CONTROL SYNTHESIZER

CS2x

SERVICE MANUAL



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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 : This 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 principal-agent relationship of any form.

The data provided is belived 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 you 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.

LITHIUM BATTERY HANDLING

This product uses a lithium battery for memory back-up.

WARNING : Lithium batteries are dangerous because they can be exploded by improper handling. Observe the following precautions when handling or replacing lithium batteries.

- Leave lithium battery replacement to qualified service personnel.
- Always replace with batteries of the same type.
- When installing on the PC board by soldering, solder using the connection terminals provided on the battery cells.
- Never solder directly to the cells. Perform the soldering as quickly as possible.
- Never reverse the battery polarities when installing.
- Do not short the batteries.
- Do not attempt to recharge these batteries.
- Do not disasemble the batteries.
- Never heat batteries or throw them into fire.

ADVARSEL!
Lithiumbatteri-Eksplosionsfare ved fejlagtig handtering. Udskiftning ma kun ske med batteri af samme fabrikat og type. lever det brugte batteri tilbage til leverandren.

VARNING
Explosionsfara vid felaktigt batteribyte.
Anvand samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren.
Kassera anvant batteri enligt fabrikantens instruktion.

VAROITUS
Paristo voi rajahtaa, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Havita kaytetty paristo valmistajan ohjeiden mukaisesti.

The following information complies with Dutch official Gazette 1995. 45; ESSENTIALS OF ORDER ON THE COLLECTION OF BATTERIES.

- Please refer to the diassembly procedure for the removal of Back-up Battery.
- Leest u voor het verwijderen van de backup batterij deze beschrijving.

WARNING: CHEMICAL CONTENT NOTICE!

The solder used in the production of this product contains LEAD. In addition, other electrical/electronic and/or plastic (Where applicable) components may also contain traces of chemicals found by the California Health and Welfare Agency (and possibly other entities) to cause cancer and/or birth defects or other reproductive harm.

DO NOT PLACE SOLDER, ELECTRICAL/ELECTRONIC OR PLASTIC COMPONENTS IN YOUR MOUTH FOR ANY REASON WHAT SO EVER!

Avoid prolonged, unprotected contact between solder and your skin! When soldering, do not inhale solder fumes or expose eyes to solder/flux vapor!

If you come in contact with solder or components located inside the enclosure of this product, wash your hands before handling food.

WARNING

Components having special characteristics are marked ⚠ and must be replaced with parts having specification equal to those originally installed.

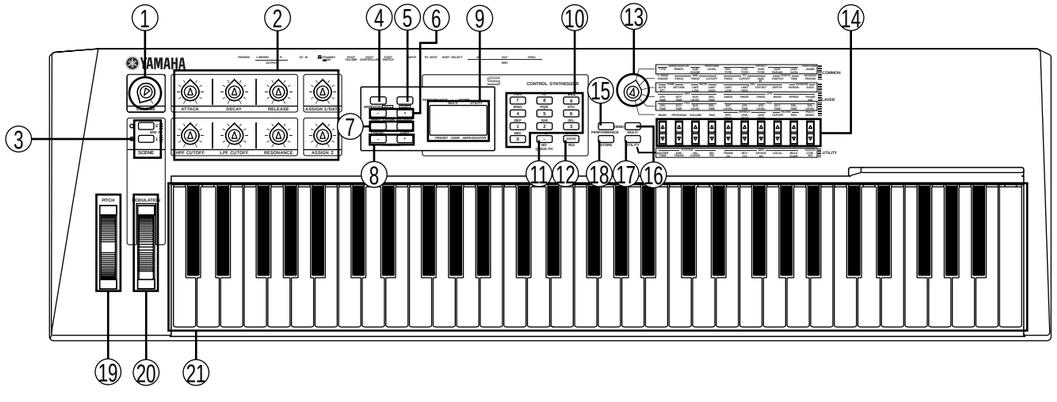
SPECIFICATIONS

KEYBOARD	61 keys with Initial Touch		
TONE GENERATOR	AWM2 (Wave ROM 16MB)		
POLYPHONY	64 notes		
MULTITIMBRE	16 (DVA)		
PERFORMANCE	256 Presets, 256 Users		
VOICE	Normal Voices	Total	779
		XG	584
		TG300B	614
	Voices For Performances		
	Drum Voices	Total	30
		XG	20
		TG300B	10
ARPEGGIATOR	40		
EFFECT	Reverb		12
	Chorus		14
	Variation		62
CONTROLS	STANDBY/ON,VOLUME, PITCH, MODULATION, Sound Control Knobs 8, SCENE 1/2, Numeric Keypad, ENTER, Mode Select (PERFORMANCE, MULTI, STORE, UTILITY), ARPEGGIATOR, SHIFT/OCTAVE, PART/LAYER +/-, PRESET, USER, PROGRAM +/-, Edit Parameter Rotary Switch, Parameter Value Up/Down buttons 10		
DISPLAY	LCD (Back Lit)		
TERMINALS	PHONES (Stereo Phone), OUTPUT (Phone): L[MONO]/R, DC IN, FOOTVOLUME, FOOT CONTROLLER, FOOTSWITCH, INPUT , TO HOST, HOST SELECT , MIDI IN/OUT/THRU		
POWER SUPPLY	AC adaptor PA-3B*		
DIMENSIONS	976(W) x 285(D) x 103(H)mm (38-3/8” x 11-1/4” x 4-1/16”)		
WEIGHT	5.7kg (12 lbs., 9 oz.)		
ACCESSORIES	Yamaha AC Adaptor PA-3B*		
	Owner’s Manual, Data List		

Specifications and descriptions are for information purposes only. Yamaha Corp. reserves the right to change or modify products or specifications at any time without prior notice.

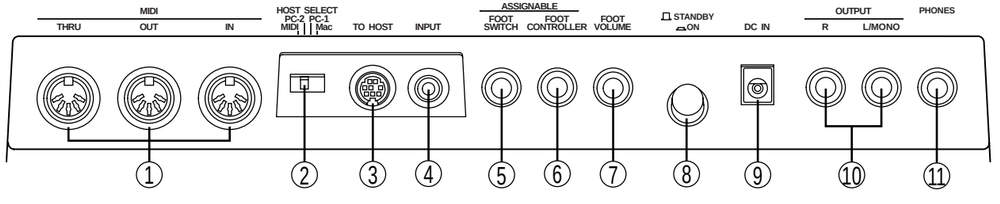
PANEL LAYOUT

• Top Panel



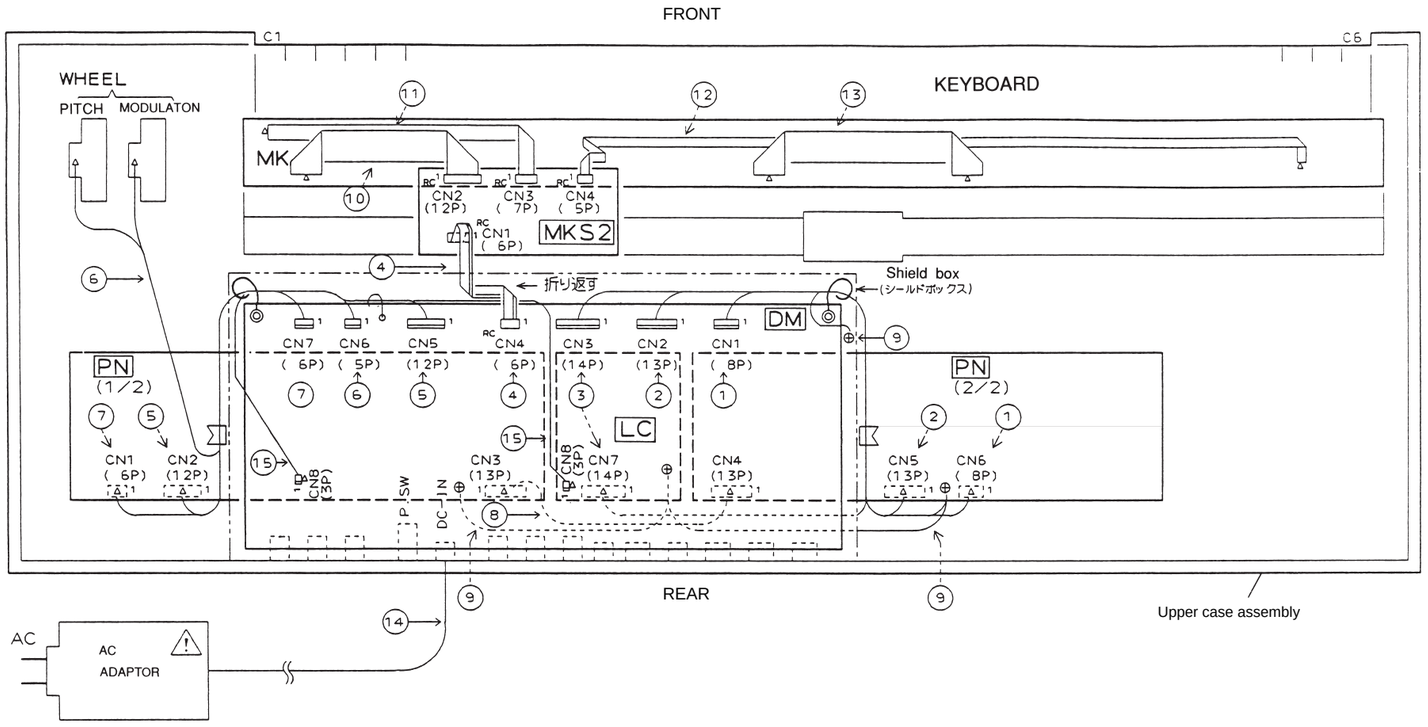
1 VOLUME knob
2 SOUND CONTROL knobs
3 [SCENE] buttons
4 [ARPEGGIO] button
5 [SHIFT] button
6 PART/LAYER/OCTAVE [-]/[+]buttons
7 [PRESET] and [USER]
Performance buttons
8 PROGRAM [-]/[+] buttons
9 LCD
10 NUMERIC KEYPAD
11 [-/NO/QUICK PC] button
12 [ENTER/YES] button
13 EDIT PARAMETER ROTARYswitch
14 Parameter Value [UP/DOWN]buttons
15 [PERFORMANCE] button
16 [MULTI] button
17 [UTILITY] button
18 [STORE] button
19 PITCH wheel
20 MODULATION wheel
21 Keyboard

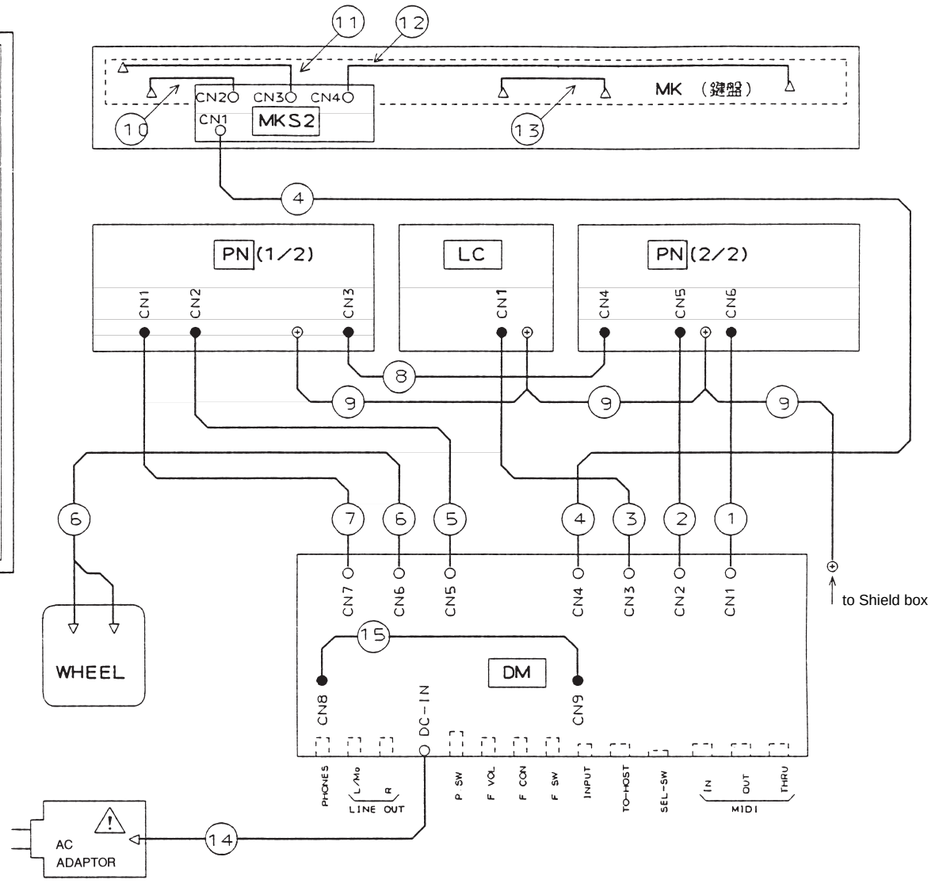
• Rear Panel



1 MIDI terminals
2 HOST SELECT switch
3 TO HOST terminal
4 INPUT jack
5 FOOT SWITCH jack
6 FOOT CONTROLLER jack
7 FOOT VOLUME jack
8 STANDBY/ON switch
9 DC IN terminal
10 OUTPUT jacks
11 PHONES jack

■ CIRCUIT BOARD LAYOUT





△ : Solder
● : Board-in
○ : Connector
○ : Screw

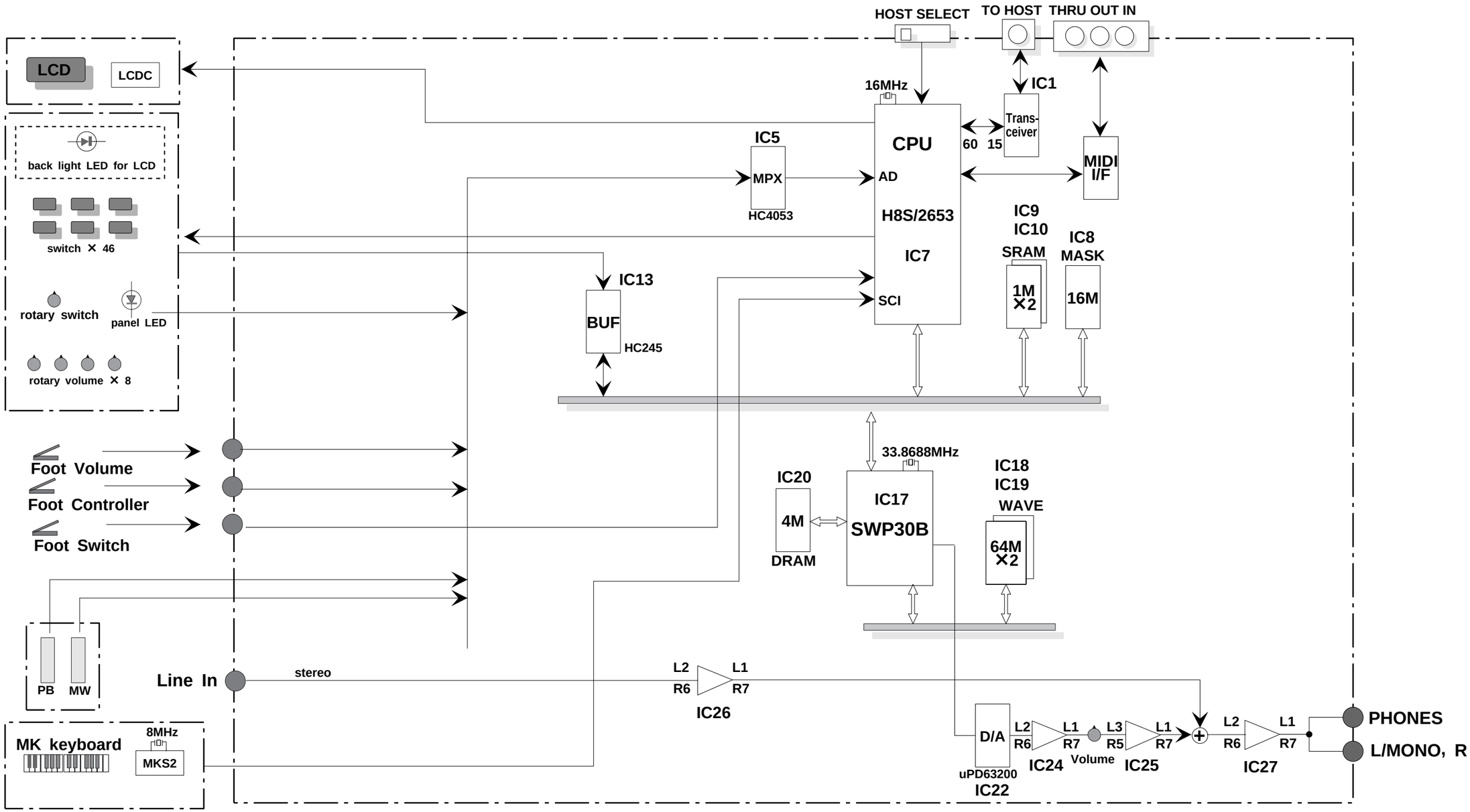
LOCATION	CONNECTOR ASSEMBLY	REMARK	PART OF
①	DS-KR	8P/250L	PN
②	DS-KR	13P/300L	PN
③	DS-KR	14P/450L	LC
④	RIBBON CABLE	6P/110L	-
⑤	DS-KR	12P/300L	PN
⑥	WHEEL	5P/400L	WHEEL
⑦	DS-KR	6P/250L	PN
⑧	DS-DS	13P/160L	PN
⑨	GND	1P/500L	-
⑩	RIBBON CABLE	12P/190L	KEYBOARD
⑪	RIBBON CABLE	7P/250L	KEYBOARD
⑫	RIBBON CABLE	5P/615L	KEYBOARD
⑬	RIBBON CABLE	12P/215L	KEYBOARD
⑭	AC ADAPTOR	-	-
⑮	DM-DM	3P/350L	DM

■ WARNING

Components having special characteristics are marked ⚠ and must be replaced with parts having specification equal to those originally installed.

2NC-VU63910-0020 △4
8811296 △3

■ BLOCK DIAGRAM



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■ DISASSEMBLY PROCEDURE

1. Bottom Assembly

1-1 Remove the thirty-three (33) screws marked [165]. The bottom assembly can then be removed. (Fig. 1)

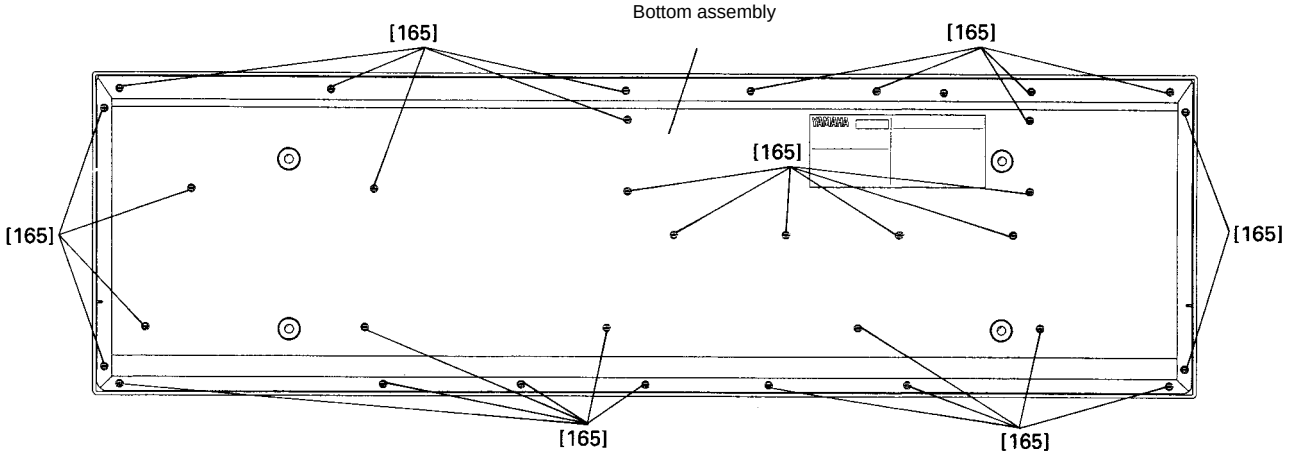


Fig.1

[165]: Bonding Tapping Screw-B 4.0X10 MFZN2BL (VJ254100)

2. DM Circuit Board

2-1 Remove the bottom assembly (See Procedure 1.)

2-2 Remove the two (2) screws marked [80], and the screw marked [100A]. The DM circuit board with the shield box can then be removed. (Fig. 2)

2-3 Remove the seven (7) screws marked [100] and the four (4) screws marked [110B]. The DM circuit board can then be removed from the shield box. (Fig. 3)

2-4 Pull off the power switch knob from the DM circuit board.

❇ *The lithium battery is not a part of the DM circuit board. When you replace the DM circuit board, you should remove the lithium battery from the board, and put it back into the holder on the new circuit board. (Fig. 4)*

❇ *You can remove the lithium battery by pushing the hook of the battery holder. (Fig. 4)*

3. Keyboard Assembly

3-1 Remove the bottom assembly. (See Procedure 1.)

3-2 Remove the DM circuit board with the shield box. (See Procedure 2-2.)

3-3 Remove the four (4) screws marked [60A]. The keyboard assembly and the two (2) MKR angles can then be removed. (Fig. 2)

3-4 Removed the ten (10) screws marked [40]. The keyboard assembly can then be removed from the five (5) MKF angles. (Fig. 2)

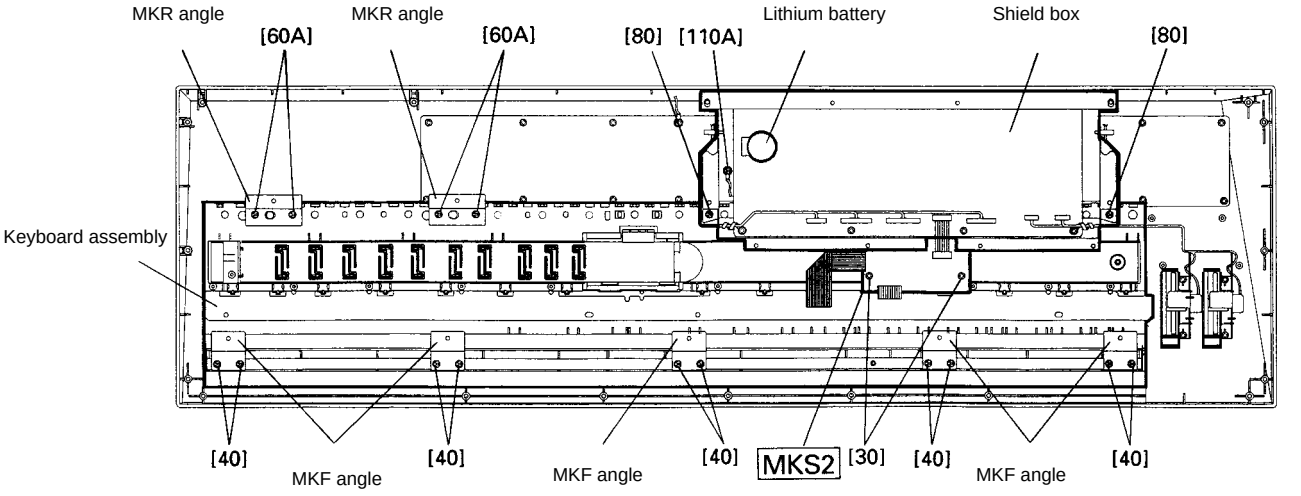
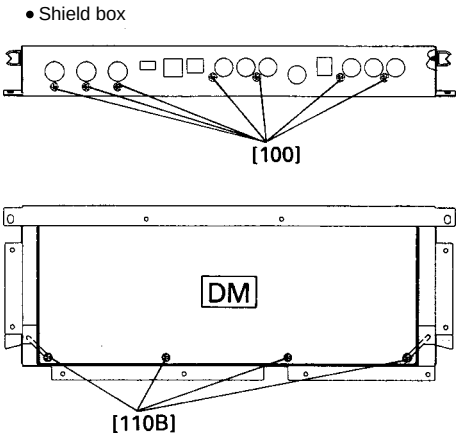


Fig.2

[30]: Bind Head Tapping Screw-P 3.0X8 MFZN2BL (EP630220)
[40]: Bind Head Tapping Screw-B 3.0X8 MFZN2BL (EP600190)
[60A]: Bind Head Tapping Screw-B 3.0X20 MFZN2BL (VJ999700)
[80]: Bind Head Tapping Screw-B 3.0X20 MFZN2BL (VJ999700)
[110A]:Bind Head Tapping Screw-B 3.0X8 MFZN2BL (EP600190)



[100]: Bonding Tapping Screw-B 3.0X10 MFZN2BL (VQ049800)
[110B]: Bind Head Tapping Screw-B 3.0X6 MFZN2BL (EP600190)

Fig.3

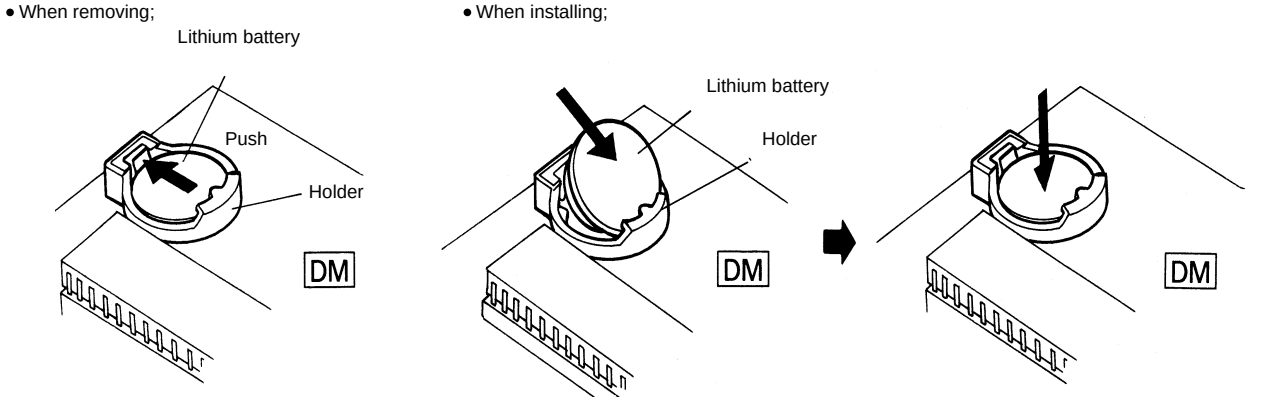


Fig.4

4. PN1/2 & PN2/2 Circuit Boards

4-1 Remove the bottom assembly. (See Procedure 1.)

4-2 Remove the DM circuit board with the shield box. (See Procedure 2-2.)

4-3 Pull off the ten (10) knobs.

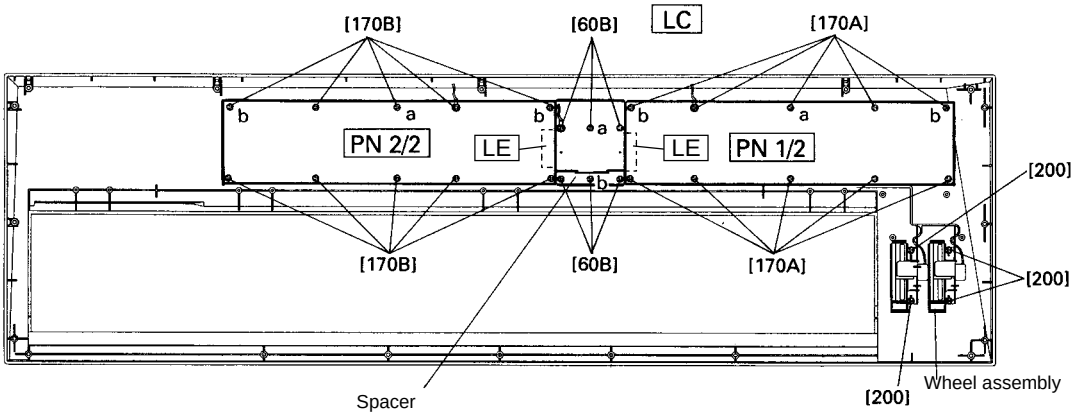
4-4 Remove the ten (10) screws marked [170A]. The PN 1/2 circuit board can then be removed. (Fig. 5)

✻ *The LE 1/2 circuit board is mounted on the PN 1/2 circuit board.*

4-5 Remove the ten (10) screws marked [170B]. The PN 2/2 circuit board can then be removed. (Fig. 5)

✻ *The LE 2/2 circuit board is mounted on the PN 2/2 circuit board.*

4-6 When you re-install the PN 1/2 and PN 2/2 circuit boards, you should tighten the screws marked [170A] and [170B] in the order of a, b.



[60B]: Bind Head Tapping Screw-P 3.0X8 MFZN2Y (EP630280)
[170A]: Bind Head Tapping Screw-P 3.0X8 MFZN2Y (EP630280)
[170B]: Bind Head Tapping Screw-P 3.0X8 MFZN2Y (EP630280)
[200]: Bind Head Tapping Screw-P 3.0X8 MFZN2Y (EP630280)

Fig.5

5. LC Circuit Board & LCD

5-1 Remove the bottom assembly. (See Procedure 1.)

5-2 Remove the DM circuit board with the shield box. (See Procedure 2-2.)

5-3 Remove the PN 1/2 or PN 2/2 circuit board. (See Procedure 4.)

5-4 Remove the six (6) screws marked [60B]. The spacer and the LC circuit board can then be removed. (Fig. 5)

✻ *When you re-install the LC circuit board, you should tighten the screws marked [60B] in the oeder of a, b shown in the figure. (Fig. 5)*

5-5 After the LC circuit board has been removed, the reflection sheet can then be removed. After that, remove both the back-lit lens with the rubber connectors and the LCD.

5-6 While pushing the hooks marked [A], take the LCD out of the back-lit lens. (Fig. 6)

✻ *When you re-install the LCD, put the projection side at the slit of the rib of the upper case.*

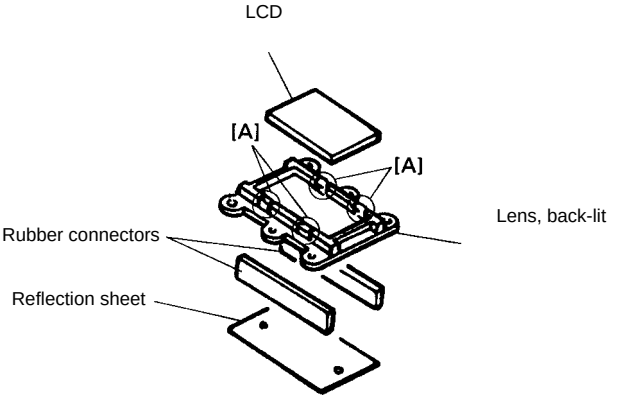


Fig.6

6. Wheel Assembly

6-1 Remove the bottom assembly. (See Procedure 1.)

6-2 Remove the four (4) screws marked [200]. The wheel assembly can then be removed. (Fig. 5)

7. Disassembling the Keyboard Assembly

7-1 Remove the bottom assembly. (See Procedure 1.)

7-2 Remove the DM circuit board with the shield box. (See Procedure 2-2.)

7-3 Remove the keyboard assembly. (See Procedure 3.)

7-4 Remove the two (2) screws marked [30]. The MKS2 circuit board can then be removed. (Fig. 2)

7-5 Remove the MK circuit board while pressing the fifteen (15) hooks inward, and then remove the rubber contact. (Fig. 7)

7-6 Remove the twenty-one (21) screws marked [140], then remove the black keys from the lower notes. Afterwards, remove the white keys DFA and C' and then remove the white keys CEGB from the higher notes. At this time, lift the keys from the front and slide them towards you. The keys can then be removed from the assembly (Fig.8)

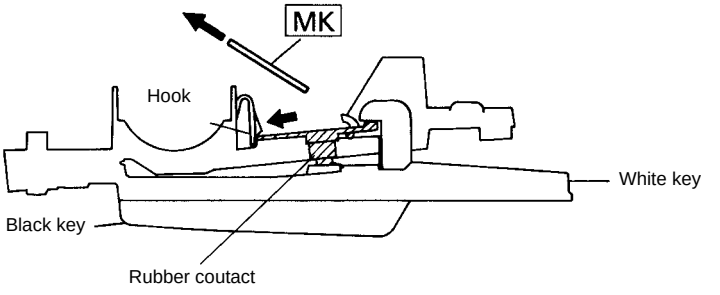
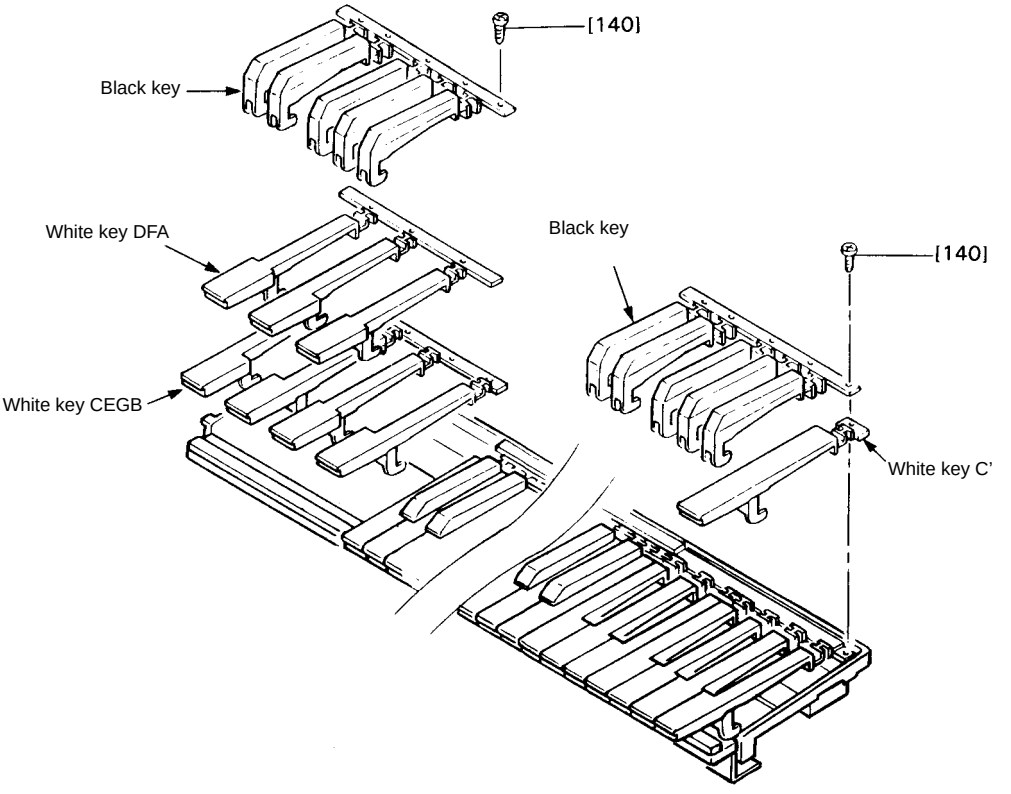


Fig.7



[140]: Bind Head Tapping Screw-P 3.0X16 MFZN2BL (VB205200)

Fig.8

8. Assembling of Keyboard Assembly

8-1 Install the white keys CEGB in the lower notes, then install the DFA and C' keys. Afterwards, install the black keys in the higher notes, and tighten the twenty-one (21) screws marked [140]. (Fig. 8)

8-2 Install the rubber contacts in the assembly while pressing the keys as shown in Figure 9.
Check that the rubber contact has been firmly placed into position in the area indicated by the arrow in Figure 10.
When fitting the rubber contacts, raise both ends of the frame so that the keys do not push the rubber contact up.
Install the MK circuit board in the assembly so that the hooks hold it as shown in Figure 11.
(Fig. 9, Fig.10, Fig. 11)

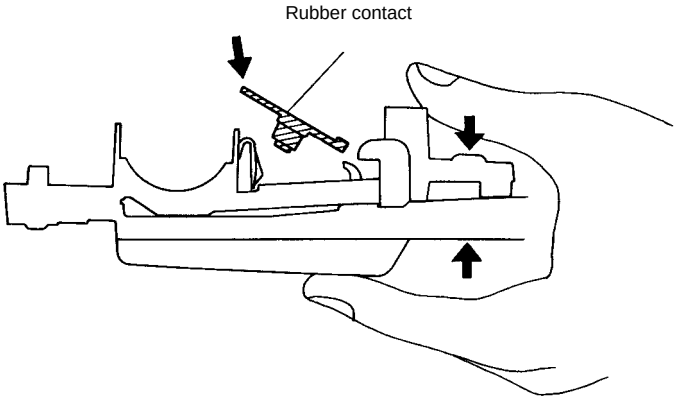


Fig.9

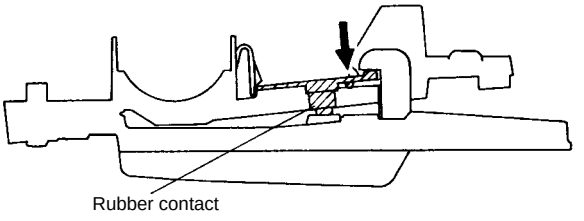


Fig.10

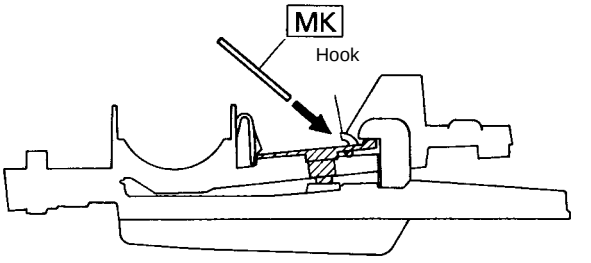


Fig.11

■ LSI PIN DESCRIPTION

● HD6432655A00F (XT443A00) CPU

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	CS1	O	Chip Select for System RAM (CS1)	65	Vss	-	GND
2	CS0	O	Chip Select for System RAM (CS0)	66	P60	O	NC
3	Vss	-		67	Vss	-	GND
4	Vss	-	GND	68	Vss	-	GND
5	Vcc	-	Power Supply	69	P61	O	NC
6	A0	O		70	P62	O	PB Select (SW1)
7	A1	O		71	P63	O	PB Select (SW2)
8	A2	O	Address Bus	72	P27	O	NC
9	A3	O		73	P26	O	1 MHz Clock for Serial Interface
10	Vss	-	GND	74	P25	O	LCD Contrast (LCDC-C)
11	A4	O		75	P24	O	LCD Contrast (LCDC-B)
12	A5	O		76	P23	O	LCD Contrast (LCDC-A)
13	A6	O		77	P22	O	LCD Control (LCD-E)
14	A7	O		78	P21	O	LCD Control (LCD-R/W)
15	A8	O	Address Bus	79	P20	O	LCD Control (LCD-RS)
16	A9	O		80	WDT0VF	O	NC
17	A10	O		81	RES	I	Reset Signal
18	A11	O		82	NMI	I	not used
19	Vss	-	GND	83	STBV	I	not used
20	A12	O		84	Vcc	-	Power Supply
21	A13	O		85	XTAL		Quartz Cristal 16MHz
22	A14	O		86	EXTAL		Quartz Cristal 16MHz
23	A15	O		87	Vss	-	GND
24	A16	O	Address Bus	88	ϕ	NC	
25	A17	O		89	Vcc	-	Power Supply
26	A18	O		90	AS	O	NC
27	A19	O		91	RD	O	Read Signal
28	Vss	-	GND	92	HWR	O	Write Signal
29	A20	O	Address Bus	93	LWR	O	NC
30	PA5	I	Off Line Detection	94	PF2	O	PB Select (SW4)
31	PA6	O	Signal for Rotary encoder(REB)	95	PF1	O	SW Data Read Control (SWD)
32	PA7	O	Signal for Rotary encoder(REA)	96	PF0	O	LED,SW Strobe Data Latch (SWS)
33	P67	I	Plug Detection of A/D Input	97	TXD2	O	Serial Output for PB (TXD2)
34	P66	O	NC	98	RXD2	I	Serial Input for PB (RXD2)
35	Vss	-	GND	99	Vss	-	GND
36	Vss	-	GND	100	Vss	-	GND
37	P65	O	Reset Signal for SWP30	101	SCK2		OSerial Sync Clock for PB (MIDCLK)
38	P64	O	Reset Signal for PB	102	P53	O	Reset Signal for Rotary Encoder
39	Vcc	-	Power Supply	103	AVcc	I	Power Supply for A/D
40	D0	I/O		104	Vref	I	Reference Voltage for A/D
41	D1	I/O		105	AN0	I	Analog Level Input R
42	D2	I/O	Two Way Data Bus	106	AN1	I	not used
43	D3	I/O		107	AN2	I	Analog Level Output L
44	Vss	-	GND	108	AN3	I	not used
45	D4	I/O		109	AN4	I	Detection of Host SW Position
46	D5	I/O		110	AN5	I	not used
47	D6	I/O		111	AN6	I	Battery Voltage Check
48	D7	I/O		112	AN7	I	ModelCheck (MU100:GND)
49	D8	I/O	Two Way Data Bus	113	AVss	-	GND
50	D9	I/O		114	Vss	-	GND
51	D10	I/O		115	P17	I/O	LCD Data(DB7),SW Data,LED6
52	D11	I/O		116	P16	I/O	LCD Data(DB6),SW Strobe Data
53	Vss	-	GND	117	P15	I/O	LCD Data(DB5),SW Strobe Data
54	D12	I/O		118	P14	I/O	LCD Data(DB4),SW Data,LED5
55	D13	I/O		119	P13	I/O	LCD Data(DB3),SW Data,LED4
56	D14	I/O	Two Way Data Bus	120	P12	I/O	LCD Data(DB2),SW Data,LED3
57	D15	I/O		121	P11	I/O	LCD Data(DB1),SW Data,LED2
58	Vcc	-	Power Supply	122	P10	I/O	LCD Data(DB0),SW Data,LED1
59	TXD0	O	Serial MIDI OUT (TXD0)	123	MD0	I	GND
60	TXD1	O	Serial Host OUT (TXD1)	124	MD1	I	GND
61	RXD0	I	Serial MIDI IN B (RXD0)	125	MD2	I	+5D
62	RXD1	I	Serial MIDI IN A (RXD1) or Host IN	126	PG0	O	PB Select (SW3)
63	P34	O	A/D Gain Control Signal(ADG1)	127	CS3	O	NC
64	P35	O	A/D Gain Control Signal(ADG2)	128	CS2	O	Chip Select for SWP30 (CS2)

● μPD63200GS-E1 (XP867A00) DAC (Digital to Analog Converter)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	4/8FS	I	4/8 Fs selection	9	R. REF		Channel R voltage reference
2	D. GND	D	igital ground	10	L. REF		Channel L voltage reference
3	16/8 BIT	I	16 bit/8 bit selection	11	L. OUT	O	Channel L output
4	D. VDD		Digital power supply	12	A. GND		Analog ground
5	A. GND		Analog ground	13	LRCX/WD	I	Left/right check, Word clock
6	R. OUT	O	Channel R output	14	LR/RSI	I	Left/right selection, Channel R series input
7	A. VDD		Analog power supply	15	SI/LSI	I	Series input/Channel L series input
8	A. VDD			16	CLK	I	Clock

● HD63B05V0F073P (XR951A00) CPU

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	/RES	I	Reset	21	C7	I/O	
2	/INT	I	Interrupt request	22	C6	I/O	
3	NUM	I	Non-maskable interrupt	23	C5	I/O	
4	A7	I/O		24	C4	I/O	Port C
5	A6	I/O		25	C3	I/O	
6	A5	I/O		26	C2	I/O	
7	A4	I/O	Port A	27	C1	I/O	
8	A3	I/O		28	C0	I/O	
9	A2	I/O		29	D0	I/O	
10	A1	I/O		30	D1	I/O	Port D
11	A0	I/O		31	D2	I/O	
12	B0	I/O		32	D3/TX	O	(Serial data output)
13	B1	I/O		33	D4/RX	I	(Serial data input)
14	B2	I/O		34	D5//CK	O	(Clock for serial operation)
15	B3	I/O	Port B	35	D6//INT2		(Interrupt request 2)
16	B4	I/O		36	/STBY	I	(Standby mode signal)
17	B5	I/O		37	TIMER	I	Timer
18	B6	I/O		38	XTAL	O	Clock
19	B7	I/O		39	EXTAL	I	
20	VSS		Ground	40	VCC		Power supply

● LC7985ND (XN859A00) LCD Controller & Driver

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	OS22	O		41	DB2	I/O	
2	OS21	O		42	DB3	I/O	
3	OS20	O		43	DB4	I/O	
4	OS19	O		44	DB5	I/O	Data Bus
5	OS18	O		45	DB6	I/O	
6	OS17	O		46	DB7	I/O	
7	OS16	O		47	OC1	O	
8	OS15	O		48	OC2	O	
9	OS14	O		49	OC3	O	
10	OS13	O		50	OC4	O	
11	OS12	O		51	OC5	O	
12	OS11	O	Segment Signal	52	OC6	O	
13	OS10	O		53	OC7	O	
14	OS9	O		54	OC8	O	
15	OS8	O		55	OC9	O	
16	OS7	O		56	OC10	O	
17	OS6	O		57	OC11	O	
18	OS5	O		58	OC12	O	
19	OS4	O		59	OC13	O	
20	OS3	O		60	OC14	O	
21	OS2	O		61	OC15	O	
22	OS1	O		62	OC16	O	
23	VSS		GND	63	OS40	O	
24	OSC1		Oscillator	64	OS39	O	
25	OSC0		Oscillator	65	OS38	O	
26	V1			66	OS37	O	
27	V2			67	OS36	O	
28	V3		Display Drive Power Supply	68	OS35	O	
29	V4			69	OS34	O	
30	V5			70	OS33	O	
31	LOAD	O	Clock for Sirial Data Latch	71	OS32	O	Segment Signal
32	CP	O	Clock for Sirial Data shift	72	OS31	O	
33	VDD		Power supply +5V	73	OS30	O	
34	M	O	Select Sibnal	74	OS29	O	
35	D	O	Common Signal	75	OS28	O	
36	RS	I	Register Select Signal	76	OS27	O	
37	R/W	I	Read Write Select Signal	77	OS26	O	
38	E	I	Setup Start trigger	78	OS25	O	
39	DB0	I/O	Data Bus	79	OS24	O	
40	DB1	I/O		80	OS23	O	

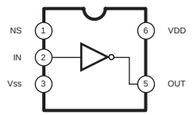
● **TC203C760HF-002** (XS725A00) **SWP30B** (AWM Tone Generator coped with MEG) Standard Wave Processor

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	Vss		(Ground)	121	VSS		(Ground)
2	CA0	I		122	HMD0	I/O	
3	CA1	I		123	HMD1	I/O	
4	CA2	I		124	HMD2	I/O	
5	CA3	I		125	HMD3	I/O	
6	CA4	I		126	HMD4	I/O	
7	CA5	I	Address bus of internal register	127	HMD5	I/O	
8	CA6	I		128	HMD6	I/O	Wave memory data bus (Upper 16 bits)
9	CA7	I		129	HMD7	I/O	
10	CA8	I		130	HMD8	I/O	
11	CA9	I		131	HMD9	I/O	
12	CA10	I		132	HMD10	I/O	
13	CA11	I		133	HMD11	I/O	
14	VSS		(Ground)	134	HMD12	I/O	
15	CD0	I/O		135	HMD13	I/O	
16	CD1	I/O		136	HMD14	I/O	
17	CD2	I/O		137	HMD15	I/O	
18	CD3	I/O		138	VSS		(Ground)
19	CD4	I/O		139	HMA0	O	
20	CD5	I/O		140	HMA1	O	
21	CD6	I/O		141	HMA2	O	
22	CD7	I/O		142	HMA3	O	
23	CD8	I/O	Data bus of internal register	143	HMA4	O	
24	CD9	I/O		144	HMA5	O	
25	CD10	I/O		145	HMA6	O	
26	CD11	I/O		146	HMA7	O	
27	CD12	I/O		147	HMA8	O	
28	CD13	I/O		148	HMA9	O	
29	CD14	I/O		149	HMA10	O	
30	VDD		(Power supply)	150	VDD		(Power supply)
31	VSS		(Ground)	151	VSS		(Ground)
32	CD15	I/O		152	HMA11	O	
33	CSN	I	Chip select	153	HMA12	O	Wave memory address bus
34	WRN	I	Write strobe	154	HMA13	O	
35	RDN	I	Read strobe	155	HMA14	O	
36	VDD		(Power supply)	156	HMA15	O	
37	SYSH0	O		157	HMA16	O	
38	SYSH1	O		158	HMA17	O	
39	SYSH2	O		159	HMA18	O	
40	SYSH3	O	NSYS/LNSYS upper 16 bits output	160	HMA19	O	
41	SYSH4	O		161	HMA20	O	
42	SYSH5	O		162	HMA21	O	
43	SYSH6	O		163	HMA22	O	
44	SYSH7	O		164	HMA23	O	
45	KONO0	O		165	HMA24	O	
46	KONO1	O	Key on data	166	VSS		(Ground)
47	KONO2	O		167	MRASN	O	RAS when DRAM(s) is connected to wave memory
48	KONO3	O		168	MCASN	O	CAS when DRAM(s) is connected to wave memory
49	VSS		(Ground)	169	MOEN	O	Wave memory output enable
50	SYSL0	I/O		170	MWEN	O	Wave memory write enable
51	SYSL1	I/O		171	VSS		(Ground)
52	SYSL2	I/O		172	LMD0	I/O	
53	SYSL3	I/O	NSYS input/LNSYS output lower 8 bits	173	LMD1	I/O	
54	SYSL4	I/O		174	LMD2	I/O	
55	SYSL5	I/O		175	LMD3	I/O	
56	SYSL6	I/O		176	LMD	I/O	
57	SYSL7	I/O		177	LMD5	I/O	
58	KONI0	I		178	LMD6	I/O	
59	KONI1	I	Key on data input	179	LMD7	I/O	Wave memory data bus (Lower 16 bits)
60	VDD	I	(Power supply)	180	VDD		(Power supply)

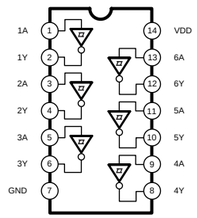
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
61	VSS		(Ground)	181	VSS		(Ground)
62	KONI2	I		182	LMD8	I/O	
63	KONI3	I		183	LMD9	I/O	
64	DAC0	O	DAC output	184	LMD10	I/O	
65	DAC1	O		185	LMD11	I/O	
66	WCLK	O	DAC0/DAC1 word clock	186	LMD12	I/O	
67	MELO0	O		187	LMD13	I/O	
68	MELO1	O		188	LMD14	I/O	
69	MELO2	O		189	LMD15	I/O	
70	MELO3	O	MEL wave data output	190	VSS		(Ground)
71	MELO4	O		191	LMA0	O	
72	MELO5	O		192	LMA1	O	
73	MELO6	O		193	LMA2	O	
74	MELO7	O		194	LMA3	O	
75	VDD		(Power supply)	195	LMA4	O	
76	ADLR	O	ADC word clock	196	LMA5	O	
77	MELI0	I		197	LMA6	O	
78	MELI1	I		198	LMA7	O	
79	MELI2	I		199	LMA8	O	
80	MELI3	I	MEL wave data input	200	LMA9	O	
81	MELI4	I		201	LMA10	O	
82	MELI5	I		202	LMA11	O	
83	MELI6	I		203	VSS		(Ground)
84	MELI7	I		204	LMA12	O	
85	VSS		(Ground)	205	LMA13	O	Wave memory address bus (Lower data memory)
86	RCASN	O	DRAM column address strobe (RAS signal)	206	LMA14	O	
87	RA8	O		207	LMA15	O	
88	RA7	O		208	LMA16	O	
89	RA6	O		209	LMA17	O	
90	VDD		(Power supply)	210	VDD		(Power supply)
91	VSS		(Ground)	211	VSS		(Ground)
92	RA5	O	DRAM address bus	212	LMA18	O	
93	RA4	O		213	LMA19	O	
94	RA3	O		214	LMA20	O	
95	RA2	O		215	LMA21	O	
96	RA1	O		216	LMA22	O	
97	RA0	O		217	LMA23	O	
98	RRASN	O	DRAM row address strobe (RAS signal)	218	LMA24	O	
99	RWEN	O	DARM write enable	219	VSS		(Ground)
100	VSS		(Ground)	220	SYO	O	Sync. signal for master clock
101	RD7	I/O		221	SYOD	O	Sync. signal for HCLK/QCLK
102	RD6	I/O		222	QCLK	O	1/12 master clock (64Fs)
103	RD5	I/O		223	HCLK	O	1/6 master clock (128Fs)
104	RD4	I/O		224	CK256	O	1/3 master clock (256Fs)
105	RD3	I/O		225	SYSCLK	O	1/2 master clock (384Fs)
106	RD2	I/O		226	VDD		(Power supply)
107	RD1	I/O		227	SYI	I	Sync. clock
108	RD0	I/O		228	MCLKI	I	Master clock input
109	VSS		(Ground)	229	MCLKO	O	Master clock output
110	RD17	I/O		230	VDD		(Power supply)
111	RD16	I/O	DRAM data bus	231	XIN	I	Crystal osc. input
112	RD15	I/O		232	XOUT	O	Crystal osc. output
113	RD14	I/O		233	VSS		(Ground)
114	RD13	I/O		234	ICN	I	Initial clear
115	RD12	I/O		235	CHIP2	I	2 chips mode enable
116	RD11	I/O		236	SLAVE	I	Master/Slave select when 2 chips mode
117	RD10	I/O		237	TESTON	I	
118	RD9	I/O		238	ACIN	I	Test pin
119	RD8	I/O		239	DCTEST	I	
120	VDD		(Power supply)	240	VDD		(Power supply)

IC BLOCK DIAGRAM

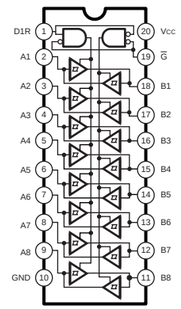
- **SC7SU04FEL**(XI348A00)
  Inverter Gate



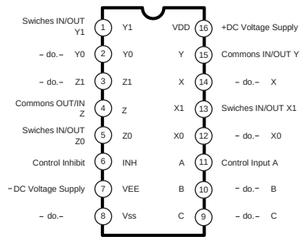
- **TC74HC14AF-TP1**(XD657A00)
  Hex inverter



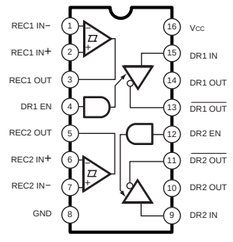
- **SN74HC245NSR**(XD848A00)
  Octal 3-State Bus Transceiver



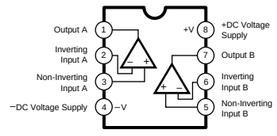
- **TC74HC4053AF**(XR150A00)
  Triple 2-Ch
  Multiplexer/Demultiplexer



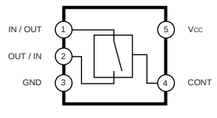
- **M5M34051F**(XV103A00)
- **MC34051MEL**(XP881A00)
  Dual EIA-422/423 Transceiver



- **µPC4570G2**(XF291A00)
- **NJM4556AMT1**(XQ138A00)
  Dual Operational Amplifier

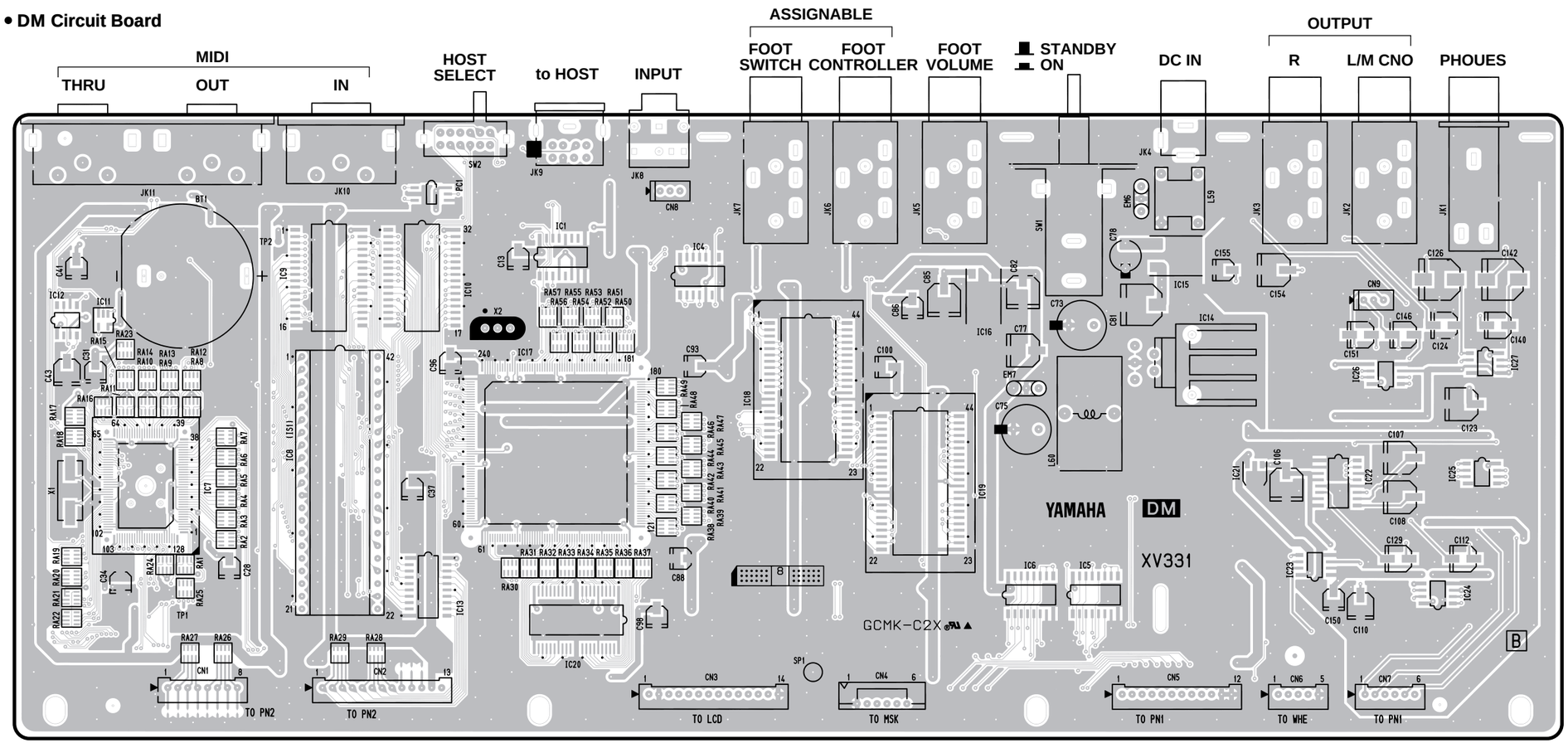


- **TC7S66F** (XR682A00)
  Bilateral Switch



■ CIRCUIT BOARDS

• DM Circuit Board

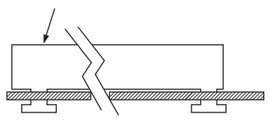


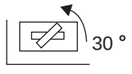
to PN(2/2)-CN6 to PN(2/2)-CN5 to LC-CN7 to MKS2-CN5 to PN(2/2)-CN2 to WHEEL to PN(2/2) -CN1

Component side

• JK angle installation

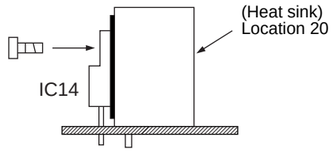
Location 40(JK angle)



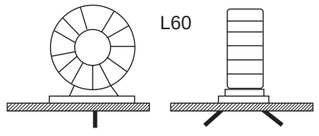


Location 30

• Heat sink, IC14 installation

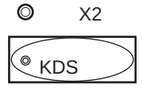


• L60 installation

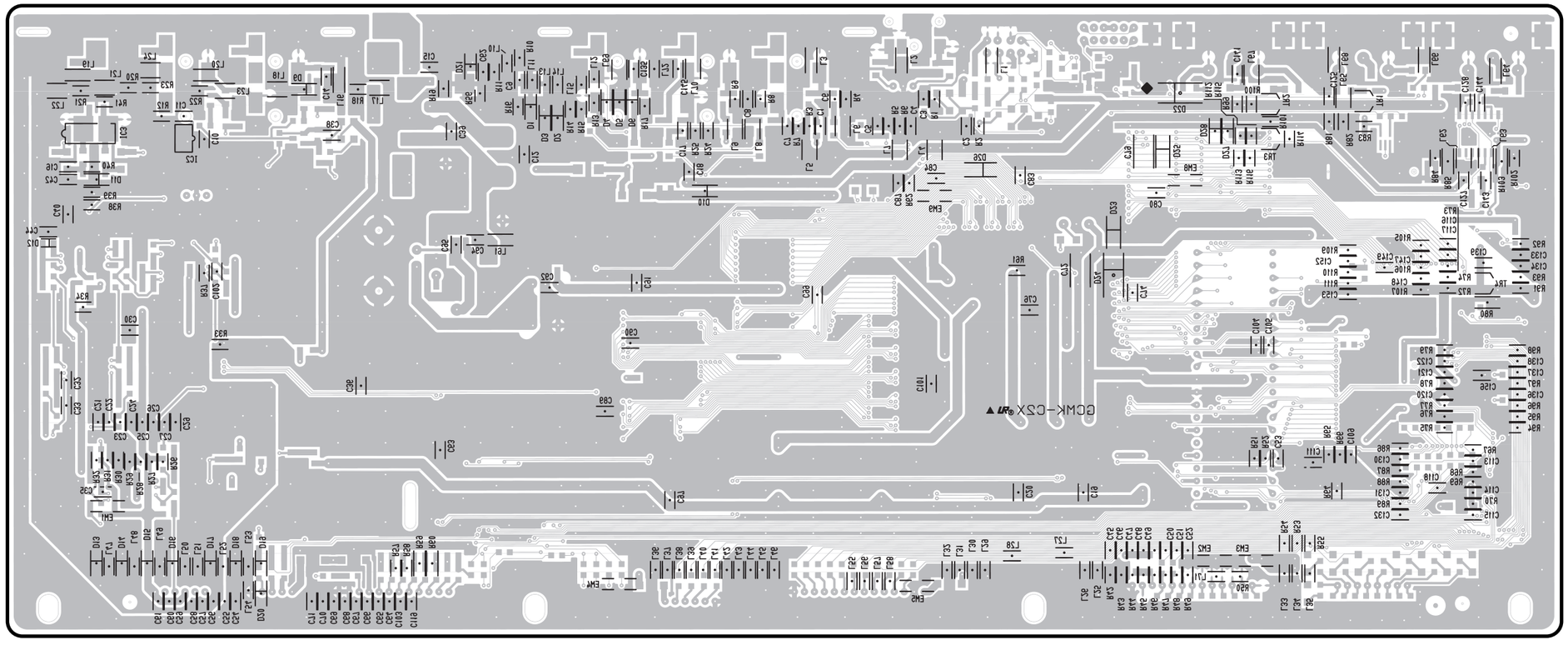


• X2 installation

mark 1pin



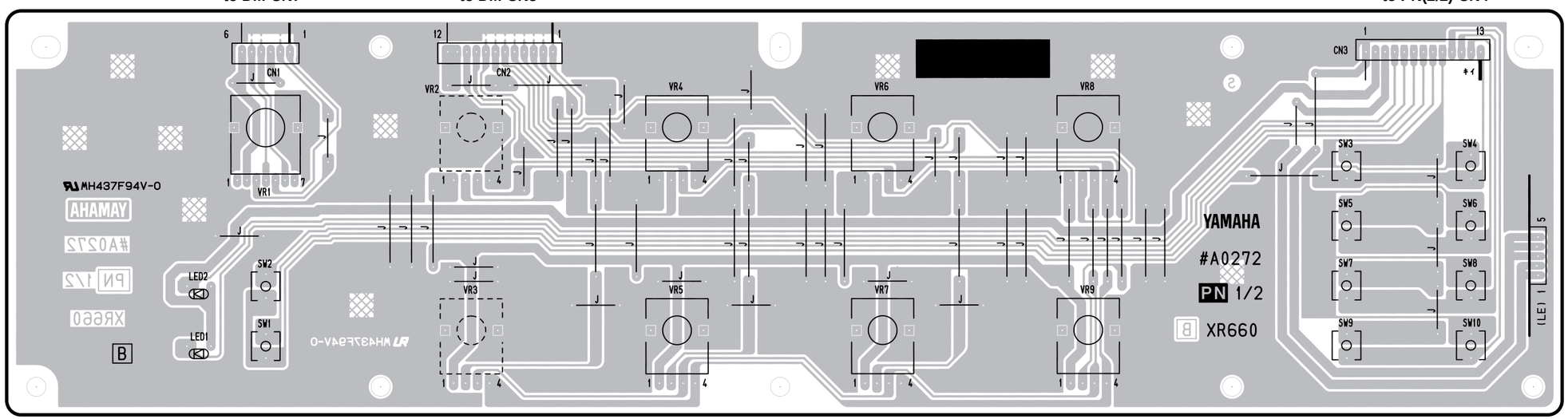
V278390- 1



Pattern side

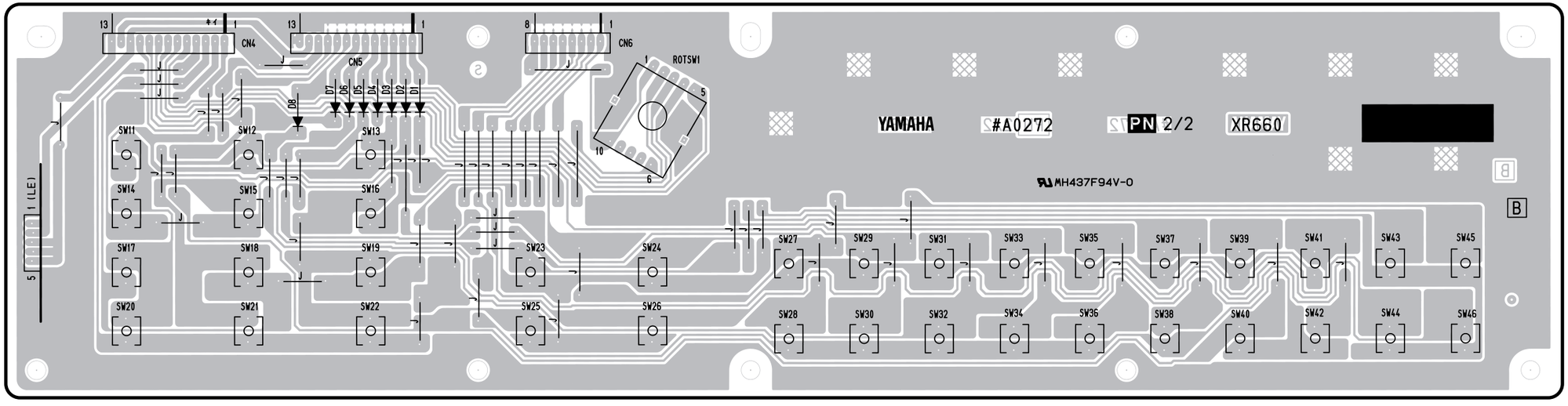
- **PN Circuit Board**
- **PN 1/2**

to DM-CN7 **to DM-CN5** **to PN(2/2)-CN4**



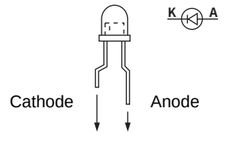
Component side

- **PN 2/2** **to PN(1/2)-CN3** **to DM-CN2** **to DM-CN1**

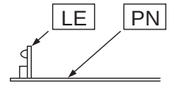


Pattern side

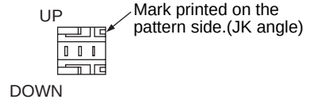
- **LED1, LED2**



- **LE circuit board (See page 26)**

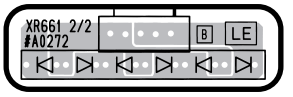


- **Switches**



• LE Circuit Board

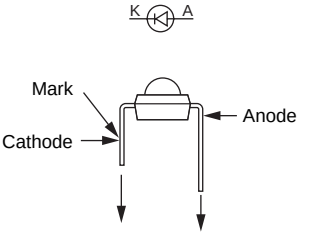
✻ An LE board is located on either of the PN1/2 and PN2/2 circuit boards.



LCD back-lit

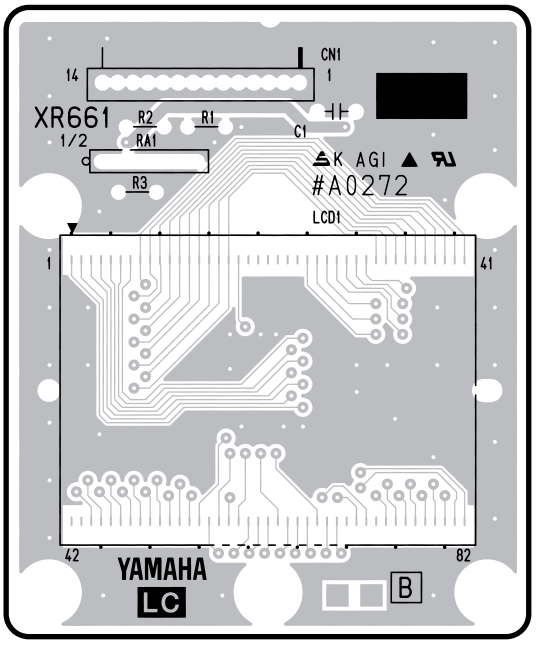
Component side

• LED3~LED8

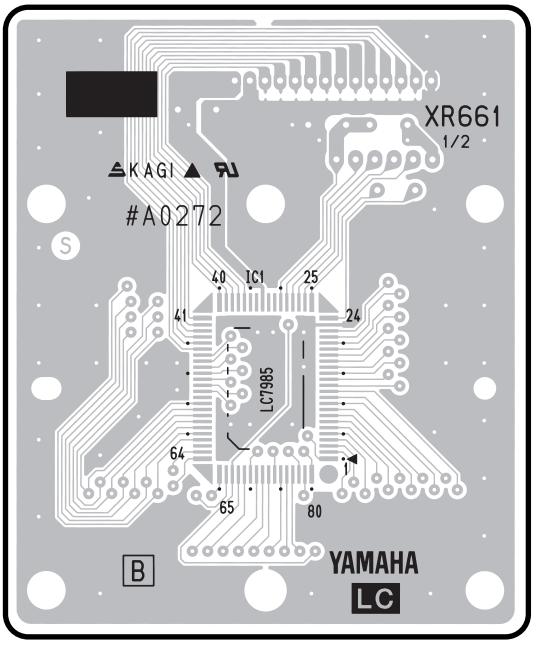


• LC Circuit Board

to DM-CN3



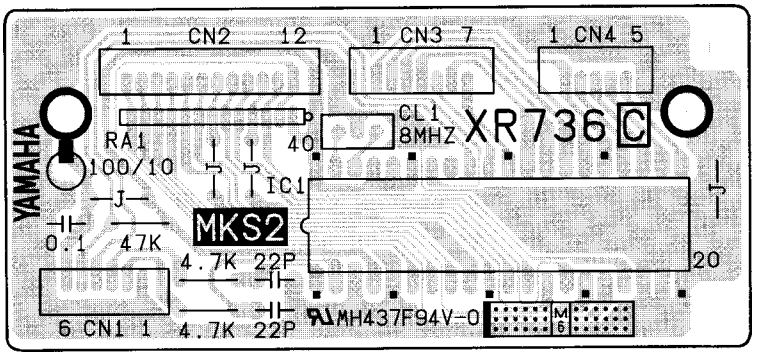
Component side



Pattern side

• MKS Circuit Board

to MK-H **to MK-H** **to MK-L**



to DM-CN4

Component side

2NA-VU40760 △2 ; LE, LC
2NA-VU49440 ; MKS

TEST PROGRAM

NUMBER	TEST	TEST RESULTS
T1	RAM READ/WRITE	OK / NG
T2	BATTERY	OK / NG
T3	LCD	ALL DOTS ON / OFF
T4	PANEL SWITCH / LED	OK, ON / OFF
T5	MIDI IN / OUT / THRU	OK / NG THRU (Confirmation)
T6	HOST SELECT	OK / NG
T7	TO HOST	OK / NG
T8	WAVE ROM	OK / NG
T9	1k Hz OUTPUT L (OUTPUT)	OUTPUT L: +1.2 +/- 2 dBm (10k ohm load)
		OUTPUT R: less than -70.0 dBm (10k ohm load)
		PHONES (L): -5.7 +/- 2 dBm (33 ohm load)
		PHONES (R): less than -60.0 dBm (33 ohm load)
T10	1k Hz OUTPUT R (OUTPUT)	OUTPUT R: +1.2 +/- 2 dBm (10k ohm load)
		OUTPUT L: less than -70.0 dBm (10k ohm load)
		PHONES (R): -5.7 +/- 2 dBm (33 ohm load)
		PHONES (L): less than -60.0 dBm (33 ohm load)
T11	KEYBOARD	OK, KEY CORD / KEY TOUCH
T12	FX DRAM	
T13	64CH OUT	Listening
T14	KNOB 1	OK /NG, 64-127-00-64
T15	KNOB 2	OK /NG, 64-127-00-64
T16	KNOB 3	OK /NG, 64-127-00-64
T17	KNOB 4	OK /NG, 64-127-00-64
T18	KNOB 5	OK /NG, 64-127-00-64
T19	KNOB 6	OK /NG, 64-127-00-64
T20	KNOB 7	OK /NG, 64-127-00-64
T21	KNOB 8	OK /NG, 64-127-00-64
T22	PITCH BEND	OK /NG, 64-127-00-64
T23	MODULATION WHEEL	OK, 0-10-120-127-120-10-0
T24	FOOT VOLUME	OK, 0-10-120-127-120-10-0
T25	FOOT CONTROLLER (QS)	OK, 0-10-120-127-120-10-0
T26	SUSTAIN SWITCH	OK, 0-1
T27	FACTORY SET	OK / NG
T28	EXIT (NOISE LEVEL)	OUTPUT(L, R): less than -80.0 dBm (10k ohm load)
		PHONES(L, R): less than -90.0 dBm (33 ohm load)
T29	INPUT	
T30	BATTERY	

Measuring instruments: frequency counter, oscilloscope, AC voltmeter (with a JIS-C filter), distortion meter (with flat filter), keyboard amplifier etc.

Jigs: MIDI cable, expansion board etc.

A. HOW TO ENTER THE TEST PROGRAM

Turn on the CS2x power switch while pressing the [-], the [+] and the [ENTER] switches simultaneously.
The CS2x will indicate that it has entered the test program by displaying the following message.

```
Test Mode
##.##
```

After a while the following display will appear.

```
01 RAM
```

Use the PROGRAM [+], PROGRAM [-], [ENTER] or [PERFORMANCE] switches to select the test number.

B. PROCEEDING THOUGH THE TESTS

When entering the test program, the following display will appear.

```
01 RAM
```

Use the PROGRAM [+] and PROGRAM [-] switches to select the appropriate test program, and use the [ENTER] switch to be execut the selected test.
The PROGRAM [+] switch will select the test which follows the current test.
The PROGRAM[-] switch will select the test which precedes the current test.
The [ENTER] switch will execute the currently selected test. If the test result is OK, the next test will be selected and executed automatically and proceed sequentially.
The [PERFORMANCE] switch will cancel the execution of the test and the CS2x will go back to the status before the execution.

C. TEST SELECTION WHEN AN ERROR IS DETECTED

In each of the tests, if an NG (No Good) error is detected, pressing the [PORTAMENTO] switch will make the CS2x wait for a test number to be entered. You can then retry the test or perform another test.

D. INITIALIZING

Turn on the power switch of the CS2x while pressing the [7], the [8] and the [9] switches. The CS2x will initialize the memorized data.

T1. RAM READ/WRITE TEST

```
01 RAM
```

Perform a read/write/verify test of RAM.

DISPLAY OF THE RESULTS

OK

```
01 RAM
 OK
```

NG

```
01 RAM
 NG
```

TEST END
This test ends after displaying the result. All RAM data is preserved.

T2. RAM BACKUP BATTERY TEST

```
02 BATTERY
```

This test checks if the voltage of the RAM backup battery is greater than 2.8 V and less than 3.5 V.

DISPLAY OF THE RESULTS

OK

```
02 BATTERY
 OK
```

NG

```
02 BATTERY
 NG
```

TEST END
This test ends after displaying the result.

T3. LCD TEST

Check that all dots of the LCD blink ON/OFF.

TEST END
Press the [ENTER] switch to end this test, and the test will then proceed to the next test.

T4. PANEL SWITCH TEST

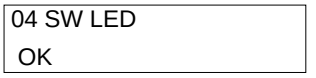
```
04 SW LED
 Scen2
```

Press the panel switches consecutively from the [Scen 2] switch to the [Rotary 6] switch, according to the order indicated on the LCD.



When the next check is ready, the LCD indicates the next check switch. If there is a corresponding LED, it blinks. When the check switch is pressed and the result of the check is good, a beep will sound and the blinking LED will go out, if applicable. Then the next check is ready and the LCD will indicate the switch. If a switch that the LCD is not indicating is pressed, the check will be ignored and the status will not change. When all the switch checks have finished and all the results have been good, the LCD will indicate "OK".

DISPLAY OF THE RESULTS

OK 

NG (No change in display message)

TEST END
After displaying "OK" of the test result above, the test will end and proceed to the next test.

T5. MIDI TEST



After connecting the MIDI IN to the MIDI OUT via a MIDI cable, execute the test. If the MIDI IN/OUT check is good, "OK" will be displayed on the LCD and the test pattern MIDI code (AA FF 00 55) will be transmitted from the MIDI THRU.

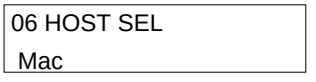
DISPLAY OF THE RESULTS

OK 

NG 

TEST END
When the test result is displayed on the LCD, the test will end. If the test result is "OK", the test will proceed to the next test.

T6. HOST SELECT SWITCH TEST



If the [HOST SELECT] switch has been set at the [MAC] position, set the switch at the other position and return it to the [MAC] position again.
Switch the [HOST SELECT] from [Mac] to [MIDI], according to the order indicated on the LCD.
If the switch is OK, a beep wave will sound.

DISPLAY OF THE RESULTS

OK 

NG (No change in display message)

TEST END
If the switch is OK at all positions, "OK" is displayed and the test will end.

T7. TO HOST TEST



This test is only utilized at the factory and it is not intended for field service use.
When the test enters this test, the LCD will display "NG". Press the [PERFORMANCE] switch, then use the PROGRAM [+] and PROGRAM [-] switches to select anther test.

T8. WAVE ROM TEST



Performs a read test of WAVE ROMs.

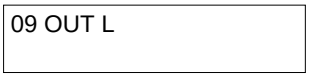
DISPLAY OF THE RESULTS

OK 

NG 

TEST END
This test ends after displaying the result.

T9. 1k Hz SOUND OUTPUT (OUTPUT L) TEST



Check that the correct signal is output from the OUTPUT L and PHONES (L) jacks.

Insert the appropriate phone plugs into each output jack OUTPUT L, OUTPUT R, and PHONES (L/R) outputs. If necessary, verify the frequency, output waveform and output level of each output using a frequency counter, oscilloscope and AC voltmeter (with a JIS-C filter). The VOLUME control must be set at maximum for these checks. While sounding, the LCD will display the following message.



OUTPUT L: 1k Hz +/- 1.5 Hz, sine wave,
+1.2 +/- 2 dBm (10k ohm load)
OUTPUT R: less than -70 dBm (10k ohm load)
PHONES (L): 1k Hz +/- 1.5 Hz, sine wave,
-5.7 +/- 2 dBm (33 ohm load)
PHONES(R): less than-60 dBm (33 ohm load)

TEST END
After pressing the [PERFORMANCE] switch, the sound will stop and the CS2x will wait for a test number to be entered.
If the [ENTER]switch is pressed, the sound will stop and the test will proceed to the next test.

T10. 1k Hz SOUND OUTPUT (OUTPUT R) TEST



Check that the correct signal is output from the OUTPUT R and PHONES (R) jacks.
Insert the appropriate phone plugs into each output jack OUTPUT L, OUTPUT R, and PHONES (L/R) outputs. If necessary, verify the frequency, output waveform and output level of each output using a frequency counter, oscilloscope and AC voltmeter (with a JIS-C filter). The VOLUME control must be set at maximum for these checks. While sounding, the LCD will display the following message.



OUTPUT L: less than -70 dBm (10k ohm load)
OUTPUT R: 1k Hz +/- 1.5 Hz, sine wave,
+1.2 +/- 2 dBm (10k ohm load)
PHONES (L): less than -60 dBm (33 ohm load)
PHONES (R): 1k Hz +/- 1.5 Hz, sine wave,
-5.7 +/- 2 dBm (33 ohm load)

TEST END
After pressing the [PERFORMANCE] switch, the sound will stop and the CS2x will wait for of a test number to be entered.
If the [ENTER] switch is pressed, the sound will stop and the test will proceed to the next test.

T11. KEYBOARD TEST



Play a scale on the keyboard from C1 to C6.



(e.g. the next key switch check is G#3)

If the key switch is good, the note will sound and the LCD will indicate the next key switch number. If the wrong key is played, the sound of that note will not be heard and the check will be ignored. However, if the right key is played following the playing of a wrong key, the note of that key will sound. Proceed to playing the next key. If all key switches are good, "OK" will be displayed on the LCD.

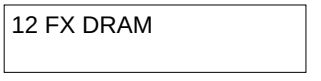
DISPLAY OF THE RESULTS
OK



NG (No change in display message)

TEST END
After displaying "OK" for the test result, the test will end and proceed to the next test.

T12. EFFECT DRAM TEST



Check that the correct signal is output from the OUTPUT jacks.
If necessary, verify the output level of each output using an oscilloscope and AC voltmeter (with a JIS-C filter).
The VOLUME control must be set at maximum for these checks (output is observed for two seconds or more). While sounding, the LCD will display the following message.

```
12 FX DRAM
Doing
```

OUTPUT L: 1k Hz +/- 3 Hz, sine wave
+1.2 +/- 2 dBm (10k ohm load)

TEST END
Press the [PERFORMANCE]switch to end the test.
After pressing the [PERFORMANCE]switch, the sound will stop and the CS2x will wait for a test number to be entered.
If the [ENTER]switch is pressed, the sound will stop and the test will proceed to the next test.

T13. 64 CHANNEL OUTPUT TEST

```
13 64ch OUT
```

Check that the correct signal is output.
If necessary, verify the output level of each output using an oscilloscope and AC voltmeter (with a JIS-C filter). The VOLUME control must be set at maximum for these checks. While sounding, the LCD will display the following message.

```
13 64ch OUT
xx yy
```

(where xx is currently the output channel number from the L channel and yy is from the R channel)

Check by listening that the correct signals of the sine wave are output.
(L ch: 1k Hz, R ch: 2k Hz)

TEST END
Press the [PERFORMANCE] switch to end the test.
After pressing the [PERFORMANCE] switch, the sound will stop and the CS2x will wait for a test number to be entered.
If the [ENTER] is pressed, the sound will stop and the test will proceed to the next test.

T14. KNOB 1 (ATTACK) TEST

```
14 Kn1 xxx
000
```

(xxx: current KNOB 1 value)

According to the target value displayed on the LCD, rotate the KNOB 1 knob slowly.
Check that the value changes from 64 to 127 then from 00 and back to 64 (in other words: center to top to bottom and then back to center).

```
14 Kn1 xxx
yyy
```

(xxx: current KNOB 1 value
yyy: next target value)

DISPLAY OF THE RESULTS

OK

```
14 Kn1 xxx
OK
```

NG (No change in display message)

TEST END
This test ends after displaying the result.

T15. KNOB 2 (DECAY) TEST
T16. KNOB 3 (RELEASE) TEST
T17. KNOB 4 (ASSIGN 1 / DATA) TEST
T18. KNOB 5 (HPF CUTOFF) TEST
T19. KNOB 6 (LPF CUTOFF) TEST
T20. KNOB 7 (RESONANCE) TEST
T21. KNOB 8 (ASSIGN 2) TEST

These tests can be performed in the same manner as Test 14, “KNOB 1 (ATTACK) TEST”.

T22. PITCH BEND TEST

```
22 PB  xxx
 000
```

(xxx: current PITCH bend value)

According to the target value displayed on the LCD, slowly rotate the PITCH bend wheel.
Check that the value changes from 64 to 00 then from 127 back to 00 (in other words: from center to bottom to top and then back to bottom).

```
22 PB xxx
 yyy
```

(xxx: current PITCH bend value
yyy: next target value)

DISPLAY OF THE RESULTS

OK

```
22 PB xxx
OK
```

NG (No change in display message)

TEST END
The test ends after displaying the result.

T23. MODULATION WHEEL TEST

```
23 MW xxx
 000
```

(xxx: current MODULATION wheel value)

According to the target value displayed on the LCD, slowly rotate the MODULATION wheel.
Check that the value changes from 00 to 127 and then back to 00 (in other words: from bottom to top and then back to bottom).

```
23 MW  xxx
 yyy
```

(xxx: current MODULATION wheel value
yyy: next target value)

DISPLAY OF THE RESULTS

OK

```
23 MW  xxx
 OK
```

NG (No change in display message)

TEST END
The test ends after displaying the result.

T24. FOOT VOLUME TEST

```
24 F.V xxx
 000
```

(xxx: current FOOT VOLUME value)

According to the target value displayed on the LCD, gently press the FOOT VOLUME pedal.
Check that value changes from 00 to 127 then back to 00 (in other words: from the raised position to the lowered position then back to the raised position).

```
24 F.V xxx
 yyy
```

(xxx: current FOOT VOLUME value
yyy: next target value)

DISPLAY OF THE RESULTS

OK

```
24 F.V xxx
 OK
```

NG (No change in display message)

TEST END
The test ends after displaying the result.

T25. FOOT CONTROLLER TEST

```
25 F.C xxx
 000
```

(xxx : current FOOT CONTROLLER value)

According to the target value displayed on the LCD, gently press the FOOT CONTROLLER pedal.
Check that value changes from 00 to 127 then back to 00 (in other words: from the raised position to the lowered position then back to the raised position).

```
25 F.C xxx
 yyy
```

(xxx: current FOOT CONTROLLER value
yyy: next target value)

DISPLAY OF THE RESULTS

OK

```
25 F.C xxx
  OK
```

NG (No change in display message)

TEST END
The test ends after displaying the result.

T26. FOOT SWITCH TEST

```
26 F.S off
 on
```

Connect a FOOT SWITCH, press down and lift up.
Check that the indication on the LCD changes from off to ON then back to off, and verify that the “OK” result is displayed.

```
26 F.S xxx
 yyy
```

(xxx: current FOOT SWITCH value
yyy : next target value)

DISPLAY OF THE RESULTS

OK

```
26 F.S off
 OK
```

NG (No change in display message)

TEST END
The test ends after displaying the result.

T27. FACTORY SETTING

27 FACTORY

This test is used to initialize the data to the factory settings.
If you press the [ENTER], the factory preset data will be restored and the test will end.
After the factory preset data has been restored, the system data will be as follows:

(Factory setting data)

SYSTEM SETUP

System Setup	Data
Master Tune	+0(cent)
Master Volume	127
Transpose	+0
MIDI Performance Receive Channel	1
MIDI Device Number	ALL
Sound Module Mode	PFM
Keyboard Transpose	+0
Keyboard Velocity Curve	NORMAL
Keyboard Fix Velocity	OFF
Keyboard Velocity Transmit Channel	1
Midi Local	ON
MW Control Number	1
FC Control Number	16
FV Control Number	11
Data Knob 1 Control Number	73
Data Knob 2 Control Number	80
Data Knob 3 Control Number	72
Data Knob 4 Control Number	17
Data Knob 5 Control Number	81
Data Knob 6 Control Number	74
Data Knob 7 Control Number	71
Data Knob 8 Control Number	18
Foot Switch Control Number	64
Scene Controller Number	MN
Scene Mode	OFF

USER PERFORMANCE
The 128 user performance data of the factory preset data will be restored.

FACTORY PRESET MODE & VOICE NUMBER
MODE: PERFORMANCE MODE
PERFORMANCE NUMBER: PRESET 1

Set the voice number to 1, after setting sound control knobs to the positions listed below.

ATTACK Knob	center
DECAY Knob	center
RELEASE Knob	center
HPF CUTOFF Knob	center
LPF CUTOFF Knob	center
RESONANCE Knob	center
ASSIGNABLE Knob 1	center
ASSIGNABLE Knob 2	center
EDIT PARAMETER SELECT Knob	most top
VOLUME Knob	minimum
PITCH BEND WHEEL	center
MODULATION WHEEL	minimum

T28. EXIT TEST PROGRAM

28 EXIT

To exit the test program mode, press the [ENTER] switch.
After exiting the test program mode, measure the noise level of each output never playing on any key on the keyboard. While measuring the noise level, use an AC voltmeter (with JIS-C filter).

OUTPUT L: less than -80 dBm (10k ohm load)
OUTPUT R: less than -80 dBm (10k ohm load)
PHONES L: less than -90 dBm (33 ohm load)
PHONES R: less than -90 dBm (33 ohm load)

T29. INPUT TEST

This test is performed in the normal mode.
Confirm that the signal input to the INPUT is output to the LINE OUT.
Connect a standard plug to the LINE OUT (L,R) and measure that the frequency and the output level of each output are as follows.

INPUT L: 1k Hz, 2.5 dBm, sine wave
INPUT R: GND

LINE OUT L: 2.5 dBm +/- 2 dBm (10k ohm load)
LINE OUT R: less than -70 dBm

INPUT L: GND
INPUT R: 1k Hz, 2.5 dBm, sine wave

LINE OUT L: less than -70 dBm
LINE OUT R: 2.5 dBm +/- 2 dBm (10k ohm load)

T30. BATTERY TEST

After waiting 30 seconds or more after the power switch has been turned is off, perform the test without turning the power switch on.
Confirm that the voltage it between TP and GE on the DM circuit board and is +2.7 V or more.

MIDI DATA FORMAT

Decimal	Hexadecimal	Binary
0	00	0000 0000
1	01	0000 0001
2	02	0000 0010
3	03	0000 0011
4	04	0000 0100
5	05	0000 0101
6	06	0000 0110
7	07	0000 0111
8	08	0000 1000
9	09	0000 1001
10	0A	0000 1010
11	0B	0000 1011
12	0C	0000 1100
13	0D	0000 1101
14	0E	0000 1110
15	0F	0000 1111
16	10	0001 0000
17	11	0001 0001
18	12	0001 0010
19	13	0001 0011
20	14	0001 0100
21	15	0001 0101
22	16	0001 0110
23	17	0001 0111
24	18	0001 1000
25	19	0001 1001
26	1A	0001 1010
27	1B	0001 1011
28	1C	0001 1100
29	1D	0001 1101
30	1E	0001 1110
31	1F	0001 1111
32	20	0010 0000
33	21	0010 0001
34	22	0010 0010
35	23	0010 0011
36	24	0010 0100
37	25	0010 0101
38	26	0010 0110
39	27	0010 0111
40	28	0010 1000
41	29	0010 1001
42	2A	0010 1010
43	2B	0010 1011
44	2C	0010 1100
45	2D	0010 1101
46	2E	0010 1110
47	2F	0010 1111
48	30	0011 0000
49	31	0011 0001
50	32	0011 0010
51	33	0011 0011
52	34	0011 0100
53	35	0011 0101
54	36	0011 0110
55	37	0011 0111
56	38	0011 1000
57	39	0011 1001
58	3A	0011 1010
59	3B	0011 1011
60	3C	0011 1100
61	3D	0011 1101
62	3E	0011 1110
63	3F	0011 1111

Decimal	Hexadecimal	Binary
64	40	0100 0000
65	41	0100 0001
66	42	0100 0010
67	43	0100 0011
68	44	0100 0100
69	45	0100 0101
70	46	0100 0110
71	47	0100 0111
72	48	0100 1000
73	49	0100 1001
74	4A	0100 1010
75	4B	0100 1011
76	4C	0100 1100
77	4D	0100 1101
78	4E	0100 1110
79	4F	0100 1111
80	50	0101 0000
81	51	0101 0001
82	52	0101 0010
83	53	0101 0011
84	54	0101 0100
85	55	0101 0101
86	56	0101 0110
87	57	0101 0111
88	58	0101 1000
89	59	0101 1001
90	5A	0101 1010
91	5B	0101 1011
92	5C	0101 1100
93	5D	0101 1101
94	5E	0101 1110
95	5F	0101 1111
96	60	0110 0000
97	61	0110 0001
98	62	0110 0010
99	63	0110 0011
100	64	0110 0100
101	65	0110 0101
102	66	0110 0110
103	67	0110 0111
104	68	0110 1000
105	69	0110 1001
106	6A	0110 1010
107	6B	0110 1011
108	6C	0110 1100
109	6D	0110 1101
110	6E	0110 1110
111	6F	0110 1111
112	70	0111 0000
113	71	0111 0001
114	72	0111 0010
115	73	0111 0011
116	74	0111 0100
117	75	0111 0101
118	76	0111 0110
119	77	0111 0111
120	78	0111 1000
121	79	0111 1001
122	7A	0111 1010
123	7B	0111 1011
124	7C	0111 1100
125	7D	0111 1101
126	7E	0111 1110
127	7F	0111 1111

ldditional Notes

For example, 144 - 159(Decimal)/9nH/1001 0000 - 1001 1111(Binary) indicate the note-on messages for the channels 1 through 16 respectively. 176 - 191/BnH/1011 0000 - 1011 1111 indicate the control change messages for the channels 1 through 16 respectively. 192 - 207/CnH/1100 0000 - 1100 1111 indicate the program change messages for the channels 1 through 16 respectively. 240/F0H/1111 0000 is positioned at the beginning of data to indicate a system exclusive message. 247/F7H/1111 0111 is positioned at the end of the system exclusive message.

aaH(Hexadecimal)/0aaaaaaa(Binary) indicates the data addresses. The data address consists of High, Mid and Low.

bbH/0bbbbbbb indicates byte counts.

ccH/0ccccccc indicates tcheck sums.

ddH/0ddddddd indicates data/value.

```
        |   +--- CONTROL CHANGE
        |   |     BANK SEL MSB            BnH,00H
        |   |     BANK SEL LSB            BnH,20H
        |   |     MODULATION              BnH,01H
        |   |     EXPRESSION              BnH,0BH
        |   |     FOOT CONTROLLER         BnH,10H
        |   |     SUSTAIN SWITCH          BnH,40H
        |   |     HARMONIC CONTENT        BnH,47H
        |   |     RELEASE TIME            BnH,48H
        |   |     ATTACK TIME             BnH,49H
        |   |     BRIGHTNESS              BnH,4AH
        |   |     ASSIGNABLE              BnH,00H...5FH
        |   |
        |   +--- PROGRAM CHANGE           CnH
        |   |
        |   +--- PITCH BEND CHANGE        EnH
        |SW2
        +[]-+--- SYSTEM EXCLUSIV MESSAGE
            |   |         <BULK DUMP>
            |   |------- XG SYSTEM          F0H 43H 0nH 4CH bbH bbH aaH aaH aaH
            |   |-[SW3]- MULTI EFFECT       F0H 43H 0nH 4CH bbH bbH aaH aaH aaH
            |   |-[SW5]- MULTI PART         F0H 43H 0nH 4CH bbH bbH aaH aaH aaH
            |   |------- DRUM SETUP         F0H 43H 0nH 4CH bbH bbH aaH aaH aaH
            |   |------- SYSTEM INFOMATION  F0H 43H 1nH 4CH bbH bbH aaH aaH aaH
            |   |------- USER PERF.COMMON   F0H 43H 0nH 63H bbH bbH 7#H aaH aaH
            |   |------- USER PERF.LAYER    F0H 43H 0nH 63H bbH bbH 7$H aaH aaH
            |   |-[SW4]- CURRENT PERFORMANCE F0H 43H 0nH 63H hhH hbH 60H 0lH aaH
            |   |------- CS2x SYSTEM        F0H 43H 0nH 63H bbH bbH 50H aaH aaH
            |   |
            |   |       <PARAMETER CHANGE>
            |   |------- MIDI MASTER TUNING F0H 43H 1nH 27H 30H 00H 00H mmH llH
            |   |------- XG SYSTEM          F0H 43H 1nH 4CH aaH aaH aaH ddH.....
            |   |-[SW3]- MULTI EFFECT       F0H 43H 1nH 4CH aaH aaH aaH ddH.....
            |   |-[SW5]- MULTI PART         F0H 43H 1nH 4CH aaH aaH aaH ddH.....
            |   |------- DRUM SETUP         F0H 43H 1nH 4CH aaH aaH aaH ddH.....
            |   |-[SW4]- CURRENT PERFORMANCE F0H 43H 1nH 63H 60H 0lH aaH ddH.....
            |   |------- CS2x SYSTEM        F0H 43H 1nH 63H 50H aaH aaH ddH.....
            |   |
            +---+--- SYSTEM EXCLUSIV MESSAGE
                |    MIDI MASTER VOLUME     F0H 7FH 7FH 04H 01H llH mmH F7H
                |    IDENTITY REPLY         F0H 7EH 7FH 06H 02H 43H 00H 41H ddH
                +--- ACTIVE SENSING         FEH

SW1 []       MIDI Transmit Channel(Depends on Keyboard Transmit Channel in
SW2 []       MIDI Device Number(When Device Number is "All", Transmit Chann
SW3 []       Multi Mode
SW4 []       Performance Mode
SW5 []       Parts 5 through 16 in Performance Mode, or Multi Mode
```

(2) RECEIVE FLOW

```
   SW6
MIDI ->-+-[]-
IN      |   |
    +---+   |
    | +-----+
    | | SW7
    | |-[]-+--- NOTE OFF                8nH
    | |    |
    | |    +--- NOTE ON/OFF             9nH
    | |    |
    | |    +--- CONTROL CHANGE
    | |    |     BANK SEL MSB           BnH,00H
    | |    |     BANK SEL LSB           BnH,20H
    | |    |     MODULATION             BnH,01H
    | |    |     PORTAMENTO TIME        BnH,05H
    | |    |     DATA ENTRY MSB         BnH,06H
    | |    |     DATA ENTRY LSB         BnH,26H
    | |    |     MAIN VOLUME            BnH,07H
    | |    |     PANPOT                 BnH,0AH
    | |    |     EXPRESSION             BnH,0BH
    | |    |     FOOT CONTROLLER        BnH,10H
    | |    |     SUSTAIN SWITCH         BnH,40H
    | |    |     PORTAMENTO SWITCH      BnH,41H
    | |    |     SOSTENUTO              BnH,42H
    | |    |     SOFT PEDAL             BnH,43H
    | |    |     HARMONIC CONTENT       BnH,47H
    | |    |     RELEASE TIME           BnH,48H
    | |    |     ATTACK TIME            BnH,49H
    | |    |     BRIGHTNESS             BnH,4AH
    | |    |     PORTAMENTO CONTROL     BnH,54H
    | |    |     REVERB DEPTH           BnH,5BH
    | |    |     CHORUS DEPTH           BnH,5DH
    | |    |     VARIATION DEPTH        BnH,5EH
    | |    |     DATA ENTRY INC         BnH,60H
    | |    |     DATA ENTRY DEC         BnH,61H
    | |    |     ASSIGNABLE CONTROLLER  BnH,00H..5FH
    | |    |     NRPN
    | |    |       VIBRATO RATE         BnH,63H,01H,62H,08H,06H,mmH
    | |    |       VIBRATO DEPTH        BnH,63H,01H,62H,09H,06H,mmH
    | |    |       VIBRATO DELAY        BnH,63H,01H,62H,0AH,06H,mmH
    | |    |       FILTER CUTOFF FREQ   BnH,63H,01H,62H,20H,06H,mmH
    | |    |       FILTER RESONANCE     BnH,63H,01H,62H,21H,06H,mmH
    | |    |       HPF CUTOFF FREQ      BnH,63H,01H,62H,24H,06H,mmH
    | |    |       EQ BASS GAIN         BnH,63H,01H,62H,30H,06H,mmH
    | |    |       EQ TREBLE GAIN       BnH,63H,01H,62H,31H,06H,mmH
    | |    |       EQ BASS FREQ         BnH,63H,01H,62H,34H,06H,mmH
    | |    |       EQ TREBLE FREQ       BnH,63H,01H,62H,35H,06H,mmH
    | |    |       AEG ATTACK TIME      BnH,63H,01H,62H,63H,06H,mmH
    | |    |       AEG DECAY TIME       BnH,63H,01H,62H,64H,06H,mmH
    | |    |       AEG RELEASE TIME     BnH,63H,01H,62H,66H,06H,mmH
    | |    |       DRUM INST            *1
    | |    |         CUTOFF FREQ        BnH,63H,14H,62H,rrH,06H,mmH
    | |    |         FILTER RESONANCE   BnH,63H,15H,62H,rrH,06H,mmH
    | |    |         AEG ATTACK RATE    BnH,63H,16H,62H,rrH,06H,mmH
    | |    |         AEG DECAY RATE     BnH,63H,17H,62H,rrH,06H,mmH
    | |    |         PITCH COARSE       BnH,63H,18H,62H,rrH,06H,mmH
    | |    |         PITCH FINE         BnH,63H,19H,62H,rrH,06H,mmH
    | |    |         LEVEL              BnH,63H,1AH,62H,rrH,06H,mmH
    | |    |         PANPOT             BnH,63H,1CH,62H,rrH,06H,mmH
    | |    |         REVERB SEND        BnH,63H,1DH,62H,rrH,06H,mmH
    | |    |         CHORUS SEND        BnH,63H,1EH,62H,rrH,06H,mmH
    | |    |         VARIATION SEND     BnH,63H,1FH,62H,rrH,06H,mmH
    | |    |         HPF CUTOFF FREQ    BnH,63H,24H,62H,rrH,06H,mmH
    | |    |         EQ BASS GAIN       BnH,63H,30H,62H,rrH,06H,mmH
    | |    |         EQ TREBLE GAIN     BnH,63H,31H,62H,rrH,06H,mmH
    | |    |         EQ BASS FREQ       BnH,63H,34H,62H,rrH,06H,mmH
    | |    |         EQ TREBLE FREQ     BnH,63H,35H,62H,rrH,06H,mmH
    | |    |       RPN
    | |    |         PITCH BEND SENS.   BnH,64H,00H,65H,00H,06H,mmH
    | |    |         FINE TUNING        BnH,64H,01H,65H,00H,06H,mmH,26H,llH
    | |    |         COARSE TUNING      BnH,64H,02H,65H,00H,06H,mmH
    | |    |         RPN RESET          BnH,64H,7FH,65H,7FH
    | |    |     ALL SOUNDS OFF         BnH,78H,00H
    | |    |     RESET ALL CONTROLLERS  BnH,79H,00H
    | |    |     ALL NOTES OFF          BnH,7BH
    | |    |     OMNI MODE OFF          BnH,7CH
    | |    |     OMNI MODE ON           BnH,7DH
    | |    |     MONO MODE              BnH,7EH
    | |    |     POLY MODE              BnH,7FH
    | | SW8
    | |-[]-+--- PROGRAM CHANGE          CnH
    | | SW7
```

```
| |-[]-+--- CHANNEL AFTER TOUCH     DnH
| |    |
| |    +--- POLYPHONIC AFTER TOUCH  AnH
| |    |
| |    +--- PITCH BEND CHANGE       EnH
| | SW2
| |-[]-+ SYSTEM EXCLUSIV MESSAGE
| |    |        <BULK DUMP>
| |    |------- XG SYSTEM            F0H 43H 0nH 4CH bbH bbH aaH aaH aaH ddH.....ddH ccH F7H
| |    |-[SW3]- MULTI EFFECT         F0H 43H 0nH 4CH bbH bbH aaH aaH aaH ddH.....ddH ccH F7H
| |    |-[SW5]- MULTI PART           F0H 43H 0nH 4CH bbH bbH aaH aaH aaH ddH.....ddH ccH F7H
| |    |------- DRUM SETUP           F0H 43H 0nH 4CH bbH bbH aaH aaH aaH ddH.....ddH ccH F7H
| |    |------- USER PERF.COMMON     F0H 43H 0nH 63H bbH bbH 7#H aaH aaH ddH.....ddH ccH F7H
| |    |------- USER PERF.LAYER      F0H 43H 0nH 63H bbH bbH 7$H aaH aaH ddH.....ddH ccH F7H
| |    |------- USER PERF.COMMON(CS1x)F0H 43H 0nH 4BH bbH bbH 70H aaH aaH ddH.....ddH ccH F7H
| |    |------- USER PERF.LAYER(CS1x) F0H 43H 0nH 4BH bbH bbH 71H aaH aaH ddH.....ddH ccH F7H
| |    |-[SW4]- CURRENT PERFORMANCE  F0H 43H 0nH 63H hhH hbH 60H 0lH aaH ddH.....ddH ccH F7H
| |    |-[SW4]- CURRENT PERFORMANCE(CS1x)F0H 43H 0nH 4BH hhH hbH 60H 0lH aaH ddH.....ddH ccH F7H
| |    |------- CS2x SYSTEM          F0H 43H 0nH 63H bbH bbH 50H aaH aaH ddH.....ddH ccH F7H
| |    |        <PARAMETER CHANGE>
| |    |------- MIDI MASTER TUNING   F0H 43H 1nH 27H 30H 00H 00H mmH llH ccH F7H
| |    |------- XG SYSTEM ON         F0H 43H 1nH 4CH 00H 00H 7EH 00H F7H
| |    |------- XG SYSTEM            F0H 43H 1nH 4CH aaH aaH aaH ddH.....ddH F7H
| |    |-[SW3]- MULTI EFFECT         F0H 43H 1nH 4CH aaH aaH aaH ddH.....ddH F7H
| |    |-[SW5]- MULTI PART           F0H 43H 1nH 4CH aaH aaH aaH ddH.....ddH F7H
| |    |------- DRUM SETUP           F0H 43H 1nH 4CH aaH aaH aaH ddH.....ddH F7H
| |    |-[SW4]- CURRENT PERFORMANCE  F0H 43H 1nH 63H 60H 0lH aaH ddH.....ddH F7H
| |    |------- CS2x SYSTEM          F0H 43H 1nH 63H 50H aaH aaH ddH.....ddH F7H
| |    |        <BULK DUMP REQUEST>
| |    |------- XG SYSTEM            F0H 43H 2nH 4CH aaH aaH aaH F7H
| |    |-[SW3]- MULTI EFFECT         F0H 43H 2nH 4CH aaH aaH aaH F7H
| |    |-[SW5]- MULTI PART           F0H 43H 2nH 4CH aaH aaH aaH F7H
| |    |------- DRUM SETUP           F0H 43H 2nH 4CH aaH aaH aaH F7H
| |    |------- SYSTEM INFOMATION    F0H 43H 2nH 4CH aaH aaH aaH F7H
| |    |------- USER PERF.COMMON     F0H 43H 2nH 63H 7#H aaH aaH F7H
| |    |------- USER PERF.LAYER      F0H 43H 2nH 63H 7$H aaH aaH F7H
| |    |-[SW4]- CURRENT PERFORMANCE  F0H 43H 2nH 63H 60H 0lH aaH F7H
| |    |------- CS2x SYSTEM          F0H 43H 2nH 63H 50H aaH aaH F7H
| |    |        <PARAMETER REQUEST>
| |    |------- XG SYSTEM            F0H 43H 3nH 4CH aaH aaH aaH F7H
| |    |-[SW3]- MULTI EFFECT         F0H 43H 3nH 4CH aaH aaH aaH F7H
| |    |-[SW3]- MULTI PART           F0H 43H 3nH 4CH aaH aaH aaH F7H
| |    |-[SW3]- DRUM SETUP           F0H 43H 3nH 4CH aaH aaH aaH F7H
| |    |-[SW4]- CURRENT PERFORMANCE  F0H 43H 3nH 63H 60H 0lH aaH F7H
| |    |------- CS2x SYSTEM          F0H 43H 3nH 63H 50H aaH aaH F7H
| |
| +----+ SYSTEM EXCLUSIV MESSAGE
|        GM MODE ON                  F0H 7EH 7FH 09H 01H F7H
|        MIDI MASTER VOLUME          F0H 7FH 7FH 04H 01H llH mmH F7H
|        IDENTITY REQUEST            F0H 7EH 0nH 06H 01H F7H
|
+------+ SYSTEM EXCLUSIV MESSAGE
|        PARAMETER CHANGE
|        TEST ENTRY                  F0H 43H 10H 18H 5AH 00H F7H
|        LCD HARD COPY               F0H 43H 10H 18H 5AH 01H F7H
|
+--- ACTIVE SENSING                  FEH
```

```
SW2 []      MIDI Device Number
SW3 []      Multi Mode
SW4 []      Performance Mode
SW5 []      Parts 5 through 16 in Performance Mode, or Multi Mode
SW6 []      Receive Filter
*1          Only when the drum is selected for the Part.
SW7 []      MIDI Receive Channel(In Performance Mode, depends on the Receive Channel in Utility Mode).
SW8 []      MIDI Receive Channel and Play Mode
            In Performance Mode, depends on the Receive Channel in Utility Mode
            No reception in Performance Edit Mode or Store Mode.
```

(3) TRANSMIT/RECEIVE DATA

(3-1) CHANNEL VOICE MESSAGES

(3-1-1) NOTE OFF (Receive only)

```
STATUS          1000nnnn(8nH) n = 0 ~ 15 VOICE CHANNEL NUMBER
NOTE NUMBER     0kkkkkkk      k = 0 (C-2) ~ 127 (G8)
VELOCITY        0vvvvvvv      ignores "v"
```

(3-1-2) NOTE ON/OFF

```
STATUS          1001nnnn(9nH) n = 0 ~ 15 VOICE CHANNEL NUMBER
NOTE NUMBER     0kkkkkkk      k =  0 (C-2) ~ 127 (G8); when receiving
                              k = 36(C1) ~ 96(C6); when transmitting
                              k =  0 (C-2) ~ 127 (G8) ; selectable when transposed
VELOCITY        0vvvvvvv      (v⁻0) NOTE ON
                00000000      (v=0) NOTE OFF
```

(3-1-3) PROGRAM CHANGE

```
STATUS          1100nnnn(CnH) n = 0 ~ 15 VOICE CHANNEL NUMBER
PROGRAM NUMBER  0ppppppp      p = 0 ~ 127
```

* The Program numbers correspond to the XG Drum Voice numbers as follows:

```
P = 1   DR1  Standard
P = 2   DR2  Standard2
P = 3   DR3  Dry
P = 4   DR4  Bright
P = 9   DR5  Room
P = 10  DR6  Dark
P = 17  DR7  Rock
P = 18  DR8  Rock2
P = 25  DR9  Elctrnic
P = 26  DR10 Analog
P = 27  DR11 Analog2
P = 28  DR12 Dance
P = 29  DR13 HipHop
P = 30  DR14 Jungle
P = 33  DR15 Jazz
P = 34  DR16 Jazz2
P = 41  DR17 Brush
P = 49  DR18 Classic
```

*The Program numbers correspond to the XG SFX Kit numbers as follows:

```
P = 1   DR19 SFX1
P = 2   DR20 SFX2
```

When receiving a drum voice program change message while a drum voice is currently selected, the drum setup data will be reset to the new data.

(3-1-4) CHANNEL AFTER TOUCH (Receive only)

```
STATUS          1101nnnn(DnH) n = 0 ~ 15 VOICE CHANNEL NUMBER
VALUE           0vvvvvvv      v = 0 ~ 127 AFTER TOUCH VALUE
```

(3-1-5) POLYPHONIC AFTER TOUCH (Receive only)

```
STATUS          1010nnnn(AnH) n = 0 ~ 15  VOICE CHANNEL NUMBER
KEY             0kkkkkkk      k = 0 ~ 127 KEYCODE
VALUE           0vvvvvvv      v = 0 ~ 127 AFTER TOUCH VALUE
```

(3-1-6) PITCH BEND CHANGE

```
STATUS          1110nnnn(EnH) n = 0 ~ 15 VOICE CHANNEL NUMBER
LSB             0vvvvvvv      PITCH BEND CHANGE LSB
MSB             0vvvvvvv      PITCH BEND CHANGE MSB

Transmitted with a resolution of 7 bits.
```

(3-1-7) CONTROL CHANGE

```
STATUS          1011nnnn(BnH) n = 0 ~ 15 VOICE CHANNEL NUMBER
CONTROL NUMBER  0ccccccc
CONTROL VALUE   0vvvvvvv

* TRANSMITTED CONTROL NUMBERS
c =  0      BANK SEL MSB          ; v = 0:XG NORMAL,
                                        63:USER/PRESET PERFORMANCE
                                        64:SFX NORMAL,
                                      126:XG SFX KIT,
                                      127:XG DRUM
c = 32      BANK SEL LSB          ; v = 0 - 127                          *3
c =  1      MODULATION            ; v = 0 - 127                          *2
c = 11      EXPRESSION            ; v = 0 - 127
c = 16      FOOT CONTROLLER       ; v = 0 - 127                          *2
c = 64      SUSTAIN SWITCH        ; v = 0-63:OFF , 64-127:ON             *2
c = 71      HARMONIC CONTENT      ; v = 0:-64  -  64:0  -  127:+63       *2
c = 72      RELEASE TIME          ; v = 0:-64  -  64:0  -  127:+63       *2
c = 73      ATTACK TIME           ; v = 0:-64  -  64:0  -  127:+         *2
c = 74      BRIGHTNESS            ; v = 0:-64  -  64:0  -  127:+63       *2
c = 00…95   ASSIGNABLE CONT       ; v = 0 - 127                          *2

* RECEIVED CONTROL NUMBERS
c =  0      BANK SEL MSB          ; v = 0:XG NORMAL,
                                        63:USER/PRESET PEROFRMANCE/VOICE,
                                        64:SFX NORMAL,
                                      126:XG SFX KIT,
                                      127:XG DRUM
c = 32      BANK SEL LSB          ; v = 0 - 127                          *3
c =  1      MODULATION            ; v = 0 - 127                          *2
c =  5      PORTAMENTO TIME       ; v = 0 - 127                          *2
c =  6      DATA ENTRY MSB        ; v = 0 - 127                          *1
c = 38      DATA ENTRY LSB        ; v = 0 - 127                          *1
c =  7      MAIN VOLUME           ; v = 0 - 127
c = 10      PANPOT                ; v = 0 - 127
c = 11      EXPRESSION            ; v = 0 - 127
c = 16      FOOT CONTROLLER       ; v = 0 - 127                          *2
c = 64      SUSTAIN SWITCH        ; v = 0-63:OFF , 64-127:ON             *2
c = 65      PORTAMENTO SWITCH     ; v = 0-63:OFF , 64-127:ON             *2
c = 66      SOSTENUTO             ; v = 0-63:OFF , 64-127:ON             *2
c = 67      SOFT PEDAL            ; v = 0-63:OFF , 64-127:ON             *2
c = 71      HARMONIC CONTENT      ; v = 0:-64  -  64:0  -  127:+63       *2
c = 72      RELEASE TIME          ; v = 0:-64  -  64:0  -  127:+63       *2
c = 73      ATTACK TIME           ; v = 0:-64  -  64:0  -  127:+63       *2
c = 74      BRIGHTNESS            ; v = 0:-64  -  64:0  -  127:+63       *2
c = 84      PORTAMENTO CONTROL    ; v = 0 - 127                          *2
c = 91      REVERB DEPTH          ; v = 0 - 127
c = 93      CHORUS DEPTH          ; v = 0 - 127
c = 94      VARIATION DEPTH       ; v = 0 - 127 (Only when System effect is used)
c = 96      DATA ENTRY INC        ; v = 127                              *1
c = 97      DATA ENTRY DEC        ; v = 127                              *1
c = 00…95   ASSIGNABLE CONT       ; v = 0 - 127                          *2

*1 Used only when assigning the parameter with RPN numbers.
*2 Ineffective with the drum voices.
*3 0 is selected, when the MSB value is other than 0 or 63.

   0,1,3,6,8,12,14,16,17,18,19,20,24,25,26,27,28,32,33,34,35,36,37,38,39,40,
   41,42,43,45,64,65,66,67,68,69,70,71,72,73,96,97,98,99,100,or 101 is selected, when the MSB
   value is 0.

   64(Preset Performance Bank1),65(User Performance Bank1 ),66(Preset Performance Bank2),
   67(User Performance Bank2) or 0-20(Voices for Performances) is selected, when the MSB
   value is 63 (In Performance Mode Only) .

MODULATION is used to control vibrato depth.

PORTAMENTO TIME sets the time it takes for the pitch to reach the next note played when
PORTAMENTO SWITCH (CONTROL #65) is set to on. 0 is the minimum time and 127 is the maximum.

PANPOT position relatively changes accordiong to the preset value for each normal/drum voice.
It is not effective for the sounds currently played.

PORTAMENTO TIME is fixed to 0 in PORTAMENTO CONTROL.

REVERB DEPTH controls reverb send level. CHORUS DEPTH controls chorus send level. VARIATION
DEPTH controls variation send level.

HARMONIC CONTENT adjusts the resonance preset for each voice. Setting a value adds to or
subtracts from the center value 64 since it is an offset parameter. The larger the value
more resonant sound will be produced. The effective range may be narrower than the range you
can designate depending on the selected voice.

RELEASE TIME adjusts the envelop release time preset for each voice. Setting a value adds to
or subtracts from the center value 64 since it is an offset parameter.

ATTACK TIME adjusts the envelop attack time preset for each voice. Setting a value adds to
or subtracts from the center value 64 since it is an offset parameter.

BRIGHTNESS adjusts the Low Pass Filter cutoff frequency preset for each voice. Setting a
value adds to or subtracts from the center value 64 since it is an offset parameter. The
smaller the value warmer sound will be produced. The effective range may be narrower than
the range you can designate depending on the selected voice.

When the program change message is received the following operations related to the bank
select are actually executed:

Bank selectMSB number is other than 0,40H,7EH or 7FH, Silence will be selected.
When the bank select MSB number is 0,40H,7EH or 7FH,  and the bank select LSB number is
illegal, the input will be ignored.
```

(3-2) CHANNEL MODE MESSAGES

```
STATUS          1011nnnn(BnH)           n = 0 ~ 15 VOICE CHANNEL NUMBER
CONTROL NUMBER  0ccccccc                c = CONTROL NUMBER
CONTROL VALUE   0vvvvvvv                v = DATA VALUE
```

(3-2-1) ALL SOUNDS OFF (CONTROL NUMBER = 78H, DATA VALUE = 0)

All the sounds currently played including the channel messages such as note-on and hold-on in a certain channel are muted when receiving this message.

(3-2-2) RESET ALL CONTROLLERS (CONTROL NUMBER = 79H , DATA VALUE = 0)
Resets the values set for the following controllers.

	Multi Mode	Performance Mode(Other than part5...16)
PITCH BEND CHANGE	0 (Center)	←
AFTER TOUCH	0 (Minimum)	←
POLYPHONIC AFTER	0 (Minimum)	←
MODULATION	0 (Minimum)	←
EXPRESSION	127 (Maximum)	←
SUSTAIN SWITCH	0 (Off)	←
SOSTENUTO SWITCH	0 (Off)	←
SOFT PEDAL	0 (Off)	←
NRPN	Not assigned; no change	
RPN	Not assigned; no change	
PORTAMENTO CONTROL	Reset	←
PORTAMENTO SWITCH	0 (Off)	1 (On)
FOOT CONTROLLER	Not reset	0 (Minimum)
VOLUME	Not reset	127 (Maximum)
PAN	Not reset	64(No effect)
REVERB DEPTH	Not reset	64(No effect)
CHORUS DEPTH	Not reset	64(No effect)
VARIATION DEPTH	Not reset	64(No effect)
VIBRATO SPEED(NRPN)	Not reset	64(No effect)
VIBRATO DEPTH(NRPN)	Not reset	64(No effect)
VIBRATO DELAY(NRPN)	Not reset	64(No effect)
AEG DECAY TIME(NRPN)	Not reset	64(No effect)

(3-2-3) ALL NOTES OFF (CONTROL NUMBER = 7BH , DATA VALUE = 0)
All the notes currently set to on in a certain channel are muted when receiving this message. However, if Hold 1 or Sostenute is on, notes will continue sounding until these are turned off.

(3-2-4) OMNI MODE OFF (CONTROL NUMBER = 7CH , DATA VALUE = 0)
Performs the same function as when receiving ALL NOTES OFF.

(3-2-5) OMNI MODE ON (CONTROL NUMBER = 7DH , DATA VALUE = 0)
Performs the same function as when receiving ALL NOTES OFF.

(3-2-6) MONO (CONTROL NUMBER = 7EH , DATA VALUE = 0)
Performs the same function as when receiving ALL SOUNDS OFF.
If the 3rd byte (mono) is within 0 through 16, the channel will be Mode4(m = 1).

(3-2-7) POLY (CONTROL NUMBER = 7FH , DATA VALUE = 0)
Performs the same function as when receiving ALL SOUNDS OFF. The channel will be Mode3.

(3-3) REGISTERED PARAMETER NUMBER

STATUS	1011nnnn(BnH)	n = 0 ~ 15 VOICE CHANNEL NUMBER
LSB	01100100(64H)	
RPN LSB	0ppppppp	p = RPN LSB(see chart below)
MSB	01100101(65H)	
RPN MSB	0qqqqqqq	q = RPN MSB(see chart below)
DATA ENTRY MSB	00000110(06H)	
DATA VALUE	0mmmmmmm	m = Data Value
DATA ENTRY LSB	00100110(26H)	
DATA VALUE	0lllllll	l = Data Value

First, designate the parameter using RPN MSB/LSB numbers.
Then, set its value with data entry MSB/LSB.

RPN LSB	RPN MSB	PARAMETER NAME	DATA RANGE
00H	00H	PITCH BEND SENSITIVITY	00H - 18H (0 - 24 semitones)
01H	00H	MASTER FINE TUNE	{mmH,llH} = {00H,00H} - {40H,00H} - {7FH,7FH} (-8192*100/8192) - 0 - (+8192*100/8192)
02H	00H	MASTER COARSE TUNE	28H - 40H - 58H (-24 - 0 - +24 semitones)
7FH	7FH	RPN RESET	Cancels RPN numbers. The internal value is not affected.

(3-4) NON-REGISTERED PARAMETER NUMBER

STATUS	1011nnnn(BnH)	n = 0 ~ 15 VOICE CHANNEL NUMBER
LSB	01100010(62H)	
RPN LSB	0ppppppp	p = NRPN LSB(see chart below)
MSB	01100011(63H)	
RPN MSB	0qqqqqqq	q = NRPN MSB(see chart below)
DATA ENTRY MSB	00000110(06H)	
DATA VALUE	0mmmmmmm	m = Data Value

First, designate the parameter using NRPN MSB/LSB numbers. Then, set its value with data entry MSB/LSB.

NRPN MSB	NRPN LSB	PARAMETER NAME	DATA RANGE
01H	08H	VIBRATO RATE	00H - 40H - 7FH (-64 - 0 - +63)
01H	09H	VIBRATO DEPTH	00H - 40H - 7FH (-64 - 0 - +63)
01H	0AH	VIBRATO DELAY	00H - 40H - 7FH (-64 - 0 - +63)
01H	20H	FILTER CUTOFF FREQUENCY	00H - 40H - 7FH (-64 - 0 - +63)
01H	21H	FILTER RESONANCE	00H - 40H - 7FH (-64 - 0 - +63)
01H	24H	HPF CUTOFF FREQ	00H - 40H - 7FH (-64 - 0 - +63)
01H	30H	EQ BASS GAIN	00H - 40H - 7FH (-64 - 0 - +63)
01H	31H	EQ TREBLE GAIN	00H - 40H - 7FH (-64 - 0 - +63)
01H	34H	EQ BASS FREQ	00H - 40H - 7FH (-64 - 0 - +63)
01H	35H	EQ TREBLE FREQ	00H - 40H - 7FH (-64 - 0 - +63)
01H	63H	EG ATTACK TIME	00H - 40H - 7FH (-64 - 0 - +63)
01H	64H	EG DECAY TIME	00H - 40H - 7FH (-64 - 0 - +63)
01H	66H	EG RELEASE TIME	00H - 40H - 7FH (-64 - 0 - +63)
14H	rrH	DRUM INST FILTER CUTOFF FREQ.	00H - 40H - 7FH (-64 - 0 - +63)
15H	rrH	DRUM INST FILTER RESONANCE	00H - 40H - 7FH (-64 - 0 - +63)
16H	rrH	DRUM INST AEG ATTACK RATE	00H - 40H - 7FH (-64 - 0 - +63)
17H	rrH	DRUM INST AEG DECAY RATE	00H - 40H - 7FH (-64 - 0 - +63)
18H	rrH	DRUM INST PITCH COARSE	00H - 40H - 7FH (-64 - 0 - +63)
19H	rrH	DRUM INST PITCH FINE	00H - 40H - 7FH (-64 - 0 - +63)
1AH	rrH	DRUM INST LEVEL	00H - 7FH (0 - Maximum)
1CH	rrH	DRUM INST PANPOT	00H ,01H - 40H - 7FH (random,left - center - right)
1DH	rrH	DRUM INST REVERB SEND LEVEL	00H - 7FH (0 - Maximum)
1EH	rrH	DRUM INST CHORUS SEND LEVEL	00H - 7FH (0 - Maximum)
1FH	rrH	DRUM INST VARIATION SEND LEVEL	00H - 7FH (0 - Maximum)
24H	rrH	DRUM INST HPF CUTOFF FREQ	00H - 40H - 7FH (-64 - 0 - +63)
30H	rrH	DRUM INST EQ BASS GAIN	00H - 40H - 7FH (-64 - 0 - +63)
31H	rrH	DRUM INST EQ TREBLE GAIN	00H - 40H - 7FH (-64 - 0 - +63)
34H	rrH	DRUM INST EQ BASS FREQ	00H - 40H - 7FH (-64 - 0 - +63)
35H	rrH	DRUM INST EQ TREBLE FREQ	00H - 40H - 7FH (-64 - 0 - +63)

MSB 14H-1FH(for drum voices) are effective only when the channel is assigned to the drum voice.
rrH : drum instrument note number

(3-5) SYSTEM REAL TIME MESSAGES

(3-5-1) ACTIVE SENSING
STATUS 11111110 (FEH)

Transmitted at every 175 msec.

Once this code is received, the CS1x starts sensing. When no status nor data is received for over approximately 350 ms, MIDI receiving buffer will be cleared, and the sounds currently played and the sustain switch are forcibly turned off. In this case, each control data will be reset to a certain value.

(3-5-2) TIMING CLOCK (Receive only)
STATUS 11111000 (F8H)

Selects whether the tempo clock of the Arpeggiator is controlled by internal clock or the timing clock of an external device via MIDI.

(3-6) SYSTEM EXCLUSIVE MESSAGE

(3-6-1) UNIVERSAL NON REALTIME MESSAGE

(3-6-1-1) GENERAL MIDI MODE ON
F0H 7EH 7FH 09H 01H F7H

The following controller values will be reset.

VOLUME	100
PAN	Center
PROGRAM CHANGE	1 (Grandpno)
BANK SELECT MSB	0
REVERB DEPTH	4
PITCH BEND CHANGE	0 (Center)
MODULATION	0 (Off)
EXPRESSION	127 (Maximum)
SUSTAIN SWITCH	0 (Off)
SOSTENUTO SWITCH	0 (Off)
RPN	Not assigned
PORTAMENTO CONTROL	Reset
MIDI MASTER VOLUME	127 (Maximum)
PITCH BEND SENSITIBITY	02 (2semitones)
FINE TUNING	0
COURSE TUNING	0

(3-6-1-2) IDENTITY REQUEST(Receive only)
F0H 7EH 0nH 06H 01H F7H (n = Device No. However, the CS1x can receive without the device Number setting)

(3-6-1-3) IDENTITY REPLY (Transmit only)
F0H 7EH 7FH 06H 02H 43H 00H 41H ddH ddH 00H 00H 00H vvH F7H

dd;Device Number Code	CS2x:4F 03
vv;TG Support Level	CS2x:01(XG)

(3-6-2) UNIVERSAL REALTIME MESSAGE

(3-6-2-1) MIDI MASTER VOLUME
F0H 7FH 7FH 04H 01H llH mmH F7H

Sets the MASTER VOLUME value.
The value "mm" is used to set the master volume (the value "ll" will be ignored).

(3-6-3) PARAMETER CHANGE

(3-6-3-1) MIDI MASTER TUNING
F0H 43H 1nH 27H 30H 00H 00H mmH llH ccH F7H

Sets the MASTER TUNING value.
The values "mm" and "ll" are used to set the master tuning (the values "n" and "cc" will be ignored).

T = M*200/256-100

"T " indicates the actual tuning value.(-99 - +99)
"M" is the one byte value consisting of MSB, 0 - 3 bits of "mm", and LSB, 0 - 3 bits of "ll".

(3-6-3-2) XG SYSTEM ON

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0001nnnn	1n	device Number
01001100	4C	Model ID
0aaaaaaa	00	Address High
0aaaaaaa	00	Address Mid
0aaaaaaa	7E	Address Low
00000000	00	Data
11110111	F7	End of Exclusive

When receiving this message, the internal tone generator will be reset to XG SYSTEM ON. Since approximately 50ms is required to execute this message, be sure to leave an appropriate interval before the subsequent message.All the parameters will be initialized and reset to each default values.

(3-6-3-3) XG PARMETER CHANGE

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0001nnnn	1n	device Number
01001100	4C	Model ID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
0ddddddd	ddddddd	Data
|	|	
11110111	F7	End of Exclusive

For parameters with data size of 2 or 4, transmit the appropriate number of data bytes. See MIDI Data Table for Address and Byte Count.

The following four types of data are transmitted/received (Transmitted only when receiving parameter change request).
XG System Data
Multi Effect Data(ignored in Performance Mode)
Multi Part Data(ignored with Part 1 - 4 in Performance Mode)
Drums Setup Data

(3-6-3-4) CS2x NATIVE PARMETER CHANGE

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0001nnnn	1n	device Number
01001011	63	Model ID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
0ddddddd	ddddddd	Data
|	|	
11110111	F7	End of Exclusive

For parameters with data size of 2 or 4, transmit the appropriate number of data bytes. See MIDI Data Table for Address and Byte Count.

The following two types of data are received.
CS2x System Data
Current Performance Data (ignored in Multi Mode)

(3-6-4) BULK DUMP

(3-6-4-1) XG BULK DUMP

11110000	F0	Exclusive status
01000011	43	YAMAHA ID
0000nnnn	0n	device Number
01001100	4C	Model ID
0bbbbbbb	bbbbbbb	ByteCount
0bbbbbbb	bbbbbbb	ByteCount
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
00000000	00	Data
0ccccccc	ccccccc	Check-sum
11110111	F7	End of Exclusive

See MIDI Data Table for Address and Byte Count.
The Check sum is the value that results in a value of 0 for the lower 7 bits when the Byte Count, Start Address, Data and Check sum itself are added. Don't send the data more than 513 bytes at one time. When the Dump request with the data more than 513 bytes is received, be sure to divide the data into appropriate sizes and send them with appropriate intervals (over 120 ms).

The following five types of data are transmitted/received (Transmitted only when receiving bulk dump request).
- System Data
- Multi Effect Data(each effect)(ignored in Performance Mode)
- Multi Part Data(each Part)(ignored with Part 1 - 4 in Performance Mode)
- Drums Setup Data(each note)
- System Information(Transmit only)

(3-6-4-2) CS2x NATIVE BULK DUMP

11110000	F0	Exclusivestatus
01000011	43	YAMAHAID
0000nnnn	0n	deviceNumber
01001011	63	ModelID
0bbbbbbb	bbbbbbb	ByteCount
0bbbbbbb	bbbbbbb	ByteCount
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
00000000	00	Data
0ccccccc	ccccccc	Check-sum
11110111	F7	End of Exclusive

The following four types of data are transmitted/received (Transmitted only when receiving bulk dump request).
- CS2x System Data
- User Performance Common Data
- User Performance Layer Data
- Current Performance Data (ignored in Multi Mode)

(3-6-4-3) CS1x NATIVE BULK DUMP

CS1x Current/User Performance Bulk data are received.

(3-6-5) DUMP REQUEST

(3-6-5-1) XG DUMP REQUEST

11110000	F0	Exclusivestatus
01000011	43	YAMAHAID
0010nnnn	2n	deviceNumber
01001100	4C	ModelID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
11110111	F7	End of Exclusive

See MIDI Data Table for Address and Byte Count.

The following five types of data are received.
- System Data
- Multi Effect Data(each effect)(ignored in Performance Mode)
- Multi Part Data(each Part)(ignored with Part 1 - 4 in Performance Mode)
- Drums Setup Data(each note)
- System Information

(3-6-5-2) CS2x NATIVE DUMP REQUEST

11110000	F0	Exclusivestatus
01000011	43	YAMAHAID
0010nnnn	2n	deviceNumber
01001011	63	ModelID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
11110111	F7	End of Exclusive

See MIDI Data Table for Address and Byte Count.
The following four types of data are received.
- CS2x System Data
- User Performance Common Data
- User Performance Layer Data
- Current Performance Data (ignored in Multi Mode)

(3-6-6) XG PARAMETER REQUEST

11110000	F0	Exclusivestatus
01000011	43	YAMAHAID
0011nnnn	3n	deviceNumber
01001100	4C	Model ID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
11110111	F7	End of Exclusive

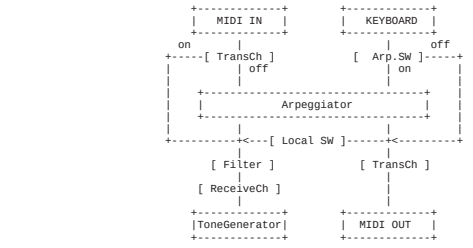
See MIDI Data Tabl for Address and Byte Count.
The following four types of data are received.
- System Data
- Multi Effect Data(ignored in Performance Mode)
- Multi Part Data(ignored with Part 1 - 4 in Performance Mode)
- Drums Setup Data

(3-6-7) CS2x NATIVE PARAMETER REQUEST

11110000	F0	Exclusivestatus
01000011	43	YAMAHAID
0011nnnn	3n	deviceNumber
01001011	63	ModelID
0aaaaaaa	aaaaaaa	Address High
0aaaaaaa	aaaaaaa	Address Mid
0aaaaaaa	aaaaaaa	Address Low
11110111	F7	End of Exclusive

See MIDI Data Table for Address and Byte Count.
The following two types of data are received.
- CS2x System Data
- Current Performance Data (ignored in Multi Mode)

(4) CONFIGURATION OF KEYBOARD, ARPEGGIATOR AND TONE GENERATOR



The tone generator will respond to both control data received via MIDI and generated by the CS2x, such as sustain and sostenuto.

ALL SOUNDS OFF clears all the sounds in the specific channel played by both the keyboard and the data via MIDI.

MIDI Data Table <1-1>

Parmeter Bass Address

	Parameter Change Address (H)	(M)	(L)	Description				
SYSTEM	00	00	00	System				
	00	00	7D	Drum Setup Reset				
	00	00	7E	XG System On				
	00	00	7F	All Parameter Reset				
INFORMATION	01	00	00	System Information				
EFFECT 1	02	01	00	Effect1(Reverb,Chorus,Variation)				
	02	40	00	Reserved				
	:	:	:	:				
MULTI PART	08	00	00	Multi Part 1				
	:			:				
	08	0F	00	Multi Part 16				
	08	10	00	Reserved				
	:	:	:	:				
DRUM	30	0D	00	Drum Setup 1 ----------> Address			Parameter	
	31	0D	00	Drum Setup 2	:		:	
	3n	0D	00	note number 13				
	32	0D	00	Reserved	3n	0E	00	note number 14
	:	:	:	:				:
	3F	nn	nn	Reserved	3n	5B	00	note number 91

MIDI Data Table <1-2>

MIDI Parameter Change table (SYSTEM)

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
00 00 00	4	0000	Master Tune	-102.4..+102.3[cent]	00 04 00 00
01		..07FF		1st bit3-0→bit15-12	(0400)
02				2nd bit3-0→bit11-8	(Not to be reset with XGSysytem on or GM on)
03				3rd bit3-0→bit7-4 4th bit3-0→bit3-0	
04	1	00..7F	Master Volume	0..127	7F
05	1	00..7F	Not Used		00
06	1	28..58	Transpose	-24..+24[semitones]	40
7D	1	n	Drum Setup Reset n=Drum Setup Number (Receive only)		
7E	1	00	XG System On 00=XG Sytem on (Receive only)		
7F	1	00	All Parameter Reset 00=on (Receive only)		
TOTAL SIZE 07					

MIDI Data Table <1-3>

MIDI Parameter table (System information)

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
01 00 00	E	20..7F	Model Name	32..127(ASCII)	(CS2x)
		:			
0E	1	00..7F	XG Level1		
0F	1	00..7F	XG Level2		

TOTAL SIZE 10
(Transmitted by Dump Request. Bulk Dump Only. No reception.)

MIDI Data Table <1-4>

MIDI Parameter Change table (EFFECT 1)

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
02 01 00	2	00..7F	Reverb Type MSB	see Effect Type List	01(=HALL1)
		00..7F	Reverb Type LSB	00 :basic type	00
02	1	00..7F	Reverb Parameter 1	see Effect Parameter List	depends on Reverb type
03	1	00..7F	Reverb Parameter 2	〃	〃
04	1	00..7F	Reverb Parameter 3	〃	〃
05	1	00..7F	Reverb Parameter 4	〃	〃
06	1	00..7F	Reverb Parameter 5	〃	〃
07	1	00..7F	Reverb Parameter 6	〃	〃
08	1	00..7F	Reverb Parameter 7	〃	〃
09	1	00..7F	Reverb Parameter 8	〃	〃
0A	1	00..7F	Reverb Parameter 9	〃	〃
0B	1	00..7F	Reverb Parameter 10	〃	〃
0C	1	00..7F	Reverb Return	-°..0..+6dB(0..96..127)	40
0D	1	01..7F	Reverb Pan	L63..C..R63(1..64..127)	40
TOTAL SIZE 0E					
02 01 10	1	00..7F	Reverb Parameter 11	see Effect Parameter List	depends on Reverb type
11	1	00..7F	Reverb Parameter 12	〃	〃
12	1	00..7F	Reverb Parameter 13	〃	〃
13	1	00..7F	Reverb Parameter 14	〃	〃
14	1	00..7F	Reverb Parameter 15	〃	〃
15	1	00..7F	Reverb Parameter 16	〃	〃
TOTAL SIZE 6					
02 01 20	2	00..7F	Chorus Type MSB	see Effect Type List	41(=Chorus1)
		00..7F	Chorus Type LSB	00 :basic type	00
22	1	00..7F	Chorus Parameter 1	see Effect Parameter List	depends on Chorus Type
23	1	00..7F	Chorus Parameter 2	〃	〃
24	1	00..7F	Chorus Parameter 3	〃	〃
25	1	00..7F	Chorus Parameter 4	〃	〃
26	1	00..7F	Chorus Parameter 5	〃	〃
27	1	00..7F	Chorus Parameter 6	〃	〃
28	1	00..7F	Chorus Parameter 7	〃	〃
29	1	00..7F	Chorus Parameter 8	〃	〃
2A	1	00..7F	Chorus Parameter 9	〃	〃
2B	1	00..7F	Chorus Parameter 10	〃	〃
2C	1	00..7F	Chorus Return	-°..0..+6dB(0..96..127)	40
2D	1	01..7F	Chorus Pan	L63..C..R63(1..64..127)	40
2E	1	00..7F	Send ChoToRev	-°..0..+6dB(0..96..127)	00
TOTAL SIZE 0F					
02 01 30	1	00..7F	Chorus Parameter 11	see Effect Parameter List	depends on Chorus Type
31	1	00..7F	Chorus Parameter 12	〃	〃
32	1	00..7F	Chorus Parameter 13	〃	〃
33	1	00..7F	Chorus Parameter 14	〃	〃
34	1	00..7F	Chorus Parameter 15	〃	〃
35	1	00..7F	Chorus Parameter 16	〃	〃
TOTAL SIZE 6					
02 01 40	2	00..7F	Vari. Type MSB	see Effect Type List	05(=DELAY L,C,R)
		00..7F	Vari. Type LSB	00 : basic type	00
42	2	00..7F	Vari. Param 1 MSB	see Effect Parameter List	depends on vari. type
		00..7F	Vari. Param 1 LSB	〃	〃
44	2	00..7F	Vari. Param 2 MSB	〃	〃
		00..7F	Vari. Param 2 LSB	〃	〃
46	2	00..7F	Vari. Param 3 MSB	〃	〃
		00..7F	Vari. Param 3 LSB	〃	〃
48	2	00..7F	Vari. Param 4 MSB	〃	〃
		00..7F	Vari. Param 4 LSB	〃	〃
4A	2	00..7F	Vari. Param 5 MSB	〃	〃
		00..7F	Vari. Param 5 LSB	〃	〃
4C	2	00..7F	Vari. Param 6 MSB	〃	〃
		00..7F	Vari. Param 6 LSB	〃	〃
4E	2	00..7F	Vari. Param 7 MSB	〃	〃
		00..7F	Vari. Param 7 LSB	〃	〃
50	2	00..7F	Vari. Param 8 MSB	〃	〃
		00..7F	Vari. Param 8 LSB	〃	〃
52	2	00..7F	Vari. Param 9 MSB	〃	〃
		00..7F	Vari. Param 9 LSB	〃	〃
54	2	00..7F	Vari. Param 10 MSB	〃	〃
		00..7F	Vari. Param 10 LSB	〃	〃
56	1	01..7F	Vari. Return	-°..0..+6dB(0..96..127)	40
57	1	01..7F	Vari. Pan	L63..C..R63(1..64..127)	40
58	1	00..7F	Send Vari. To Rev.	-°..0..+6dB(0..96..127)	00
59	1	00..7F	Send Vari. To Cho.	-°..0..+6dB(0..96..127)	00
5A	1	00..01	Vari. Connection	0:insertion,1:system	00
5B	1	00..1F	Vari. Part	part1..16(0..15),off(127)	7F
5C	1	01..7F	MW Vari.Ctrl Depth	-63..+63	40
5D	1	01..7F	PB Vari.Ctrl Depth	-63..+63	40
5E	1	01..7F	AT Vari.Ctrl Depth	-63..+63	40
5F	1	01..7F	FC Vari.Ctrl Depth	-63..+63	40
60	1	01..7F	AC2 Vari. CtrlDepth	-63..+63	40
TOTAL SIZE 21					
02 01 70	1	00..7F	Vari. Parameter 11	option Parameter	depends on vari. type
71	1	00..7F	Vari. Parameter 12	〃	〃
72	1	00..7F	Vari. Parameter 13	〃	〃
73	1	00..7F	Vari. Parameter 14	〃	〃
74	1	00..7F	Vari. Parameter 15	〃	〃
75	1	00..7F	Vari. Parameter 16	〃	〃
TOTAL SIZE 6					

MIDI Data Table <1-5>

MIDI Parameter Change table (MULTI PART)

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
08 nn 00	1	00..40	Element Reserve	0..64	0(Part10),2(Others)
nn 01	1	00..7F	Bank Select MSB	0..127	7F(Part10),00(Others)
nn 02	1	00..7F	Bank Select LSB	0..127	00
nn 03	1	00..7F	Program Number	1..128	00
nn 04	1	00..7F	Rcv Channel	0..15;1..16,127;off	Part No.
nn 05	1	00..01	Mono/Poly Mode	0:mono,1:poly	01
nn 06	1	00..02	Same Note Number Key On Assign	0:single 1:multi 2:inst (for DRUM)	01
nn 07	1	00..03	Part Mode	0:normal 1..3:drum thru,drum1..2	00 (Other than Part10) 02 (Part10)
nn 08	1	28..58	Note Shift	-24..+24[semitones]	40
nn 09	2	00..FF	Detune	-12.8..+12.7[Hz]	08 00
nn 0A				1st bit3..0→bit7..4 2nd bit3..0→bit3..0	(80)
nn 0B	1	00..7F	Volume	0..127	64
nn 0C	1	00..7F	Velocity Sense Depth	0..127	40
nn 0D	1	00..7F	Velocity Sense Offset	0..127	40
nn 0E	1	00..7F	Pan	0:random L63..C..R63(1..64..127)	40
nn 0F	1	00..7F	Note Limit Low	C-2..G8	00
nn 10	1	00..7F	Note Limit High	C-2..G8	7F
nn 11	1	00..7F	Dry Level	0..127	7F
nn 12	1	00..7F	Chorus Send	0..127	00
nn 13	1	00..7F	Reverb Send	0..127	28
nn 14	1	00..7F	Variation Send	0..127	00
nn 15	1	00..7F	Vibrato Rate	-64..+63	40
nn 16	1	00..7F	Vibrato Depth	-64..+63	40
nn 17	1	00..7F	Vibrato Delay	-64..+63	40
nn 18	1	00..7F	Filter Cutoff Freq.	-64..+63	40
nn 19	1	00..7F	Filter Resonance	-64..+63	40
nn 1A	1	00..7F	EG Attack Time	-64..+63	40
nn 1B	1	00..7F	EG Decay Time	-64..+63	40
nn 1C	1	00..7F	EG Release Time	-64..+63	40
nn 1D	1	28..58	MW Pitch Control	-24..+24[semitones]	40
nn 1E	1	00..7F	MW Filter Control	-9600..+9450[cent]	40
nn 1F	1	00..7F	MW Amp. Control	-100..+100[%]	40
nn 20	1	00..7F	MW LFO PMod Depth	0..127	0A
nn 21	1	00..7F	MW LFO FMod Depth	0..127	00
nn 22	1	00..7F	MW LFO AMod Depth	0..127	00
nn 23	1	28..58	Bend Pitch Control	-24..+24[semitones]	42
nn 24	1	00..7F	Bend Filter Control	-9600..+9450[cent]	40
nn 25	1	00..7F	Bend Amp. Control	-100..+100[%]	40
nn 26	1	00..7F	Bend LFO PMod Depth	0..127	00
nn 27	1	00..7F	Bend LFO FMod Depth	0..127	00
nn 28	1	00..7F	Bend LFO AMod Depth	0..127	00
TOTAL SIZE 29					
nn 30	1	00..01	Rcv Pitch Bend	off/on	01
nn 31	1	00..01	Rcv Ch After Touch	off/on	01
nn 32	1	00..01	Rcv Program Change	off/on	01
nn 33	1	00..01	Rcv Control Change	off/on	01
nn 34	1	00..01	Rcv Key's After Touch	off/on	01
nn 35	1	00..01	Rcv Note Message	off/on	01
nn 36	1	00..01	Rcv RPN	off/on	01
nn 37	1	00..01	Rcv NRPN	off/on	01(XG),00(GM)
nn 38	1	00..01	Rcv Modulation	off/on	01
nn 39	1	00..01	Rcv Volume	off/on	01
nn 3A	1	00..01	Rcv Pan	off/on	01
nn 3B	1	00..01	Rcv Expression	off/on	01
nn 3C	1	00..01	Rcv Hold1	off/on	01
nn 3D	1	00..01	Rcv Portamento	off/on	01
nn 3E	1	00..01	Rcv Sostenute	off/on	01
nn 3F	1	00..01	Rcv Soft Pedal	off/on	01
nn 40	1	00..01	Rcv Bank Select	off/on	01(XG),00(GM)
nn 41	1	00..7F	Scale Tuning C	-64..+63[cent]	40
nn 42	1	00..7F	Scale Tuning C#	-64..+63[cent]	40
nn 43	1	00..7F	Scale Tuning D	-64..+63[cent]	40
nn 44	1	00..7F	Scale Tuning D#	-64..+63[cent]	40
nn 45	1	00..7F	Scale Tuning E	-64..+63[cent]	40
nn 46	1	00..7F	Scale Tuning F	-64..+63[cent]	40
nn 47	1	00..7F	Scale Tuning F#	-64..+63[cent]	40
nn 48	1	00..7F	Scale Tuning G	-64..+63[cent]	40
nn 49	1	00..7F	Scale Tuning G#	-64..+63[cent]	40
nn 4A	1	00..7F	Scale Tuning A	-64..+63[cent]	40
nn 4B	1	00..7F	Scale Tuning A#	-64..+63[cent]	40
nn 4C	1	00..7F	Scale Tuning B	-64..+63[cent]	40
nn 4D	1	28..58	Ch's AT Pitch Cntrl	-24..+24[semitones]	40
nn 4E	1	00..7F	Ch's AT Filter Cntrl	-9600..+9450[cent]	40
nn 4F	1	00..7F	Ch's AT Amp. Cntrl	-100..+100[%]	40
nn 50	1	00..7F	Ch's AT LFO PMod	0..127	00
nn 51	1	00..7F	Ch's AT LFO FMod	0..127	00
nn 52	1	00..7F	Ch's AT LFO AMod	0..127	00
nn 53	1	28..58	Key's AT Pitch Cntrl	-24..+24[semitones]	40
nn 54	1	00..7F	Key's AT Filter Cntrl	-9600..+9450[cent]	40
nn 55	1	00..7F	Key's AT Amp. Cntrl	-100..+100[%]	40
nn 56	1	00..7F	Key's AT LFO PMod	0..127	00
nn 57	1	00..7F	Key's AT LFO FMod	0..127	00
nn 58	1	00..7F	Key's AT LFO AMod	0..127	00
nn 59	1	00..5F	AC1(FC) Cntrl Number	0..95	10
nn 5A	1	28..58	AC1(FC) Pitch Cntrl	-24..+24[semitones]	40
nn 5B	1	00..7F	AC1(FC) Filter Cntrl	-9600..+9450[cent]	40
nn 5C	1	00..7F	AC1(FC) Amp. Cntrl	-100..+100[%]	40
nn 5D	1	00..7F	AC1(FC) LFO PMod	0..127	00
nn 5E	1	00..7F	AC1(FC) LFO FMod	0..127	00
nn 5F	1	00..7F	AC1(FC) LFO AMod	0..127	00
nn 60	1	00..5F	AC2 Cntrl Number	0..95	11
nn 61	1	28..58	AC2 Pitch Cntrl	-24..+24[semitones]	40
nn 62	1	00..7F	AC2 Filter Cntrl	-9600..+9450[cent]	40
nn 63	1	00..7F	AC2 Amp. Cntrl	-100..+100[%]	40
nn 64	1	00..7F	AC2 LFO PMod	0..127	00
nn 65	1	00..7F	AC2 LFO FMod	0..127	00
nn 66	1	00..7F	AC2 LFO AMod	0..127	00

```
   nn 67  1    00..01   Portamento Switch      off/on                    00
   nn 68  1    00..7F   Portamento Time        0..127                    00
   nn 69  1    00..7F   PitchEG Initial Level  -64..+63                  40
   nn 6A  1    00..7F   PitchEG Attack Time    -64..+63                  40
   nn 6B  1    00..7F   PitchEG Release Level  -64..+63                  40
   nn 6C  1    00..7F   PitchEG Release Time   -64..+63                  40
   nn 6D  1    00..7F   Velocity Limit Low     1..127                    01
   nn 6E  1    00..7F   Velocity Limit High    1..127                    7F
TOTAL  SIZE 3F

   nn 70  1             NotUsed                                         --
   nn 71  1             NotUsed                                         --
   nn 72  1    00..7F   EQ Bass Gain           -12..+12[db]              40
   nn 73  1    00..7F   EQ Treble Gain         -12..+12[db]              40
TOTAL  SIZE 4


   nn 74  1             NotUsed                                         --
   nn 75  1             NotUsed                                         --
   nn 76  1    04..28   EQ Bass Freq           32..2.0[KHz]              0C
   nn 77  1    1C..3A   EQ Treble Freq         500..16.0[KHz]            36
   nn 78  1             NotUsed                                         --
   nn 79  1             NotUsed                                         --
   nn 7A  1             NotUsed                                         --
   nn 7B  1             NotUsed                                         --
   nn 7C  1             NotUsed                                         --
   nn 7D  1             NotUsed                                         --
   nn 7E  1             NotUsed                                         --
   nn 7F  1             NotUsed                                         --
TOTAL  SIZE C

0A nn 20  1    00..7F   HPF Cutoff Freq        -64..+63                  40
   nn 21  1             NotUsed                                         --

TOTAL  SIZE 2

nn = PartNumber
When a drum voice is assigned to the Part, the following parameters are not effective with the
selected Part.
  •Bank Select LSB
  •Amp EG
  •Portamento
  •Soft Pedal
  •Mono/Poly
  •Scale Tuning
  •Pitch EG
  •FIlter Modulation Depth ( FMOD DEPTH )
  •Amplitude Modulation Depth ( AMD DEPTH )
```

MIDI Data Table <1-6>

MIDI Parameter Change table (DRUM SETUP)

```
Address   Size Data     Prameter Name          Description               Default
(H)       (H)  (H)                                                      value(H)
3n rr 00  1    00..7F   Pitch Coarse           -64..+63                  40
3n rr 01  1    00..7F   Pitch Fine             -64..+63[cent]            40
3n rr 02  1    00..7F   Level                  0..127                    Depend on the Note
3n rr 03  1    00..7F   Alternate Group        0:off,1..127              Depend on the Note
3n rr 04  1    00..7F   Pan                    0:random                  Depend on the Note
                                               L63..C..R63(1..64..127)
3n rr 05  1    00..7F   Reverb Send Level      0..127                    Depend on the Note
3n rr 06  1    00..7F   Chorus Send Level      0..127                    Depend on the Note
3n rr 07  1    00..7F   Variation Send Level   0..127                    7F
3n rr 08  1    00..01   Key Assign             0;single,1;multi          00
3n rr 09  1    00..01   Rcv Note Off           off/on                    Depend on the Note
3n rr 0A  1    00..01   Rcv Note On            off/on                    01
3n rr 0B  1    00..7F   Filter Cutoff Freq.    -64..63                   40
3n rr 0C  1    00..7F   Filter Resonance       -64..63                   40
3n rr 0D  1    00..7F   EG Attack Rate         -64..63                   40
3n rr 0E  1    00..7F   EG Decay1 Rate         -64..63                   40
3n rr 0F  1    00..7F   EG Decay2 Rate         -64..63                   40
TOTAL  SIZE 10

3n rr 20  1    00..7F   EQ Bass Gain           -12..+12[db]              40
3n rr 21  1    00..7F   EQ Treble Gain         -12..+12[db]              40
3n rr 22               Not Used
3n rr 23               Not Used
3n rr 24  1    04..28   EQ Bass Freq           32..2.0[KHz]              0C
3n rr 25  1    1C..3A   EQ Treble Freq         500..16[KHz]              36
3n rr 26               Not Used
3n rr 27               Not Used
3n rr 28               Not Used
3n rr 29               Not Used
3n rr 2A               Not Used
3n rr 2B               Not Used
3n rr 2C               Not Used
3n rr 2D               Not Used
TOTAL  SIZE 0E

3n rr 50  1    00..7F   HPF Cutoff Freq        -64..63                   40
3n rr 51               Not Used
TOTAL  SIZE 02

3n rr 60  1    30..50   Velocity Sense Pitch   -64..63                   Depend on the Note
3n rr 61  1    30..50   Velocity LPF Cutoff    -64..63                   Depend on the Note
TOTAL  SIZE 02


n:Drum Setup Number 0 - 1
rr:note number(0D - 5B)
When receiving XG system on or GMon message, the Drum Setup Parameters will be initialized.
Each Drum Setup Parameter can be initialized by Drum Setup Reset message.
```

MIDI Data Table <1-7>

Effect Type List

*The figures in [ ] indicate the order to be displayed in the LCD while type selection.

```
REVERB TYPE
TYPE MSB    TYPE LSB
DEC HEX     00                  01                  02
000 0       [00]No Effect
001 1       [01]Rev Hall1       [02]Rev Hall2
002 2       [03]Rev Room1       [04]Rev Room2       [05]Rev Room3
003 3       [06]Rev Stage1      [07]Rev Stage2
004 4       [08]Rev Plate
005 5       No Effect
  : :        :
015 F       No Effect
016 10      [09]Rev WhiteRm
017 11      [10]Rev Tunnel
018 12      [11]Canyon
019 13      [12]Rev Basement
020 14      No Effect
  : :        :
127 7F      No Effect


CHORUS TYPE
TYPE MSB    TYPE LSB
DEC HEX     00                  01                  02                  08
000 0       [00]No Effect
001 1       No Effect
  : :        :
064 40      No Effect
065 41      [01]Chorus1         [02]Chorus2         [03]Chorus3         [04]Chorus4
066 42      [05]Celeste1        [06]Celeste2        [07]Celeste3        [08]Celeste4
067 43      [09]Flanger1        [10]Flanger2                            [11]Flanger3
068 44      [12]Synphonic
069 45      No Effect
  : :        :
072 48      [14]Phaser1
  : :        :
087 57      [13]Ensemble Detune
  : :        :
127 7F      No Effect


VARIATION TYPE(0-63)
TYPE MSB    TYPE LSB
DEC HEX     00                  01                  02
000 0       [00]No Effect
001 1       [01]Rev Hall1       [02]Rev Hall2
002 2       [03]Rev Room1       [04]Rev Room2       [05]Rev Room3
003 3       [06]Rev Stage1      [07]Rev Stage2
004 4       [08]Rev Plate
005 5       [13]DelayL,C,R
006 6       [14]Delay L,R
007 7       [15]Echo
008 8       [16]CrossDelay
009 9       [17]EarlyRef1       [18]EarlyRef2
010 A       [19]GateReverb
011 B       [20]ReversGate
012 C       No Effect(sys),THRU(ins)
  : :        :
016 10      [09]WhiteRoom
017 11      [10]Tunnel
018 12      [11]Canyon
019 13                          [12]Basement
020 14      [21]RevKaraok1      [22]RevKaraok2      [23]RevKaraok3
021 15      No Effect(sys),THRU(ins)
  : :        :
063 3F      No Effect(sys),THRU(ins)

VARIATION TYPE(64-127)
TYPE MSB    TYPE LSB
DEC HEX     00                  01                  02                  08
064 40      [63]THRU
065 41      [24]Chorus1         [25]Chorus2         [26]Chorus3         [27]Chorus4
066 42      [28]Celeste1        [29]Celeste2        [30]Celeste3        [31]Celeste4
067 43      [32]Flanger1        [33]Flanger2                            [34]Flanger3
068 44      [35]Symphonic
069 45      [38]RotarySp.
070 46      [40]Tremolo
071 47      [41]Auto PAN
072 48      [42]Phaser1                                                 [43]Phaser2
073 49      [44]Distortion      [45]Comp+Dist
074 4A      [46]Overdrive
075 4B      [47]G-Amp.Sim.
076 4C      [48]3 Band EQ
077 4D      [49]2 Band EQ
078 4E      [50]Auto Wah        [51]AutoWh+Dis      [52]AutoWah+OVDR
079 4F      THRU
080 50      [57]PitchChng1      [58]PitchChng2
081 51      [59]HM-Enhncer
082 52      [53]TouchWah1       [55]TchWh+DIST      [56]TchWh+OVDR      [54]TouchWah2
083 53      [60]Compressor
084 54      [61]NoiseGate
085 55      [62]VceCancel
086 56      [39]2wayRtrySp
087 57      [36]EnsmblDetune
088 58      [37]Ambience
089 59      THRU
  : :        :
127 7F      THRU
```

MIDI Data Table <2-1>

Parameter Bass Address

```
                        Parameter Change
                        Address
                        (H) (M) (L)  Description
SYSTEM                  50  00  00   CS2x System
Current Performance     60  00  00   Current Performance Common
                        60  01  00   Current Performance Layer1
                        60  02  00   Current Performance Layer2
                        60  03  00   Current Performance Layer3
                        60  04  00   Current Performance Layer4
User Perf.Bank1 1       70  00  00   User Performance Common
             :          71  00  00   User Performance Layer1
             :          72  00  00   User Performance Layer2
             :          73  00  00   User Performance Layer3
             :          74  00  00   User Performance Layer4
             :
User Perf.Bank1 128     70  7F  00   User Performance Common
             :          71  7F  00   User Performance Layer1
             :          72  7F  00   User Performance Layer2
             :          73  7F  00   User Performance Layer3
             :          74  7F  00   User Performance Layer4

User Perf.Bank2 1       78  00  00   User Performance Common
             :          79  00  00   User Performance Layer1
             :          7A  00  00   User Performance Layer2
             :          7B  00  00   User Performance Layer3
             :          7C  00  00   User Performance Layer4
             :
User Perf.Bank2 128     78  7F  00   User Performance Common
             :          79  7F  00   User Performance Layer1
             :          7A  7F  00   User Performance Layer2
             :          7B  7F  00   User Performance Layer3
             :          7C  7F  00   User Performance Layer4
```

MIDI Data Table <2-2>

MIDI Parameter Change table (CS2x SYSTEM)

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
50 00 00	1	00...10	Performance RcvChannel	1(0)...16(f)	0(1)
01	1		reserved		
02	1		reserved		
03	1		reserved		
04	1	00...11	Midi Device Number	1(0)...16(f),all(10),off(11)	10(all)
05	1		reserved		
06	1	00...03	Sound Module Mode	TG300B(0),XG(1),PFM(3)	3(PFM)
07	1	1C...64	Keyboard Transpose	-36...+36(semitones)	40(+0)
08	1	00...05	Keyboard Velocity Curve	norm(0)hard(5)	00(norm)
09	1	00...7F	Keyboard Fix Velocity	off(0),1..127	00(off)
0a	1	00...0F	Keyboard TransChannel	1(0)...16(f)	0(1)
0b	1	00...01	Midi Local	off(0),on(1)	1(on)
0c	1	00...61	MW Control Number	0...95	1
0d	1	00...61	FC Control Number	0...95	10
0e	1	00...61	FV Control Number	0...95	0B
0f	1	00...5F	Knob1 Control Number	0...95	49
10	1	00...5F	Knob2 Control Number	0...95	50
11	1	00...5F	Knob3 Control Number	0...95	48
12	1	00...5F	Knob4 Control Number	0...95	11
13	1	00...5F	Knob5 Control Number	0...95	51
14	1	00...5F	Knob6 Control Number	0...95	4a
15	1	00...5F	Knob7 Control Number	0...95	47
16	1	00...5F	Knob8 Control Number	0...95	12
17	1	00...61	Foot Sw Control Number	0...95	40
18	1	00...01	Scene Controller	MW(0),FC(1)	0(MW)
19	1	00...03	Scene Mode	off(0),S1Sw(1),S2Sw(2),S.Ctl(3)	0(off)
Total size 1A					

MIDI Data Table <2-3>

MIDI Parameter Change table (Current Performance Common)

Address (H)(H)(H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
60 00 00	1	20...7F	Performance Name 1	Ascii Code	I
01	1	20...7F	Performance Name 2	Ascii Code	n
02	1	20...7F	Performance Name 3	Ascii Code	i
03	1	20...7F	Performance Name 4	Ascii Code	t
04	1	20...7F	Performance Name 5	Ascii Code	P
05	1	20...7F	Performance Name 6	Ascii Code	e
06	1	20...7F	Performance Name 7	Ascii Code	r
07	1	20...7F	Performance Name 8	Ascii Code	f
08	1	00...16	Performance Category	--,Pf...Sq	-(00)
09	1	00...7F	Common Volume	0...127	64(100)
0a	1	00...7F	Scene1 For Knob1	-64...+63	40(+0)
0b	1	00...7F	Scene1 For Knob2	-64...+63	40(+0)
0c	1	00...7F	Scene1 For Knob3	-64...+63	40(+0)
0d	1	00...7F	Scene1 For Knob4	-64...+63	40(+0)
0e	1	00...7F	Scene1 For Knob5	-64...+63	40(+0)
0f	1	00...7F	Scene1 For Knob6	-64...+63	40(+0)
10	1	00...7F	Scene1 For Knob7	-64...+63	40(+0)
11	1	00...7F	Scene1 For Knob8	-64...+63	40(+0)
12	1	00...7F	Scene2 For Knob1	-64...+63	40(+0)
13	1	00...7F	Scene2 For Knob2	-64...+63	40(+0)
14	1	00...7F	Scene2 For Knob3	-64...+63	40(+0)
15	1	00...7F	Scene2 For Knob4	-64...+63	40(+0)
16	1	00...7F	Scene2 For Knob5	-64...+63	40(+0)
17	1	00...7F	Scene2 For Knob6	-64...+63	40(+0)
18	1	00...7F	Scene2 For Knob7	-64...+63	40(+0)
19	1	00...7F	Scene2 For Knob8	-64...+63	40(+0)
1a	1	00...7F	Knob1 Value	-64...+63	40(+0)
1b	1	00...7F	Knob2 Value	-64...+63	40(+0)
1c	1	00...7F	Knob3 Value	-64...+63	40(+0)
1d	1	00...7F	Knob4 Value	-64...+63	40(+0)
1e	1	00...7F	Knob5 Value	-64...+63	40(+0)
1f	1	00...7F	Knob6 Value	-64...+63	40(+0)
20	1	00...7F	Knob7 Value	-64...+63	40(+0)
21	1	00...7F	Knob8 Value	-64...+63	40(+0)
22	2	00...03	Knob8 Parameter1 MSB	layer1(0)...4(3)	00(layer1)
		00...1D	Knob8 Parameter1 LSB	off(0),1...29	00(off)
24	2	00...03	Knob8 Parameter2 MSB	layer1(0)...4(3)	01(layer2)
		00...1D	Knob8 Parameter2 LSB	0(off),1...29	00(off)
26	2	00...03	Knob8 Parameter3 MSB	layer1(0)...4(3)	02(layer3)
		00...1D	Knob8 Parameter3 LSB	0(off),1...29	00(off)
28	2	00...03	Knob8 Parameter4 MSB	layer1(0)...4(3)	03(layer4)
		00...1D	Knob8 Parameter4 LSB	0(off),1...29	00(off)
2a	1	20...60	Knob8 Sensitivity1	-32...+32	40(+0)
2b	1	20...60	Knob8 Sensitivity2	-32...+32	40(+0)
2c	1	20...60	Knob8 Sensitivity3	-32...+32	40(+0)
2d	1	20...60	Knob8 Sensitivity4	-32...+32	40(+0)
2e	1	00...1D	Knob4 Parameter	off(0),1...29	00(off)
2f	2	00...01	ArpeggiatorTempo MSB	0(MIDI),40(1)..240(201)	00 65(140)
		00...7F	ArpeggiatorTempo LSB		
31	1	00...17	Arpeggiator Type	0(Up1Oct)...39(special17)	09(UpDnB1Oct)
32	1	00...09	Arpggiator Subdivide	0(3/8)...9(1/32)	07(1/16)
33	1	00...06	Arpeggiator On/Off	0(off)/1(on)/2(hold) bit2=split on/off	00(off,split on)
Total size 34					

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
60 00 40	2	00...7F	Reverb Type MSB	See Effect Type List	01(=Hall)
		00...7F	Reverb Type LSB	00:basic type	00(basic)
42	2	00...7F	Chorus Type MSB	See Effect Type List	41(=Chorus1)
		00...7F	Chorus Tyle LSB	00:basic type	00(basic)
44	2	00...7F	Vari. Type MSB	See Effect Type List	05(=Delay L,C,R)
		00...7F	Vari. Type LSB	00:basic type	00(basic)
46	2	00...7F	Vari. Param 1 MSB	See Effect Parameter List	Depends On Variation Type
		00...7F	Vari. Param 1 LSB	〃	〃
48	2	00...7F	Vari. Param 2 MSB	〃	〃
		00...7F	Vari. Param 2 LSB	〃	〃
4a	2	00...7F	Vari. Param 3 MSB	〃	〃
		00...7F	Vari. Param 3 LSB	〃	〃
4c	2	00...7F	Vari. Param 4 MSB	〃	〃
		00...7F	Vari. Param 4 LSB	〃	〃
4e	2	00...7F	Vari. Param 5 MSB	〃	〃
		00...7F	Vari. Param 5 LSB	〃	〃
50	2	00...7F	Vari. Param 10 MSB	〃	〃
		00...7F	Vari. Param 10 LSB	〃	〃
52	1	40	reserved	64	40
53	1	00...7F	FC Vari. Cntrl Depth	-64...+63	40(+0)
54	1	00...7F	Send Chorus To Reverb	0...127	0
55	1	00...7F	Vari on layer RevSend	0...127	28(40)
56	1	00...7F	Vati on layer ChoSend	0...127	0
Total size 17					

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
60 00 60	1	00...7F	MW Filter Control	-64...+63	40(+0)
61	1	00...7F	MW LFO PMod Depth	0...127	0A(10)
62	1	00...7F	MW LFO FMod Depth	0...127	0
63	1	28...58	Bend Pitch Control	-24...+24(semitones)	42(+2semitones)
64	1	00...7F	FC Filter Control	-64...+63	40(+0)
65	1	00	reserved	0	00
66	1	00...7F	FC LFO FMod Depth	0...127	0
67	1	00...0F	Portamento Switch	b0(L1)...b3(L4),off(0),on(1)	0(off)
68	1	00...7F	Portamento Time	0...127	0
Total size 09					

MIDI Data Table <2-4>

MIDI Parameter Change table (Current Performance Layer)

Address (H)(H)(H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
60 0L 00	1	00...7F	Voice Bank Number MSB	0...127	00
01	1	00...7F	Voice Bank Number LSB	0...127	00
02	1	00...7F	Voice Number	1...128	00
03	1	00...03	Play Mode	mono(0),poly(1)	1(poly)
04	1	28...58	Note Shift	-24...+24(semitones)	40(+0)
05	2	00...FF	Detune	-12.8...+12.7(Hz) 1st bit3...0 >> bit7...4	08(+0.0Hz) 00
07	1	00...7F	Volume	0...127	64(100)
08	1	00...7F	Velocity Sense Depth	0...127	40(64)
09	1	00...7F	Velocity Sens Offset	-64...+63	40(+0)
0a	1	00...7F	Pan	random(0),L63...C...R63	40(C)
0b	1	00...7F	Note Limit Low	C-2...G8	00(C-2)
0c	1	00...7F	Note Limit High	C-2...G8	7F(G8)
0d	1	00...7F	Chorus Send	0...127	00
0e	1	00...7F	Reverb Send	0...127	28(40)
0f	1	00...03	Variation Send	off(0),on(1...127)	7F(on)
10	1	00...02	LFO K.ey Sync	FreeRun(0),retrigger(1),-(2)	2(-)
11	1	00...7F	Filter Cutoff Freq.	-64...+63	40(+0)
12	1	01...7F	Filter Resonance	-64...+63	40(+0)
13	1	01...7F	Amp. EG Attack Time	-63...+63	40(+0)
14	1	01...7F	Amp. EG Decay Time	-63...+63	40(+0)
15	1	01...7F	Amp. EG Release Time	-63...+63	40(+0)
16	1	00...03	Receive Note(Mute)	off(0),on(1)	1(on)
17	1	00...7F	PitchEG Initial Level	-64...+63	40(+0)
18	1	01...7F	PitchEG Attack Time	-63...+63	40(+0)
19	1	01...7F	PitchEG Release Time	-63...+63	40(+0)
1a	1	00...7F	PitchEG Release Level	-64...+63	40(+0)
1b	1	01...7F	Velocity Limit Low	1...127	01
1c	1	01...7F	Velocity Limit High	1...127	7F(127)
1d	1	00...7F	Amp. EG Sustain Level	-64...+63	40(+0)
1e	1	01...7F	LFO Speed	-63...+63	40(+0)
1f	1	00...7F	LFO Wave	0...3(saw,tri,S&H,--)	3(--)
20	1	21...5F	LFO AMod Depth	-31...+31	40(+0)
21	1	01...7F	LFO PMod Depth	-63...+63	40(+0)
22	1	31...4F	LFO FMod Depth	-15...+15	40(+0)
23	1	01...7F	FilterEG Attack Time	-63...+63	40(+0)
24	1	01...7F	FilterEG Decay Time	-63...+63	40(+0)
25	1	00...7F	FilterEG Sus Level	-64...+63	40(+0)
26	1	01...7F	FilterEG Release Time	-63...+63	40(+0)
27	1	00...7F	PitchEG Attack Level	-64...+63	40(+0)
28	1	01...7F	PitchEG Decay Time	-63...+63	40(+0)
29	1	00...7F	EQ Bass Gain	-12..+12[db]	0x40
2A	1	00...7F	EQ Treble Gain	-12..+12[db]	0x40
2B	1	04...28	EQ Bass Frequency	32..2.0KHz	0C
2C	1	1C...3A	EQ Treble Frequency	500..16.0KHz	36
Total size 2D					

```
l =  1 ;Layer1
     2 ;Layer2
     3 ;Layer3
     4 ;Layer4
```

MIDI Data Table <2-5>

MIDI Parameter Change table (User Performance Common)

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
7# pp 00	1	20...7F	Performance Name 1	Ascii Code	I
01	1	20...7F	Performance Name 2	Ascii Code	n
02	1	20...7F	Performance Name 3	Ascii Code	i
03	1	20...7F	Performance Name 4	Ascii Code	t
04	1	20...7F	Performance Name 5	Ascii Code	P
05	1	20...7F	Performance Name 6	Ascii Code	e
06	1	20...7F	Performance Name 7	Ascii Code	r
07	1	20...7F	Performance Name 8	Ascii Code	f
08	1	00...16	Performance Category	--,Pf...Sq	-(00)
09	1	00...7F	Common Volume	0...127	64(100)
0a	1	00...7F	Scene1 For Knob1	-64...+63	40(+0)
0b	1	00...7F	Scene1 For Knob2	-64...+63	40(+0)
0c	1	00...7F	Scene1 For Knob3	-64...+63	40(+0)
0d	1	00...7F	Scene1 For Knob4	-64...+63	40(+0)
0e	1	00...7F	Scene1 For Knob5	-64...+63	40(+0)
0f	1	00...7F	Scene1 For Knob6	-64...+63	40(+0)
10	1	00...7F	Scene1 For Knob7	-64...+63	40(+0)
11	1	00...7F	Scene1 For Knob8	-64...+63	40(+0)
12	1	00...7F	Scene2 For Knob1	-64...+63	40(+0)
13	1	00...7F	Scene2 For Knob2	-64...+63	40(+0)
14	1	00...7F	Scene2 For Knob3	-64...+63	40(+0)
15	1	00...7F	Scene2 For Knob4	-64...+63	40(+0)
16	1	00...7F	Scene2 For Knob5	-64...+63	40(+0)
17	1	00...7F	Scene2 For Knob6	-64...+63	40(+0)
18	1	00...7F	Scene2 For Knob7	-64...+63	40(+0)
19	1	00...7F	Scene2 For Knob8	-64...+63	40(+0)
1a	1	00...7F	Knob1 Value	-64...+63	40(+0)
1b	1	00...7F	Knob2 Value	-64...+63	40(+0)
1c	1	00...7F	Knob3 Value	-64...+63	40(+0)
1d	1	00...7F	Knob4 Value	-64...+63	40(+0)
1e	1	00...7F	Knob5 Value	-64...+63	40(+0)
1f	1	00...7F	Knob6 Value	-64...+63	40(+0)
20	1	00...7F	Knob7 Value	-64...+63	40(+0)
21	1	00...7F	Knob8 Value	-64...+63	40(+0)
22	2	00...03	Knob8 Parameter1 MSB	layer1(0)...4(3)	00(layer1)
		00...1D	Knob8 Parameter1 LSB	off(0),1...29	00(off)
24	2	00...03	Knob8 Parameter2 MSB	layer1(0)...4(3)	01(layer2)
		00...1D	Knob8 Parameter2 LSB	0(off),1...29	00(off)
26	2	00...03	Knob8 Parameter3 MSB	layer1(0)...4(3)	02(layer3)
		00...1D	Knob8 Parameter3 LSB	0(off),1...29	00(off)
28	2	00...03	Knob8 Parameter4 MSB	layer1(0)...4(3)	03(layer4)
		00...1D	Knob8 Parameter4 LSB	0(off),1...29	00(off)
2a	1	20...60	Knob8 Sensitivity1	-32...+32	40(+0)
2b	1	20...60	Knob8 Sensitivity2	-32...+32	40(+0)
2c	1	20...60	Knob8 Sensitivity3	-32...+32	40(+0)
2d	1	20...60	Knob8 Sensitivity4	-32...+32	40(+0)
2e	1	00...1D	Knob4 Parameter	off(0),1...29	00(off)
2f	2	00...01	ArpeggiatorTempo MSB	0(MIDI),40(1)..240(201)	00 65(140)
		00...7F	ArpeggiatorTempo LSB		
31	1	00...17	Arpeggiator Type	0(Up1Oct)...39(special17)	09(UpDnB1Oct)
32	1	00...09	Arpggiator Subdivide	0(3/8)..9(1/32) 07(1/16)	
33	1	00...06	Arpeggiator On/Off	0(off)/1(on)/2(hold) bit2=split on/off	00(off,split on)
Total size 34					

Address (H)	Size (H)	Data (H)	Prameter Name	Description	Default value(H)
7# pp 40	2	00...7F	Reverb Type MSB	See Effect Type List	01(=Hall)
		00...7F	Reverb Type LSB	00:basic type	00(basic)
42	2	00...7F	Chorus Type MSB	See Effect Type List	41(=Chorus1)
		00...7F	Chorus Tyle LSB	00:basic type	00(basic)
44	2	00...7F	Vari. Type MSB	See Effect Type List	05(=Delay L,C,R)
		00...7F	Vari. Type LSB	00:basic type	00(basic)
46	2	00...7F	Vari. Param 1 MSB	See Effect Parameter List	Depends On Variation Type
		00...7F	Vari. Param 1 LSB	〃	〃
48	2	00...7F	Vari. Param 2 MSB	〃	〃
		00...7F	Vari. Param 2 LSB	〃	〃
4a	2	00...7F	Vari. Param 3 MSB	〃	〃
		00...7F	Vari. Param 3 LSB	〃	〃
4c	2	00...7F	Vari. Param 4 MSB	〃	〃
		00...7F	Vari. Param 4 LSB	〃	〃
4e	2	00...7F	Vari. Param 5 MSB	〃	〃
		00...7F	Vari. Param 5 LSB	〃	〃
50	2	00...7F	Vari. Param 10 MSB	〃	〃
		00...7F	Vari. Param 10 LSB	〃	〃
52	1	40	reserved	64	40

```
       53 1    00...7F  FC Vari. Cntrl Depth   -64...+63                  40(+0)
       54 1    00...7F  Send Chorus To Reverb  0...127                    0
Total size 15

Address   Size Data     Prameter Name          Description                Default
(H)       (H)  (H)                                                       value(H)
7# pp 60  1    00...7F  MW Filter Control      -64...+63                  40(+0)
       61 1    00...7F  MW LFO PMod Depth      0...127                    0A(10)
       62 1    00...7F  MW LFO FMod Depth      0...127                    0
       63 1    28...58  Bend Pitch Control     -24...+24(semitones)       42(+2semitones)
       64 1    00...7F  FC Filter Control      -64...+63                  40(+0)
       65 1    00       reserved               0                          00
       66 1    00...7F  FC LFO FMod Depth      0...127                    0
       67 1    00...01  Portamento Switch      off(0),on(1)               0(off)
       68 1    00...7F  Portamento Time        0...127                    0
Total size 09

#  =  BankNo.(0=0x0, 1=0x8)
pp =  Performance Number(00...7F)
```

MIDI Data Table <2-6>

MIDI Parameter Change table (User Performance Layer)

```
Address   Size Data     Prameter Name          Description                Default
(H)       (H)  (H)                                                       value(H)
7$ pp 00  1    00...7F  Voice Bank Number MSB  0...127                    00
       01 1    00...7F  Voice Bank Number LSB  0...127                    00
       02 1    00...7F  Voice Number           1...128                    00
       03 1    00...03  Play Mode              mono(0),poly(1)            1(poly)
       04 1    28...58  Note Shift             -24...+24(semitones)       40(+0)
       05 2    00...FF  Detune                 -12.8...+12.7(Hz)          08(+0.0Hz)
                                                1st bit3...0 >> bit7...4   00
       07 1    00...7F  Volume                 0...127                    64(100)
       08 1    00...7F  Velocity Sense Depth   0...127                    40(64)
       09 1    00...7F  Velocity Sens Offset   -64...+63                  40(+0)
       0a 1    00...7F  Pan                    random(0),L63...C...R63    40(C)
       0b 1    00...7F  Note Limit Low         C-2...G8                   00(C-2)
       0c 1    00...7F  Note Limit High        C-2...G8                   7F(G8)
       0d 1    00...7F  Chorus Send            0...127                    00
       0e 1    00...7F  Reverb Send            0...127                    28(40)
       0f 1    00...7F  Variation Send         off(0),on(1...127)         7F(on)
       10 1    00...02  LFO Key Sync           FreeRun(0),retrigger(1),-(2) 2(-)
       11 1    00...7F  Filter Cutoff Freq.    -64...+63                  40(+0)
       12 1    01...7F  Filter Resonance       -63...+63                  40(+0)
       13 1    01...7F  Amp. EG Attack Time    -63...+63                  40(+0)
       14 1    01...7F  Amp. EG Decay Time     -63...+63                  40(+0)
       15 1    01...7F  Amp. EG Release Time   -63...+63                  40(+0)
       16 1    00...03  Receive Note(Mute)     off(0),on(1)               1(on)
       17 1    00...7F  PitchEG Initial Level  -64...+63                  40(+0)
       18 1    01...7F  PitchEG Attack Time    -63...+63                  40(+0)
       19 1    01...7F  PitchEG Release Time   -63...+63                  40(+0)
       1a 1    00...7F  PitchEG Release Level  -64...+63                  40(+0)
       1b 1    01...7F  Velocity Limit Low     1...127                    01
       1c 1    01...7F  Velocity Limit High    1...127                    7F(127)
       1d 1    00...7F  Amp. EG Sustain Level  -64...+63                  40(+0)
       1e 1    01...7F  LFO Speed              -63...+63                  40(+0)
       1f 1    00...7F  LFO Wave               0...3(saw,tri,S&H,--)      3(--)
       20 1    21...5F  LFO AMod Depth         -31...+31                  40(+0)
       21 1    01...7F  LFO PMod Depth         -63...+63                  40(+0)
       22 1    31...4F  LFO FMod Depth         -15...+15                  40(+0)
       23 1    01...7F  FilterEG Attack Time   -63...+63                  40(+0)
       24 1    01...7F  FilterEG Decay Time    -63...+63                  40(+0)
       25 1    00...7F  FilterEG Sus Level     -64...+63                  40(+0)
       26 1    01...7F  FilterEG Release Time  -63...+63                  40(+0)
       27 1    00...7F  PitchEG Attack Level   -64...+63                  40(+0)
       28 1    01...7F  PitchEG Decay Time     -63...+63                  40(+0)
       29 1    00...7F  EQ Bass Gain           -12..+12[db]               0x40
       2A 1    00...7F  EQ Treble Gain         -12..+12[db]               0x40
       2B 1    04...28  EQ Bass Frequency      32..2.0KHz                 0C
       2C 1    1C...3A  EQ Treble Frequency    500..16.0KHz               36
Total size 2D

pp =  Performance Number(00...7F)
$  =  1 ;Bank1Layer1  ,9=Bank2Layer1
       2 ;Bank1Layer2  ,A=Bank2Layer2
       3 ;Bank1Layer3  ,B=Bank2Layer3
       4 ;Bank1Layer4  ,C=Bank2Layer4
```

YAMAHA [Control Synthesizer --- synthesizer part] Date :16-NOV-1998
Model CS2x MIDI Implementation Chart Version : 1.0

Function...		Transmitted	Recognized	Remarks
Basic	Default	1 - 16	1 - 16	Memorised
Channel	Changed	1 - 16	1 - 16	
Mode	Default	3	1 - 4(m=1)	Memorised
	Messages	×	1 - 4(m=1) *2	
	Altered	**********	×	
Note Number : True voice		0 - 127 **********	0 - 127 *1 0 - 127	Transpose
Velocity	Note ON	○ 9nH,v=1-127	○ v=1-127	
	Note OFF	× 9nH,v=0	×	
After	Key's	×	○ *1	
Touch	Ch's	×	○ *1	
Pitch Bend		○	○ 0-24 semi *1	
Control Change	0,1,7,11,32,64	○	○ *1	
	5,10,65-67	×	○ *1	
	6	○	○	Data Entry MSB
	38	×	○	Data Entry LSB
	0-95	○	○	Assignable Cntrl
	71-74	○	○	Sound Controller
	84	×	○	Portament Cntrl
	91,93,94	×	○	Effect SendLevel
	96,97	×	○ *1	Data Inc,Dec
	98,99	×	○ *1	NRPN LSB,MSB
	100,101	×	○ *1	RPN LSB,MSB
Prog Change : True #		○ 0 - 127 **********	○ 0 - 127 *1 0 - 127	
System Exclusive		○	○ *3	
Common	: Song Pos.	×	×	
	: Song Sel.	×	×	
	: Tune	×	×	
System	: Clock	×	×	
Real Time	: Commands	×	×	
Aux	:All Sound Off	×	○	
	:Reset All Cntrls	×	○	
	:Local ON/OFF	×	×	
Mes-	:All Notes OFF	×	○(123-127) *1	
sag-	:Active Sense	○	○	
es	:Reset	×	×	

Notes: *1 receive if filter switch is off.
*2 m is always treated as "1" regardless of its value.
*3 transmit/receive if exclusive switch is on.

Mode 1 : OMNI ON , POLY Mode 2 : OMNI ON ,MONO ○ : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF,MONO × : No

CONTROL SYNTHESIZER



PARTS LIST

CONTENTS

OVERALL ASSEMBLY 2
KEYBOARD ASSEMBLY 4
ELECTRICAL PARTS ..... 4~10

Notes : DESTINATION ABBREVIATIONS

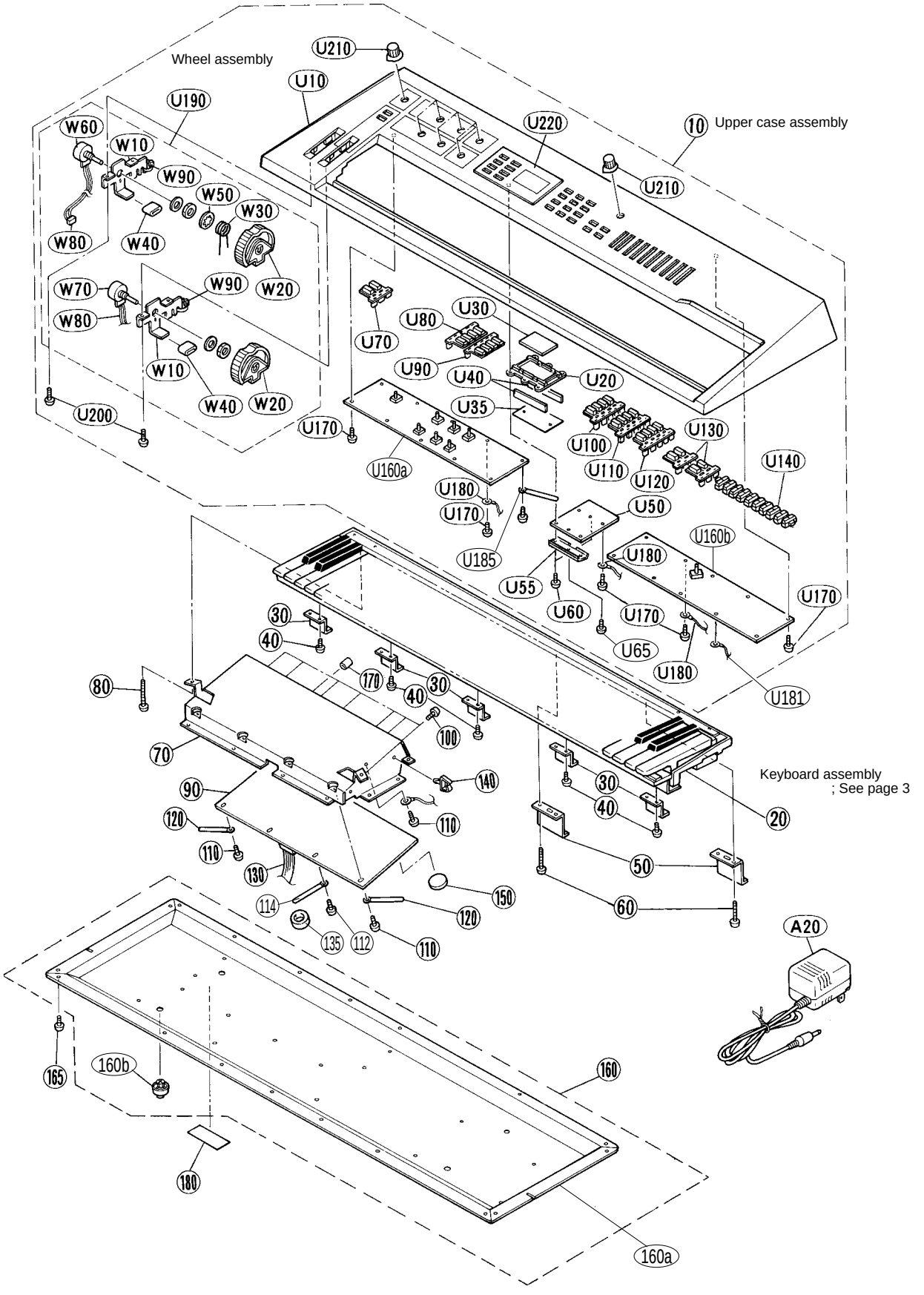
J	: Japanese model	A	: Australian model
U	: U.S.A. model	E	: European model
C	: Canadian model	D	: German model
X	: General export model	B	: British model
M	: South African model	I	: Indonesian model
H	: North European model	O	: Chinese model

■ WARNING

Components having special characteristics are marked ⚠ and must be replaced with parts having specification equal to those originally installed.

- The numbers “QTY” show quantities for each unit.
- The parts with “--” in “PART NO.” are not available as spare parts.
- This mark “ } ” in the REMARKS column means these parts are interchangeable.

■ OVERALL ASSEMBLY



	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
		--	OVERALL ASSEMBLY			CS2X		
		--	Overall Assembly			(V286010)		
	10	--	Upper Case Assembly			(V299750)		
	20	**VU621100**	Keyboard Assembly	C61 K6			24	
	30	**VU540700**	Angle Bracket				5	03
	40	**EP600190**	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			10	01
	50	**VU540900**	MKR Angle				2	04
	60	**VJ999700**	Bind Head Tapping Screw-B	3.0X20 MFZN2BL			4	01
	70	**VU540500**	Shield Box				11	
	80	**VJ999700**	Bind Head Tapping Screw-B	3.0X20 MFZN2BL			2	01
*	90	**V2783900**	Circuit Board	DM				
	100	**VQ049800**	Bonding Tapping Screw-B	3.0X10 MFZN2BL			7	01
	110	**EP600190**	Bind Head Tapping Screw-B	3.0X8 MFZN2BL			5	01
	112	**VE683000**	Bind Head Tapping Screw-B	3.0X12 MFZN2Y				01
	114	--	Cord Holder	T18MR		(V242290)		
	120	**CB502030**	Cord Binder	S-75B			2	01
	130	--	Jumper Wire	P=2.0-C-26SB-6-160		(V361090)		01
	135	**VC362700**	Ferrite core	FR25/15/12-1400L				04
*	136	**V3651400**	Cushion					
	140	**VR641100**	Cord Holder	UAMS-09-0			2	01
	150	**VN103500**	Lithium Battery	CR2032				03
	160	**VU640800**	Bottom Assembly				12	
	160a	--	Bottom Board			(VU58480)		
	160b	**VC999400**	Foot	205Y4179			4	02
	165	**VJ254100**	Bonding Tapping Screw-B	4.0X10 MFZN2BL			33	01
	170	**CB825380**	Push Button			STANDBY ON		03
	180	--	Name Plate			(V353190)		
		--	Upper Case Assembly			(V299750)		
*	U10	**V3002700**	Upper Case					
	U20	**VU540300**	Lens, Back-lit					05
	U30	**VU421400**	LCD	LCD5853H				06
	U35	**VU673400**	Reflection Sheet					03
	U40	**VS555800**	Rubber Connector	SG			2	02
	U50	**VU407800**	Circuit Board	LC			11	
	U55	**VV170400**	Spacer					03
	U60	**EP600280**	Bind Head Tapping Screw-P	3.0X8 MFZN2Y			3	01
	U65	**EP630660**	Bind Head Tapping Screw-P	3.0X10 MFZN2BL			3	01
	U70	**VU590900**	Key Top Rubber	L2		SCENE (1,2)		03
	U80	**VU640100**	Key Top	S1		ARPEGGIO/PART(-)/PRESET/ PART(-)/PROGRAM(-)		05
	U90	**VU640200**	Key Top	S2		SHIFT/PART(+)/USER/ PROGRAM(+)		05 05
	U100	**VU640300**	Key Top	T1		0/1/4/7		05
	U110	**VU640400**	Key Top	T2		-/2/5/8		05
	U120	**VU640500**	Key Top	T3		ENTER/3/6/9		05
*	U130	**V3225500**	Key top Rubber			PERFORM/MULTI/STORE/ UTILITY	2 2	
	U140	**VU643100**	Key Top Rubber			up/down		06
*	U160a	**NX820420**	Circuit Board	PN 1/2				
*	U160b	**NX820430**	Circuit Board	PN 2/2				
	U170	**EP600280**	Bind Head Tapping Screw-P	3.0X8 MFZN2Y			20	01
	U180	--	GND Wire			(VU57890)		
	U181	--	PN-SB GNG Wire			(V360098)		
	U185	**CB502030**	Cord Binder	S-75B				01
	U190	--	Wheel Assembly			(VU64090)		
	U200	**EP600280**	Bind Head Tapping Screw-P	3.0X8 MFZN2Y			4	01
*	U210	**V3005900**	Knob			VOLUME,ATTACK,HPF CUTOFF, DECAY,LPF CUTOFF,RELEASE, ASSIGN 1/DATA,ASSIGN 2, RESONANCE,Dial	10 10 10 10	
*	U220	**V3002900**	LCD Cover					
		--	Wheel Assembly			(VU64090)		
	W10	**VQ561400**	Frame				2	04
	W20	**VF537400**	Wheel	YS200			2	03
	W30	**VC792800**	Spring					01
	W40	**CB819020**	Wheel Tube				3	04
	W50	**EW600110**	Stop Ring	12.0				01
	W60	**VQ764300**	Rotary Variable Resistor	RK1631110T54Aƒ∏10K		PITCH		03

✻: New Parts

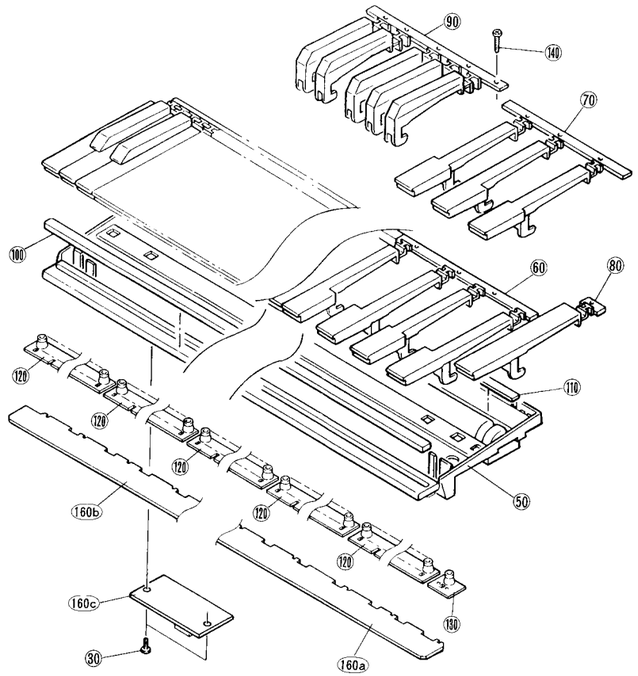
RANK : Japan only

REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
W70	**VN245400**	Rotary Variable Resistor	10.0K K161100S		MODULATION		03
W80	--	Connector Assembly	PH5P-5F 300L+100L		(VU55440)		
W90	--	Cord Holder	BK-1		(CB06925)	2	01
		ACCESSORY					
⚠ A20	**VT368600**	AC Adapter	PA-3B JP		J		09
⚠ A20	**VT368700**	AC Adapter	PA-3B UC		U		
⚠ A20	**VT368800**	AC Adapter	PA-3B CEE		E		08

✻: New Parts

RANK : Japan only

KEYBOARD ASSEMBLY



REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
		KEYBOARD ASSEMBLY			CS2X		
	VU621100	Keyboard Assembly	C61 K6				24
30	**EP630220**	Bind Head Tapping Screw-P	3.0X8 MFZN2BL			2	01
50	**--**	Frame	C61 16M		(VU32860)		10
60	**VH1809C0**	White Keys	CEGBDFA			5	05
	--	White Keys	CEGB		(VH18090)	5	03
	--	White Keys	DFA		(VH18100)	5	03
80	**VH181100**	White Key					01
90	**VH181200**	Black Key				5	03
100	**VH181300**	Felt					03
110	**VH181400**	Rubber Sheet					01
120	**VU328400**	Rubber Contact	16M OCT 2M 12KEYS			5	06
130	**VU328500**	Rubber Contact	16M C' 2M 1KEY				05
140	**VB205200**	Bind Head Tapping Screw-P	3.0X16 MFZN2BL			21	01
140	**VS756700**	Bind Head Tapping Screw-P	3.0X16 MFZN2B			21	01
150	**TX920280**	Grease	G-31KA				
160	**--**	Circuit Board	Keyboard Switch		(VU62120)		15
160a	**VU648100**	Circuit Board	MK-L				09
160b	**VU648200**	Circuit Board	MK-H				09
160c	**VU494600**	Circuit Board	16M MKS2				10
160d	**VU958900**	Cable	12P 190L				03
160e	**VU659500**	Cable	12P 215L				02
160f	**VU659400**	Cable	7P 250L				02
160g	**VU659600**	Cable	5P 615L				02

✻: New Parts

RANK : Japan only

ELECTRICAL PARTS

	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
			ELECTRICAL PARTS			CS2X		
✻		**V2783900**	Circuit Board	DM		(XV331A0)		
		VU407800	Circuit Board	LC		(XR661B0)		11
		VU617900	Circuit Board	LE		(XR661B0)		09
		VU648100	Circuit Board	MK-L		(XR564B0)		09
		VU648200	Circuit Board	MK-H		(XR565B0)		09
		VU494600	Circuit Board	16M MKS2		(XS829A0)(XR736C0)		10
✻		**NX820420**	Circuit Board	PN 1/2		(XR660B0)		
✻		**NX820430**	Circuit Board	PN 2/2		(XR660B0)		
✻		**V2783900**	Circuit Board	DM		(XV331B0)		
	20	**BA808520**	Heat Sink	T220M 25L				03
	30	**EG330360**	Bind Head Screw	3.0X6 MFZN2BL				01
	40	**VU540600**	Angle, Jack					05
	50	**--**	Shield Seat			(V360360)		
	60	**--**	Shield Seat			(V360370)		
	BT1	**VN103600**	Battery Holder	CR2032				03
	C1	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
	C2	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
	C3	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
	C4	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
	C5	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
	-8	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
	C9	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
	C10	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	-12	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C13	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
	C13	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
	C14	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
	C15	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C16	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C17	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
	C18	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	-20	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C21	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
	-27	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
	C28	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
	C28	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
	C29	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C30	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C31	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
	C31	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
	C32	**UB051330**	Monolithic Ceramic Cap.	SL 33P 50V J				01
	C33	**UB051330**	Monolithic Ceramic Cap.	SL 33P 50V J				01
	C34	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
	C34	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
	C35	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C36	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C37	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
	C37	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
	C38	**VQ686200**	Monolithic Ceramic Cap.	F 1.0 16V Z				01
	C39	**VQ686200**	Monolithic Ceramic Cap.	F 1.0 16V Z				01
	C40	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C41	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
	C41	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
	C42	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C43	**UF066470**	Electrolytic Cap. (chip)	4.7 50V				01
	C43	**UG066470**	Electrolytic Cap. (chip)	4.7UF 50V				01
	C44	**VQ686200**	Monolithic Ceramic Cap.	F 1.0 16V Z				01
	C45	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
	-52	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
	C53	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
	C54	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
	-62	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
	C63	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
	C64	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
	-71	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
	C72	**VR331500**	Mylar Capacitor (chip)	0.1 50V J				01
	C73	**VH340500**	Electrolytic Cap.	470.00 25.0V				01
	C74	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01

✻: New Parts

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REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
C75	**VH340500**	Electrolytic Cap.	470.00 25.0V				01
C76	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C77	**UF038100**	Electrolytic Cap. (chip)	100 16V		⎫		01
C77	**UG038100**	Electrolytic Cap. (chip)	100UF 16V		⎭		01
C78	**UR848100**	Electrolytic Cap.	100.00 25.0V				01
C79	**VR331500**	Mylar Capacitor (chip)	0.1 50V J				01
C80	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C81	**UF138220**	Electrolytic Cap. (chip)	220 16V UUR1C2				01
C82	**UF037470**	Electrolytic Cap. (chip)	47 16V		⎫		01
C82	**UG037470**	Electrolytic Cap. (chip)	47UF 16V		⎭		01
C83	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C84	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C85	**UF037470**	Electrolytic Cap. (chip)	47 16V		⎫		01
C85	**UG037470**	Electrolytic Cap. (chip)	47UF 16V		⎭		01
C86	**UF037100**	Electrolytic Cap. (chip)	10 16V		⎫		01
C86	**UG037100**	Electrolytic Cap. (chip)	10UF 16V		⎭		01
C87	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C88	**UF037100**	Electrolytic Cap. (chip)	10 16V		⎫		01
C88	**UG037100**	Electrolytic Cap. (chip)	10UF 16V		⎭		01
C89	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
-92	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C93	**UF037100**	Electrolytic Cap. (chip)	10 16V		⎫		01
C93	**UG037100**	Electrolytic Cap. (chip)	10UF 16V		⎭		01
C94	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
C95	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C96	**UF037100**	Electrolytic Cap. (chip)	10 16V		⎫		01
C96	**UG037100**	Electrolytic Cap. (chip)	10UF 16V		⎭		01
C97	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C98	**UF037100**	Electrolytic Cap. (chip)	10 16V		⎫		01
C98	**UG037100**	Electrolytic Cap. (chip)	10UF 16V		⎭		01
C99	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C100	**UF037100**	Electrolytic Cap. (chip)	10 16V		⎫		01
C100	**UG037100**	Electrolytic Cap. (chip)	10UF 16V		⎭		01
C101	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C103	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
C104	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C105	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C106	**UF037470**	Electrolytic Cap. (chip)	47 16V		⎫		01
C106	**UG037470**	Electrolytic Cap. (chip)	47UF 16V		⎭		01
C107	**UF037470**	Electrolytic Cap. (chip)	47 16V		⎫		01
C107	**UG037470**	Electrolytic Cap. (chip)	47UF 16V		⎭		01
C108	**UF037470**	Electrolytic Cap. (chip)	47 16V		⎫		01
C108	**UG037470**	Electrolytic Cap. (chip)	47UF 16V		⎭		01
C109	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C110	**UF037220**	Electrolytic Cap. (chip)	22 16V		⎫		01
C110	**UG037220**	Electrolytic Cap. (chip)	22UF 16V		⎭		01
C111	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C112	**UF037220**	Electrolytic Cap. (chip)	22 16V		⎫		01
C112	**UG037220**	Electrolytic Cap. (chip)	22UF 16V		⎭		01
C113	**UB013270**	Monolithic Ceramic Cap.	B 2700P 50V K				01
C114	**UB052220**	Monolithic Ceramic Cap.	SL 220P 50V J				01
C115	**UB013680**	Monolithic Ceramic Cap.	B 6800P 50V K				01
C116	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C117	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C118	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C119	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
C120	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
C121	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C122	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C123	**UF038100**	Electrolytic Cap. (chip)	100 16V		⎫		01
C123	**UG038100**	Electrolytic Cap. (chip)	100UF 16V		⎭		01
C124	**UF037220**	Electrolytic Cap. (chip)	22 16V		⎫		01
C124	**UG037220**	Electrolytic Cap. (chip)	22UF 16V		⎭		01
C125	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
C126	**UF138220**	Electrolytic Cap. (chip)	220 16V UUR1C2				01
C127	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
C128	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
C129	**UF037220**	Electrolytic Cap. (chip)	22 16V		⎫		01
C129	**UG037220**	Electrolytic Cap. (chip)	22UF 16V		⎭		01
C130	**UB013270**	Monolithic Ceramic Cap.	B 2700P 50V K				01

✻ : New Parts

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REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
C131	**UB052220**	Monolithic Ceramic Cap.	SL 220P 50V J				01
C132	**UB013680**	Monolithic Ceramic Cap.	B 6800P 50V K				01
C133	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C134	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C135	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
C136	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
C137	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C138	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C139	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C140	**UF037220**	Electrolytic Cap. (chip)	22 16V				01
C140	**UG037220**	Electrolytic Cap. (chip)	22UF 16V				01
C141	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
C142	**UF138220**	Electrolytic Cap. (chip)	220 16V UUR1C2				01
C143	**UB013100**	Monolithic Ceramic Cap.	B 1000P 50V K				01
C144	**UB044100**	Monolithic Ceramic Cap.	F 0.01 50V Z				01
C145	**UB013220**	Monolithic Ceramic Cap.	B 2200P 50V K				01
C146	**UF066470**	Electrolytic Cap. (chip)	4.7 50V				01
C146	**UG066470**	Electrolytic Cap. (chip)	4.7UF 50V				01
C147	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C148	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
C149	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
C150	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
C150	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
C151	**UF066470**	Electrolytic Cap. (chip)	4.7 50V				01
C151	**UG066470**	Electrolytic Cap. (chip)	4.7UF 50V				01
C152	**UB052100**	Monolithic Ceramic Cap.	SL 100P 50V J				01
C153	**UB051470**	Monolithic Ceramic Cap.	SL 47P 50V J				01
C154	**UF038100**	Electrolytic Cap. (chip)	100 16V				01
C154	**UG038100**	Electrolytic Cap. (chip)	100UF 16V				01
C155	**UF037100**	Electrolytic Cap. (chip)	10 16V				01
C155	**UG037100**	Electrolytic Cap. (chip)	10UF 16V				01
C156	**UB245100**	Monolithic Ceramic Cap.	F 0.1 25V Z				01
CN1	**VB390400**	Connector Base Post	PH- 8P TE				01
CN2	**VF283100**	Connector Base Post	PH-13P TE				01
CN3	**VE352600**	Connector Base Post	PH-14P TE				01
CN4	**VF728300**	Wire Trap	52147 6P TE				01
CN5	**VB390800**	Connector Base Post	PH-12P TE				01
CN6	**VB390100**	Connector Base Post	PH- 5P TE				01
CN7	**VB390200**	Connector Base Post	PH- 6P TE				01
* CN8	**VU820200**	Connector Assembly	SAN-SAN3P 350L-S				
D1	**VV925900**	Diode	RLS-73 TE-11				01
-11	**VV925900**	Diode	RLS-73 TE-11				01
D12	**VU171500**	Zener Diode	UDZ 3.6BTE-17 3.6V				01
D13	**VV925900**	Diode	RLS-73 TE-11				01
-21	**VV925900**	Diode	RLS-73 TE-11				01
D22	**VZ016600**	Diode	D3FP3				03
D23	**VS201100**	Diode	D1F60				01
D24	**VZ016600**	Diode	D3FP3				03
D25	**VS201100**	Diode	D1F60				01
D26	**VS201100**	Diode	D1F60				01
D27	**VV925900**	Diode	RLS-73 TE-11				01
D28	**VV925900**	Diode	RLS-73 TE-11				01
EM1	**VT332800**	LC Filter (chip)	NFM41P11C204				01
-5	**VT332800**	LC Filter (chip)	NFM41P11C204				01
EM6	**VR193800**	LC Filter	STF-104ZB-TBM				01
EM7	**VR193800**	LC Filter	STF-104ZB-TBM				01
EM8	**VT332800**	LC Filter (chip)	NFM41P11C204				01
EM9	**VT332800**	LC Filter (chip)	NFM41P11C204				01
IC1	**XP881A00**	IC	MC34051MEL		LINE TRANCEIVER		05
IC1	**XV103A00**	IC	M5M34051FP				05
IC2	**XI348A00**	IC	SC7SU04FEL		INVERTER		01
IC3	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
IC4	**XD657A00**	IC	TC74HC14AF-TP1		INVERTER		02
IC5	**XR150A00**	IC	TC74HC4053AF		MULTIPLEXER		03
IC6	**XR150A00**	IC	TC74HC4053AF		MULTIPLEXER		03
IC7	**XT443A00**	IC	HD6432655A00F		CPU		11
* IC8	**XV407B00**	IC	M27C160-100F1		EPROM 16M		
IC9	**XS681A00**	IC	M5M51008BFP-70LLT		SRAM		11
IC10	**XS681A00**	IC	M5M51008BFP-70LLT		SRAM		11
IC11	**XR682A00**	IC	TC7S66F		ANALOG SW		01

✻: New Parts

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	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
	IC12	**XI686A00**	IC	M62021FP		RESET		04
	IC13	**XD838A00**	IC	SN74HC245NSR		BUFFER		04
	IC14	**XT442A00**	IC	SI-8050S		REGULATOR +5V		05
	IC15	**XT441A00**	IC	UPC2909T-E1		REGULATOR +9V		03
	IC16	**XS516A00**	IC	UPC2933T-E1		REGULATOR +3.3V		03
	IC17	**XS725A00**	IC	TC203C760HF-002		SWP30B		19
*	IC18	**XV537A00**	IC	KM23C64000G-KF74B5		ROM		
*	IC19	**XV538A00**	IC	KM23C64000G-KF74B6		ROM		
	IC20	**XS438A00**	IC	M5M44260CTP-7		DRAM 4M		16
	IC20	**XU462A00**	IC	MSM514260C-60TS-K		DRAM 4M		16
	IC21	**XJ598A00**	IC	NJM78L05UA		REGULATOR +5V		02
	IC22	**XP867A00**	IC	UPD63200GS-E1		DAC		07
	IC23	**XF291A00**	IC	UPC4570G2		OP AMP		03
	-26	**XF291A00**	IC	UPC4570G2		OP AMP		03
	IC27	**XQ138A00**	IC	NJM4556AMT1		OP AMP		03
	IS1	**VK863100**	IC Socket	DICF-42CS-E				03
	JK1	**VE382300**	Phone Jack	YKB21-5010		PHONES		01
	JK2	**VS115400**	Phone Jack	LGR4609-7000		OUTPUT L/MONO		01
	JK3	**VS115400**	Phone Jack	LGR4609-7000		OUTPUT R		01
	JK4	**VJ207400**	DC-IN Jack	16V DC 3A HEC2305		DC IN		01
	JK5	**VS115400**	Phone Jack	LGR4609-7000		FOOT (VOLUME,CONTROL)		01
	-7	**VS115400**	Phone Jack	LGR4609-7000		FOOT SWITCH		01
	JK8	**LB302010**	Phone Jack	ST HSJ0912		INPUT		02
	JK9	**VM761000**	DIN Connector	DIN 8P MD-S810		TO HOST		03
	JK10	**VT033600**	DIN Connector	3P YKF51-5067		MIDI IN		03
	JK11	**VJ885500**	DIN Connector	3P YKF51-5054		MIDI (THRU,OUT)		04
	L1	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	-3	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L4	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	-9	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L10	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-15	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L16	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L17	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L18	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L19	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L20	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L21	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	-24	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L25	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-32	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L33	**VR579900**	Chip Inductance	BK2125HS601-T				01
	-58	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L59	**VG238200**	LC Filter	PLT2003C				04
	L60	**VZ017900**	Coil	HP-022J 180U				05
	L61	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L62	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L63	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L64	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L65	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L66	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L67	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L68	**VL139800**	Chip Solid Inductance	BLM31A700SPT 70				01
	L69	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L70	**VR243700**	Chip Inductance	56U LEM2520 T 560J				01
	L71	**VR579900**	Chip Inductance	BK2125HS601-T				01
	L72	**VU954000**	Chip Solid Inductance	BLM21P300SPT				01
	PC1	**VR903700**	Photo Coupler	HCPL-M600				04
	R1	**RD255220**	Carbon Resistor (chip)	220.0 0.1 J				01
	R2	**RD256270**	Carbon Resistor (chip)	2.7K 0.1 J				01
	R3	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
	R4	**RD255220**	Carbon Resistor (chip)	220.0 0.1 J				01
	R5	**RD256270**	Carbon Resistor (chip)	2.7K 0.1 J				01
	R6	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
	R7	**RD256470**	Carbon Resistor (chip)	4.7K 0.1 J				01
	R8	**RD258100**	Carbon Resistor (chip)	100.0K 0.1 J				01
	R9	**RD257220**	Carbon Resistor (chip)	22.0K 0.1 J				01
	R10	**RD254560**	Carbon Resistor (chip)	56.0 0.1 J				01
	R11	**RD254560**	Carbon Resistor (chip)	56.0 0.1 J				01
	R12	**RD256470**	Carbon Resistor (chip)	4.7K 0.1 J				01

✻: New Parts

RANK : Japan only

REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
R13	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R14	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R15	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R16	**RD257220**	Carbon Resistor (chip)	22.0K 0.1 J				01
R17	**RD257220**	Carbon Resistor (chip)	22.0K 0.1 J				01
R18	**RD255220**	Carbon Resistor (chip)	220.0 0.1 J				01
R19	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R20	**RD255220**	Carbon Resistor (chip)	220.0 0.1 J				01
-23	**RD255220**	Carbon Resistor (chip)	220.0 0.1 J				01
R24	**RD255680**	Carbon Resistor (chip)	680.0 0.1 J				01
R25	**RD258680**	Carbon Resistor (chip)	680.0K 0.1 J				01
R26	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R32	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R33	**RD254680**	Carbon Resistor (chip)	68.0 0.1 J				01
R34	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R37	**RD256150**	Carbon Resistor (chip)	1.5K 0.1 J				01
R38	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
-41	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R42	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
-49	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R50	**RD254100**	Carbon Resistor (chip)	10.0 0.1 J				01
R51	**VI197400**	Metal Film Resistor (chip)	10.0K 1/10 D				01
R52	**VI197400**	Metal Film Resistor (chip)	10.0K 1/10 D				01
R53	**RD257470**	Carbon Resistor (chip)	47.0K 0.1 J				01
R54	**RD257470**	Carbon Resistor (chip)	47.0K 0.1 J				01
R55	**RD254100**	Carbon Resistor (chip)	10.0 0.1 J				01
R56	**RD257470**	Carbon Resistor (chip)	47.0K 0.1 J				01
R57	**RD255470**	Carbon Resistor (chip)	470.0 0.1 J				01
R58	**RD255470**	Carbon Resistor (chip)	470.0 0.1 J				01
R59	**RD154560**	Carbon Resistor (chip)	56.0 1/4 J				01
R60	**RD154560**	Carbon Resistor (chip)	56.0 1/4 J				01
R61	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R62	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R64	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R65	**RD256150**	Carbon Resistor (chip)	1.5K 0.1 J				01
R66	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R67	**RD256680**	Carbon Resistor (chip)	6.8K 0.1 J				01
R68	**RD257150**	Carbon Resistor (chip)	15.0K 0.1 J				01
R69	**RD256680**	Carbon Resistor (chip)	6.8K 0.1 J				01
R70	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R72	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
-74	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R75	**RD258100**	Carbon Resistor (chip)	100.0K 0.1 J				01
R76	**RD257270**	Carbon Resistor (chip)	27.0K 0.1 J				01
R77	**RD257120**	Carbon Resistor (chip)	12.0K 0.1 J				01
R78	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R79	**RD257180**	Carbon Resistor (chip)	18.0K 0.1 J				01
R80	**RD155470**	Carbon Resistor (chip)	470.0 1/4 J				
R81	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R82	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R83	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R84	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R85	**RD154470**	Carbon Resistor (chip)	47.0 1/4 J				01
R86	**RD256680**	Carbon Resistor (chip)	6.8K 0.1 J				01
R87	**RD257150**	Carbon Resistor (chip)	15.0K 0.1 J				01
R88	**RD256680**	Carbon Resistor (chip)	6.8K 0.1 J				01
R89	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R91	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
-93	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R94	**RD258100**	Carbon Resistor (chip)	100.0K 0.1 J				01
R95	**RD257270**	Carbon Resistor (chip)	27.0K 0.1 J				01
R96	**RD257120**	Carbon Resistor (chip)	12.0K 0.1 J				01
R97	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R98	**RD257180**	Carbon Resistor (chip)	18.0K 0.1 J				01
R99	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R100	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R101	**RD256100**	Carbon Resistor (chip)	1.0K 0.1 J				01
R102	**RD257100**	Carbon Resistor (chip)	10.0K 0.1 J				01
R103	**RD154470**	Carbon Resistor (chip)	47.0 1/4 J				01
R105	**RD257220**	Carbon Resistor (chip)	22.0K 0.1 J				01

✻: New Parts

RANK : Japan only

REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
R106	**RD257180**	Carbon Resistor (chip)	18.0K 0.1 J				01
R107	**RD257200**	Carbon Resistor (chip)	20.0K 0.1 J				01
R109	**RD257220**	Carbon Resistor (chip)	22.0K 0.1 J				01
R110	**RD257180**	Carbon Resistor (chip)	18.0K 0.1 J				01
R111	**RD257200**	Carbon Resistor (chip)	20.0K 0.1 J				01
R112	**RD254100**	Carbon Resistor (chip)	10.0 0.1 J				01
R113	**RD255150**	Carbon Resistor (chip)	150.0 0.1 J				01
R114	**RD254680**	Carbon Resistor (chip)	68.0 0.1 J				01
R115	**RD257470**	Carbon Resistor (chip)	47.0K 0.1 J				01
R116	**RD258100**	Carbon Resistor (chip)	100.0K 0.1 J				01
RA1	**RE047220**	Resistor Array	22KX4				01
RA2	**RE044680**	Resistor Array	68X4				01
-6	**RE044680**	Resistor Array	68X4				01
RA7	**RE047100**	Resistor Array	10KX4				01
RA8	**RE047220**	Resistor Array	22KX4				01
-11	**RE047220**	Resistor Array	22KX4				01
RA12	**RE044680**	Resistor Array	68X4				01
-15	**RE044680**	Resistor Array	68X4				01
RA16	**RE047100**	Resistor Array	10KX4				01
-18	**RE047100**	Resistor Array	10KX4				01
RA19	**RE044680**	Resistor Array	68X4				01
RA20	**RE047220**	Resistor Array	22KX4				01
RA21	**RE047100**	Resistor Array	10KX4				01
-24	**RE047100**	Resistor Array	10KX4				01
RA25	**RE044680**	Resistor Array	68X4				01
RA26	**RE047470**	Resistor Array	47KX4				01
-29	**RE047470**	Resistor Array	47KX4				01
RA30	**RE044680**	Resistor Array	68X4				01
-57	**RE044680**	Resistor Array	68X4				01
SP1	**VB966900**	Style Pin	IMSA-6024				01
SW1	**VP691000**	Push Switch	SDDLB1		POWER		03
SW2	**VT761300**	Slide Switch	SSSF12539A		HOST SELECT		03
TR1	**VD303700**	Transistor	2SC3326 A,B TE85R				01
TR2	**VD303700**	Transistor	2SC3326 A,B TE85R				01
TR3	**VJ927200**	Transistor	2SA1162 O,Y				01
TR4	**VD303700**	Transistor	2SC3326 A,B TE85R				01
X1	**VP864900**	Quartz Crystal Unit	16M SMD-49				04
X2	**VV345500**	Quartz Crystal Unit	DOC-49S5				05
	VU407800	Circuit Board	LC		(XR661B0)		11
	VU617900	Circuit Board	LE		(XR661B0)		09
	VU619100	Pin Header	A4B-5PA-2DS				01
C1	**VD930900**	Semiconductive Cera. Cap.	0.1 25V M				01
CN1	**VU554300**	Connector Assembly	14P-450				06
R1	**HF455330**	Carbon Resistor	330.0 1/4 J				01
R2	**HF457100**	Carbon Resistor	10.0K 1/4 J				01
R3	**HF457910**	Carbon Resistor	91.0K 1/4 J				01
RA1	**VR538200**	Resistor Array	EXBF6N102J				01
IC1	**XN859A00**	IC	LC7985ND		LCD CONTROLLER		06
D3	**VU767400**	LED	GL1EG211 GR		LCD back-lit		01
-8	**VU767400**	LED	GL1EG211 GR				01
	VU648100	Circuit Board	MK-L		(XR564B0)		09
	VB941200	Diode	1SS133,1SS176				01
	VK025600	Wire Trap	52147 12P TE				01
	VK025100	Wire Trap	52147 7P TE				01
	VU648200	Circuit Board	MK-H		(XR565B0)		09
	VB941200	Diode	1SS133,1SS176				01
	VK025600	Wire Trap	52147 12P TE				01
	VK024900	Wire Trap	52147 5P TE				01
	VU494600	Circuit Board	16M MKS2		(XS829A0)(XR736C0)		10
	--	Vibration-proof Tape	10X64X0.5		(VK34680)		10
	--	Jumper Wire	0.55		(VA07890)		40
C1	**FG651220**	Ceramic Capacitor-SL	22P 50V J				01
C1	**VR027400**	Ceramic Capacitor	22P 63V J				01
C2	**FG651220**	Ceramic Capacitor-SL	22P 50V J				01
C2	**VR027400**	Ceramic Capacitor	22P 63V J				01
C3	**UJ828100**	Electrolytic Cap.	100.00 10.0V				01

✻ : New Parts

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	REF NO.	PART NO.	DESCRIPTION			REMARKS	QTY	RANK
	C4	**VD930900**	Semiconductive Cera. Cap.	0.1 25V M				01
	C4	**VM902400**	Carbon Resistor	0.1 25V Z				01
	CL1	**VN002100**	Ceramic Resonator	CST8.00MTW140				02
	CL1	**VQ305500**	Ceramic Resonator	8.00M EFOEC8004T3				02
	CN1	**VF728300**	Wire Trap	52147 6P TE				01
	CN2	**VK025600**	Wire Trap	52147 12P TE				01
	CN3	**VK025100**	Wire Trap	52147 7P TE				01
	CN4	**VK024900**	Wire Trap	52147 5P TE				01
	IC1	**XR951A00**	IC	HD63B05V0F07P		CPU		06
	R1	**HF456470**	Carbon Resistor	4.7K 1/4 J				01
	R1	**VL631400**	Carbon Resistor	4.7K 1/6 J				01
	R2	**HF456470**	Carbon Resistor	4.7K 1/4 J				01
	R2	**VL631400**	Carbon Resistor	4.7K 1/6 J				01
	R3	**HF457470**	Carbon Resistor	47.0K 1/4 J				01
	R3	**VL632600**	Carbon Resistor	47.0K 1/6 J				01
	RA1	**VH373200**	Resistor Array	RGLE12X473J				01
*		**NX820420**	Circuit Board	PN 1/2		(XR660B0)		
*		**NX820430**	Circuit Board	PN 2/2		(XR660B0)		
		--	Jumper Wire	0.55		(VA07890)		
	CN1	**--**	Connector Assembly	6P-250		(VU40630)		
	CN2	**--**	Connector Assembly	12P-300		(VU40660)		
	CN3	**--**	Connector Assembly	13P-160		(VU40610)		
	CN5	**--**	Connector Assembly	13P-300		(VU47340)		
	CN6	**--**	Connector Assembly	8P-250		(VU40650)		
	D1	**VD631600**	Diode	1SS133,176,HSS104				01
	-8	**VD631600**	Diode	1SS133,176,HSS104				01
	LE1	**VU617900**	Circuit Board	LE				09
	LE2	**VU617900**	Circuit Board	LE				09
	LED1	**VS704700**	LED	SEL2210W TP8 RE		SCENE 1		01
	LED2	**VS704700**	LED	SEL2210W TP8 RE		SCENE 2		01
	RTSW1	**VU411100**	Rotary Switch	SRBV16036A		Dial		04
	SW1	**VV056000**	Tact Switch	SKQNAE025A		SCENE(1,2),ARPEGGIO,SHIFT		01
	-46	**VV056000**	Tact Switch	SKQNAE025A		PART/LAYER(+,-),PRESET, USER,PROGURAM(+,-),0to9, -,ENTER,PERFORMANCE, MULTI,STORE,UTILITY, (all up,down switch)		01
	VR1	**VT683300**	Rotary Variable Resistor	A 30.0K RK14K12C		VOLUME		03
	VR2	**VQ032500**	Rotary Variable Resistor	B 10.0K RK11K113		ATTACK,DECAY,RELEASE,		02
	-9	**VQ032500**	Rotary Variable Resistor	B 10.0K RK11K113		HPF CUTOFF,LPF CUTOFF, RESONANSE,ASSIGN 1/DATA, ASSIGN 2		02
⚠		**VT368600**	AC Adapter	PA-3B JP		J		09
⚠		**VT368700**	AC Adapter	PA-3B UC		U		
⚠		**VT368800**	AC Adapter	PA-3B CEE		E		08
		VN103500	Lithium Battery	CR2032				03
		VU421400	LCD	LCD5853H				06
		VQ764300	Rotary Variable Resistor	RK1631110T54Aƒ∏10K		PITCH		03
		VN245400	Rotary Variable Resistor	10.0K K161100S		MODULATION		

✻: New Parts

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■CS2X CIRCUIT DIAGRAM 1/2(DM)

CS2X

to PN(1/2)-CN2

to wheel

to LC-CN7

to PN(2/2)-CN6

to PN(2/2)-CN5

to MKS2-CN5

to PN(1/2)-CN1

MULTIPLEXER

OPAMP

INVERTER

LINE TRANCEIVER

CPU

ROM

SRAM

BUFFER

ANALOG SW

RESET

REGULATOR+9V

REGULATOR+5V

REGULATOR+3.3V

DAC

DRAM

SW30B

- μPC2933T (XS516A00) REGULATOR +3.3V — 1: V in 2: GND 3: V out
- MJMJ78L05UA (XJ598A00) REGULATOR +5V — 1: OUTPUT 2: COMMON 3: INPUT
- μPC2909T-E1 (XT441A00) REGULATOR +9V — 1: V in 2: GND 3: V out
- SI-8050S (XT442A00) REGULATOR +5V — 1: V in 2: SW out 3: GND 4: V os 5: S.S

（マ）：**Mylar Capacitor**
（セ）：**Ceramic Capacitor**
金被：**Metal Film Resistor**

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■CS2X CIRCUIT DIAGRAM 2/2 (PN, LC, LE, MKS2, MK-H, MK-L)

