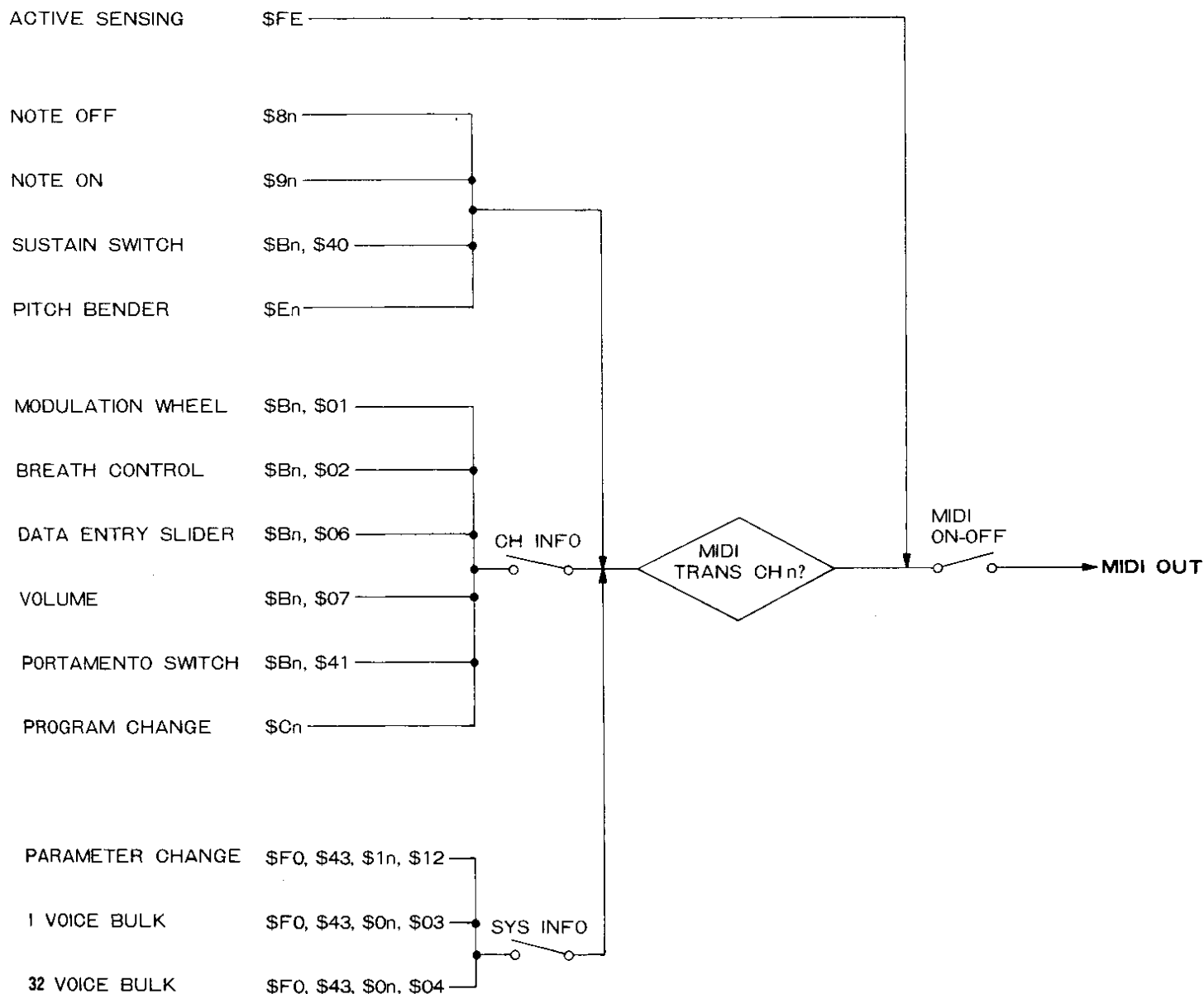


MIDI DATA FORMAT

1. Transmission Conditions



2. Transmission Data

All MIDI data is transmitted when the MIDI ON/OFF function is ON. The MIDI transmission channel is determined by the setting of the MIDI TRNS CH function.

2-1. CHANNEL INFORMATION

2-1-1. Channel Voice Message

(1) Key Off

Status	1000nnnn	n=channel no.
Note no.	0kkkkkkk	k=36(C1) ~ 96(C6)
Velocity	01000000	

(2) Key On

Status	1000nnnn	n=channel no.
Note no.	0kkkkkkk	k=36(C1) ~ 96(C6)
Velocity	01000000	

(3) Control Change

Status	1011nnnn	n=channel no.
Control no.	0ccccccc	
Control code	0vvvvvvv	

a) Transmitted whether MIDI CH INFO is ON or OFF

Control no.	Control code.
C=64: Sustain sw.	V=0:OFF, 127:ON

b) Transmitted when MIDI CH INFO is ON

Control No.	Control code
C=1: modulation wheel	V=0~127
C=2: breath control	V=0~127
C=6: data entry slider	V=0~127
C=7: foot volume	V=0~127
C=65: portamento sw.	V=0:OFF, 127:ON

(4) Program Change

Status	1100nnnn	n=channel no.
Program no.	0ppppppp	p=0~31

This data is transmitted when a voice selector is pressed during the play mode, when MIDI CH INFO is ON and MIDI SYS INFO is OFF. Also transmitted when a performance selector is pressed in the performance mode.

(5) Pitch Bend

Status	1110nnnn	n=channel no.
Code (LSB)	0uuuuuuu	
Code (MSB)	0vvvvvvv	

The transmitted data is as follows:

MSB	LSB	
00000000	00000000	Lowest value
01000000	00000000	Center value
01111111	01111110	Highest value

2-2. SYSTEM INFORMATION

2-2-1. System Real-time Message

Active sensing	
Status	11111110

Transmitted once approximately every 200 milliseconds

2-2-2. System Exclusive Message

Transmitted only when MIDI SYS INFO is ON

(1) Parameter Change

Status	11110000	
ID no.	01000011	
Substatus/ch. no.	0001nnnn	n=channel no.
Parameter group no.	00010010	
Parameter no.	0ppppppp	
Data	0ddddddd	
EOX	11110111	

This data is transmitted when voice or function parameters are changed in the EDIT or FUNCTION modes. The voice parameters transmitted are those given in voice parameter table 5-2, and the function parameters transmitted are shown in function parameter table 5-3.

(2) 1 Voice Bulk Data

Status	11110000	
ID no.	01000011	
Substatus/ch. no.	0000nnnn	n=channel no.
Format no.	00000011	
Byte count	00000000	
Byte count	01011101	
Data	0ddddddd	} 93 bytes
	0ddddddd	
Checksum	0eeeeeee	
EOX	11110111	

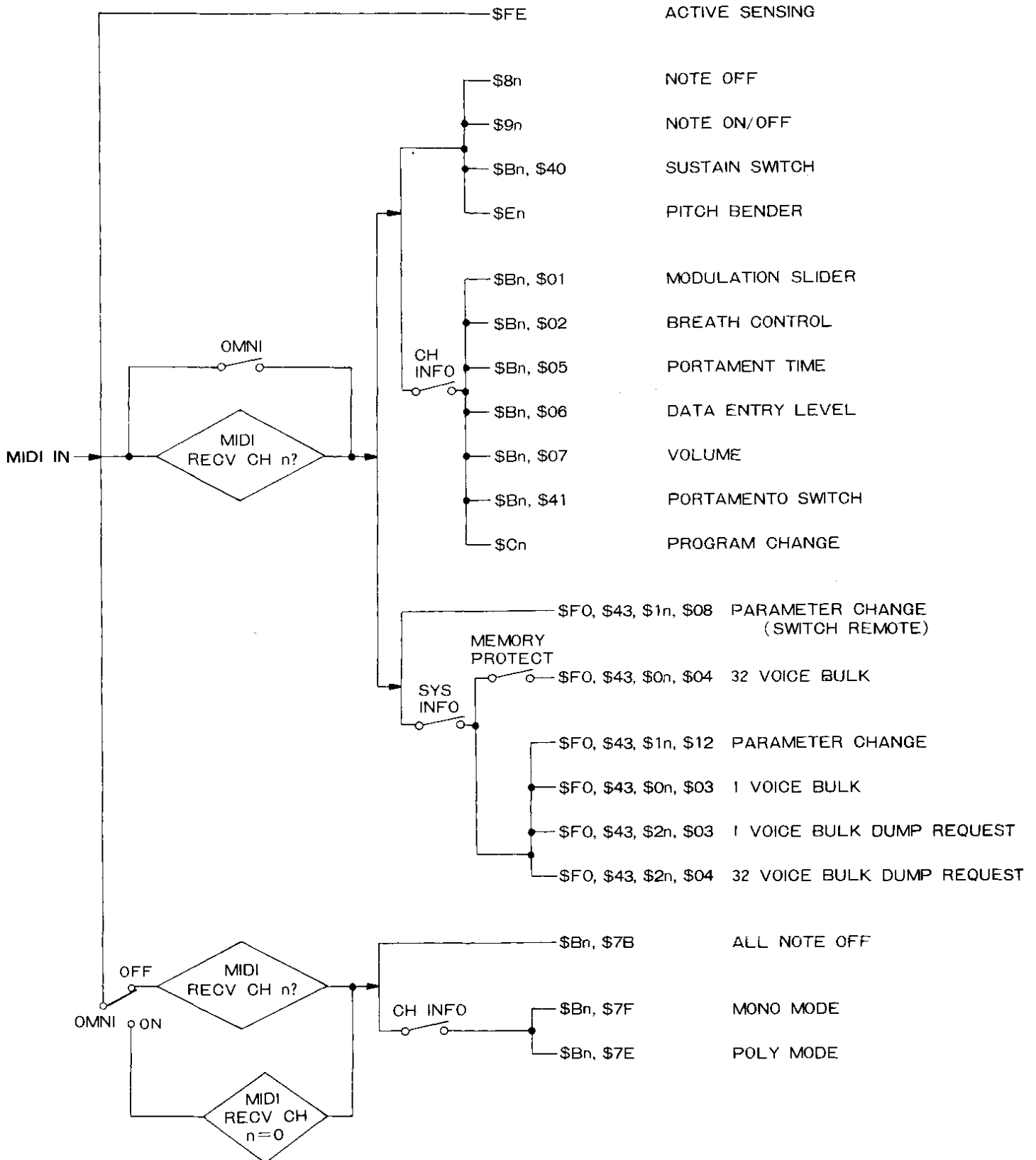
The data for one voice is transmitted when a voice selector is pressed in the PLAY SINGLE mode. Data in the voice edit buffer is transmitted when a format no. f=3 dump request is received. The transmitted data is shown in voice parameter table 5-2. The checksum is the lowest 7 bits of the two's complement sum of all data bytes (the same applies below).

(3) 32 Voice Bulk Data

Status	11110000	
ID no.	01000011	
Substatus/ch. no.	0000nnnn	n=channel no.
Format no.	00000100	
Byte count	00100000	
Byte count	00000000	
Data	0ddddddd	} 4096 bytes
	0ddddddd	
Checksum	0eeeeeee	
EOX	11110111	

The data of all 32 voices in RAM memory will be transmitted if the YES (or BULK) key is pressed in response to the "MIDI Transmit?" display which appears when the BULK key is pressed in the FUNCTION mode. The data for all 32 voices will also be transmitted when a format no. f=4 dump request is received. The transmitted data is shown in voice data table 5-1. 55 bytes of 0's are added to the 73 bytes in this table, so 128 bytes are transmitted for each voice. 4096 bytes are therefore transmitted for all 32 voices.

3. Reception Conditions



4. Reception Data

All MIDI data is received when the MIDI ON/OFF function is ON. When a specific MIDI receive channel has been selected using the MIDI RECV CH function, and the OMNI mode is OFF, MIDI data will be received only on the specified channel. MIDI data will be received on all channels when the OMNI mode is ON.

4-1. CHANNEL INFORMATION

4-1-1. Channel Voice Message

(1) Key off

Status	1000nnnn	n=channel no.
Note no.	0kkkkkkk	k=0(C-2) ~ 127 (G8)
Velocity	0vvvvvvv	v is ignored

(2) Key On/Off

Status	1001nnnn	n=channel no.
Note no.	0kkkkkkk	k=0(C-2) ~ 127 (G8)
Velocity	0vvvvvvv	v=0: key off v=1~127: key on

The key on note level will vary according to the received velocity value. The range of this instrument is C-1 to B6. If a higher or lower key number is received, it will be output within the range limits. For example, received C7 through B7 data will be output as notes in the C6 through B6 range.

(3) Control Change

Status	1011nnnn	n=channel no.
Control no.	0ccccccc	
Control code	0vvvvvvv	

a) Received whether MIDI CH INFO is ON or OFF

Control no.	Control code
C=64: Sustain sw.	V=0:OFF, 127:ON
Control no.	Control code
C=1: modulation wheel	V=0~127
C=2: breath control	V=0~127
C=5: portamento time	V=0~127
C=6: data entry slider	V=0~127
C=7: foot volume	V=0~127
C=65: portamento sw.	V=0:OFF, 127:ON

(4) Program Change

Status	1100nnnn	n=channel no.
Program no.	0ppppppp	

Received only when MIDI CH INFO is ON. If received during the PLAY or PERFORMANCE mode the voice or performance number will be changed accordingly. The lower five bits of the program no. contain the voice or performance number.

(5) Pitch Bend

Status	1110nnnn	n=channel no.
Code (LSB)	0uuuuuuu	
Code (MSB)	0vvvvvvv	

Function s only on MSB data:

MSB	
00000000	Lowest value
01000000	Center value
01111111	Highest value

4-1-2. Channel Mode Message

Status	1011nnnn	n=channel no.
	0ccccccc	
	0vvvvvvvv	

a) Recived whether MIDI CH INFO is ON or OFF

C=123	V=0	All notes OFF
-------	-----	---------------

b) Received only when MIDI CH INFO is ON

C=126	V=1	MONO mode ON
C=127	V=0	POLY mode ON

4-2. SYSTEM INFORMATION

4-2-1. System Real-Time Message

Active sensing

Status	11111110
--------	----------

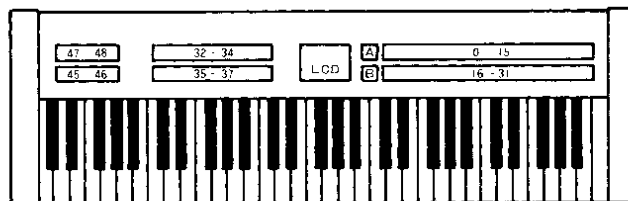
Sensing begins when this code is received once. If status and data are not received within 300 milliseconds the MIDI receive buffer will be cleared and the currently output note will be turned OFF.

4-2-2. System Exclusive Message

(1) parameter Change (switch mode)

Status	11110000	
ID no.	01000011	
Substatus/ch. no.	0001nnnn	n=channel no.
Parameter group no.	00001000	
Switch no.	0mmmmmmm	
Data	0ddddd	d=0:OFF, 1~127:ON
EOX	11110111	

All panel swithces are controlled. The switch numbers are arranged as shown in the illustration below. Receiced only when MIDI SYS INFO is ON.



(2) Parameter Change

The format is the same as the transmitted parameter change data. Received only when MIDI SYS INFO is ON. Permits changing voice and function parameters while the EDIT mode is active. It is also possible to change modes: PLAY, EDIT, etc. The parameter no. and data received are shown in voice parameter table 5-2 and function parameter table 5-3.

(3) 1 Voice Bulk Data

Received only when MIDI SYS INFO is ON. The format is the same as for the transmitted 1 voice bulk data. The 93 voice data bytes are read into the voice edit buffer, replacing the current voice data. The 93 received data bytes are shown in voice parameter table 5-2.

(4) 32 Voice Bulk Data

Received only when MIDI SYS INFO is ON. The format is the same as for the transmitted 32 voice bulk data. This data can be received only when the MEMOTY PROTECT function is OFF. The received voice data is stored in the 32 RAM voice memory locations. The "MIDI RECEIVED!!" display appears to confirm complete reception of 32 voice bulk data.

(5) Dump Request

Status	11110000	
ID no.	01000011	
Substatus/ch. no.	0010nnnn	n=channel no.
Format no.	0 f f f f f f f	f=3,4
EOX	11110111	

Received only when MIDI SYS INFO is ON. When received the bulk data corresponding to the received format code will be dumped via MIDI OUT.

f=3: 1 voice bulk data
f=4: 32 voice bulk data

5. System Exclusive Data

5-1. VOICE DATA (VMEM format)

Parameter no. P	Parameter	
0	ATTACK RATE	OP 4
1	DECAY 1 RATE	
2	DECAY 2 RATE	
3	RELEASE RATE	
4	DECAY 1 LEVEL	
5	KEYBOARD SCALING LEVEL	
6	AMPLITUDE MODULATION ENABLE/EG BIAS SENSITIVITY/KEY VELOCITY	
7	OUTPUT LEVEL	
8	OSCILLATOR FREQUENCY	
9	KEYBOARD SCALING RATE/DETUNE 1	
10 }	SAME AS FOR OP4	OP 2
19		
20 }	SAME AS FOR OP4	OP 3
29		
30 }	SAME AS FOR OP4	OP 1
39		
40	LFO SYNC/FEEDBACK LEVEL/ALGORITHM	
41	LFO SPEED	
42	LFO DELAY	
43	PITCH MODULATION DEPTH	
44	AMPLITUDE MODULATION DEPTH	
45	PITCH MODULATION SENSITIVITY/AMPLITUDE MODULATION SENSITIVITY/LFO WAVE	
46	TRANPOSE	
47	PITCH BEND RANGE	
48	CHORUS SWITCH/PLAY MODE/SUSTAIN FOOT SWITCH/PORTAMENT FOOT SWITH/PORTAMENTO MODE	
49	PORTAMENTO TIME	
50	FOOT VOLUME	
51	MODULATION WHEEL PITCH MODULATION RANGE	
52	MODULATION WHEEL AMPLITUDE MODULATION RANGE	
53	BREATH CONTROL PITCH MODULATION RANGE	
54	BREATH CONTROL AMPLITUDE MODULATION RANGE	
55	BREATH CONTROL PITCH BIAS RANGE	
56	BREATH CONTROL EG BIAS RANGE	
57	VOICE NAME 1	
66	VOICE NAME 10	
67	PITCH EG RATE 1	
68	PITCH EG RATE 2	
69	PITCH EG RATE 3	
70	PITCH EG LEVEL 1	
71	PITCH EG LEVEL 2	
72	PITCH EG LEVEL 3	

5-2. VOICE PARAMETERS (VCED format)

Parameter no. P	Parameter	LCD Display	Data	Note
0	ATTACK RATE	EG AR	0 ~ 31	
1	DECAY 1 RATE	EG D1R	0 ~ 31	
2	DECAY 2 RATE	EG D2R	0 ~ 31	
3	RELEASE RATE	EG RR	0 ~ 15	
4	DECAY 1 LEVEL	EG D1L	0 ~ 15	
5	KEYBOARD SCALING LEVEL	LEVEL SCALE	0 ~ 99	
6	KEYBOARD SCALING RATE	RATE SCALE	0 ~ 3	OP4
7	EG BIAS SENSITIVITY	E BIAS SENS.	0 ~ 7	
8	AMPLITUDE MODULATION ENABLE	A MOD SENS.	0, 1	
9	KEY VELOCITY	KEY VELOCITY	0 ~ 7	
10	OUTPUT LEVEL	OUTPUT LEVEL	0 ~ 99	
11	OSCILLATOR FREQUENCY	FREQUENCY	0 ~ 63	
12	DETUNE 1	DETUNE	0 ~ 7	
13 } 25	SAME AS FOR OP4	OP2		
26 } 38	SAME AS FOR OP4	OP3		
39 } 51	SAME AS FOR OP4	OP1		
52	ALGORITHM	ALGORITHM SELECT	0 ~ 7	
53	FEEDBACK LEVEL	FEEDBACK	0 ~ 7	
54	LFO SPEED	LFO SPEED	0 ~ 99	
55	LFO DELAY	LFO DELAY	0 ~ 99	
56	PITCH MODULATION DEPTH	LFO PMD	0 ~ 99	
57	AMPLITUDE MODULATION DEPTH	LFO AMD	0 ~ 99	
58	LFO SYNC	LFO SYNC	0, 1	
59	LFO WAVE	LFO WAVE	0 ~ 3	
60	PITCH MODULATION SENSITIVITY	P MOD SENS.	0 ~ 7	
61	AMPLITUDE MODULATION SENSITIVITY	A MOD SENS.	0 ~ 7	
62	TRANSPOSE	Middle C	0 ~ 48	
63	PLAY MODE POLY/MONO	Poly Mode	0, 1	
64	PITCH BEND RANGE	P Bend Range	0 ~ 12	
65	PORTAMENTO MODE	Full Time Porta	0, 1	
66	PORTAMENTO TIME	Porta Time	0 ~ 99	
67	FOOT VOLUME	Foot Volume	0 ~ 99	
68	SUSTAIN FOOT SWITCH	Foot Sustain	0, 1	
69	PORTAMENT FOOT SWITCH	Foot Porta	0, 1	
70	CHORUS SWITCH	Chorus	0, 1	
71	MODULATION WHEEL PITCH MODULATION RANGE	MW Pitch	0 ~ 99	
72	MODULATION WHEEL AMPLITUDE MODULATION RANGE	MW Amplitude	0 ~ 99	
73	BREATH CONTROL PITCH MODULATION RANGE	BC Pitch	0 ~ 99	
74	BREATH CONTROL AMPLITUDE MODULATION RANGE	BC Amplitude	0 ~ 99	
75	BREATH CONTROL PITCH BIAS RANGE	BC Pitch Bias	0 ~ 99	
76	BREATH CONTROL EG BIAS RANGE	BC EG Bias	0 ~ 99	
77	VOICE NAME		1 ASCII	
86			10 ~ 99	
87	PITCH EG RATE 1	PEG RATE 1	0 ~ 99	
88	PITCH EG RATE 2	PEG RATE 2	0 ~ 99	
89	PITCH EG RATE 3	PEG RATE 3	0 ~ 99	
90	PITCH EG LEVEL 1	LEVEL 1	0 ~ 99	
91	PITCH EG LEVEL 2	LEVEL 2	0 ~ 99	
92	PITCH EG LEVEL 3	LEVEL 3	0 ~ 99	

5-3. FUNCTION PARAMETERS

Parameter no. P	Parameter	LCD Display	Data	Note
93	OPERATOR ENABLE/DISABLE		0 ~ 15	
94	OPETATOR SELECT		0 ~ 3	
95	EDIT MODE I=ON		0, 1	※
96	FUNCTION MODE I=ON	FUNCTION CONTROL	0, 1	※
97	STORE MODE I=ON	MEMORY STORE	0, 1	※
98	PLAY DUAL MODE I=ON		0, 1	※
99	PLAY SPLIT MODE I=ON		0, 1	※
100	PLAY SINGLE MODE I=ON	PLAY SINGLE	0, 1	※
101	DUAL MODE DETUNE	Dual Detune	0 ~ 99	
102	SPLIT POINT		0 ~ 127	※
103	MASTER TUNE \$40=CENTER .	Master Tune	0 ~ 127	
104	MIDI SWITCH I=ON	Midi Switch	0, 1	※
105	MIDI CH INFO	Midi is OFF!	0, 1	※
106	OMNI 0=OFF I=ON	Midi Omni	0, 1	※
107	MIDI TRANS CH	Midi Trns Ch	0 ~ 15	※
108	MIDI RECV CH 0=OMNI ON	Midi Recv Ch	0 ~ 16	※
109	MIDI SYS INFO	Midi Sy Info	0, 1	※
110	32 VOICE BULK DUMP	Midi Transmit?	1	※
111	EDIT RECALL	Recall Edit?	0, 1	※
112	INIT VOICE	Init. Voice?	0, 1	※
113				
114				
115				
116				
117				
118				
119	MEMORY PROTECT I=ON	Mem Protect	0, 1	※
120	KEY SHIFT 24=CENTER	Key Shift	0 ~ 48	
121	PITCH BEND MODE I=ON	Bend Mode	0, 1	※
122	KEY SHIFT		0, 1	※
123	COMPARE		0, 1	※
124	PITCH BEND MODE		0 ~ 2	
125				
126				
127				

※ Receive only

```

Mode 1 : OMNI ON, POLY      Mode 2 : OMNI ON, MONO      o : Yes
Mode 3 : OMNI OFF, POLY     Mode 4 : OMNI OFF, MONO     x : No

```