# ■ DISASSEMBLY PROCEDURE (HC-2, HC-4)
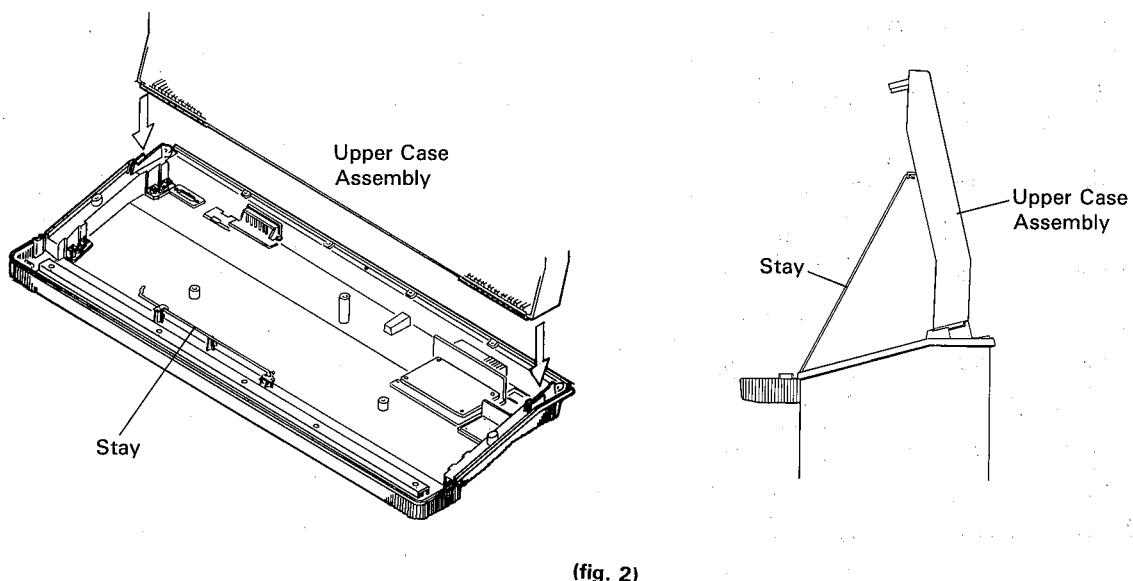
1. Main Unit Removal (Refer to fig. 1.)

1-1. Disconnect the 2 connectors (PK and SP connectors) located on the underside of the main unit, the PK connector on the left, the SP connector on the right.

1-2. Remove the 4 wing bolts ① (5.0 × 12), and then remove the main unit by lifting upward from the stand.

    * Keep your fingers away from the area near the stand when lifting or lowering the main unit.


(fig. 1)
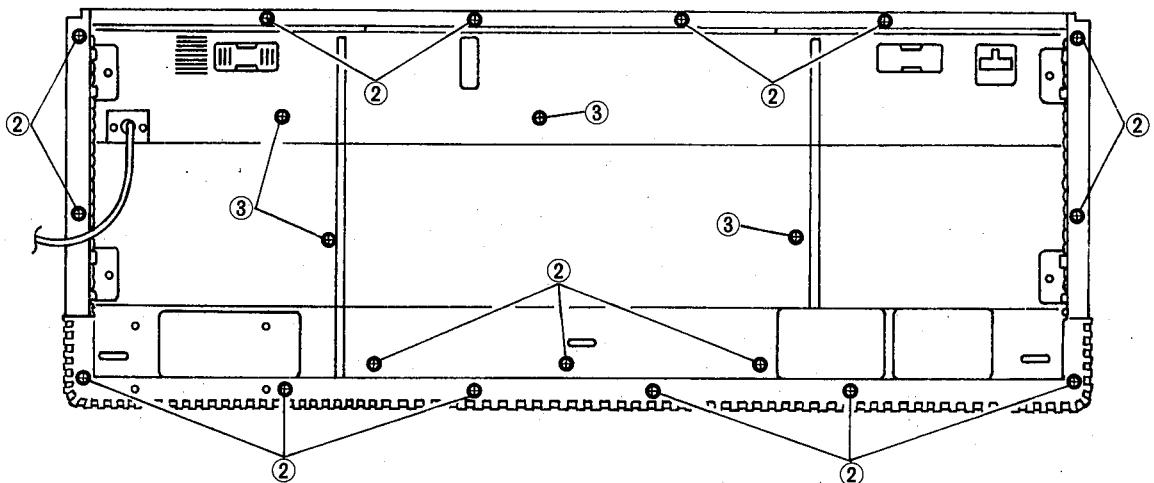
2. Opening The Main Unit (Refer to fig. 2.)

- Remove the main unit from the stand. (see procedure 1.)
- Remove the screws fastening the lower case. (see procedure 3.)

2-1. Replace the main unit on the stand, then retighten the screws ① and connect the PK and SP connectors.

2-2. Open the upper case assembly, and then fix the stay to keep up the upper case assembly open.

    * This will give you access to the circuit boards located inside of the main unit.

(fig. 2)

3. Lower Case Assembly Removal (Refer to fig. 3.)
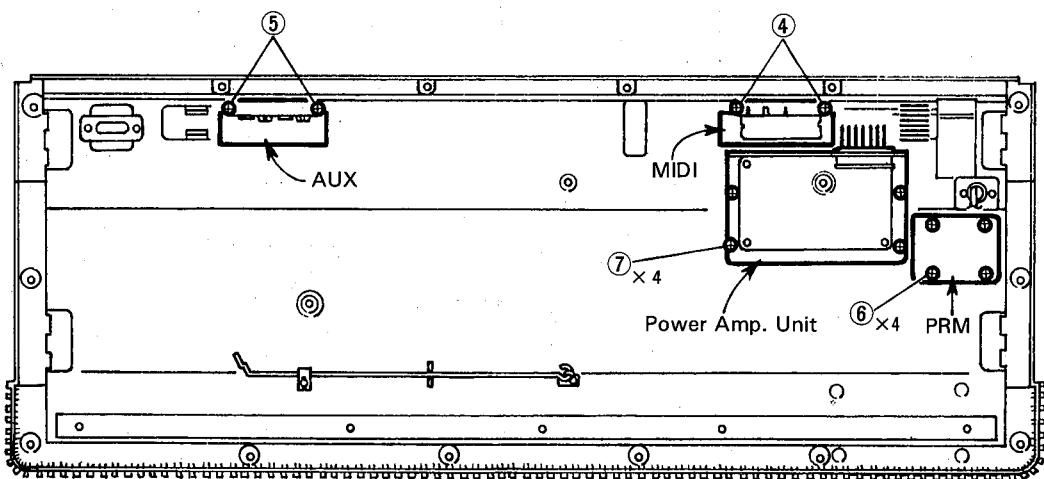
- Remove the main unit from the stand. (see procedure 1.)

3-1. Place the main unit upside down on the maintenance table. Remove the 17 screws ② (4.0 × 16 Bind head tapping screw), the 4 screws ③ (4.0 × 10 Bind head screw) and disconnect the connectors. Then remove the lower case assembly.

(fig. 3)

4. AUX, PRM, MIDI Circuit Boards and Power Amp. Unit Removal (Refer to fig. 4.)

• Remove the lower case. (see procedure 3.)

4-1. The AUX circuit board can be removed by removing the 2 screws ⑤ (3.0 × 10 Bind head tapping screw).

4-2. To remove the PRM circuit board, remove the 4 screws ⑥ (3.0 × 10 Bind head tapping screw).

4-3. After the 4 screws ⑦ (3.0 × 10 Bind head tapping screw) have been removed, the power amplifier unit can be removed.

4-4. To remove the MIDI circuit board, remove the Power amplifier unit first, then remove the 2 screws ④ (3.0 × 10 bind head tapping screw).

(fig. 4)

5. DM Circuit Board Removal (Refer to fig. 5, 6.)

• Remove the lower case assembly. (see procedure 3.)

5-1. Remove the 7 screws ⑧ (3.0 × 8 Bind head screw), and then remove the shield cover (L).

5-2. Remove the 4 screws ⑨ (3.0 × 10 Blaze washer head tapping screw), the 4 screws ⑩ (3.0 × 8 Blaze washer head screw) and disconnect the connectors. Then remove the DM circuit board with the shield cover (U).

6. ENC, HP Circuit Boards and Power Switch Removal (Refer to fig. 5.)

• Remove the lower case assembly. (see procedure 3.)

6-1. To remove the ENC circuit board, remove the VR knob (or tempo knob) on the left panel and the 4 screws ⑪ (3.0 × 8 Pan head tapping screw).

6-2. To remove the HP circuit board, remove the 2 screws ⑫ (3.0 × 12 Bind head tapping screw).

6-3. The Power switch can be removed by removing the 2 screws ⑬ (3.0 × 12 Bind head tapping screw).
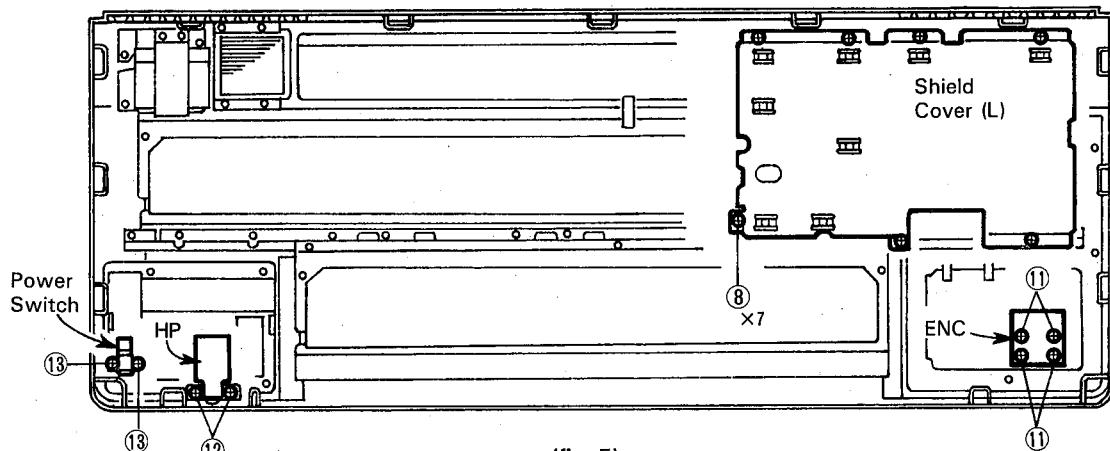
7. Upper and Lower Keyboard Assemblies Removal (Refer to fig. 6.)

• Remove the lower case assembly. (see procedure 3.)
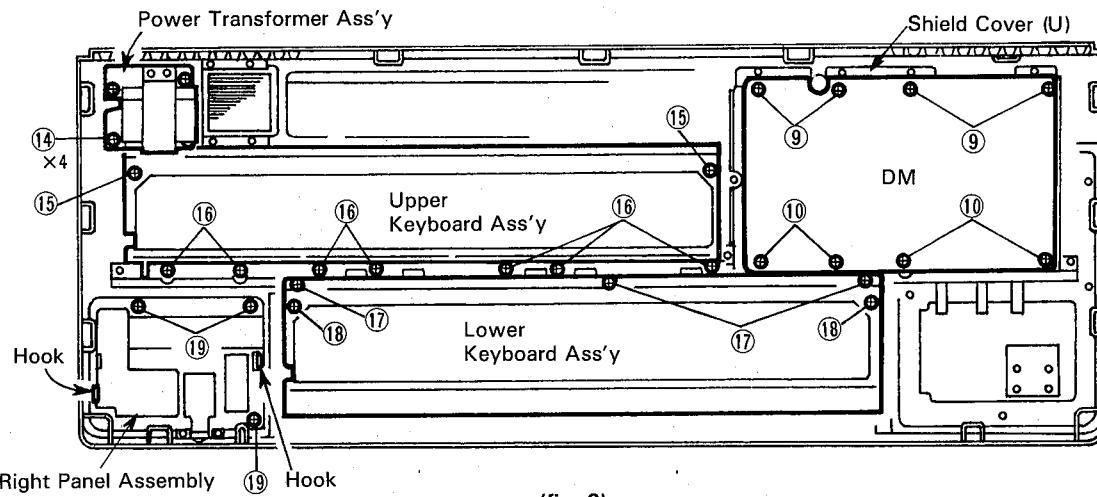
7-1. Remove the 4 screws ⑭ (4.4 × 10 Bind head tapping screw YPF), and then remove the Power transformer assembly.

7-2. To remove the Upper keyboard assembly, remove the 2 screws ⑮ (3.0 × 12 Bind head tapping screw), 7 screws ⑯ (3.0 × 8 Bind head screw) and disconnect the connector.

7-3. To remove the Lower keyboard assembly, remove the 3 screws ⑰ (3.0 × 8 Bind head screw), 2 screws ⑱ (3.0 × 12 Bind head tapping screw) and disconnect the connector.

(fig. 5)

(fig. 6)

8. MVR and PN2 Circuit Boards Removal (Refer to fig. 6, 7.)

* Remove the lower case assembly. (see procedure 3.)
* Remove the power switch. (see procedure 6.)
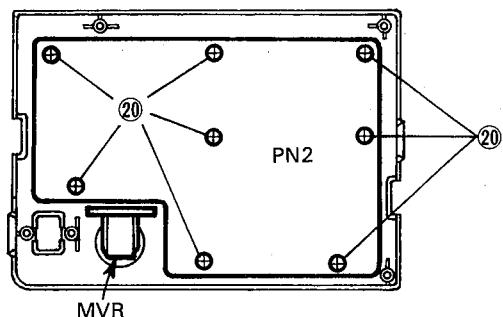
8-1. Remove the 3 screws ⑲ (3.0 × 12 Bind head tapping screw) and disconnect the connectors. Push the hook inward, and then remove the Right panel assembly.
   * When removing it, you should hold it's outside surface not to fall.

8-2. To remove the MVR circuit board, remove the VR knob and the hex. nut on the right panel.

8-3. To remove the PN2 circuit board, remove the 8 screws ⑳ (3.0 × 8 Pan head tapping screw).

* Right Panel Assembly

(fig. 7)
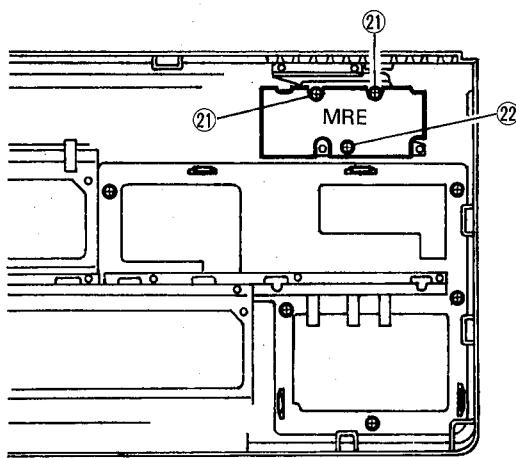
9. MRE and RP Circuit Boards Removal (Refer to fig. 8, 9.) *HC-4 only
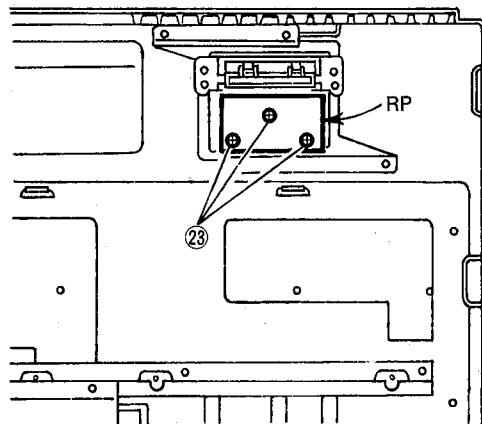
* Remove the lower case assembly. (see procedure 3.)
* Remove the DM circuit board and the shield cover (U). (see procedure 5).

9-1. To remove the MRE circuit board, remove the 2 screws ㉑ (3.0 × 16 Bind head tapping screw) and 1 screw ㉒ (3.0 × 8 Bind head tapping screw).

9-2. To remove the RP circuit board, remove the 3 screws ㉓ (3.0 × 8 Bind head tapping screw) after removing the MRE circuit board.
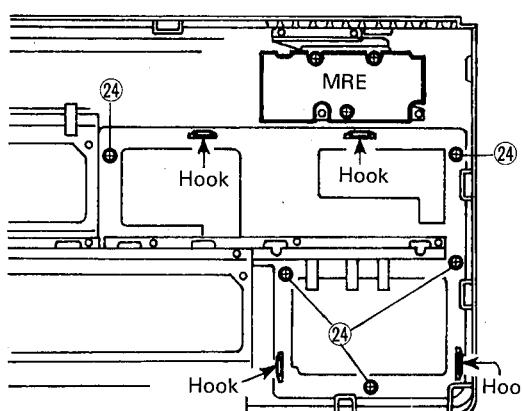
(fig. 8)
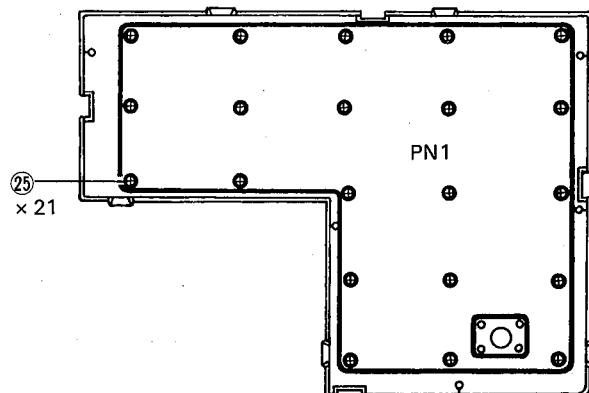
(fig. 9)

10. PN1 Circuit Board Removal (Refer to fig. 10.)

* Remove the lower case assembly. (see procedure 3.)
* Remove the DM circuit board and the shield cover (U). (see procedure 5.)
* Remove the ENC circuit board. (see procedure 6-2.)

10-1. Remove the 5 screws ㉔ (3.0 × 12 Bind head tapping screw) and disconnect the connectors. Push the hook inward, and then remove the Left panel assembly.

      * When removing it, you should hold it's outside surface not to fall.

10-2. Remove the 21 screws ㉕ (3.0 × 8 Pan head tapping screw), and then remove the PN1 circuit board.
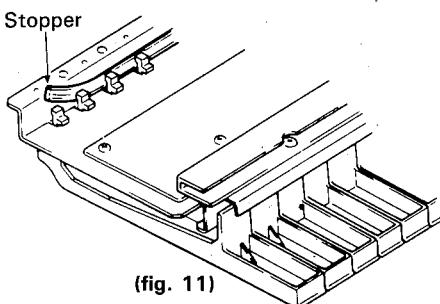
(fig. 10-a)
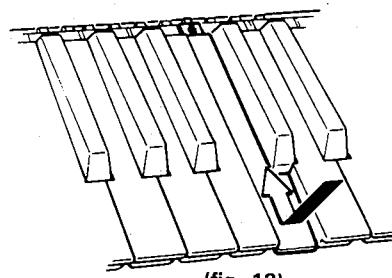
(fig. 10-b)

11. White Key and Black Key Removal (Refer to fig. 11, 12.)

* Remove the keyboard assembly. (see procedure 7.)

11-1. The white keys should be removed before removing the black keys.

11-2. Remove the stopper. Then slide the white key horizontally till it comes off from the frame and lift it up.

      * Re-installation: Insert a key spring to the grove and push it till it fits into the frame fully.
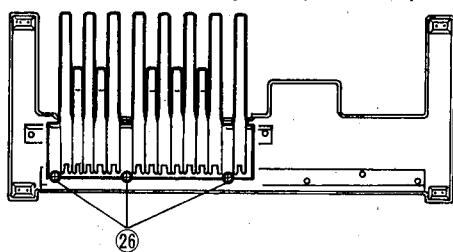
(fig. 11)
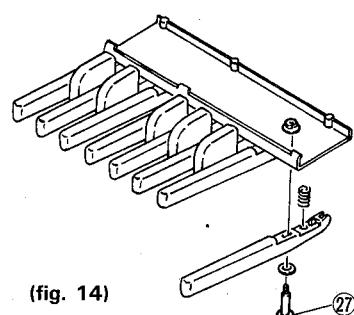
(fig. 12)

12. Pedal Keyboard Assembly Disassembly (Refer to fig. 13, 14.)

12-1. Turn off the power switch and lay the unit on its side carefully.

12-2. Remove the 3 screws ㉖ (4.0 × 20 Bind head screw) and disconnect the connectors, then remove the Pedal keyboard assembly.

12-3. Remove the screw ㉗ (4.0 × 41) while holding the hex. nut stationary, and then remove the pedal key.

      * After re-installing the pedal key, be sure to apply the screw lock to the hex. nut.
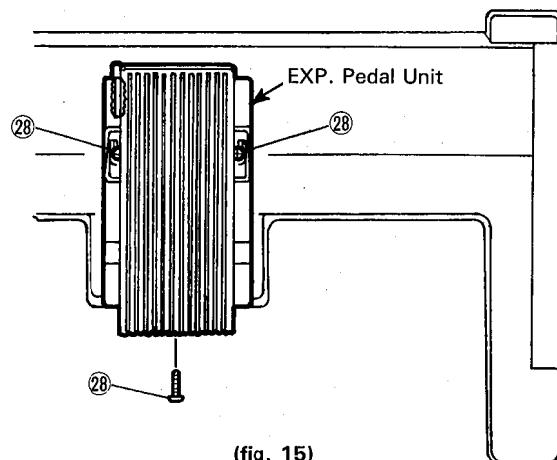
(fig. 13)

(fig. 14)

13. EXP. Pedal Unit Removal (Refer to fig. 15.)
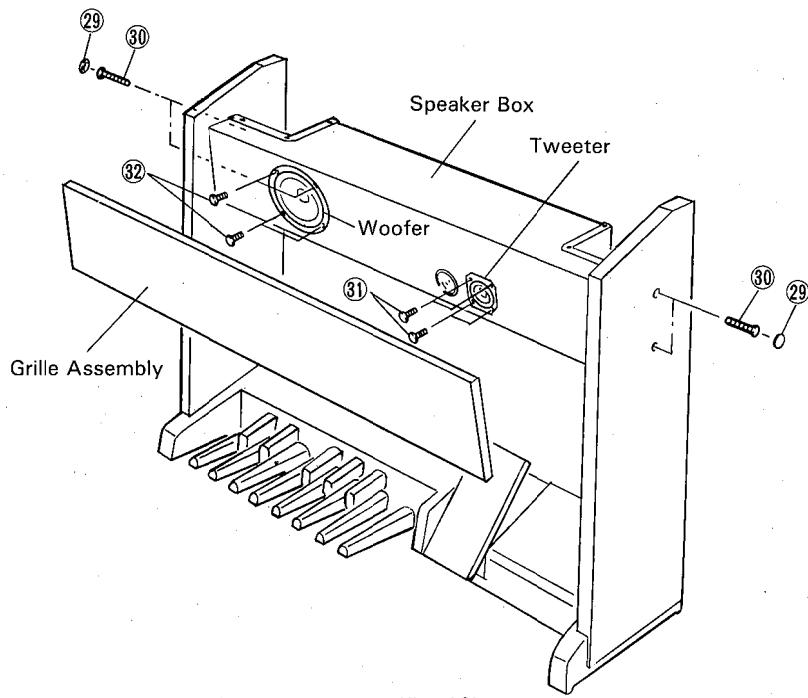
13-1. After remove the 3 screws ㉘ (4.0 × 16 Bind head tapping screw) and disconnect the connector of the EXP cable, the EXP. pedal unit can be removed.

EXP. Pedal Unit

(fig. 15)

14. Speaker Box Assembly Removal (Refer to fig. 16)

• Remove the main unit from the stand. (see procedure 1.)

14-1. Remove the 4 caps ㉙ and 4 bolts ㉚ located on the side boards. After that, lift the Speaker box assembly up and then slide it toward the back.

14-2. After the Grille assembly has been removed, the Speaker (tweeter) can be removed by removing the 4 screws ㉛ (3.5 × 16 Bind head tapping screw).

14-3. To remove the Speaker (woofer), remove the 4 screws ㉜ (4.0 × 16 Bind head screw).

Speaker Box

Tweeter

Woofer

Grille Assembly
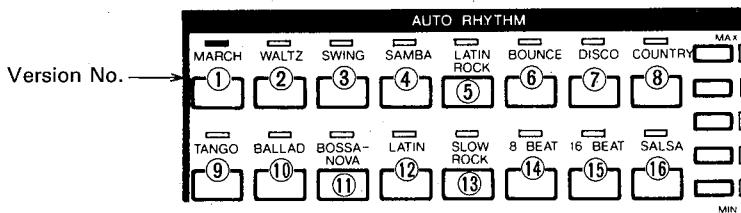
(fig. 16)

■ INTERNAL TEST PROGRAM (HC-2, HC-4)

1. ROM VERSION DISPLAY MODE
- HC-2:
  Hold down the FILL IN 1 button while applying power to the unit, a AUTO RHYTHM switch LED will light on and off to indicate the VERSION NUMBER of MAIN ROM as following:

- HC-4:
  Hold down the FILL IN 1 button while applying power to the unit, then the VERSION NUMBER of MAIN ROM will appear in the TEMPO/(DATA) display.

2. SWITCH INDICATOR CHECK (HC-4 only)
To enter this test, hold down the CONFIRM button while applying power to the unit. The entire LED indicators of the panel switch will light "ON and OFF" repeatedly.
And press the CONFIRM button again, the LED indicators will light "ON and OFF" one after another.
Then press it again, the LED of the pressed switch will light on.
And press it again, the unit will return to normal operation.
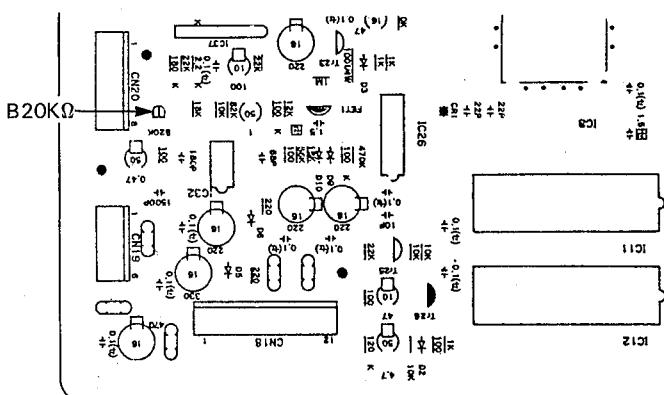
3. RAM CHECK
To enter the RAM test, hold down the second button from the right of the VOICE MENU, while applying power to the unit. If the test result is normal, the Bass drum will sound continuously.

4. POWER ON RESET
To perform the POWER ON RESET, hold down the first button from the left of VOICE MENU while applying power to the unit.
After this operation, the unit will return to normal operation.

5. BASIC REGISTRATIONS SET
While pressing the red M (Memory) button, turn on the POWER switch, the contents of the Registration Memory will be replaced by the data of the Basic Registrations.

6. LEVEL ADJUSTMENT
To call the Basic signal for adjustment, press the gray button of the LK Orchestral while pressing and holding the 2nd, 4th and 6th buttons from the left of the Voice Menu. Then press C3 key of LK, and adjust the trimmer pot. B20kΩ on the DM circuit board so that the output signal of +9.5dB is obtained at the HEADPHONES jack.

■LSI DATA TABLE

• M50734SP (XB826001) CPU

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	STB	O	Strobe	33	AFTU	I	UK after touch AD
2	DME	O	Data memory enable	34	AFTL	I	LK after touch AD
3	TXD	I	MIDI data input	35	EXP	I	Master volume AD
4	RXD	O	MIDI data output	36	CONF	I	CONFIRM button data
5	P10	O	} Port 1	37	VREF	I	Reference voltage for A/D
6	P11	O		38	RD	O	Read control
7	P12	I		39	WR	O	Write control
8	P13	I		40	φ	O	Clock (2MHz)
9	KN	I	Knee lever control	41	SYNC	O	Synchro. pulse
10	M0	I	} Model select	42	A15	O	} Address bus
11	M1	I		43	A14	O	
12	M2	I		44	A13	O	
13	AIC	O	Initial clear (MIDI)	45	A12	O	
14	MIC	O	Initial clear (LSK1)	46	A11	O	
15	DIC1	O	Initial clear (KBS-UK)	47	A10	O	
16	DIC2	O	Initial clear (KBS-LK)	48	A9	O	
17	DIC3	O	Initial clear (GEW, OPZ)	49	A8	O	
18	DIC4	O	Initial clear (DAL)	50	ALE	O	Adress latch enable
19	MIN	I	Memory inserted	51	D7	I/O	} Data bus
20	WP	I	Write protect data	52	D6	I/O	
21	PWM	O	Pulse width modulation	53	D5	I/O	
22	SCLK	O	Shift clock	54	D4	I/O	
23	SIO	I/O	Serial data input/output	55	D3	I/O	
24	E1	O	Chip enable	56	D2	I/O	
25	P34	O	not used	57	D1	I/O	
26	P35	I	not used	58	D0	I/O	
27	DIR1	I	Direction control	59	WD		Not Used
28	MTG	O	Mute control	60	INT1	I	Interrupt request
29	RES	I	Reset	61	LOAD	I	Cassette load
30	XIN	I	} Clock (8MHz)	62	P2	O	} Bank select
31	XOUT	O		63	P1	O	
32	Vss		Ground	64	Vcc		DC supply (+5V)

• ADEC (XB828001) Address Decoder

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	A10	I	Address bus	13	A16	O	Address bus
2	I2	I		14	DVO	O	Clock (1/8)
3	O	O		15	DVI	I	Clock
4	PB	I	Bank select	16	P2	I	} Bank select
5	ROM3	O	Chip enable (ROM3)	17	P1	I	
6	A11	I		18	DME	I	Data memory enable
7	A12	I	} Address bus	19	RYP	O	Chip enable (RYP4)
8	A13	I		20	MI	O	Chip enable (MI1)
9	A14	I		21	ROM2	O	Chip enable (ROM2)
10	A15	I		22	ROM1	O	Chip enable (ROM1)
11	RS	I	Resistor select	23	RAM	O	Chip enable (RAM)
12	Vss		Ground	24	VDD		DC supply (+5V)

• SFC (XE755A00) Signal Format Converter

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	SI12	I	} Serial data input	15	D4	I/O	} Data bus
2	SI11	I		16	D5	I/O	
3	SI10	I		17	D6	I/O	
4	SI20	I		18	D7	I/O	
5	SI21	I		19	WR	I	Write control
6	SI22	I		20	CS	I	Chip select
7	Vss		} Ground	21	VDD		} DC supply
8	Vss			22	VDD		
9	TST	I	Test input	23	CLK	I	Clock
10	CDO	O	CD data output	24	SYW	I	Synchro pulse
11	D0	I/O	} Data bus	25	IC	I	Initial clear
12	D1	I/O		26	SOT	O	Test output
13	D2	I/O		27	SO2	O	} Serial data output
14	D3	I/O		28	SO1	O	

• TMC3493PH (XF987A00) GEW-5

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	CASI00	I	Cascade in A	41	MAE	O	Memory address enable
2	VDD		Power supply (+5V)	42	VDD		Power supply
3	D0	I/O		43	MRD	O	Memory read control
4	D1	I/O		44	MWR	O	Memory write control
5	D2	I/O		45	MD7	I/O	
6	D3	I/O	µCom. data bus	46	MD6	I/O	
7	D4	I/O		47	MD5	I/O	
8	D5	I/O		48	MD4	I/O	External memory data bus
9	D6	I/O		49	MD3	I/O	
10	D7	I/O		50	MD2	I/O	
11	A0	I		51	MD1	I/O	
12	A1	I	µCom. address bus	52	MD0	I/O	
13	CS	I	Chip select	53	MUTE	O	Analog mute control
14	WR	I	Write control	54	IC	I	Initial clear
15	RD	I	Read control	55	SYO	O	Synchro. pulse input
16	SM	I	Slave/Master select	56	SYI	I	Synchro. pulse output
17	TEST1	I	Test pin	57	XCLK	O	3.2MHz
18	TEST2	I		58	CLC	I	MCLK in/out select
19	MA0	O		59	MCLK	I/O	6.4MHz
20	MA1	O		60	VDD		Power supply
21	MA2	O	External memory address bus	61	XOUT	O	Clock
22	MA3	O		62	XIN	I	
23	Vss		Ground	63	Vss		Ground
24	MA4	O		64	SO12	O	
25	MA5	O		65	SO11	O	PSD3 format output B
26	MA6	O		66	SO10	O	
27	MA7	O		67	SO02	O	
28	MA8	O		68	SO01	O	PSD3 format output A
29	MA9	O		69	SO00	O	
30	MA10	O		70	CASO12	O	Cascade out B
31	MA11	O		71	CASO11	O	(SFC/RFL format-linear)
32	MA12	O	External memory address bus	72	CASO10	O	
33	MA13	O		73	CASO02	O	Cascade out A
34	MA14	O		74	CASO01	O	(SFC/RFL format-linear)
35	MA15	O		75	CASO00	O	
36	MA16	O		76	CASI12	I	
37	MA17	O		77	CASI11	I	Cascade in B (serial sum)
38	MA18	O		78	CASI10	I	
39	MA19	O		79	CASI02	I	Cascade in A (serial sum)
40	MA20	O		80	CASI01	I	

• SI-1 (XB810001) Serial/Pararell Interface

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	Vss2	I	Power supply ground	21	Vss	I	Ground
2	IC	I	Initial clear	22	Vss	I	Ground
3	CLK	I	Shift clock input	23	D2	I/O	
4	EN	I	Enable signal	24	D1	I/O	RAM pack data bus signal
5	DIR	I	Serial data direction control ("0" for SI-1 output, "1" for SI-1 input)	25	D0	I/O	
				26	D7	I/O	
6	SD	I/O	Serial data	27	Vss	I	Ground
7	STO	O	Byte 0 input wait signal	28	A10	O	
8	ADEN	O	Address valid signal ("0" for address valid period)	29	A9	O	
				30	A0	O	
9	A13	O		31	A2	O	RAM pack address signal
10	A7	O		32	A4	O	
11	A5	O		33	A6	O	
12	A3	O	RAM pack address signal	34	A12	O	
13	A1	O		35	A14	O	
14	A8	O		36	OE	O	OE signal
15	A11	O		37	WE	O	WE signal
16	Vss	I	Ground	38	DOUT	I	D0 to D7 direction control
17	D3	I/O		39	RW	O	Read/Write signal
18	D4	I/O	RAM pack data bus signal	40	·E	O	Chip select
19	D5	I/O		41	E	O	Chip select
20	D6	I/O		42	VDD	I	+5V

• LC92018B-305 (XF998A00) LSK1 (LED drive & Switch Scan)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	L108	O	⎫	51	RDV	I	Read control
2	L107	O	⎟	52	WRV	I	Write control
3	L106	O	⎟	53	CLK1	I	Clock 1
4	L105	O	⎬ LED drive 1	54	A7	O	⎫
5	L104	O	⎟	55	A6	O	⎟
6	L103	O	⎟	56	A5	O	⎟
7	L102	O	⎟	57	A4	O	⎬ Address bus
8	L101	O	⎭	58	A3	I/O	⎟
9	Vss		Ground	59	A2	I/O	⎟
10	S212	I	⎫	60	A1	I/O	⎟
11	S211	I	⎟	61	A0	I/O	⎭
12	S210	I	⎟	62	AIS	I	For address data multiplex operation
13	S209	I	⎟	63	ALE	I	Address latch enable
14	S208	I	⎟	64	Vss		Ground
15	S207	I	⎬ Switch scan	65	D7	I/O	⎫
16	S206	I	⎟	66	D6	I/O	⎟
17	S205	I	⎟	67	D5	I/O	⎟
18	S204	I	⎟	68	D4	I/O	⎬ Data bus
19	S203	I	⎟	69	D3	I/O	⎟
20	S202	I	⎟	70	D2	I/O	⎟
21	S201	I	⎭	71	D1	I/O	⎟
22	PD2A	O	⎫	72	D0	I/O	⎭
23	PD2B	O	⎬ Scan drive code 2	73	IRQV	O	Interrupt request
24	PD2C	O	⎟	74	DRPV	O	PK data request
25	PD2D	O	⎭	75	KDP	I	PK key data
26	L210	O	⎫	76	DRLV	O	LK data request
27	L209	O	⎟	77	KDL	I	LK key data
28	L208	O	⎟	78	DRUV	O	UK data request
29	L207	O	⎟	79	KDU	I	UK key data
30	L206	O	⎬ LED drive 2	80	CLK2	I	Clock 2
31	L205	O	⎟	81	S112	I	⎫
32	L204	O	⎟	82	S111	I	⎟
33	L203	O	⎟	83	S110	I	⎟
34	L202	O	⎟	84	S109	I	⎟
35	L201	O	⎭	85	S108	I	⎬ Switch scan 1
36	NC			86	S107	I	⎟
37	NC			87	S106	I	⎟
38	NC			88	S105	I	⎭
39	NC			89	VDD		Power supply
40	Vss		Ground	90	Vss		Ground
41	VDD		Power supply	91	S104	I	⎫
42	NC			92	S103	I	⎟
43	NC			93	S102	I	⎬ Switch scan 1
44	NC			94	S101	I	⎭
45	NC			95	PD1A	O	⎫
46	NC			96	PD1B	O	⎬ Scan drive code 1
47	NC			97	PD1C	O	⎟
48	NC			98	PD1D	O	⎭
49	ICV	I	Initial clear	99	L110	O	⎫ LED drive 1
50	CEV	I	Chip enable	100	L109	O	⎭

• YM2414 (XB768001) OPZ

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	Vss	O	Ground	13	D2	I/O	⎫
2	IRQ	O	Interrupt request	14	D3	I/O	⎟
3	IC	I	Initial clear	15	D4	I/O	⎟
4	A0	I	Address bus	16	D5	I/O	⎬ Data bus
5	WR	I	Write control	17	D6	I/O	⎟
6	RD	I	Read control	18	D7	I/O	⎭
7	CS	I	Chip select	19	SYW	O	Sample and hold (Ch2)
8	CT1	O	Control data 1	20	CDO	O	Sample and hold (Ch1)
9	CRS	O	Control data 2	21	OPOUT	O	Tone signal data
10	D0	I/O	Data bus	22	VDD		DC supply (+5V)
11	Vss		Ground	23	φ1	I	Synchro pulse
12	D1	I/O	Data bus	24	φM	I	Clock

• YM3415-B (XE450B00) LEF (L-Effecter)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	+5		Power supply	21	A7	O	
2	SI0	I	} Serial data input	22	A6	O	
3	SI1	I		23	A5	O	
4	SO0	O	} Serial data input	24	A4	O	
5	SO1	O		25	A3	O	} Address bus
6	XCLK	I	Clock	26	A2	O	
7	CDO	O	CD data output	27	A1	O	
8	$\overline{CDI}$	I	CD data input	28	$\overline{A0}$	O	
9	$\overline{CRS}$	I	CD counter reset	29	$\overline{RAS}$	O	DRAM control
10	$\overline{WR}$	I	Write control	30	$\overline{CAS}$	O	DRAM control
11	$\overline{A/D}$	I	Address/data parameter select	31	$\overline{WE}$	O	WE signal
12	PD0	I/O		32	$\overline{OE}$	O	OE signal
13	PD1	I/O		33	D3	I/O	
14	PD2	I/O		34	D2	I/O	
15	PD3	I/O		35	D1	I/O	} Data bus
16	PD4	I/O	} Data bus	36	D0	I/O	
17	PD5	I/O		37	TST2	I	Internal test
18	PD6	I/O		38	SYW	I	Synchro pulse
19	PD7	I/O		39	CLK	I	Clock
20	Vss		Ground	40	$\overline{IC}$	I	Initial clear

• YM3430 (XF497A00) KBS2 (Keyboard Scanner)
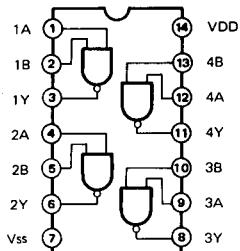
| Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	VDD		+5V	40	CK1	I	Connector for 3.25MHz ceramic etc.
2	$\overline{M_4}$	I		39	CK2	I	Connector for 3.25MHz ceramic etc.
3	$\overline{M_3}$	I		38	AEN	I	Outputs AD conversion data (1)/ stops (0)
4	$\overline{M_2}$	I	} Make point	37	$\overline{KI}$	I	Initial set
5	$\overline{M_1}$	I		36	D_{12}	O	
6	$\overline{M_0}$	I		35	D_{11}	O	
7	$\overline{B_4}$	I		34	D_{10}	O	
8	$\overline{B_3}$	I		33	D_9	O	
9	$\overline{B_2}$	I	} Break point	32	D_8	O	
10	$\overline{B_1}$	I		31	D_7	O	
11	$\overline{B_0}$	I		30	D_6	O	} Scan drive pulse
12	TRS	I	Transfer (1)/2 make (0) select	29	D_5	O	
13	S21	I	2 make (1)/1 make (0) select	28	D_4	O	
14	AVDD		+5 volts for analog circuit	27	D_3	O	
15	$\overline{TST}$		Test mode (0) select. When testing, the value of the shift register is sent.	26	D_2	O	
16	AI	I	Analog voltage for AD conversion input.	25	D_1	O	
17	DAC OUT	O	DAC output	24	D_0	O	
18	A GND		Analog circuit Gnd.	23	$\overline{DR}$	I	Host data request. When KBS detects the fall of DR, event data transmission is enabled.
19	GND		GND	22	KD	O	8 bit key data. A start bit of '0', stop bit of '1' is added, and the LSB is sent.
20	$\overline{EVR}$	O	Not used.	21	TXC	I	Clock for serial communication (100K-500K)

• **YM3028A** (XE789A00)   Digital Analog Converter Logic
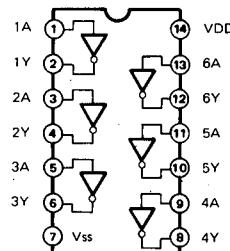
| PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	VDD	I	Power supply	13	to Buff	O	Analog output to buffer amp.
2	SYW		Synchro pulse	14	MP	I	Middle point 1/2 VDD bias
3	DGND		Digital ground	15	RC	O	Bias compensation
4	CLK	I	Clock	16	RB	O	Bias-R
5	CRASH	O	Crash detect	17	AGND		Analog ground
6	ZEROA	O	Zero detect	18	AVDD		Analog power supply
7	OUT4	O	⎫	19	LMTEM	I	Limiter enable
8	OUT3	O	⎪	20	IN1	I	⎫ Digital data input
9	OUT2	O	⎬ Analog signal output	21	IN2	I	⎭
10	OUT1	O	⎭	22	SEL1	I	⎫ Data shift
11	NS	I	Chip test	23	SEL2	I	⎭
12	COM	I	Analog input from buffer amp.	24	IC	I	Initial clear

■ IC BLOCK DIAGRAM
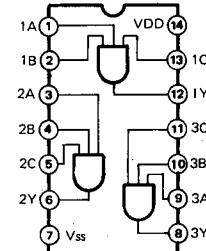
• **TC74HC00P** (IR000000)
Quad 2 Input NAND
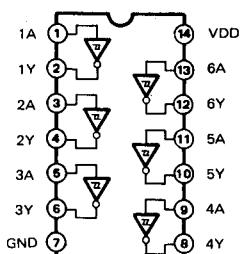
• **TC40H004P** (IG051000)
Hex Inverter
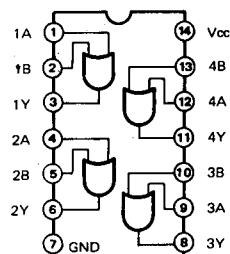
• **TC74HC11P** (IR001100)
Triple 3 Input AND
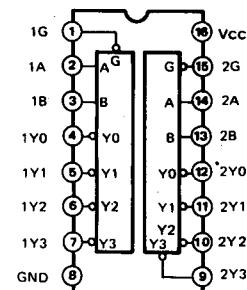
• **TC74HC14P** (IR001400)
Hex Inverter
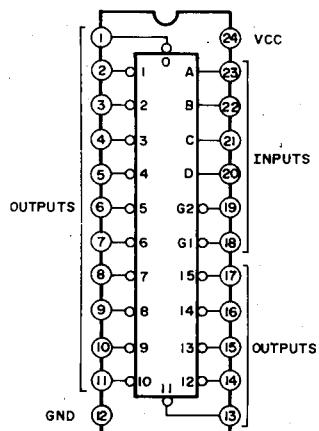
• **TC74HC32P** (IR003200)
Quad 2 Input OR
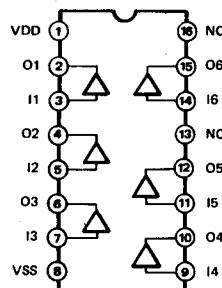
• **TC40H139P** (IG078300)
Dual 2 to 4 Demultiplexer
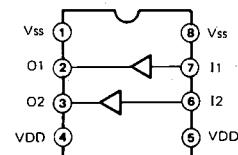
- **TC74HC154P** (IRO15400)
  4 to 16 Demultiplexer
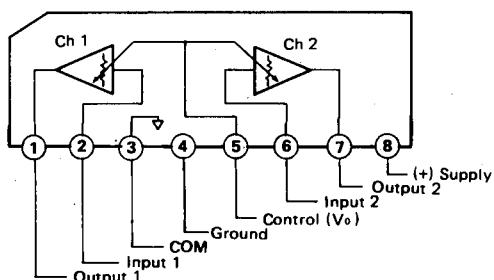
- **TC4050BP** (IG001740)
  Hex Buffer/Converter
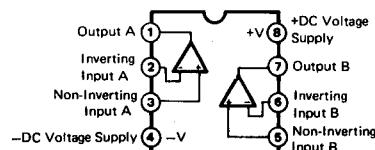
- **T6400 (S)** (IG079500)
  Clock Buffer

- **M5222L** (IG120700)
  VCA (2 ch)

- **RC4558D-V** (IG001390)
- **NJM4560ED** (IG040000)
  Dual Operational Amplifier

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■MIDI

Main Data that Can be Transmitted/Received

● Transmission/reception of Performance data:
  Upper keyboard: Channel 1
  Lower keyboard: Channel 2
  Pedal keyboard: Channel 3

● Transmission/reception of the control data for the Expression Pedal and SUSTAIN.

● Transmission/reception of only the data indicating the selection of Registration Nos. in REGISTRATION MEMORY and REGISTRATION MENU.

● Transmission/reception of the control data (Exclusive Messages) for the FILL IN, INTRO/ENDING, and FOOT SWITCH (HC-4) using the message format below:
  F0H, 43H, 70H, 70H, 40H, nnH, xxH, F7H
In the above format, "nnH" and "xxH" signify the following:
nnH 45H: Foot Switch   48H: Fill In
    4BH: Intro/Ending   4CH: User Fill In
xxH 7FH: ON   00H: OFF
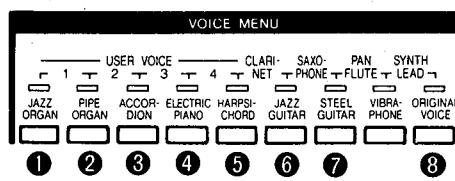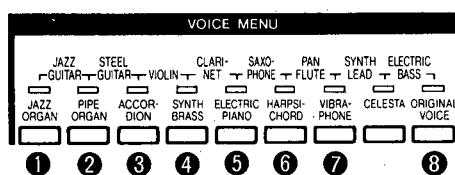
Changing the MIDI Modes

The MIDI modes can be changed by using the VOICE MENU buttons on HC-4 and HC-2.

[HC-4]

[HC-2]

Item	Changing the Mode		Resetting the Mode		Remarks
	HC-4	HC-2	HC-4	HC-2	
RHYTHM SYNC mode (INTERNAL SYNC→ EXTERNAL SYNC)	Press JAZZ ORGAN ❶ while pressing ORIGINAL VOICE ❽		Press PIPE ORGAN ❷ while pressing ORIGINAL VOICE ❽		In EXTERNAL SYNC mode, the Electone can receive signals from a rhythm machine or an instrument with Rhythm functions.
Receive Channel No. for the Lead Voice (CH 1→CH 4)	Press ACCORDION ❸ while pressing ORIGINAL VOICE ❽		Press ELECTRIC-PIANO ❹ while pressing, ORIGINAL VOICE ❽	Press SYNTH BRASS ❹ while pressing ORIGINAL VOICE ❽	Select CH 4 when you wish to record and play back the Lead voice performance on a separate channel at MDR.
Transmit Channel Nos. of the upper and lower keyboards Upper keyboard: CH 1→CH 4 Lower keyboard: CH 2→CH 5	Press HARPSICHORD ❺ while pressing ORIGINAL VOICE ❽	Press ELECTRIC-PIANO ❺ while pressing ORIGINAL VOICE ❽	Press JAZZ GUITAR ❻ while pressing ORIGINAL VOICE ❽	Press HARPSICHORD ❻ while pressing ORIGINAL VOICE ❽	When recording to MDR, etc., changing the Channles Nos. lets you create a multi-part recording with specific voice sections (LEAD VOICES, ARPEGGIO CHORD, etc.) on separate channels.
Transmit Bulk data	Press STEEL GUITAR ❼ while pressing ORIGINAL VOICE ❽	Press VIBRAPHONE ❼ while pressing ORIGINAL VOICE ❽			Transmits Bulk data to a MIDI recorder other than MDR.

■CHANNEL MESSAGES

Code	Function	Transmitted	Recognized	Remarks
8nH, nnH (Note No.), 00H-7FH	Note OFF	×	CH 1 CH 2 CH 3 (CH 4)∗ CH 15	UK LK PK LEAD Keyboard Percussion
9nH, nnH (Note No.), 01H-7FH (ON) 00H (OFF)	Note ON/OFF	CH 1 CH 2 CH 3 (CH 4)∗ (CH 5)∗ ×	CH 1 CH 2 CH 3 (CH 4)∗ × CH 15	UK LK PK LEAD Arpeggio Chord Keyboard Percussion
BFH, 0BH, 00H-7FH	Expression Pedal	CH 16	CH 16	CONTROL
BnH, 40H, 7FH (ON) 00H (OFF)	Sustain ON/OFF	CH 1 CH 2 CH 3	CH 1 CH 2 CH 3	UK LK PK
BnH, 7BH, 00H	All Note OFF	×	CH 1 CH 2 CH 3 (CH 4)∗ CH 16	UK LK PK LEAD CONTROL
CnH, nnH (REGIST. No.)	Program Change	CH 1 CH 2 CH 3 CH 16	CH 1 CH 2 CH 3 CH 16	UK LK PK CONTROL

∗Can be replaced by MIDI CONTROL functions on the MULTI MENU.

■SYSTEM REALTIME MESSAGES

Code	Function	Transmitted	Recognized	Remarks
F8H	Clock	○	○∗	
FAH	Start	○	○	
FCH	Stop	○	○	
FEH	Active Sensing	○	○	
FFH	Reset	×	○	

∗Only in External Synchronous mode.

■SYSTEM EXCLUSIVE MESSAGES

Code	Messages	Remarks
F0H, 43H, 70H, 70H (Electone), ..., F7H	1. Electone common messages	(➡Page 31)
F0H, 43H, 70H, 72H (HS), ..., F7H	2. HS Series common messages	(➡Page 32)
F0H, 43H, 70H, 74H (HE), ..., F7H	3. HC-4•2 common messages	(➡Page 33)
F0H, 43H, 70H, nnH, (Model)∗..........................., F7H	4. Model-Specific messages	(➡Page 33)
F0H, 43H, 73H, ..., F7H	5. Electone/Single Keyboard common messages	(➡Page 33)

1. Electone common messages

■BULK DUMP Related Messages

Code	Messages	Transmitted	Recognized
F0H, 43H, 70H, 70H, 00H, ...(data)........, F7H	Bulk Dump data	×	O
01H,	Request-to-Send Voice Parameter data	×	O
02H,	Request-to-Receive Voice Parameter data	×	O
F0H, 43H, 70H, 70H, 10H, F7H	Request-to-Send all RAM data	×	O
11H	Request-to-Send Registration data	×	O
12H	Request-to-Send C.S.P./R.S.P. data	×	×
13H	Request-to-Send F.M.P. data	×	×
14H	Request-to-Send USER Pattern data	×	×
15H	Request-to-Send USER Pattern data	×	×
16H	Request-to-Send USER Voice data	×	O
F0H, 43H, 70H, 70H, 20H, F7H	Request-to-Receive all RAM data	*1	O
21H	Request-to-Receive Registration data	×	O
22H	Request-to-Receive C.S.P./R.S.P. data	×	×
23H	Request-to-Receive F.M.P. data	×	×
24H	Request-to-Receive USER Pattern data	×	×
25H	Request-to-Receive USER Pattern data	×	×
26H	Request-to-Receive USER Voice data	×	O
F0H, 43H, 70H, 70H, 30H, F7H	Request-to-Send Model ID data	×	O
F0H, 43H, 70H, 70H, 38H, 7FH, F7H	Bulk Dump Acknowledge	O	×
00H	Unacknowledge	O	×

*1 Can be transmitted using MIDI CONTROL function on the MULTI MENU.

■CONTROL CHANGE

Code	Messages		Transmitted	Recognized
F0H, 43H, 70H, 70H, 40H, 45H, 7FH, F7H	FOOT SWITCH LEFT	ON	*1	*1
00H		OFF	*1	*1
40H, 47H, 7FH, F7H	KNEE LEVER	ON	×	×
00H		OFF	×	×
40H, 48H, 7FH, F7H	FILL IN 1	ON	O	O
00H		OFF	O	O
40H, 49H, 7FH, F7H	FILL IN 2	ON	O	O
00H		OFF	O	O
40H, 4BH, 7FH, F7H	INTRO./ENDING	ON	O	O
00H		OFF	O	O
40H, 4CH, 7FH, F7H	EXT. FILL IN	ON	×	×
00H		OFF	×	×
40H, 50H, TLH, THH, F7H	TEMPO		O	O

*1 Transmitted and Recognized only by HC-4.

■MDR-3・MDR-2P STATUS

Code	Messages		Transmitted	Recognized
F0H, 43H, 70H, 70H, 70H, 01H, F7H	PLAY	Start	×	O
02H		Stop	×	O
03H	RECORD	Start	×	O
04H		Stop	×	O
05H	FF ▶▶	Start	×	O
06H		Stop	×	O
09H	Rhythm Pointer Reset		×	O

■OTHERS

Code	Messages		Transmitted	Recognized
F0H, 43H, 70H, 70H, 71H, 06H, 00H, F7H	Expression Control	Internal	×	O
7FH, F7H		External	×	O
07H, 30H, F7H	LEAD VOICES Receive CH	1 CH	×	O
33H, F7H		4 CH	×	O
08H, 70H, F7H	UK/LK Send CH	1・2 CH	×	O
71H, F7H		4・5 CH	×	O
F0H, 43H, 70H, 70H, 78H, SC, NC, F7H	Bar signal		O	O

2. HS-Series common messages

Code	Messages	Transmitted	Recognized
F0H, 43H, 70H, 72H, 00H, ...(data)........, F7H	Bulk Dump data	O	O
01H	Request-to-Send Voice Parameter data	×	O
02H	Request-to-Receive Voice Parameter data	×	O
F0H, 43H, 70H, 72H, 10H, F7H	Request-to-Send all RAM data	×	O
11H	Request-to-Send Registration data	×	O
12H	Request-to-Send C.S.P./R.S.P. data	×	×
13H	Request-to-Send F.M.P. data	×	×
14H	Request-to-Send USER Pattern data	×	×
15H	Request-to-Send USER Pattern data	×	×
16H	Request-to-Send USER Voice data	×	O
F0H, 43H, 70H, 72H, 20H, F7H	Request-to-Receive all RAM data	×	O
21H	Request-to-Receive Registration data	×	O
22H	Request-to-Receive C.S.P./R.S.P. data	×	×
23H	Request-to-Receive F.M.P. data	×	×
24H	Request-to-Receive USER Pattern data	×	×
25H	Request-to-Receive USER Pattern data	×	×
26H	Request-to-Receive USER Voice data	×	O
F0H, 43H, 70H, 72H, 41H, ...(data)........, F7H	Panel Switch Event data *1	O	O
F0H, 43H, 70H, 72H, 42H, ...(data)........, F7H	Current Registration data	O	O

*1 Refer to the "Table of Switch-Related MIDI Codes."

● Table of SW MIDI codes [F0H, 43H, 70H, 72H, 41H, nnH (SW code), nnH (SW data), F7H]

Functions/Switches		SW code	SW data	Remarks
Selector	UPPER ORCHESTRAL VOICES	02H	00H-06H	SW No.
	LOWER ORCHESTRAL VOICES	03H	00H-07H	SW No.
	UPPER LEAD VOICES	06H	00H-03H	SW No.
	BASS VOICES	07H	00H-03H	SW No.
	ARPEGGIO	09H	00H-03H	SW No.
	RHYTHM	0BH	00H-0FH	SW No.
Volume	UPPER ORCHESTRAL VOICES	12H	00H-7FH	Volume data
	LOWER ORCHESTRAL VOICES	13H	00H-7FH	Volume data
	UPPER LEAD VOICES	16H	00H-7FH	Volume data
	BASS VOICES	17H	00H-7FH	Volume data
	ARPEGGIO	19H	00H-7FH	Volume data
	RHYTHM	1AB	00H-7FH	Volume data
Balance	MANUAL BALANCE	20H	02H-0AH	Balance data
Effect	SYMPHONIC	40H	00H-01H	00H=SYMPHONIC ON, 01H=CELESTE ON
	UPPER ORCHES.	41H	00H-01H	00H=OFF, 01H=ON
	LOWER ORCHES.	42H	00H-01H	00H=OFF, 01H=ON
	TREMOLO	43H	00H-01H	00H=TREMOLO ON, 01H=CHORUS ON
Function	A.B.C. Mode	4CH	00H-03H	00H=OFF, 01H=SINGLE FINGER, 02H=FINGERED CODE, 03H=CUSTOM A.B.C.
	M.O.C. Mode	4DH	00H-03H	00H=OFF, 01H=Mode 1, 02H=Mode 2, 03H=Mode 3
	M.O.C. (Knee Control)	4DH	10H-11H	10H=OFF, 11H=ON *
	* FOOT SWITCH Function	4EH	00H-05H	00H=OFF, 01H=STOP, 02H=ENDING, 03H=FILL IN 1, 04H=FILL IN 2
			10H-11H	10H=GLIDE (LEAD) OFF, 11H=GLIDE (LEAD) ON
	* TOUCH Switch	4FH	00H-01H	00H=OFF, 01H=ON
	SUSTAIN (UPPER)	50H	00H-01H	00H=OFF, 01H=ON
	SUSTAIN (LOWER)	51H	00H-01H	00H=OFF, 01H=ON
	SUSTAIN (PEDAL)	52H	00H-01H	00H=OFF, 01H=ON
	VIBRATO (UPPER LEAD)	53H	00H-01H	00H=OFF, 01H=ON
	VIBRATO (UPPER ORCHES.)	54H	00H-01H	00H=OFF, 01H=ON
	VIBRATO (LOWER ORCHES.)	55H	00H-01H	00H=OFF, 01H=ON
	MEMORY ON	57H	00H-01H	00H=OFF, 01H=ON
	KEYBOARD PERCUSSION LOWER	5BH	00H-01H	00H=OFF, 01H=ON
	KEYBOARD PERCUSSION UPPER	5CH	00H-01H	00H=OFF, 01H=ON
	DISABLE Switch	5FH	00H-01H	00H=OFF, 01H=ON

*Applicable only to HC-4.

3. HC-4•HC-2 common messages

Code	Messages	Transmitted	Recognized
F0H, 43H, 70H, 74H, 00H, ...(data)........, F7H	Bulk Dump data	×	○
02H	Request-to-Send Voice Parameter data	×	○

4. Model-Specific messages

Code	Messages	Transmitted	Recognized
F0H, 43H, 70H, nnH, 00H, ...(data)........, F7H	Bulk Dump data	×	○
mmH, 00H	Model ID data *1	○	×
nnH, 01H	Request-to-Send Voice Parameter data	×	○
nnH, 02H	Request-to-Receive Voice Parameter data	×	○
F0H, 43H, 70H, nnH, 10H, F7H	Request-to-Send all RAM data	×	○
11H	Request-to-Send Registration data	×	○
12H	Request-to-Send C.S.P./R.S.P. data	×	×
13H	Request-to-Send F.M.P. data	×	×
14H	Request-to-Send USER Pattern data	×	×
15H	Request-to-Send USER Pattern data	×	×
16H	Request-to-Send USER Voice data	×	○
F0H, 43H, 70H, nnH, 20H, F7H	Request-to-Receive all RAM data	×	○
21H	Request-to-Receive Registration data	×	○
22H	Request-to-Receive C.S.P./R.S.P. data	×	×
23H	Request-to-Receive F.M.P. data	×	×
24H	Request-to-Receive USER Pattern data	×	×
25H	Request-to-Receive USER Pattern data	×	×
26H	Request-to-Receive USER Voice data	×	○

*The above value of "mm" is either $2E to identify HC-2 or $30 to identify HC-4.

5. Electone/Single Keyboard common messages

Code	Messages	Transmitted	Recognized
F0H, 43H, 73H, 01H, 02H, F7H	Request for Internal Synchronous mode	×	○
03H	Request for External Synchronous mode	×	○

■MIDI IMPLEMENTATION CHART

Electone HC-4/HC-2

Date: 4/7, 1989
Version: 1.0

Function		Transmitted	Recognized	Remarks
Basic Channel	Default	1 2 3 16	1 2 3 15 16	UK LK PK Keyboard Percussion CONTROL
	Changes	4 5	4	UK LK LEAD
Mode	Default Messages Altered	Mode 3 × *************	Mode 3 × ×	
Note Number		53-96 41-84 36-48 × × ×	36-96 36-96 36-96 36-96 36-96 36-96	UK LK PK LEAD Arpeggio Chord Keyboard Percussion
	True Voice	*************	36-96	UK, LK, PK
Velocity	Note ON Note OFF	○ 9nH, v=1-127 ○ 9nH, v=0	○ 9nH, v=1-127 ○ 9nH, v=0, 8nH	
After Touch	Key's Ch's	× ×	× ×	
Pitch Bender		×	× *	
Control Change	1	×	× *	Modulation Wheel
	4	×	× *	2nd Expression Pedal
	11	○	○ **	Expression pedal
	64	○	○	Sustain
Program Change	 True #	0-4, nn-mm *************	0-4, nn-mm 0-4, nn-mm	HC-2: 32-44 HC-4: 64-76
System Exclusive		○	○	
System Common	Song Pos Song Sel Tune	× × ×	× × ×	
System Real Time	Clock Commands	○ ○	○ ** ○	(FAH, FCH)
Aux Messages	Local ON/OFF All Notes OFF Active Sense Reset	× × ○ ×	× ○ ○ ○	
Notes		* Recognize only when the Lead Voice has been separately assigned to Channel 4. ** Recognize only when External mode.		

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

○: YES
×: NO