show "HA-800" for approximately 5 seconds. If you press and hold the "Bank Hold" button during boot up then the HAWK-800 will display its progress through the boot up power on self tests.

If your Poly-800 displays "11 P" immediately after power on then it has not been upgraded with the HAWK-800 kit. You can obtain the upgrade kit at: http://www.hawk800.com/

Front Panel

There are four major differences between the operation of the front panel buttons and the original Korg Poly-800 or EX-800.

Poly-800 MK1 and MK2 Key Assign Modes (with Portamento Modes)

The original Poly-800 MK1 and MK2 has three key assign mode buttons. They are the Poly, Chord and Hold mode buttons. All three buttons are still used to enter the original modes. However, the "Poly" button now also doubles as a way to enter into Portamento mono mode. Pressing the "Poly" button will toggle the Poly-800 between polyphonic mode (the display will show "P") and Portamento mono mode (the display will show an "S" meaning slide mode). And the "Chord" button now also doubles as a way to enter into Portamento unison mode. Pressing the "Chord" button will toggle the Poly-800 between chord mode (the display will show "C") and Portamento Unison mode (the display will show an "U" meaning unison/chord slide mode). A Poly-800 MK1 or MK2 that is fitted with the HAWK-800 upgrade kit can both send and receive MIDI controller messages to change the key assign mode. See the MIDI implementation chart for details.

Arpeggiator Operation

You can enter two different arpeggiator modes by selecting Poly or Hold mode and then pressing and holding the Bank Hold button and then pressing the sequencer Start button.

EX-800 Key Assign Mode

The original EX-800 has no key assign mode buttons. However, an EX-800 that is fitted with the HAWK-800 upgrade kit can be sent MIDI controller messages to change the key assign mode. Also, an EX-800 can be set up in tandem with a master Poly-800 so that it receives key assign commands from the Poly-800. See the MIDI implementation chart for details.

Global Parameter Editing Mode

As the name suggests, global mode provides a way to control various global aspects of the Poly-800 and EX-800 that apply to all patches and to the overall operation of the synthesizer.

Entering and Exiting Global Mode

To enter global mode, make sure that you are in program (patch) selection mode (in other words, you should not be in parameter editing mode) and press the "Step" key.

When you have entered Global mode the display will change to show 11 GL 11. The first 11 refers to the selected global parameter. The "GL" indicates that the synthesizer is in global parameter edit mode and the second 11 indicates the data value of the global parameter.

There are two types of global parameters. They are global commands and global parameters.

Press the "Step" key to exit global mode at any time.

Global Mode Executable Commands

To execute a global command requires using the keypad to select global parameter 11 and then selecting a command to execute using the data up and down buttons.

How to execute a global executable command

1. Select the global parameter number for executable commands: "11".
2. Select the desired command using the "Up" and "Down" value buttons.
3. Press the "Write" button to execute the command.

The following executable commands are implemented in the HAWK-800 software:

11 GL 11 = No operation

No command is executed if you select executable parameter 11 and set the data value to 11 and press the "Write" key. This ensures that you don't accidentally execute a command if you enter Global mode and press the "Write" key in error.

11 GL 12 = All notes off (Panic Button)

The synthesizer resets all sounding notes and will send the all notes off MIDI message on the currently selected keyboard MIDI transmit channel if it has been set to a channel. If the keyboard MIDI transmit channel is set to zero then the MIDI all notes off message will not be sent.

11 GL 13 = SYSEX bulk dump all patches

The synthesizer sends a sequence of 64 individual SYSEX single patch dumps of all of the patches (11-88). The individual SYSEX patch dumps are paced out of the MIDI port at a rate that any HAWK-800 can receive. You should not send any other SYSEX commands to the HAWK-800 until the SYSEX dump send is completed.

11 GL 14 = SYSEX dump single patch

The synthesizer sends a SYSEX single patch dump of the patch selected by global parameter 12. This means that you should first set the appropriate desired patch number in global 12 prior to executing this command.

11 GL 15 = SYSEX dump current selected patch

The synthesizer sends a SYSEX single patch dump of the currently select patch. This means that you should first set the appropriate desired patch number before entering global mode and executing this command.

11 GL 16 = SYSEX dump sequencer data

Pressing the "Write" key will cause the synthesizer to send a SYSEX dump of the stored sequencer data. This means that you can send (and receive) individual recorded sequences without using the sysex bulk dump commands. Advanced sequencer mode allows 7 different sequences. The global parameter 44 (default selected sequence) determines which one of the 7 sequences is transmitted in the sysex sequencer data dump. Select the desired sequence using global parameter 44 and then use this global command 16 to dump the data.

11 GL 17 = SYSEX dump global parameters

Pressing the "Write" key will cause the synthesizer to send a SYSEX dump of the Global parameters. This can be used to synchronize a slave Poly-800 or EX-800 unit. It can also be used to save the Poly-800 global settings in a sequencer program or computer utility in order to later bring the Poly-800 or EX-800 into a particular global configuration mode. See the MIDI implementation chart for details.

11 GL 25 = Jump into flash update routine

Pressing the "Write" key will cause the synthesizer to jump into flash ROM upgrade mode. See Upgrading the Software on your HAWK-800 for flash ROM upgrade instruction.

11 GL 26 = Jump into "Tools" mode

See the section on "Tools" Mode later in this manual.

Global Mode Parameters

Global parameters are those numbered from 12 through to 88. Not all parameters in the range are implemented. If you select a global parameter that is not implemented then the data display will be blanked out. You edit global parameters by using the keypad to select the desired parameter and then using the up and down buttons to set the value for that global parameter. There is no need to write a global parameter as the value is immediately set by the up or down buttons when you press them and is saved in flash memory immediately.

12 GL xx - Selected patch or parameter

xx = 11 through 88.

Allows setting the selected patch or parameter number. This value is then used by other global executable commands to carry out certain actions.

13 GL xx – Patch Bank Select

x = 1 through 4.

Allows selecting one of four different patch banks. HAWK-800 kits produced after May 2009 are all fitted with a 32K flash ROM for patch storage. This large flash memory is capable of storing 256 patches. Global parameter 13 allows selecting one of four banks of 64 patches. Changing the bank does not change the currently operating patch so it is possible to change the patch bank without interrupting any current sounding notes. To select a patch from the new selected patch bank requires then exiting global mode and then selecting a desired patch. Patch bank selection can also be engaged by sending a bank select MIDI controller message. See the MIDI implementation chart for details.

14 GL xx - Sequencer clock internal/external

xx = 1=internal or 2=MIDI

Determines if the sequencer clock is internally generated and controlled by the sequencer speed slider or is clocked by external MIDI clock.

15 GL xx - Program change enable

xx – 0=disable, 1=enable

Incoming MIDI program change that are received on the selected MIDI receive channel are ignored when this parameter is set to zero. When set to 1, the synthesizer will respond to incoming MIDI program change messages.

16 GL xx – NRPN MSB Device Select

xx – 0-63

MIDI NRPN controller messages can be used to set the value of any original or extended parameter. The NRPN LSB determines the parameter to be changed. The NRPN MSB must match global parameter 16. NRPN messages with an MSB that does not match global 16 are ignored. See the MIDI implementation chart for additional details. NRPN messages MUST be sent as three consecutive messages starting with the MSB, followed by the LSB and then the data value. Generally this global parameter should be set to one (1) since any MIDI templates that are released by the HAWK-800 team will use an NRPN MSB equal to one.

17 GL xx – Sustain Pedal Operation Select

xx -   0=Pedal Jack operates as Program Up
1=Pedal will hold notes at sustain level
2=Decay and Release will be extended by extended parameter 78
3=Both mode 1 and 2 combined.

The pedal jack on the rear of the Poly-800 was originally designed to operate as a way to slowly work through the patches

by selecting the next higher patch each time the pedal is depressed. Global parameter 17 now allows the Poly-800 or EX-800 to operate with a full sustain pedal operation.

18 GL xx - Portamento fine tuning (deprecated)

xx – 00-63

NOTE: Deprecated - this parameter is no longer used In version 2.6.5 from sub version 'j' and higher. All tuning of portamento is controlled internally. Changing this parameter has no effect in version 2.6.5j and higher.

21 GL xx - Omni on/off/auto

xx - 0=omni auto (on at power on), 1=omni off (including at power on)

For most configurations it is desirable to have your synthesizer start up in Omni off mode.

22 GL xx - Keyboard MIDI transmit select

xx – 0=Off, 1-16=keyboard MIDI transmit channel
0=no MIDI keyboard transmit, 1-16 selects the MIDI transmit channel

23 GL xx - Local Keyboard control

xx - 0=off, 1=on

Setting local keyboard control to off stops the keyboard from triggering the sound generation of the synthesizer. This means that you can use your synthesizer to transmit MIDI data to another MIDI instrument while your synthesizer can play its own sequencer or even respond to incoming MIDI data.

24 GL xx - Local Sequencer control

xx - 0=off, 1=on

Setting local sequencer control to off stops the sequencer from triggering the sound generation of the synthesizer. This means that you can use your synthesizer to transmit MIDI data while you continue to play the keyboard to generate sounds on the synthesizer.

25 GL xx - Sequencer MIDI time code send

xx - 0=no, 1=yes

Setting this parameter to no allows the sequencer to send just the note data without MIDI sequencer clock messages. Setting this parameter to 1 causes the synthesizer to transmit MIDI sequencer clock messages. This parameter does not affect the transmission of start or stop MIDI messages when those buttons are pressed on the front panel.

26 GL xx - Sequencer MIDI transmit channel

xx – 0=Off, 1-16=sequencer MIDI transmit channel

0=no MIDI sequencer transmit, 1-16 selects the MIDI transmit channel

27 GL xx - MIDI receive channel

xx – 1-16

Determines the MIDI receive channel to which the synthesizer will respond.

28 GL xx - MIDI soft thru

xx – 0=off, 1=on

This parameters allows setting the HAWK-800 so that it retransmits MIDI data messages that are received on the MIDI "in" port and retransmits them on the MIDI "out" port. This is useful if you wish to cascade MIDI devices. You should not use

this feature except to cascade another Poly-800 or EX-800 together in a master and slave configuration.

31 GL xx - Extended playing range

xx – 0=off, 1=on

Will set operating the currently selected patch to octave 2 position and will turn off note correction one octave above and one octave below the keyboard range. This allows the Poly-800 and EX-800 to respond to MIDI note messages across six octaves instead of the four that the original keyboard used. To do this, the octave parameters 11 and 21 are set to their mid point.

32 GL xx - Cascading unit number

xx - 0=off, 1=play odd notes, 2=play even notes

This parameter allows two Poly-800's or EX-800's to be set up so that they work in tandem to play odd and even notes individually. This provides an increase in the Polyphony (number of simultaneous notes being played). This requires that both units be set to receive MIDI on the same channel.

33 GL xx - Cascading sync mode

xx – 0=off, 1=temporary on, 2=permanent on

If cascading synchronization mode is on then when program changes are made via the front panel a corresponding sysex single patch send occurs so that a cascaded Poly-800 or EX-800 unit will update is corresponding patch so that it plays the exact same sound as the master unit. When entering chord made, the Poly-800 will also send the chord progression that has been set up so that the slave unit can play the same chord progression. This mode will generally be used when global parameter 32 is also set on. Since it may not be expected that the synth would be sending patch dumps via MIDI at power up, using mode 1 is recommended since on power up the synth will return to 0 sync mode. But if the owner wishes to force sync mode on after power on then select mode 2.

34 GL xx - Device type

xx - 0=Poly-800 MK1, 1=EX800, 2=Poly-800 MK2

This parameter must be set according to the type of Poly-800 unit that the HAWK-800 kit is installed in. For the Poly-800 MK1 this parameter should be set to zero. For the EX-800 this parameter should be set to one. In the case of the EX-800, pitch bend control messages and the pitch of the unit itself will not work correctly if this parameter is not set to one. If your HAWK-800 kit is installed in a Poly-800 MK2 then the device type should be set to 2. This enables the MK2 effects parameters (34-38 and 46-47) and disables parameter 48 (chorus).

35 GL xx - Keyboard MIDI transmit note octave offset

xx -   0=standard Poly-800 keyboard operation
           1=down one octave
           2=down two octaves
           3=down three octaves
           4=up one octave
           5=up two octaves
           6=up three octaves

Allows a Poly-800 keyboard to transmit MIDI note messages offset from their standard note configuration. This is useful when you wish to use the Poly-800 as a MIDI controller because you can set the keyboard to transmit notes across the full MIDI playable note range.

36 GL xx - Keyboard MIDI transmit note velocity offset

xx – 0-63

This parameter allows you to set the keyboard MIDI note velocity transmission level. The range for the parameter is 0-63 which corresponds with a MIDI note velocity range of 2 to 126.

37 GL xx - Sequencer note follow mode

xx - 0=off, 1=keyboard, 2=keyboard and MIDI operation

When the sequencer is playing, it is possible to have the sequencer shift keys within a one octave range to match the last note played on the keyboard (or received from MIDI). This feature only applies to notes played on the lowest octave of the keyboard. All notes played above the lowest keyboard do not change the sequencer key.

38 GL xx – Velocity sensitive trigger delay

xx – 0=off, 1-63 – xx multiples of (approx.) 300uS delay

When using patches that engage velocity sensitive parameters (P1 - 81-88), a small delay is introduced at the onset of note on events. The delay is caused by the velocity calculations that are required to set up the VCF or envelope generators just after velocity information is received at the MIDI in port. Global parameter 38 allows setting up a delay that holds off recalculation of velocity for a specific length of time after a velocity calculation is made. This improves note onset reaction by limiting the velocity calculation to the initial note received out of a consecutive group of notes or chord that is received at the MIDI in port. In most cases, the default value of 30 (which causes a minimum delay of approximately 9 milliseconds) is enough to ensure proper triggering of velocity. However, in some cases a longer delay may be appropriate. This might be the case where more than eight note on events are sent as a chord even though the Poly 800 will only play the last eight notes received (due to 8 note polyphony). Also, it may be useful to increase the delay if your MIDI equipment sends note on events with a larger delay between each note event. In that case, the Poly-800 may recalculate velocity values mid way through a chord or fast sequence of notes which could cause uneven spacing of the played notes. Thus, lengthening the delay value (up to a maximum of 63 which corresponds to approximately 19mS) may help to avoid re-triggering velocity calculations.

41 GL xx - Joystick MIDI TX channel number

xx - 0=no transmit, 1-16 MIDI joystick transmit channel number

Sets the joystick MIDI controller transmit channel. Can also be set to off so that no transmission of joystick movement occurs.

42 GL xx - Local Joystick control off

xx - 0=off, 1=on original, 2=extended mode, 3=extended mode with patch change

Allows turning local control of VCF, DCO modulation and pitch bend off on the Poly-800. This allows the joystick to be used to control other MIDI capable devices while not affecting the Poly-800 itself.
Mode zero completely disables local control of the joystick. The joystick will still send MIDI controller messages if global parameter 41 is set (not zero) but in mode zero the joystick will not affect anything on the local Poly-800.
Mode one sets up the Poly-800 to control the Poly-800 in its original configuration which means it will control pitch (X axis) and DCO/VCF modulation (Y axis).
Mode two disables pitch bend and modulation but enables editing of parameters when in original, extended or global parameter editing modes.
Mode three is the same as mode two except that you can also use the X axis to change patches up or down while in patch selection mode (and while not in parameter editing mode).
In mode two and three, the rate of change of the parameters can be increased or decreased according to how much you push the joystick up, down, left or right. The more you deflect the joystick, the faster the parameters or parameter values will change. This allows very fast access to the desired parameter and changing of the parameter value itself.

43 GL xx – Extended Sequencer Mode Beats per Bar

xx – 1=original sequencer operation, 2-64=extended sequencer operation with 2-64 beats per bar.

Setting this parameter to 1 engages the original sequencer behavior which uses just one sequence. Setting this parameter anywhere in the range 2 to 64 switches the sequencer into advanced mode. This parameter should be set to the number of quarter notes per bar for the sequences that you are editing. For additional details, see the section "Sequencer Advanced Mode".

44 GL xx – Default Selected Sequence

xx – 01 - 07.
Global parameter 44 determines which sequence (of the seven available) will be preselected when the HAWK-800 is

powered up. If the sequencer is in original mode (global 43 is set to 1) then this global parameter has no effect. For additional details, see the section "Sequencer Advanced Mode".

45 GL xx – Note Event Fast Response Timer

xx – 01 - 64.

This parameter determines how long the HAWK-800 will remain in fast note trigger mode after it receives a note on event from either MIDI or the HAWK-800 keyboard. You should generally leave this global parameter at the default value of nine (9). You may wish to adjust this value up or down in order to ensure that the HAWK-800 responds to MIDI note ON events or Poly-800 keyboard events as fast as possible. CAUTION: as you increase the value of this parameter, the HAWK-800 will respond to events more reliably with less lag in general BUT will cause the front panel buttons and the joystick to respond less quickly.

46 GL xx – Sequencer ¼ Note Ticks

xx – 01 - 12.

This parameter determines how many MIDI (F8) or on board sequencer clocks correspond to each sequencer ¼ note duration. The default value is 6 ticks which means that the sequencer will advance one position in time after 6 ticks. You can increase the resolution of the sequencer by reducing the number of ticks. A typical use would be to set the tick count to 3 so that the sequencer would step forward twice as fast. This is particularly useful for matching the time resolution with drum machines and rhythm boxes etc. Using values 1 and 2 are not generally recommended.

47 GL xx – Scaled MIDI Data

xx – 0-1

This parameter determines how several MIDI control change messages treat the data values. When global 47 is set to zero (0), scaled values are used. When global 47 is set to one (1), absolute data values are used. The affected CC and sysex messages are:

NRPN Data Entry	– MIDI CC 6
Patch Bank Select	– MIDI CC 32
Parameter Changes	– MIDI CC's 23 through 30
Parameter Quick Change	– MIDI CC 85
Sysex message ID E	

See MIDI implementation chart for details.

48 GL xx – MIDI CC Bank Select Change Caused Patch Change

xx – 0-1

When enabled (1), MIDI bank select message and Sysex message ID 'E' will result in both a bank change and a patch (program) update.
When disabled (0), MIDI bank select message and Sysex message ID 'E' will result in a bank change but no patch (program) update will occur. This means that bank select can be made without causing an update in the running patch (program) until a patch change message is received or a manual patch (program) change is selected using the keypad.

51(-57) GL xx – Sequence Edit Write Protect

Xx – 00 (edit) – 01 (write protected).

Global parameters 51 through 57 allow protecting sequences (1 to 7 respectively) from accidental editing. For example, setting global parameter 51 to zero (0) allows editing of sequence 1 while setting global parameter 57 to one (1) would protect sequence 7 from being edited. For additional details, see the section "Sequencer Advanced Mode".

58 GL xx – AtomaHawk Version Select

Xx – 00 (AtomaHawk version 1.3b and below) – 01 (AtomaHawk version 1.4).

Must be set to the version of AtomaHawk kit installed in the synthesizer. If you are not sure which version is installed, you must open up your synthesizer and examine the version number that is printed on the AtomaHawk printed circuit board. You must set this parameter correctly or otherwise the AtomaHawk board will not function.

86 GL xx – Display MIDI transmitted bytes counter

Provides a visual indication of proper transmission of MIDI information from the HAWK out the MIDI OUT port.

87 GL xx – Display MIDI received bytes counter

Provides a visual indication of proper reception of MIDI information into the HAWK via the MIDI IN port.

88 GL xx – Display MIDI received bytes parity error counter

Provides a visual indication of incorrect or malformed MIDI IN data. If this counter increments it could mean improper MIDI cabling.

Original Parameter and Extended Parameter Editing Mode

As the name suggests, extended parameter editing mode provides a way to set and control the extended parameters that have been implemented above and beyond the original patch parameters. The extended parameters are able to be set for each patch individually and they are stored separately in the same manner as the original parameters in the Korg Poly-800 or EX-800.
NOTE: For the purpose of simplifying this document and the discussion of parameters, from this point forward, original parameters will be referred to as "P1" parameters and extended parameters will be referred to as "P2" parameters.

Parameter Edit Modes

The behavior of parameter edit mode has been changed to make it easier to access both original (P1) and extended (P2) parameters. Enter extended parameter edit mode by pressing the prog/para button once to access the original (P1) parameters. The left hand display will show P1. Press the prog/para button again to access the new (P2) parameters. The left hand display will show P2. Press the prog/para button a third time to exit parameter edit mode. The operation of the "Step" key has been changed to allow moving back to P1 mode (from P2 mode) and back to patch select mode (from P1 mode). This allows for faster editing of parameters by being able to quickly move back and forth between P1 and P2 mode using the prog/para and step buttons.

Remapped Original Parameters

Certain parameter numbers have been changed to allow support of the MK2 effects parameters and to fit in additional parameters as efficiently as possible. The HAWK-800 uses an almost exactly identical set of parameter numbers for all three versions of the Poly-800. This means that a Poly-800 MK2 that is fitted with a HAWK-800 kit will have many of the parameters mapped into locations that are unlike the original Poly-800 MK2 but are identical to the MK1 and EX-800. Some parameters in the MK1 and EX-800 have also been moved so that the front panel decal on any of these synths is not of much use since too many parameters are new and old parameters have moved.
1. The purpose of the original parameters 13 to 16 (DCO1 harmonics) and 23 to 26 (DCO2 harmonics) have been changed so that harmonics can be modulated by LFO's.
2. The MK2 effects parameters are now placed in original parameter locations 34-38.
3. The VCF resonance (parameter 42) has been moved to extended parameter 51.
4. Original parameters 43 to 46 have shifted down one (to 42 to 45).
5. Original parameters 46 and 47 are now the parameters for the Poly-800 MK2 bass and treble.

It is recommended that you print out and use the parameter quick reference guide for fast reference to all of the P1 and P2 parameter numbers and their use.

Modulator LFO Waveforms and Other Modulating Sources

Various parameters allow the selection of different LFO waveforms for modulation or selecting of various special modulation sources. The following modulators are available for specific modulation based parameters:

Modulating LFO Waveforms and Other Modulating Sources			
1=triangle	2=inverted triangle	3=sawtooth	4=inverted sawtooth

5=sine wave	6=inverted sine wave	7=square PWM wave	8=inverted square PWM wave
9=random sample and hold from selected LFO	10=random sample and hold from sequencer clock or MIDI **beat** clock	11=random sample and hold from sequencer **loop/repeat** point	12=EG3 modulation
13=EG3 invertedmodulation			

IMPORTANT: EG3 modulation is an experimental feature and may be deprecated, modified and or changed in future releases.

P1 Parameter Groups

The P1 parameters are divided up into groups of operation. There are eight groups as follows:

1. 11-18 – DCO1 group
2. 21-27 – DCO2 group
3. 31-38 – DCO interval, detune, noise and MK2 effects group
4. 41-48 – VCF, EG3 triggering, MK2 EQ and MK1 chorus group
5. 51-56 – Envelope generator 1 (EG1) group
6. 61-66 – Envelope generator 2 (EG2) group
7. 71-76 – Envelope generator 3 (EG3) group
8. 81-88 – Velocity sensitivity group

The following sections discuss each of the groups.

P1 Parameters 11-18, 21-27

Parameters 11 (DCO1 octave) and 12 (DCO1 waveform) and the DCO2 equivalents (21 and 22) have not changed. Also, parameters 17 and 27 (DCO level) and 18 (DCO mode) have not changed. Refer to the original Poly-800 owners manual for information regarding the use and setting of these parameters. Parameters 13 to 16 and 23 to 26 have changed and are described below

P1 13,23 – DCO harmonics selector

```
1-16 –   1= 16'
         2= 8'
         3= 4'
         4= 2'
         5= 16' + 8'
         6= 16' + 4'
         7= 16' + 2'
         8= 8' + 4'
         9= 8' + 2'
         10 = 4' + 2'
         11= 16' + 8' + 4'
         12= 16' + 8' + 2'
         13= 16' + 4' + 2'
         14= 8' + 4' + 2'
         15= all harmonics on
         16= all harmonics off
```

Selects the DCO harmonics to be enabled at note onset. If no harmonic modulation is applied then this parameter determines the DCO harmonics that will be applied through the entire duration of a played note. If harmonic modulation is applied then this parameter determines the harmonics that will sound at initial note onset only.

P1 14,24 – DCO harmonics modulation waveform selector

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.
Selects the LFO waveform or other modulator that will be used to modulate the DCO harmonics.

P1 15,25 – DCO harmonics modulation LFO selector

> 1-4 – 1=LFO1, 2=LFO2, 3=SLFO3, 4=SLFO4

Selects the LFO or SLFO that will modulate the DCO harmonics.

P1 16,26 – DCO harmonics modulation depth

> 00-15 – 00=no harmonics modulation, 01-15 apply LFO harmonics modulation

Selects the amount of LFO modulation to apply to the DCO's. Setting this parameter to zero will turn off all LFO modulation of the DCO harmonics. Setting this parameter to 15 will apply the maximum range of possible modulation.

MK2 Effects Unit Group

The Poly-800 MK2 effects unit control parameters now reside at P1 parameter location numbers 34 through to 38. When the Poly-800 device global parameter (34) is set to 2 then these parameters become active. If global parameter 34 is set to 0 or 1 corresponding with Poly-800 MK1 or EX-800 then these parameters are inactive and will not be available for editing.

P1 34 – MK2 Effects Unit Delay Time

> 00-99 – sets the delay of the MK2 effects unit.

P1 35 – MK2 Effects Unit Feedback

> 00-15 – sets the amount of feedback (echo) of the MK2 effects unit.

P1 36 – MK2 Effects Unit Modulation Frequency

> 00-31 – sets the modulation frequency that will be used to apply to the MK2 effects unit.

P1 37 – MK2 Effects Unit Modulation Intensity

> 00-31 – sets the amount of modulation intensity to apply to the MK2 effects unit.

P1 38 – MK2 Effects Unit Volume Level

> 00-15 – sets the volume level of the MK2 effects unit.

VCF Group

The Voltage Controlled Low Pass filters parametes reside at P1 parameter location numbers 41 through to 45.

P1 41 – VCF Cut Off Set Point

> 00-99 – sets the VCF cut off frequency.

P1 42 – VCF Keyboard Tracking

> 0-21 –   0= tracking off
> 1=half tracking
> 2=full tracking

It is important to understand that keyboard tracking is OFF when velocity sensitive VCF is enabled. Refer to P1 parameters 87 and 88 for additional detail.

P1 43 – VCF EG3 Polarity

> 1-2 –   1=normal positive polarity
> 2=negative polarity

P1 44 – VCF EG3 Intensity

        0-15 –   0= EG3 influence off, 1=minimum – 15=maximum.

This parameter determines the amount of influence envelope generator 3 (EG3) will have over the VCF cut off.

P1 45 – EG3 Trigger

        0-1 –   0= single trigger
                    1=multi triggering

This parameter determines if the envelope generator 3 (EG3) will be re-triggered by multiple notes (when set to 1) or if it will only trigger once for the first note held down (when set to 0).

P1 46 – MK2 Bass Equalization

        0-11 –   0 – 6 = lower bass
                    7 = neutral bass position
                    8 – 12 = higher bass

When the Poly-800 device global parameter (34) is set to 2 then these parameters become active. If global parameter 34 is set to 0 or 1 corresponding with Poly-800 MK1 or EX-800 then parameters 46 and 47 are inactive and will not be available for editing.

P1 47 – MK2 Treble Equalization

        0-11 –   0 – 6 = lower treble
                    7 = neutral treble position
                    8 – 12 = higher treble

When the Poly-800 device global parameter (34) is set to 2 then these parameters become active. If global parameter 34 is set to 0 or 1 corresponding with Poly-800 MK1 or EX-800 then parameters 46 and 47 are inactive and will not be available for editing.

P1 48 – MK1 and EX-800 Chorus Effect

        0-1 –   0 = chorus off
                    1 = chorus on

When the Poly-800 device global parameter (34) is set to 0 (MK1) or 1 (EX-800) then these parameters become active. If global parameter 34 is set to 2 corresponding with a Poly-800 MK2 then parameter 48 will be inactive and will not be available for editing.

P1 Parameters 51-56, 61-66 and 71-76 – Envelope Generators EG1, EG2 and EG3

These parameters have not been altered from the original Poly-800 design so please refer to the original Poly-800 owners manual for information regarding the use and setting of these parameters.

P1 57 – Arpeggiator Length

        2-16 –   Length of arpeggiator

The arpeggiator operates with a maximum number of held notes which is set by this parameter.

P1 58 – Arpeggiator Direction

        1-3 –   1=Up, 2=Down, 3=Up/Down

The arpeggiator notes will be played in the order selected.

P1 67 – Arpeggiator Range

       1-3 –   1=octave, 2=2 octaves, 3=3 octaves

The arpeggiator notes will be played across multiple octaves according to this parameter setting.

P1 68 – Arpeggiator Sort

       1-3 –   1=None, 2=Down, 3=Up/Down

The arpeggiator notes will be played in the order selected. This order is of the played notes themselves.

P1 77 – Arpeggiator Sound Played Notes

       0-1 –   0=disabled, 1=sound played notes

This parameter determines if played notes will sound or not.

Velocity Effects Group

The parameters P1 81-88 are utilized for applying velocity sensitive effects to the envelope generators and VCF. There are two velocity "operators" named OP1 and OP2. These parameters that apply to these two operators are 81 to 83 for OP1 and 84 to 86 for OP2. Both operators have identical controls which are the intensity, inversion and target.

P1 81, 84 – OP1, OP2 Velocity Intensity

       0-4 –   0 = operator off
                   1= minimum – 4=maximum intensity

Both velocity operators can be applied to different envelope parameters with adjustable levels of velocity intensity. The operator is disabled and does not affect any target parameter when the velocity intensity is set to zero. Intensity levels 1 through to 4 increases the level of influence that the incoming velocity will have over the target parameter. For improved performance, if either of the velocity operators are not being used then that operator (or both) should be disabled.

P1 82, 85 – OP1, OP2 Velocity Intensity Invert

       0 – 1   0 = normal intensity
                   1= inverted intensity

Both velocity operators can have their velocity influence inverted. When the inversion is set to zero then normal intensity is applied such that increasing the velocity increases the level of influence that will occur on the target parameter. When the inversion parameter is set to 1, the velocity influence is inverted so that the greater the velocity the less the influence that will be applied to the target parameter. For example, this parameter can be used to apply a shorter attack to an envelope generator as velocity increases thus creating a more lifelike hammer effect.

P1 83, 86 – OP1, OP2 Velocity Target

       1-12 –   1 =EG1 Attack
                  2 =EG1 Decay
                  3 =EG1 Sustain
                  4 =EG1 Release
                  5 =EG2 Attack
                  6 =EG2 Decay
                  7 =EG2 Sustain
                  8 =EG2 Release
                  9 =EG3 Attack
                  10=EG3 Decay
                  11=EG3 Sustain
                  12=EG3 Release

The two velocity operators can be applied to any of the envelope generator target parameters shown above. If OP1 and OP2 are set to the same target parameter then OP2 takes precedence and OP1 will not affect the target parameter at all.

P1 87 – VCF Velocity Intensity

> 0-6 –   0= VCF velocity influence disabled
> 1=minimum influence – 6= maximum influence

P1 88 – VCF Velocity Shape

> 1-6 –   1 = Linear
> 2 = Inverted linear
> 3 = S shape
> 4 = Inverted S shape
> 5 = Logarithmic
> 6 = Inverted Logarithmic

VCF Velocity shape determines both the shape and the inversion of the application of velocity to the VCF set point.

P2 Parameter Groups

The P2 parameters are divided up into groups in a similar way as the P1 parameter groups. There are eight groups as follows:

9. 11-18 – LFO1 group
10. 21-28 – LFO2 group
11. 31-38 – DCO modulation group
12. 41-48 – VCF modulation group
13. 51-58 – Resonance modulation group
14. 61-68 – FM modulation group (AtomaHawk only)
15. 71-78 – SLFO group
16. 81-88 – Tremolo and special parameters group

The following sections discuss each of the groups.

LFO1 and LFO2 Group

There are now two LFO's available. These LFO's have new waveforms, delay controls and modulation techniques. Both LFO's have seven identical parameter controls. The eighth parameter is unique between the two LFO's. We discuss each of the common parameters together and then discuss the unique parameters separately.

P2 11, 21 – LFO1, LFO2 frequency

> 00-15 – sets the frequency of the LFO's. Zero is slowest.

NOTE: There may be times where you find that the frequency of LFO2 is much slower than you expect or it may not cycle at all. In those cases you should check for the desired setting of extended parameter 28 (see below).

P2 12, 22 – LFO1, LFO2 delay timer

> 00-15 – sets the onset delay for the LFO's.

Zero provides no delay while 15 is the maximum. The behavior of the delay is determined by parameter 14 and 24.

P2 13, 23 – LFO1, LFO2 free running

> 0-1 – 0=reset the LFO on note on trigger. 1=LFO free running

Allows the LFO's to operate independently of note trigger events. The LFO's never restart their waveform cycles when set to free running. A note down event will restart the LFO cycle when this parameter is set to zero.

P2 14, 24 – LFO1, LFO2 delay invert

> 0-1 – 0=delay then modulate. 1=modulate then cease.

Allows the LFO's delay timer (ext. 12 and ext. 22) to invert their behavior. When set to zero, the LFO's do not begin cycling until the delay timer has expired. When set to one, the LFO's cycle when a note down event occurs and then cease cycling

when the delay timer expires.

P2 15, 25 – LFO1, LFO2 PWM phase

01-63 – 01=zero degrees through to 63=180 degrees

Allows setting the square waveform duty cycle. Due to the way in which the square wave is generated, the faster the frequency of the LFO the less reliable the extremes of the PWM will be. This means that at slow rates, it is possible to set the PWM range at the extremes (for example: ranges of 00-06 and 57-63). However, when the frequency of an LFO is increased, the PWM will become erratic and it may be necessary to choose a less aggressive range (for example: set the PWM closer to the midpoint).

P2 16, 26 – LFO3/4 waveform for LFO1/2 frequency modulation

01-13 – Modulators

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.

It is now possible to modulate the frequency of LFO1 by SLFO3 and LFO2 by SLFO4. The SLFO waveform that will be used to modulate the LFO is determined:
● SLFO3 modulates the rate of LFO1.
● SLFO4 modulates the rate of LFO2.

Note: Modulators 1-9 use the chosen SLFO frequency and waveform for control. Modulators 10-13 are independent of the SLFO.

P2 17, 27 – LFO3/4 modulation depth of LFO1/2 freq. modulation

00-15 – 00=no rate modulation though to 15= maximum modulation

This parameter determines the depth of the modulation of the rate of LFO1 or LFO2 by the corresponding SLFO. When set to zero, no rate modulation occurs. When set higher than zero, the rate of the LFO will be modulated by adding speed to the base frequency set by P2 parameters 11 and 21.

P2 18 – LFO1 waveform phase starting position

1-4 – 1 = start at 0 degrees
2 = start at 90 degrees
3 = start at 180 degrees
4 = start at 270 degrees

Shifts the starting point of LFO1 cycle by the number of degrees selected. This allows the LFO1 cycle to begin at any desired position each of the waveforms. Triangle, sawtooth and sine waveforms (both normal and inverted) are all influenced by this parameter. PWM is not affected by this parameter.

P2 28 – LFO2 sync driven frequency

00-63 – 00=use normal clocking
01-63 set frequency to xx sequencer or MIDI ticks

Allows MIDI or on board sequencer clock to drive the frequency of LFO2.

DCO Modulation Group

The digitally controlled oscillators (DCO1 and DCO2) pitch (frequency) can now be modulated by any of the four LFO's and the EG3 envelope generator. Modulation applies to both DCO1 and DCO2 so that they both modulate in identical ways. This is because both DCO's operate using a single master oscillator.

P2 31 – DCO LFO waveform selector

01-13 – Modulator

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.

Selects the LFO waveform that will be used to modulate the DCO's.

Note: Modulators 1-9 use the chosen LFO frequency and waveform for control. Modulators 10-13 are independent of the LFO.

P2 32 – DCO LFO modulation source selector

> 1-4 – 1=LFO1, 2=LFO2, 3=SLFO3, 4=SLFO4

Selects the LFO or SLFO that will modulate the DCO's.

P2 33 – DCO LFO modulation depth

> 00-15 – 00=no LFO modulation, 01-15 apply LFO modulation

Selects the amount of LFO modulation to apply to the DCO's. Setting this parameter to zero will turn off all LFO modulation of the DCO's. Setting this parameter to 15 will apply the maximum possible modulation.

P2 35 – DCO EG invert

> 1-2 – 1=EG addition, 2=EG subtraction

Selects where the envelope generator modulation is added to or subtracted LFO DCO modulation. If no LFO modulation is applied then the modulation applied by EG will be added or subtracted from the point of no modulation at all.

P2 36 – DCO EG depth

> 00-15 – 00=no EG modulation, 01-15 apply EG modulation

Selects the amount of EG modulation to apply to the DCO's. Setting this parameter to zero will turn off all EG modulation of the DCO's. Setting this parameter to 15 will apply the maximum possible modulation.

P2 38 – DCO Modulation mode

> 0-2 –   0=apply normal DCO modulation
> 1=apply pitch bend DCO modulation
> 2=not yet implemented (note biased pitch bend modulation)

Selects the mode of operation of the DCO modulation. Setting this parameter to zero applies the normal amount of modulation to the DCO's such that they can modulate only one semitone up or down from the base note frequency. Setting this parameter to one (1) will switch off pitch bend operation (for example: the joystick pitch bend will be disabled) so that the modulation can move seven full notes up or down from the base note frequency. This allows much wider frequency modulation by the LFO's or envelope generators.

VCF Modulation Group

The voltage controlled filter can now be modulated by any of the four LFO's and the EG3 envelope generator.

P2 41 – VCF 1st LFO waveform selector

> 01-13 – Modulator

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.

Selects the LFO waveform that will be used to modulate the VCF.

Note: Modulators 1-9 use the chosen LFO frequency and waveform for control. Modulators 10-13 are independent of the LFO.

P2 42 – VCF 1st LFO modulation source selector

> 1-4 – 1=LFO1, 2=LFO2, 3=SLFO3, 4=SLFO4

Selects the LFO or SLFO that will modulate the VCF.

P2 43 – VCF 1st LFO modulation depth

00-15 – 00=no LFO modulation, 01-15 apply LFO modulation

Selects the amount of LFO modulation to apply to the VCF. Setting this parameter to zero will turn off all LFO modulation of the VCF. Setting this parameter to 15 will apply the maximum possible modulation.

P2 44 – VCF 2nd LFO waveform selector

01-13 – Modulator

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.

Selects the LFO waveform that will be used to modulate the VCF.

Note: Modulators 1-9 use the chosen LFO frequency and waveform for control. Modulators 10-13 are independent of the LFO.

P2 45 – VCF 2nd LFO modulation source selector

1-4 – 1=LFO1, 2=LFO2, 3=SLFO3, 4=SLFO4

Selects the LFO or SLFO that will modulate the VCF.

P2 46 – VCF 2nd LFO modulation depth

00-15 – 00=no LFO modulation, 01-15 apply LFO modulation

Selects the amount of LFO modulation to apply to the VCF. Setting this parameter to zero will turn off all LFO modulation of the VCF. Setting this parameter to 15 will apply the maximum possible modulation.

P2 47 – VCF 2nd modulator type and minimum

00-15 -   00=2nd modulator is additive, 01-15=2nd modulator is attenuative

Determines how the 2nd modulator will act over the 1stmodulator. When set to 00, the 2nd VCF modulator is additive to the 1st modulator. That is, both the 1st and 2nd modulators are added together. When set to 01-15, the 2nd VCF modulator attenuates the influence of the first modulator and the set value determines the minimum modulation of the 2nd modulator.

P2 48 – VCF 12/24db filter selector **

1-2 –   1=use 24db per octave filter slope
          2=use 12db per octace filter slope

** NOTE: Only works with the aTomaHawk-800 upgrade kit.

Resonance Modulation Group

The resonance of the VCF can now be modulated by any of the four LFO's and the EG3 envelope generator.

P2 51 – Resonance set point

00-99 – 00-99 set the resonance level

Use this parameter to set the resonance level from zero to maximum (99).

NOTE: The original resonance parameter (P1 42) is no longer used and has been reused because the extended resonance set point parameter (P2 51) provides much higher resolution and is more aggressive at higher resonance levels.

P2 52 – Resonance LFO modulation waveform selector

01-13 – Modulator

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.

Selects the LFO waveform that will be used to modulate resonance.

Note: Modulators 1-9 use the chosen LFO frequency and waveform for control. Modulators 10-13 are independent of the LFO.

P2 53 – Resonance LFO modulation source selector

1-4 – 1=LFO1, 2=LFO2, 3=SLFO3, 4=SLFO4

Selects the LFO or SLFO that will modulate the resonance.

P2 54 – Resonance LFO modulation depth

00-15 – 00=no LFO modulation, 01-15 apply LFO modulation

Selects the amount of LFO modulation to apply to the resonance level. Setting this parameter to zero will turn off all LFO modulation of resonance. Setting this parameter to 15 will apply the maximum possible modulation.

P2 56 – Resonance EG depth

00-15 – 00=no EG modulation, 01-15 apply EG modulation

Selects the amount of EG modulation to apply to the resonance level. Setting this parameter to zero will turn off all EG modulation of resonance. Setting this parameter to 15 will apply the maximum possible modulation.

P2 57 – Resonance EG invert

1-2 – 1=EG addition, 2=EG subtraction

Selects where the envelope generator modulation is added to or subtracted LFO resonance modulation. If you wish to use subtraction then it is recommended that you set the resonance set point to a high value. Use low values for addition.

P2 58 – Aggressive Resonance**

0-1 – 0=normal resonance, 1=set aggressive resonance (Moog Slayer)

** NOTE: Only available with the aTomaHawk-800 upgrade kit.

Selects the mode of operation of the resonance modulation. Setting this parameter to zero applies the normal amount of modulation to the resonance level. Setting this value to one (1) with the aTomaHawk-800 kit fitted also will set very aggressive resonance levels.

** CAUTION ** – Damage to speakers, amplifiers and other audio equipment can occur with aggressive resonance enabled. We recommend the use of a compressor or other audio level limiting device before using this feature.

** WARNING ** – Be extremely careful when using headphones while using aggressive resonance mode. Use proper precautions to avoid hearing damage. An audio compressor is recommended. Use of headphones should be avoided since a compressor cannot be inserted into the audio path.

FM/Noise Modulation Group**

** NOTE: FM is only available with the aTomaHawk-800 upgrade kit.

The output of the DCO's can be routed to the VCF modulation point. This simulates or resembles a form of frequency modulation. This modification is only available with the addition of the aTomaHawk-800 upgrade kit. This modification of the Poly-800 is also known as the FM800 modification. The VCF filter can now be DCO signal modulated by any of the four LFO's and the EG3 envelope generator.

Since this parameter group requires the aTomaHawk-800 kit, we have also implemented a mode parameter that allows the noise generator level to be modulated by this parameter group.

P2 61 – FM800 set point**

> 00-99 – 00-99 set the FM800 level

Use this parameter to set the FM800 level from zero to maximum (99).

P2 62 – FM800 LFO modulation waveform selector**

> 01-13 – Modulator

See section **Modulator LFO Waveforms and Other Modulating Sources** (page 15) for the list of available modulators.

Selects the LFO waveform that will be used to modulate FM800.

Note: Modulators 1-9 use the chosen LFO frequency and waveform for control. Modulators 10-13 are independent of the LFO.

P2 63 – FM800 LFO modulation source selector**

> 1-4 – 1=LFO1, 2=LFO2, 3=SLFO3, 4=SLFO4

Selects the LFO or SLFO that will modulate the FM800.

P2 64 – FM800 LFO modulation depth**

> 00-15 – 00=no LFO modulation, 01-15 apply LFO modulation

Selects the amount of LFO modulation to apply to the FM800 level. Setting this parameter to zero will turn off all LFO modulation of FM800. Setting this parameter to 15 will apply the maximum possible modulation.

P2 66 – FM800 EG depth**

> 00-15 – 00=no EG modulation, 01-15 apply EG modulation

Selects the amount of EG modulation to apply to the FM800 level. Setting this parameter to zero will turn off all EG modulation of FM800. Setting this parameter to 15 will apply the maximum possible modulation.

P2 67 – FM800 EG invert**

> 1-2 – 1=EG addition, 2=EG subtraction

Selects where the envelope generator modulation is added to or subtracted LFO resonance modulation. If you wish to use subtraction then it is recommended that you set the FM800 set point to a high value. Use low values for addition.

P2 68 – FM800 Mode**

> 0-2 –   0=Use the FM800 parameter group to modulate FM800 only.
>   1=Use the FM800 parameter group to modulate FM800 and noise level.
>   2=Use the FM800 parameter group to modulate noise level only.

** NOTE: Only works with the aTomaHawk-800 upgrade kit.

This parameter allows routing of the FM800 group modulation to either the FM800 signal only, the noise level or to both.

SLFO Group

Two super low frequency oscillators are now available in the HAWK-800 upgrade.

P2 71 – SLFO3 frequency

00-15 – sets the frequency of SLFO3. Zero is slowest.

P2 72 – SLFO3 PWM phase

01-63 – 00=zero degrees through to 63=180 degrees

Allows setting the square waveform duty cycle. Due to the way in which the square wave is generated, the faster the frequency of SLFO3 the less reliable the extremes of the PWM will be. This means that at slow rates, it is possible to set the PWM range at the extremes (for example: ranges of 01-06 and 57-63). However, when the frequency is increased, the PWM will become erratic and it may be necessary to choose a less aggressive range (for example: set the PWM closer to the midpoint).

P2 73 – SLFO3 free running

0-1 – 0=reset SLFO3 on note on trigger. 1=SLFO3 free running

Allows the SLFO3 oscillator to cycle without being reset be any note down event.

P2 74 – Sequencer/MIDI clocked Random Sample and Hold Ticks

01-99 – Number of note ticks to pass before next RSH from seq. Or MIDI clock.

This setting determines how many quarter notes should pass before the next random sample is held for the seq./MIDI clock RSH1. This RSH is selected by P2 parameters 33 and 43 when they are set to a waveform value of 10. This allows the DCO MG or VCF MG to be controlled by a random and sample hold value that is directly clocked and synchronized with the internal sequencer or MIDI clock.

NOTE: You should only use waveforms 10 and 11 when the sequencer is running because the clocked random sample and hold values do NOT change unless the sequencer is actually running.

P2 75 – SLFO4 frequency

00-15 – sets the frequency of SLFO4. Zero is slowest.

P2 76 – SLFO4 PWM phase

01-63 – 00=zero degrees through to 63=180 degrees

Allows setting the square waveform duty cycle. Due to the way in which the square wave is generated, the faster the frequency of SLFO4 the less reliable the extremes of the PWM will be. This means that at slow rates, it is possible to set the PWM range at the extremes (for example: ranges of 01-06 and 57-63). However, when the frequency is increased, the PWM will become erratic and it may be necessary to choose a less aggressive range (for example: set the PWM closer to the midpoint).

P2 77 – SLFO4 free running

0-1 – 0=reset SLFO4 on note on trigger. 1=SLFO4 free running

Allows the SLFO4 oscillator to cycle without being reset be any note down event.

P2 78 – SLFO4 waveform phase starting position

1-4 –   1 = start at 0 degrees
          2 = start at 90 degrees
          3 = start at 180 degrees
          4 = start at 270 degrees

Shifts the starting point of SLFO4 cycle by the number of degrees selected. This allows the SLFO4 cycle to begin at any desired position each of the waveforms. Triangle, sawtooth and sine waveforms (both normal and inverted) are all influenced by this parameter. PWM is not affected by this parameter.

Tremolo and Special Parameters Group

This parameter group is split into two sub groups. The first four parameters are for control of tremolo and then last four a unique per patch parameters.

P2 81 – Tremolo DCO1 mode and LFO source

> 0-2 –   0=set tremolo on DCO1 off
> 1=use LFO1 as source for tremolo modulation
> 2=use LFO2 as source for tremolo modulation

Use this parameter to disable tremolo on DCO1 or select LFO1 or LFO2 as sources for tremolo. The waveform used by tremolo is always triangle.

P2 82 – Tremolo DCO1 LFO modulation depth

> 00-15 – 00=off, 01-15 sets tremolo depth on DCO1

Sets the depth of the tremolo. When you wish to apply the largest tremolo it is best to set the DCO1 volume (parameter 17) to 17 (the volume midpoint). This allows the maximum amount of tremolo depth (15) to be applied.

P2 83 – Tremolo DCO2 mode and LFO source

> 0-2 –   0=set tremolo on DCO2 off
> 1=use LFO1 as source for tremolo modulation
> 2=use LFO2 as source for tremolo modulation

Use this parameter to disable tremolo on DCO2 or select LFO1 or LFO2 as sources for tremolo. The waveform used by tremolo is always triangle. When in double mode, DCO2 is modulated using the same DCO1 settings as set by P2 parameters 81 and 82 above.

P2 84 – Tremolo DCO2 LFO modulation depth

> 00-15 – 00=off, 01-15 sets tremolo depth on DCO2

Sets the depth of the tremolo. When you wish to apply the largest tremolo it is best to set the DCO2 volume (parameter 27) to 17 (the volume midpoint). This allows the maximum amount of tremolo depth (15) to be applied.

P2 85 – Bend Depth

> 00-63 – 00=bend off, 01-63 apply joystick bend

Selects the amount of bend depth that the joystick will apply to pitch bend, DCO and VCF modulation.

P2 86 – Portamento Rate

> 01-08 – fixed speed portamento
> 09-15 – variable speed portamento

Selects the portamento slide rate between notes. This parameter selects the speed mode and the rate. Values 1-8 are for fixed speed portamento with 01 being fastest and 08 slowest. While values 09-16 are for variable speed portamento with 09 being fastest and 16 slowest. Fixed mode means that the speed of the portamento slide is always the same. The further apart the notes are the longer it will take to slide between. While in variable mode, the speed is increased or decreased in order to keep the slide time the same regardless of how far apart the played notes are.

P2 87 – Sustain Pedal Decay/Sustain Offset

> 00-31 – 00=no decay or sustain offset, 01-31 increased decay and sustain.

This parameter allows the decay and sustain times to be increased from their settings in both EG1 and EG2 when the sustain pedal is depressed. This allows realistic sustain pedal operation by allowing decay and or sustain to be extended when the sustain pedal is being used.

NOTE: See Global parameter 17 for details on the three different sustain modes that are available.
NOTE: Using the sustain pedal cancels out the influence of the two velocity operators OP1 and OP2 (see P1 parameters 81-86).

P2 88 – Key Assign Mode

1-5 -   1=Poly
          2=Chord
          3=Hold
          4=Portamento Mono Mode
          5=Portamento Unison Mode

Selects the key assign mode for the patch. By setting this parameter (and saving it) you can preselect the key assign mode for each patch. When you select any patch , the Poly-800 or EX-800 will automatically change to the key assign mode set by this parameter. If the sequencer is running when you change patches, the key assign mode set by this parameter will be ignored and the key assign mode will remain in Poly mode. This parameter will be blanked out when the sequencer is running. And any attempts to change the key assign mode via MIDI CC or system exclusive messages will be ignored while the sequencer is running.

Storage Hints and Tips

WARNING: NEVER store a Poly-800 for a long period of time with the C cell batteries inserted into the battery compartment. Just don't do that!!!

 If you MUST store your Poly-800 with batteries in it (please don't do that – see above) make sure that it is stored flat/horizontal or with the joystick end highest. NEVER store your Poly-800 with the joystick closest to the ground (lowest) because this places the batteries above the electronics and if you do forget to remove the batteries and they leak, they will leak all over the electronics and cause severe corrosive damage. This will destroy your synth!

DON'T store your Poly-800 with C cell batteries installed. Just DON'T DO IT!!!

MIDI Hints and Tips

MIDI System Exclusive Messages

This section discusses the details of using original EX-800 and Poly-800 Mk2 MIDI system exclusive bulk data dump messages with the HAWK-800. Refer to the MIDI implementation chart for details on the many other MIDI system exclusive messages that the HAWK-800 recognizes and supports.

Receiving EX-800 or Poly-800 Mk2 Sysex Bulk Data

Receiving EX-800 and MK2 sysex bulk patch dumps is handled by Tools mode 8. See "Tools" mode function 8 later in this document.

MIDI Controller Messages

This section discusses the details of using MIDI controller messages to change parameters in a running patch. Refer to the MIDI implementation chart for details on the many other MIDI controller messages that the HAWK-800 recognizes and supports. There are three different ways in which you can control the parameters in the HAWK-800 using MIDI controller (CC) messages. We discuss each method below. See the MIDI implementation chart for additional information on the format of MIDI CC messages for the HAWK-800.

MIDI CC Non Registered Parameter Number Method

The first MIDI CC parameter change method conforms to the MIDI specification for controlling non registered parameter numbers (NRPN's). This method uses MIDI CC's 99 (NRPN MSB), 98 (NRPN LSB) and 6 (Data Value). The use this method, the MIDI CC messages would be sent in this order and format:

1) Send MIDI CC 99 with the data value matching global parameter 16. If the NRPN MSB does not match global parameter

16 then the desired parameter will not be changed. This is useful if you have more than one HAWK-800 listening on the same MIDI channel and wish to edit sounds independently which can be done by setting global parameter 16 to be unique on each HAWK-800.

2) Send MIDI CC 98 with the data value set to select the desired target parameter where 00-63 matches parameters in the P1 bank (P1 11-88) and 64-127 matches the parameters in the P2 bank (P2 11-88).

3) Send MIDI CC 6 with the data value set to the desired value for the target parameter. Global parameter 47 determines if the data value should be scaled from 0-127 or if the data value should be absolute to match the possible parameter data values. When global parameter 47 is set to zero, each parameter data value sent should be in the range 0-127 and the HAWK-800 will automatically adjust the value to fit the parameter. So for example, DCO waveform is only 1-2 so the HAWK-800 would set 1 if the MIDI CC data value was from 0-63 and the HAWK-800 would set the waveform to 2 if the MIDI CC data was in the range 64-127. When global parameter 47 is set to one, each parameter value should be sent to match the absolute value possible for the specific parameter. See the "Sysex Reference" document for parameter data value ranges.

4) NRPN INC (CC 96) and DEC (CC 97) can be sent to increment or decrement parameter data values.

MIDI CC "Quick Parameter Change" Method

The second MIDI CC parameter change method is a non standard method for quickly changing HAWK-800 parameters. It is similar to the NRPN method but uses two non standard MIDI CC's (84 and 85) instead of three as the NRPN method uses. This makes this MIDI controller parameter changing method more efficient. To use this method, the MIDI CC messages would be sent in this order and format:

1) Send MIDI CC 84 with the data value set to select the desired target parameter where 00-63 matches parameters in the P1 bank (P1 11-88) and 64-127 matches the parameters in the P2 bank (P2 11-88).

2) Send MIDI CC 85 with the data value set to the desired value for the target parameter (but ranged to fit within 0-127 or an absolute value depending upon global parameter 47).

MIDI CC "Hardware Controller Friendly" Method

The third method is a non standard method for changing HAWK-800 parameters where a hardware MIDI controller is being used to change parameters. This method makes it easier to set up a MIDI hardware controller that has sliders and push buttons that can be assigned to parameter banks. This method uses MIDI CC's 22 through to 30. CC 22 is used to select parameter groups. There are 16 parameter groups starting at P1 11 through to P1 88 and then P2 11 through to P2 88. Once a parameter group is selected then CC's 23 through to 30 correspond to the parameter within the selected parameter group. To use this method, the MIDI CC messages would be sent in this order and format:

1) Send MIDI CC 22 with the data value set to select the desired parameter group where 00-63 corresponds to groups P1 1x to 8x and 64-127 corresponds to groups P2 1x to 8x. When you send this CC to the HAWK-800, the display will briefly switch to show the selected parameter group.

2) Send any MIDI CC from 23 to 30 where each CC corresponds to the parameters within the selected parameter group. This means that with the parameter group selected (in step 1 above) you can use MIDI CC's 23 to 30 to set the parameters of any of the 8 parameters within each parameter group.

So for example, use MIDI CC 22 to select the desired parameter group (say DCO1 group) then use MIDI CC's 23 to 30 to change any of the parameters in that group (which would be DCO octave, DCO waveform, harmonics, level and DCO mode).

The nice thing about this method is that a musician will generally edit HAWK-800 sounds by working inside of each parameter group. So it is very convenient to be able to set up a hardware controller to select a parameter group and then edit any one of the eight possible parameters in that group. Then the musician would select another parameter group and edit the parameters within that group and so on.

Miscellaneous Information

Flash Memory Backup

Software versions 2.0 and later include additional flash memory so that all patch, global and sequencer data is stored direct into flash memory.

Lithium Backup Battery

Later versions of the HAWK-800 kit (produced January 2009 and after) use a larger flash memory for all patch, global and sequencer data storage. This means that there is no need to continue to maintain or use a lithium battery in the Poly-800. If your HAWK-800 equipped Poly-800 is fitted with a lithium backup battery then it is recommended that you remove it.

Tools Mode

The HAWK-800 upgrade kit has a "tools" mode that provides access to several useful activities. There are two ways to enter into tools mode.

1. If your Poly-800 or EX-800 is powered off then hold down the "Prog/Para" button while turning the synthesizer on. Release the "Prog/Para" button when you see "Tools" appear on the display.

2. If your Poly-800 or EX-800 is powered on then execute Global 11 command 26. This will immediately switch your synthesizer to "Tools" mode.

When you successfully enter into tools mode the Poly-800 or EX-800 will display "Tools" on the left hand side of the seven segment displays. You then press one of the numeric keypad buttons in order to execute the desired utility tool command. Once a command has been entered, the command will execute and the display will either show information or will display "Good" if the command executed correctly. Press the "Write" button to return back to "Tools" display where you can execute another utility tool command.

There are two ways to exit tools mode. Pressing the "Bank Hold" button will return you to normal synthesizer operation. Or, you can press the "Prog/Para" button and the synthesizer will reboot and will go through normal start up procedure until it enters normal operation.

Tools Function 1 - Display Software Versions

Press "1" and tools mode will display the software version installed in the boot ROM. After approximately two seconds, the display changes to show the software version that is installed in the flash software memory. After approximately two seconds, the display will change to "Good". Press the write button to continue back into Tools mode or press

Tools Function 2 - Validate Patch Memory

Press "2" and the tools mode will ensure that all patch data is within parameter value limits. If any data is found to be outside of correct limits then that parameter value will be set to half of the possible maximum.

Tools Function 3 - Clear Global Memory

Press "3" and the tools mode will reset all global memory to zero except for the device type (global parameter 34) which will retain its value. It is important to ensure that the device type and all other parameters are set correctly. Use this function with care.

Tools Function 4 - System Memory Inspection

Press "4" and the display will change to show data stored in system memory. The address pointer uses the four left hand displays. Pressing keypad numbers changes the address pointer in 8K blocks . The Up and Down buttons scroll through addresses. And the two right hand seven segment displays show the data stored in the memory location.

Keypad	Inspection Memory Address
1	0x2000
2	0x4000
3	0x6000
4	0x8000
5	0xA000
6	0xC000
7	0xE000

8	0x0000

Tools Function 5 – Tape Functions

Press "5" and the HAWK-800 will enter into "Tape" mode. This mode allows "loading" and "verifying" of original Poly-800 and EX-800 tape functions. You can Load, Verify or Cancel Poly-800 or EX-800 audio tape bulk messages via the audio input jack. See the original Poly-800 or EX-800 owners manual for details on using tape mode. You can exit tape mode by pressing the "Write" (after tape 'cancel') button which will return back to tools mode.

Tools Function 7 – Patch Bank Dump to System Exclusive Message

Press "7" and the HAWK-800 will send a system exclusive message out the MIDI OUT port that is a HAWK bulk patch dump. This sysex message contains a copy of all of the 64 patches found in the currently selected patch bank (as determined by global parameter 13). To use this tool function you should set up your MIDI computer or another HAWK-800 to receive the patch dump from the HAWK-800 MIDI out port. If you intend to send the patch flash dump to another HAWK-800, you would set up the receiving unit in tools mode "8" (see below for details) and then engage tools mode "7" to initiate the transfer of the patches from one HAWK-800 to another (or to a MIDI equipped computer). When completed, the HAWK-800 display shows "Good" and pressing the "Write" button returns the HAWK-800 to tools mode or pressing the "Prog/Para" button initiates a reboot of your HAWK-800. Or you can press the "Bank Hold" button to return to normal synthesizer operation.

Tools Function 8 - Uploading Patch Sets using System Exclusive Message

Press "8" and the tools mode will wait for a MIDI patch sysex message in order to update the HAWK patch memory. When you press "8" the display will switch to show "Patch" on the display. The HAWK-800 is now waiting for a system exclusive message that contains an entire set of patches. The HAWK can accept HAWK patch dumps, EX-800 sysex dumps and Poly-800 Mk2 sysex dumps. When a sysex patch dump is being received the display will change according to the type of sysex dump.

SYSEX Dump Type	HAWK display
HAWK patch dump	Shows "PATCHH" then "PATCH4" and "PATCHS"
EX-800 patch dump (includes sequencer data and chord memory)	Shows "PATCHE" then counts up until all patches are saved. Sequencer data is stored in the sequence location specified by global parameter 44.
Poly-800 MK2 patch dump	Shows "PATCH2" then counts up until all patches are saved

CAUTION: In ALL cases, the bulk dump patch data bank will be stored in the current selected patch bank (as set in global parameter 13). Be sure to set global 13 to the desired patch bank prior to using Tools mode 8.

NOTE: After uploading a bulk dump patch data bank dump, you must select a new patch in order for a patch from the uploaded bank to sound.

An integrity check is carried out as the data is being copied into memory. If the integrity check succeeds then the HAWK-800 display will change to "Good" at which point you may press the "Write" button to return to other tools functions . Or, press the the "Bank Hold" button to return to normal synthesizer operation. Or press the "Prog/Para" button to restart the HAWK-800. If the HAWK-800 displays an error code then consider the following possible problems:

- Error 0 – A system exclusive message was received where the manufacturers ID was not Korg (ID 66 or 42 hex).

- Error 1 – A Korg system exclusive message was received where the Device ID was not Poly-800 (ID 33 or 21 hex).

- Error 2 – A Korg Poly-800 system exclusive message was received where the message type was not correct.

- Error 3 – A Korg Poly-800 flash memory upgrade message was received where the flash message was a software image file and not a patch flash upload.

- Error 4 – The patch flash upload was successfully received but the copy of the data into the patch flash memory failed. This could indicate a hardware problem with the patch flash memory itself.

- Error 5 - The patch flash upload was successfully received and the data was copied into the patch flash memory but the patch data integrity checked failed to match the system exclusive checksum. This could indicate that the patch upload data was corrupted during transmission or that the original patch upload system exclusive message

is corrupted.

- Error 7 – The system exclusive message was received including all of the data but more data was received than was expected. This could indicate that the system exclusive message has more data than it should or that other MIDI data was transmitted along with the system exclusive message itself. Check that the Poly-800 sysex message is not corrupted and check your MIDI set up to ensure that only the sysex message is sent and no other MIDI data is being transmitted somultaneously.

Errors 0 to 2 generally indicate that the system exclusive message that you are sending to the HAWK-800 is not patch flash upload message type. Error 3 generally indicates that you are sending a HAWK-800 software image system exclusive message to the HAWK-800. In these cases, check to make sure that you are using a valid HAWK-800 patch flash upload system exclusive message.

Errors 4 and 5 could indicate a hardware problem with the patch flash memory.

Error 5 could also indicate that the system exclusive patch flash upload message was corrupted in some way or that the MIDI transmission contained other unwanted MIDI messages interspersed with the sysex message.

Performance Considerations

The Poly-800 was designed and manufactured using an OKI 80C85 8 bit microprocessor. This microprocessor operates at a 6MHz clock speed which is significantly slower than modern microprocessor designs. In order to get the best possible results from a Poly-800 that is fitted with the HAWK-800 kit certain considerations should be given to CPU performance.

1. Unlike the original Poly-800, the HAWK-800 software is designed to buffer all incoming and outgoing MIDI data. This improves the synth's performance in some ways but it also means that there can be noticeable delay of the onset of notes if a large amount of MIDI data is sent to the HAWK-800 in a short period of time. Wherever possible, a HAWK-800 should be provided with a dedicated MIDI IN connection (port) so that only MIDI information that is intended to be received by the HAWK-800 is actually sent to the HAWK-800. It is preferable that the MIDI IN connection should be set up on the upstream device so that it only sends channel data that is on the channel that the HAWK-800 is set to receive on. Try to avoid sending other channel data to the HAWK-800 as this only makes the HAWK-800 spend additional CPU time processing MIDI information that it is ultimately going to ignore.

2. A special "fast" mode has been implemented in the HAWK-800. This allows the HAWK-800 to react to note ON events as fast as possible even though the HAWK-800 is actually handling many more parameters than the original Poly-800. Nevertheless, even in "fast" mode, the HAWK-800 experiences up to 15mS of additional lag time before note ON events (either sourced via MIDI or the keyboard) result in a sounding note. To ensure that the lag is kept to a minimum, you should try to ensure that MIDI controller messages (or any other control messages) are sent to the HAWK-800 long before any note ON event is sent. Also, try not to intersperse MIDI controller messages with MIDI note chords. In other words, take advantage of "fast" mode by sending note ON events without any other interspersed MIDI messages.

3. The velocity operators OP1 and OP2 (set by parameters P1 81-86) and VCF velocity operator (set by parameters P1 87-88) add additional delay between when a MIDI note on event is received by the Poly-800 and the actual onset of those notes. Thus, if you do not wish to use velocity sensitive data incoming on the MIDI in port then disable all three velocity operators by setting parameters P1 81, 84 and 87 to zero (0).

4. Avoid using soft thru if at all possible. If you are cascading an EX-800 and a Poly-800 and you wish to use cascade mode then using soft thru can be useful but other than this particular configuration try to avoid using soft thru. If you do use soft thru understand that there can be noticeable delays between receiving MIDI data and then the HAWK-800 resending the MIDI data.

5. When playing chords it is recommended that EG3 trigger mode (parameter 45) be set to single trigger (1). This will improve both the speed of note onset as well as the attack gradient of envelope generator three (EG3). This is particularly noticeable when using the on board sequencer to play sequences of chords.

6. If you are not using the LFO's to modulate any sound then set the LFO free running mode to ON for all LFO's. This slightly improves the speed of note onset (by avoiding resetting all of the LFO's waveforms each time a note on event occurs).

Sequencer Operation and Key Assign Modes

Key assign mode (Poly, Chord, Hold, Portamento) is now stored per patch. This means that changing patches will also change the key assign mode. However, the sequencer cannot play if key assign mode Chord or Hold are selected. If you try to change patches while the sequencer is playing, the key assign mode will remain in the same mode (Poly "P" or Portamento Mono "S") as when the sequencer was started. In other words, if the sequencer is running when a patch

change occurs, the key assign mode stored for the selected patch will be ignored.

Sequencer Advanced Mode

The original Poly-800 sequencer is probably close to one of the worst (if not the worse) step edit sequencers ever created for a synthesizer. The HAWK-800 upgrade provides improvements to both sequence editing as well as sequence playback. The original Poly-800 sequence editing and playback features remain available in the HAWK-800. Setting global parameter 43 to a value of one (1) will set the HAWK-800 to work just as the original Poly-800 sequencer did. However, we think that you will quickly find that the new "advanced sequencer mode" provides so many new features that you will never go back to the old sequencer operation.

Here are the main features and operations of advanced sequencer mode:

1. To set the HAWK-800 to operate in "Advanced Sequence Mode) set global parameter 43 to any value from 2 to 64. The value you choose should be the number of quarter notes per bar that you desire. The most common selections would be 16 (4/4 time) and 12 (3/4 time). If you wish to use eight notes then you can use 32 and 24 notes per bar. However, using 32 quarter notes per bar results in half the memory available for sequences.

2. There are now seven (7) sequencers available for editing and playback. Each sequence has record and playback up to a maximum of 256 notes.

3. The HAWK-800 display now shows the current selected sequence (1 – 7) to the left of the Poly mode. In the illustration below, sequence three (3) is shown as selected. You can select a sequence by pressing and holding down the "Bank Hold" button and then pressing keypad numbers 1 through 7.
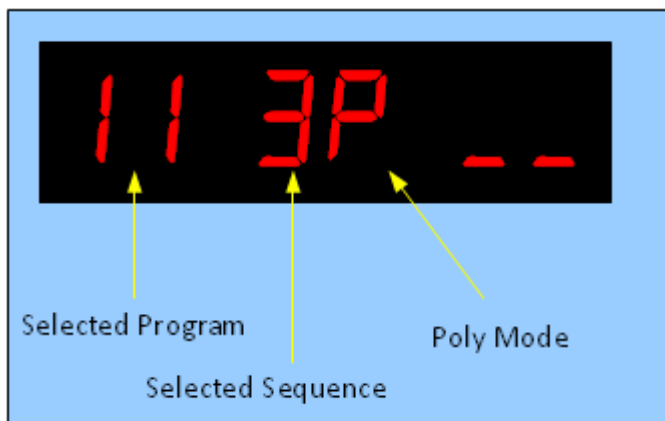

Illustration 1: Advanced Sequence Mode Display

4. Once you have selected a sequence, you can enter sequence edit mode by pressing and holding down the "Write" button and then pressing the sequencer "Start" button. The display will immediately switch into sequence edit display mode. The illustration below shows the display as it would be if we had first selected sequence three (as mentioned in point 3 above) and then pressed and held the "Write" button while then pressing the sequencer "Start" button. The display shows the selected patch (which can be changed using the up/down buttons). It also shows the selected sequence (3), the bar counter (shown as 1 since we are editing the first bar) and also shows the ¼ note counter. In sequencer step edit mode, the display now shows a bar count (up to 9 bars). If you edit beyond 9 bars then the bar display will change to a dash ("-") and it is up to you to count bars beyond 9. The display also shows a quarter note counter up to a maximum of 64 quarter notes per bar. The quarter note counter counts up to the maximum set by global parameter 43 and the resets back to one (1) when entering into the next bar. This makes it much, much easier to determine (and therefore edit) the quarter note position that you are editing in each bar.
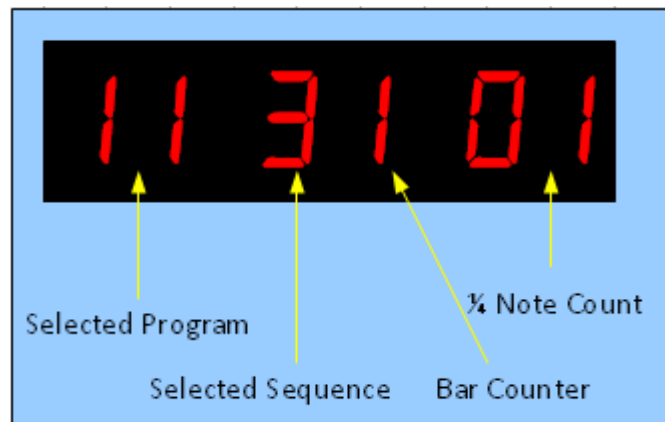
Illustration 2: Advanced Seq. Edit Display

5. You can edit the sequence by playing notes (to enter notes into the sequence), use the Step button (to insert rests or tie notes), and press the Start button to step back (to delete notes or rests). While in advanced sequence edit mode, the sequence edit display shows you a quarter note count (up to the maximum 64 as set per global parameter 43) and also shows the bar count (up to the maximum 9). You can still record more than 9 bars of music but the display will show a dash (-) once you go beyond 9 bars.
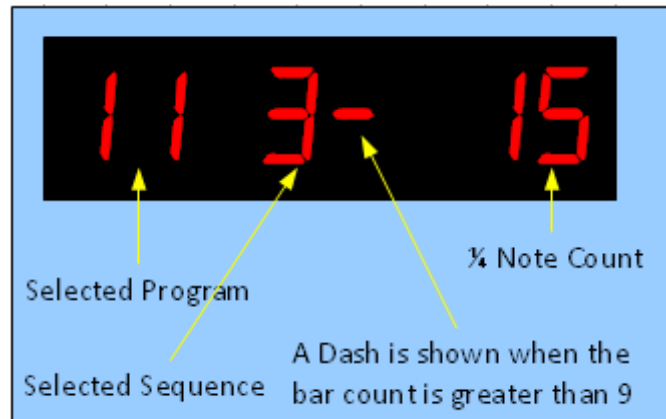

Illustration 3: A dash is shown when editing beyond 9 bars

6. Pressing the "Write" button while editing a sequence will finalize the edit and return the HAWK-800 back to normal playing mode.

7. You can select which sequence you wish to play back by pressing and holding down the "Bank Hold" button and then pressing keypad numbers 1 through 7. You can select sequences to play while the sequencer is stopped or while running. If the sequencer is running and you select a new sequence to play then the new selected sequence number will flash on the display until the current sequence finishes playing and the new selected sequence begins to play. A selected sequence will continue to loop until it is either stopped (using the "Start/Stop" button) or another sequence is selected for playback.

8. While the sequencer is running, if you attempt to select a sequence that has not been edited (and therefore has no prerecorded song) then you cannot select that sequence and the selected sequence display will not change.

9. It is quite easy to accidentally edit over an existing sequence. To protect against such a mistake, it is now possible to lock (protect) a sequence so that it cannot be edited. Global parameters 51 through to 57 can be set so that you cannot enter sequence edit mode if you have selected a protected sequence. Setting global 51 to one (1) protects sequence 1 from being edited. Each global parameter 51 through to 57 corresponds with sequences 1 through 7. If you wish to edit a protected sequence, you should change the corresponding global parameter back to zero (0) or unprotected mode. Refer to the table below.

Global	Sequence	Unprotected	Protected

Parameter	Number	Unlocked	Locked
51	1	0	1
52	2	0	1
53	3	0	1
54	4	0	1
55	5	0	1
56	6	0	1
57	7	0	1

10. Special MIDI controllers have been created for advanced sequencer edit and playback. All of the above mentioned functions can be activated using MIDI controllers and also, a sequence can be muted while it continues to cycle. This is particularly useful for playing live sequences in time with drum machines and other sequencing instruments or controllers. See MIDI controller 21 in the MIDI implementation documentation for details.

11. You can copy a sequence from one sequence location to another. First, select the sequence that you wish to copy (see point 7 above). Then, press and hold down the "Write" button. Then, use the keypad to select the sequence into which you wish the sequence to be copied. Finally, release the "Write" button.

Real Time Advanced Sequencer Editing Operations

Several functions are available for real time editing of sequences. All of these functions require that the sequencer be running. You cannot perform any of these functions while the sequencer is not running.

12. You can copy append two sequences together. This allows you to create two different sequences and copy them into the sequencer scratch memory (sequence 8). Once you have copy appended two sequences into scratch memory 8, you can then copy that larger sequence back into one of the stored sequences 1 thru 7. You cannot copy append two sequences together if the total length of the resulting sequence exceeds 256 events. To copy append two sequences, select the sequence that you wish to have play first. Then, hold down the "Write" button and select the sequence that you wish to play after the first sequence. If the copy append operation is successful then the display will change to show sequence 8 as being selected. Sequence 8 is not stored in non volatile flash memory so you must copy the sequence to 1 thru 7 sequence locations if you wish to keep sequence 8.

13. You can punch in notes to a playing sequence by pressing the "Write" button. The selected program will flash (as though you were about to carry out a patch write). With the patch number flashing, you can now play notes into the sequence. Any notes played will be punched in to the sequence. The new sequence that includes the punched notes is stored in sequence scratch memory 8. You can continue to punch in notes as you desire.

14. You can punch in rests into your sequence by pressing and holding down the "Bank Hold" button. While holding down the "Bank Hold" button you punch in rests by pressing the "Write" button. The longer you hold the "Write" button down the more rests will be punched in over your sequence.

15. If you don't like the last real time edit you made, whether it's punching in notes or some rests, you can undo the last edit by pressing the "Chord Memory" button.

16. Whenever you punch in notes or punch in rests, the display will flash briefly. While the display flashes you cannot carry out any further punching operations. You must wait for the flashing to stop before attempting any additional real time edits.

The Arpeggiator

The arpeggiator is capable of up, down and up/down directions and can operate over one, two or three octaves. Further, the arpeggiator can operate with or without rests with overall length set according to that chosen by the operator. The foot pedal can be used to remove notes from the arpeggiator when in hold mode operation.

Power On Functions

The following power up functions are available.

Button Combination	Action	Purpose
Hold down the "Write" button	Enters"Flash" mode	Allows upgrading boot software and operating software
Hold down the "Prog/Para" button	Enters "Tools" mode	Allows access to "Tools" functions
Hold down the "CHORD" and "HOLD" buttons	Clears all patch memory	Helps to troubleshoot problems with patch memory by clearing all patch memory with zero values.
Hold down the "CHORD" and "DOWN" buttons	Clears all software flash memory. The display will show "Clear1", "Clear2", "Clear3" and "Clear4" at which point the HAWK will reboot automatically once the erare process is completed.	Helps to troubleshoot problems with software flash memory memory by clearing all memory with 0xFF.
Hold down the "Step" button.	Switch to seven segment display mode.	Instructs the synth to use seven segment displays.
Hold down the "Start/Stop" button.	Switch to LCD display mode.	Not yet implemented. Allows use of a standard 16 x 2 LCD display.

Boot Software Power On Self Tests

The HAWK-800 boot software includes power on self tests that are performed each time the HAWK-800 is powered on. At power on, the HAWK-800 display will flash "88 88 88" several times and then will display "HA-800" while the power on self tests are performed (see picture below).

Illustration 4: Power On Display Message

The tests take a few seconds to complete at which time the HAWK-800 will enter its normal operating mode.

You can watch the power on self tests as they occur by pressing and holding down the "Bank Hold" button during power up. The display will change to show "POST" and will then work through each test until completed. Some tests occur so quickly that you will not see the corresponding digit for that test unless a problem is detected during that test. Refer to the table below for information regarding each test. You must hold down the "Bank Hold" button throughout all of the tests otherwise the display will return to "HA-800".
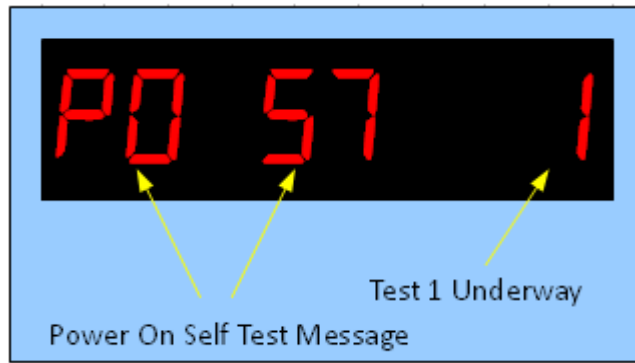
Illustration 5: Power On Self Test Display

Power On Self Tests	
Test	Description
POST 0	Tests the 8155 PIC memory found on the main board
POST 1	Tests the 6264 8K Static memory found on the HAWK-800 board
POST 2	Not implemented
POST 3	Tests that the boot ROM software checksum matches the software data
POST 4	Tests that the 1st software flash ROM software checksum matches the software data
POST 5	Tests that the 2nd software flash ROM software checksum matches the software data
POST 6	Tests that the 3rd software flash ROM software checksum matches the software data

If POST tests 0 or 1 fail then the display will change to show the address location of where the failure occurred and the data that was read for that memory location. The HAWK-800 will not attempt to enter into normal operational mode if POST 0 or 1 fails.

If POST test 3 fails then the display will change to show "Err 3". This indicates that the boot software ROM had a checksum test failure which suggests that the boot flash ROM has corrupted data. The HAWK-800 will continue to attempt to resume normal operations but since corrupted data was detected in the boot software you should contact support@hawk800.com for assistance.

If POST tests 4 to 6 fail then the display will change to show "Err x" where x is 4 to 6 and indicates that one of the the software flash memories had a checksum test failure. This indicates that a particular software flash ROM has corrupted data. The HAWK-800 will continue to attempt to resume normal operations but since corrupted data was detected you should upgrade the software ("reflash") as soon as possible. Software corruption could cause you to lose patches or sequencer data so, in most cases, you should immediately power off the HAWK-800 and investigate as soon as possible. We designed the power on self tests to continue to try to enter normal operations in order to accommodate "live performance" situations where it might be better to try to continue to operate the HAWK-800 rather than simply make the synth inoperable. However, in most circumstances you should power off the HAWK-800 and "reflash" or seek assistance from support@hawk800.com.
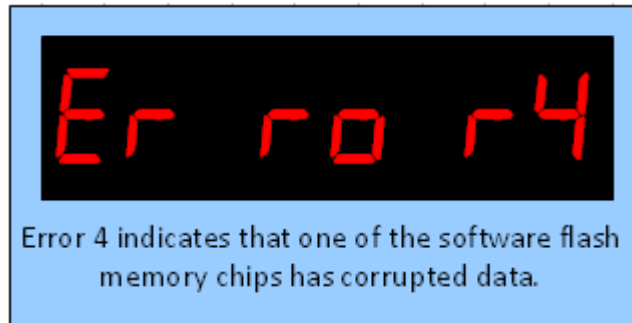

Illustration 6: Operating Software Flash Checksum Error Display

Other Useful Functions

Envelope Generator Parameters Copy

You can copy all six EG parameters from any EG to another EG using the following simple method.

1. Press and hold down the "Bank Hold" button to select EG copy (the display does not change).

2. Select the source EG that you want to copy from by pressing momentarily either "Poly" - EG1, "Chord" - EG2 or "Hold" - EG3.

3. Select the destination EG that you want to copy to by pressing momentarily either "Poly" - EG1, "Chord" - EG2 or "Hold" - EG3.

Installing and Updating Software

You must install the HAWK software immediately after installing the HAWK kit into your Korg Poly-800 or EX-800. If you have successfully installed the HAWK kit, when you power on the Poly it will display flashing 88 88 88, then HA-800, then ERROR 4, ERROR 5 ERROR 6. And it will keep repeating this endlessly. It does this because you have not yet installed the HAWK software into the flash software memory.

To install the software into your HAWK, follow the steps below:

Step 1 - Download and unzip the latest software SYSEX files from:

> https://sourceforge.net/projects/hawk800/files/Software/

Step 2 - Make sure that you have the files: EEPROM0.SYX, EEPROM1.SYX and EEPROM2.SYX on the computer from where you will be sending the SYSEX.

Step 3 - Connect MIDI OUT from your computer to MIDI IN on your Poly-800. Make sure you don't have any MIDI loops. Make sure your computer is not sending any MIDI except for the SYSEX file. MIDI-OX is commonly used on Windows OS PC's.

Step 4 - Power on your Poly-800 and press and hold down the "Write" button. The display will change to "FLASH".

Step 5 - Use MIDI to send "EEPROM0.SYX" to your Poly-800.

Step 6 - The Poly-800 display should change to "FLASH 1" then "FLASH 4" then "FLASH 5" and then should stop at "Good 0".

Step 7 - Press the "Write" button to return the display to "FLASH".

Step 8 - Use MIDI to send "EEPROM1.SYX" to your Poly-800.

Step 9 - The Poly-800 display should change to "FLASH 2" then "FLASH 4" then "FLASH 5" and then should stop at "Good 1".

Step 10 - Press the "Write" button to return the display to "FLASH".

Step 11 - Use MIDI to send "EEPROM2.SYX" to your Poly-800.

Step 12 - The Poly-800 display change to "FLASH 3" then "FLASH 4" then "FLASH 5" and then should stop at "Good 2".

Step 13 - Press the "Prog/Para" button to restart your Poly-800. If all goes well, then your Poly-800 should display flashing 88 88 88 followed by HA-800 and should stop at "11 P".

FLASH 1, 2 and 3 means the Poly is receiving one of the three SYX files.
FLASH 4 means copying received data into FLASH memory.
FLASH 5 means doing a checksum check of the FLASH memory.

ERROR 1 means there was an error in the SYSEX message. Check your MIDI setup. Especially look out for cheap USB MIDI interfaces that do not conform to MIDI electrical spec's.

If your Poly-800 booted up OK and but showed 11 H. That usually means you need to upload a patch set.

NOTE: Each time you install new software check that global parameter 34 is set correctly for the type of Poly that you have (Poly-800='00', EX-800='01' or MKII='02').
NOTE: And, you also need to check that global parameter 58 (if available) is set to the correct AtomaHawk version. AtomaHawk up to and including versions 1.3 should use '00' and version 1.4 should use '01'.

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