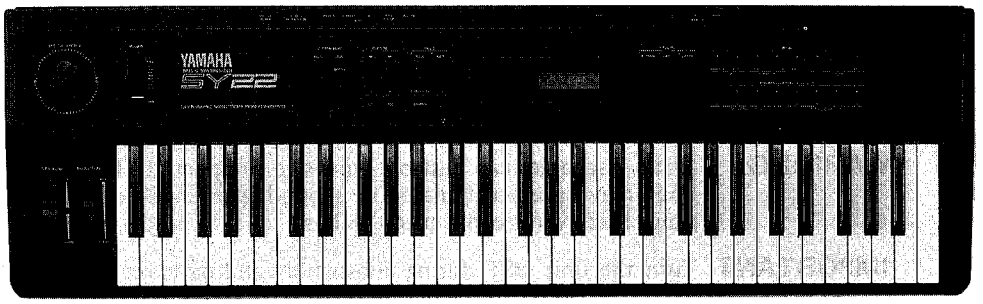
MUSIC SYNTHESIZER

SY22

SERVICE MANUAL



SY22

■CONTENTS（目次）

SPECIFICATIONS（総合仕様）..... 2
PANEL LAYOUT（パネルレイアウト）..... 4
CIRCUIT BOARD LAYOUT & WIRING（ユニットレイアウト&結線図）. 6
BLOCK DIAGRAM（ブロックダイアグラム）..... 8
DIASSEMBLY PROCEDURE（分解手順）..... 10
LSI PIN DESCRIPTION（LSI 端子機能表）..... 14
IC BLOCK DIAGRAM（IC ブロック図）..... 16
CIRCUIT BOARDS（シート基板図）..... 18
TEST PROGRAM（テストプログラム）..... 22
MIDI DATA FORMAT（MIDI データフォーマット）..... 24
MIDI IMPLEMENTATION CHART 27
PARTS LIST

YAMAHA CORP.
HAMAMATSU, JAPAN
2.96K-104 Printed in Japan '90.3

LM 006986

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（総合仕様）

Keyboard: 61 keys, initial and after-touch response.

Tone Generator Systems: AWM (Advanced Wave Memory) & FM (Frequency Modulation).

Internal Memory:
Wave ROM; 128 preset AWM & 256 preset FM waveforms.
Preset ROM; 64 preset voices.
Internal RAM; 64 user voices.

External Memory: Voice & Multi data; MCD64 or MCD32 memory cards + write & read.

Displays:
16-character x 2-line backlit LCD.
7-segment 2-digit LED display.

Controls: VOLUME, VECTOR CONTROL, PITCH BEND, MODULATION.

Key & Switches: POWER; VECTOR PLAY ON/OFF, LEVEL/DETUNE; PAGE ◁and▷; MODE VOICE and MULTI; —1/NO and +1/YES; EDIT/UTILITY/COMPARE; STORE; INTERNAL,CARD, PRESET; BANK 1～8 (VOICE COMMON and VECTOR; ELEMENT TONE and ENVELOPE; MULTI; UTILITY RECALL, SETUP and MIDI); NUMBER/MULTI PART SELECT 1～8 (ELEMENT SELECT A～D, ELEMENT ON/OFF A～D);

Connectors: DC 10V–12V IN; PHONES; OUTPUT R & L/MONO, FOOT VOLUME, SUSTAIN.

MIDI Connectors:
IN, OUT, THRU.

Power requirements:
UL, CSA: 120V
Europe, WG, Australia, BS: 220–240V

Power consumption:
7W (with PA-3 AC Adaptor)

Dimensions (W x H x D):
976 x 285 x 93 mm

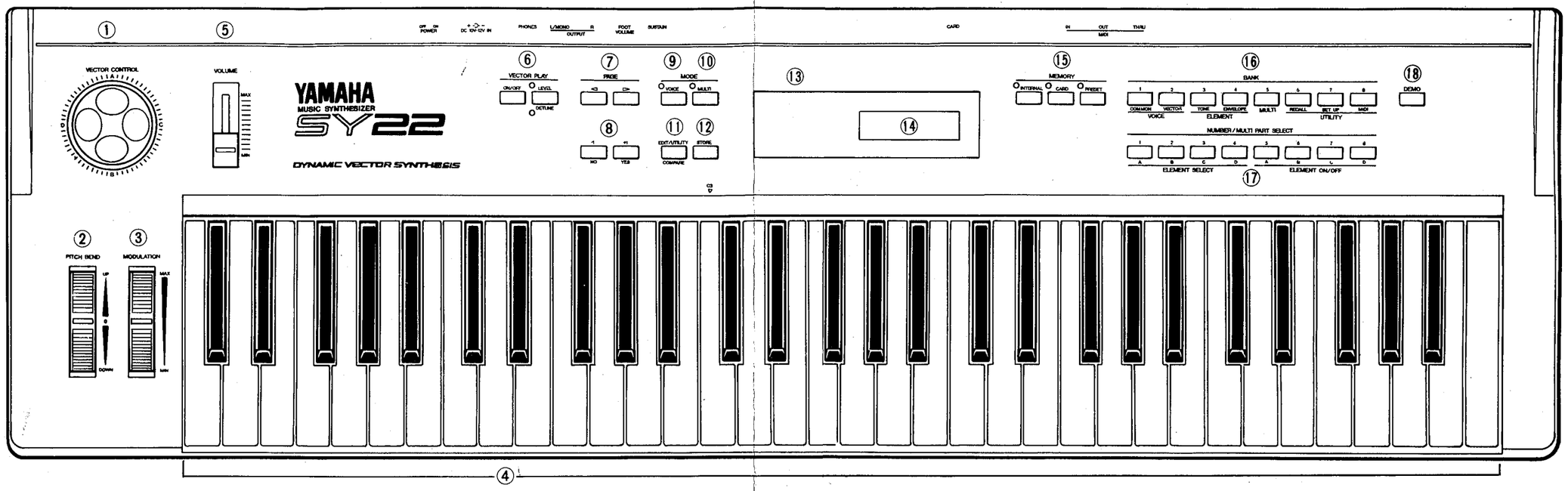
Output level:
OUTPUT L;—7±3 dB (MONO; —5±3 dB)
OUTPUT R; —7±3 dB
HEADPHONES; +3± dB

鍵盤	：	61鍵、C1～C6（イニシャルタッチ、アフタータッチ付）
音源	：	AWM & FM
内部メモリー	：	プリセットROM　64プリセットボイス インターナルRAM　64ユーザーボイス ウェーブROM　128プリセットAWM、256プリセットFM
外部メモリー		ボイス & マルチデータ（MCD64、MCD32）
表示器	：	LCD;16文字×2行（バックライト付） LED;7セグメント、2文字
コントロール	：	ボリューム、ベクターコントロール、ピッチベンド、モジュレーション
スイッチ	：	パワースイッチ、ベクタープレイ：ON/OFF・レベル/デチューン、ページ：◁・▷、 モード：ボイス・マルチ、－1/NO・＋1/YES、エディット/ユーティリティー/コンペアー、ストアー、 メモリー：インターナル・カード・プリセット、バンク（ボイス：コモン・ベクター、 エレメント：トーン・エンベロープ、マルチ、ユーティリティー：リコール、セットアップ、MIDI）、 ナンバー/マルチパートセレクト（エレメントセレクト：A・B・C・D、エレメントON/OFF：A・B・C・D）、デモ
入出力端子	：	DC10V～12V IN、ヘッドフォーン、アウトプットR・L/MONO、フットボリューム、サスティン、 カードスロット
MIDIコネクター	：	IN、OUT、THRU
出力レベル	：	アウトプット　L:－7±3dB（MONO時：－5±3dB） R:－7±3dB ヘッドホン　：＋3±3dB
電源電圧	：	AC100V、50Hz/60Hz
消費電力	：	7W（電源アダプター使用時）
寸法(W×H×D)	：	976×285×93mm
重量	：	6.8kg

SY22

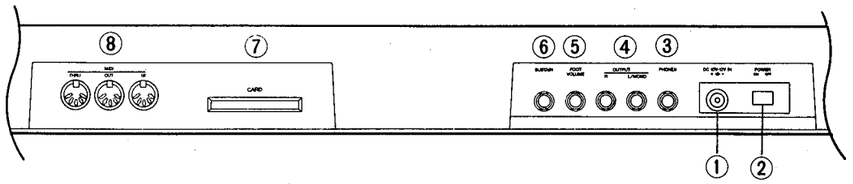
■PANEL LAYOUT（パネルレイアウト）

● Front Panel（フロントパネル）



① [VECTOR CONTROL]
② [PITCH BEND] Wheel
③ [MODULATION] Wheel
④ Keyboard
⑤ VOLUME Control
⑥ VECTOR PLAY [ON/OFF] and [LEVEL/DETUNE] Keys & Indicators
⑦ [◁] and [▷] Cursor Keys
⑧ [−1/NO] and [+1/YES] Keys
⑨ [MULTI] Key & Indicator
⑩ [VOICE] Key & Indicator
⑪ [EDIT/UTILITY/COMPARE] Key
⑫ [STORE] Key
⑬ LED Display
⑭ Liquid Crystal Display Panel
⑮ [INTERNAL], [CARD], and [PRESET] Keys & Indicators
⑯ [BANK] Select and Edit/Utility Mode Access keys
⑰ [NUMBER/MULTI PART SELECT] and Element Control Keys
⑱ [DEMO] Key

● Rear Panel（リアパネル）



① DC 10V-12V IN Jack
② [POWER] Switch
③ PHONES Jack
④ OUTPUT R and L/MONO Jacks
⑤ FOOT VOLUME Jack
⑥ SUSTAIN Jack
⑦ CARD Slot
⑧ MIDI IN, OUT and THRU Connectors

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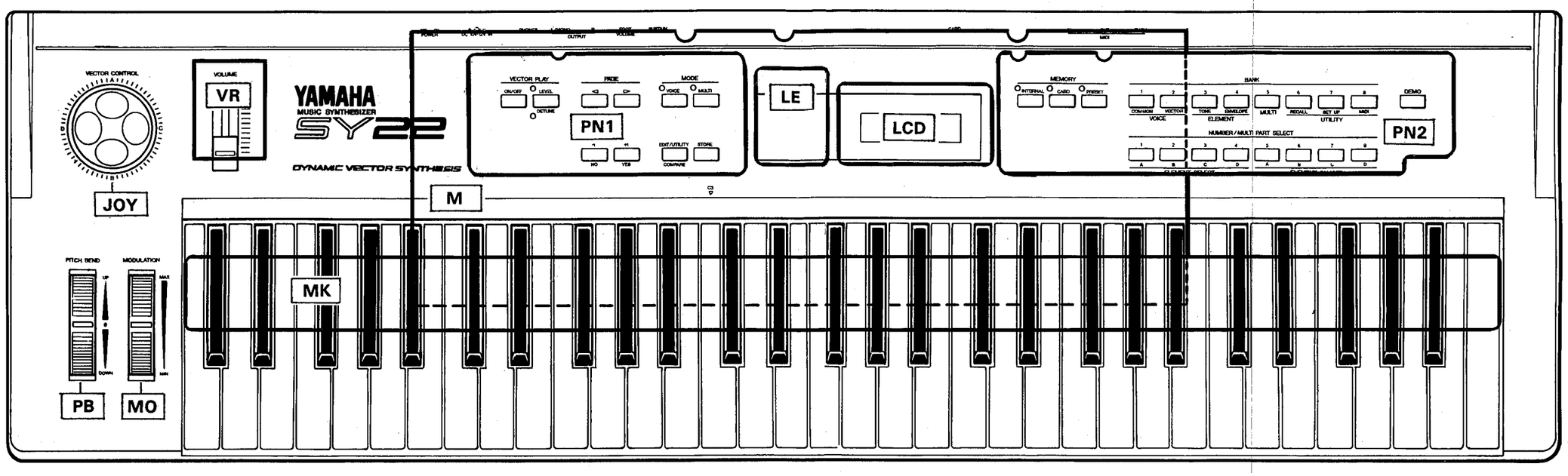
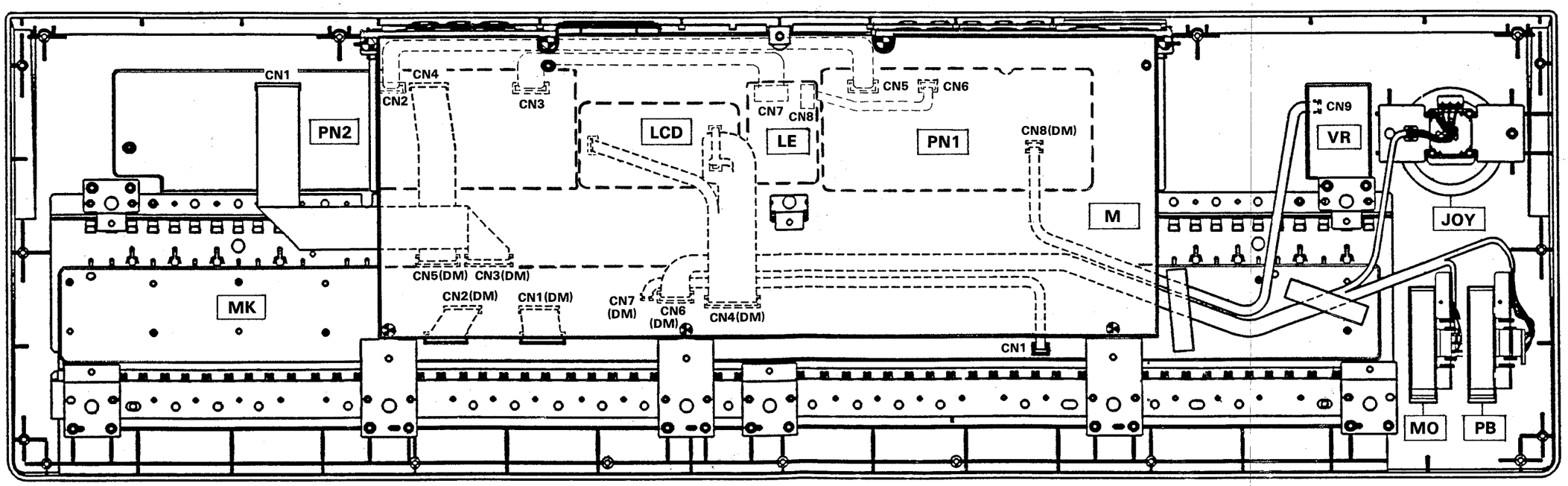
■CIRCUIT BOARD LAYOUT & WIRING（ユニットレイアウト＆結線図）





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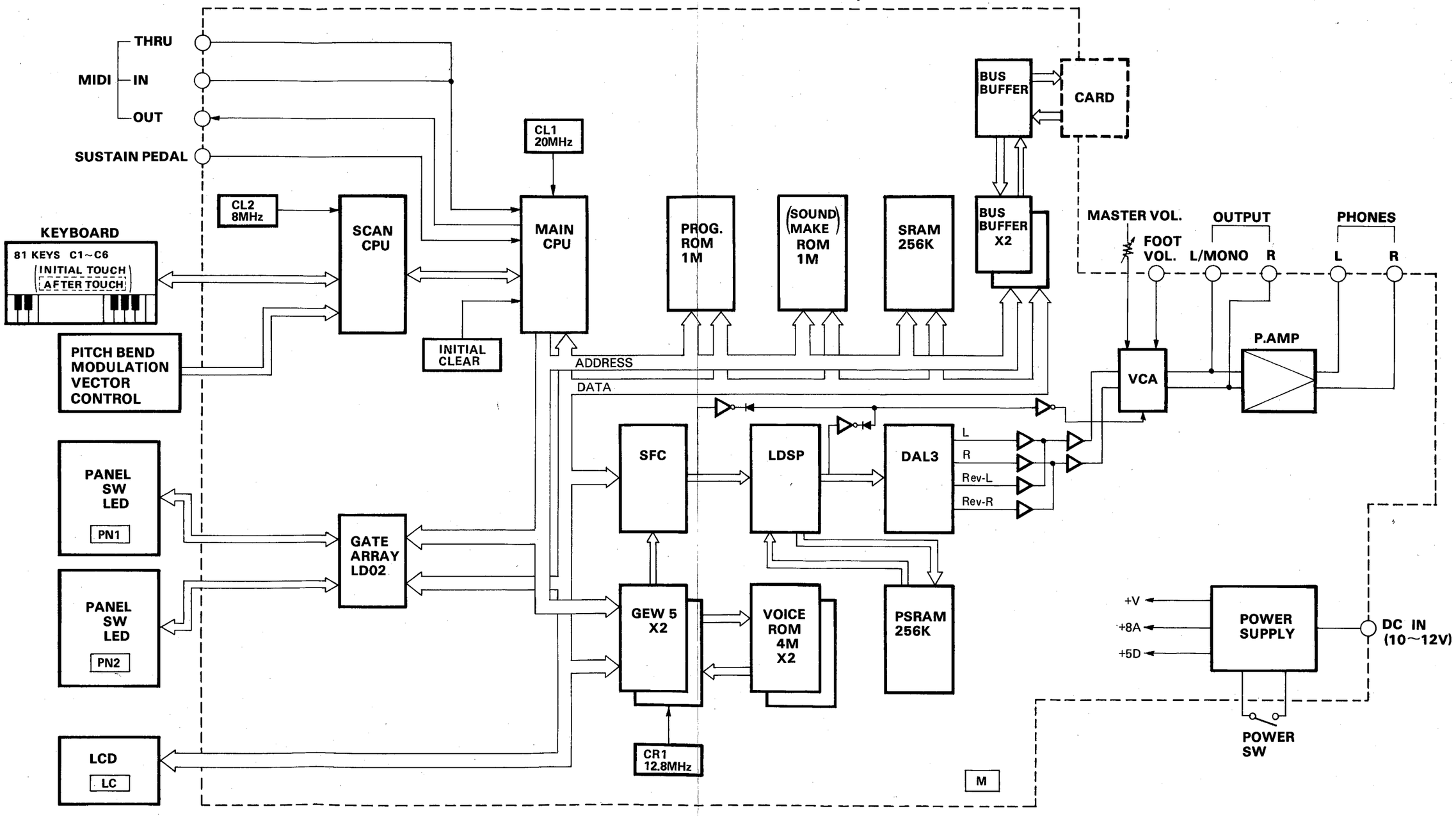
■BLOCK DIAGRAM（ブロックダイアグラム）



■DISASSEMBLY PROCEDURE（分解手順）

1. Bottom Case Removal

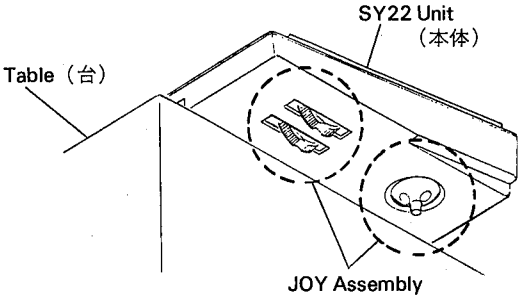
1-1 Place the unit up side down on a soft blanket. At that time care must be taken not to damage the Joy stick and Wheels. (Fig. 1)

1-2 There are twenty-two (22) screws located on the Bottom case, sixteen (16) screws marked in the figure as Ⓐ (bind tapping screw 4.0X10) around the outer edge, and six (6) screws marked Ⓑ (bind head screw 4.0X6). After these screws have been removed, the Bottom case can be reomved. (Fig. 2)

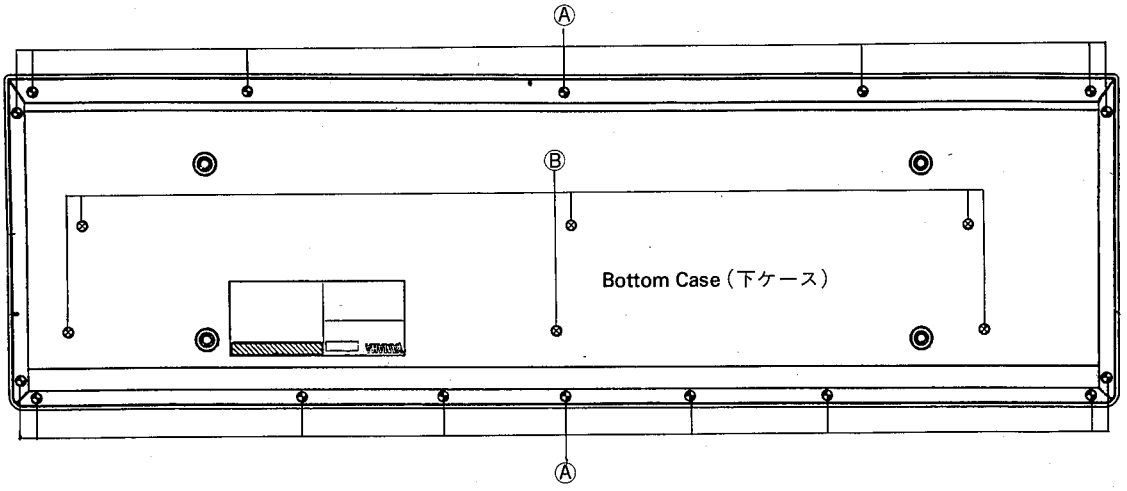
1. 下ケースの外し方

1-1 ジョイスティックとホイールを傷めないように気をつけながら、本体を裏返してテーブルの上に置きます。(図1参照)

1-2 下ケースを止めているネジ Ⓐ (バインドタッピングネジ4.0X10) 16本と、ネジ Ⓑ (バインド小ネジ4.0X6) 6本を外すと、下ケースを外すことができます。(図2参照)



(Fig. 1)



(Fig. 2)

2. Shield Sheet Removal

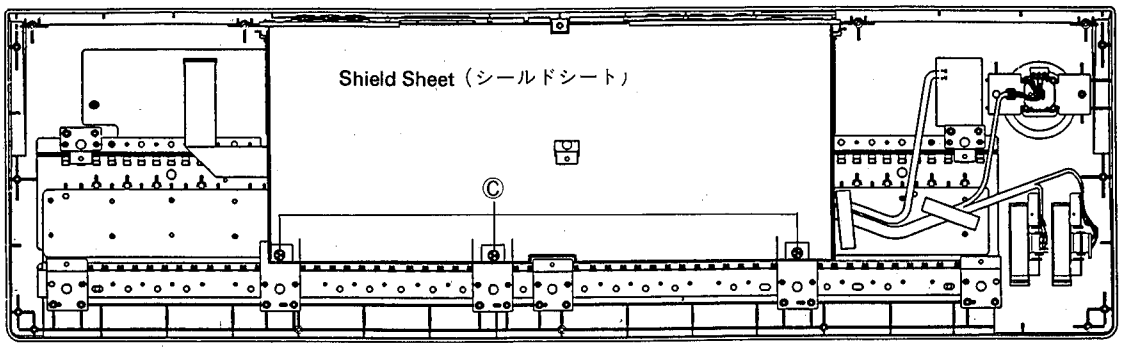
2-1 Remove the Bottom case. (see procedure 1.)

2-2 The Shield sheet can be removed by removing the three (3) screws marked Ⓒ(bind head screw 4.0X8). (Fig. 3)

2. シールドシートの外し方（図3参照）

2-1 下ケースを外します。(1項参照)

2-2 シールドシートを止めているネジ Ⓒ (バインド小ネジ4.0X8) 3本を外すと、シールドシートを外すことができます。



(Fig. 3)

3. M Circuit Board Removal

3-1 Remove the Bottom case. (see procedure 1.)
3-2 Remove the Shield sheet. (see procedure 2.)
3-3 Pull out the Power switch knob.
3-4 To remove The DIN jack angle bracket, remove the four (4) screws Ⓓ(bind tapping screw 4.0X10). (Fig. 4)
3-5 After the three (3) screws marked Ⓔ(bind head screw 4.0X8) have been removed, the M circuit board can be removed. (Fig. 4)

4. VR Circuit Board Removal

4-1 Remove the Bottom case. (see procedure 1.)
4-2 The VR circuit board can be removed by removing the three (3) screws marked Ⓕ (bind tapping screw 3.0X8). (Fig. 4)

5. Joy Stick and Wheel Assemblies Removal

5-1 Remove the Bottom case. (see procedure 1.)
5-2 Remove the four (4) screws marked Ⓖ (bind tapping screw 3.0X8), you can remove the Pitch bend assembly and Modulation wheel assembly. (Fig. 4)
5-3 The Joy stick assembly can be removed by removing the four (4) screws marked Ⓗ (bind tapping screw 4.0X10).(Fig.4)
* The Wheel assembly and Joy stick assembly can be completly removed by disconnecting wire harnesses on the M circuit board.

3. Mシートの外し方（図4参照）

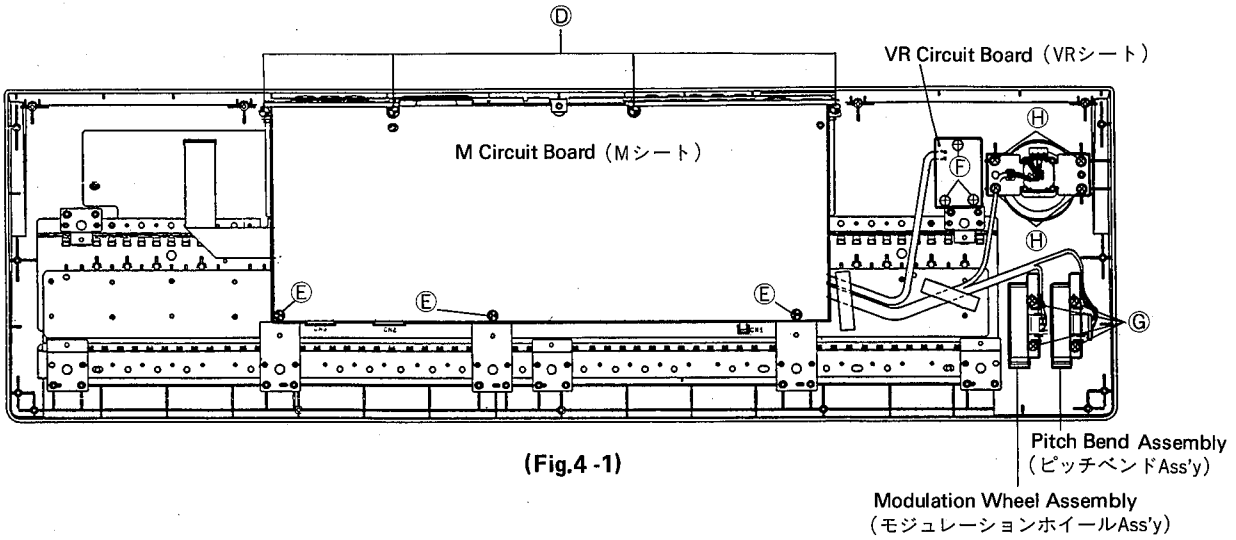
3-1 下ケースを外します。(1項参照)
3-2 シールドシートを外します。(2項参照)
3-3 パワースイッチツマミを外します。
3-4 ジャック金具を止めているネジ Ⓓ (バインドタッピングネジ4.0X10) 4本を外します。
3-5 Mシートを止めているネジ Ⓔ (バインド小ネジ4.0X8) 3本を外すと、Mシートを外すことができます。

4. VRシートの外し方（図4参照）

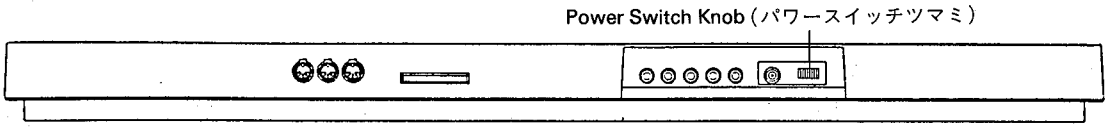
4-1 下ケースを外します。(1項参照)
4-2 ＶＲシートを止めているネジ Ⓕ (バインドタッピングネジ3.0X8) 3本を外すと、ＶＲシートを外すことができます。

5. ジョイスティックAss'yとホイールAss'yの外し方（図4参照）

5-1 下ケースを外します。(1項参照)
5-2 ネジ Ⓖ (バインドタッピングネジ3.0X8) 4本を外し、ピッチベンドとモジュレーションホイールＡｓｓ'ｙを外します。
5-3 ネジ Ⓗ (バインドタッピングネジ4.0X10) 4本を外すと、ジョイスティックＡｓｓ'ｙを外すことができます。
＊束線も一緒に外す場合は、Mシートを外し、Mシート上のコネクターから束線を外して下さい。



(Fig.4 -1)



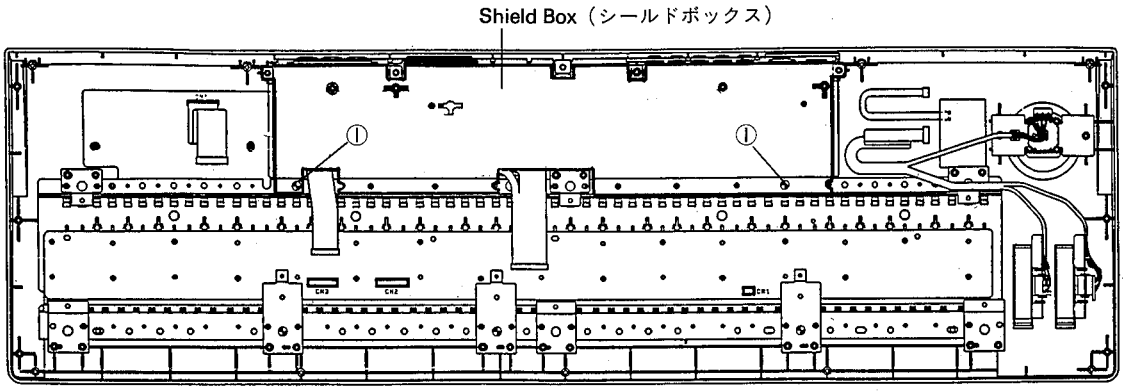
(Fig. 4-2)

6. PN1,PN2,LE Circuit Boards and LCD Assembly Removal

6-1 Pull out the Volume control knob on the Control panel.
6-2 Remove the Bottom case. (see procedure 1.)
6-3 Remove the Shield sheet. (see procedure 2.)
6-4 Remove the M circuit board.(see procedure 3.)
6-5 After the two (2) screws marked Ⓘ(bind tapping screw 4.0X10) have been removed, the Shield box can be removed. (Fig. 5)

6. PN1, PN2, LEシートとLCD Ass'yの外し方

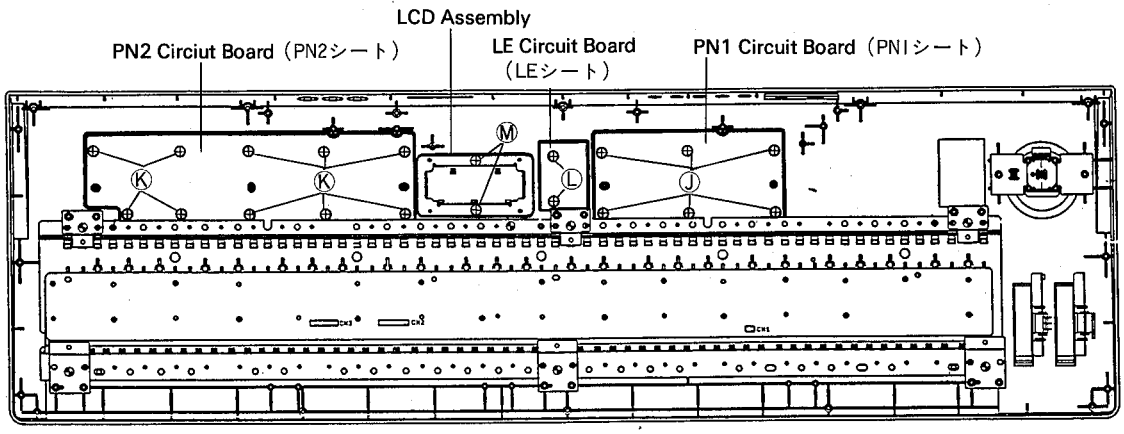
6-1 パネル表側のボリュームツマミを外します。
6-2 下ケースを外します。(1項参照)
6-3 シールドシートを外します。(2項参照)
6-4 Mシートを外します。(3項参照)
6-5 シールドボックスを止めているネジⒾ(バインドタッピングネジ4.0X10)2本を外し、シールドボックスを外します。(図5参照)



(Fig. 5)

6-6 The PN1 circuit board can be removed by removing the six (6) screws marked Ⓙ(bind tapping screw 3.0X6). (Fig. 6)
6-7 The PN2 circuit board can be removed by removing the ten (10) screws marked Ⓚ(bind tapping screw 3.0X6). (Fig. 6)
6-8 The LE circuit board can be removed by removing the two (2) screws marked Ⓛ (bind tapping screw 3.0X8). (Fig. 6)
6-9 The LCD assembly can be removed by removing the two (2) screws marked Ⓜ (bind tapping screw 3.0X8). (Fig. 6)

6-6 ＰＮ1シートを止めているネジⒿ(バインドタッピングネジ3.0X6)6本を外すと、ＰＮ1シートを外すことができます。(図6参照)
6-7 ＰＮ2シートを止めているネジⓀ(バインドタッピングネジ3.0X6)10本を外すと、ＰＮ2シートを外すことができます。(図6参照)
6-8 ＬＥシートを止めているネジⓁ(バインドタッピングネジ3.0X8)2本を外すと、ＬＥシートを外すことができます。(図6参照)
6-9 ＬＣＤ Ａｓｓ'ｙを止めているネジⓂ(バインドタッピングネジ3.0X8)2本を外すと、ＬＣＤ Ａｓｓ'ｙを外すことができます。(図6参照)



(Fig. 6)

7. MK Circuit Board Removal

7-1 Remove the Bottom case. (see procedure 1.)
7-2 Remove the Shield sheet. (see procedure 2.)
7-3 Remove the M circuit board. (see procedure 3.)
7-4 To remove the MK circuit board, remove the sixteen (16) screws marked Ⓝ (bind tapping screw 3.0X10). (Fig. 7)

8. Keyboard Assembly Removal

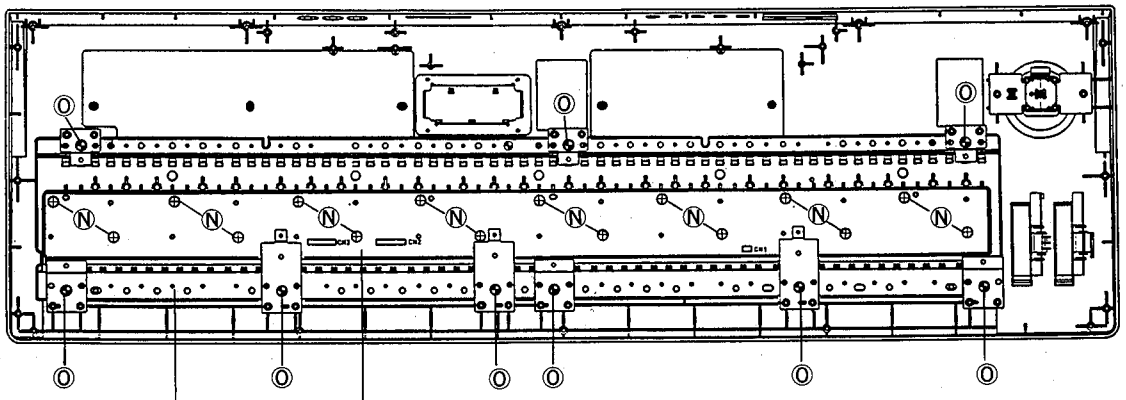
8-1 Remove the Bottom case. (see procedure 1.)
8-2 Remove the Shield sheet. (see procedure 2.)
8-3 Remove the M circuit board. (see procedure 3.)
8-4 Remove the Shield box. (see procedure 6-5.)
8-5 After the nine (9) screws marked Ⓞ (bind tapping screw 4.0X10) have been removed, the Keyboard assembly can be removed. (Fig.7)

7. ＭＫ－トの外し方（図7参照）

7-1 下ケースを外します。(1項参照)
7-2 シールドシートを外します。(2項参照)
7-3 Ｍシートを外します。(3項参照)
7-4 ＭＫシートを止めているネジ Ⓝ (バインドタッピングネジ3.0X10) 16本を外すと、ＭＫシートを外すことができます。

8. 鍵盤Ass'yの外し方 （図7参照）

8-1 下ケースを外します。(1項参照)
8-2 シールドシートを外します。(2項参照)
8-3 Ｍシートを外します。(3項参照)
8-4 シールドボックスを外します。(6-5項参照)
8-5 ネジ Ⓞ (バインドタッピングネジ4.0X10) 9本を外すと、鍵盤Ａｓｓ'ｙを外すことができます。



(Fig. 7)

■LSI PIN DESCRIPTION (LSI端子機能表)

• HD6475208P (XH261B00) CPU

Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	EXT	I	Clock	33	A7	O	Address bus
2	XTAL	I		34	A8	O	
3	$\overline{WAIT}$	I	Bus cycle wait	35	A9	O	
4	P11	O	Interrupt request	36	A10	O	
5	A18	O	Address bus	37	A11	O	
6	A17	O		38	A12	O	
7	A16	O		39	A13	O	
8	$\overline{AS}$	O	Address strobe	40	A14	O	
9	$\overline{RD}$	O	Read control	41	A15	O	
10	$\overline{WR}$	O	Write control	42	VCC		Power supply
11	VCC		Power supply	43	P50	O	Port 5
12	MD0	I	Mode select	44	P51	O	
13	MD1	I		45	P52	O	
14	MD2	I		46	P53	O	
15	$\overline{RES}$	I	Reset	47	P54	O	
16	$\overline{NMI}$	I	Non-maskable interrupt	48	P55	O	
17	VSS		Ground	49	P56	O	
18	D0	I/O	Data bus	50	P57	O	
19	D1	I/O		51	VSS		Ground
20	D2	I/O		52	AVSS		Analog ground
21	D3	I/O		53	AN0	I	Analog data input
22	D4	I/O		54	AN1	I	
23	D5	I/O		55	AN2	I	
24	D6	I/O		56	AN3	I	
25	D7	I/O		57	AVCC		Analog power supply
26	A0	O	Address bus	58	TX2	O	Transmit data
27	A1	O		59	RX2	I	Receive data
28	A2	O		60	A19	O	Address bus
29	A3	O		61	TX1		Transmit data
30	A4	O		62	RX1	I	Receive data
31	A5	O		63	SCLK	I	Clock for serial operation
32	A6	O		64	Vss		Ground

• HD63B05 (XH259B00) CPU

Pin No.	Name	I/O	Function	Pin No.	Name	I/O	Function
1	$\overline{RES}$	I	Reset	21	C7	I/O	Port C
2	$\overline{INT}$	I	Interrupt request	22	C6	I/O	
3	NUM	I	Non-maskable interrupt	23	C5	I/O	
4	A7	I/O	Port A	24	C4	I/O	
5	A6	I/O		25	C3	I/O	
6	A5	I/O		26	C2	I/O	
7	A4	I/O		27	C1	I/O	
8	A3	I/O		28	C0	I/O	
9	A2	I/O		29	D0	I/O	Port D
10	A1	I/O		30	D1	I/O	
11	A0	I/O		31	D2	I/O	
12	B0	I/O	Port B	32	TX	O	Serial data output
13	B1	I/O		33	D4	I/O	
14	B2	I/O		34	CLK	O	Clock for serial operation
15	B3	I/O		35	D6	I/O	
16	B4	I/O		36	$\overline{STBY}$	I	Standby mode signal
17	B5	I/O		37	TIM	I	Timer
18	B6	I/O		38	XT	I	Clock
19	B7	I/O		39	EXT	I	
20	VSS		Ground	40	VCC		Power supply

• TMC3493PH (XF987A00) GEW-5 (AWM & FM Tone Generator)

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

• TMC3489NL (XE755A00) SFC (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	$\overline{WR}$	I	Write control
6	SI22	I		20	$\overline{CS}$	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	Synch pulse
11	D0	I/O	Data bus	25	$\overline{IC}$	I	Initial clear
12	D1	I/O		26	TST2	O	Test output
13	D2	I/O		27	SO2	O	Serial data output
14	D3	I/O		28	SO1	O	

- **YM3032** (XG411A00)DAL3 (Digital Analog Converter Logic)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	DVDD		Power supply	13	to Buff	O	Analog output to buffer amp.
2	SYW	I	Synch 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	Analog signal output	19	LMTEM	I	Limiter enable
8	OUT3	O		20	IN1	I	Digital data input
9	OUT2	O		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

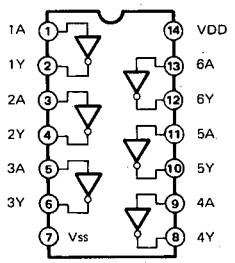
- **YM3413** (XE449A00) LDSP (Digital Signal Processor)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	VDD		DC supply (+5V)	21	A5	O	Address bus
2	D7	I/O	Data bus	22	A6	O	
3	D6	I/O		23	A7	O	
4	D5	I/O		24	A8	O	
5	D4	I/O		25	A9	O	
6	D3	I/O		26	A10	O	
7	D2	I/O		27	A11	O	
8	D1	I/O		28	A12	O	
9	D0	I/O		29	A13	O	
10	SI0	I	Serial data input	30	A14	O	
11	SI1	I		31	A15	O	
12	SYW	I	Synch pulse	32	A16	O	
13	WE	O	Write enable	33	SO0	O	Serial data output
14	OE	O	Output enable	34	XCLK	I	Clock
15	A0	O	Address bus	35	IC	I	Initial Clear
16	A1	O		36	CRS	I	CD counter reset
17	A2	O		37	CDI	I	CD input
18	A3	O		38	CDo	O	CD output
19	A4	O		39	SO1	O	Serial data output
20	Vss		Ground	40	CLK	I	Clock

■IC BLOCK DIAGRAM (IC ブロック図)

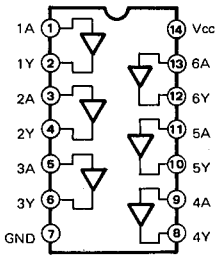
- **TC4069UBP** (IG001720)
- **TC40H004P** (IG051000)
- **TC74HC04P** (IR000400)
- **SN74HC04N** (IR000450)

Hex Inverter



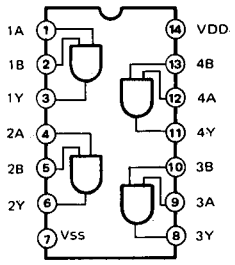
- **TC74HCT7007AP** (XH404A00)

Hex Buffer



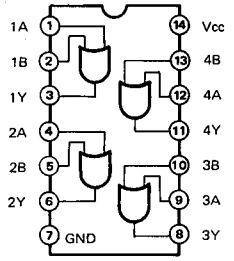
- **TC74HC08AP** (IR000800)
- **SN74HC08N** (IR000850)

Quad 2 Input AND



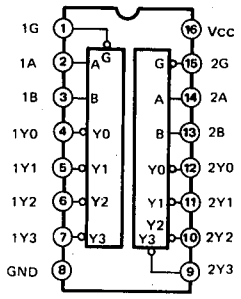
- **TC74HC32AP** (IR003200)
- **SN74HC32N** (IR003250)

Quad 2 Input OR



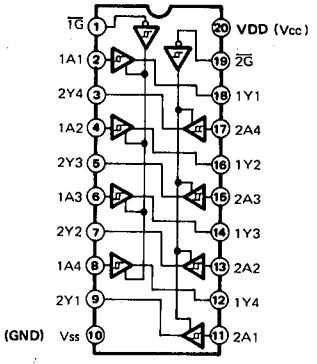
- **TC74HC139AP** (IR013900)
- **SN74HC139N** (IR013950)

Dual 2 to 4 Demultiplexer



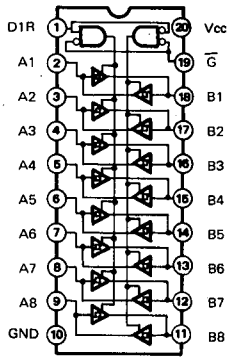
- **TC74HC244AP** (IR024400)
- **SN74HC244** (IR024450)

Octal 3-State Bus Buffer



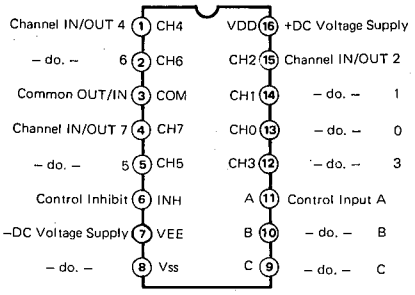
- **TC74HC245AP** (IR024500)
- **SN74HC245N** (IR024550)

Octal 3-State Bus Transceiver



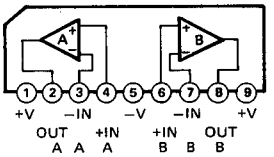
- **TC4051BP** (IG001770)

Single 8-Ch.
Multiplexer/Demultiplexer



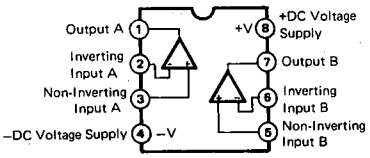
- **NJM4560S** (IG121800)

Dual Operational Amplifier



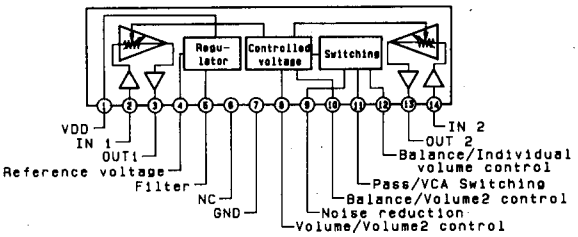
- **RC4558D-V** (IG001390)

Dual Operational Amplifier



- **M51132L** (XE470001)

VCA



■TEST PROGRAM

A. HOW TO ENTER THE TEST PROGRAM

While pressing the PAGE ◁, ▷ and VOICE buttons, turn the POWER switch on.
Use the NUMBER/MULTI PART SELECT and BANK SELECT buttons to select the appropriate test mode as follows:

NUMBER/MULTI PART SELECT 1; LED check
NUMBER/MULTI PART SELECT 2; LCD check
NUMBER/MULTI PART SELECT 3; Panel switch check
NUMBER/MULTI PART SELECT 4; AD check
NUMBER/MULTI PART SELECT 5; Card read/write check
NUMBER/MULTI PART SELECT 6; Reverb check
NUMBER/MULTI PART SELECT 7; Sound output check (left)
NUMBER/MULTI PART SELECT 8; Sound output check (right)
BANK SELECT 1; ROM check
BANK SELECT 3; RAM check
BANK SELECT 4; Initialization

B. EXIT

To exit the test program mode, press the DEMO button.

1. TEST 1: LED CHECK

Check that each LED indicator blinks once in succession and then verify that all LEDs blink together.

2. TEST 2: LCD CHECK

Check that all dots of LCD "ON and OFF" repeatedly.

3. TEST 3: SWITCH CHECK

Press the panel switches consectively from left to right of the panel. If the switch is OK, the corresponding note will sound. To exit this test, press the DEMO button.

4. TEST 4: AD CHECK

Move the following controllers and check that the value on the LCD changes from 00 to 127.
PITCH BEND, MODULATION, AFTER TOUCH, VECTOR CONTROL

5. TEST 5: CARD READ/WRITE CHECK

Insert a RAM card (MCD64) into the CARD slot with the memory protect switch turned off and execute the test.

6. TEST 6: REVERB CHECK

Check that the REVERB is properly effected. To exit the test, press the NUMBER/MULTI PART SELECT button again.

7. TEST 7: SOUND OUTPUT CHECK (LEFT)

Check that a sine wave of A3 is output from the OUTPUT L. The VOLUME control must be set at a comfortable listening level for this test.

8. TEST 8: SOUND OUTPUT CHECK (RIGHT)

Check that a sine wave of A3 is output from the OUTPUT R. The VOLUME control must be set at a comfortable listening level for this test.

9. TEST 9: ROM CHECK

Performs a read test on the ROM.

10. TEST 10: RAM CHECK

Performs the RAM check on the area of VOICE and MULTI.

11. INITIALIZATION

Memorized data will be cleared.

■テストプログラム

A．テストプログラムの起動

PAGE◁、▷とMODEのVOICEを押しながら、電源をONします。
NUMBER/MULTI PART SELECTとBANK SELECTスイッチを使用して、テストを選択します。

NUMBER/MULTI PART SELECT1; LEDチェック
NUMBER/MULTI PART SELECT2; LCDチェック
NUMBER/MULTI PART SELECT3; パネルスイッチチェック
NUMBER/MULTI PART SELECT4; ADチェック
NUMBER/MULTI PART SELECT5; CARDチェック
NUMBER/MULTI PART SELECT6; REVERBチェック
NUMBER/MULTI PART SELECT7; Lチャンネル発音チェック
NUMBER/MULTI PART SELECT8; Rチャンネル発音チェック
BANK SELECT1; ROMチェック
BANK SELECT3; RAMチェック
BANK SELECT4; 初期化

B．テストプログラムの終了

DEMOスイッチを押すとテストプログラムを終了し、通常モードに戻ります。

1．テスト1：LEDチェック

LEDが1個ずつ点灯した後、全てのLEDが点滅することを目視により確認します。

2．テスト2：LCDチェック

LCDの全ドットが点滅します。

3．テスト3：パネルスイッチチェック

パネルスイッチを押すと、次のスイッチが押されるまで、ある音程で発音を続けます。
DEMOスイッチを押すと、このテストを終了します。

4．テスト4：ADチェック

次の各操作子を動かした時、LCDにADの出力レベルが00から127の範囲で表示されることを確認します。
PITCH BEND、MODULATION、AFTER TOUCH、VECTOR CONTROL

5．テスト5：CARDチェック

RAMカード（MCD64）をカードスロットに差し込み、ライト/ベリファイテストを実行します。

6．テスト6：REVERBチェック

スイッチを押すごとに、リバーブ効果がON/OFFされます。

7．テスト7：Lチャンネル発音チェック

Lチャンネルより、A3のサイン波が出力されます。

8．テスト8：Rチャンネル発音チェック

Rチャンネルより、A3のサイン波が出力されます。

9．テスト9：ROMチェック

LCDにROMのチェックサムを表示します。

10．テスト10：RAMチェック

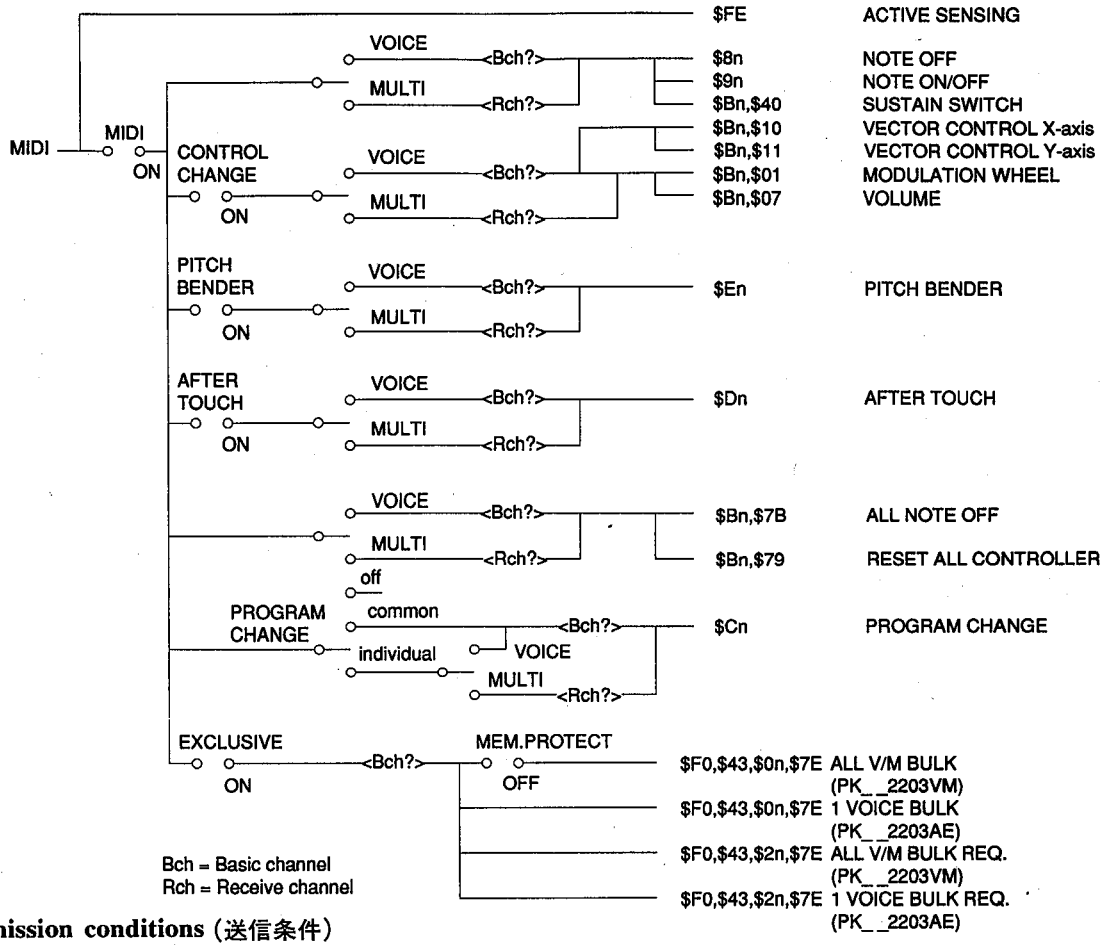
VOICE、MULTI部分のチェックサムを表示します。

11．テスト11：初期化

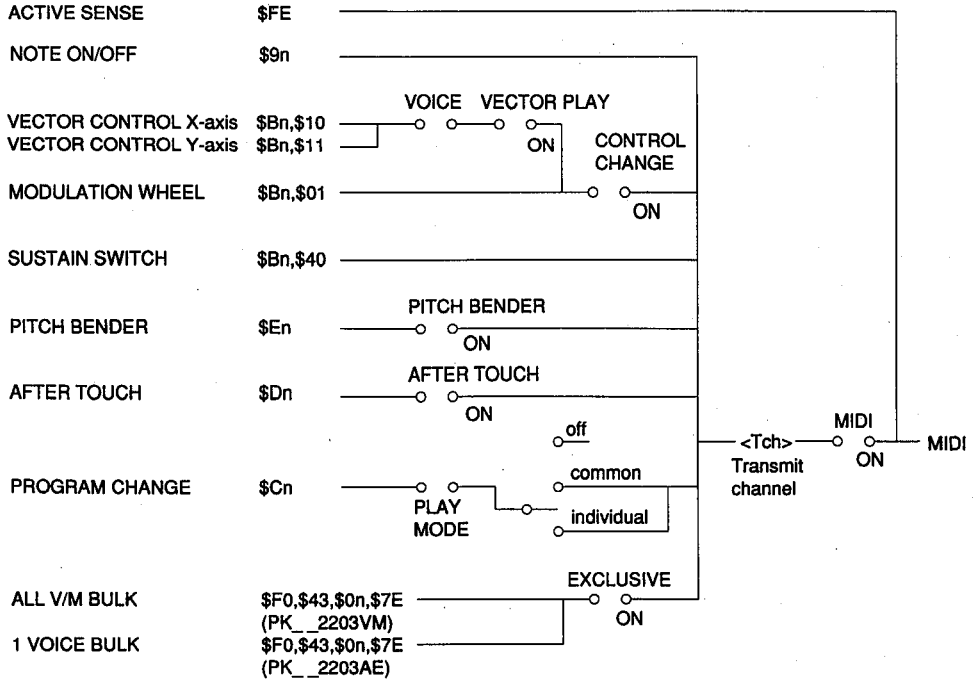
メモリーの内容が、初期化されます。

■MIDI DATA FORMAT（MIDI データフォーマット）

(1) MIDI reception conditions（受信条件）



(2) MIDI transmission conditions（送信条件）



(3) Channel Messages

3.1 Note On/Off

Transmission: (送信)
- Note range = C1($24)~C6($60)
- Velocity range = 0~$7F (0: note off)
- $9n, note, $00 for note off and $8n is not transmitted.

Reception: (受信)
- Note range = C-2($00)~G8($7F)
- Velocity range = 0~$7F

3.2 Control Change

MODULATION WHEEL and VECTOR CONTROL is possible to set transmission/reception on/off by the utility control change on/off.

(ユーティリティーのコントロールチェンジON/OFFにより，モジュレーションホイールとベクターコントロールの送受信のON/OFFを設定できる。)

Transmission: (送信)
- Output to MIDI through the transmit channel when the following controller is operated irrespective of the play, edit, etc. mode.

(プレイ，エディット等のモードにかかわらず，下記のコントローラーを操作したとき，送信チャンネルでMIDIに出力される。)

controller	code	output data range
MODULATION WHEEL	$Bn, $01, $vv	vv = 0~$7F
SUSTAIN SWITCH	$Bn, $40, $vv	off:vv=0, on:vv=$7F
VECTOR CONTROL X-axis Y-axis	 $Bn, $10, $vv $Bn, $11, $vv	 vv=0~$7F vv=0~$7F

- VECTOR CONTROL is transmitted only if the VECTOR PLAY ON/OFF switch on the panel is on.

(ベクターコントロールは，パネル上のベクタープレイON/OFFスイッチがONの時のみ送信される。)

Reception: (受信)
- The following parameters are accepted by MIDI.

(下記のパラメータをMIDIにより受付ける。)

parameter	code	Description
MODULATION WHEEL	$Bn,$01,$vv	vv=0(WHEEL:MIN)~$7F(WHEEL:MAX)
SUSTAIN SWITCH	$Bn,$40,$vv	vv=0~$3F:SUS OFF, vv=$40~$7F:SUS ON
VOLUME	$Bn,$07,$vv	
VECTOR CONTROL X-axis Y-axis	$Bn,$10,$vv $Bn,$11,$vv	Depends on the panel [VECTOR PLAY ON/OFF] and [LEVEL/DETUNE] status.

3.3 Program Change

- It is possible to set transmit/receive on/off by the utility program change on/off.

(ユーティリティーのプログラムチェンジON/OFFにて，送受信のON/OFFが設定できる。)

Transmission: (送信)
- The voice and multi Nos. and the program change Nos. correspond to each other as shown below.

(ボイスNo，マルチNoとプログラムチェンジNoは，次表のように対応する。)

		NUMBER 1	2	3	4	5	6	7	8
VOICE	BANK 1	$00	$01	$02	$03	$04	$05	$06	$07
	2	$08	$09	$0A	$0B	$0C	$0D	$0E	$0F
	3	$10	$11	$12	$13	$14	$15	$16	$17
	4	$18	$19	$1A	$1B	$1C	$1D	$1E	$1F
	5	$20	$21	$22	$23	$24	$25	$26	$27
	6	$28	$29	$2A	$2B	$2C	$2D	$2E	$2F
	7	$30	$31	$32	$33	$34	$35	$36	$37
	8	$38	$39	$3A	$3B	$3C	$3D	$3E	$3F
MULTI	1	$40	$41	$42	$43	$44	$45	$46	$47
	2	$48	$49	$4A	$4B	$4C	$4D	$4E	$4F

Reception: (受信)
- The above program change Nos. are accepted. Other Nos. are ignored.

(上記のプログラムチェンジNoを受付ける。それ以外のNoは無視する。)

3.4 Pitch Bend

- It is possible to set transmission/reception on/off by the utility pitch bend on/off.

(ユーティリティーのピッチベンドON/OFFにて，送受信のON/OFFを設定できる。)

Transmission: (送信)
- Transmitted at 7-BIT resolution.

(7ビット分解能で送信される。)

Reception: (受信)
- Operates by 7 BIT on the MSB side only. The LSB side is ignored.

(MSB側7ビットのみで動作する。LSB側は無視する。)

3.5 After Touch

- It is possible to set transmission/reception on/off by the utility after touch on/off.

(ユーティリティーのアフタータッチON/OFFにて，送受信のON/OFFを設定できる。)

Channel mode message

Reception: (受信)
- With the following codes, receive is possible in each of the voice and multi modes and the corresponding channel process is performed.
  Not accepted if OMNI ON, however.
  The NOTE OFF process is restricted to the MIDI input NOTE only.

(次のコードでは，ボイス，マルチ両モードで受信が可能であり，対応するチャンネルの処理を行う。但し，OMNI ON時には受付けない。また，NOTE OFFの処理は，MIDI入力によるNOTEのみに限られる。)

ALL NOTE OFF $Bn, $7B, $00
RESET ALL CONTROLLER $Bn, $79, $00

(4) System Common Message

- At statuses $F1~$F6, nothing is done.
  ($F1～$F6時は，何もしない。)
- At status $F7, "END OF SYSTEM EXCLUSIVE".

(5) System Realtime Message

Transmission: (送信)

- $FE is transmitted about every 270 msec.
  (約270msec毎に$FEを送信する。)

Reception: (受信

- If no signal comes from MIDI for about 300 msec or more after once receiving $FE, the MIDI receive buffer is cleared and the MIDI KEY ON is turned OFF.

(一度$FEを受信後，約300msec以上MIDIからの信号が来ない場合は，MIDI受信バッファーをクリアーし，MIDIでのKEY ONはOFFする。)

(6) System Exclusive Messages

4.1 1 VOICE BULK DUMP

Transmission: (送信)
The voice data set by input is transmitted.
(入力により設定されたボイスデータを送信する。)

Reception: (受信)
The received data is saved in the voice edit buffer.
(受信したデータは，ボイスエディットバッファーにセーブされる。)

Format: (フォーマット)

```
$F0   %11110000   Status
$43   %01000011   Yamaha
$0n   %0000nnnn   n=Receive or Transmit channel
$7E   %01111110
$06   %0nnnnnnn   BYTE Count (MSB)
$21   %0nnnnnnn   BYTE Count (LSB)
$50   %01010000   ASCII 'P      ┐
$4B   %01001011   ASCII 'K      │
$20   %00100000   ASCII '_      │
$20   %00100000   ASCII '_      │  Byte count shows this area.
$32   %00110010   ASCII '2      │
$32   %00110010   ASCII '2      │
$30   %00110000   ASCII '0      │
$33   %00110011   ASCII '3      │
$41   %01000001   ASCII 'A      │
$45   %01000101   ASCII 'E      │
$dd   %0ddddddd ┐               │
 |       |      │ 1 VOICE DATA  │
$dd   %0ddddddd ┘               ┘
$ee   %0eeeeeee   CHECK SUM
$F7   %11110111   EOX
```

4.2 ALL V/M BULK DUMP

Transmission: (送信)
All the internal voice and multi data is transmitted.
(インターナルの全てのボイス及びマルチのデータを送信する。)

Reception: (受信)
The received data is internally saved.
(受信したデータは，インターナルにセーブされる。)

Format: (フォーマット)

```
$F0   %11110000   Status
$43   %01000011   Yamaha
$0n   %0000nnnn   n=Receive or Transmit channel
$7E   %01111110
$18   %0nnnnnnn   BYTE Count (MSB)
$66   %0nnnnnnn   BYTE Count (LSB)
$50   %01010000   ASCII 'P      ┐
$4B   %01001011   ASCII 'K      │
$20   %00100000   ASCII '_      │
$20   %00100000   ASCII '_      │  Byte count shows this area.
$32   %00110010   ASCII '2      │
$32   %00110010   ASCII '2      │
$30   %00110000   ASCII '0      │
$33   %00110011   ASCII '3      │
$56   %01010110   ASCII 'V      │
$4D   %01001101   ASCII 'M      │
$dd   %0ddddddd ┐               │
 |       |      │ VOICE DATA    │
$dd   %0ddddddd ┘ (00~03)       ┘
$ee   %0eeeeeee   CHECK SUM
-----100 msec WAIT-----------------------------------------
$18   %0nnnnnnn   BYTE Count (MSB)
$5C   %0nnnnnnn   BYTE Count (LSB)
$dd   %0ddddddd ┐
 |       |      │ VOICE DATA
$dd   %0ddddddd ┘ (04~07)
$ee   %0eeeeeee   CHECK SUM
-----100 msec WAIT-----------------------------------------
Voice data is transmitted as divided per 4 timbres as shown above.
A time interval of a minimum of 100 msec is always allocated
between them.
```

(上記のように，ボイスデータを4音色ずつ分割して送信する。その間には必ず100msec以上の間隔をあける。)

```
-----100 msec WAIT-----------------------------------------
$09   %0nnnnnnn   BYTE Count (MSB)
$00   %0nnnnnnn   BYTE Count (LSB)
$dd   %0ddddddd ┐
 |       |      │ MULTI DATA
$dd   %0ddddddd ┘ (00~15)
$ee   %0eeeeeee   CHECK SUM
$F7   %11110111   EOX
```

4.3.1 VOICE BULK REQUEST

Reception: (受信)
The request signal of the above Item 4.1. However, the data transmitted by this request is the timbre No. sounded at VOICE instead of being the one set as specified in Item 4.1.

(上記4.1のリクエスト信号。ただし，このリクエストによって送信されるデータは，4.1によって設定されたものではなく，VOICE時に発音される音色Noとなる。)

Format: (フォーマット)

```
$F0   %11110000   Status
$43   %01000011   Yamaha
$2n   %0010nnnn   n=Receive channel
$7E   %01111110
$50   %01010000   ASCII 'P
$4B   %01001011   ASCII 'K
$20   %00100000   ASCII '_
$20   %00100000   ASCII '_
$32   %00110010   ASCII '2
$32   %00110010   ASCII '2
$30   %00110000   ASCII '0
$33   %00110011   ASCII '3
$41   %01000001   ASCII 'A
$45   %01000101   ASCII 'E
$F7   %11110111   EOX
```

4.4 ALL V/M BULK REQUEST

Reception: (受信)
The request signal of the above Item 4.2.
(上記4.2のリクエスト信号)

Format: (フォーマット)

```
$F0   %11110000   Status
$43   %01000011   Yamaha
$2n   %0010nnnn   n=Receive channel
$7E   %01111110
$50   %01010000   ASCII 'P
$4B   %01001011   ASCII 'K
$20   %00100000   ASCII '_
$20   %00100000   ASCII '_
$32   %00110010   ASCII '2
$32   %00110010   ASCII '2
$30   %00110000   ASCII '0
$33   %00110011   ASCII '3
$56   %01010110   ASCII 'V
$4D   %01001101   ASCII 'M
$F7   %11110111   EOX
```

YAMAHA [Digital synthesizer]
Model SY22 MIDI Implementation Chart

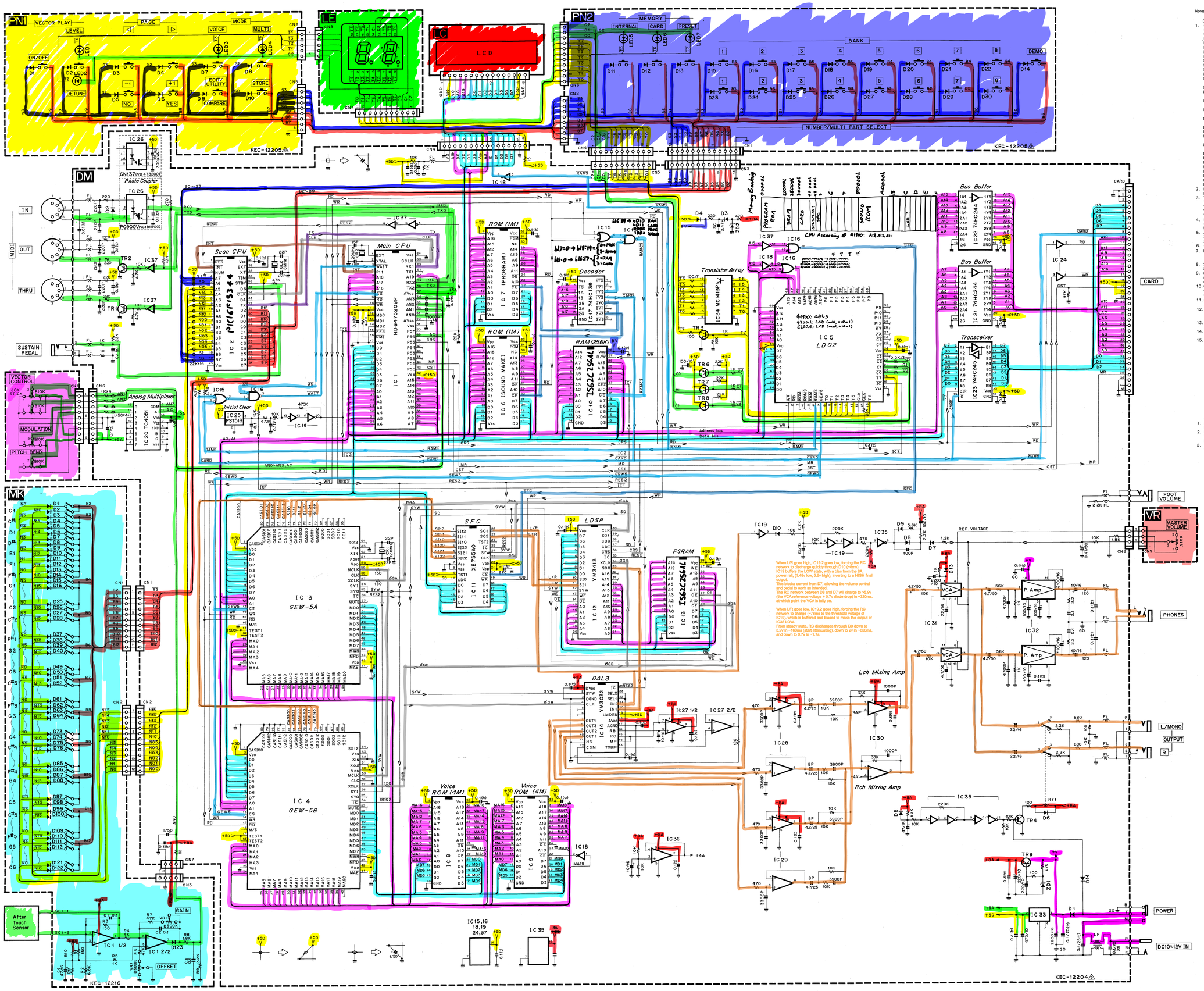
Date : 1/07 1990
Version : 1.0

Function		Transmitted	Recognized	Remarks
Basic Channel	Default	1-16	1-16	memorized
	Changed	1-16	1-16	
Mode	Default	3	1, 3	memorized
	Messages	X	X	
	Altered	**********	X	
Note Number		36-96	0 -127	
	: True voice	**********	19-114	
Velocity	Note on	O 9nH,v=1-127	O v=1-127	
	Note off	X 9nH,v=0	X	
After Touch	Key's	X	X	
	Ch's	O *3	O *3	
Pitch Bender		O *2	O 0-12 semi *2	7bit resolution
Control Change	1	O *1	O *1	Modulation wheel
	7	X *1	O *1	Volume
	16	O *1	O *1	Vector control X
	17	O *1	O *1	Vector control Y
	64	O *1	O *1	Sustain
Program Change	: True #	O 0-79	O 0-79	
		**********	0-79	
System Exclusive		O *4	O *4	
System Common	: Song Pos	X	X	
	: Song Sel	X	X	
	: Tune	X	X	
System Real Time	:Clock	X	X	
	:Commands	X	X	
Aux Mes-sages	:Local ON/OFF	X	X	
	:All Notes OFF	X	O (123)	
	:Active Sense	O	O	
	:Reset	X	X	

Notes : *1 = transmit/recive if control change sw is on.
*2 = transmit/recive if pitch bend sw is on.
*3 = transmit/recive if after touch sw is on.
*4 = transmit/recive if exclusive sw is on.

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO O : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO X : No

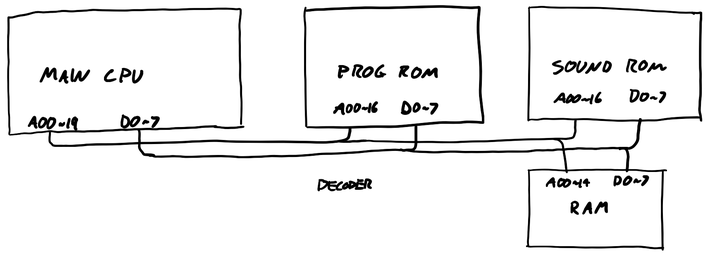
■SY22 OVERALL CIRCUIT DIAGRAM(SY22総回路図)



Notes)

1. Circuit Board: M (VJ112900) XH17080
   - IC:
     - IC 1: HD6475208P (XH261A00) MAIN CPU
     - IC 2: HD63850V0P (XH259B00) SCAN CPU
     - IC 3,4: TMC3493PH (XF987A00) GEW5
     - IC 5: LC9111A-310 (XG077A00) LD02
     - IC 6: D27C010-12 (XH520B00) ROM (SOUND MAKE)
     - IC 7: D27C010-12 (XH425B00) PROGRAM ROM
     - IC 8: HN62304BPH68 (XH251B00) VOICE ROM 1.4M
     - IC 9: HN62304BPH67 (XH252B00) VOICE ROM 2.4M
     - IC10: M5M5255BP-10LL (XH080A00) SRAM 256K
     - IC11: TMC3489NL (XE755A00) SFC
     - IC12: YM3413 (XE448A00) LDSP
     - IC13: TC51832FL-10 (XC628A00) PSRAM 256K or HM65256BLP-10 (XH116A00) PSRAM 256K
     - IC14: YM3032 (XG411A00) DAL3
     - IC15: TC74HC08AP (IR000B00) AND or SN74HC08N (IR000B50) AND
     - IC16: TC74HC32AP (IR003200) OR or SN74HC32N (IR003250) OR
     - IC17: TC74HC139AP (IR013900) DECODER or SN74HC139N (IR013950) DECODER
     - IC18: TC74HC04P (IR000400) INVERTER or SN74HC04N (IR000450) INVERTER
     - IC19,35,37: TC40H004P (IG051000) INVERTER
     - IC20: TC4051BP (IG001770) MULTIPLEXER
     - IC21,22: TC74HC244AP (IR024400) BUS BUFFER or SN74HC244 (IR024450) BUS BUFFER
     - IC23: TC74HC245AP (IR024500) BUS BUFFER or SN74HC245N (IR024550) TRANSCEIVER
     - IC24: TC74HC7007AP (XH404A00) BUFFER
     - IC25: PST518A-2 (XC722001) RESET
     - IC27-30,36: NJM4560S (IG121B00) OP AMP
     - IC31: M51132L (XE470001) VCA
     - IC32: AN7148 (XE417A00) P AMP 2.1W 2CH
     - IC33: PQ05R04V (XD179001) +5V REGULATOR
     - IC34: MC1413P (VH441500) Tr Array
     - IC35: TC4069UBP (IG001720) INVETER
2. Photo Coupler
   - IC26: 6N137 (VD473200)
3. Transistor
   - Tr 1-2: 2SC1740S R,S (IC174070)
   - Tr 3,4: 2SC2603 E,F (IC260320)
   - Tr 6-8: 2SD880 O,Y (IO088000)
   - Tr 9: 2SA881 Q (IA088110)
4. Diode
   - Di 1: 11E54 (VB481900)
   - Di 2-10,13,14: 1SS133 (IF003450)
5. Zener Diode
   - ZDi 1: MTZ9.1A 9.1V (IX804080)
   - ZDi 2: MTZ5.68 5.6V (VA007600)
6. Cera. Cap. Array: 100P 50V M (VH483900)
7. Electrolytic Cap.
   - 1000μ 10.0V (UI829100)
   - connected across pin 1 of IC31 and GND.
8. Super Capacitor
   - SC: 0.470F 5.5V (VI054900)
9. Semiconductive Ceramic Capacitor
   - marked 0.1(e): 0.1μ 16V M (FZ004100)
   - marked 0.1(e)25V: 0.1μ 25V Z (VC694800)
10. Quartz Crystal Unit
    - CR 1: 12.8M AT-49 (VI460600)
    - CR 2: 20.0M AT-49 (VI927300)
11. Ceramic Resonator
    - CL 2: 8.00M CSA8.00MT (QU008500)
12. Coil
    - FL: FL5R200QNT (VB835000) 20μ
    - LF: SU10V-20010 (VD293400) 10mH
13. Slide Switch
    - SW 1: HSW0754-01-010 (KA400990) POWER
14. Relay
    - RY 1: DC G5A-237P (VB998300)
15. Connector
    - CARD: IC3A38PS1 270 38P (VF821100) CARD connector
    - HEADPHONE, FOOT VOL: YKB21-5010 (VE382300) Phone Jack
    - L MONO: YKB21-5014 BL (VC687500) Phone Jack
    - R,SUS PEDAL: YKB21-5012 BL (VB312600) Phone Jack
    - DC 9-12V IN: X-G9242 (VH303600) Connector,DC-IN
    - MIDI IN,OUT,THRU: 3P YKF51-5049 (VI856100) DIN Jack

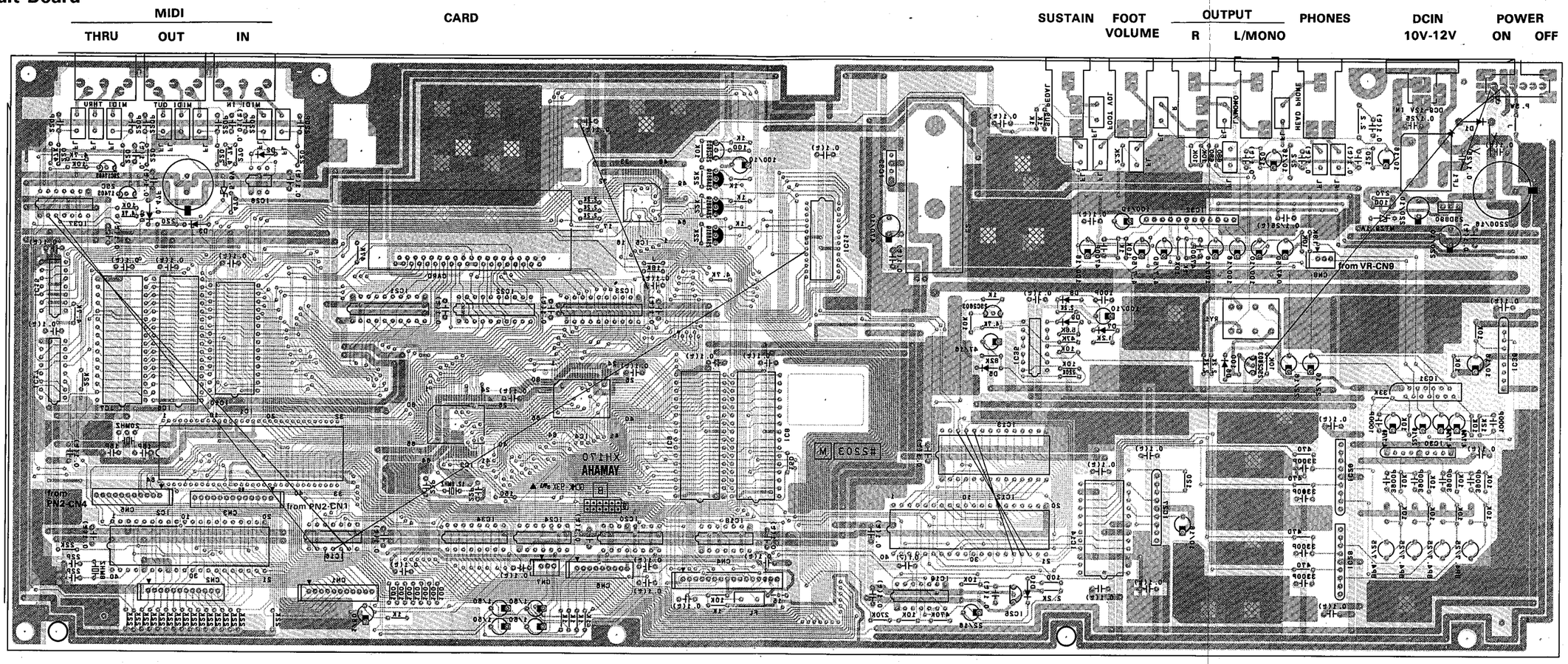
Circuit Board	PN (VI872200) XH17180
1. Diode	
Di 1-30:	1SS133 (IF003450)
2. LED Display 2	
7seg LED:	HDSP-5521 (VH630700)
LED 1-7:	SLZ18180976 RE (VI813100)
3. Slide Pot.	
M.VR:	B 10.0K EWA-NF0 (VI856200) VOLUME


MAIN CPU
A00-19
D0-7
PROG ROM
A00-16
D0-7
SOUND ROM
A00-16
D0-7
DECODER
A00-14
D0-7
RAM

SY22

■CIRCUIT BOARDS（シート基板図）

● M Circuit Board



Pattern side（パターン側）

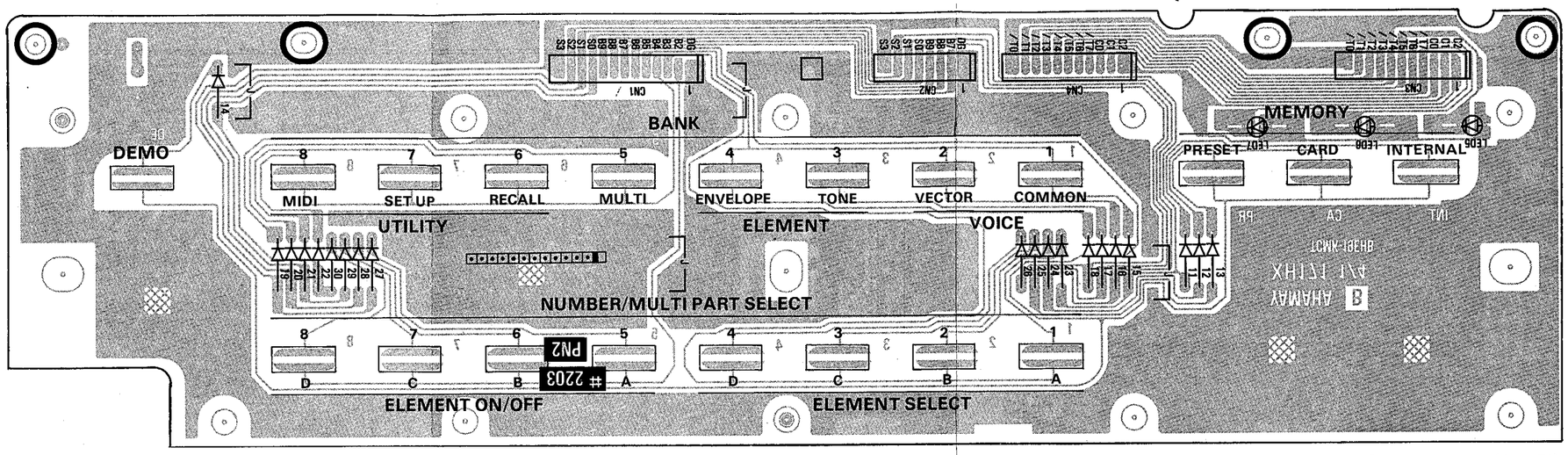
Notes)

Circuit Board: M (VJ112900) XH170B0

1. IC
   - IC 1: HD6475208P (XH261A00) MAIN CPU
   - IC 2: HD63B50V0P (XH259B00) SCAN CPU
   - IC 3,4: TMC3493PH (XF987A00) GEW5
   - IC 5: LC9111A-310 (XG077A00) LD02
   - IC 6: D27C010-12 (XH520B00) ROM (SOUND MAKE)
   - IC 7: D27C010-12 (XH425B00) PROGRAM ROM
   - IC 8: HN62304BPH66 (XH251B00) VOICE ROM 1 4M
   - IC 9: HN62304BPH67 (XH252B00) VOICE ROM 2 4M
   - IC10: M5M5255BP-10LL (XH080A00) SRAM 256K
   - IC11: TMC3489NL (XE755A00) SFC
   - IC12: YM3413 (XE449A00) LDSP
   - IC13: TC51832PL-10 (XC628A00) PSRAM 256K or HM65256BLP-10 (XH116A00) PSRAM 256K
   - IC14: YM3032 (XG411A00) DAL3
   - IC15: TC74HC08AP (IR000800) AND or SN74HC08N (IR000850) AND
   - IC16: TC74HC32AP (IR003200) OR or SN74HC32N (IR003250) OR
   - IC17: TC74HC139AP (IR013900) DECODER or SN74HC139N (IR013950) DECODER
   - IC18: TC74HC04P (IR000400) INVERTER or SN74HC04N (IR000450) INVERTER
   - IC19,35,37: TC40H004P (IG051000) INVERTER
   - IC20: TC4051BP (IG001770) MULTIPLEXER
   - IC21,22: TC74HC244AP (IR024400) BUS BUFFER or SN74HC244 (IR024450) BUS BUFFER
   - IC23: TC74HC245AP (IR024500) BUS BUFFER or SN74HC245N (IR024550) TRANSCEIVER
   - IC24: TC74HCT7007AP (XH404A00) BUFFER
   - IC25: PST518A-2 (XC722001) RESET
   - IC27-30,36: NJM4560S (IG121800) OP AMP
   - IC31: M51132L (XE470001) VCA
   - IC32: AN7148 (XE417A00) P AMP 2.1W 2CH
   - IC33: PQ05R04V (XD179001) +5V REGULATOR
   - IC34: MC1413P (VH441500) Tr.Array
   - IC35: TC4069UBP (IG001720) INVETER
2. Photo Coupler
   - IC26: 6N137 (VD473200)
3. Transistor
   - Tr 1-2: 2SC1740S R,S (IC174070)
   - Tr 3,4: 2SC2603 E,F (IC260320)
   - Tr 6-8: 2SD880 O,Y (ID088000)
   - Tr 9: 2SA881 Q (IA088110)
4. Diode
   - Di 1: 11ES4 (VB481900)
   - Di 2-10,13,14: 1SS133 (IF003450)
5. Zener Diode
   - ZDi 1: MTZ9.1A 9.1V (IX604080)
   - ZDi 2: MTZ5.6B 5.6V (VA007600)
6. Cera. Cap. Array: 100P 50V M (VH483900)
7. Electrolytic Cap.
   - 1000μ 10.0V (UI829100) connected across pin 1 of IC31 and GND.
8. Super Capacitor
   - SC: 0.470F 5.5V (VI054900)
9. Semiconductive Ceramic Capacitor
   - marked 0.1(セ): 0.1μ 16V M (FZ004100)
   - marked 0.1(セ)25V: 0.1μ 25V Z (VC694800)
10. Quartz Crystal Unit
    - CR 1: 12.8M AT-49 (VI460600)
    - CR 2: 20.0 M AT-49 (VI927300)
11. Ceramic Resonator
    - CL 2: 8.00M CSA8.00MT (QU008500)
12. Coil
    - FL: FL5R200QNT (VB835000) 20μ
    - LF: SU10V-20010 (VD293400) 10mH
13. Slide Switch
    - SW 1: HSW0754-01-010 (KA400990) POWER
14. Relay
    - RY 1: DC G5A-237P (VB996300)
15. Connector
    - CARD: IC3A38PS1.27D 38P (VF821100) CARD connector
    - HEADPHONE,FOOT VOL: YKB21-5010 (VE382300) Phone Jack
    - L/MONO: YKB21-5014 BL (VC687500) Phone Jack
    - R,SUS PEDAL: YKB21-5012 BL (VB312600) Phone Jack
    - DC 9-12V IN: X-G9242 (VH303600) Connector,DC-IN
    - MIDI IN,OUT,THRU: 3P YKF51-5049 (VI856100) DIN Jack

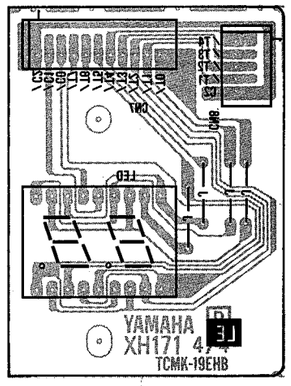
● PN Circuit Board

● PN2



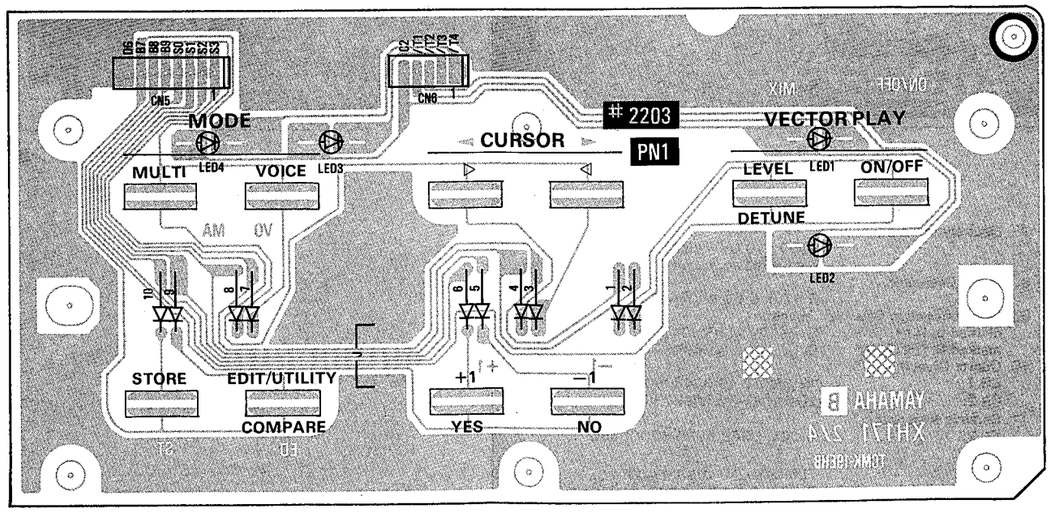
Components side (部品側)

● LE



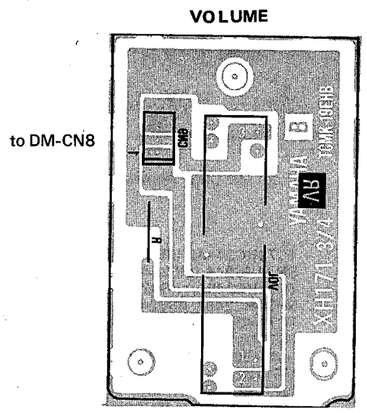
Pattern side (パターン側)

● PN1



Components side (部品側)

● VR



Pattern side (パターン側)

Notes)

	Circuit Board	PN (VI872200) XH171B0
1.	Diode Di 1-30:	 1SS133 (IF003450)
2.	LED Display 2 7seg LED: LED 1-7:	 HDSP-5521 (VH630700) SLZ181B09T6 RE (VI813100)
3.	Slide Pot. M.VR:	 B 10.0K EWA-NF0 (VI856200) VOLUME

2NA-VI87220 ⚠1

MUSIC SYNTHESIZER

SY22

PARTS LIST

Notes DESTINATION ABBREVIATIONS

J	: Japanese model	A	: Australian model
U	: U.S. model	E	: European model
C	: Canadian model	D	: West German model
X	: General model	B	: British model
M	: South African model	I	: Indonesian model
H	: North European model		

■ELECTRICAL PARTS（電気部品）

	Ref. No.	Part No.	Description		部品名	Remarks	ランク
*		VJ112900	Circuit Board	M	Mシート	SY22	
*		VI872200	Circuit Board	PN	PNシート		
*		VI912000	Circuit Board	MK	MKシート		
*		VJ112900	Circuit Board	M	Mシート		
		IG121800	IC	NJM4560S	IC	OP AMP	05
		XE417A00	IC	AN7148	IC	P AMP 2.1W 2CH	04
		XE470001	IC	M51132L	IC	VCA	05
		XD179001	IC	PQ05R04V	IC	+5V REGULATOR	03
		IG001720	IC	TC4069UBP	IC	INVERTER	03
		IG001770	IC	TC4051BP	IC	MULITIPLEXER	05
		IG051000	IC	TC40H004P	IC	INVERTER	03
		XC722001	IC	PST518A-2	IC	RESET	03
*		XH404A00	IC	TC74HCT7007AP	IC	BUFFER	01
*		XH259B00	IC	HD63B05V0P	IC	SCAN CPU	07
*		XH261A00	IC	HD6475208P	IC	CPU	17
*		XH251B00	IC	HN62304BPH66	IC	ROM 1 4M	16
*		XH252B00	IC	HN62304BPH67	IC	ROM 2 4M	16
*		XH425B00	IC	D27C010-12	IC	PROGRAM ROM	
*		XH520B00	IC	D27C010-12	IC	ROM	
		XE449A00	IC	YM3413	IC	LDSP	10
		XE755A00	IC	TMC3489NL	IC	SFC	09
		XF987A00	IC	TMC3493PH	IC	GEW5	10
		XG077A00	IC	LC9111A-310	IC	LD02	06
		XG411A00	IC	YM3032	IC	DAL3	10
		XH080A00	IC	M5M5255BP-10LL	IC	SRAM 256K	13
		XC628A00	IC	TC51832PL-10	IC	PSRAM 256K	09
		XH116A00	IC	HM65256BLP-10	IC	PSRAM 256K	09
		IR000400	IC	TC74HC04P	IC	INVERTER	03
		IR000450	IC	SN74HC04N	IC	INVETER	03
		IR000800	IC	TC74HC08AP	IC	AND	03
		IR000850	IC	SN74HC08N	IC	AND	03
		IR003200	IC	TC74HC32AP	IC	OR	03
		IR003250	IC	SN74HC32N	IC	OR	03
		IR013900	IC	TC74HC139AP	IC	DECODER	05
		IR013950	IC	SN74HC139N	IC	DECODER	05
		IR024400	IC	TC74HC244AP	IC	BUS BUFFER	07
		IR024450	IC	SN74HC244	IC	BUS BUFFER	07
		IR024500	IC	TC74HC245AP	IC	BUS BUFFER	07
		IR024550	IC	SN74HC245N	IC	TRANSCEIVER	06
		VD473200	Photo Coupler	6N137	フォトカプラ		05
		IC174070	Transistor	2SC1740S R,S	トランジスタ		03
		IC260320	Transistor	2SC2603 E,F	トランジスタ		03
		ID088000	Transistor	2SD880 O,Y	トランジスタ		03
		IA088110	Transistor	2SA881 Q	トランジスタ		01
		VH441500	Transistor Array	MC1413P	トランジスタアレイ		03
		VB481900	Diode	11ES4	ダイオード		01
		IF003450	Diode	1SS133	ダイオード		01
		VA007600	Zener Diode	MTZ5.6B 5.6V	ツェナーダイオード		01
		IX604080	Zener Diode	MTZ9.1A 9.1V	ツェナーダイオード		01
		UJ828470	Electrolytic Cap.	470μ 10.0V	ケミコン		01
		UI929100	Electrolytic Cap.	1000μ 10.0V	ケミコン		01
*		VH603700	Electrolytic Cap.	2200μ 16.0V	ケミコン		02
		FZ004100	Semiconductive Cera. Cap.	0.1μ 16V M	半導体セラコン		01
		VC694800	Semiconductive Cera. Cap.	0.1μ 25V Z	半導体セラコン		01
*		VI054900	Super Cap.	0.470F 5.5V	スーパーキャパシタ		06
		VH483900	Cera. Cap. Array	100P 50V M	セラコンアレイ		01
		VB835000	Coil	FL5R200QNT	コイル	20μ	01
		VD293400	Coil	SU10V-20010	コイル	10mH	03
		QU008500	Ceramic Resonator	8.00M CSA8.00MT	セラミック振動子		03
		VI951800	Quartz Crystal Unit	20.0M AT49	水晶振動子		
*		VI460600	Quartz Crystal Unit	12.8M AT-49	水晶振動子		03
		KA400990	Slide Switch	HSW0754-01-010	スライドスイッチ	POWER	02
		VB996300	Relay	DC G5A-237P	リレー		05
		VF821100	Connector, IC Card	IC3A-38PS-1.27D	ICカード用コネクタ	CARD (38-pins)	06
		VF020600	Heat Sink		放熱板		07
		VF456400	Card Guide		カードガイド	CARD	03
*		VI860700	Jack Assembly		ジャックAss'y		
		VB312600	Phone Jack	YKB21-5012	ホーンジャック（黒）	OUT R,SUSTAIN	02
		VC687500	Phone Jack	YKB21-5014	ホーンジャック（黒）	OUT L/MONO	01
		VE382300	Phone Jack	YKB21-5010	ホーンジャック	PHONES,FOOT VOL	01
		VH303600	DC-IN Connector	X-G9242	電源コネクタ	DC-IN	01
		VI867300	DIN Assembly		DIN Ass'y		
*		VI856100	DIN Jack	3P YKF51-5049	DINジャック	MIDI IN,OUT,THR	03
*		VI872200	Circuit Board	PN	PNシート		
		IF003450	Diode	1SS133	ダイオード		01
*		VI813100	LED	SLZ181B09T6 RE	LED		01
*		VI856200	Slide Pot.	B 10.0K EWA-NF0	スライドボリューム	VOLUME	02

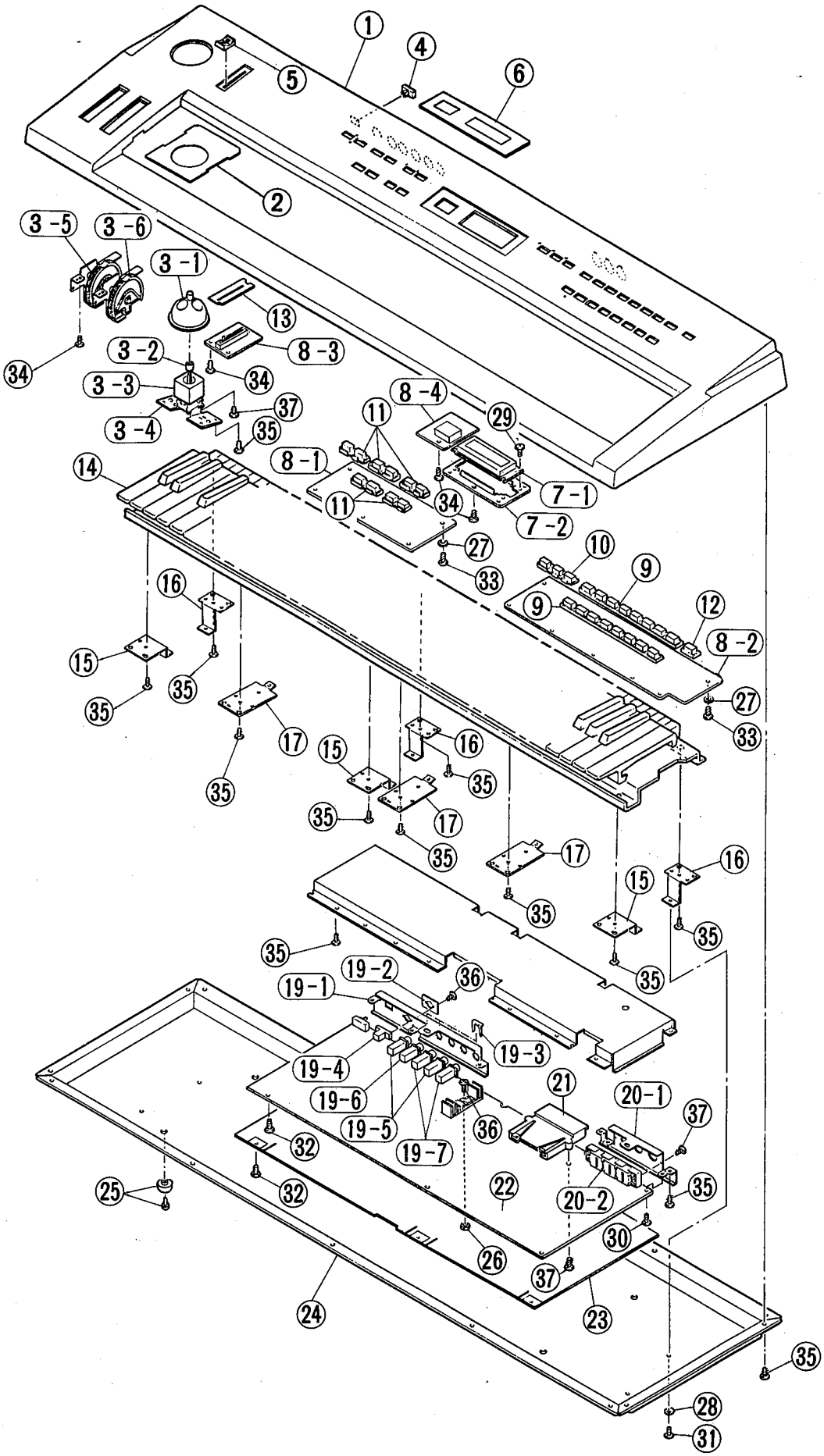
＊：New Parts（新規部品） NR

ランク：Japan Only

Ref. No.	Part No.	Description		部品名	Remarks	ランク
	VH630700	LED Display 2	HDSP-5521	ＬＥＤディスプレイ２		04
*	VI912000	Circuit Board	MK	ＭＫシート		
	IG001390	IC	RC4558D-V	ＩＣ	OP AMP	03
	IF003450	Diode	1SS133	ダイオード		01
	HT370280	Trimmer Potentiometer	B 500K 3P EVN	半固定ボリューム	After Touch adj	02
	VC694800	Semiconductive Cera. Cap.	0.1μ 25V Z	半導体セラコン		01
**	VI860800	LCD Assembly		ＬＣＤ Ａｓｓ'ｙ		
**	VI856300	LCD	LM162AT1	液晶ディスプレイ		14

＊：New Parts（新規部品）　NR　　ランク：Japan Only

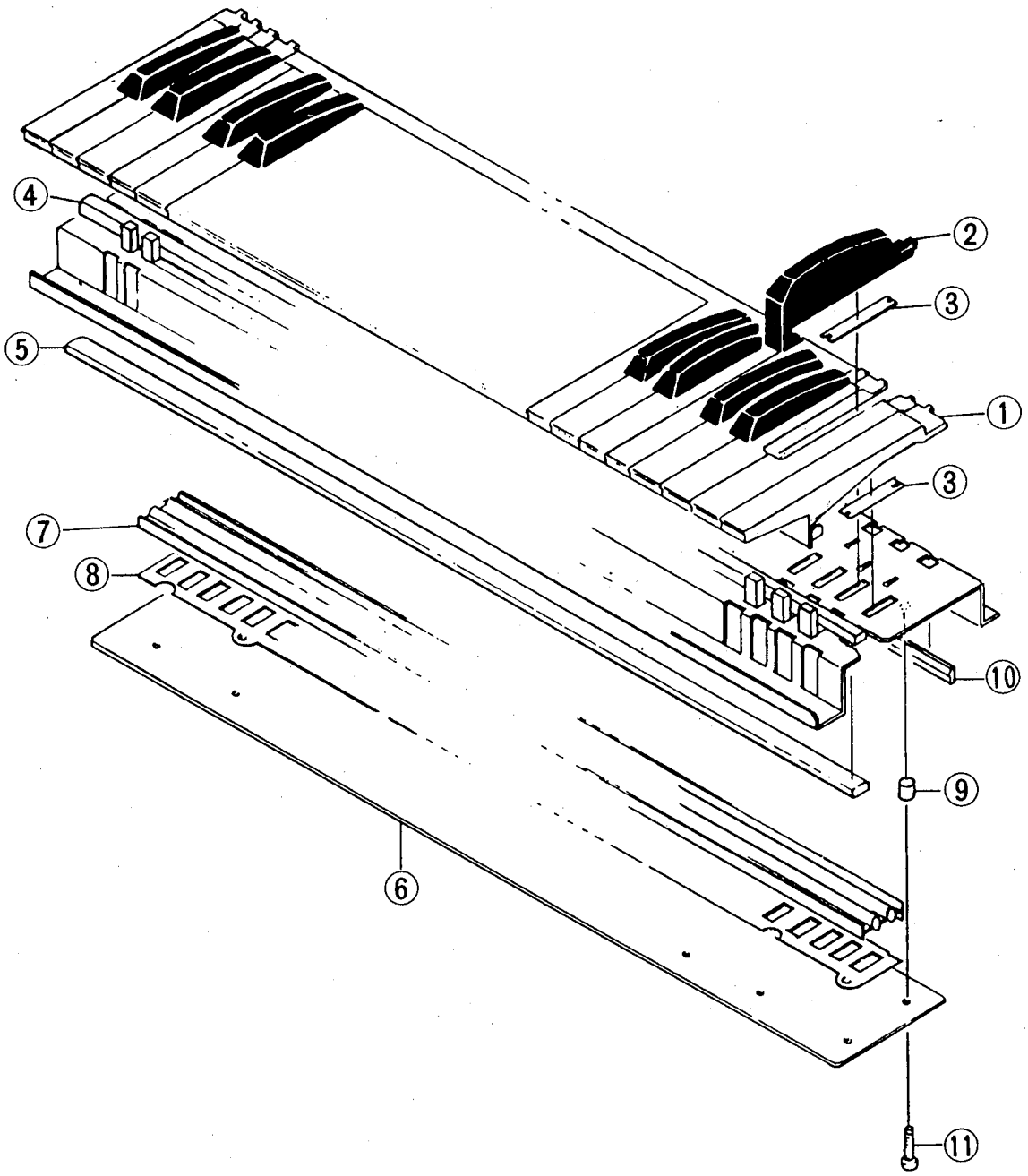
■OVERALL ASSEMBLY（総組立）



	Ref. No.	Part No.	Description		部品名	Remarks	ランク
*	1	VI860600	Upper Case		上ケース	SY22	14
*	2	VJ155100	Felt	BL 90X72X2	フェルト		01
*	3	VI860900	JOY Assembly		ＪＯＹ Ａｓｓ'ｙ		
*	3-1	VI847700	Knob, JOY		ＪＯＹツマミ	VECTOR CONTROL	02
*	3-2	VJ086000	Tube	8X8 T=1.0	チューブ		
*	3-3	VI864200	JOY Stick	RKJXB 100KB B	ジョイスティック		06
*	3-4	VI848600	Angle Bracket, JOY Stick		ＪＯＹスティック金具		03
*	3-5	VI936900	Pitch Bend Assembly		ＰＢ Ａｓｓ'ｙ	PITCH BEND	06
*	3-6	VI937000	Modulation Wheel Assembly		ＭＯ Ａｓｓ'ｙ	MODULATION	05
	4	CB825990	Knob		ツマミ	POWER	01
	5	VB774000	Knob		ツマミ	VOLUME	01
*	6	VI905800	LCD Filter		ＬＣＤ保護板		04
*	7	VI860800	LCD Assembly		ＬＣＤ Ａｓｓ'ｙ		
*	7-1	VI856300	LCD	LM162AT1	液晶ディスプレイ		14
*	7-2	VI849000	Angle Bracket, LCD		ＬＣＤ金具		02
*	8	VI872200	Circuit Board	PN	ＰＮシート		
	8-1		Circuit Board	PN1	ＰＮ１シート		
	8-2		Circuit Board	PN2	ＰＮ２シート		
	8-3		Circuit Board	VR	ＶＲシート		
	8-4		Circuit Board	LE	ＬＥシート		
*	9	VI848100	Key Top Rubber	×8	キートップラバー８連	BANK,SELECT	03
*	10	VI848200	Key Top Rubber	×3	キートップラバー３連	MEMORY	02
*	11	VI848300	Key Top Rubber	×2	キートップラバー２連	MODE,VECTOR	01
*	12	VI848400	Key Top Rubber	×1	キートップラバー単品	DEMO	01
*	13	VJ436900	Dust Proof Cloth		防塵クロス		
*	14	VI912200	Keyboard Assembly	LC C61K6	ＬＣ鍵盤Ａｓｓ'ｙ		
*	15	VI849100	Angle Bracket, MK	Front	ＭＫ金具（前）		01
*	16	VI849200	Angle Bracket, MK	Rear	ＭＫ金具（後）		01
*	17	VI848500	Angle Bracket, PCB		ＰＣＢ取り付金具		01
*	18	VI905700	Shield Box		シールドボックス		
*	19	VI860700	Jack Assembly		ジャックＡｓｓ'ｙ		
*	19-1	VI848900	Angle Bracket, Jack		ジャック取り付金具		02
*	19-2	VI334500	Seal, DC Jack		ＤＣジャックシール		
*	19-3	VI549000	Angle Bracket,U	MET41-0191	Ｕ字金具		01
	19-4	VH303600	DC-IN Connector	X-G9242	電源コネクタ	DC-IN	01
	19-5	VE382300	Phone Jack	YKB21-5010	ホーンジャック	PHONES,FOOT VOL	01
	19-6	VC687500	Phone Jack	YKB21-5014 BL	ホーンジャック（黒）	OUT L/MONO	01
	19-7	VB312600	Phone Jack	YKB21-5012 BL	ホーンジャック（黒）	OUT R,SUSTAIN	02
*	20	VI867300	DIN Assembly		ＤＩＮ Ａｓｓ'ｙ		
*	20-1	VI848800	Angle Bracket, DIN Jack		ＤＩＮ取り付金具		03
*	20-2	VI856100	DIN Jack	3P YKF51-5049	ＤＩＮジャック	MIDI IN,OUT,TH.	03
	21	VF456400	Card Guide		カードガイド	CARD	03
*	22	VJ112900	Circuit Board	M	Ｍシート		
*	23	VI861800	Shield Sheet		シールドシート		
*	24	VI848700	Bottom Case		ボトムケース		
	25	VC999400	Foot	205Y4179	ゴム足		01
	26	EV100036	Hexagonal Nut	φ3 ZMC2Y	六角ナット		01
	27	EV203036	Flat Washer	φ3 FCM3BL	平座金		01
	28	EV413046	Toothed Lock Washer	φ4 FCM3BL	歯付座金内歯形		01
*	29	ED325066	Bind Head Screw	2.5X 6 FCM3BL	バインド小ネジ		
	30	ED030066	Bind Head Screw	3.0X 6 ZMC2Y	バインド小ネジ		01
	31	ED340066	Bind Head Screw	4.0X 6 FCM3BL	バインド小ネジ		01
	32	ED040086	Bind Head Screw	4.0X 8 ZMC2Y	バインド小ネジ		01
	33	EI330066	Bind Head Tapping Screw	3.0X 6 FCM3BL	ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ		01
	34	EI030086	Bind Head Tapping Screw	3.0X 8 ZMC2Y	ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ		01
	35	EI340106	Bind Head Tapping Screw	4.0X10 FCM3BL	ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ		01
	36	EA030086	Pan Head Screw	3.0X 8 ZMC2Y	ナベ小ネジ		01
	37	EI330086	Pan Head Tapping Screw	3.0X 8 ZMC2BL	ナベタッピングネジ		01
			Accessory		付属品		
			AC Adaptor	PA-3	ＡＣアダプター	J,U,C,E	

＊：New Parts（新規部品）　NR　　ランク：Japan Only

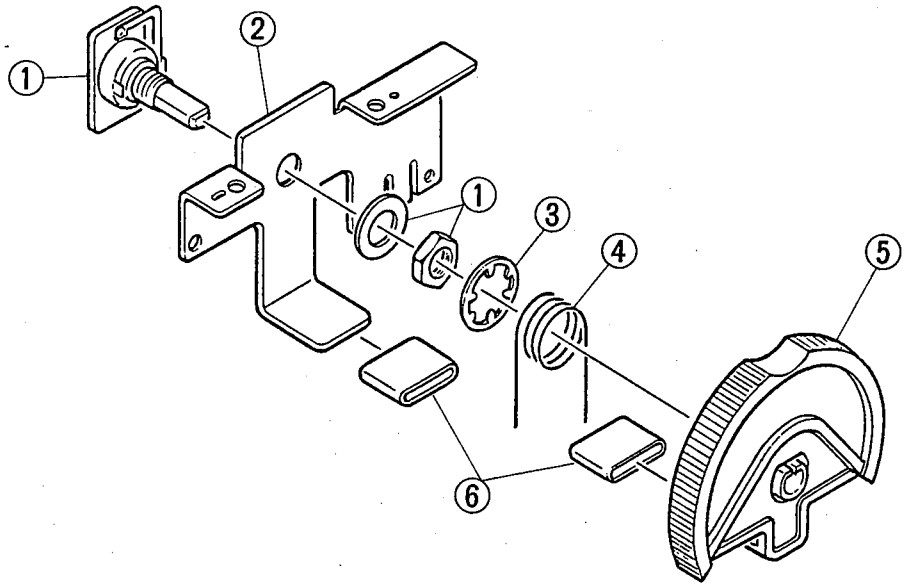
■KEYBOARD ASSEMBLY（鍵盤Ass'y）



	Ref. No.	Part No.	Description		部品名	Remarks	ランク
*		VI912200	Keyboard Assembly	LC C61K6	ＬＣ鍵盤Ａｓｓ'ｙ	SY22	
	1	VA850000	White Key	C,F	白鍵Ｃ,Ｆ		02
	1	VA850100	White Key	D	白鍵Ｄ		02
	1	VA850200	White Key	B,E	白鍵Ｂ,Ｅ		02
	1	VA850300	White Key	G	白鍵Ｇ		02
	1	VA850400	White Key	A	白鍵Ａ		02
	1	VA853800	White Key	C'	白鍵Ｃ'		02
	2	VA850500	Black Key		黒鍵		01
	3	VC077600	Spring		バネ		01
*	4	VI911900	PC Sensor	MK-LC	ＰＣセンサー		10
	5	VC078900	Felt	820×6×4 RE	フェルト（赤）		03
*	6	VI912000	Circuit Board	MK	ＭＫシート		
	7	VC077700	Rubber Contact		可動導電ゴム		08
	8	VC078600	Insulation Spacer		絶縁スペーサー		03
	9	EK003740	Spacer	4.0X 5	スペーサー		01
	10	VC079800	Stopper		ストッパー		02
	11	EI030106	Bind Head Tapping Screw	3.0X10 ZMC2Y	ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ		01

＊：New Parts（新規部品）　NR　　ランク：Japan Only

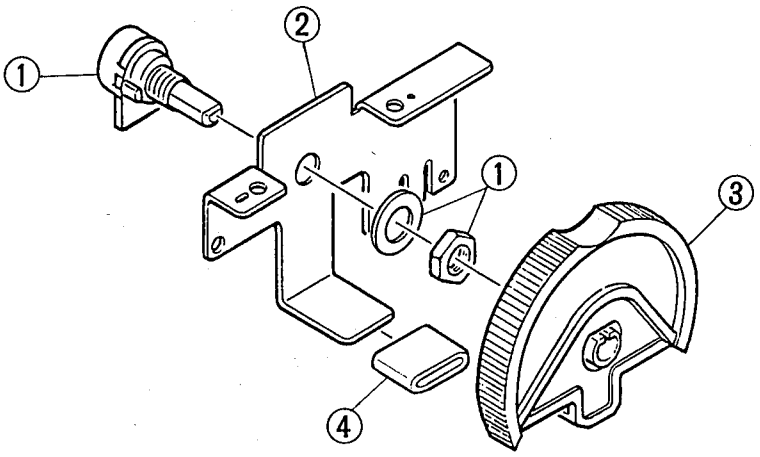
■PITCH BEND WHEEL ASSEMBLY (ピッチベンド Ass'y)



Ref. No.	Part No.	Description		部品名	Remarks	ランク
*	VI936900	Pitch Bend Assembly		PB Ass'y	PITCH BEND SY22	06
1	VC363100	Variable Resistor	B 10K	ロータリーボリューム		04
2	VF536800	Frame		フレーム		01
3	EW600110	Wheel Ring	φ 12.0	CS形止め輪		01
4	VC792800	Return Spring		リターンスプリング		01
5	VF537400	Wheel		ホイール		02
6	CB819020	Wheel Tube		ホイールチューブ		02

＊：New Parts (新規部品)　NR　　ランク：Japan Only

■MODULATION WHEEL ASSEMBLY (モジュレーションホイール Ass'y)



Ref. No.	Part No.	Description		部品名	Remarks	ランク
*	VI937000	Modulation Wheel Assembly		MO Ass'y	MODULATION SY22	05
1	HS412160	Variable Resistor	10K K161100S	ロータリーボリューム		03
2	VF536800	Frame		フレーム		01
3	VF537400	Wheel		ホイール		02
4	CB819020	Wheel Tube		ホイールチューブ		02

＊：New Parts (新規部品)　NR　　ランク：Japan Only