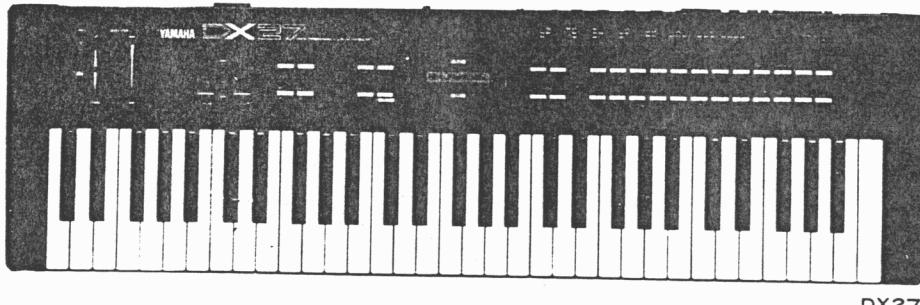


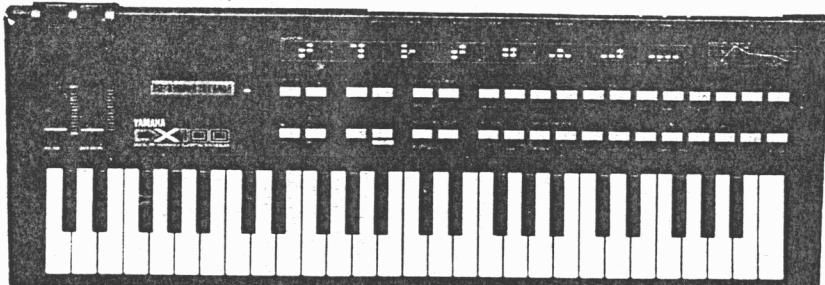
DIGITAL PROGRAMMABLE ALGORITHM SYNTHESIZER

# DX27/DX100

## SERVICE MANUAL



DX27



DX100

DX27/DX100

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**YAMAHA**  
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

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**YAMAHA**  
NIPPON GAKKI CO., LTD  
P.O. BOX 1, HAMAMATSU, JAPAN

*Combo  
Instruments*

# SERVICE NEWS

**DX27 DX100**

BULLETIN NO.: E-396

DATE: May, 1987

## ROM Update

**Purpose:** To correct the following functional problems and to change parts of the test program.

- From V1.1 to V1.2:**
1. Once parameter change has been received, bulk dump (1 voice or 32 voices) is not done if the bulk dump request is then given. Correction has been made to allow bulk dump.  
(Before the version is changed, the bulk dump request was not accepted until parameter change was received and the panel switch was pressed.)
  2. When power is switched off in shift mode, then switched on and the voice number prior to power off is selected, the voice name remains the same as in shift mode. Correction has therefore been made so that normal mode voice is selected.
  3. When power is switched off during preset search, then switched on, the function M. Tune is set. Correction has been made to keep preset search unchanged.
  4. When voice data is transmitted through the MIDI during sound generation by the MIDI or keyboard, the sound remains for some time. Correction has been made so that the sound does not remain.
  5. When MONO control change is transmitted through the MIDI, "B0 7E 00" is output. This has therefore been corrected to "B0 7E 01".  
For receiving, correction has also been made so that MONO is set when "B0 7E 01" is given.  
(After change, all notes are switched off and MONO is not set if MONO control change prior to version V1.1. is received.)
  6. Control change sustain and portamento ON/OFF boundary received through the MIDI has been changed from \$40/41 to \$3F/40. (MIDI revision)

BULLETIN NO.: E-396

DATE: May, 1987

The following are changes of the test program.

1. Local control OFF mode (MIDI) is set when power is switched on with **[2]** pressed.
2. TEST 1 (RAM battery), TEST 2 (cassette) and TEST 8 (dry battery for DX100 only) check mode is set when power is switched on with **[5]** pressed.  
If an error occurs during this test, the next test can be started by pressing **[-1]**.

**Servicing:** Change the ROM when any of the above problems occurs.

**Parts:**              Description              Part No.              Version No.  
                    ROM                    XA151003              V1.2

**Application to production:**      DX27 S/# 26651 and up  
  DX100 S/# 37121 and up

## IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

**WARNING:** Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

**IMPORTANT:** The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

**WARNING:** Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

**IMPORTANT:** Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

## ■ SPECIFICATIONS

### ● DX27

Keyboard .....	61 keys
Sound Source .....	FM Tone Generator (4 operators, 8 algorithms)
Simultaneous .....	8 notes (Polyphonic)
Note Output .....	
Internal Memory .....	24-voice INTERNAL RAM (alterable) 192-voice ROM (reading only) 96-voice number bank (alterable)
Effects .....	PITCH BEND, MODULATION, PORTAMENTO, SUSTAIN, KEY VELOCITY (MIDI reception only)
Controls .....	PITCH BEND WHEEL, MODULATION WHEEL, VOLUME
External Control Terminals .....	BREATH CONTROL, FOOT SWITCH
Connecting Terminals ...	OUTPUT (rated output level -20dB/ output impedance 10kΩ or less), PHONES (rated output level -16dB/ output impedance 47Ω or less), FOOT SWITCH (PORTAMENTO ON- OFF/SUSTAIN ON-OFF), MIDI IN, MIDI OUT, MIDI THRU, CASSETTE (transmission speed 1200 baud), BREATH CONTROL, DC 12V IN
Power Supply .....	PA-1210 AC Adapter (DC 12V)
Dimensions (W × H × D) .	909(W) × 82(H) × 270(D)mm (35.8" × 3.2" × 10.6")
Weight .....	7.5kg (16.5 lbs)
Standard Accessories ...	PA-1210 AC Adapter, Cassette Cable, Explanation Cassette Tape, Music Rest
Optional Accessories ....	FC4/FC5 Foot Switches, BC-1 Breath Controller, MIDI-03/04 MIDI Cable

\*0dB=0.775Vr.m.s.

\*Specifications and appearance are subject to change without notice.

## ■ SPECIFICATIONS

### ● DX100

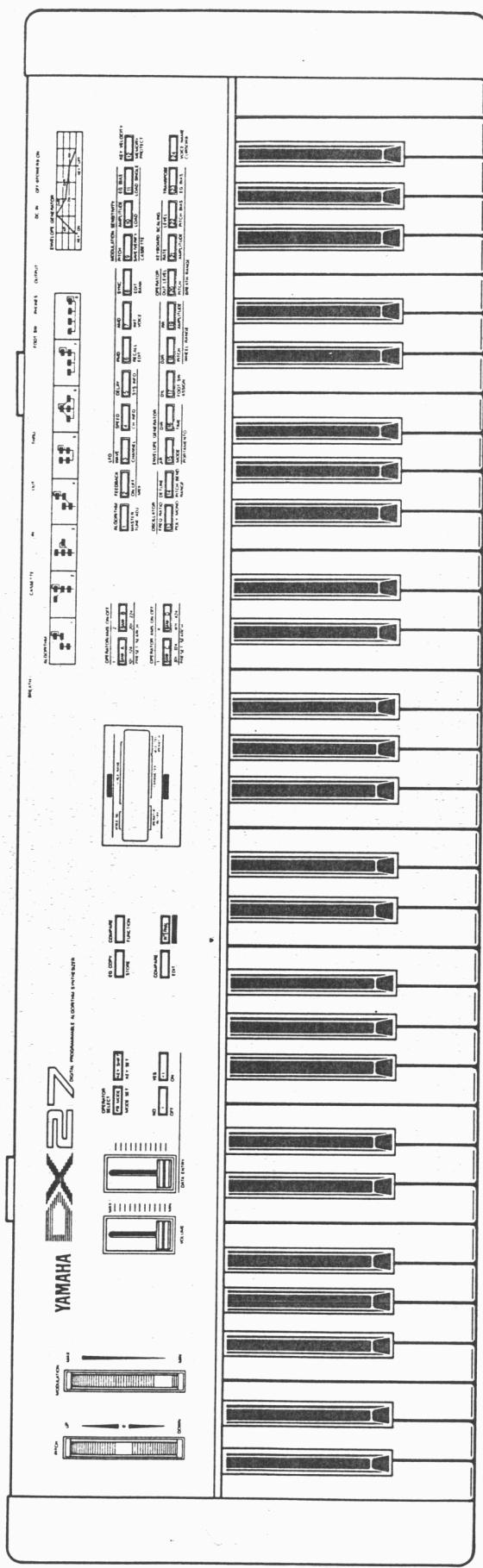
Keyboard .....	49 keys (Mini keyboard)
Sound Source .....	FM Tone Generator (4 operators, 8 algorithms)
Simultaneous .....	8 notes (Polyphonic)
Note Output .....	
Internal Memory .....	24-voice INTERNAL RAM (alterable) 192-voice ROM (reading only) 96-voice number bank (alterable)
Effects .....	PITCH BEND, MODULATION, PORTAMENTO, SUSTAIN, KEY VELOCITY (MIDI reception only)
Controls .....	PITCH BEND WHEEL, MODULATION WHEEL, VOLUME, LCD CONTRAST
External Control Terminals .....	BREATH CONTROL, FOOT SWITCH
Connecting Terminals ...	OUTPUT (rated output level -20dB/ output impedance 10kΩ or less), PHONE (rated output level -16dB/ output impedance 47Ω or less), FOOT SWITCH (PORTAMENTO ON- OFF/SUSTAIN ON-OFF), MIDI IN, MIDI OUT, MIDI THRU, CASSETTE (transmission speed 1200 baud), BREATH CONTROL, DC 12V IN
Power Supply .....	C-size batteries × 6 (Battery life: Ap- prox. 10 hours). PA-1210 AC adapter
Dimensions (W × H × D) .	628(W) × 75(H) × 218(D)mm (24.7" × 2.9" × 8.6")
Weight .....	2.7kg (5.9 lbs) (including batteries)
Standard Accessories ...	C-size batteries × 6, Cassette Cable, Explanation Cassette Tape,
Optional Accessories ....	FC4/FC5 Foot Switches, BC-1 Breath Controller, PA-1210 AC adapter, MIDI-03/04 MIDI Cable

\*0dB=0.775Vr.m.s.

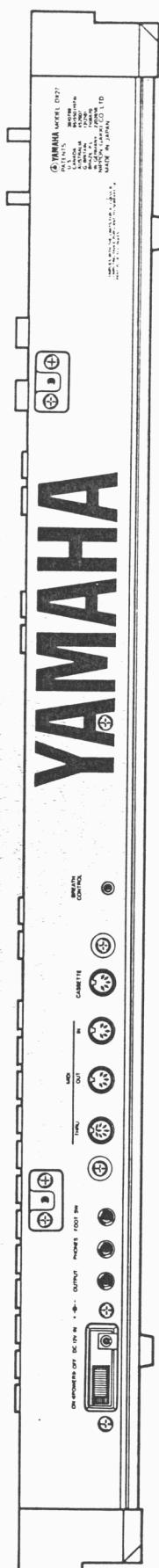
\*Specifications and appearance are subject to change without notice.

## ■ PANEL LAYOUT

● DX27 CONTROL PANEL

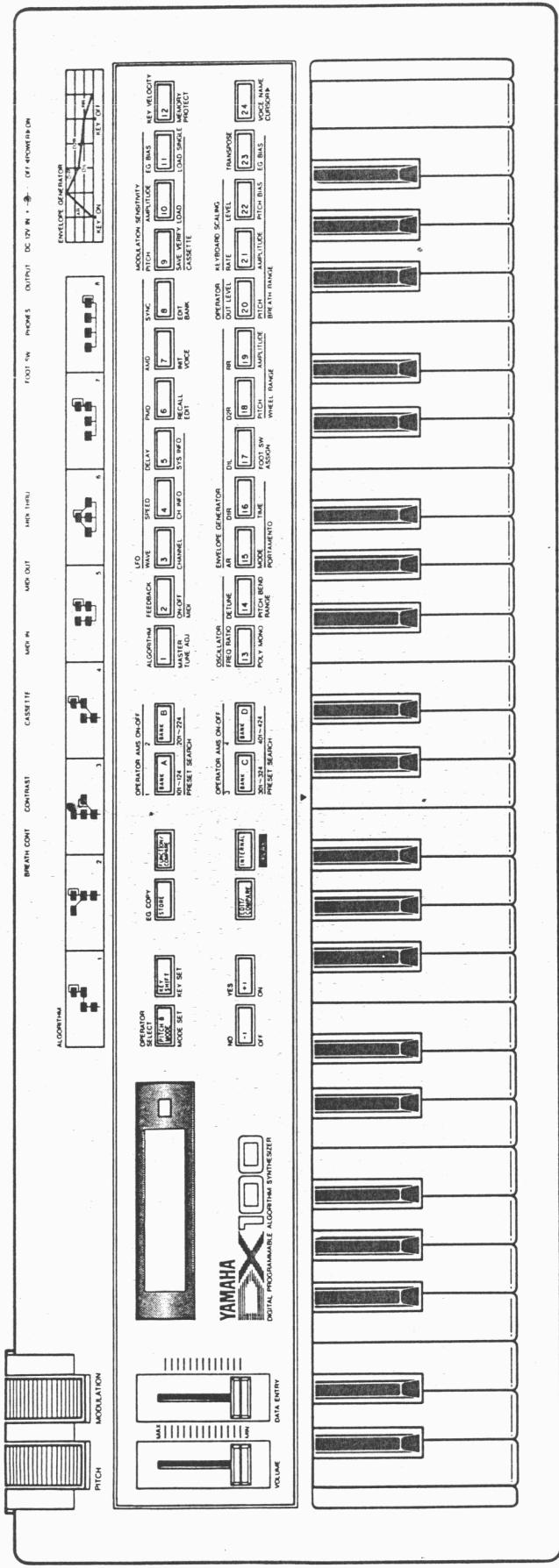


● DX27 REAR PANEL

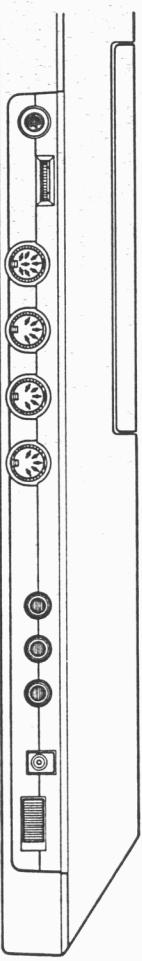


## DX27/DX100

### • DX100 CONTROL PANEL



### • DX100 REAR PANEL



## ■ BASIC CIRCUIT OPERATIONS

### 1. Main Clock Circuit

The Main Clock Circuit generates a clock signal circuit. It generates a signal having a frequency of 7.15909MHz. A Flip Flop divides it by a factor of 2 into 3.58MHz, which is applied to the EXTAL pin of the CPU. Then it is divided by a factor of 4 inside the CPU to create the system clock.

### 2. Sub-Clock Circuit

This clock circuit generates a signal of 500kHz for the MIDI clock. The 500kHz clock signals applied to the P22 pin of the CPU are divided by a factor of 16 inside the CPU to create the 31.25K baud MIDI clock.

### 3. The Reset Circuit

A reset signal is generated the RC network and Schmitt Trigger inverter IC. A reset IC is used to short any remaining voltage of the 10 microfarad charging capacitor to ground on power-up. Then the reset IC goes to a high impedance state to allow the capacitor to charge via a resistor connected to the +5V supply. Therefore, initially the reset signal is a logic "LOW" level until the capacitor reaches the threshold of the Schmitt Trigger Invertor ICs and then the reset signal switches to a "HIGH" logic level. The reset signal is also fed to two transistors. One transistor controls the Battery Back-Up circuit and the other control the CHIP SELECT 2 signal for the RAM IC (IC13). The CHIP SELECT 2 (CE2) signal disables the RAM IC so they will not be selected. This eliminates the possibility of the RAM IC being accessed and accidentally written to.

### 4. CPU, ROM and RAM

- The CPU with a clock input of 3.58MHz operates with a system clock of approximately 0.89MHz. As the read/write pulse width is approximately 560mS, the access time for the ROM, RAM and other components connected to the bus must be faster.
- The ROM is allocated from addresses \$8000 to \$FFFF, with \$CDAO to \$FFDF as the 192 voice data area and \$8000 to \$CDBF and \$FFEO to \$FFFF as program areas.
- The RAM is allocated from addresses \$0800 to \$17FF, with \$0800 to \$0E47 as the voice memory area and from \$0E48 and above as various stack and register areas. Only the \$0800 to \$OFFF area is memory backed up at the power OFF.

### 5. Address Map

The CPU addresses are as follows:

\$0000 ~ \$001F	Internal CPU registers and ports
\$0040 ~ \$00FF	Internal CPU RAM
\$2000	LCD command port
\$2001	LCD data port
\$2800	A/D output port
\$3000	A/D start
\$3800	OPP address port
\$3801	OPP data port
\$0800 ~ \$17FF	RAM .
\$8000 ~ \$FFFF	ROM

### 6. A/D Circuit

The A/D circuit operates by means of the E system clock (0.89MHz) and uses 6 channels among 8 channels of the 8-bit ADC IC. When it receives a channel number and a start pulse from the CPU, it executes the conversion for that channel and notifies completion of the conversion to the CPU through the EOC pin. The CPU outputs the OE signal after the detection of the signal EOC and the CPU can receive data from the data bus.

### 7. Sound Generation Circuit

This circuit consists of an FM sound generator utilizing 4 operators with 8 note capability and the DAC, and operates according to the data from the CPU. The audio output is mono-channel configuration.

### 8. HP Circuit

This is an amplification circuit for the headphones. It outputs the same audio signals to both channels and allows the use of the headphones with 8Ω to 150Ω impedance.

### 9. Switch Scan Circuit

The switch scan circuit is connected directly to the CPU and is capable of scanning 128 (8 × 16) switches.

DX27 : 61 keyboard switches and 36 panel switches, equaling a total of 97, switches scanned.  
DX100: 49 keyboard switches and 36 panel switches, equaling a total of 85, switches scanned.

### 10. MIDI Circuit

The MIDI circuit is connected directly to the CPU and has IN, OUT, and THRU OUT terminals, and meets MIDI standards V1.0.

### 11. Cassette Interface Circuit

The cassette interface circuit is also connected directly to the CPU and runs the cassette I/O at a rate of 1200 baud which is controlled by the CPU software.

### 12. Power Supply Circuit

When 12V is supplied to the DC IN terminal, a +5 volt source is obtained from the +5 terminal of the Power Supply and GND.

Also a -3 volt source is obtained from the -3 terminal of the Power Supply and GND.

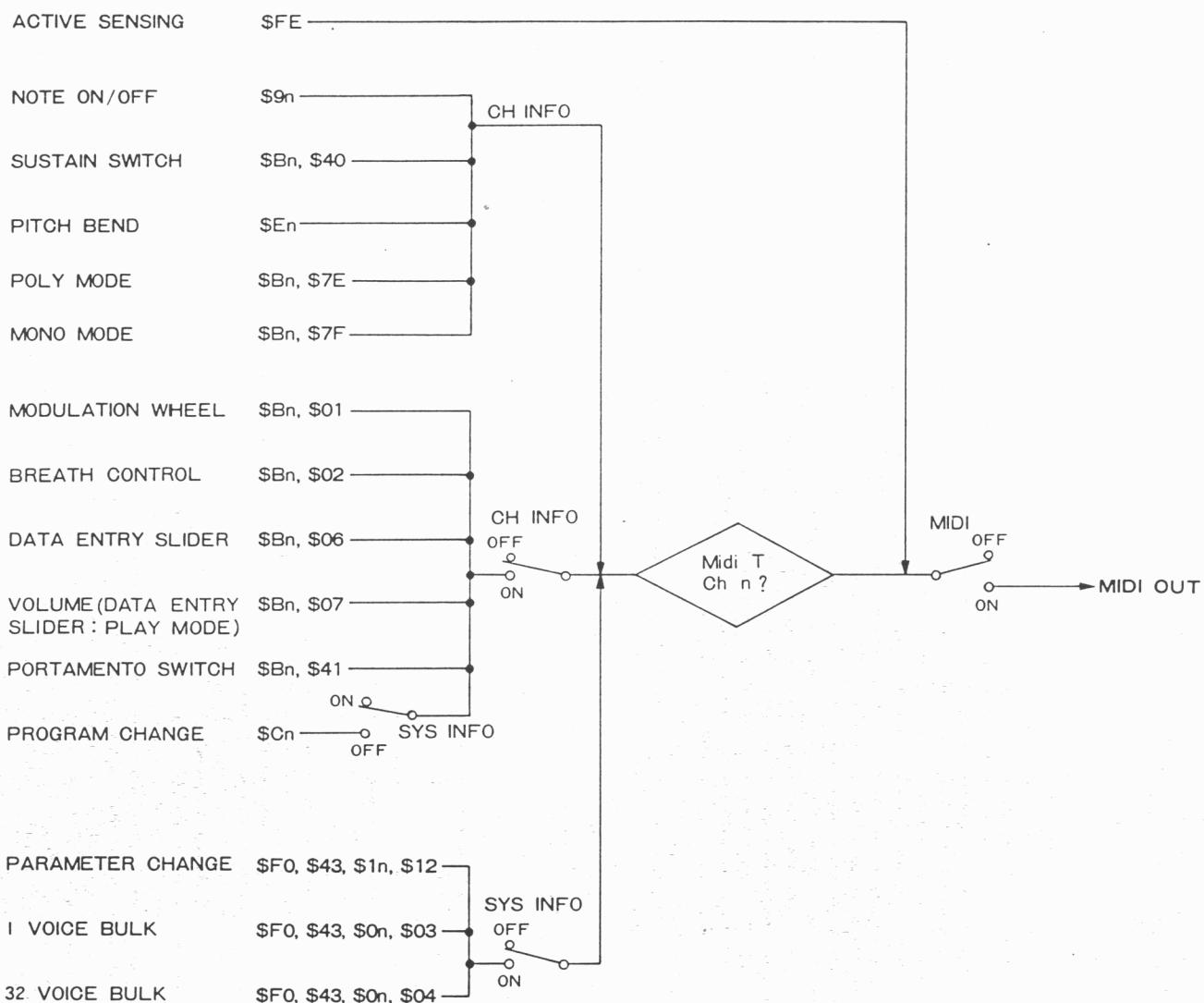
DX100: When 9V is supplied between B+ and B-, a +5V source is obtained between the +5 terminal and GND, and a -3V source between -3 terminal and GND.

### 13. Reduced Voltage Indicating Circuit (DX100 only)

The power LED flashes when the voltage between B+ and B- decreases to  $7.0 \pm 0.5V$ .

## ■ MIDI DATA FORMAT

### 1. Transmission Conditions



### 2. Transmission Data

All MIDI data is transmitted only 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

##### 1) Channel Voice Message

###### ① Key ON/OFF

Status      1001nnnn(9n)    n = channel No.  
 Note No.      Okkkkkkk      k = 36(C1) ~ 96(C6) ... DX27  
                                   k = 36(C1) ~ 84(C5) ... DX100  
 Velocity      01000000(64) key on  
                                   00000000(00) key off

###### ② Control Change

Status      1011nnnn(Bn)    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
C = 126: POLY mode	
C = 127: MONO mode	

**b) Transmitted only when MIDI CH INFO is ON**

Control No.	Control code
C = 1 : modulation wheel	V = 0 ~ 127
C = 2 : breath controller	V = 0 ~ 127
C = 6 : data entry slider	V = 0 ~ 127
C = 7 : volume (data entry slider)	V = 0 ~ 127
C = 65 : portamento SW.	V = 0:OFF, 127:ON
C = 96 : data entry + 1	
C = 97 : data entry - 1	

**③ Program Change**

Status 1100nnnn(Cn) n = channel No.  
 Program No. 0ppppppp P = 0 ~ 23: INTERNAL  
                   P = 24 ~ 119: BANK

This data is transmitted when a voice selector is pressed during the play mode and with MIDI CH INFO switch ON and MIDI SYS INFO switch OFF.

**④ Pitch Bend**

Status 1110nnnn(En) n = channel No.  
 Code (LSB) Ouuuuuuu  
 Code (MSB) Ovvvvvvv

The transmitted data is as follows:

MSB	LSB	
00000000(00)	00000000(00)	Lowest value
01000000(40)	00000000(00)	Center value
01111111(7F)	01111110(7E)	Highest value

**2-2 SYSTEM INFORMATION****1) System Real-time Message**

Active sensing  
 Status 11111110(FE)  
 Transmitted once approximately every 200 milliseconds.

**2) System Exclusive Message**

Transmitted only when MIDI SYS INFO is ON.

**① Parameter Change**

Status	11110000(F0)
ID no.	01000011(43)
Sub-status/ch. no.	0001nnnn(ln) n = channel no.
Parameter group no.	00010010(12)
Parameter no.	0ppppppp
Data	Oddddddd
EOX	11110111(F7)

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

**② 1 Voice Bulk Data**

Status	11110000(F0)
ID no.	01000011(43)
Sub-status/ch. no.	0000nnnn(On) n = channel no.
Format no.	00000011(03)
Byte count	00000000(00)
Byte count	01011101(5D)
Data	Oddddddd
	{ 93 bytes
Checksum	Oeeeeeee
EOX	11110111(F7)

The data for one voice is transmitted when a voice selector is pressed in the PLAY mode. Data in the voice edit buffer is transmitted when a format no. f=3 dump request is received. The transmitted data is 93 bytes as shown in the voice parameter table, 5-2. For the functions not available with this unit, the parameters are set as follows.

CHORUS: 0

PEG PR1 = 99, PR2 = 99, PR3 = 99

PL1 = 50, PL2 = 50, PL3 = 50

FOOT VOLUME RANGE = 99

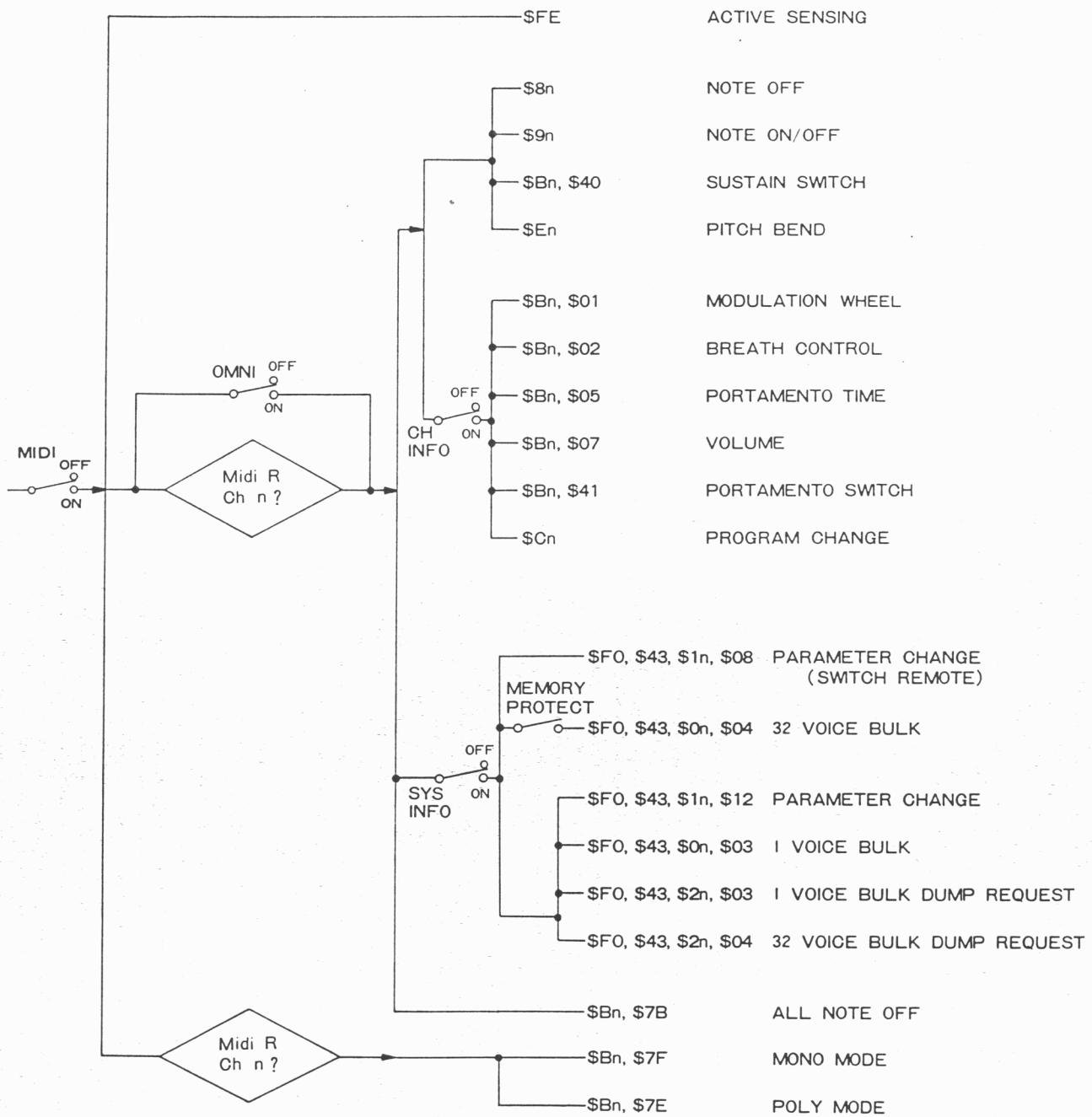
The checksum is the lowest 7 bits of the two's complement sum of all data bytes. (The same applies below.)

**③ 32 Voice Bulk Data**

Status	11110000(F0)
ID no.	01000011(43)
Sub-status/ch. no.	0000nnnn(On) n = channel no.
Format no.	00000100(04)
Byte count	00100000(20)
Byte count	00000000(00)
Data	Oddddddd
	{ 4096 bytes
Checksum	Oeeeeeee
EOX	11110111(F7)

The data of 32 voices including the 24 in the internal RAM will be transmitted if the YES switch is pressed in response to the "MIDI Transmit?" display which appears when the SYS INFO switch 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 the voice data table, 5-1. With 00 of 55 bytes added to the 73 bytes in this table, 128 bytes are transmitted for each voice. 4096 bytes are therefore transmitted for 32 voices in all. The 25th and higher number voices are initial voices. For the functions not available with this unit, the setting are the same as those for the one voice bulk.

## 3. Reception Conditions



#### 4. Reception Data

All MIDI data is received only 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

##### 1) Channel Voice Message

###### ① Key ON/OFF

Status	1000nnnn(8n)	n = channel no.
Note no.	Okkkkkkk	k = 0(C-2) ~ 127(G8)
Velocity	Ovvvvvvv(00)	v is ignored

###### ② Key ON/OFF

Status	1001nnnn(9n)	n = channel no.
Note no.	Okkkkkkk	k = 0(C-2) ~ 127(G8)
Velocity	Ovvvvvvv	v = 1 ~ 27 key on
	00000000	key off

The key on note level will vary according to the received velocity value (but only when the key velocity sensitivity is set). The range of this instrument is C# 1 to C7. If a higher or lower key number is received, it will be output within the range limits. For example, received C# 7 through C8 data will be output as notes in the C# 6 through C7 range.

###### ③ Control Change

Status	1011nnnn(Bn)	n = channel no.
Control no.	Occccccc	
Control code	Ovvvvvvv	

###### a) Received whether MIDI CH INFO is ON or OFF

Control no.	Control code
C = 64: sustain sw.	V = 0 ~ 126: OFF, 127: ON

###### b) Received only 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 = 5 : portamento time	V = 0 ~ 127
C = 7 : foot volume	V = 0 ~ 127
C = 65: portamento sw.	V = 0 ~ 126: OFF, 127: ON

###### ④ Program Change

Status	1100nnnn(Cn)	n = channel no.
Program no.	Oooooooooo	p = 0 ~ 127

Received only when MIDI CH INFO is ON and the unit is in the PLAY mode. However, 120 through 127 are treated as 119.

###### ⑤ Pitch Bend

Status	1110nnnn	n = channel no.
Code (LSB)	Ouuuuuuu	
Code (MSB)	Ovvvvvvv	

Functions only on MSB data:

MSB		
00000000	Lowest value	
01000000	Center value	
01111111	Highest value	

###### 2) Channel Mode Message

Status	1011nnnn	n = channel no.
	Occccccc	
	Ovvvvvvv	

Received whether MIDI CH INFO is ON or OFF

C = 123	V = 0	All notes OFF
C = 126	V = 1	MONO mode ON
C = 127	V = 0	POLY mode ON

#### 4-2 SYSTEM INFORMATION

##### 1) System Real-time Message

Active sensing	
Status	11111110(FE)

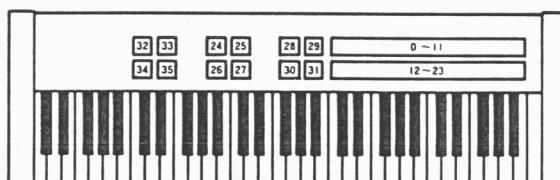
Sensing begins when this code is received once. If status and data bytes are not received within 300 milliseconds, the MIDI receive buffer will be cleared and the currently output note will be turned OFF.

##### 2) System Exclusive Message

###### ① Parameter Change (switch remote)

Status	11110000(F0)	
ID no.	01000011(43)	
Sub-status/ch. no.	0001nnnn(ln)	n = channel no.
Parameter group no.	00001000(08)	
Switch no.	Ommmmmmm	
Data	Odffffdd d = 0: OFF, 1 ~ 127: ON	
EOX	11110111(F7)	

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



**② Parameter Change**

The format is the same as for the transmitted parameter change data. Received only when MIDI SYS INFO is ON. It is also possible to change modes: PLAY, EDIT, etc. The parameter no. and data received are shown in the voice parameter table, 5-2 and the 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. The chorus, PEG and Foot volume range data are disregarded.

**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 MEMORY PROTECT function is OFF. The received voice data replaces the 24 RAM voice data. The 25th and higher number voice data parameters are disregarded. (The "Midi Received!!" message appears to confirm complete reception of 32 voice bulk data.)

**⑤ Dump Request**

Status	11110000(F0)
ID no.	01000011(43)
Sub-status/ch. no.	0010nnnn(2n) n = channel no.
Format no.	0xffffffff f = 3,4
EOX	11110111(F7)

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

f = 3: 1 voice bulk data

f = 4: 32 voice bulk data

**5. System Exclusive Data**

**5-1. VOICE DATA (VMEM format)**

Parameter no.	Parameter
0	ATTACK RATE
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
10	
11	The same to OP4
19	
20	
21	The same to OP4
29	
30	
31	The same to OP4
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	TRANSPOSE
47	PITCH BEND RANGE
48	CHORUS SWITCH/PLAY MODE/SUSTAIN FOOT SWITCH/ PORTAMENTO FOOT SWITCH/PORTAMENTO MODE
49	PORTAMENTO TIME
50	FOOT VOLUME RANGE *
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
58	
66	VOICE NAME 10
67	PITCH EG RATE 1 *
68	2 *
69	3 *
70	LEVEL 1 *
71	2 *
72	3 *

\* : Parameter of DX21 model only

## 5-2. VOICE PARAMETERS (VCED format)

Parameter no.	Parameter	LCD Display	Data	Note
0	ATTACK RATE	OP4	0 ~ 31	{
1	DECAY 1 RATE		0 ~ 31	
2	DECAY 2 RATE		0 ~ 31	
3	RELEASE RATE		0 ~ 15	
4	DECAY 1 LEVEL		0 ~ 15	
5	KEYBOARD SCALING LEVEL		0 ~ 99	
6	KEYBOARD SCALING RATE		0 ~ 3	
7	EG BIAS SENSITIVITY		0 ~ 7	
8	AMPLITUDE MODULATION ENABLE		0, 1	
9	KEY VELOCITY		0 ~ 7	
10	OUTPUT LEVEL		0 ~ 99	
11	OSCILLATOR FREQUENCY		0 ~ 63	
12	DETUNE		0 ~ 6	
13	The same to OP4	OP2		EDIT
25				
26				
31	The same to OP4	OP3		
38				
39	The same to OP4	OP1		
51				
52	ALGORITHM	ALG	0 ~ 7	FUNCTION
53	FEEDBACK LEVEL	FBL	0 ~ 7	
54	LFO SPEED	LFS	0 ~ 99	
55	LFO DELAY	LFD	0 ~ 99	
56	PITCH MODULATION DEPTH	PMD	0 ~ 99	
57	AMPLITUDE MODULATION DEPTH	AMD	0 ~ 99	
58	LFO SYNC	SYNC	0, 1	
59	LFO WAVE	LW	0 ~ 3	
60	PITCH MODULATION SENSITIVITY	PMS	0 ~ 7	
61	AMPLITUDE MODULATION SENSITIVITY	AMS	0 ~ 7	
62	TRANSPOSE	MID. 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 T. Porta	0, 1	
66	PORTAMENTO TIME	Porta Time	0 ~ 99	
67	FOOT VOLUME RANGE	Foot Sw	0, 1	Pair
68	SUSTAIN FOOT SWITCH	Foot Sw	0, 1	
69	PORTAMENTO FOOT SWITCH			
70	CHORUS SWITCH			
71	MODULATION WHEEL PITCH MODULATION RANGE	MW Pitch	0 ~ 99	
72	MODULATION WHEEL AMPLITUDE MODULATION RANGE	MW Ampli	0 ~ 99	
73	BREATH CONTROL PITCH MODULATION RANGE	BC Pitch	0 ~ 99	
74	BREATH CONTROL AMPLITUDE MODULATION RANGE	BC Ampli	0 ~ 99	
75	BREATH CONTROL PITCH BIAS RANGE	BC P Bias	0 ~ 99	
76	BREATH CONTROL EG BIAS RANGE	BC E Bias	0 ~ 99	
77	VOICE NAME 1		32 ~ 127 (ASCII)	
86	VOICE NAME 10			
87	PITCH EG RATE 1			
88	2		*	
89	3		*	
90	LEVEL 1		*	
91	2		*	
92	3		*	

\* : Parameter of DX21 model only

## 5-3. FUNCTION PARAMETERS

Parameter no.	Parameter	LCD Display	Data	Note
93	OPERATOR ENABLE/DISABLE		0, I	
94	OPETATOR SELECT		0 ~ 3	
95	EDIT MODE I=ON	E, e	0, I	*
96	FUNCTION MODE I=ON	F, f	0, I	*
97	STORE MODE I=ON	Mem Store	0, I	*
98				*
99				*
100	PLAY MODE I=ON	P, p	0, I	*
101				
102				
103	MASTER TUNE \$64= Center	M. Tune	0 ~ 127	*
104	MIDI SWITCH I=ON	Midi :	0, I	*
105	MIDI CH INFO	Ch.Info :	0, I	*
106	OMNI 0=OFF I=ON	Omni :	0, I	*
107	MIDI TRANS CH	Midi T Ch	0 ~ 15	*
108	MIDI RECV CH	Midi R Ch	0 ~ 15	*
109	MIDI SYS INFO	Midi Sys.Info	0, I	*
110	32 VOICE BULK DUMP	Midi Transmit ?	I	*
111	RECALL EDIT	Recall Edit ?	0, I	*
112	INIT VOICE	Init Voice ?	0, I	*
113	SAVE	Save to Tape ?	0, I	*
114	VERIFY	Verify Tape ?	0, I	*
115	LOAD	Load Tape ?	0, I	*
116	LOAD SINGLE	Load Single ?	0 ~ 127	*
117				
118				
119	MEMORY PROTECT I=ON	M.Protect	0, I	*
120	KEY SHIFT 24=Center	Key Shift	0 ~ 48	*
121	PITCH BEND MODE I=ON	Bend Mode	0, I	*
122	KEY SHIFT	K	0, I	*
123	COMPARE	C	0, I	*
124	PITCH BEND MODE		0 ~ 2	*
125	PRESET SEARCH No.		0 ~ 95	*
126	BANK VOICE No.		0 ~ 95	*
127	BANK VOICE DATA		0 ~ 119	*

\* : Receive only

[ Digital Programmable Algorithm Synthesizer ] Date : 5/10, 1985  
 Model DX27 MIDI Implementation Chart Version : 1.0

		Transmitted	Recognized	Remarks
	Function ...			
:Basic	Default	: 1 - 16	: 1 - 16	: memorized
:Channel	Changed	: 1 - 16	: 1 - 16	:
:Mode	Default	: 3	: 1, 2, 3, 4	: memorized
	Messages	: x	: POLY, MONO(M=1)	:
	Altered	: XXXXXXXXXXXXXXXXX	: x	:
:Note		: 36 - 96	: 0 - 127	:
:Number	: True voice	: XXXXXXXXXXXXXXXXX	: 13 - 108	:
:Velocity	Note ON	: x 9nH, v=64	: o v=1-127	:
	Note OFF	: x 9nH, v=0	: x	:
:After	Key's	: x	: x	:
:Touch	Ch's	: x	: x	:
:Pitch Bender		: o	: o 0-12 semi	: 7 bit resolution
	1	: o	: x1	: Modulation wheel
	2	: o	: x1	: Breath control
	5	: x	: o	: Portamento time
:Control	6	: o	: x1	: Data entry knob
	7	: o	: x1	: Data entry knob
:Change				: in play mode
	7		: o	: Volume
	64	: o	: o	: Sustain foot sw
	65	: o	: x1	: Portamento f sw
	96	: o	: x1	: Data entry +1
	97	: o	: x1	: Data entry -1
:Prog		: o 0 - 119	: x3	: o 0 - 127
:Change	: True #	: XXXXXXXXXXXXXXXXX		: 0 - 119
:System Exclusive		: o	: x2	: Voice parameters
:System	: Song Pos	: x	: x	:
	: Song Sel	: x	: x	:
:Common	: Tune	: x	: x	:
:System	: Clock	: x	: x	:
:Real Time	: Commands	: x	: x	:
:Aux	: Local ON/OFF	: x	: x	:
	: All Notes OFF	: x	: o (123,126,127)	:
:Mes-	: Active Sense	: o	: o	:
:sages	: Reset	: x	: x	:

:Notes: All MIDI communications are enabled if MIDI switch is on.

: x1 = transmit/receive if CH information switch is on.

: x2 = transmit/receive if system information switch is on.

: x3 = transmit if CH information switch is on and system information switch is off.

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

o : Yes

x : No 12

## DX27/DX100

[ Digital Programmable Algorithm Synthesizer ] Date : 5/10, 1985  
 Model DX100 MIDI Implementation Chart Version : 1.0

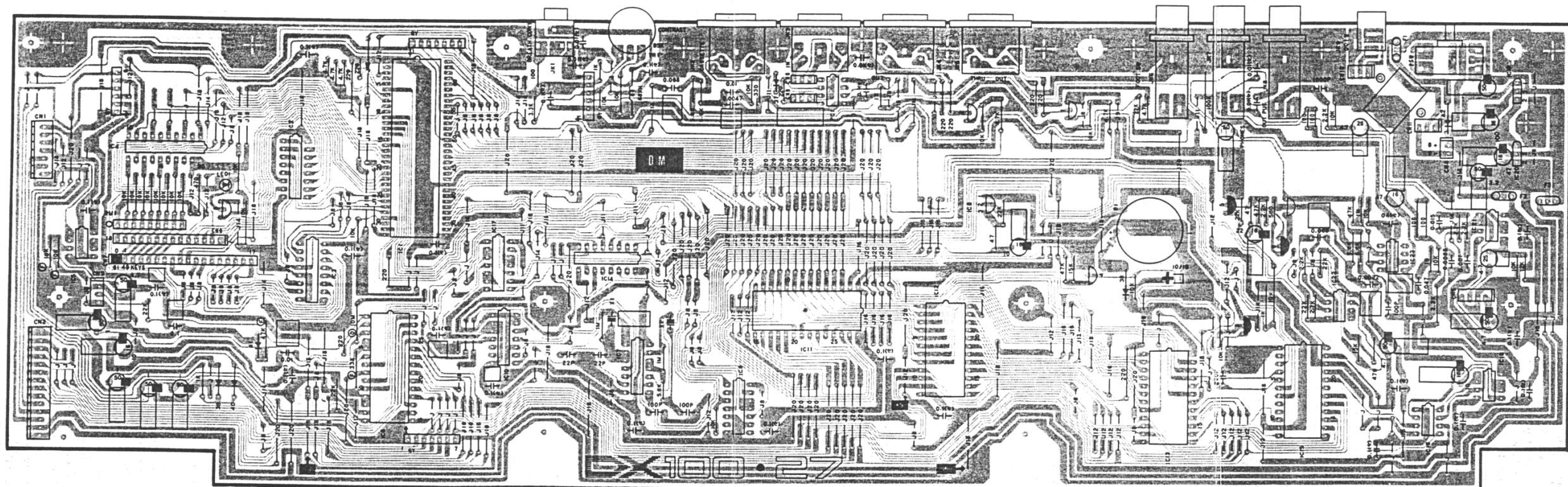
		Transmitted	Recognized	Remarks
	Function ...			
: Basic	Default	: 1 - 16	: 1 - 16	: memorized
: Channel	Changed	: 1 - 16	: 1 - 16	
: Mode	Default	: 3	: 1, 2, 3, 4	: memorized
: Mode	Messages	: x	: POLY, MONO(M=1)	
: Mode	Altered	: XXXXXXXXXXXXXXXXX	: x	
: Note		: 36 - 84	: 0 - 127	
: Number	: True voice	: XXXXXXXXXXXXXXXXX	: 13 - 108	
: Velocity	Note ON	: x 9nH, v=64	: o v=1-127	
: Velocity	Note OFF	: x 9nH, v=0	: x	
: After	Key's	: x	: x	
: Touch	Ch's	: x	: x	
: Pitch Bender		: o	: o 0-12 semi	: 7 bit resolution
: Control	1	: o	: x1	: Modulation wheel
: Control	2	: o	: x1	: Breath control
: Control	5	: x	: o	: Portamento time
: Control	6	: o	: x1	: Data entry knob
: Control	7	: o	: x1	: Data entry knob
: Change				: in play mode
: Change	7		: o	: Volume
: Change	64		: o	
: Change	65	: o	: x1	: Sustain foot sw
: Change			: o	: Portamento f sw
: Change	96	: o	: x1	: Data entry +1
: Change	97	: o	: x1	: Data entry -1
: Prog		: o 0 - 119	: x3	: o 0 - 127 x1 :
: Change	: True #	: XXXXXXXXXXXXXXXXX	: 0 - 119	
: System Exclusive		: o	: x2	: Voice parameters
: System	Song Pos	: x	: x	
: System	Song Sel	: x	: x	
: Common	Tune	: x	: x	
: System	Clock	: x	: x	
: Real Time	: Commands	: x	: x	
: Aux	: Local ON/OFF	: x	: x	
: Mes-	: All Notes OFF	: x	: o (123,126,127)	
: sages	: Active Sense	: o	: o	
: Notes	: Reset	: x	: x	
Notes: All MIDI communications are enabled if MIDI switch is on.				
x1 = transmit/receive if CH information switch is on.				
x2 = transmit/receive if system information switch is on.				
x3 = transmit if CH information switch is on and system information switch is off.				
Mode 1	: OMNI ON, POLY	Mode 2	: OMNI ON, MONO	o : Yes
13 Mode 3	: OMNI OFF, POLY	Mode 4	: OMNI OFF, MONO	x : No

A | B | C | D | E | F | G | H

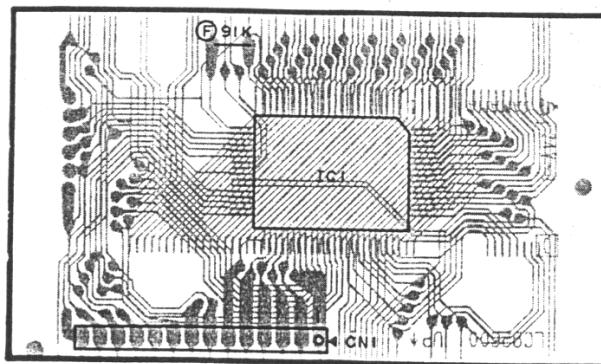
DX27/DX100

## ■ CIRCUIT BOARD

- DM circuit board (DX27 : VA128800)  
DX100: VA082400)



- LCD circuit board (DX100 only: VA107300)



A  
DX27/DX100

B

C

D

E

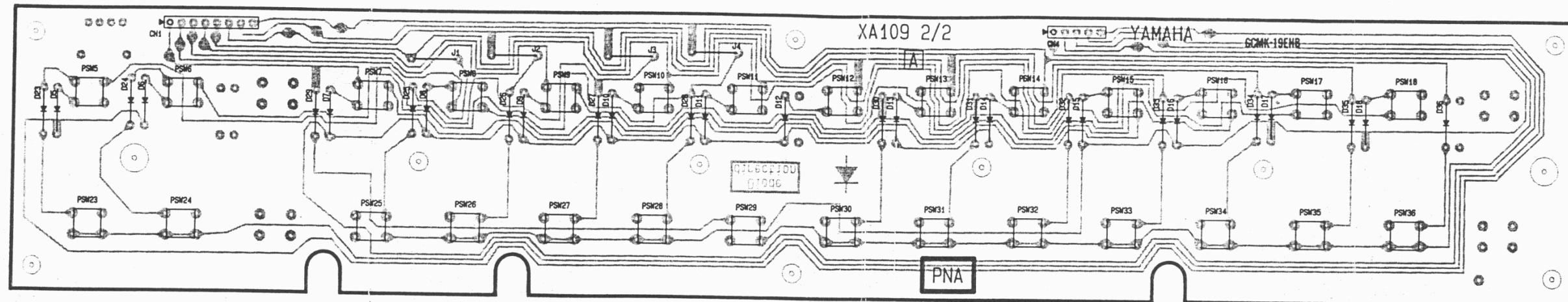
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G

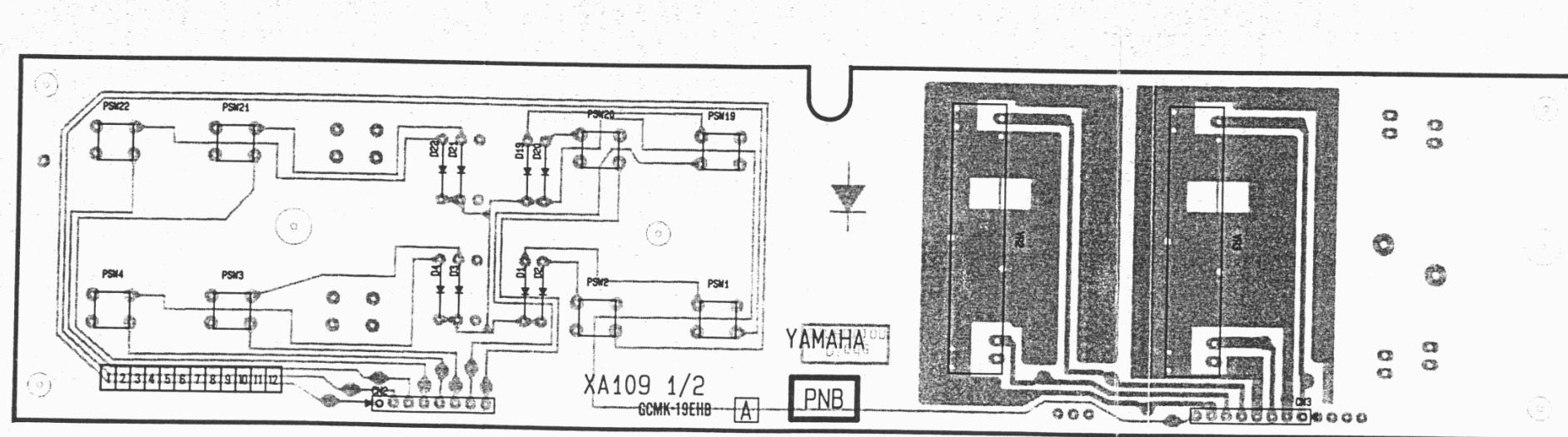
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1

- DX27 PNA circuit board (NX801800)



2



3

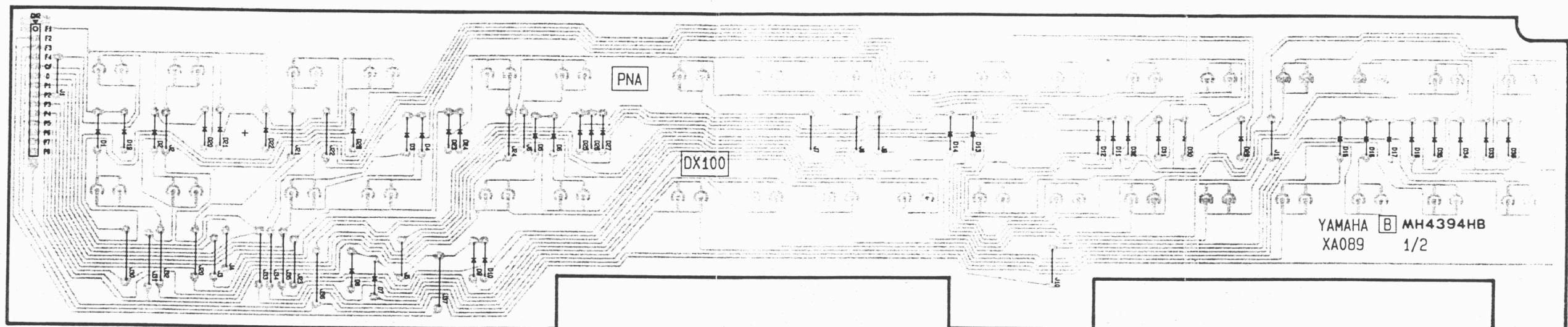
- DX27 PNB circuit board (NX801810)

4

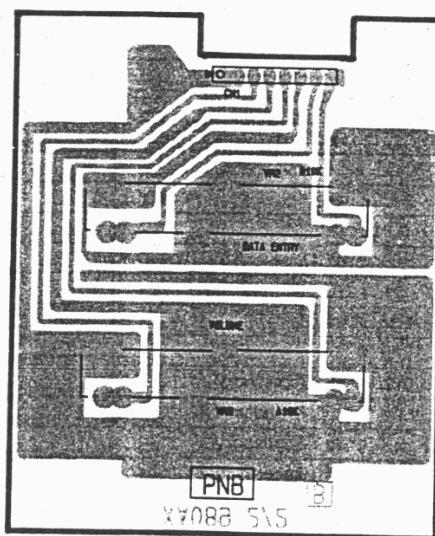
5

6

- 1  
• DX100 PNA circuit board (NX801820)



- 2  
• DX100 PNB circuit board (NX801830)



A  
DX27/DX100

B

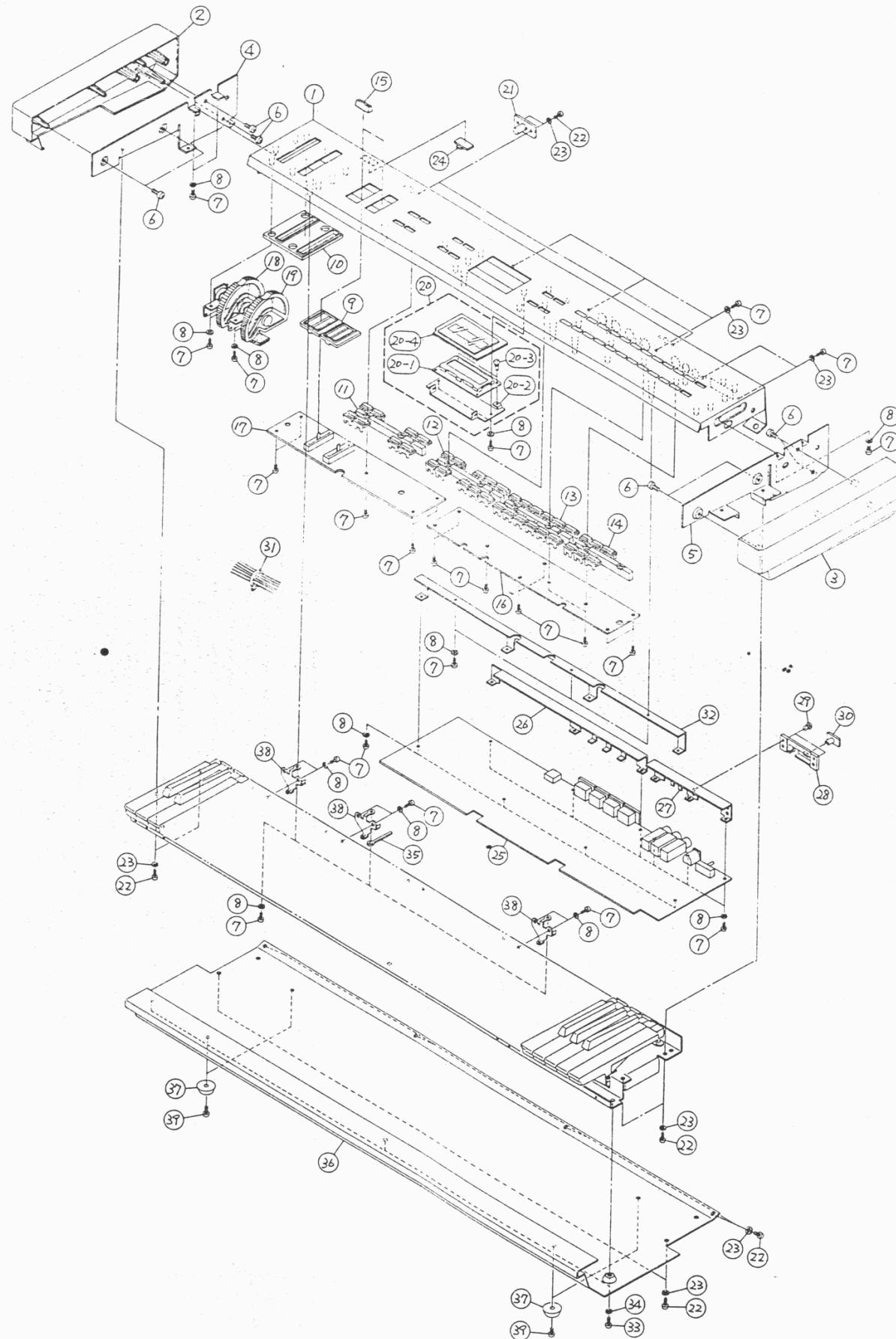
C

D

E

# PARTS LIST

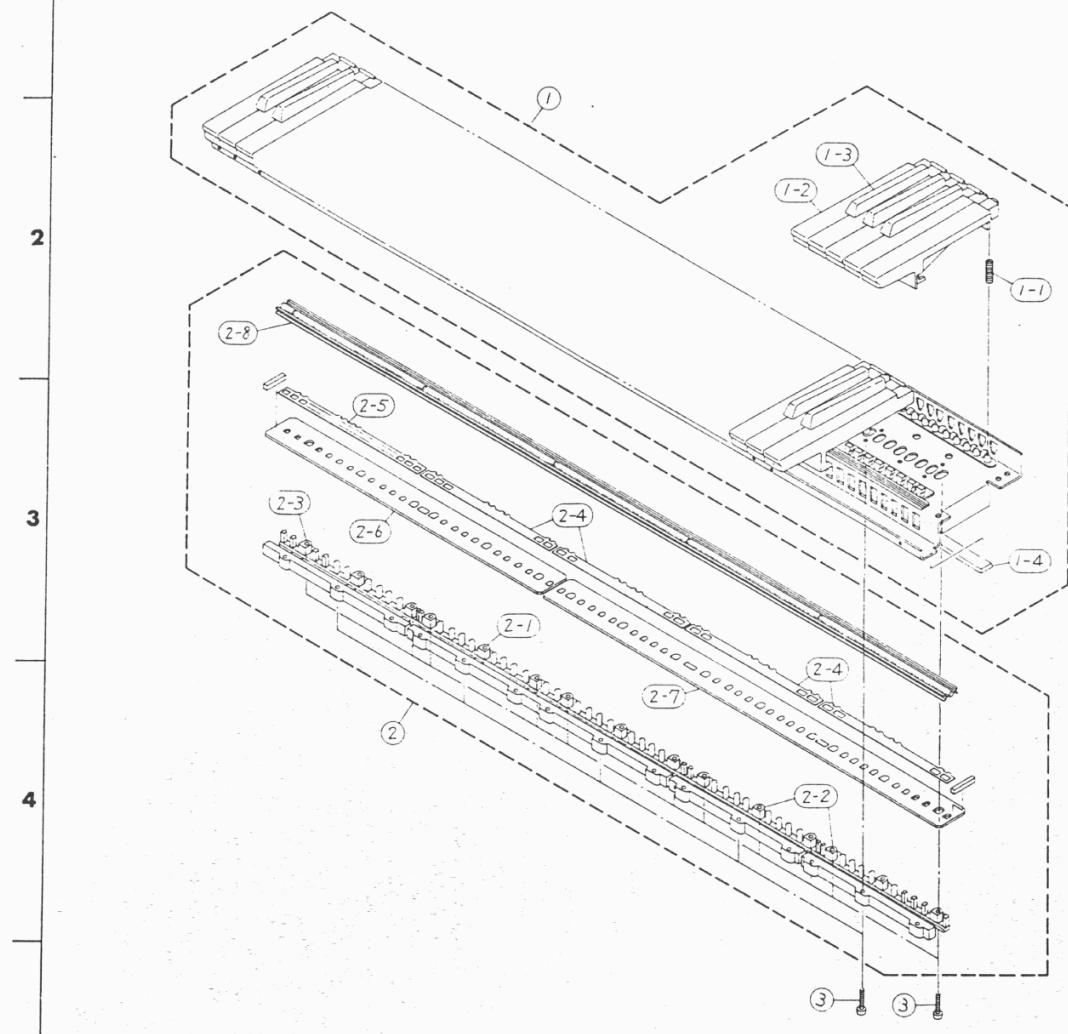
## ■ DX27 OVERALL ASSEMBLY



Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
*	1 VA 12 11 00	Control Panel	コントロールパネル				16
2	CB 83 62 20	Side Cover	側板				09
3	CB 83 62 30	"	"				09
4	AA 83 38 10	Side Panel	サイドパネル				05
5	AA 83 38 20	"	"				05
6	Ei 34 01 06	Bind Head Tapping Screw	M4×10 BI	バインドタッピングネジ			01
7	ED 33 00 66	Bind Head Screw	M3×6 BI	バインド小ネジ			01
8	EV 41 30 36	Toothed Lock Washer	A3S BI	歯付座金			01
9	VA 83 94 00	Escutcheon, Slide Potentiometer		スライドVRエスカッション	VOLUME, DATA ENTRY		04
10	CB 83 63 00	Escutcheon, Wheel		ホイールエスカッション	PITCH, MODULATION		03
*	11 VA 12 24 00	Push Button A		プッシュボタン A			03
*	12 VA 12 25 00	" B	" B				03
*	13 VA 12 26 00	" C	" C				03
*	14 VA 12 27 00	" D	" D				03
15	CB 82 81 40	Knob	ツマミ	VOLUME, DATA ENTRY			01
*	16 NX 80 18 00	PNA Circuit Board	P N A シート	Refer to Page 28			10
*	17 NX 80 18 10	PNB Circuit Board	P N B. シート	Refer to Page 28			10
18	NB 83 31 20	Wheel Assembly	PITCH	ホイール Ass'y	Refer to Page 26		08
19	NB 83 31 30	"	MODULATION	"	Refer to Page 26		08
*	20 VA 12 40 00	LCD Assembly	L C D Ass'y				20
20-1	JN 20 00 60	LCD Module	L C D モジュール				17
*	20-2 VA 12 10 00	Frame	L C D フレーム				01
20-3	CB 83 56 50	Nylon Rivet	ナイロンリベット				01
*	20-4 VA 12 15 00	Protector	L C D 保護板				06
21	CB 83 62 80	Bush, Music Rest	譜面板ブッシュ				01
22	ED 34 00 86	Bind Head Screw	M4×8 BI	バインド小ネジ			01
23	EV 41 30 16	Toothed Lock Washer	A4S BI	歯付座金			01
24	CB 83 00 70	Stopper, Cord	コードストッパー				01
25	VA 12 88 00	DM Circuit Board	D M シート	Refer to Page 27			47
26	VA 12 08 00	Angle, DIN	D I N アングル				03
27	VA 12 09 00	" JK	J K アングル				03
28	VA 12 13 00	DC Escutcheon	D C エスカッション				01
29	CB 81 57 40	Nylon Rivet	ナイロンリベット				01
30	VA 13 13 00	Knob	ツマミ	POWER			01
31	CB 06 92 50	Binding Tie	インシュロックタイ				01
*	32 VA 12 12 00	Angle, DM	D M アングル				04
33	ED 35 01 06	Bind Head Screw	M5×10 BI	バインド小ネジ			01
34	EV 41 00 56	Toothed Lock Washer	A5S Ye	歯付座金			01
35	CB 81 75 10	Wire Clip	ワイヤークリップ				01
36	AA 83 37 30	Bottom Cover	底板				10
37	CB 82 77 80	Foot	スペリ座				01
38	AA 83 38 00	Angle, Circuit Board	シートアングル				01
39	ED 34 01 06	Bind Head Screw	M4×10 BI	バインド小ネジ			01
*	VA 83 58 00	Instruction Tape	磁気テープ(商品説明)	Accessory	J		
*	VA 83 56 00	"	"	Accessory	U,C,G,WG		
*	VA 11 35 00	Cassette Cable	1.0m	カセットケーブル	Accessory		07
NB 82 63 60	Music Rest		譜面板	Accessory			06
VA 12 82 00	AC Adaptor	PA-1210	A C アダプター		J		
VA 12 83 00	"		"		U,C		
VA 12 86 00	"		"		G,WG		

\* New Parts (新規部品)

## 1 ■ DX27 KEYBOARD ASSEMBLY



Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
1	NX 80:15:90	Frame Assembly	フレームAss'y				09
1-1	AA 04:37:20	Coil Spring	コイルスプリング				01
1-2	CB 03:22:10	White Key	C,F 白鍵				02
"	CB 03:22:20	"	D "				02
"	CB 03:22:30	"	B,E "				02
"	CB 03:32:40	"	G "				02
"	CB 03:22:50	"	A "				02
"	CB 03:22:60	"	C' "				02
1-3	CB 03:22:70	Black Key	黒鍵				02
1-4	CC 02:17:60	Felt	フェルト				02
2	NB 11:03:60	Switch Unit	スイッチユニット				14
2-1	CB 04:63:30	Holder,Circuit Board	24 Keys 基板ホルダー				04
2-2	CB 03:24:00	"	12 Keys "				03
2-3	CB 03:24:10	"	13 Keys "				04
2-4	CB 03:35:70	Spacer	絶縁スペーサー				01
2-5	CB 03:35:80	"	"				01
2-6	NA 11:08:50	MK1 Circuit Board	M K 1 シート	Refer to Page 24			07
2-7	NA 11:11:40	MK3 Circuit Board	M K 3 シート	"			09
2-8	CB 82:86:30	Rubber Contact	可動導電ゴム				06
3	ED 33:01:46	Bind Head Screw	M3×14 BI	バインド小ネジ			01

※New Parts (新規部品)

A  
DX27/DX100

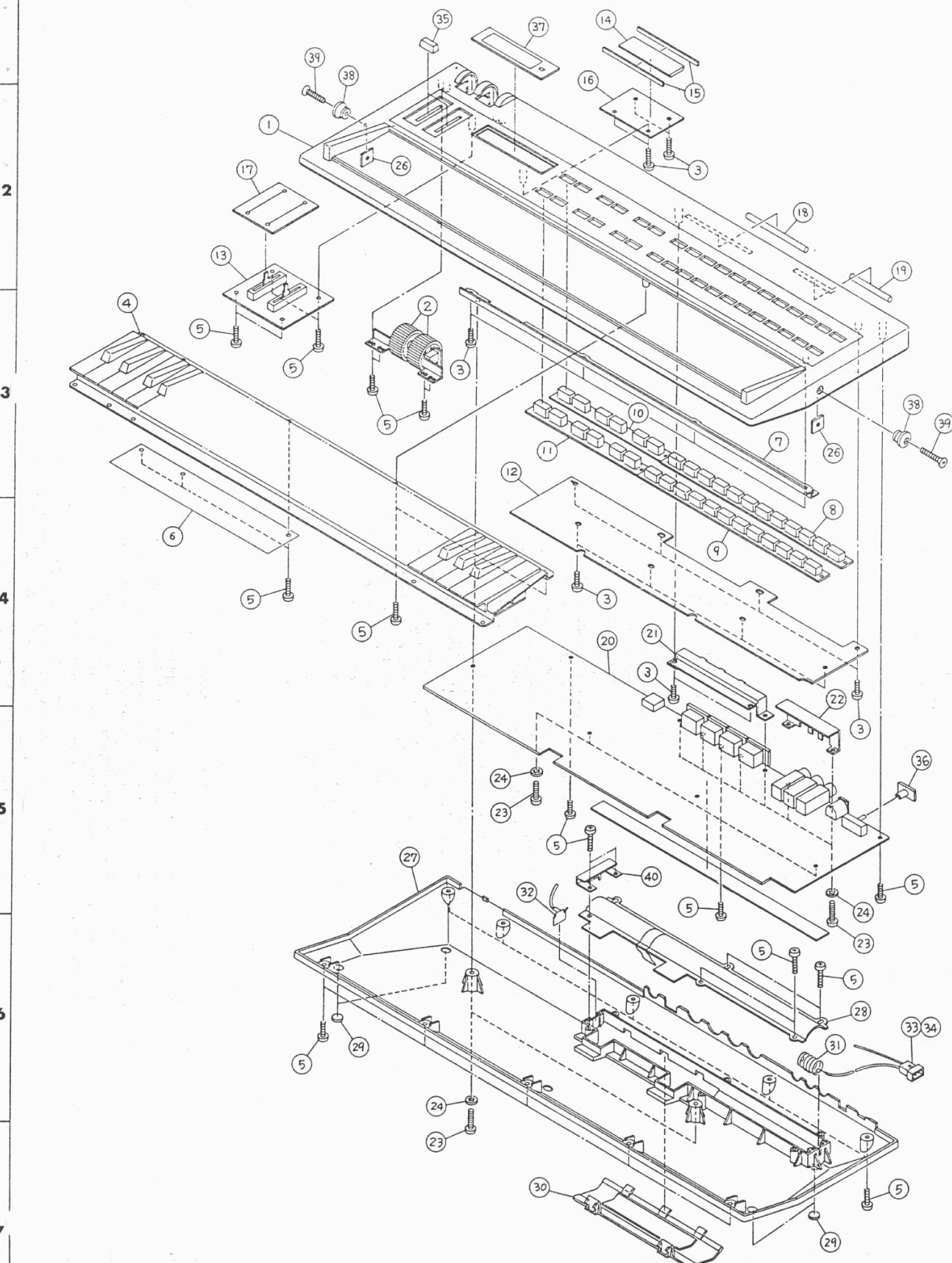
B

C

D

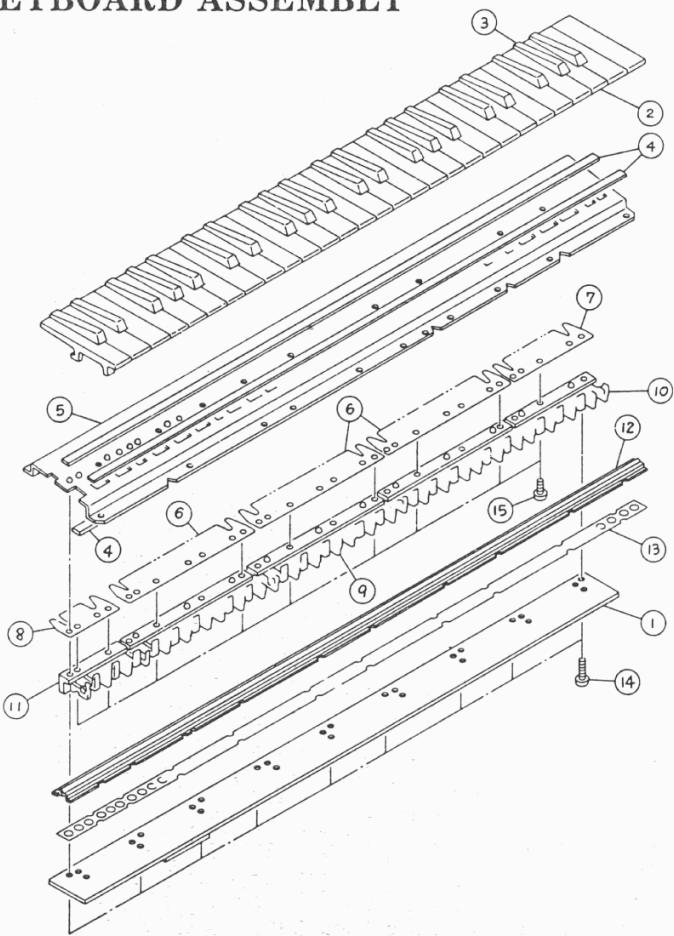
E

1 ■ DX100 OVERALL ASSEMBLY





## ■ DX100 KEYBOARD ASSEMBLY



Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
1	NA 10.83.80	MK Circuit Board	M K シート	Refer to Page 28			05
2	CB 04.04.10	White Key	C 白鍵	"			01
"	CB 04.04.20	"	D	"			01
"	CB 04.04.30	"	E	"			01
"	CB 04.03.70	"	F	"			01
"	CB 04.03.80	"	G	"			01
"	CB 04.03.90	"	A	"			01
"	CB 04.04.00	"	B	"			01
"	CB 04.04.40	"	F'/C'	"			01
3	CB 04.04.50	Black Key	黒鍵				01
4	CC 01.54.80	Felt, Keyboard Frame	鍵盤フェルト				01
5	AA 05.30.10	Keyboard Frame	C49	鍵盤フレーム			05
6	AA 05.30.70	Key Spring	F12	鍵バネ			02
7	AA 05.30.80	"	F8	"			02
8	AA 05.30.90	"	C5	"			01
9	CB 04.04.70	Key Guide	F12	鍵盤ガイド			02
10	CB 04.04.80	"	F8	"			02
11	CB 04.04.90	"	C5	"			02
12	CB 04.26.90	Rubber Contact	C49-6	可動導電ゴム			05
13	CB 04.15.70	Isolation Spacer	C49	絶縁スペーサー			02
14	Ei 03.01.46	Bind Head Tapping Screw	M3×14 Ye	バインドタッピングネジ			01
15	Ei 03.01.86	"	M3×18 Ye	"			01

\*New Parts (新規部品)

A

B

C

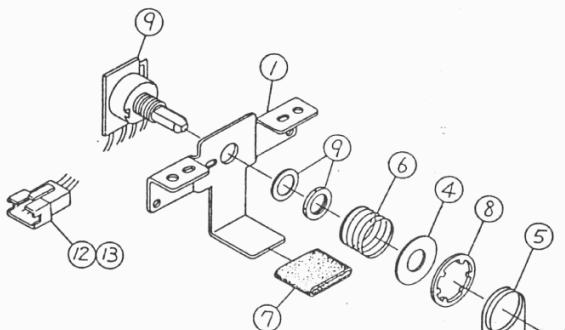
D

DX27/DX100

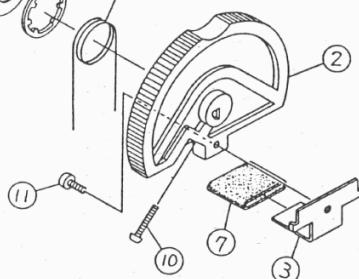
## 1 ■ WHEEL ASSEMBLY & WHEEL UNIT

### ● DX27

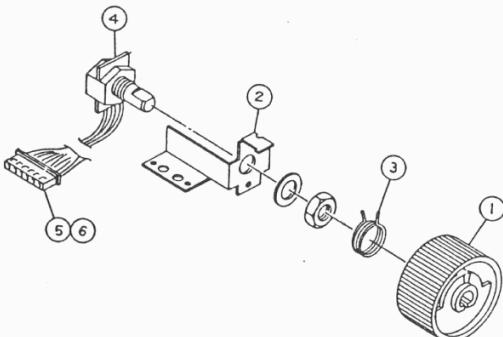
2



3



### ● DX100



### ● DX27

Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
NB	83.31.20	Wheel Assembly	ホイールAss'y	PITCH			08
NB	83.31.30	"	"	MODULATION			08
1	AA.83.37.80	Frame	フレーム				01
2	CB.82.82.81	Wheel	ホイール				03
3	AA.81.74.70	Wheel Angle	ホイールアングル	PITCH			03
4	AA.81.74.80	Wheel Plate	ホイールプレート	"			03
5	AA.81.74.90	Return Spring	リターンスプリング	"			01
6	AA.81.75.00	Friction Spring	フリクションスプリング	"			01
7	CB.81.90.20	Wheel Tube	ホイールチューブ				02
8	EK.80.12.60	Wheel Ring	C S型止め輪	PITCH			01
9	HS.31.24.60	Rotary Potentiometer	B10kΩ	ロータリーバ	R	"	04
"	HS.41.21.60	"	"	MODULATION			03
10	ED.33.01.66	Bind Head Screw	M3×16 BI	バインド小ネジ			01
11	ED.33.00.86	"	M3×8 BI	"	PITCH		01
12	LB.40.08.30	Connector Housing	4P	コネクタハウジング	"		01
"	LB.30.11.90	"	3P	"	MODULATION		01
13	BB.00.46.90	Contact Pin		コントクトピン			01

### ● DX100

Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
*	VA.09.97.00	Wheel Unit	ホイールユニット				08
*	1 CB.83.74.70	Wheel	ホイール				01
*	2 AA.83.42.50	Wheel Angle	ホイールアングル	PITCH			01
*	" AA.83.42.60	"	"	MODULATION			01
*	3 VA.08.60.00	Wheel Spring	ホイールスプリング	PITCH			01
*	4 VA.10.76.00	Rotary Potentiometer	B10kΩ	ロータリーバ	R	PITCH	03
*	" VA.10.75.00	"	B10kΩ,CT	"	MODULATION		03
*	5 CB.10.15.80	Connector Housing	7P	コネクタハウジング			01
*	6 BB.00.58.20	Contact Pin		コントクトピン			01

\*New Parts (新規部品)

## ■ CIRCUIT BOARD &amp; ELECTRICAL PARTS

Ref. No.	Part No.	Description	部品名	Remarks	Common Model	Markets	ランク
*	VA 12 88 00	DM Circuit Board	D M シート	DX27			47
*	VA 08 24 00	"	"	DX100			47
FZ 00 41 00	Semiconductive Ceramic Cap.	0.1μF 16V	半導体セラコン				01
FZ 00 69 70	EMI Filter	Y233NB	エミフィル				02
GE 30 03 50	Choke Coil	68μH	チョークコイル				01
BD 55 00 50	Ferrite Core	ESD-R-12C	フェライトコア				05
HZ 00 31 90	Module Resistor	4.7kΩ×8	モジュール抵抗				01
VA 29 22 00	Carbon Composition Resistor	10MΩ	ソリッド抵抗				01
VA 10 77 00	Rotary Potentiometer	B5kΩ	ロータリーバリューム	DX100			03
iA 09 33 00	Transistor	2SA933S (Q,R)	トランジスタ				03
iC 17 40 00	"	2SC1740S (R,S)	"				03
iC 28 78 00	"	2SC2878(A,B)	"				03
iH 00 05 90	Diode	10E-1	ダイオード				01
VA 24 07 00	"	1SS176TPA4	"				01
iF 00 95 70	LED	LD201VR3	L E D	DX100			02
iG 00 13 90	IC	NJM4558DV	I C				03
iG 05 66 00	"	NJM386D	"				04
iG 10 70 00	"	NJM072D	"				04
iG 08 78 00	"	μPC7905H	"				05
iG 13 03 00	"	μPC7808H	"				05
iG 11 62 00	"	PST-518B-2	"				04
iG 13 49 00	"	IR9311	"				04
iG 05 10 00	"	TC40H004P	"				03
iG 05 11 00	"	TC40H074P	"				04
iG 09 63 00	"	TC40H002P	"				03
iG 11 19 00	"	TC40H138P	"				04
iR 00 14 00	"	TC74HC14P	"				05
XA 01 70 01	"	TC40H241P	"				05
iG 14 06 00	"	HD6303XP	"				14
iT 21 64 00	"	YM2164	"				16
iG 07 88 00	"	TC5518BPL	"				12
XA 15 10 02	"	HN613256PCL2	"				
iG 10 61 00	"	M58990P-1	"				09
iT 30 14 00	"	YM-3014	"				07
iK 00 04 70	Photo Conductor	TLP552	フォトカプラー				06
QU 00 47 00	Ceramic Oscillator	500kHz	セラロック				03
QU 00 81 00	Quartz Crystal Unit	7.15909MHz	水晶振動子				05
PC 90 00 40	Lithium Battery,3V	CR2032T	リチウム電池				04
KA 40 09 90	Slide Switch		スライドスイッチ	POWER			02
LB 20 23 30	Phone Jack	Mono	ホーンジャック	FOOT SW,OUTPUT			02
LB 20 30 90	"	Stereo	"	PHONES			02
LB 30 20 10	Mini Jack	Stereo	ミニジャック	BREATH CONT			02
LB 20 27 10	DC Power Jack	2mm	電源ジャック	DC 12V IN			02
LB 60 37 10	DIN Jack	8P	D I N ジャック	CASSETTE			03
LB 50 05 20	"	5P	"	MIDI			03
LB 60 60 50	IC Socket	28P	I C ソケット				05
iL 00 06 90	Insulator		放熱シート				01
CB 05 62 50	LED Spacer		LEDスペーサー	DX100			01
CB 07 28 80	Insulation Bush		絶縁ブッシュ				01
CB 06 92 50	Binding Tie		インシュロックタイ				01
LB 94 40 70	Connector Base Pin	7P SE	コネクタベースピン	DX100			01
LB 94 41 40	"	14P SE	"	DX100			01
VA 03 03 00	"	3P TE	"	DX27			01

\* New Parts (新規部品)

Ref. No.	Part No.	Description			部品名	Remarks	Common Model	Markets	ランク
	VA 03 07 00	Connector Base Pin	7P	TE	コネクタベースピン	DX27			01
	VA 09 01 00	"	18P	TE	"	DX27			01
	LB 00 91 40	Connector Housing	14P	XH	コネクタハウジング	DX27			01
	LB 10 11 30	Contact Pin		XH	コンタクトピン	DX27			01
	BD 55 00 50	Ferrite Core	ESD-R-12C		フェライトコア				05
	CB 04 83 70	Connector Housing	3P		ボードインハウジング				01
*	BB 00 55 40	Contact Pin			コンタクトピン				01
*	VA 09 10 00	Connector Housing	17P		コネクタハウジング	DX100			01
*	BB 00 58 20	Contact Pin			コンタクトピン	DX100			01
*	CB 10 16 50	Connector Housing	14P		コネクタハウジング	DX100			01
	LB 60 24 80	"	8P	NH	"	DX100			01
	CB 04 83 60	"	2P		ボードインハウジング	DX100			01
	CB 04 83 80	"	4P		"	DX100			01
	LB 20 28 10	Housing Plug	2P	SM	SMPハウジング	DX100			01
*	BB 00 44 30	Contact Pin			コンタクトピン	DX100			01
*	VA 09 66 00	Connector Housing	14P		コネクタハウジング	DX100			01
	ED 33 00 66	Bind Head Screw	3×6	BI	バインド小ネジ				01
	EA 32 60 86	Pan Head Screw	2.6×8	BI	ナベ小ネジ				01
*	NX 80 18 00	PNA Circuit Board			PNAシート	DX27			10
*	NX 80 18 20	"			"	DX100			09
*	NX 80 18 10	PNB Circuit Board			PNBシート	DX27			10
*	NX 80 18 30	"			"	DX100			09
	HQ 23 01 70	Slide Potentiometer	A10kΩ		スライドVR	VOLUME			03
	HQ 23 01 80	"	B10kΩ		"	DATA ENTRY			03
	iF 00 34 50	Diode	1SS133		ダイオード				01
*	VA 24 07 00	"	1SS176		"	DX27			01
*	VA 24 07 00	"	1SS176		"	DX100			01
*	VA 78 96 00	Push Switch	EVQ-QSL04M		プッシュスイッチ	DX27			01
	LB 50 03 70	Connector Base Pin	5P	NH	コネクタベースピン	DX27			02
	LB 60 30 10	"	5P	"	"				03
*	LB 94 41 40	"	14P	SE	"	DX100			01
*	VA 10 73 00	LCD Circuit Board			LCDシート	DX100			11
	HZ 00 51 50	Module Resistor	2.2kΩ×5		モジュール抵抗	DX100			01
	iG 15 59 00	IC	HD44780RAOO	I	C	DX100			09
	NA 11 08 50	MK1 Circuit Board			MK1シート	DX27			07
	NA 11 11 40	MK3 Circuit Board			MK3シート	DX27			09
	NA 10 83 80	MK Circuit Board			MKシート	DX100			05
	iF 00 34 50	Diode	1SS133		ダイオード				01
	LB 92 31 20	Connector Base Pin	12P	TE	コネクタベースピン	DX27			01
	LB 91 60 30	"	3P	TE	"	DX27			01
	LB 91 60 40	"	4P	TE	"	DX27			01
	VA 09 05 00	"	17P	TE	"	DX100			02

\* New Parts (新規部品)

RICOH

## ■ TABLE OF IC PIN FUNCTIONS

YM2164 OPP

Pin No.	Pin Name	I/O	Function	Remarks
1	Vss	—	GND	
2	IRQ		Interrupt data	
3	IC	I	Initial clear	
4	A <sub>0</sub>	I	Address bus	
5	WT	I	Write control	
6	RD	I	Read control	
7	CS	I	Chip Select	
8	CT1	O	Control data out 1	
9	CT2	O	Control data out 2	
10	D <sub>0</sub>	I/O	Data bus	
11	Vss	—	GND	
12	D <sub>1</sub>	I/O	Data bus	
13	D <sub>2</sub>	I/O		
14	D <sub>3</sub>	I/O	Data bus	
15	D <sub>4</sub>	I/O		
16	D <sub>5</sub>	I/O	Data bus	
17	D <sub>6</sub>	I/O		
18	SH2	O	Sample and hold (Ch2)	
19	SH1	O	Sample and hold (Ch1)	
20	S <sub>0</sub>	O	Tone signal data	
21	Vcc	—	DC Supply (+ 5V)	
22	φl	O	Synchro pulse for DAC	
23	φM	I	Clock 3.58 MHz	

YM3014 DAC

Pin No.	Pin Name	I/O	Function	Remarks
1	V <sub>DD</sub>	—	+5V	
2	TO BUFF	O	Analog signal output	
3	LOAD	I	Generates internal signal to latch serial data by using falling edge of the signal input.	
4	SD	I	Serial input of digital signal to be converted	
5	CLOCK	I	Clock input to operate shift register and timing generator	
6	Vss	—	GND	
7	R <sub>B</sub>	O	Outputs highly accurate voltage that is 1/2 of V <sub>DD</sub>	
8	MP	I	The voltage of this pin is normally biased at 1/2 of V <sub>DD</sub>	

## TEST PROGRAM

### 1. Data Storage

When the test program is executed, the voices in the internal RAM area and voice number in the 96 voice number bank area will be erased. Please be sure to save the voices in the 24 voice internal RAM area on to a cassette and write down the voice names of the voice numbers in the 96 voice number bank area before executing the program. Also, the programmed message that is momentarily displayed when the POWER switch is turned ON will be erased, therefore write it down.

### 2. Test program preparation

Before initiating the Test Program please make the following connections:

- Connect the MIDI IN terminal and MIDI OUT terminal with a MIDI cable.
- Connect an amplifier with approx 10dB gain between the cassette IN and OUT jacks.
- Connect the breath controller BC-1 to the BREATH controller jack.
- Connect the foot switch FC-4 or FC-5 to the FOOT SW jack.
- Connect the AC adapter PA-1210 to the DC 12 IN jack.

### 3. Test Mode Entry Procedure

Turn the POWER switch ON while depressing the voice select switches [ ] and [ ]. After the version number has been displayed, the LCD then displays the following message.

Test entry?

Once this message is displayed you may release both select switches.

Now press the [ ] switch, and the unit will be in the test mode. (Pressing any switch other than the [ ] switch instead will set the unit back to the normal operation mode.)

\* Turning the POWER switch ON while pressing the voice switches [ ] and [ ] allows execution of TEST 1 to TEST 5 only.

\* Turning the POWER switch ON while pressing the voice switches [ ] and [ ] allows execution of TEST 6 to TEST 9 only.

\* The moment the unit enters the test mode, the preset voices are loaded into the internal 24 voice RAM area automatically and the preset voice numbers are set in the 96 voice number bank. Also, the momentary message display at POWER ON will be set back the original to <Welcome to DX!> message.

### 4. TEST 1: Checking Output level and RAM Back-up Battery voltage.

When the unit enters the this test mode, the following message is displayed.

Check level nn

The nn in this message indicates 10 times the RAM back-up battery voltage. If it is below 2.2V or above 4.0V, "BLO" appears on the display and the test program stops. Also, at this time, the A3 key is automatically turned ON and the output of the following standard levels can be measured at the OUTPUT and HEADPHONES jack.

OUTPUT:  $-20\text{dBm} \pm 2\text{dBm}$   
 (RL =  $10\text{k}\Omega$ , VOLUME = MAX)  
 PHONES:  $-16\text{dBm} \pm 2\text{dBm}$   
 (RL =  $47\Omega$ , VOLUME = MAX)

Acceptable noise level is as follows.

OUTPUT:  $-85\text{dBm}$  or less  
 PHONES:  $-75\text{dBm}$  or less

The test check OK, press the [ ] switch to proceed to the next test.

\* Upon completion of TEST 1, the MIDI parameters are set as follows.

MIDI:	ON
MIDI CH INFO:	ON
MIDI TRANS CH:	1
MIDI RECV CH:	1
OMNI:	ON
MIDI SYS INFO:	ON

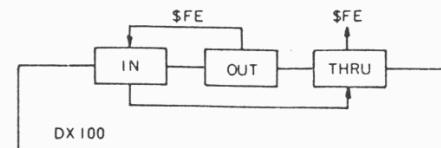
### 5. TEST 2: Checking the RAM, Cassette Interface and MIDI Test.

① The RAM, Cassette Interface and MIDI Test are automatically checked.

- If a RAM IC is NO GOOD then the display will indicate.
- If the cassette interface is NO GOOD then the display will indicate.
- If the MIDI Interface circuit is NO GOOD then the display will indicate.

IC No. of RAM  
 IC [ ] is NG!  
 ERROR CASS!  
 ERROR MIDI!

\$FE is output as shown below.



\$FE is output through the OUT terminal, enter the IN terminal through and is then output from the THRU terminal.

② The active sensing (\$FE) is output from the MIDI THRU terminal for confirmation and it is displayed as shown below. (A special monitor is required for checking \$FE at the THRU terminal.)

Check MIDI THRU

Pressing the [ ] switch will allow the operation to proceed to the next test.

### 6. TEST 3: Checking the LCD Display Test

① This test flashes the LCD display ON and OFF. If this test check O.K., press the [ ] switch to proceed to ②.

② 16 pieces of the following figure are displayed on the LCD. If this test check O.K., press the [ ] switch to proceed to the next test.



### 7. TEST 4: Checking A/D Test

The name of control and A/D code (0 ~ 99) are displayed on the LCD. When the displayed control is set to MIN ~ MAX (0 ~ 99) or ON/OFF, the test will automatically advance to the next control.

The controls are checked in the following order.

- ① PITCH BEND wheel including the center check (49 or 50 is acceptable.)
- ② MODULATION wheel
- ③ DATA ENTRY slider
- ④ BREATH controller
- ⑤ FOOT SWITCH

Upon completion of all checks, the test routine moves on to the next test.

\* If the PITCH BEND wheel (①) is N.G., it is displayed as shown below.

P. BEND 2.5V ERR

### 8. TEST 5: Checking The Foot Switch Detecting Circuit Test.

When the message Pull FOOT SWITCH is displayed, pull off the foot switch. If this test check O.K., proceed to the next test.

\* If the Test detects on Error, then the message F. SW Connect ERR will be displayed.

### 9. TEST 6: Checking the Keyboard Contact Test

Depress and release the keys displayed on the LCD one after another. Once the note is depressed and release, the LCD display indicates to depress and release the next key name.

### DX27: C1 ~ C6

When the C6 key is depressed and released, the test routine advances to TEST 9.

### DX100: C1 ~ C5

When "C#5" is displayed, press the [ ] switch to proceed to TEST 7.

\* If an error occurs, the key name displayed on the LCD.

### 10. TEST 7: Checking the LCD Contrast Test (applicable to DX100 only)

CONTRAST BL & WH? is displayed, turn the CONTRAST knob to check that the characters on the LCD turn white (they are seen slightly and the dots in the background become invisible) and black (all dots are ON and characters are almost invisible).

If this test checks O.K., press the [ ] switch to proceed to the next test.

### 11. TEST 8: Checking the Reduced Battery Voltage

Warning Circuit Test (applicable to DX100 only)  
Before initiating this test, it is necessary to remove the batteries and apply 9V DC to the Battery terminals, then reduce the voltage to 7V when the following message appears on the LCD.

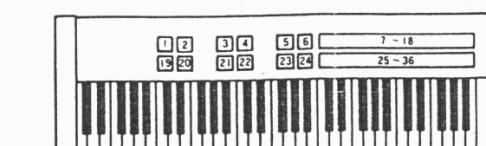
Set Battery 7V

When the voltage is reduced to 7V, the message LED Flash? will be displayed. Then confirm that the LED is flashing.

\* If the power voltage is not set to 9V for the test, the message Set Battery 9V is displayed. In that case, press the [ ] switch to proceed to the next test.

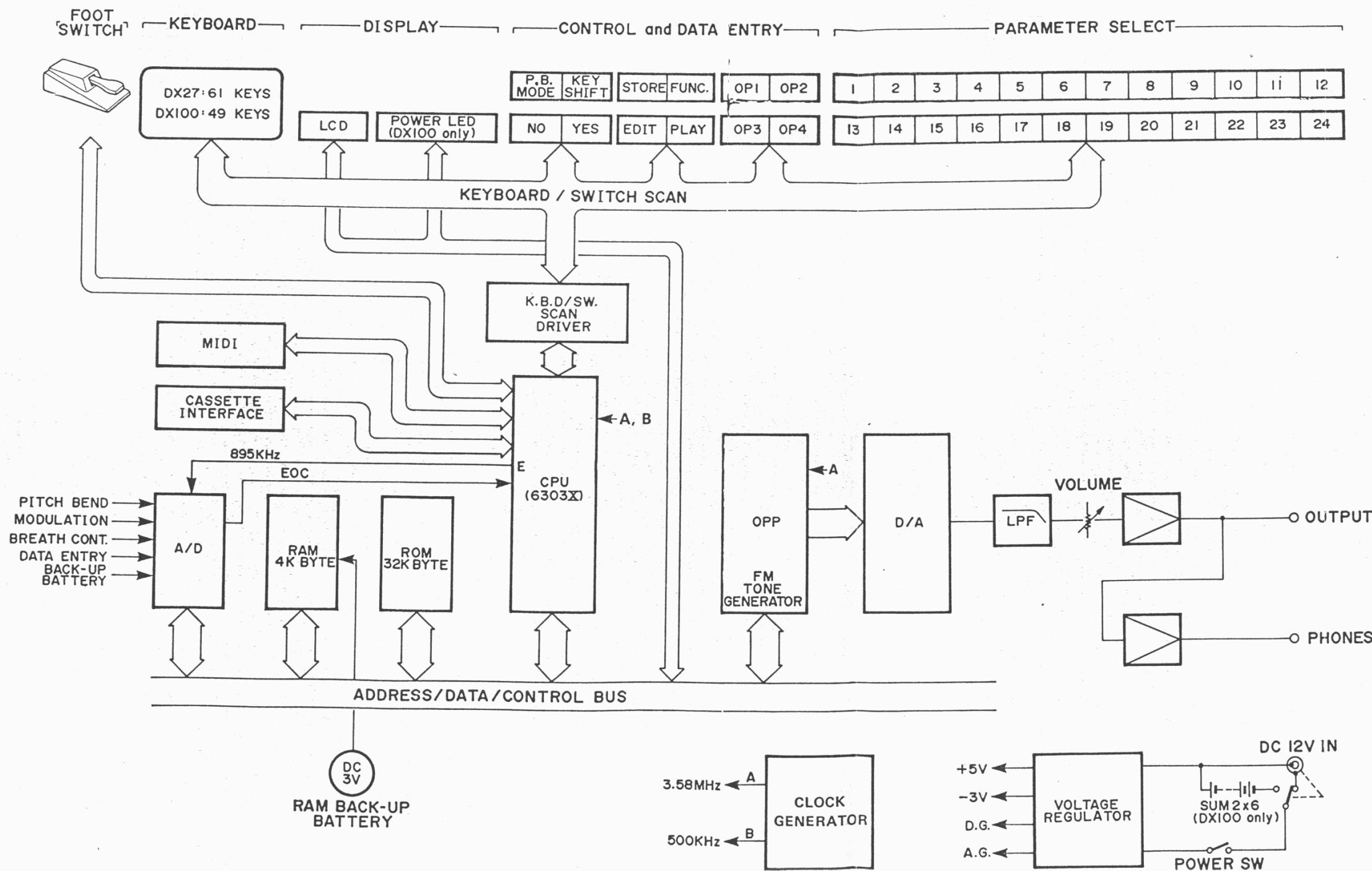
### 12. TEST 9: Checking the Panel Switch Test

Press the key (switch) corresponding to the number displayed on the LCD.



After the panel switch test has been completed, the test routine automatically exits the Test Mode and the unit returns to its normal operating mode.

## ■ BLOCK DIAGRAM

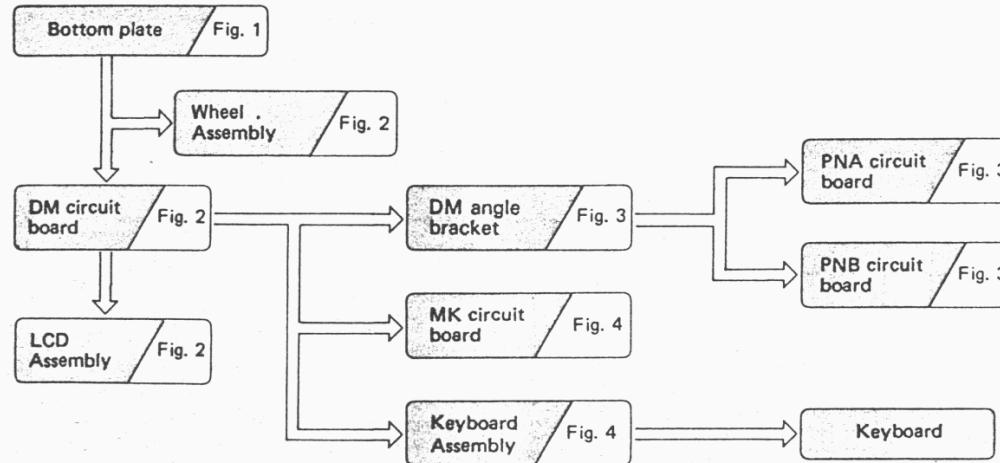


## DX27/DX100

### DISASSEMBLY PROCEDURES

Remove each of the following parts according to the flow chart.

#### DX27 FLOW CHART



#### • Removal of bottom plate

- Bottom plate: (a) Bind head screw M4 x 8 6 pcs.
- (b) Bind head screw M5 x 10 3 pcs.

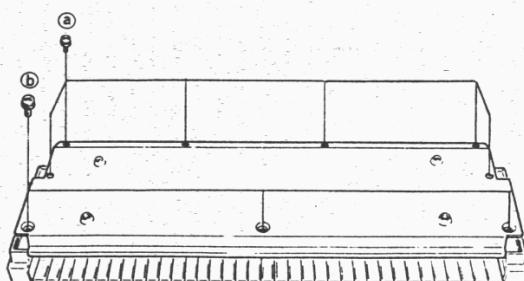


Fig. 1

#### • Removal of wheel Assembly, DM circuit board and LCD Assembly

- DM circuit board: (b) Bind head screw M3 x 6 4 pcs.
- (c) Bind head screw M4 x 10 5 pcs.

- LCD Assembly
- (d) Bind head screw 3 x 6 2 pcs.

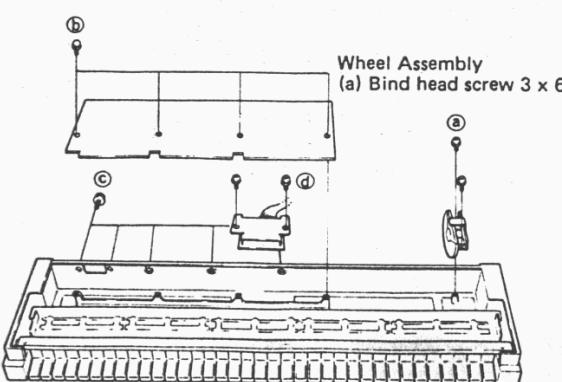
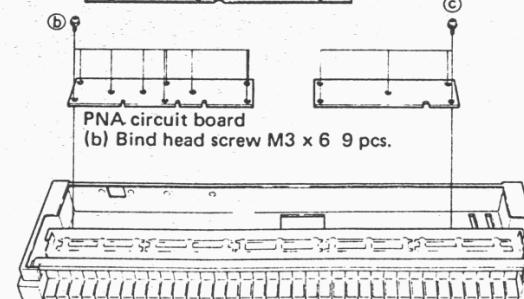
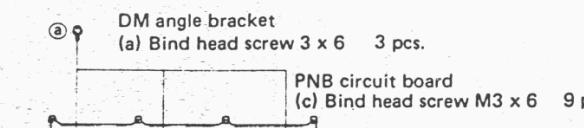


Fig. 2

#### • Removal of DM angle bracket, PNA circuit board and PNB circuit board



#### • Removal of MK circuit board and keyboard Assembly

- MK circuit board
- (a) Bind head screw M3 x 14 15 pcs.

- Keyboard Assembly
- (b) Bind head screw M4 x 8 4 pcs.

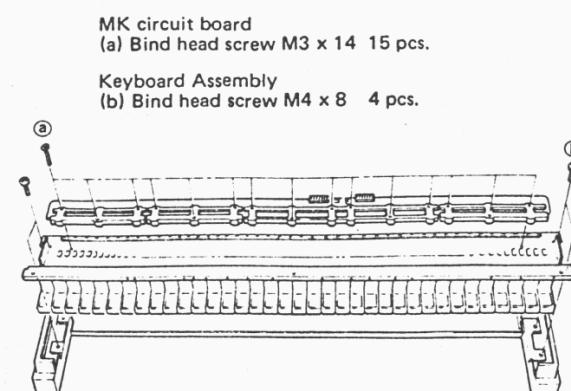
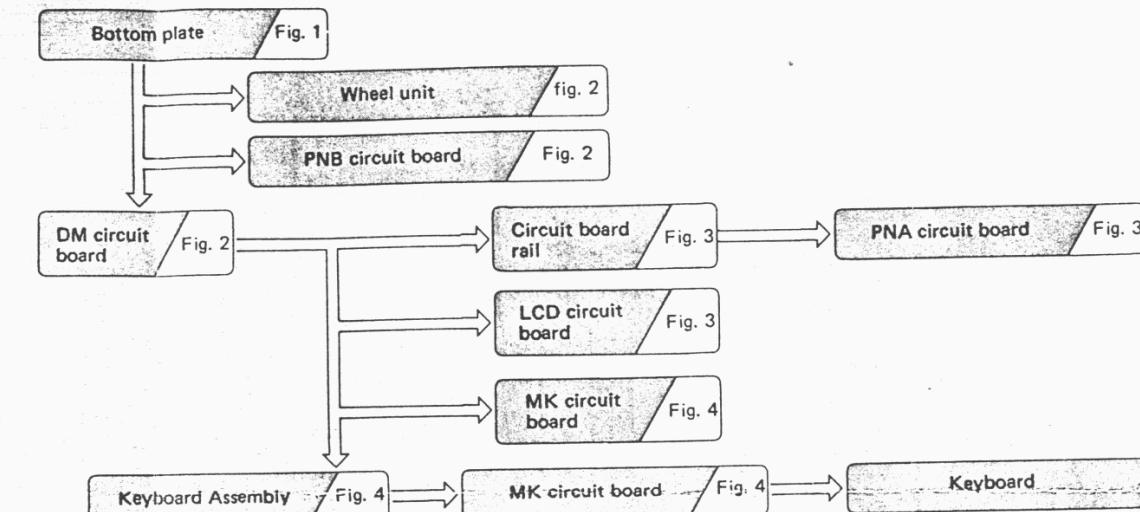


Fig. 4

#### DX100 FLOW CHART



#### • Removal of lower case

- (a) Bind head tapping screw M3 x 6 8 pcs.
- (b) Bind head screw M3 x 10 2 pcs.
- (c) Bind head tapping screw M3 x 8 5 pcs.

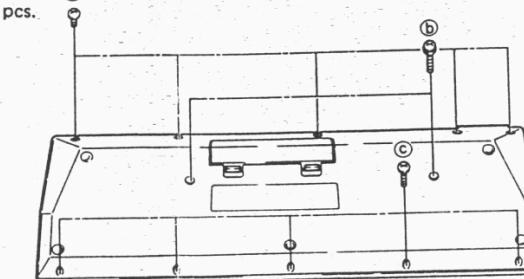


Fig. 2

#### • Removal of circuit board rail, PNA circuit board and LCD circuit board

- Circuit board rail
- (a) Bind head tapping screw M3 x 6 4 pcs.

- LCD circuit board
- (c) Bind head tapping screw M3 x 6 4 pcs.

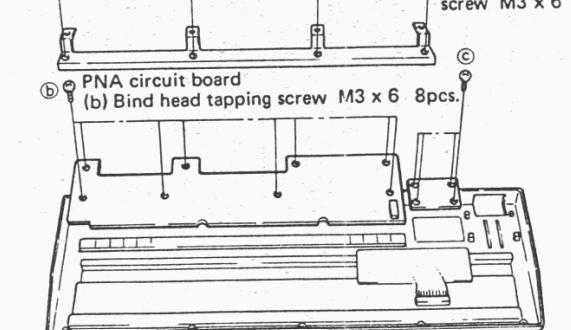


Fig. 3

#### • Removal of wheel unit, PNB circuit board and DM circuit board

##### Wheel unit

- (a) Bind head tapping screw M3 x 6 4 pcs.

##### PNB circuit board

- (b) Bind head tapping screw M3 x 6 4 pcs.

##### DM circuit board

- (c) Bind head tapping screw M3 x 6 3pcs.

- (d) Bind head screw M3 x 10 6pcs.

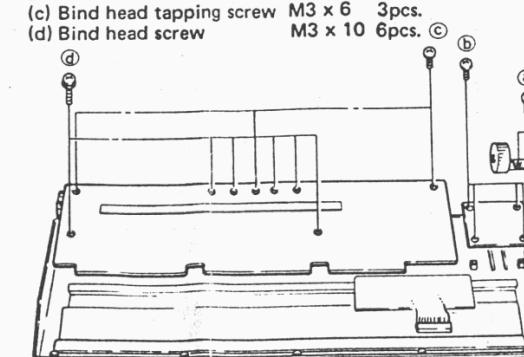


Fig. 1

#### • Removal of MK circuit board and keyboard Assembly

- MK circuit board
- (a) Bind head tapping screw M3 x 14 9 pcs.

- Keyboard Assembly
- (b) Bind head tapping screw M3 x 8 7 pcs.

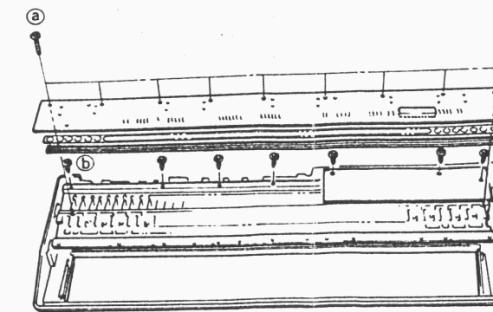


Fig. 4