CASIO CZ-1

MIDI SPECIFICATION

Extract

(filler)

Parameter Change Message Formats

```
<SysEx>
          <Casio ID> (44H)
          <00> (Sub ID 1)
          <00> (Sub ID 2)
          <7n> (n= Basic channel)
          <Operation Code> *
          <data>
  <EOX>
```

* defined operation codes for parameter changes are **40H-59H** (see table).
Level (**46H**), Tone 2 Pitch (**52H**) have 2 data bytes.
Key Code Sweep (**59H**) has 3 data bytes.
All other parameter change messages have 1 data byte.

This table shows which parameter change messages are recognized by the different CZ instruments. Note that the CZ–1000 recognizes the same messages as the CZ–101, and the CZ–3000 recognizes the same messages as the CZ–5000 (with the exception of sequencer data).

Hex Code	Message Description	CZ1	CZ101	CZ5000	CZ230	CZ6500
40	Bend Range	•	•	•	•	•
41	Transpose	•	•	•	•	•
42	Tone Mix	•	•			•
43	Glide Note	•		•		
44	Glide Time	•		•		
45	Mod Wheel Depth	•		•		
46	Level	•		•		
47	Glide On/Off	•		•		
48	Portamento Sweep	•				
49	Modulation On/Off	•				
4A	Mod After Touch Depth •					
4B	Amp After Touch Range •					
4C	Cartridge On/Off	•				
4D	CZ-1 Mode	•				
4E	Cursor	•				
4F	Page	•				

Hex Code	Message Description	CZ1	CZ101	CZ5000	CZ230	CZ6500
50	Multi-Channel Mode On/Off	•				
51	Number of Poly 1/2	•				
52	Tone 2 Pitch	•				
53	Split Point	•				
54	Sus Pedal ENA/DIS	•				
55	Octave Shift	•				
56	Chorus On/Off	•				
57	Time Break 1	•				
58	Time Break 2	•				
59	Key Code Sweep	•				

Casio
CZ-1 (Digital PD Synthesizer)

The CZ-1 is capable of sending and receiving the system exclusive messages noted in the table below. The send/receive status of each message is also noted.

I. SYSTEM EXCLUSIVE MESSAGE

SYSTEM EXCLUSIVE MESSAGE	NORMAL				TONE MIX		KEY SPLIT		OPERATION MEMORY	
	POLY MODE		MULTI CH MODE		POLY MODE		POLY MODE		POLY MODE	
	RECEIVE	SEND	RECEIVE	SEND	RECEIVE	SEND	RECEIVE	SEND	RECEIVE	SEND
(1) SEND REQUEST 1	○	○			○	○	○	○	○	○
(2) RECEIVE REQUEST 1	○	○			○	○	○	○	○	○
(3) SEND REQUEST 2	○	○			○	○	○	○	○	○
(4) RECEIVE REQUEST 2	○	○			○	○	○	○	○	○
(5) SEND REQUEST 3	○	○			○	○	○	○	○	○
(6) RECEIVE REQUEST 3	○	○			○	○	○	○	○	○
(7) BEND RANGE	○		○		○		○		○	
(8) KEY TRANSPOSE	○		○		○		○		○	
(9) GLIDE NOTE	○		○		○		○		○	
(10) GLIDE TIME	○		○		○		○		○	
(11) MOD WHEEL DEPTH	○		○		○		○		○	
(12) LEVEL	○		○		○		○		○	
(13) GLIDE ON§OFF	○	○	○	○	○	○	○	○	○	○
(14) PORTAMENTO SWEEP	○		○		○		○		○	
(15) MODULATION ON§OFF	○	○	○	○	○	○	○	○	○	○
(16) MOD. AFTER TOUCH DEPTH	○				○		○		○	
(17) AMP. AFTER TOUCH RANGE	○				○		○		○	
(18) CARTRIDGE ON§OFF	○	○			○	○	○	○		
(19) CZ-1 MODE	○		○		○		○		○	
(20) CURSOR	○		○		○		○		○	
(21) PAGE	○				○		○			
(22) MULTI CHANNEL MODE	○		○		○		○		○	
(23) POLY 1			○							
(24) POLY 2			○							
(25) TONE 2 PITCH	○		○		○		○			
(26) SPLIT POINT	○		○		○		○			
(27) SUS. PEDAL ENA§DIS	○		○		○		○			
(28) OCT. SHIFT	○		○		○		○			
(29) CHORUS ON§OFF	○		○		○		○			
(30) TIME BREAK	○		○		○		○		○	
(31) KEY CODE SWEEP	○		○		○		○		○	

II. TIMBRE DATA AND OPERATION MEMORY DATA EXCLUSIVE MESSAGES

The following six messages are used by the CZ-1 for the transmission of timbre data and operation memory data.

(1) SEND REQUEST 1
(2) RECEIVE REQUEST 1
(3) SEND REQUEST 2
(4) RECEIVE REQUEST 2
(5) SEND REQUEST 3
(6) RECEIVE REQUEST 3

- Messages (1) and (2) are used for transmission of timbre data with such keyboards as the CZ-5000 and CZ-101 whose formats do not include VELOCITY (LINE 1, 2), LEVEL (DCA 1, DCA 2), NAME.
- Messages (3) and (4) are used for the communication of CZ-1 operation memory data.
- Details for each data format are included on pages 00 through 00.

(1) SEND REQUEST 1

The CZ-1 sends the specified number timbre data (1 timbre) when a SEND REQUEST 1message is received. The SEND REQUES 1 message is also sent from the CZ-1 when timbre data are received from a CZ-5000 by CZ-1 key operation.

	Personal Computer → CZ-1 CZ-1 → CZ-5000	CZ-1 → Personal Computer CZ-5000 → CZ-1
1	F 0 | 4 4 | 0 0 | 0 0 | 7 N | 1 0 | d_1d_2	
2		F 0 | 4 4 | 0 0 | 0 0 | 7 N | 3 0
3	7 N | 3 1	
4		Timbre data | F 7
5	F 7	

1 (i) INTERNAL A-1 ~ H-8 -> d_1d_{2H} = 00 ~ $3F_H$
(ii) SOUND AREA -> d_1d_{2H} = 60_H
- SOUND AREA indicates the sound production area when the keyboard of the CZ-1 is pressed
- The transmission shown in the above table repeats 64_{10} times when timbre data are received from a CZ-5000 by CZ-1 key operation. (d_1d_2 take successive values from 00 through $3F_H$).

2 (i) BASIC CH - 1 = N (0_H ~ F_H) when the CZ-1 receives a SEND REQUEST 1 message.

(ii) KBCH - 1 = N (0_H ~ F_H) when the CZ-1 sends a SEND REQUEST 1 message.

3 Details on timbre data are included on page 43.

(2) RECEIVE REQUEST 1

The CZ-1 stores the single timbre data received following a RECEIVE REQUEST 1 message to the specified memory number. The SEND REQUEST 1 message is also sent from the CZ-1 when timbre data are sent from the CZ-1 to a CZ-5000 by CZ-1 key operation.

	Personal Computer → CZ-1 CZ-1 → CZ-5000	CZ-1 → Personal Computer CZ-5000 → CZ-1
1	F0 44 00 00 00 7N 20 d_1d_2	
2		F0 44 00 00 00 7N 30
3	[ ] Timbre data F7	
4		F7

1 (i) INTERNAL A-1 ~ H-8 -> $d_1d_{2H} = 00 \sim 3F_H$

(ii) SOUND AREA + COP/RECALL AREA -> $d_1d_{2H} = 60_H$

* The transmission shown in the above table repeats 64 times when timbre data are sent to a CZ-5000 from the CZ-1 by CZ-1 key operation. (d_1d_{2H} take successive values from 00 through $3F_H$.)

In the case of a CZ-5000, 00_H through $1F_H$ is the preset areas (ROM), so 32 timbres are actually sent into the area of $d_1d_{2H} = 20_H \sim 3F_H$.

2 (i) BASIC CH - 1 = N ($0_H \sim F_H$) when the CZ-1 receives a RECEIVE REQUEST 1 message.

(ii) KBCH - 1 * N ($0_H \sim F_H$) when the CZ-1 sends a RECEIVE REQUEST 2 message.

3 Details on timbre data are included on page 43.

(3) SEND REQUEST 2

The CZ-1 sends the specified number timbre data (1 timbre) when a SEND REQUEST 2 message is received. The SEND REQUEST 2 message is also sent from the CZ-1 (MASTER) when timbre data are received from another CZ-1 (SLAVE) by CZ-1 (MASTER) key operation.

	Personal Computer → CZ-1 CZ-1(MASTER) → CZ-1(SLAVE)	CZ-1 → Personal Computer CZ-1(SLAVE) → CZ-1(MASTER)
1	F0 44 00 00 00 7N 11 d_1d_2	
2		F0 44 00 00 00 7N 30
3	7N 31	
4		[ ] Timbre data F7
5	F7	

1 (i) INTERNAL A-1 ~ H-8 -> $d_1d_{2H} = 00 \sim 3F_H$

(ii) SOUND AREA -> $d_1d_{2H} = 60_H$

* The transmission shown in the above table repeats 64 times when timbre data are received from a CZ-1(SLAVE) by CZ-1(MASTER) key operation. (d_1d_{2H} take succesive values from 00_H through $3F_H$.)

2 (i) BASIC CH - 1 = N ($0_H \sim F_H$) when the CZ-1 receives a SEND REQUEST 1 message.

(ii) KBCH - 1 = N ($0_H \sim F_H$) when the CZ-1 sends a SEND REQUEST 2 message.

(4) RECEIVE REQUEST 2

The CZ-1 stores the single timbre data received following a RECEIVE REQUEST 2 message to the specified memory number. The SEND REQUEST 2 message is also sent from the CZ-1 (MASTER) when timbre data are sent from the CZ-1 (MASTER) to another CZ-1(MASTER) key operation.

	Personal Computer → CZ-1 CZ-1(MASTER) → CZ-1(SLAVE)	CZ-1 → Personal Computer CZ-1(SLAVE) → CZ-1(MASTER)
1	F 0 | 4 4 | 0 0 | 0 0 | 7 N | 2 1 | d_1d_2	
2		F 0 | 4 4 | 0 0 | 0 0 | 7 N | 3 0
3	[ ] Timbre data F 7	
4		F 7

1 (i) INTERNAL A-1 ~ H-8 -> $00 \sim 3F_H$

(ii) SOUND AREA + COP/RECALL AREA -> 60_H

* The transmission shown in the above table repeats 64 times when 64 timbre data are sent collectively (SAVE operation) to another CZ-1 (SLAVE) from the CZ-1 (MASTER) by CZ-1 (MASTER) key operation. (d_1d_2 take successive values from 00 through $3F_H$.)
* The transmission shown in the above table repeats once ($d_1d_2 = 60_H$) when a single timbre data is sent by CZ-1 (MASTER) key operation to another CZ-1 (SLAVE).

2 (i) BASIC CH - 1 = N ($0_H \sim F_H$) when the CZ-1 receives a RECEIVE REQUEST 2 message.

(ii) KBCH - 1 = N ($0_H \sim F_H$) when the CZ-1 sends a RECEIVE REQUEST 2 message.

3 Details on timbre data are included on page 43.

(5) SEND REQUEST 3

The CZ-1 sends the specified operation memory data (1 area) when a SEND REQUEST 3 message is received. The SEND REQUEST 3 message is also sent from the CZ-1 (MASTER) when operation memory data are received from another CZ-1 (SLAVE) by CZ-1 (MASTER) key operation.

	Personal Computer → CZ-1 CZ-1(MASTER) → CZ-1(SLAVE)	CZ-1 → Personal Computer CZ-1(SLAVE) → CZ-1(MASTER)
1	F 0 4 4 0 0 0 0 7 N 1 2 d_1d_2	
2		F 0 4 4 0 0 0 0 7 N 3 0
3	7 N 3 1	
4		Operation data F 7
5	F 7	

1 OPERATION MEMORY

A-1~H-8 -> $d_1d_2 = 00_H \sim 3F_H$

- The transmission shown in the above table repeats 64 times when operation data are received from a CZ-1 (SLAVE) by CZ-1 (MASTER) key operation. (d_1d_2 take successive values from 00 through $3F_H$.)

2 (i) BASIC CH-1 = N ($0_H \sim F_H$) when the CZ-1 sends a SEND REQUEST 3 message.

(ii) KBCH-1 = N ($0_H \sim F_H$) when the CZ-1 receive a SEND REQUEST 3 message.

(6) RECEIVE REQUEST 3

The CZ-1 stores the single area operation memory data received following a RECEIVE REQUEST 3 message to the specified memory number. The SEND REQUEST 3 message is also sent from the CZ-1 (MASTER) to another CZ-1 (SLAVE) by CZ-1 (MASTER) key operation.

	Personal Computer → CZ-1 CZ-1(MASTER) → CZ-1(SLAVE)	CZ-1 → Personal Computer CZ-1(SLAVE) → CZ-1(MASTER)
1	F 0 4 4 0 0 0 0 7 N 2 2 d_1d_2	
2		F 0 4 4 0 0 0 0 7 N 3 0
3	Operation data F 7	
4		F 7

1 (i) OPERATION MEMORY

A-1~H-8 -> $d_1d_2 = 00_H \sim 3F_H$

* The transmission shown in the above table repeats 64 times when 64 area data are sent collectively (SAVE operation) to another CZ-1 (SLAVE) from the CZ-1 (MASTER) by CZ-1 (MASTER) key operation. (d_1d_2 from 00 through $3F_H$+.)
* The transmission shown in the above table repeats once when a single area data is sent by CZ-1 (MASTER) key operation to another CZ-1 (SLAVE). d_1d_2 in this case take on a value in the range of 00_H through $3F_H$ according to the CZ-1 (MASTER) key operation.

2 (i) BASIC CH-1 = N ($0_H \sim F_H$) when the CZ-1 receives a RECEIVE REQUEST 3 message.

(ii) KBCH-1 = N ($0_H \sim F_H$) when the CZ-1 sends a RECEIVE REQUEST 3 message.

3 Details on operation memory data are included on page 53.

III. EXCLUSIVE MESSAGE

(7) BEND RANGE

The bend range of the CZ-1 changes in accordance with BEND RANGE data received from a personal computer.

	Personal Computer → CZ-1												
1	F0	44	00	00	7N	40	d_1d_2	F7

HEX

1 BEND RANGE 0 ~ 12 -> $d_1d_2 = 0 \sim C_H$

2 BASIC CHANNEL - 1 = N ($0_H \sim F_H$)

(8) KEY TRANSPOSE

The key transpose of the CZ-1 changes in accordance with KEY TRANSPOSE data received from a personal computer.

	Personal Computer → CZ-1												
1	F0	44	00	00	7N	41	d_1d_2	F7

HEX

1 KEY TRANSPOSE

KEY	G	A_b	A	B_b	B	C	$C_\#$	D	E_b	E	F	$F_\#$
d_1d_2	45	44	43	42	41	00	01	02	03	04	05	06

HEX

2 BASIC CHANNEL-1 = N ($0_H \sim F_H$)

(9) GLIDE NOTE

The glide note of the CZ-1 changes in accordance with GLIDE NOTE data received from a personal computer.

	Personal Computer → CZ-1												
1	F0	44	00	00	7N	43	d_1d_2	F7

HEX

1 GLIDE NOTE

+ 1 ~ + 12 -> $d_1d_2 = 1_H \sim C_H$

- 1 ~ - 12 -> $d_1d_2 = 41_H \sim 4C_H$

2 BASIC CHANNEL - 1 = N (0 ~ F_H)

(10) GLIDE TIME

The glide time of the CZ-1 changes in accordance with GLIDE TIME data received from a personal computer.

	Personal Computer → CZ-5000												
1	F0	44	00	00	7N	44	d_1d_2	F7

HEX

1 GLIDE TIME 0 ~ 99 -> $d_1d_2 = 0 \sim 63_H$

2 BASIC CHANNEL - 1 = N (0 ~ F_H)

(11) MOD WHEEL DEPTH

The mod wheel depth time of the CZ-1 changes in accordance with MOD WHEEL DEPTH data received from a personal computer.

	Personal Computer → CZ-1												
1	F	0	4	4	0	0	0	0	7	N	4	5	d_1d_2	F	7

HEX

1 MOD WHEEL DEPTH 0 ~ 99 -> d_1d_2 = 0 ~ 63_H

2 BASIC CHANNEL - 1 = N (0_H ~ F_H)

(12) LEVEL

The volume level of the CZ-1 changes in accordance with LEVEL data received from a personal computer.

	Personal Computer → CZ-1													
1	F	0	4	4	0	0	0	0	7	N	4	6	d_1d_2	d_3d_4	F	7

HEX

1 LEVEL 01 ~ 15 -> d_1d_2 = 01_H ~ $0F_H$

2 BASIC CH-1 = d_3d_4 (0_H ~ F_H)

* CHECK CH-1 = d_3d_4 (0_H ~ F_H) when CZ-1 is in the MULTI CHANNEL mode.

3 N -> DON'T CARE

The following elements can be changed by LEVEL data.

(1) NORMAL MODE

(i) The level of each timbre is set commonly for lines 1 and 2, regardless of the LINE VOLUME level in the PARAMETER SECTION.

(ii) In the MULTI CHANNEL mode, the level of each CHECK CH can be set independently.

(2) TONE MIX mode

The levels of TONE 1 and TONE 2 can be set independently. The level can be changed at the current cursor position on the LCD of the CZ-1.

(3) KEY SPLIT mode

The levels of UPPER and LOWER can be set independently. The level can be changed at the current cursor position on the LCD of the CZ-1.

(4) OPERATION MEMORY mode

(i) Same as (1)-(i) when NORMAL mode conditions are stored in memory.
(ii) Same as (2) when TONE MIX mode conditions are stored in memory.
(iii) Same as (3) when KEY SPLIT mode conditions are stored in memory.

(13) GLIDE ON/OFF

	Personal Computer CZ-1 → CZ-1															
1	F 0	4 4	C 0	0 0	7 N	4 7	d_1d_2	F 7								

HEX

(14) PORTAMENTO SWEEP

The portamento sweep of the CZ-1 is set in accordance with PORTAMENTO SWEEP data received from a personal computer.

	Personal Computer → CZ-1															
1	F 0	4 4	0 0	0 0	7 N	4 8	d_1d_2	F 7								

HEX

1 PORTAMENTO SWEEP = 0 -> $d_1d_2 = 00_H$
1 -> $d_1d_2 = 40_H$

2 BASIC CH-1 = N ($0 \sim F_H$)

(15) MODULATION ON/OFF

MODULATION ON/OFF data is output through MIDI OUT when the MODULATION ON/OFF key of CZ-1 of the CZ-1 is switched ON and OFF. Also, the MODULATION ON/OFF setting of the CZ-1 is set in accordance with MODULATION ON/OFF data sent from an external source.

	Personal Computer CZ-1 → CZ-1															
1	F 0	4 4	0 0	0 0	7 N	4 9	d_1d_2	F 7								

HEX

1 MODULATION ON -> $d_1d_2 = 40_H$
OFF -> $d_1d_2 = 00_H$

2 (i) BASIC CH-1 = N ($0_H \sim F_H$) when the CZ-1 receives a MODULATION ON/OFF.
(ii) KBCH-1 = N ($0_H \sim F_H$) when the CZ-1 sends a MODULATION ON/OFF message.
* CHECK CH-1 = ($0_H \sim F_H$) when the CZ-1 is in the MULTI CHANNEL mode.
However, it is necessary to make the BASIC CH data value and CHECK CH data value correspond with each other.

BASIC CHANNEL

MULTI	
CH = 03	PRG = ENA

CHECK CHANNEL

CHECK	CHANNEL = 03
POLY = 2	LEVEL = 15

(16) MOD AFTER TOUCH DEPTH

The mod after touch depth of the CZ-1 is set in accordance with MOD AFTER TOUCH data received from a personal computer.

	Personal Computer → CZ-1											
1	F 0	4	4	0	0	0	0	7 N	4	A	d_1d_2	F 7

HEX

1 MOD. AFTER TOUCH
DEPTH = 00 ~ 99_H -> 00 ~ 63_H

2 BASIC CH-1 = N (0 ~ F_H)

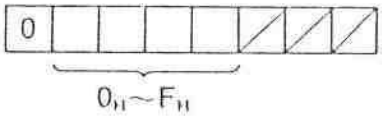
(17) AMP AFTER TOUCH RANGE

The amp after touch range of the CZ-1 is set in accordance with AMP AFTER TOUCH data received from a personal computer.

	Personal Computer → CZ-1											
1	F 0	4	4	0	0	0	0	7 N	4	B	d_1d_2	F 7

HEX

AMP AFTER TOUCH
RANGE = 00 ~ 15_{15} → d_1d_2



(18) CARTRIDGE ON/OFF

CARTRIDGE ON/OFF data is output through MIDI OUT when the CARTRIDGE key of the CZ-1 is switched ON and OFF. Also, the cartridge ON/OFF setting of the CZ-1 is set in accordance with CARTRIDGE ON/OFF data sent from an external source.

	Personal Computer CZ-1 → CZ-1											
1	F 0	4	4	0	0	0	0	7 N	4	C	d_1d_2	F 7

HEX

1 CARTRIDGE ON -> $d_1d_2 = 40_H$
OFF -> $d_1d_2 = 00_H$

2 (i) BASIC CH-1 = N (0_H ~ F_H) when the CZ-1 receives a CARTRIDGE ON/OFF.
(ii) KBCH-1 = N (0_H ~ F_H) when the CZ-1 sends a CARTRIDGE ON/OFF message.

(19) CZ-1 MODE

The mode of the CZ-1 is set in accordance with MODE data received from a personal computer.

	Personal Computer → CZ-1												
1	F0	44	00	00	7N	4D	d_1d_2	F7					

HEX

1 NORMAL MODE -> $d_1d_2 = 00_H$
TONE MIX MODE -> $d_1d_2 = 20_H$
KEY SPLIT MODE -> $d_1d_2 = 40_H$
OPERATION MEMORY -> $d_1d_2 = 60_H$

2 BASIC CH-1 = N (0 ~ F_H)

(20) CURSOR

The cursor position is set in accordance with CURSOR data received from a personal computer. This message is used by the CZ-1 for movement of the cursor by an external source to set the two timbre numbers, volume levels, and EFFECT ON/OFF for TONE MIX and KEY SPLIT timbres.

	Personal Computer → CZ-1												
1	F0	44	00	00	7N	4E	d_1d_2	F7					

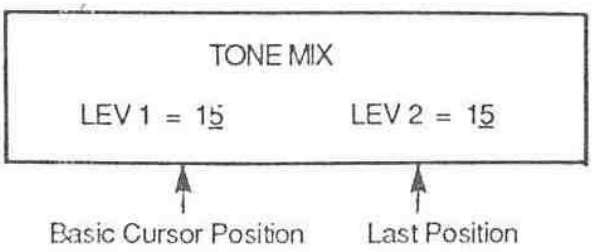
HEX

1 Cursor position -> $d_1d_2 = 00 \sim 7F_H$

Taking the leftmost position to which the cursor can move (or the upper leftmost position in the case that the cursor can move between two lines of the LCD) as the basic cursor position, the cursor movemen range is from the basic cursor position to the last (extreme right) position on the display.

d_1d_2 = 00 Move to the basic cursor position.
d_1d_2 = 01 Move to the position reached when the cursor is at the basic cursor position and the CURSOR RIGHT key on the MX 154 is pressed once.
d_1d_2 = xx Move to the position reached when the cursor is at the basic cursor position and the CURSOR RIGHT key is pressed xx times.

Example



The cursor moves to the last position on the display when the value of d_1d_2 exceeds that of the last position on the display (d_1d_2 > = 02 in the above example).

2 BASIC CH-1 = N (0 ~ F_H)

(21) PAGE

The LCD page changes in accordance with PAGE SELECT data received from a personal computer. This function is almost identical to the operation of the PAGE UP/PAGE DOWN keys of the CZ-1.

The PAGE SELECT message is used for page changes in the NORMAL, TONE MIX and KEY SPLIT modes by an external source followed by CHORUS ON/OFF settings.

	Personal Computer → CZ-1												
1	F0	44	00	00	7N	4F	d_1d_2	F7					

HEX

1 page 1 - 4 -> $d_1d_2 = 00_H \sim 03_H$

The details of the PAGE that can be changed by the PAGE SELECT message is as follows:

(i) NORMAL mode page change

PAGE 1
($d_1d_2 = 00_H$)

(LCD ; TIMBLE DISPLAY)

```
* INTERNAL *  A - 1
      BRASS 1
```

PAGE 2
($d_1d_2 = 01_H$)

(LCD ; CHORUS DISPLAY)

```
      CHORUS
        ON
```

(ii) TONE MIX mode page change

PAGE 1
($d_1d_2 = 00_H$)

(LCD; LEVEL DISPLAY)

```
        TONE MIX
LEV 1 = 15    LEV 2 = 15
```

PAGE 2
($d_1d_2 = 01_H$)

(LCD; TONE 2 PITCH DISPLAY)

```
TONE 2   (+)    OCT = 2
NOTE = 10       FINE = 03
```

PAGE 3
($d_1d_2 = 02_H$)

(LCD; CHORUS ON/OFF DISPLAY)

```
        CHORUS
TN 1 = ON    TN 2 = OFF
```

(iii) KEY SPLIT mode page change

PAGE 1
($d_1d_2 = 00_H$)
30 LEV 1 = 15 LEV 2 = 15

(LCD; LEVEL DISPALY)

```
SP    LOWER        UPPER
30    LEV=15       LEV=15
```

PAGE 2
($d_1d_2 = 01_H$)

(LCD; SUS. PEDAL ENA/DIS DISPLAY)

```
      SUS. PEDAL
LOW=ENA      UPP=ENA
```

PAGE 3
(d_1d_2 = 02_H)

(LCD; OCT. SHIFT DISPLAY)

OCT. SHIFT
LOW = +1 UPP = -1

PAGE 4
(d_1d_2 = 03_H)

(LCD; CHORUS ON/OFF DISPLAY)

CHORUS
LOW = ON UPP = OFF

2 BASIC CH-1 = N (0 ~ F_H)

(22) MULTI CHANNEL MODE ON/OFF

The MULTI CHANNEL mode and POLY mode of the CZ-1 are switched in accordance with MULTI CHANNEL mode data sent from a personal computer.

	Personal Computer → CZ-1											
1	F 0	4 4	0 0	0 0	7 N	5 0	d_1d_2	F 7				

HEX

1 MULTI CHANNEL MODE ON -> d_1d_2 = 40_H
OFF -> d_1d_2 = 00_H

NOTE: The MULTI CHANNEL mode of the CZ-1 switches OFF and the POLY mode switches on if data are received when d_1d_2 = 00_H

2 BASIC CH-1 = N (0 ~ F_H)

(23) NUMBER OF POLY 1

The number of polyphonics for each CHECK channel in the MULTI CHANNEL mode of the CZ-1 is set in accordance with the NUMBER OF POLY 1 data sent from a personal computer.

The NUMBER OF POLY 1 message is only valid when the CZ-1 is in the MULTI CHANNEL mode.

	Personal Computer → CZ-1											
1	F 0	4 4	0 0	0 0	7 N	5 1	d_1d_2	F 7				

HEX

1 NUMBER OF POLY 0 ~ 8_{10} -> d_1d_2 = 00 ~ 08_H

2 CHECK CH-1 -> N (0 ~ F_H)

(24) NUMBER OF POLY 2

The following two numbers of polyphonics are set in the MULTI CHANNEL mode of the CZ-1 is set in accordance with the NUMBER OF POLY 2 data sent from a personal computer.

(i) The number of polyphonics for the CHECK channel that equals the BASIC channel and channel number only.

(ii) The number of polyphonics for all CHECK channels other than that notes in (i) are set to zero.

The NUMBER OF POLY 2 message is only valid when the CZ-1 is in the MULTI CHANNEL mode.

	Personal Computer → CZ-1												
1	F 0	4 4	0 0	0 0	7 N	5 1	d_1d_2	F 7					HEX

1 NUMBER OF POLY $0 \sim 8_{10}$ -> $d_1d_2 = 40 \sim 48_H$

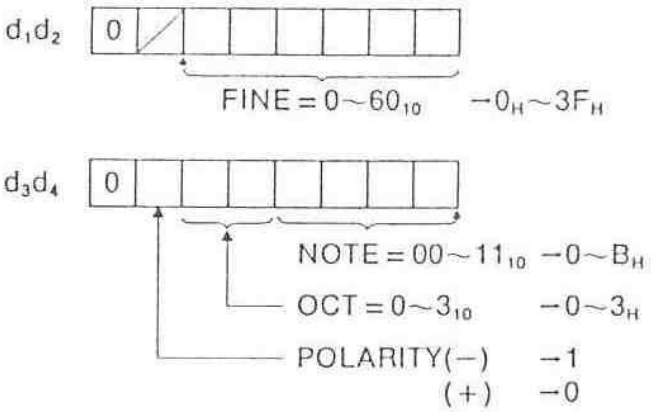
2 BASIC CH-1 -> N ($0 \sim F_H$)

(25) TONE 2 PITCH

The TONE 2 pitch in the TONE MIX MODE of the CZ-1 is set in accordance with the TONE 2 PITCH data sent from a personal computer.

	Personal Computer → CZ-1												
1	F 0	4 4	0 0	0 0	7 N	5 2	d_1d_2	d_3d_4	F 7				HEX

1 TONE 2 PITCH



2 BASIC CH-1 -> N ($0 \sim F_H$)

NOTE: FINE data ($0 \rightarrow 60_{10}$) are divided into 6-bit data ($0_H \sim 3F_H$) and then sent. The division method is illustrated in the table below:

FINE DATA $0 \sim 60_{10}$	$0_{10} \sim 15_{10}$	$16_{10} \sim 30_{10}$	$31_{10} \sim 45_{10}$	$46_{10} \sim 60_{10}$
MIDI DATA $0_H \sim 3F_H$	$0_H \sim F_H$	$11_H \sim 1F_H$	$21_H \sim 2F_H$	$31_H \sim 3F_H$

(26) SPLIT POINT

The SPLIT POINT of the CZ-1 is set in accordance with SPLIT POINT data sent from a personal computer.

	Personal Computer → CZ-1	
1	F 0 4 4 0 0 0 0 7 N 5 3 d_1d_2 F 7	HEX

1 SPLIT POINT (SP) $1 \sim 60_{10} \rightarrow d_1d_2 = 24_H \sim 5F_H$

d_1d_2	CZ-1 LOWER keyboord
$0 \sim 23_H$	1
$24_H \sim 5F_H$	$d_1d_2 - 23_H$
$60_H \sim 7F_H$	$3C_H$

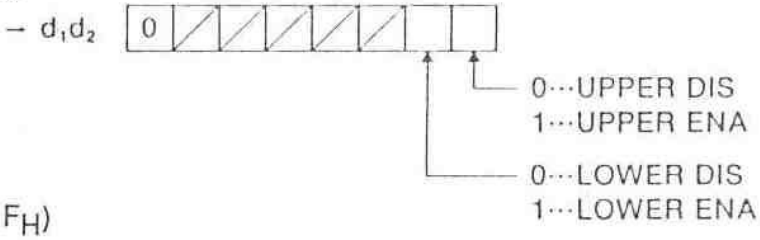
2 BASIC CH-1 = N ($0 \sim F_H$)

(27) SUS PEDAL ENA/DIS

The SUS PEDAL ENA/DIS in the KEY SPLIT mode of the CZ-1 is set in accordance with SUS PEDAL ENA/DIS data sent from a personal computer.

	Personal Computer → CZ-1	
1	F 0 4 4 0 0 0 0 7 N 5 4 d_1d_2 F 7	HEX

1 SUS PEDAL ENA/DIS



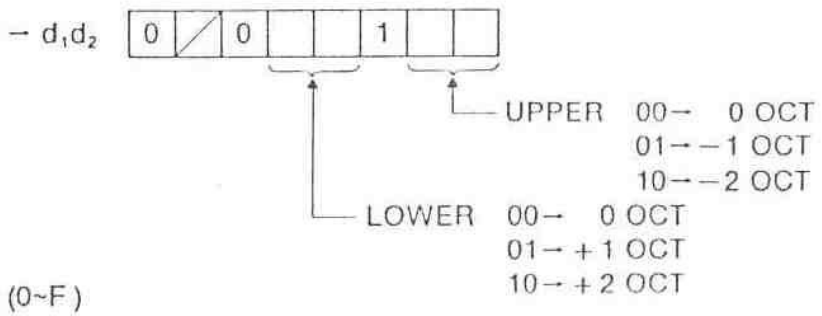
2 BASIC CH-1 = N ($0 \sim F_H$)

(28) OCT. SHIFT

The OCT. SHIFT in the KEY SPLIT mode of the CZ-1 is set in accordance with OCT. SHIFT data sent from a personal computer.

	Personal Computer → CZ-1	
1	F 0 4 4 0 0 0 0 7 N 5 5 d_1d_2 F 7	HEX

1 OCT. SHIFT



2 BASIC CH-1 = N (0~F)

(29) CHORUS ON/OFF

The CHORUS ON/OFF of the CZ-1 is set in accordance with CHORUS ON/OFF data sent from a personal computer.

	Personal Computer → CZ-1	
1	F 0 | 4 4 | 0 0 | 0 0 | 7 N | 5 6 | d_1d_2 | F 7	HEX

1 CHORUS ON -> $d_1d_2 = 40_H$
OFF -> $d_1d_2 = 00_H$

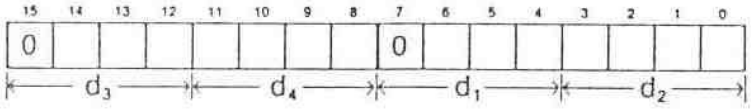
2 BASIC CH-1 = N (0 ~ F_H)

(30) TIME BREAK

The TIME BREAK* of the CZ-1 is changed in accordance with TIME BREAK data sent from a personal computer.

	Personal Computer → CZ-1	
1	F 0 | 4 4 | 0 0 | 0 0 | 7 N | 5 7 | d_1d_2 | F 7	HEX

	Personal Computer → CZ-1	
2	F 0 | 4 4 | 0 0 | 0 0 | 7 N | 5 8 | d_3d_4 | F 7	HEX



The minimum time break for each LSB is approximately 8.192 msec and the value of $d_1d_2d_3d_4$ is greater than $1C_{16}$ (approximately 230 msec). A value less than this is equivalent to a setting of $1C_{16}$. The default value is $1C_{16}$ when the power of the CZ-1 is switched ON.

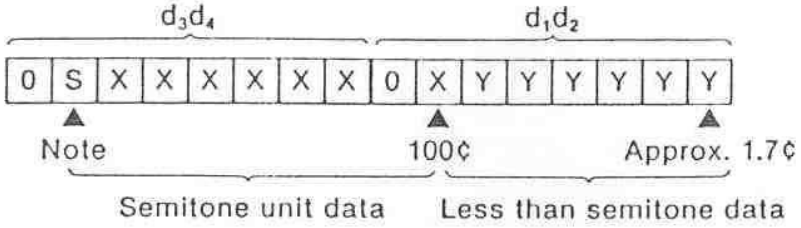
* TIME BREAK
Time break occurs and exclusive message control ends when each data byte transmission exceeds the time set above (the time between data bytes) during input of exclusive messages in the CZ-1.

(31) KEY CODE SWEEP

The pitch of the CZ-1 is changed in accordance with KEY CODE SWEEP data sent from a personal computer.

	Personal Computer → CZ-1													
1	F 0	4 4	0 0	0 0	7 N	5 9	d_1d_2	d_3d_4	d_5d_6	F 7	HEX			

1 Pitch



(i) Note + -> S = 0
- -> S = 1

(ii) Semitone unit data (7 bit)
LSB ; 100¢

(iii) Less than semtione data (6 bit)
LSB ; Approx. 1.7¢

2 BASIC CH-1 = d_5d_6 (0 ~ F_H)

* BASIC CH-1 = N (0 ~ F_H) when the CZ-1 enters the MULTI CHANNEL mode.

3 N -> DON'T CARE

IV TIMBRE DATA

(1) TIMBRE DATA

1 In the following explanation, ☐ indicates 8-bit data, but actual MIDI output divides the data into the high order 4 bits and the low order 4 bits. Each of these is assigned to the low order 4 bits of 8-bit data and output in the sequence low order -- high order.

For example, $\boxed{d_1d_2}$ is output as $\boxed{0d_2}$ $\boxed{0d_1}$.

2 Tone data is always LINE 1/ LINE 2 common data regardless of the LINE SELECT status. The format for all LINE 1 data and LINE 2 data is shown on the following page.

2 Tone data is always LINE 1/ LINE 2 common data regardless of the LINE SELECT status. The format for all LINE 1 data and LINE 2 data is shown on the following page.

(2) TIMBRE DATA

	DATA NAME	DATA FORMAT
1	PFLAG (LINE SELECT OCTAVE)	
2	PDS (DETUNE)	
3	PDEL, PDEH (DETUNE DATE LSB. MSB)	
4	PVK (VIBRATO WAVE)	
5	PVDLD, PVDLV (VIBRATO DELAY TIME)	
6	PVSD, PVSV (VIBRATO RATE)	
7	PVDD, PVDV (VIBRATO DEPTH)	
8	MFW (DCO1 WAVE FORM, MODULATION)	
*9	MAMD, MAMV (DCA1 KEY FOLLOW, LEVEL)	
*10	MWMD, MWMV (DCW1 KEY FOLLOW)	
*11	PMAL (DCA1 ENVELOPE END STEP, LINE1 VELOCITY(AMP))	
12	PMA (DCA1 ENVELOPE RATE, LEVEL)	
*13	PMWL (DCW1 ENVELOPE END STEP, LINE1 VELOCITY(WAVE))	
14	PMP (DCW1 ENVELOPE RATE, LEVEL)	
*15	PMPL (DCO1 ENVELOPE END STEP, LINE1 VELOCITY(PITCH))	
16	PMW (DCO1 ENVELOPE RATE, LEVEL)	
17	SFW (DCO2 WAVE FORM)	
*18	SAMD, SAMV (DCA2 KEY FOLLOW, LEVEL)	
*19	SWMD, SWMV (DCW2 KEY FOLLOW)	

*20	PSAL (DCA2 ENVELOPE END STEP, LINE1 VELOCITY(AMP))		
21	PSA (DCA2 ENVELOPE RATE, LEVEL)		
*22	PSWL (DCW2 ENVELOPE END STEP, LINE2 VELOCITY(WAVE))		
23	PSW (DCW2 ENVELOPE RATE, LEVEL)		
*24	PSPL (DCO2 ENVELOPE RATE, LEVEL)		
25	PSP (DCO2 ENVELOPE RATE, LEVEL)		
26	NAME (TIMBER NAME)		

* Data contents differ according to the transmission methods shown in (1) and (2) below. See the following pages for details on each data.

  (1) Data transmission using SEND REQUEST 1/RECEIVE REQUEST 1 according to the CZ-5000/CZ-101 timbre data format.

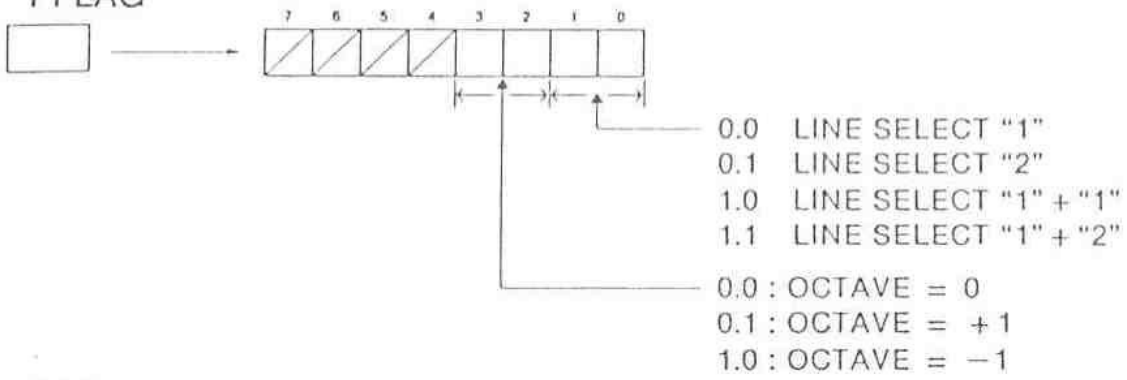
  (2) Data transmission using SEND REQUEST 2/RECEIVE REQUEST 2 according to the CZ-1 timbre data format.

* #26 NAME data is only transmitted for method (2).

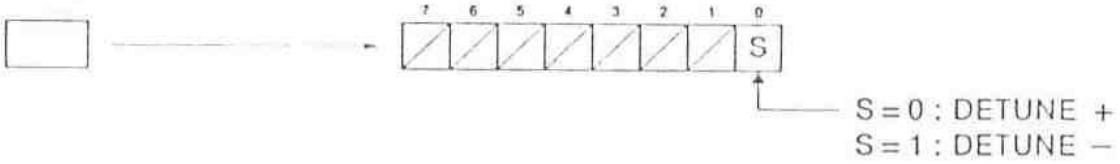
* The number of tone bytes transmitted is as follows for each method:
  (1) 128 bytes/timbre
  (2) 144 bytes/timbre

(3) DETAIL OF DATA

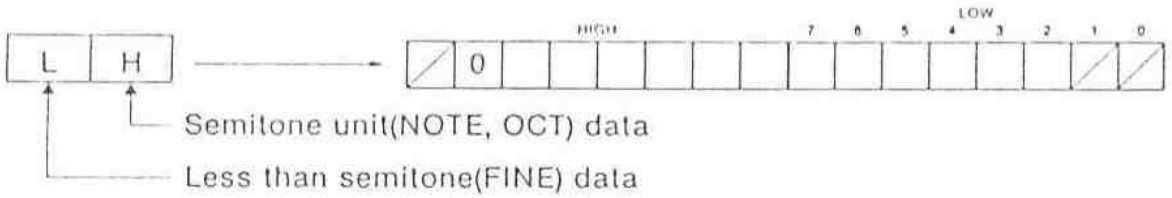
1 PFLAG



2 PDS



3 PDETL PDETH



(i) LOW (less than semitone data)
Less than semitone data (FINE) data (0 ~ 60_{10} divided into 0 ~ 63_{10} 6-bit data (bit 7 ~ bit 2).

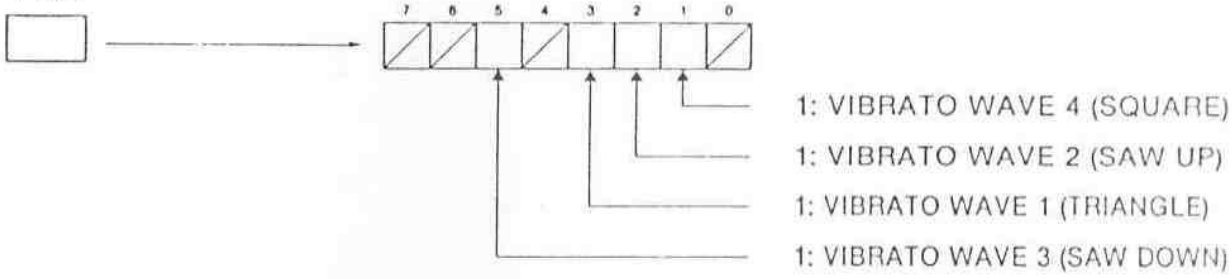
Less than semitone (FINE data)	conversion	MIDI send data
0 ⌇ 15	+0	0 0 ⌇ ⌇ 15_{10} F_H
16 ⌇ 30	+1	17 11 ⌇ ⌇ 31_{10} $1F_H$
31 ⌇ 45	+2	33 21 ⌇ ⌇ 47_{10} $2F_H$
46 ⌇ 60_{10}	+3	49 31 ⌇ ⌇ 63_{10} $3F_H$

(ii) HIGH data
ALL NOTE and OCT. data are converted to semitone unitrs, and made into $0 \sim 47_{10}$ semitone HIGH data.

NOTE, OCT DATA	MIDI DATA
0 NOTE 0 OCT ⌇ 11_{10} NOTE 3_{10} OCT	0 ⌇ $47_{10}(2F_H)$

* Transmitted in the sequence LOW< HIGH.

4 PVK



5 PVDLD, PVDLV ⟶ See Table 1

L	H	M

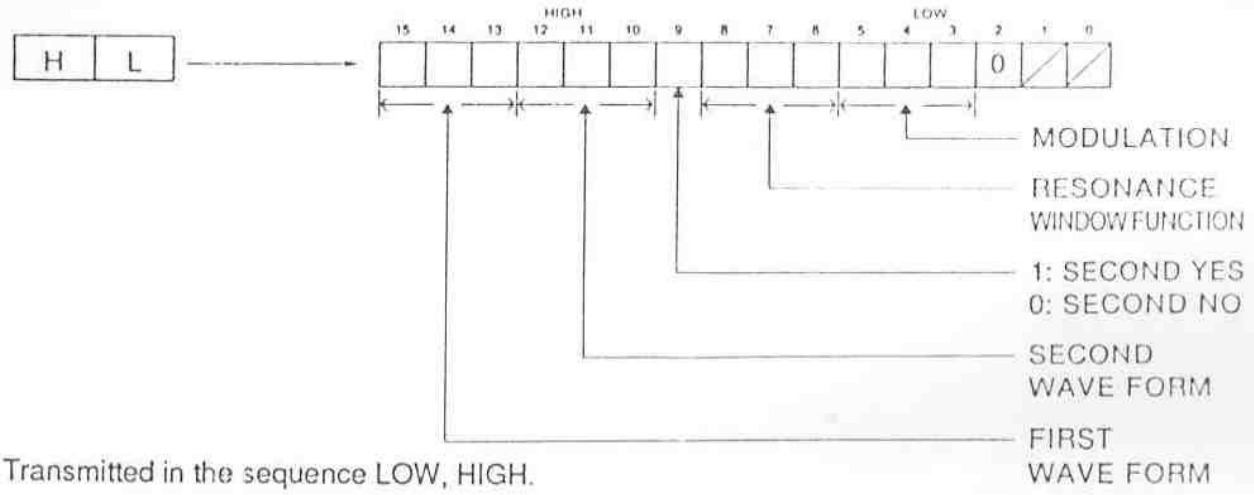
6 PVSD, PVSV ⟶ See Table 2

L	H	M

7 PVDD, PVDV ⟶ See Table 3

L	H	M

8 MFW



* Transmitted in the sequence LOW, HIGH.

WAVE FORM, MODULATION	16 bit DATA
FIRST=1	0 0 0 _ _ _ _ 0 0 0 _ _ _ _ _ _
FIRST=2	0 0 1 _ _ _ _ 0 0 0 _ _ _ _ _ _
FIRST=3	0 1 0 _ _ _ _ 0 0 0 _ _ _ _ _ _
FIRST=4	1 0 0 _ _ _ _ 0 0 0 _ _ _ _ _ _
FIRST=5	1 0 1 _ _ _ _ 0 0 0 _ _ _ _ _ _
FIRST=6	1 1 0 _ _ _ _ 0 0 1 _ _ _ _ _ _
FIRST=7	1 1 0 _ _ _ _ 0 1 0 _ _ _ _ _ _
FIRST=8	1 1 0 _ _ _ _ 0 1 1 _ _ _ _ _ _
SECOND=1	_ _ _ 0 0 0 1 0 0 0 _ _ _ _ _ _
SECOND=2	_ _ _ 0 0 1 1 0 0 0 _ _ _ _ _ _
SECOND=3	_ _ _ 0 1 0 1 0 0 0 _ _ _ _ _ _
SECOND=4	_ _ _ 1 0 0 1 0 0 0 _ _ _ _ _ _
SECOND=5	_ _ _ 1 0 1 1 0 0 0 _ _ _ _ _ _
SECOND=6	_ _ _ 1 1 0 1 0 0 1 _ _ _ _ _ _
SECOND=7	_ _ _ 1 1 0 1 0 1 0 _ _ _ _ _ _
SECOND=8	_ _ _ 1 1 0 1 0 1 1 _ _ _ _ _ _
MODULATION OFF	_ _ _ _ _ _ _ _ _ _ _ _ 0 0 0 _
RING ON	_ _ _ _ _ _ _ _ _ _ _ _ 1 0 0 _
NOISE ON	_ _ _ _ _ _ _ _ _ _ _ _ 0 1 1 _

9 -1 MAMD, MAMV (Timbre data transmitted by SEND REQUEST 1, RECEIVE REQUEST 1 messages)

L	H

DCA 1 KEY FOLLOW	MAMD, MAMV (HEX)
0	0 0 0 0
1	0 1 0 8
2	0 2 1 1
3	0 3 1 A
4	0 4 2 4
5	0 5 2 F
6	0 6 3 A
7	0 7 4 5
8	0 8 5 2
9	0 9 5 F

9 -2 MAMD, MAMV (Timbre data transmitted by SEND REQUEST 2, RECEIVE REQUEST 2 messages)

L	H

DCA 1 KEY FOLLOW	MAMD, MAMV (HEX)
0	d 0 0 0
1	d 1 0 8
2	d 2 1 1
3	d 3 1 A
4	d 4 2 4
5	d 5 2 F
6	d 6 3 A
7	d 7 4 5
8	d 8 5 2
9	d 9 5 F

d: DCA1 LEVEL
DCA1 LEVEL = $01_{10} \sim 15_{10}$ -> $d = E_H \sim 0_H$

10 -1 MWMD, MWMV (Timbre data transmitted by SEND REQUEST 2, RECEIVE REQUEST 1 messages)

L	H

DCW 1 KEY FOLLOW	MWMD, MWMV (HEX)
0	0 0 0 0
1	0 1 1 F
2	0 2 2 C
3	0 3 3 9
4	0 4 4 6
5	0 5 5 3
6	0 6 6 0
7	0 7 6 E
8	0 8 9 2
9	0 9 F F

10 -2 MWMD, MWHV (Timbre data transmitted by SEND REQUEST 2, RECEIVE REQUEST 2 messages)

L	H

DCW 1 KEY FOLLOW	MWMD, MWMV (HEX)
0	0 0 0 0
1	0 1 1 9
2	0 2 3 3
3	0 3 4 E
4	0 4 6 A
5	0 5 8 6
6	0 6 A 3
7	0 7 C 1
8	0 8 D F
9	0 9 F F

11 -1 PMAL (Timbre data transmitted by SEND REQUEST 1, RECEIVE REQUEST 1 messages)

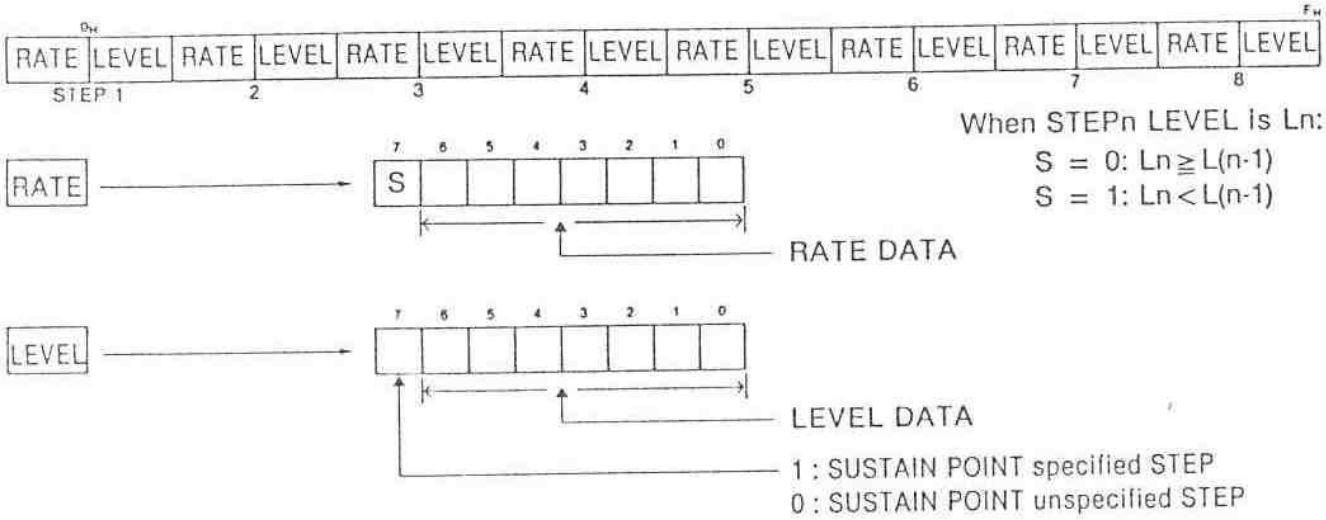
DCA 1 ENVELOPE END STEP	PMAL (HEX)
1	0 0
2	0 1
3	0 2
4	0 3
5	0 4
6	0 5
7	0 6
8	0 7

11 -2 PMAL (Timbre data transmitted by SEND REQUEST 2, RECEIVE REQUEST 2 messages)

DCA 1 ENVELOPE END STEP	PMAL (HEX)
1	d 0
2	d 1
3	d 2
4	d 3
5	d 4
6	d 5
7	d 6
8	d 7

d; LINE 1 VELOCITY (AMP)

2 PMA



See Table 4 for details on RATE and LEVEL.

13 -1 PMWL (Timbre data transmitted by SEND REQUEST 1, RECEIVE REQUEST 1 messages)

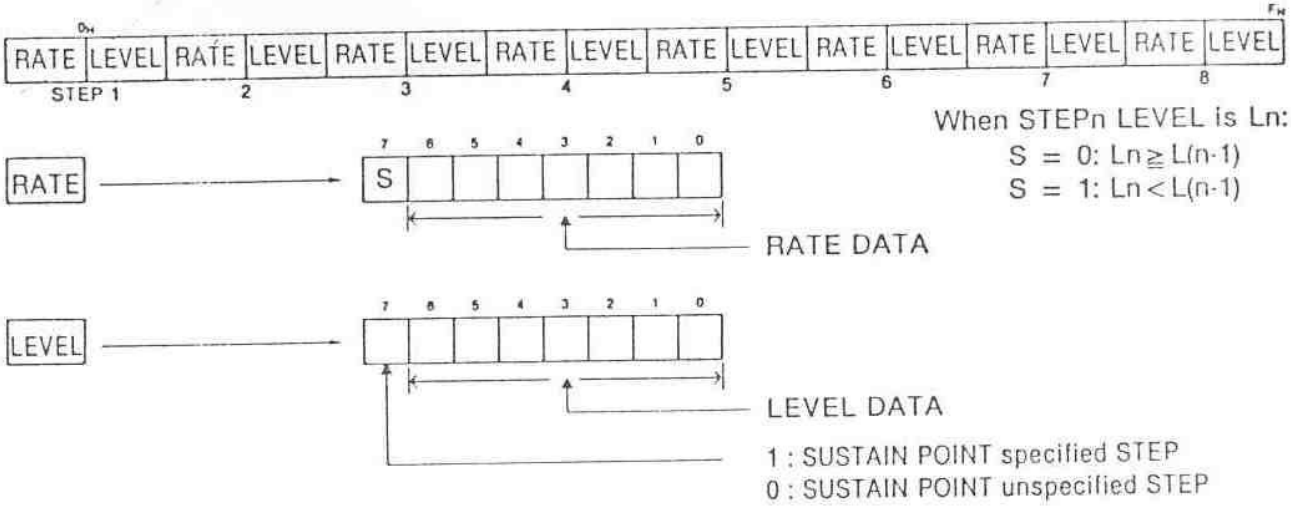
DCW 1 ENVELOPE END STEP	PMWL (HEX)
1	0 0
2	0 1
3	0 2
4	0 3
5	0 4
6	0 5
7	0 6
8	0 7

13 -2 PMWL (Timbre data transmitted by SEND REQUEST 2, RECEIVE REQUEST 2 messages)

DCW 1 ENVELOPE END STEP	PMWL (HEX)
1	d 0
2	d 1
3	d 2
4	d 3
5	d 4
6	d 5
7	d 6
8	d 7

d; LINE 1 VELOCITY (WAVE)
WAVE = 00_{10} ~ 15_{10} -> d = F_H ~ 0_H

14 PMW



See Table 5 for details on RATE and LEVEL.

15 -1 PMPL (Timbre data transmitted by SEND REQUEST 1, RECEIVE REQUEST 1 messages)

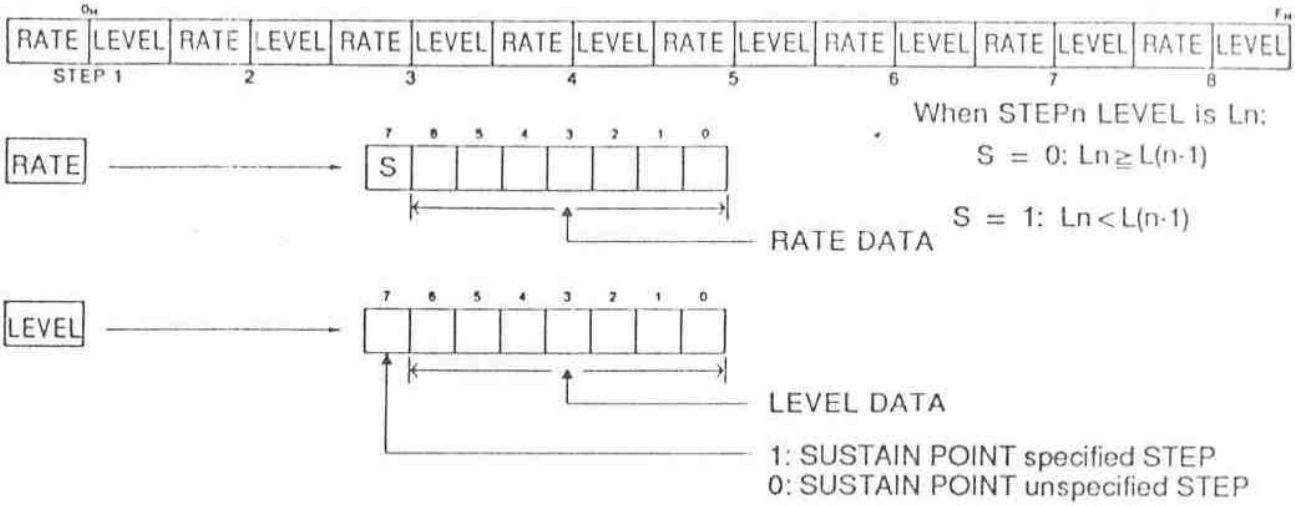
DCO 1 ENVELOPE END STEP	PMPL (HEX)
1	0 0
2	0 1
3	0 2
4	0 3
5	0 4
6	0 5
7	0 6
8	0 7

15 -2 PMPL (Timbre data transmitted by SEND REQUEST 2, RECEIVE REQUEST 2 messages)

DCO 1 ENVELOPE END STEP	PMPL (HEX)
1	d 0
2	d 1
3	d 2
4	d 3
5	d 4
6	d 5
7	d 6
8	d 7

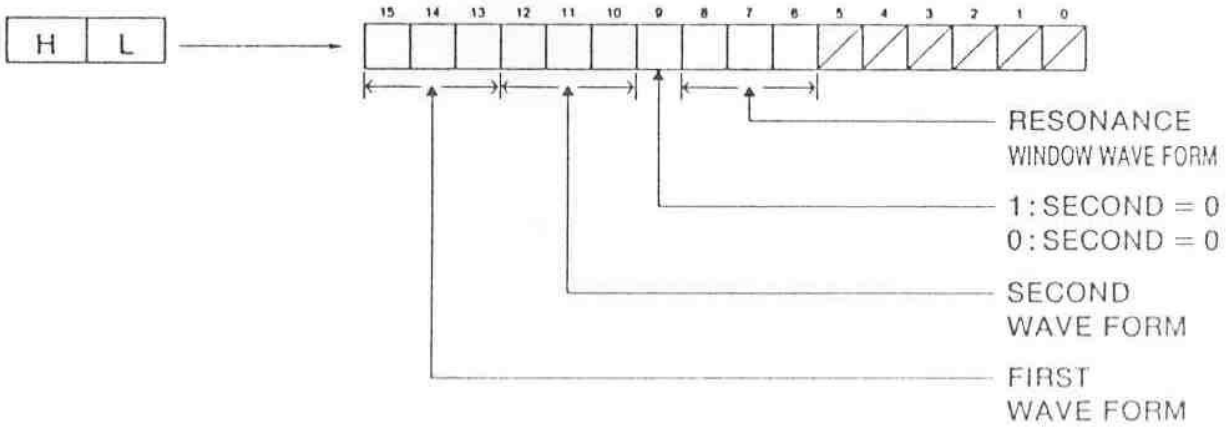
d; LINE 1 VELOCITY (WAVE)
PITCH = 00_{10} ~ 15_{10} -> d = F_H ~ 0_H

16 PMP



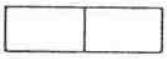
See Table 6 for details on RATE and LEVEL.

17 SFW



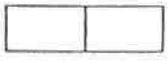
Waveform data format is the same as MFW.

18 SMAD, SAMV



DCA 2 KEY FOLLOW and LEVEL data format is the same as that for MAMD and MAMV (see 9 -1, 9 -2).

19 SWMD, SWMV



DCA 2 KEY FOLLOW format is the same as that for MWMD and MWMV (see 10 -1, 10 -2).

20 PSAL

DCA 2 ENVELOPE END STEP and LINE 2 VELOCITY (AMP) data format is the same as that for PMAL (see 11 -1, 11 -2

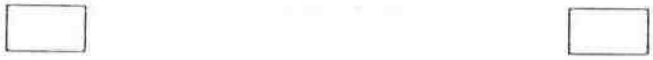
21 PSA

DCA 2 ENVELOPE RATE AND LEVEL data format is the same as that for PMA (see 12)

22 PSWL

DCW @ENVELOPE END STEP and LINE 2 VELOCITY (WAVE) data format is the same as that for PMWL (see 13 -1, 13 -2).

23 PSW



DCW 2 ENVELOPE RATE and LEVEL data format is the same as that for PMW (see 14).

24 PSPL

DCO 2 ENVELOPE END STEP and LINE 2 VELOCITY (PITCH) data format is the same as that for PMPL (see15 -1, 15-2).

25 PSP

DCO 2 ENVELOPE RATE and LEVEL data format is the same as that for PMP (see 16).

26 NAME

16 byts

Timbre name and data are composed of a total of 16 bytes, with each byte corresponding to the 16 columns on the lower line of the LCD.

LCD

The following lists the characters that can be used, and data contents are all ASCII characters.

1) 26 alphabetic characters
2) Numbers 0 ~ 9
3) • — / BLANK

VIBRATO
DELAY TIME

DELAY TIME	PVDLD, PVDLV (HEX)	DELAY TIME	PVDLD, PVDLV (HEX)	DELAY TIME	PVDLD, PVDLV (HEX)	DELAY TIME	PVDLD, PVDLV (HEX)
0	0 00 00 0	25	1 90 01 9	50	3 20 04 B	75	4 B0 0D F
1	0 10 00 1	26	1 A0 01 A	51	3 30 04 F	76	4 C0 0E 7
2	0 20 00 2	27	1 B0 01 B	52	3 40 05 3	77	4 D0 0E F
3	0 30 00 3	28	1 C0 01 C	53	3 50 05 7	78	4 E0 0F 7
4	0 40 00 4	29	1 D0 01 D	54	3 60 05 B	79	4 F0 0F F
5	0 50 00 5	30	1 E0 01 E	55	3 70 05 F	80	5 00 10 F
6	0 60 00 6	31	1 F0 01 F	56	3 80 06 3	81	5 10 11 F
7	0 70 00 7	32	2 00 02 1	57	3 90 06 7	82	5 20 12 F
8	0 80 00 8	33	2 10 02 3	58	3 A0 06 B	83	5 30 13 F
9	0 90 00 9	34	2 20 02 5	59	3 B0 06 F	84	5 40 14 F
10	0 A0 00 A	35	2 30 02 7	60	3 C0 07 3	85	5 50 15 F
11	0 B0 00 B	36	2 40 02 9	61	3 D0 07 7	86	5 60 16 F
12	0 C0 00 C	37	2 50 02 B	62	3 E0 07 B	87	5 70 17 F
13	0 D0 00 D	38	2 60 02 D	63	3 F0 07 F	88	5 80 18 F
14	0 E0 00 E	39	2 70 02 F	64	4 00 08 7	89	5 90 19 F
15	0 F0 00 F	40	2 80 03 1	65	4 10 08 F	90	5 A0 1A F
16	1 00 01 0	41	2 90 03 3	66	4 20 09 7	91	5 B0 1B F
17	1 10 01 1	42	2 A0 03 5	67	4 30 09 F	92	5 C0 1C F
18	1 20 01 2	43	2 B0 03 7	68	4 40 0A 7	93	5 D0 1D F
19	1 30 01 3	44	2 C0 03 9	69	4 50 0A F	94	5 E0 1E F
20	1 40 01 4	45	2 D0 03 B	70	4 60 0B 7	95	5 F0 1F F
21	1 50 01 5	46	2 E0 03 D	71	4 70 0B F	96	6 00 21 F
22	1 60 01 6	47	2 F0 03 F	72	4 80 0C 7	97	6 10 23 F
23	1 70 01 7	48	3 00 04 3	73	4 90 0C F	98	6 20 25 F
24	1 80 01 8	49	3 10 04 7	74	4 A0 0D 7	99	6 30 27 F

VIBRATO
RATE

RATE	PVSD, PVSV (HEX)	RATE	PVSD, PVSV (HEX)	RATE	PVSD, PVSV (HEX)	RATE	PVSD, PVSV (HEX)
0	0 0 0 0 2 0	25	1 9 0 3 4 0	50	3 2 0 9 E 0	75	4 B 1 C E 0
1	0 1 0 0 4 0	26	1 A 0 3 6 0	51	3 3 0 A 6 0	76	4 C 1 D E 0
2	0 2 0 0 6 0	27	1 B 0 3 8 0	52	3 4 0 A E 0	77	4 D 1 E E 0
3	0 3 0 0 8 0	28	1 C 0 3 A 0	53	3 5 0 B 6 0	78	4 E 1 F E 0
4	0 4 0 0 A 0	29	1 D 0 3 C 0	54	3 6 0 B E 0	79	4 F 2 0 E 0
5	0 5 0 0 C 0	30	1 E 0 3 E 0	55	3 7 0 C 6 0	80	5 0 2 3 E 0
6	0 6 0 0 E 0	31	1 F 0 4 0 0	56	3 8 0 C E 0	81	5 1 2 5 E 0
7	0 7 0 1 0 0	32	2 0 0 4 6 0	57	3 9 0 D 6 0	82	5 2 2 7 E 0
8	0 8 0 1 2 0	33	2 1 0 4 A 0	58	3 A 0 D E 0	83	5 3 2 9 E 0
9	0 9 0 1 4 0	34	2 .2 0 4 E 0	59	3 B 0 E 6 0	84	5 4 2 B E 0
10	0 A 0 1 6 0	35	2 3 0 5 2 0	60	3 C 0 E E 0	85	5 5 2 D E 0
11	0 B 0 1 8 0	36	2 4 0 5 6 0	61	3 D 0 F 6 0	86	5 6 2 F E 0
12	0 C 0 1 A 0	37	2 5 0 5 A 0	62	3 E 0 F E 0	87	5 7 3 1 E 0
13	0 D 0 1 C 0	38	2 6 0 5 E 0	63	3 F 1 0 6 0	88	5 8 3 3 E 0
14	0 E 0 1 E 0	39	2 7 0 6 2 0	64	4 0 1 1 E 0	89	5 9 3 5 E 0
15	0 F 0 2 0 0	40	2 8 0 6 6 0	65	4 1 1 2 E 0	90	5 A 3 7 E 0
16	1 0 0 2 2 0	41	2 9 0 6 A 0	66	4 2 1 3 E 0	91	5 B 3 9 E 0
17	1 1 0 2 4 0	42	2 A 0 6 E 0	67	4 3 1 4 E 0	92	5 C 3 B E 0
18	1 2 0 2 6 0	43	2 B 0 7 2 0	68	4 4 1 5 E 0	93	5 D 3 D E 0
19	1 3 0 2 8 0	44	2 C 0 7 6 0	69	4 5 1 6 E 0	94	5 E 3 F E 0
20	1 4 0 2 A 0	45	2 D 0 7 A 0	70	4 6 1 7 E 0	95	5 F 4 1 E 0
21	1 5 0 2 C 0	46	2 E 0 7 E 0	71	4 7 1 8 E 0	96	6 0 4 7 E 0
22	1 6 0 2 E 0	47	2 F 0 8 2 0	72	4 8 1 9 E 0	97	6 1 4 B E 0
23	1 7 0 3 0 0	48	3 0 0 8 E 0	73	4 9 1 A E 0	98	6 2 4 F E 0
24	1 8 0 3 2 0	49	3 1 0 9 6 0	74	4 A 1 B E 0	99	6 3 5 3 E 0

VIBRATO DEPTH

DEPTH	PVDD, PVDV (HEX)	DEPTH	PVDD, PVDV (HEX)	DEPTH	PVDD, PVDV (HEX)	DEPTH	PVDD, PVDV (HEX)
0	0 0 0 0 0 1	25	1 9 0 0 1 A	50	3 2 0 0 4 F	75	4 B 0 0 E 7
1	0 1 0 0 0 2	26	1 A 0 0 1 B	51	3 3 0 0 5 3	76	4 C 0 0 E F
2	0 2 0 0 0 3	27	1 B 0 0 1 C	52	3 4 0 0 5 7	77	4 D 0 0 F 7
3	0 3 0 0 0 4	28	1 C 0 0 1 D	53	3 5 0 0 5 B	78	4 E 0 0 F F
4	0 4 0 0 0 5	29	1 D 0 0 1 E	54	3 6 0 0 5 F	79	4 F 0 1 0 7
5	0 5 0 0 0 6	30	1 E 0 0 1 F	55	3 7 0 0 6 3	80	5 0 0 1 1 F
6	0 6 0 0 0 7	31	1 F 0 0 2 0	56	3 8 0 0 6 7	81	5 1 0 1 2 F
7	0 7 0 0 0 8	32	2 0 0 0 2 3	57	3 9 0 0 6 B	82	5 2 0 1 3 F
8	0 8 0 0 0 9	33	2 1 0 0 2 5	58	3 A 0 0 6 F	83	5 3 0 1 4 F
9	0 9 0 0 0 A	34	2 2 0 0 2 7	59	3 B 0 0 7 3	84	5 4 0 1 5 F
10	0 A 0 0 0 B	35	2 3 0 0 2 9	60	3 C 0 0 7 7	85	5 5 0 1 6 F
11	0 B 0 0 0 C	36	2 4 0 0 2 B	61	3 D 0 0 7 B	86	5 6 0 1 7 F
12	0 C 0 0 0 E	37	2 5 0 0 2 D	62	3 E 0 0 7 F	87	5 7 0 1 8 F
13	0 D 0 0 0 E	38	2 6 0 0 2 F	63	3 F 0 0 8 3	88	5 8 0 1 9 F
14	0 E 0 0 0 F	39	2 7 0 0 3 1	64	4 0 0 0 8 F	89	5 9 0 1 A F
15	0 F 0 0 1 0	40	2 8 0 0 3 3	65	4 1 0 0 9 7	90	5 A 0 1 B F
16	1 0 0 0 1 1	41	2 9 0 0 3 5	66	4 2 0 0 9 F	91	5 B 0 1 C F
17	1 1 0 0 1 2	42	2 A 0 0 3 7	67	4 3 0 0 A 7	92	5 C 0 1 D F
18	1 2 0 0 1 3	43	2 B 0 0 3 9	68	4 4 0 0 A F	93	5 D 0 1 E F
19	1 3 0 0 1 4	44	2 C 0 0 3 B	69	4 5 0 0 B 7	94	5 E 0 1 F F
20	1 4 0 0 1 5	45	2 D 0 0 3 D	70	4 6 0 0 B F	95	5 F 0 2 0 F
21	1 5 0 0 1 6	46	2 E 0 0 3 F	71	4 7 0 0 C 7	96	6 0 0 2 3 F
22	1 6 0 0 1 7	47	2 F 0 0 4 1	72	4 8 0 0 C F	97	6 1 0 2 5 F
23	1 7 0 0 1 8	48	3 0 0 0 4 7	73	4 9 0 0 D 7	98	6 2 0 2 7 F
24	1 8 0 0 1 9	49	3 1 0 0 4 B	74	4 A 0 0 D F	99	6 3 0 3 0 0

AMP ENVELOPE
PMA, PSA

RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)
0	00	25	1E	50	3C	75	5A	0	00	25	35	50	4E	75	67
1	01	26	1F	51	3D	76	5B	1	1D	26	36	51	4F	76	68
2	02	27	20	52	3E	77	5C	2	1E	27	37	52	50	77	67
3	03	28	21	53	3F	78	5D	3	1F	28	38	53	51	78	6A
4	04	29	22	54	40	79	5E	4	20	29	39	54	52	79	6B
5	06	30	24	55	42	80	60	5	21	30	3A	55	53	80	6C
6	07	31	25	56	43	81	61	6	22	31	3B	56	54	81	6D
7	08	32	26	57	44	82	62	7	23	32	3C	57	55	82	6E
8	09	33	27	58	45	83	63	8	24	33	3D	58	56	83	6F
9	0A	34	28	59	46	84	64	9	25	34	3E	59	57	84	70
10	0C	35	2A	60	48	85	66	10	26	35	3F	60	58	85	71
11	0D	36	2B	61	49	86	67	11	27	36	40	61	59	86	72
12	0E	37	2C	62	4A	87	68	12	28	37	41	62	5A	87	73
13	0F	38	2D	63	4B	88	69	13	29	38	42	63	5B	88	74
14	10	39	2E	64	4C	89	6A	14	2A	39	43	64	5C	89	75
15	12	40	30	65	4E	90	6C	15	2B	40	44	65	5D	90	76
16	13	41	31	66	4F	91	6D	16	2C	41	45	66	5E	91	77
17	14	42	32	67	50	92	6E	17	2D	42	46	67	5F	92	78
18	15	43	33	68	51	93	6F	18	2E	43	47	68	60	93	79
19	16	44	34	69	52	94	70	19	2F	44	48	69	61	94	7A
20	18	45	36	70	54	95	72	20	30	45	49	70	62	95	7B
21	19	46	37	71	55	96	73	21	31	46	4A	71	63	96	7C
22	1A	47	38	72	56	97	74	22	32	47	4B	72	64	97	7D
23	1B	48	39	73	57	98	75	23	39	48	4C	73	65	98	7E
24	1C	49	3A	74	58	99	77	24	34	49	4D	74	66	99	7F

AMP ENVELOPE RATE

1 RATE DATA (α) to MIDI DATA (ß) conversion :
$ß = 119_{10} * α + 99_H$

$ß = \frac{12 \cdot α}{10}$

2 MIDI DATA (ß) to RATE DATA (α) conversion:
When $ß = 0$ $α = 0$
When $ß = 77_H$ $α = 99_H$
In other cases :
$α = 99_{10} * ß + 119_{10} + 1$

AMP ENVELOPE RATE

LEVEL	MIDI DATA
0	0
1	29_{10} ($1D_H$)
⟩	⟩
⟨	⟨
99_{10}	127_{10} ($7F_H$)

Simple one-to-one conversion.

WAVE ENVELOPE
PMW, PSW

RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)
0	08	25	26	50	44	75	62	0	00	25	20	50	40	75	60
1	09	26	27	51	45	76	63	1	01	26	21	51	41	76	61
2	0A	27	28	52	46	77	64	2	02	27	22	52	42	77	62
3	0B	28	29	53	47	78	65	3	03	28	23	53	43	78	64
4	0C	29	2A	54	48	79	66	4	05	29	25	54	45	79	65
5	0E	30	2C	55	4A	80	68	5	06	30	26	55	46	80	66
6	0F	31	2D	56	4B	81	69	6	07	31	27	56	47	81	67
7	10	32	2E	57	4C	82	6A	7	08	32	29	57	49	82	69
8	11	33	2F	58	4D	83	6B	8	0A	33	2A	58	4A	83	6A
9	12	34	30	59	4E	84	6C	9	0B	34	2B	59	4B	84	6B
10	14	35	32	60	50	85	6E	10	0C	35	2C	60	4C	85	6D
11	15	36	33	61	51	86	6F	11	0E	36	2E	61	4E	86	6E
12	16	37	34	62	52	87	70	12	0F	37	2F	62	4F	87	6F
13	17	38	35	63	53	88	71	13	10	38	30	63	50	88	70
14	18	39	36	64	54	89	72	14	11	39	32	64	52	89	72
15	1A	40	38	65	56	90	74	15	13	40	33	65	53	90	73
16	1B	41	39	66	57	91	75	16	14	41	34	66	54	91	74
17	1C	42	3A	67	58	92	76	17	15	42	35	67	55	92	76
18	1D	43	3B	68	59	93	77	18	17	43	37	68	57	93	77
19	1E	44	3C	69	5A	94	78	19	18	44	38	69	58	94	78
20	20	45	3E	70	5C	95	7A	20	19	45	39	70	59	95	79
21	21	46	3F	71	5D	96	7B	21	1A	46	3B	71	5B	96	7B
22	22	47	40	72	5E	97	7C	22	1C	47	3C	72	5C	97	7C
23	23	48	41	73	5F	98	7D	23	1D	48	3D	73	5D	98	7D
24	24	49	42	74	60	99	7F	24	1E	49	3E	74	5E	99	7F

WAVE ENVELOPE RATE

1 RATE DATA (α) to MIDI DATA (β) conversion : $\beta = 119_{10} * \alpha \div 99_H + 8$

$\beta = \frac{12 \cdot x}{10} + 8$

2 MIDI DATA (β) to RATE DATA (α) conversion:

When $\beta' = \beta - 8$

When $\beta' = 0$ $\alpha = 0$

When $\beta' = 77_H$ $\alpha = 99_H$

In other cases :

$\alpha' = 99_{10} * \beta' \div 119_{10} + 1$

WAVE ENVELOPE RATE

1 LEVEL DATA (α) to MIDI DATA (β) conversion :

$\beta = 127_{10} * \alpha \div 99_H$

$\beta = \frac{128}{100} \cdot x$

2 MIDI DATA (β) to LEVEL DATA (α) conversion:

When $\beta = 0$ $\alpha = 0$

When $\beta = 7F_H$ $\alpha = 99_H$

In other cases :

$\alpha' = 99_{10} * \beta' \div 127_{10} + 1$

PITCH ENVELOPE
PMP, PSP

RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	RATE	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)	LEVEL	MIDI DATA (HEX)
0	00	25	20	50	40	75	60	0	00	25	19	50	32	75	4F
1	01	26	21	51	41	76	61	1	01	26	1A	51	33	76	50
2	02	27	22	52	42	77	62	2	02	27	1B	52	34	77	51
3	03	28	23	53	43	78	64	3	03	28	1C	53	35	☆78	52
4	05	29	25	54	45	79	65	4	04	29	1D	54	36	79	53
5	06	30	26	55	46	80	66	5	05	30	1E	55	37	80	54
6	07	31	27	56	47	81	67	6	06	31	2F	56	38	81	55
7	08	32	29	57	49	82	69	7	07	32	20	57	39	82	56
8	0A	33	2A	58	4A	83	6A	8	08	33	21	58	3A	83	57
9	0B	34	2B	59	4B	84	6B	9	09	34	22	59	3B	☆84	58
10	0C	35	2C	60	4C	85	6D	10	0A	35	23	60	3C	85	59
11	0E	36	2E	61	4E	86	6E	11	0B	36	24	61	3D	86	5A
12	0F	37	2F	62	4F	87	6F	12	0C	37	25	62	3E	87	5B
13	10	38	30	63	50	88	70	13	0D	38	23	63	3F	88	5C
14	11	39	32	64	52	89	72	14	0E	39	27	64	44	89	5D
15	13	40	33	65	53	90	73	15	0F	40	28	65	45	☆90	5E
16	14	41	34	66	54	91	74	16	10	41	29	☆66	46	91	5F
17	15	42	35	67	55	72	76	17	11	42	2A	67	47	92	60
18	17	43	37	68	57	93	77	18	12	43	2B	68	48	93	61
19	18	44	38	69	58	94	78	19	13	44	2C	69	49	94	62
20	19	45	39	70	59	95	79	20	14	45	2D	70	4A	95	63
21	1A	46	3B	71	5B	96	7B	21	15	46	2E	71	4B	☆96	64
22	1C	47	3C	72	5C	97	7C	22	16	47	2F	☆72	4C	97	65
23	1D	48	3D	73	5D	98	7D	23	17	48	30	73	4D	98	66
24	1E	49	3E	74	5E	99	7F	24	18	49	31	74	4E	99	67

PITCH ENVELOPE RATE

1 RATE DATA (α) to MIDI DATA (ß) conversion :
$ß = 127_{10} * α + 99_H$

$ß = \frac{12 \cdot α}{10} + 8$

2 MIDI DATA (ß) to RATE DATA (α) conversion:
When $ß = 0$ $α = 0$
When $ß = 7F_H$ $α = 99_H$
In other cases :
$α = 99_{10} * ß + 127_{10} + 1$

PITCH ENVELOPE RATE

LEVEL DATA	MIDI DATA
0	0
⌇	⌇
63_{10}	63_{10} ($3F_H$)
64_{10}	68_H (44_H)
⌇	⌇
99_{10}	103_{10} (67_H)

one-to-one

Indicates * octaves from basic pitch of LEVEL = 0

V OPERATION DATA

(1) Operation data

1 As with the timbre data in the previous section, operation data is also handled in 4-bit segments for MIDI OUT.

2 Operation data takes on the form of NORMAL mode type, TONE MIX Mode type or KEY SPLIT mode type. Each of these three forms of data is illustrated in the following pages. The messages SEND REQUEST 3 and RECEIVE REQUEST 3 are used to send/receive operation data.

NORMAL MODE FORM

	DATA NAME	DATA FORMAT
1	MODE NO.	0
2	PORTAMENTO TIME	
3	PORTAMENTO SWEEP	
4	GLIDE TIME	
5	GLIDE NOTE	
6	MODULATION DEPTH	
7	BEND RANGE	
8	MOD. AFTER TOUCH DEPTH	
9	MOD. AFTER TOUCH RANGE	
10	NORMAL EFFECT ON/OFF	
11	MODE FLAG	
12	NORMAL PROGRAM NO.	
13	———	
14	———	
15	———	
16	———	
17	———	
18	———	
19	———	
20	———	

All data formats are 1byte.

TONE MIX MODE FORM

	DATA NAME	DATA FORMAT
1	MODE NO.	
2	PORTAMENTO TIME	
3	PORTAMENTO SWEEP	
4	GLIDE TIME	
5	GLIDE NOTE	
6	MODULATION DEPTH	
7	BEND RANGE	
8	MOD. AFTER TOUCH DEPTH	
9	MOD. AFTER TOUCH RANGE	
10	EFFECT ON/OFF	
11	MODE FLAG	
12	TONE 1 PROGRAM NO.	
13	TONE 2 PROGRAM NO.	
14	TONE 1 LEVEL	
15	TONE 2 LEVEL	
16	TONE 2 FINE	
17	TONE 2 OCT. NOTE	
18	———	
19	———	
20	———	

All data formats are 1byte.

KEY SPLIT MODE FORM

	DATA NAME	DATA FORMAT
1	MODE NO.	
2	PORTAMENTO TIME	
3	PORTAMENTO SWEEP	
4	GLIDE TIME	
5	GLIDE NOTE	
6	MODULATION DEPTH	
7	BEND RANGE	
8	MOD. AFTER TOUCH DEPTH	
9	MOD. AFTER TOUCH RANGE	
10	LOWER EFFECT ON/OFF	
11	MODE FLAG	
12	UPPER EFFECT ON/OFF	
13	MODE FLAG	
14	SPLIT POINT	
15	LOWER PROGRAM NO.	
16	UPPER PROGRAM NO.	
17	LOWER LEVEL	
18	UPPER LEVEL	
19	LOWER OCT. SHIFT	
20	UPPER OCT. SHIFT	

All data formats are 1byte.

2 DATA DETAILS

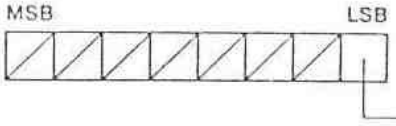
1 MODE NO.

0 NORMAL MODE FORM
1 TONE MIX MODE FORM
2 KEY SPLIT MODE FORM

2 PORTAMENTO TIME

$0 \sim 99_{10}$

3 PORTAMENTO SWEEP

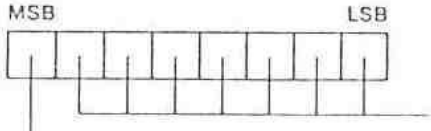


0 SWEEP 0
1 SWEEP 1

4 GLIDE TIME

$0 \sim 99_{10}$

5 GLIDE NOTE



NOTE 0~12

0 (+)
1 (−)

6 MODULATION DEPTH

$0 \sim 99_{10}$: DEPTH 0 ~ 99

7 BEND RANGE

$0 \sim 12_{10}$: RANGE 0 ~ 12

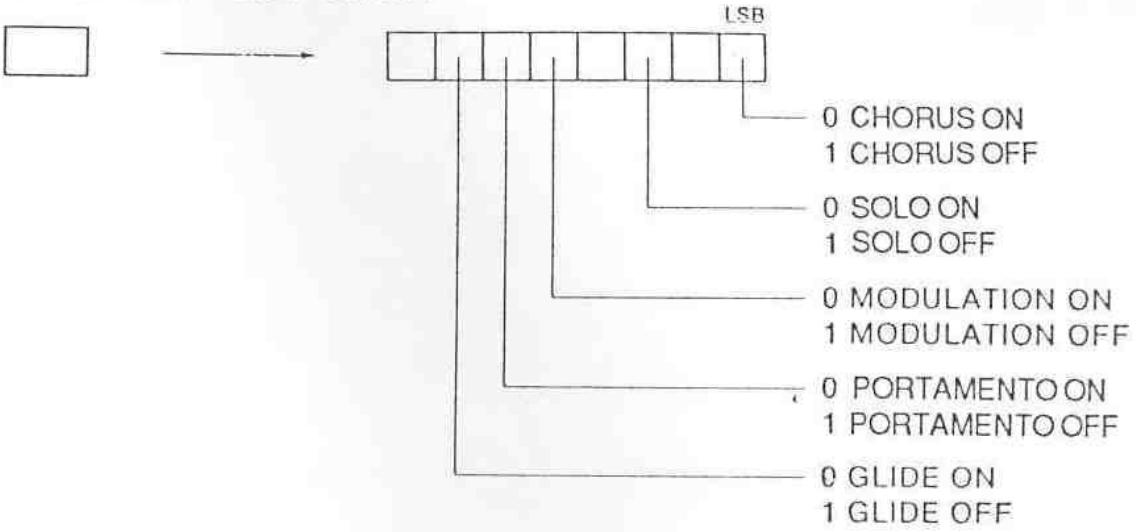
8 MOD. AFTER TOUCH DEPTH

$0 \sim 99_{10}$: DEPTH 0 ~ 99

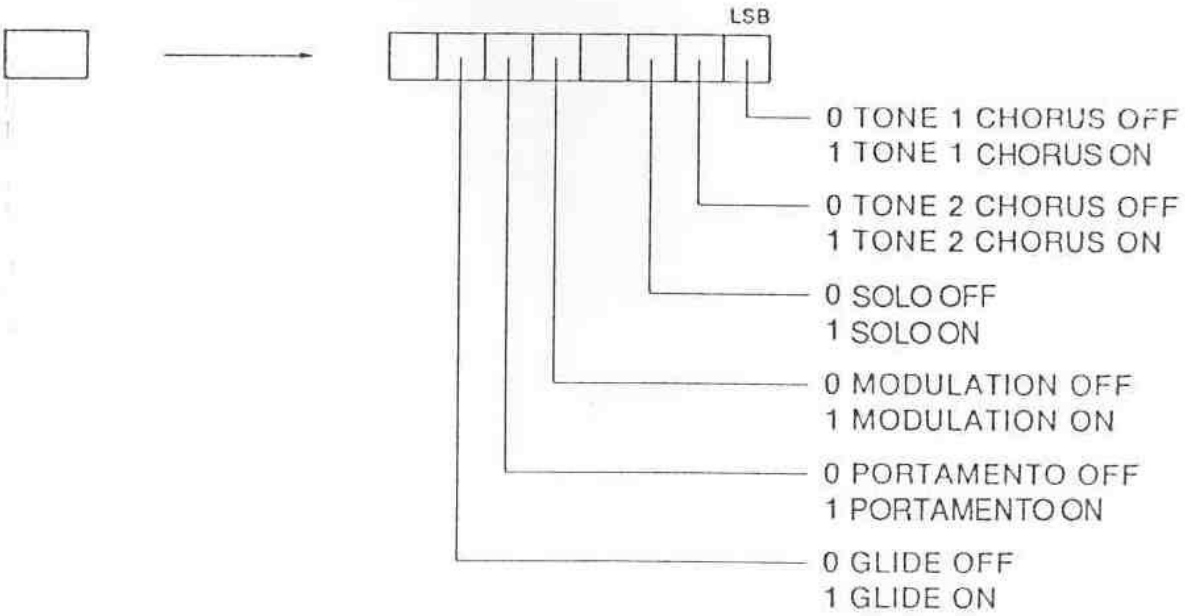
9 MOD. AFTER TOUCH RANGE

$0 \sim 15_{10}$: RANGE 0 ~ 15

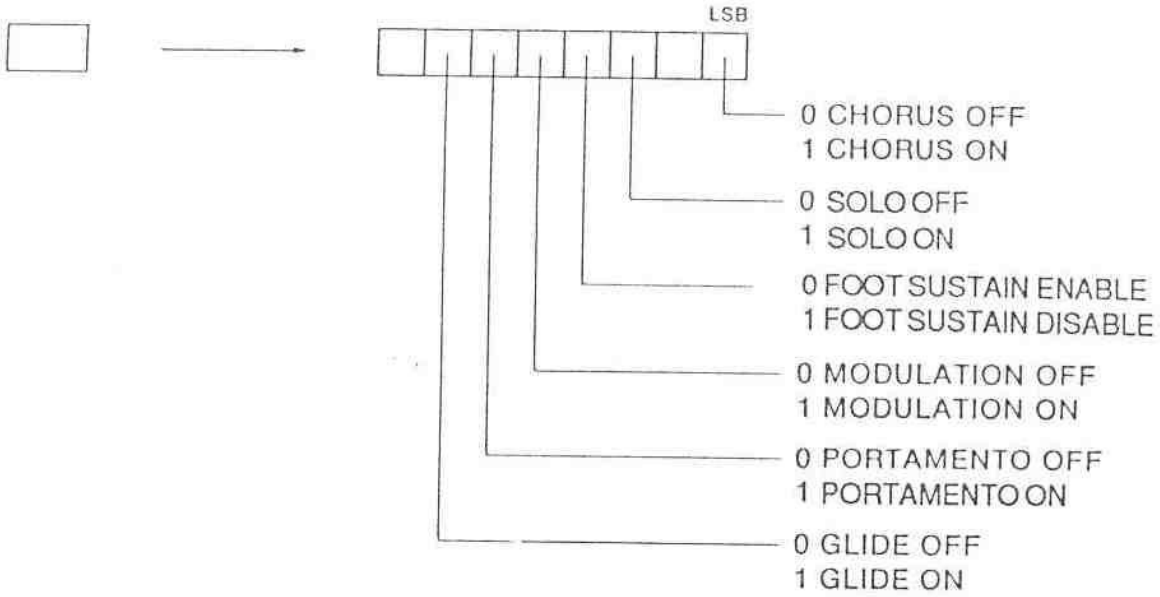
10 NORMAL EFFECT ON/OFF



11 TONE MIX EFFECT ON/OFF

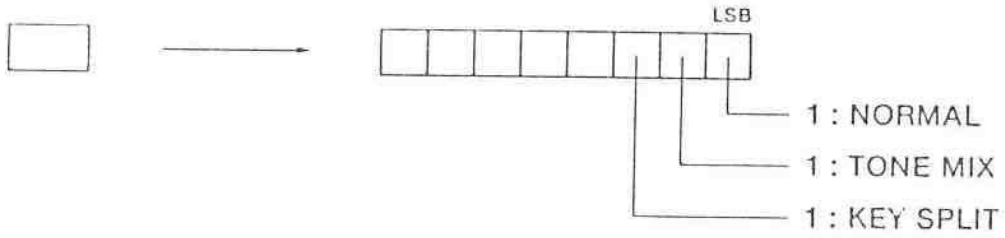


12 LOWER EFFECT ON/OFF (KEY SPLIT LOWER KEY SIDE)
UPPER EFFECT ON/OFF (KEY SPLIT UPPER KEY SIDE)



MODULATION ON/OFF is either ON or OFF for both the UPPER and LOWER keyboards.

13 MODE FLAG



Any one of the three low order bits must be i. The NORMAL mode is assumed when all three low order bits are 0.

14 NORMAL PROGRAM NO.

TONE 1 PROGRAM NO.
TONE 2 PROGRAM NO.
LOWER PROGRAM NO.
UPPER PROGRAM NO.

$0 \sim 7_{10}$	CARTRIDGE BANK	A-1～A-8
$8 \sim 15_{10}$	CARTRIDGE BANK	B-1～B-8
$16 \sim 23_{10}$	CARTRIDGE BANK	C-1～C-8
$24 \sim 31_{10}$	CARTRIDGE BANK	D-1～D-8
$32 \sim 39_{10}$	CARTRIDGE BANK	E-1～E-8
$40 \sim 47_{10}$	CARTRIDGE BANK	F-1～F-8
$48 \sim 55_{10}$	CARTRIDGE BANK	G-1～G-8
$56 \sim 63_{10}$	CARTRIDGE BANK	H-1～H-8
$64 \sim 71_{10}$	INTERNAL BANK	A-1～A-8
$72 \sim 79_{10}$	INTERNAL BANK	B-1～B-8
$80 \sim 87_{10}$	INTERNAL BANK	C-1～C-8
$88 \sim 95_{10}$	INTERNAL BANK	D-1～D-8
$96 \sim 103_{10}$	INTERNAL BANK	E-1～E-8
$104 \sim 111_{10}$	INTERNAL BANK	F-1～F-8
$112 \sim 119_{10}$	INTERNAL BANK	G-1～G-8
$120 \sim 127_{10}$	INTERNAL BANK	H-1～H-8

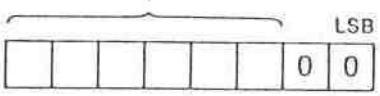
15 TONE 1 LEVEL

TONE 2 LEVEL
LOWER LEVEL
UPPER LEVEL

$1 \sim 15_{10}$: LEVEL 1～15

16 TONE 2 FINE (TONE MIX)

$0 \sim 63_{10}$: FINE 0～60



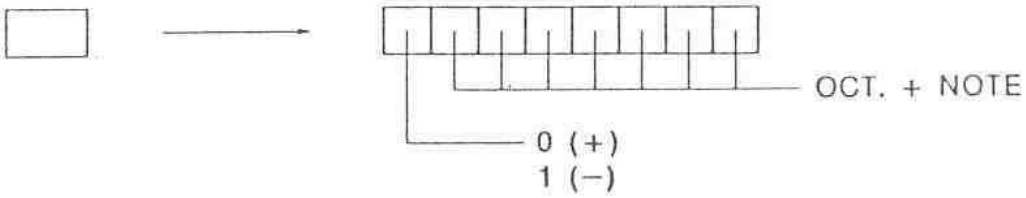
FINE 0 ~ 60

LSB
0 0

The table below shows the relationship between the FINE $0 \sim 60_{10}$ and MIDI send data $0 \sim 63_{10}$

FINE DATA $0 \sim 60_{10}$	$0_{10} \sim 15_{10}$	$16_{10} \sim 30_{10}$	$31_{10} \sim 45_{10}$	$46_{10} \sim 60_{10}$
MIDI SENT DATA $0 \sim 63_{10}$	$0_{10} \sim 15_{10}$	$17_{10} \sim 31_{10}$	$33_{10} \sim 47_{10}$	$49_{10} \sim 63_{10}$

17 TONE OCT. + NOTE (TONE MIX)



7 bits	OCT.	NOTE
0～11	0	$0 \sim 11_{10}$
12～23	1	$0 \sim 11_{10}$
24～35	2	$0 \sim 11_{10}$
36～47	3	$0 \sim 11_{10}$

18 LOWER OCT. SHIFT (KEY SPLIT)

0 ~ 2 : OCT. SHIT + 0 ~ + 2

19 UPPER OCT. SHIFT (KEY SPLIT)

0, 81, 82 : OCT. SHIT + 0, -1, - 2

20 SPLIT POINT

$1 \sim 60_{10}$: SPLIT POINT $1 \sim 60_{10}$

END