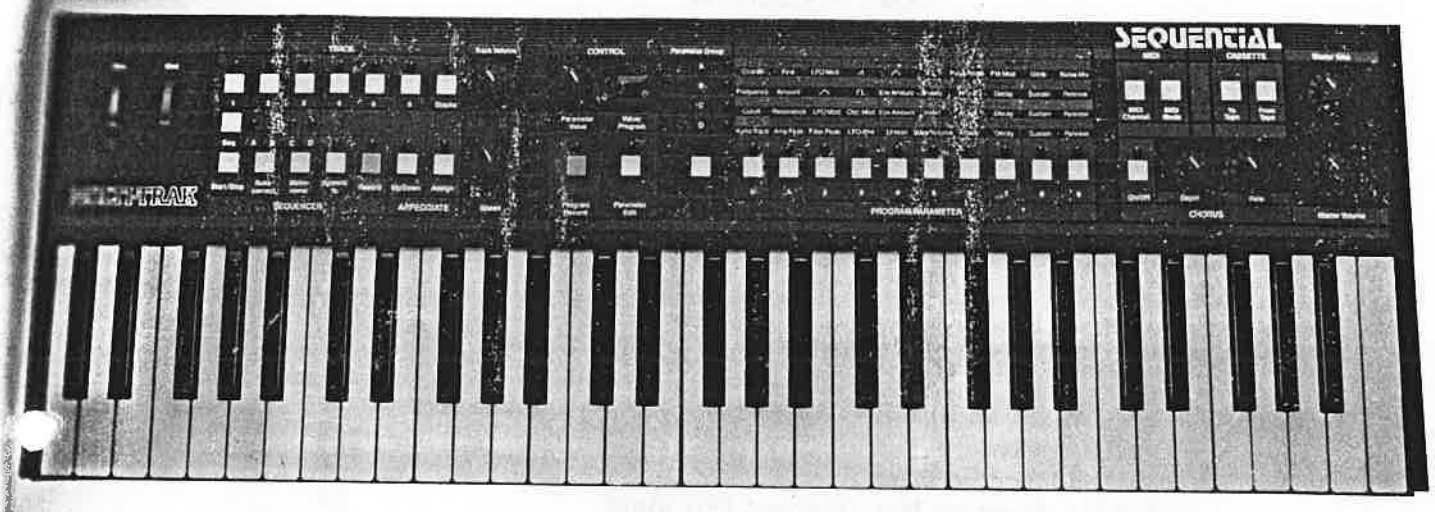


MULTI-TRAK

MIDIGUIDE

SEQUENTIAL

MULTI-TRAK MIDIGUIDE

Table of Contents

	page
INTRODUCTION	4
MIDI APPLICATIONS	4
Synchronizing with Drumtraks or other drum machines	5
Slaving a MAX to the MULTI-TRAK	8
Slaving another MULTI-TRAK	9
MIDI Modes	10
MIDI CONTROL OPTION SUMMARY	11
MULTI-TRAK MIDI IMPLEMENTATION	13
Transmitted Data	13
Recognized Receive Data	16
Table 1 Program Data Format (Bit Map)	21

INTRODUCTION

The MULTI-TRAK can be used as a stand-alone instrument, but with MIDI it can be connected to other instruments for impressive results.

Basic operation of the MULTI-TRAK is covered in the operation manual. We recommend familiarizing yourself with the MULTI-TRAK's features before moving into this MIDIGUIDE.

This MIDIGUIDE is divided into three sections:

Examples of connection with other instruments: Clocked by the Drumtraks, and Master to MAX or another MULTITRAK.

A summary of MIDI functions which can be selected from the MULTI-TRAK control panel.

MIDI implementation and program bit maps for those interested in communicating with the MULTI-TRAK through MIDI.

MIDI APPLICATIONS

The following examples show how to use the MULTI-TRAK with three Sequential instruments: Drumtraks, MAX, and a second MULTI-TRAK.

These examples have been selected so that if you play instruments other than those listed above, you can at least determine the possible applications of your instrument when connected to the MULTI-TRAK. (If you find insufficient detail in this section, read MULTI-TRAK MIDI IMPLEMENTATION to get to the nuts and bolts of the MULTI-TRAK's MIDI etiquette.)

MIDI allows instruments to communicate more than just notes between each other. Pitch bend and modulation wheels can simultaneously affect several instrument, as can program selections. Some instruments have these capabilities, but in order to be used, they must be enabled over MIDI. That is, the MOD wheels may work on the instrument you play, but they may not affect any instruments it plays over MIDI.

The examples which follow in this section demonstrate how to check for incompatabilities between instruments as far as MIDI performance controls go. Try enabling and disabling functions on your instrument to get a feel for the MULTI-TRAK's MIDI capabilities.

SYNCHRONIZING WITH DRUMTRAKS OR OTHER DRUM MACHINES

A very attractive feature of the MULTI-TRAK is its ability to synchronize with drum machines and other clock-generating devices. Commonly, drum machines are used with several pieces of equipment --typically a sequencer and a synthesizer or two--to coordinate the timing of sequenced music which the composer may not be able to play manually.

Before getting into synchronizing with external equipment, it is recommended that you get familiar with the MULTI-TRAK's sequencer and arppegiator operations as described in the MULTI-TRAK Operation Manual, CM615.

Several "sync" methods are possible with the MULTI-TRAK:

1) Sync-to-tape allows the user to synchronize several MULTI-TRAK sequences when recording on a multi-track tape deck. (For details, see the MULTI-TRAK Operation Manual, CM615.)

2) External trigger allows the MULTI-TRAK's arpeggiator and on-board sequences to be synced to drum machines or other sequencers with a single cable. Again, see the MULTI-TRAK operation manual for details.

3) MIDI allows the MULTI-TRAK's arpeggiator and on-board sequences to be started, stopped, and kept in sync with MIDI-equipped drum machines.

Only the third method is described in detail on the following pages.

(The MULTI-TRAK's on-board sequencer has its own metronome so that even if no drum machine is being used, sequences can be recorded, auto-corrected, then synchronized with a drum machine in playback.)

Sequence Playback

Although it is possible to record MULTI-TRAK sequences while connected to a drum machine, we'll first play back previously recorded sequences in sync.

Set **Speed** to **Ext Clk.** (Turn **Speed** all the way counterclockwise.)

Select desired sequence (A, B, C, D).

Press **Start** on the MULTI-TRAK.

Start the drum machine.

The sequence now plays and loops in sync with the drum machine.

Stopping, starting, and continuing the drum machine also perform the same functions on the sequencer.

Sequence Record

As we have just seen, sequences can be recorded on the MULTI-TRAK by itself, then synchronized with drum machines later. Sometimes you may want to record sequences while the drum machine plays. Recording with a drum machine is basically the same as detailed in the MULTITRAK Operation Manual, with a few things to look out for:

Clock rate of the drum machine. (Must be the MIDI standard rate of 24 clocks per quarter note.)

Auto-correct value of the MULTI-TRAK.
Care must be taken when recording the basic track, so the desired auto-correct resolution is obtained.

MIDI or not.
MIDI-equipped drum machines can eliminate a few steps in some procedures. For non-MIDI procedures, see the MULTI-TRAK Operation Manual, CM615. The following steps are for MIDI-equipped drumboxes, such as Sequential's Drumtraks.

To record the basic track (sets the sequence length):

1. Connect the drum machine's MIDI out to the MULTI-TRAK's MIDI in.

2. On the MULTI-TRAK, set **Speed** to **Ext Clk.**

3. Set **Auto-correct** to the desired value.

4. Hold **Record** and press **Start.**

5. If desired select more tracks.

6. Start the drum machine.
   The MULTI-TRAK's metronome starts. Turn it off with **Metronome** if desired.

7. Wait until the drumbox loops to the start of its pattern, then start playing on the MULTI-TRAK.

8. At the end, to start the sequence looping, press **Record** or the footswitch.

9. If desired, overdub more notes on the basic track.

10. If desired, select more tracks and programs to lay down some overdubs.

OTHER USES WITH DRUM MACHINES

With the drum machine's MIDI clock controlling the MULTI-TRAK, the arpeggiator can also be synchronized. The arpeggiator steps to the next note every sixteenth note (six MIDI clocks).

If desired, the MIDI connection can be reversed, with the MULTI-TRAK MIDI out going to the drum machine's MIDI in. This makes the drum machine the slave of the MULTI-TRAK, with the drum pattern starting, stopping, and continuing in synch with the MULTI-TRAK.

Finally, the MULTI-TRAK's keyboard can be used to "play" the drums on Sequential's Drumtraks, giving easy control to drum selection. With the MULTI-TRAK's velocity sensitivity, each drumstroke can be played with a unique and natural volume. For more details on using this feature, see the Drumtraks manual.

SLAVING A MAX TO THE MULTI-TRAK

Connection.

Connect the MULTI-TRAK MIDI OUT to MAX MIDI IN.

The following chart compares the MULTI-TRAK's default conditions with those of the Sequential MAX:

FUNCTION	MULTI-TRAK	MAX
Wheels	Enabled	Enabled
Programs	Enabled	Enabled
MIDI Mode	1	1
MIDI Channel	3	3
Velocity	Always sent	Disabled

Note: On the MULTI-TRAK, the above "defaults" indicate the way the MULTI-TRAK was shipped from the factory. If changed in the field, they remain as last set, whether or not power is switched off. (See the "MIDI Control Option Summary" in this manual for instructions on how to change them.) For the MAX, the default conditions are present whenever the power is switched on.

Play notes. MAX does too.

Change Programs. MAX changes to the same programs. MAX's programs are specially designed to complement the MULTI-TRAK's factory programs.

Move the MULTI-TRAK's wheels. MAX responds.

Enable velocity on MAX:

Hold **Erase.**

Enter 36 on the SOUND SELECT keypad.

This completes the connection, so that all the performance subtleties used in playing the MULTI-TRAK keyboard are transferred to the MAX.

To double the voices on the MAX when playing the MULTI-TRAK's sequencer, enter Double Mode on the MULTI-TRAK. (Hold **MIDI Channel** and press **PROGRAM/PARAMETER 7.**)

SLAVING ANOTHER MULTI-TRAK

Connecting two MULTI-TRAK's via MIDI is very much like connecting a MULTI-TRAK to a MAX, discussed above. The only difference in basic operation is that there is no need to enable velocity--it is already enabled. Also, there are some additional things that can be done.

1. Sequences, programs, and stacks can be copied from one to another, either singly, or in bulk. This is controlled from the master using the procedures given in the MIDI Control Option Summary.

2. When a sequence is selected, started, or stopped on the master, the same thing happens on the slave.

MODES

MIDI includes control modes which make it easy to connect several instruments. Information sent by one keyboard instrument, sequencer or computer may be sent to several receiving instruments with little interfacing hardware, by using MIDI channels to distribute MIDI information to any of sixteen destinations.

Therefore, depending on the application, it may be desired to have instruments interpret MIDI information in subtly different ways. For example, one instrument in a chain of "slave" synthesizers may be set to receive notes played only in channel 7, while another instrument may be set to play notes received from any of the sixteen MIDI channels. The first "slave" operates in "Mode 3," which allows it to select one MIDI channel through which it receives information. The latter instrument operates in "Mode 1," receiving information on all MIDI channels, and assigning the received notes to its available "voices." (Modes 1 and 3 are most commonly used, but there are two remaining modes.)

On the MULTI-TRAK, modes are selected by holding the **MIDI Mode** switch and turning the **Parameter Value** knob. Whatever mode is set remains in memory until changed.

The following information explains how the modes affect the MULTI-TRAK's behavior, and how they are used for special applications.

Mode 0 (MIDI off)
Not strictly a MIDI mode, this selection is provided to easily disable MIDI communication (both sending and receiving) from the front panel.

Mode 1 (Omni On/Mono Off)
In Mode 1, data is sent on the Basic Channel and received from all channels. When the MULTI-TRAK is shipped from the factory, Mode 1 (Omni On/ Mono Off) is selected and the Basic Channel number is set to 3.

Mode 2 (Omni On/Mono On)
On the MULTI-TRAK, Mode 2 can not be selected. Mode 2 assigns all MIDI information to one voice of an instrument, for monophonic performance. If a Mode 2 command is received through MIDI, Mode 1 is selected.

Mode 3 (Omni Off/Mono Off)
When Mode 3 is selected, messages without the Basic Channel number are ignored..Only messages in the Basic Channel are recognized.

Mode 4 (Omni Off/Mono On)
When Mode 4 is selected, the MULTI-TRAK assigns each of its six voices to channels N to N+5, where N is the current Basic Channel number. This normally means channels 3 - 8 (N=3). Note that the Basic Channel must not be set above 11, to allow room for six voices. If the Basic Channel is set above 11 when Mode 4 is selected, the Basic Channel is automatically set to 11.

MIDI CONTROL OPTION SUMMARY

ENABLE MIDI CLOCK INPUT:
Turn **Speed** knob all the way counterclockwise.
Allows the MULTI-TRAK sequencer to be "synced" to MIDI-equipped drum machines. Disabled on power-up.

DISABLE MIDI CLOCK INPUT:
Turn **Speed** clockwise, away from the stop.
Enables the MULTI-TRAK's internal clock to control the record and playback speed of the recorder.

TO CHANGE THE BASIC MIDI CHANNEL:
Hold **MIDI Channel** and turn **Parameter Value** until the desired channel (1-16) appears in the **Value/Program** display.
MIDI data is sent over the selected channel. If in Mode 3 or Mode 4, this also determines the channel through which MIDI data is accepted.Note that in Mode 4, channel 11 is the maximum usable channel. The Basic Channel number can also be changed remotely by a Select Double Mode command over MIDI.

TO DISPLAY THE CURRENT BASIC MIDI CHANNEL:
Hold **MIDI Channel.**
(Set to channel 3 at the factory)

TO DISPLAY THE CURRENT MIDI MODE:
Hold **MIDI Mode.**

TO CHANGE THE MIDI MODE:
Hold **MIDI Mode** and turn **Parameter Value** until the desired mode (0, 1, 3, or 4) appears in the **Value/Program** display.

TO TURN MIDI OFF:
Set mode to zero.

TO TURN MIDI ON:
Set mode to 1, 3, or 4.

SELECT DOUBLE MODE:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 7.**

Selects Mode 4, with external wheels and program changes enabled over MIDI. Used when the MULTI-TRAK is combined with another MULTI-TRAK, MAX, or a Six-Trak. Also sends a command over MIDI which forces the slave into the same configuration, with the same Basic Channel.

ENABLE/DISABLE PROGRAM CHANGES:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 5.**
When enabled, "on" appears in the display.

Toggles (switches on or off) the ability for the MULTI-TRAK's program changes to select and be selected by another instrument via MIDI.

ENABLE/DISABLE WHEEL CHANGES:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 4.**
When enabled, "on" appears in the display.

Allows the MULTI-TRAK to be controlled by another instrument's Pitch and Mod wheels over MIDI.

ENABLE/DISABLE EXTERNAL KEYBOARD PRESSURE:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 6.**
When enabled, "on" appears in the display.

If enabled, MIDI-equipped pressure-sensitive keyboards control the MULTI-TRAK's modulation (as **Mod** wheel).

DUMP ALL PROGRAMS AND STACKS:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 0.**

DUMP CURRENT PROGRAM:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 1.**

DUMP ALL SEQUENCES:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 2.**

DUMP CURRENT SEQUENCE:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 3.**

LOCAL ON/OFF:
Hold **MIDI Channel** and press **PROGRAM/PARAMETER 9.**
When "on" appears in the display, the MULTI-TRAK is in Local On, or normal playing mode.

"Local* off" disconnects the MULTI-TRAK's keyboard and front panel controls from the synthesizer voices. All control is done via MIDI. The keyboard information still goes out over MIDI.

* off

MULTI-TRAK MIDI IMPLEMENTATION

Note: All channel commands use running status. The status byte is "refreshed" when all envelopes have totally died out. In Mode 4, Note On/Note Off commands do not have running status.

TRANSMITTED DATA

Status	Second	Third	Fourth	Fifth	Sixth

Note On.

9NH	K	V
1001 nnnn	0kkk kkkk	0vvv vvvv

N is the Basic Channel.
K=36-97.

Note Off.

9NH	K	00H
1001 nnnn	0kkk kkkk	0000 0000

N is the Basic Channel.
Same as Note On with zero velocity (unless status change)

MOD Wheel Amount. (Default: enabled)

BNH	01H	V
1011 nnnn	0000 000	0vvv vvvv

N is the Basic Channel.
0-127 (00-7FH)

Program Change. (Default: enabled)

CNH	P
1100 nnnn	0ppp pppp

P=0-99 (00H-63H)

PITCH Wheel Change. (Default: enabled)

ENH	Vls	Vms
1110 nnn	ovvv vvvv	ovvv vvvv

LS byte.
MS byte.
When PITCH Wheel is centered, LS=0 (00H), and MS=64 (40H).

TRANSMITTED DATA

Status	Second	Third	Fourth	Fifth	Sixth
Double Mode.					
F0H	01H	7BH	0NH	F7H	
1111 0000	0000 0001	0111 1011	0000nnnn	1111 0111	
(Sys Ex	Sequential ID	Select Channel	Basic Channel	EOX)	

N is the current Basic Channel.

Song Select.	
F3H	S
1111 0011	0sss ssss
	S=0-3.

Timing Clock.
F8H
1111 1000
Sent with Arpegg or Seq

Start.
FAH
1111 1010

Stop.
FCH
1111 1100

Dump 1 Program

F0H	01H	09H	P	D	F7H
1111 0000	0000 0001	0000 1001	0ppp pppp	DATA	1111 0111
(Sys Ex	SCI ID	615 ID	Program # (0-99)	DATA	EOX)

19 bytes. See Table 1 for data format.

TRANSMITTED DATA

Status	Second	Third	Fourth	Fifth	Sixth
Dump All Programs and Stacks					
F0H	01H	09H	64H	D	F7H
1111 0000	0000 0001	0000 1001	0110 0100	DATA	1111 0111
(Sys Ex	Sequential ID	615 ID	All Progs + Stacks (100)	DATA	EOX)
				2020 bytes data.	
Dump 1 Bank Programs					
F0H	01H	09H	B	D	F7H
1111 0000	0000 0001	0000 1001	0ppp pppp	DATA	1111 0111
(Sys Ex	Sequential ID	615 ID	Bank # (110-119)	DATA	EOX)
				190 bytes data.	
Dump All Stacks					
F0H	01H	09H	78H	D	F7H
1111 0000	0000 0001	0000 1001	0111 1000	DATA	1111 0111
(Sys Ex	Sequential ID	615 ID	All Stacks (120)	DATA	EOX)
				120 bytes data.	
Dump 1 Sequence					
F0H	01H	09H	7EH	D	F7H
1111 0000	0000 0001	0000 1001	0111 1110	DATA	1111 0111
(Sys Ex	Sequential ID	615 ID	Sequence (126)	DATA	EOX)
				up to 6000 bytes data.	
			The sequence dumped is the one currently selected on the front panel.		
Dump All Sequences					
F0H	01H	09H	7FH	D	F7H
1111 0000	0000 0001	0000 1001	0111 1111	DATA	1111 0111
(Sys Ex	Sequential ID	615 ID	All Seqs (127)	DATA	EOX)
				up to 6000 bytes data.	

RECOGNIZED RECEIVE DATA

Status	Second	Third	Fourth	Fifth	Sixth

Note On.

9NH	K	V
1001 nnnn	0kkk kkkk	0vvv vvvv

N is the Basic Channel.

K=36-91. If K is outside this range, note is played at an octave transposition within the range. (If the sequencer or arpeggiator are not being used, the MULTI-TRAK may play notes outside this range, depending on the setting of the Oscillator Coarse Frequency.)

Note Off.

9NH	K	00H
1001 nnnn	0kkk kkkk	0000 0000

N is the Basic Channel.

K=36-91.

Note Off

8NH	K	V
1000 nnnn	0kkk kkkk	0vvv vvvv

V is ignored.

MOD Wheel Amount (Default: enabled)

BNH	01H	V
1011 nnnn	0000 0001	0vvv vvvv

N is Basic Channel

V=0-127 (00H-7FH)

Local On/Off

BNH	7AH	V
1011 nnnn	0111 1010	0vvv vvvv

V=0, Local Control Off.

V=127, Local Control on.

When Local Control is off, the 615's keyboard, wheels, and program changes are disconnected from internal voices.

RECOGNIZED RECEIVE DATA

Status	Second	Third	Fourth	Fifth	Sixth

Track Volume

BNH	07H	V
1011 nnnn	0000 0111	0vvv vvvv
or		
BNH	24H	V
1011 nnnn	0010 0100	0vvv vvvv

N, in modes 1 and 3, is the Basic Channel, and the volume affects all voices. In mode 4, N is the channel number which determines the voice affected.

V is track volume (0-127).

All Voices Off

BNH	7BH	00H
1011 nnnn	0111 1011	0000 0000

Omni Mode Off (All Notes Off).

BNH	7CH	00H
1011 nnnn	0111 1100	0000 0000

Omni Mode On (All Notes Off).

BNH	7DH	00H
1011 nnnn	0111 1101	0000 0000

Mono Mode On (Poly Mode Off - All Notes Off).

BNH	7EH	M
1011 nnnn	0111 1110	0vvv vvvv
		M is ignored.

Poly Mode On (Mono Mode Off - All Notes Off).

BNH	7FH	00H
1011 nnnn	0111 1111	0000 0000

Program Change.

CNH	V
1100 nnnn	0vvv vvvv
	V=Program Number (0 through 99).

RECOGNIZED RECEIVE DATA

Status	Second	Third	Fourth	Fifth	Sixth
Request to Dump All Sequences					
F0H	01H	00H	7FH	F7H	
1111 0000	0000 0001	0000 0000	0111 1111	1111 0111	
(Sys Ex	Sequential ID	0	All Seqs (127)	EOX)	
Request to Dump All Stacks					
F0H	01H	00H	78H	F7H	
1111 0000	0000 0001	0000 0000	0111 1000	1111 0111	
(Sys Ex	Sequential ID	0	All Stacks (120)	EOX)	
Double Mode.					
F0H	01H	7BH	0NH	F7H	
1111 0000	0000 0001	0111 1011	0000nnnn	1111 0111	
(Sys Ex	Sequential ID	Select Channel	Basic Channel	EOX)	

Sets Basic Channel to N(nnnn). Also enables wheels and program changes, and selects Mode 4 (Omni Off/Mono On).

Song Select

F3H	S
1111 0011	0sss ssss
	S=0-3.

Timing Clock (Default: disabled)

F8H

Can be received at any time, including between any other messages. Used to sync internal sequencer to MIDI-equipped drum machines.

RECOGNIZED RECEIVE DATA

Status	Second	Third	Fourth	Fifth	Sixth
Start. FAH 1111 1010					
Continue. FBH 1111 1011					
Stop. FCH 1111 1100					

Table 1
PROGRAM DATA FORMAT

Byte #	MS Byte						LS Byte	
0	A5	A4	A3	A2	A1	A0	B4	B3
1	B2	B1	B0	C3	C2	C1	C0	D3
2	D2	D1	D0	E4	E3	E2	E1	E0
3	F4	F3	F2	F1	F0	G3	G2	G1
4	G0	H4	H3	H2	H1	H0	I5	I4
5	I3	I2	I1	I0	J3	J2	J1	J0
6	K3	K2	K1	K0	L4	L3	L2	L1
7	L0	M4	M3	M2	M1	M0	N6	N5
8	N4	N3	N2	N1	N0	O5	O4	O3
9	O2	O1	O0	P3	P2	P1	P0	Q3
A	Q2	Q1	Q0	R4	R3	R2	R1	R0
B	S4	S3	S2	S1	S0	T3	T2	T1
C	T0	U4	U3	U2	U1	U0	V5	V4
D	V3	V2	V1	V0	W3	W2	W1	W0
E	X3	X2	X1	X0	Y4	Y3	Y2	Y1
F	Y0	Z4	Z3	Z2	Z1	Z0	AA3	AA2
10	AA1	AA0	BB4	BB3	BB2	BB1	BB0	CC6
11	CC5	CC4	CC3	CC2	CC1	CC0	DD5	DD4
12	DD3	DD2	DD1	DD0				

Code	Bits Resolution	Parameter Name
	OSCILLATOR	
A	6	Frequency
B	5	Fine
C	4	Glide
D	4	Envelope Amount
E	5	Attack
F	5	Decay
G	4	Sustain
H	5	Release
I	6	Pulse Width
	LFO/MIXER	
J	4	Velocity Sensitivity amount
K	4	LFO frequency
L	5	LFO Amount
M	5	Mixer

FILTER

N	7	Cutoff
O	6	Resonance
P	4	Velocity Sensitivity
Q	4	Envelope Amount
R	5	Attack
S	5	Decay
T	4	Sustain
U	5	Release
V	6	Frequency Modulation

VCA

W	4	Velocity Sensitivity
X	4	Envelope Amount (Voice Volume)
Y	5	Attack
Z	5	Decay
AA	4	Sustain
BB	5	Release

SWITCHES

Code	Bit	Switch Name
CC	0	Oscillator Sawtooth
CC	1	Oscillator Triangle
CC	2	Oscillator Pulse
CC	3	Oscillator Envelope Invert
CC	4	Filter Envelope Invert
CC	5	Unison
CC	6	Chorus
DD	0	LFO Shape (1= Triangle, 0= Square)
DD	1	LFO Oscillator Modulation
DD	2	LFO Pulse Modulation
DD	3	LFO Filter Modulation
DD	4	Filter Keyboard Track Half
DD	5	Filter Keyboard Track Full