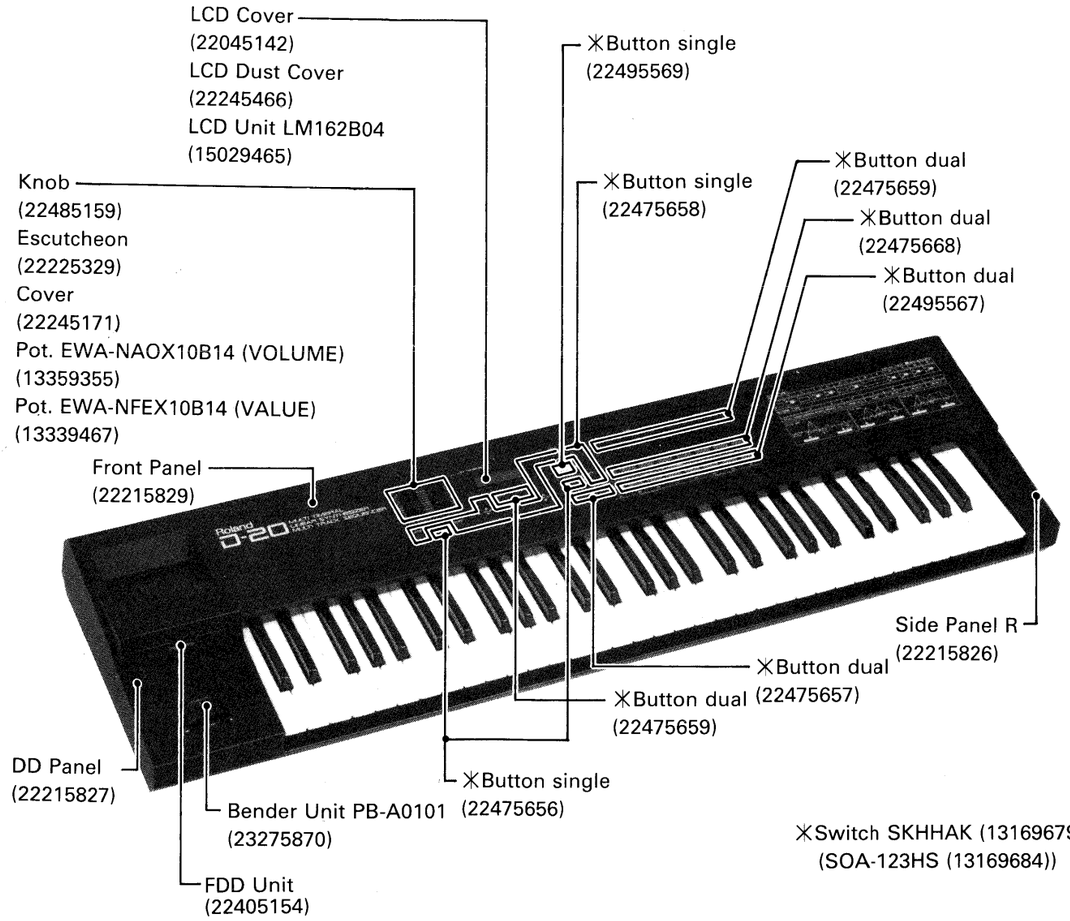
D-20

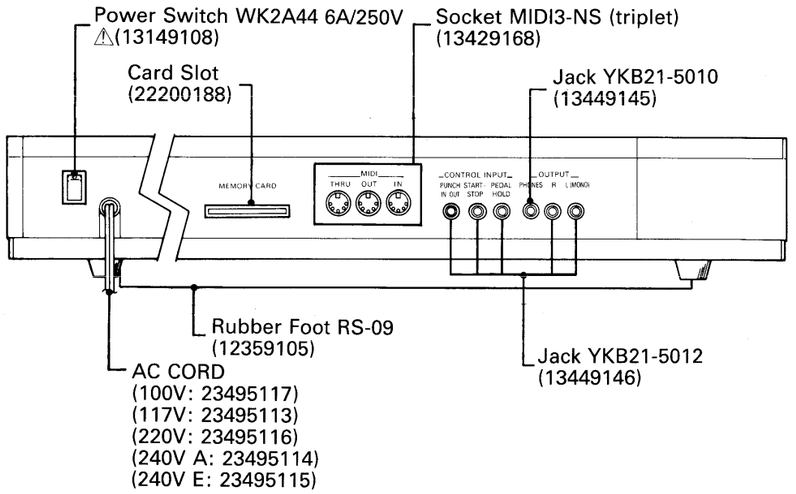
SERVICE NOTES
First Edition

SPECIFICATIONS/仕様

KEYBOARD	61 key, 5 octave, C scale with Velocity	
TUNE	MASTER TUNE	±50 cents
	FINE TUNE	±50 cents
PITCH MODULATION	LFO	±117 cents
	ENV	±5000 cents
	BENDER	±2400 cents
ENV TIME	PITCH T1 — T4	4ms — 17s
	TVF T1 — T4	4ms — 22s
	TVA T1 — T4	4ms — 22s
LFO	RATE	4ms — 17s
OUTPUT	AUDIO	+2dBm
	PHONES	+10dBm
POWER CONSUMPTION	25W, 20W (Japan)	
DIMENSIONS	1014(W) x 301(D) x 106(H)mm/39-15/16" x 11-7/8" x 4-3/16"	
WEIGHT	10.1kg/22 lb 4 oz	

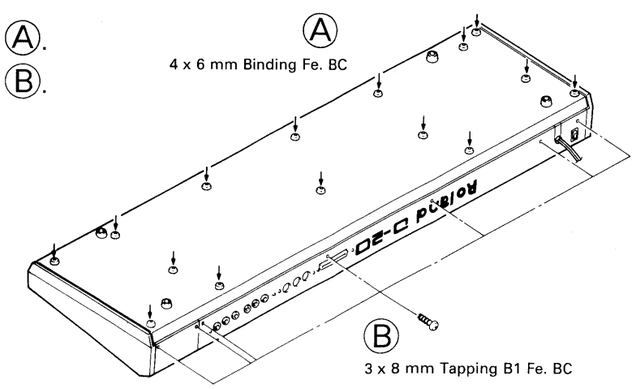


INTERNAL MEMORY		
Synthesizer Section	Patches	128
	Timbers	128
	Preset Tones	128
	Programmable Tones	64
	Preset Rhythm Tones	63
Rhythm Section	Setups	85 types (C1 to C8)
Rhythm Pattern	Preset Patterns	32
	Programmable Patterns	32
Maximum number of notes to be simultaneously recordable		8
Maximum number of notes to be recorded (in each Rhythm Pattern)		96
Rhythm Track	Maximum number of bars recordable	500
Sequencer Section	Maximum number of notes recordable	approx. 16,000 notes
	Maximum number of bars recordable	500
MEMORY CARD (M-256D, M-256E)	Patches	128
	Timbres	128
	Tones	64
	Rhythm Setup	1 set
	Rhythm Patterns	32
	Rhythm Track	One song
FLOPPY DISK (Dunble Density Track)	Memory Capacity	approx. 35,000 notes (Song Data)

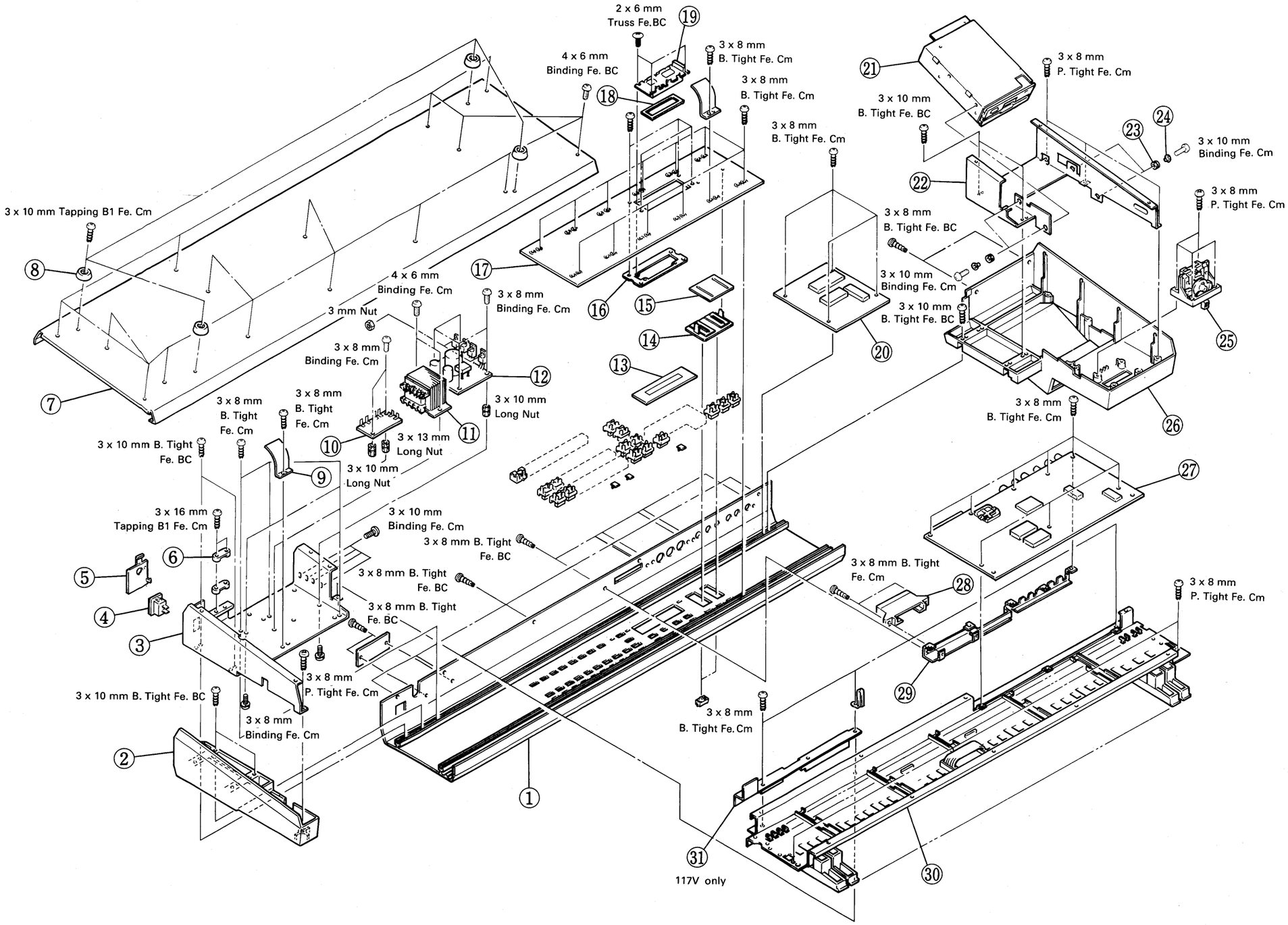


DISASSEMBLING/分解手順

1. Remove screws Ⓐ.
2. Remove screws Ⓑ.



EXPLODED/分解図



No.	PART NAME	PART No.
1	Front panel	22215829
2	Side panel	22215826
3	Power Transformer Holder	22205146
4	Power Switch ⚠	13149108
5	Cord Cover	22045144
6	Coad Band ⚠	12369410
7	Bottom Cover	22815618
8	Rubber Foot	12359105
9	Grounding Reaf	23455316
10	Fuse Board 100V 117V 220/240V	 7619918100 7619918200 7619918400
11	Power Transformer (universal) ⚠	22455511U0
12	Power Supply Board 100V 117V 220/240V	 7619915100 7619915200 7619915400
13	LCD Cover	22045142
14	Volume Escutcheon	22225329
15	Volume Cover	22245171
16	LCD Holder	22205161
17	Panel Board	7619911000
18	LCD Dust Cover	22245466
19	LCD Unit	15029465
20	CPU Board	7619908000
21	FDD Unit	22405154
22	FDD Holder	22205165
23	Danper	22265242
24	Collar	22165134
25	Bender Unit	23275870
26	FDD Panel	22215827
27	Main Board	7619905000
28	Card Slot Holder	22200188
29	Jack Holder	22205162
30	Keyboard	7619720000
31	Power Barrier	22125264

PARTS LIST

Chip components except for special parts are excluded in this list.
Unlisted chip components,such as capacitors and resistors,are considered to be substituted by locally available ordinary ones.
チップ部品について
パーツ・リストには，特殊なチップ部品以外は記載していません。
コンデンサーや抵抗などのチップ部品については，通常のパーツで代用して下さい。

SAFETY PRECAUTIONS:
The parts marked ⚠ have safety-related characteristics.
Use only listed parts for replacement.
安全上の注意:
⚠が付いている部品は，安全上特別な規格でつくられたものです。交換の際は，指定された部品番号以外の部品は使わないようにして下さい。

CASING

22215829	Front Panel
22815618	Bottom Cover
22215826	Side Panel R
22215827	DD Panel
22043116	LED Cover
22225329	Volume Escutcheon
22045142	LCD Cover
22245171	Volume Cover
22245466	LCD Dust Cover
12359105	Rubber Foot RS-09
22045144	Cord Cover

BUTTON, KNOB

22485159	Knob	VOLUME, VALUE
22475656	Button single (with LED window)	START, RHYTHM
22475657	Button dual (with LED window)	SYNTH, A/B
22475658	Button single	STOP, TEMPO, INT/CARD, etc.
22475668	Button dual	BANK 1 — BANK 8
22495209	Button dual	EXIT, EDIT, MIDI, ENTER, etc.
22495567	Button dual (with LED window)	NUMBER 1 — NUMBER 8
22495209	Button dual	LOWER, UPPER
22495569	Button signal (blue) (with LED window)	SEQENCER

HOLDER

12199570	*BBH-1	battery retainer	
22195889	*	MIDI	
22205162	*	Jack	
22200188	*	Card slot	
	**Attaching parts to main board.* メイン・ボード付属品。		
22205165		Disk driver	
22205164		Power transformer	
22125264		Power Barrier	117V only
22205161		LCD	

KEYBOARD

7619720000	SK-361-TR	61 key
	NOTE: See KEYBOARD PARTS LIST for details. 詳細は鍵盤パーツ・リスト参照。	

FDD UNIT

22405154	3.5inch	FDD FB-010
	No field serviceable parts inside. *Replace by a unit.* 交換はユニット単位で行ってください。 個別部品の補修用は用意されていません。	

BENDER UNIT

23275870	PB-A0101

LCD UNIT

15029465	LM162B04 with LED, PCB and wiring
	No replacement for individual parts. 補修品はユニット単位

AC COAD

⚠23495117	100V
⚠23495113	117V
⚠23495116	220V
⚠23495114	240V Australian
⚠23495115	240V England

PCB ASSEMBLY

7619905000	Main Board (PCB 22925582)
7619908000	CPU Board (PCB 22925639)
7619911000	Panel Board (PCB 22925583)
7619915100	Power Supply Board 100V (PCB 22925599)
7619915200	Power Supply Board 117V (PCB 22925599)
7619915400	Power Supply Board 220/240V (PCB 22925599)
7619918100	Fuse Board 100V (PCB 22925599)
7619918200	Fuse Board 117V (PCB 22925599)
7619918400	Fuse Board 220/240V (PCB 22925599)

The fact the difference between voltage versions of power supply board is in only fuse rating allows the factory to supply any version as a replacement provided that the fuses be changed with the correct one. When receiving a replacement PCB, first check the fuses for rating and repalce with correct ones, if wrong.
D2 on power supply board of 117V version requires heatsink (part No. 12469169). Use the existing one for the replacement.
電圧による違いはヒューズの値と117V のみパワーサプライボードD2にヒート・シンク（Part No.12469169）が必要ということのみですので，補修用には異なった電圧のものが供給されることもあります。この際は，ヒューズが適当な値のものに取り換えられているか，117V の場合 D2にヒート・シンクがついているか確認して下さい。

POWER TRANSFORMER

⚠22455511U0	Universal	100/117/220/240V

FUSE

⚠12559361	SGC-5A	power supply board 100V
⚠12559603	19198-3.5A	fuse board 100/117V
⚠12559573	CEE-4.0AT	power supply board 220/240V
(⚠12559554	CEE-4.0AT)	
⚠12559586	19198-500mA	fuse board 100/117V
⚠12559562	CEE-315MAT	fuse board 220/240V
(⚠12559543	CEE-315MAT BESWICK)	

BATTERY

12569249	CR2032 (leadless)	lithium

OPT-ISOLATOR

15229718	6N137	main board

IC

(main board)		
15179276	8097BH	CPU
1544913200	μPD27C256D-15	PROM A
1544913300	μPD27C256D-15	PROM B
	When ordering PROM, specify version number. PROM を発注される場合は，バージョン・ナンバーを明記して下さい。	
15179879	HN623257PZ20	ROM (reverb)
15179873	LH531097	ROM (tone) Old Ver.
15179904	LH5310DJ	ROM (tone) New Ver.
15179878	HN62304BPC99	ROM (PCM A)
15179880	HN62304BPD10	ROM (PCM B)
15279506	SRM2064M-15	64K SRAM
(15279511	HM6264LFP-15)	
15279508	HM62256LFP-12T	256K SRAM
15279509	LC3517AM-12	16K SRAM
(15279512	HM6116)	
15179380	μPD41416C-12	DRAM
15229899	LA32	synthe chip
15229863	HG61H20R36F	reverb chip
15239106	HG-61H15B-72F	gate array
15229830	MB63H149PF-G-BND	gate array
15229848	μPD65005G-062	gate array
15269201	SN74LS04NS TAP-L	hex inverter
15259701T0	TC74HC00F-T2	quad2-input NAND gate
15259702T0	TC74HC02F-T2	quad2-input NOR gate
15259704T0	TC74HC04F-T2	hex inverter
15259713T0	TC74HC21F-T2	dual 4-input AND gate
15259714T0	TC74HC27F-T2	triple 3-input NOR gate
15259863T0	TC74HC4051LAF-T2	8-channel analog multiplexer
15219162	PCM54	D/A converter
15289105	μPC4570G	low noise OP amp (dual in line)
15289106	M5238FP	low noise OP amp (dual in line)
15189210	BA15218F	low noise OP amp (dual in line)
15289110	μPC4062G	J-FET OP amp (dual in line)
15199172	TA79L005P-TPE5	—5V voltage regulator
(CPU board)		
15179277	HD64180R1P6	CPU
15219198	M60012-0110	FDD Controler
1544913400	μPD27C512-15	PROM C
	When ordering PROM, specify version number. PROM を発注される場合は，バージョン・ナンバーを明記して下さい。	
15279510	HM65256BFP12	PSRAM
15289113	TD62305F-T2	transistor array
15289114	TD62506F-T2	transistor array
15259710T0	TC74HC00F-T2	quad2-input NAND gate
15259702T0	TC74HC02F-T2	quad2-input NOR gate
15259716T0	TC74HC32F-T2	quad2-input OR gate
15259720T0	TC74HC74F-T2	dual D flip-flop
15259740T0	TC74HC139F-T2	dual 2-to-4 line decoder
15259786T0	TC74HC273F-T2	octal D flip-flop
15259881D0	BU74HC174F MF	hex D flip-flop
15259882D0	BU74HC244F MF	octal bus buffer
(power supply board)		
⚠15199155	L78MR05R	+5V voltage ragulator
⚠15199176	L78M12ML	+12V voltage ragulator
⚠15199177	L79M12ML	—12V voltage ragulator
⚠15199167	BA17805	+5V voltage ragulator
(panel board)		
15189209	BA15218	low noise OP amp (dual in line)

Please see page 15 for CHANGE INFORMATION.
16頁の変更案内を参照してください。

TRANSISTOR

15309101	2SA1037KR T-96	main board
15319101	2SC2412KR T-96	main board
15329507	DTA-114EK T-96	CPU board
15329503	DTA-124EK T-96	main board
15329501	DTA-143EK T-96	main board
15329502	DTC-124EK T-96	main board
15329509	DTC-143EK T-96	CPU board
15329505	DTC-314TK T-96	main board

RESONATOR

12389792	16.384MHZ	crystal	main board
12389765	12MHz	crystal	main board
12389789	CST4MHzMG	ceralock	CPU board
12389793	FAR-C4SB-10000000-KO2-u	crystal	CPU board

DIODE

(main board)			
15339104	RLS-71 TE-11	chip	
15339105	DAN202K T-96	chip	
15339103	MA-153	chip	
(panel board)			
15029222	SLR55VC3F	LED (red)	
15029258	TLSG126	LED (red/green)	
15019120	1S-2473-T77		
(power supply board)			
⚠15019245	1B4B41	100V 1A rectifier	
⚠15019293	3B4B41 LC1	100V 3A bridge rectifier	
15019520	05AZ-5.1Y	5V zener	
(15019612OX	05Z-5.1X)		
15019281	1SR35-100A T-93	100V 1A	

CAPACITOR

(main board)			
13649105M0	25N10ECEAIEN100SB	10μF/25V BP	
13639602S0	50MV1HA+T	1μF/50V	
13639565S0	25MV4R7HA+T	4.7μF/25V	
13639546S0	16MV10HA+T	10μF/16V	
13639549S0	16MV47HA+T	47μF/16V	
13639609S0	50MV47HA+T	47μF/50V	
13639550S0	16MV100HA+T	100μF/16V	
13639510S0	6MV100HA+T	100μF/6.3V	
13549263M0	ECQ-MIH472JF3	0.0047	
13549269M0	ECQ-MIH153JF3	0.015	
(CPU board)			
13639550S0	16MV100HA+T	100μF/16V	
15369146M0	ECEVICA100RZ	10μF/16V chip	
(power supply board)			
13639194S0	35MV1000H	1000μF/35V	
13659216M0	ECESIEV682K	6800μF/25V	
13639602S0	50MV1HA+T	1μF/50V	
13639549S0	16MV47HA+T	47μF/16V	
13519640M0	50VK10000PF	0.01μF 50V ceramic	
13519641M0	ECFR1H104ZFS	0.1μF 50V ceramic	
13519452	DD306-959-F104Z25	0.1μF 25V ceramic	
⚠13529104	DE7150F472MVA1	line bypass	
(panel board)			
13639146S0	16MV10HA	10μF/16V	

CAPACITOR ARRAY

13529141	CN3Q9E220K 22P X 8	main board
13529147	CXKD8X101M 100P X 8	main board

RESISTOR ARRAY

15239108	MNRDM4JX681E 680 X 4	main board
15239103	MNRDM4JX102E 1K X 4	CPU board
15399914	MNRDM4JX222E 2.2K X 4	main board
15399917	MNRDM4JX103E 10K X 4	main board, CPU board
15399907	MNRDM4JX153E 15K X 4	main board, CPU board

POTENTIOMETER

13299217	RVF6P51-5-104N 100K	D/A	main board
13359355	EWA-NAOX 10B14 10KB (stereo)	VOLUME.	panel board
13339467	EWA-NFEX 10B14 10KB (mono)	VALUE.	panel board

SWITCH

⚠13149108	WK2A44 6A/250V	POWER	
13169684	SOA-123HS		panel board

SOCKET

13429541	268-7234-51-3851	CPU
13429536	100-028-000	PROM
13449145	YKB21-5010(stereo)	PHONES
13449146	YKB21-5012(mono)	OUTPUT, CONTROL INPUT
13429168	MIDI3-NS(triplet)	MIDI IN/OUT/THRU

CONNECTOR

(wire trap)			
13439411	52004-0610	6P	main board CN2
13439410	52004-0710	7P	main board CN12
13439409	52004-0810	8P	main board CN1
13439407	52004-1010	10P	CPU board CN2
13439414	52004-1210	12P	main board CN4, CPU board CN3
13439435	52004-1310	13P	main board CN5, CPU board CN4
13439436	52004-1410	14P	main board CN6, CPU board CN6
(cable holder)			
13439463	SD-51016-0600	6P	power supply board CN2
13429219	SD-51016-0700	7P	power supply board CN1
13429220	SD-51016-0800	8P	main board CN8, etc, CPU board CN1
13429222	SD-51016-1000	10P	power supply board CN3
13429224	SD-51016-1200	12P	panel board CN3
13429225	SD-51016-1300	13P	panel board CN1
(pin header)			
13439330	IL-S-3P-S2T2-EF	3P	CPU board CN5
13439335	IL-S-6P-S2T2-EF	6P	main board CN13
13439298	IL-S-10P-S2T2-EF	10P	main board CN11
13369503	B7B-PH-K-S	7P	CPU board CN8
13369504	B8B-PH-K-S	8P	CPU board CN7
(memory card connector)			
13429233	7508095A		main board CN3

FILTER

13529165	NFV510-655T2A506	main board
13529164	DSS306-55F223Z16	main board
13529150	DSS310-SS310-55B101M	power supply board

INDUCTOR

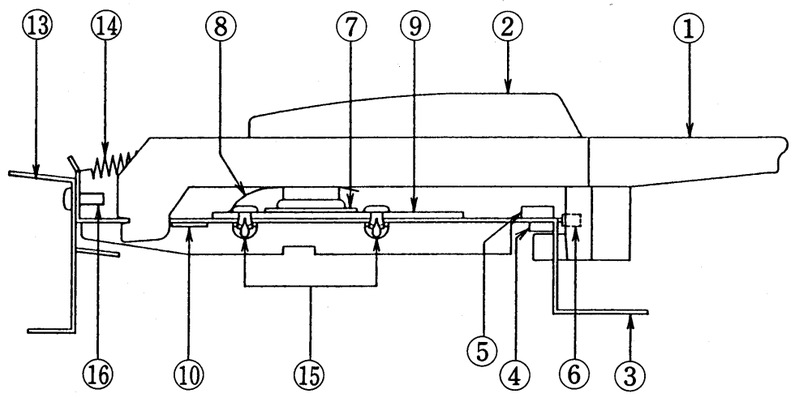
12449326	SBT-0460	main board
12449273	BL03RN2-R62	main board, CPU board

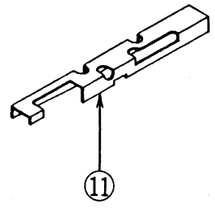
MISCELLANEOUS

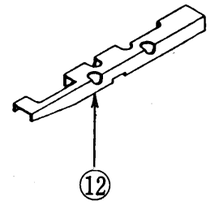
22165134	Collar	disk drive holder
22265242	Danper	disk drive holder
23455316	Grounding leaf	
⚠12369410	Coad Band 1702B	power supply board (117V only)
12469169	Heat sink 16P 16 L12	power supply board, fuse board
12199550	Fuse Clip H0446	

SK-361-TR PARTS LIST

No.	PARTS No.	PARTS NAME		
1	22575136	NATURAL KEY C·F	257-136	
	22575137	NATURAL KEY D	257-137	
	22575135	NATURAL KEY E·B	257-135	
	22575138	NATURAL KEY G	257-138	
	22575134	NATURAL KEY A	257-134	
	22575139	NATURAL KEY C' F'	257-139	
2	22575140	SHARP KEY	257-140	
3	22815575	CHASSIS 61P	281-575	CHASSIS 61P ASSY
4	22265147	SK-3 FELT	226-147	281-575 22815619
5	22265403	SK-3 FELT	226-403	
6	22155716	HP-GUIDE BUSH	215-716	
7	22185218	CONTACT RUBBER 12P	218-218	
	22185219	CONTACT RUBBER 13P	218-219	
8	22245144	SWITCH COVER 29P	224-144	
	22245145	SWITCH COVER 32P	224-145	
9	7618022000	P, C, B 32P ASSY		P, C, B ASSY
	7619722000	P, C, B 29P ASSY		7619721000
10	22135415	SK-3 STOPPER A	213-415	
	22135416	SK-3 STOPPER B	213-416	
	22135417	SK-3 STOPPER C	213-417	
11	22125542	SK-3 ANGLE A-JX	212-542	
12	22125541	SK-3 ANGLE B-JX	212-541	
13	22125590	ANGLE	212-590	
14	(22175187)	SK-3 SPRING (NATURAL)	217-187	☆
	(22175188)	SK-3 SPRING (SHARP)	217-188	☆
15	————	NYLON RIVET NRP-345		☆
16	————	TAPPING SCREWS 3X8 B1		☆

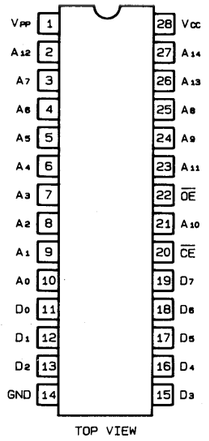




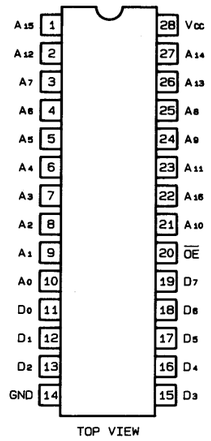


IC DATA

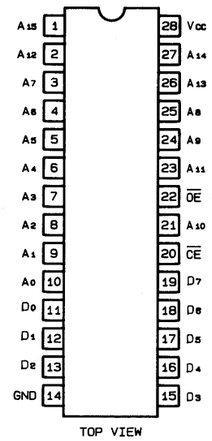
REVERB MASK ROM HN623257PZ20



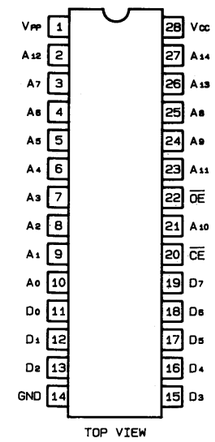
TONE ROM LH53100



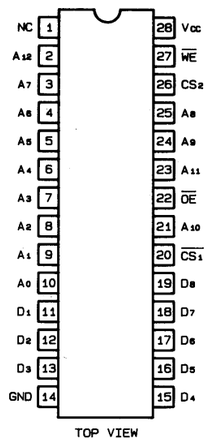
EP ROM μPD27C512-15



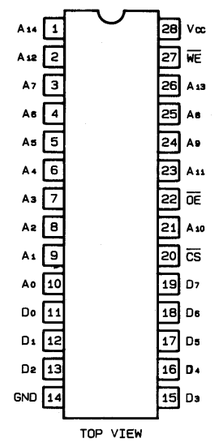
EP ROM μPD27C256D-15



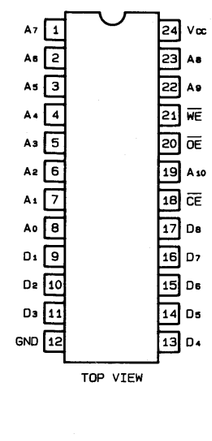
S RAM SRM2064M-15 HM6264LFP-15



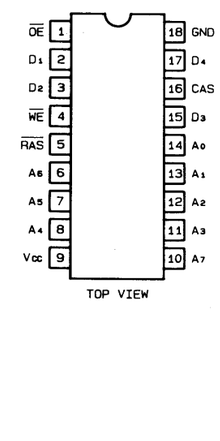
S RAM HM62256LFP-12T HM62256BFP-12



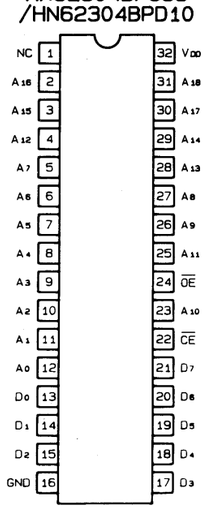
S RAM LC3517AM-12 HM6116



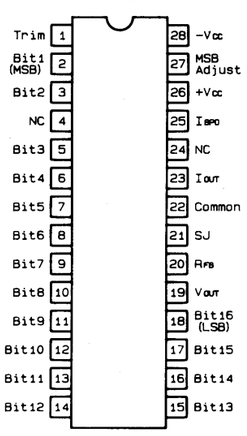
D RAM μPD41416C-12



PCM ROM A/B HN62304BPC99 /HN62304BPD10



D/A CONVERTER PCM54



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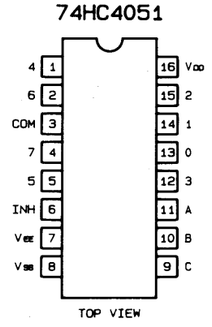

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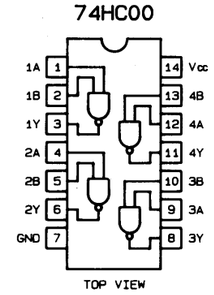

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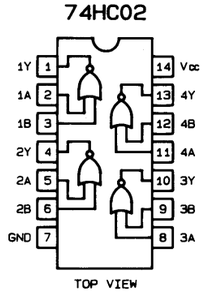

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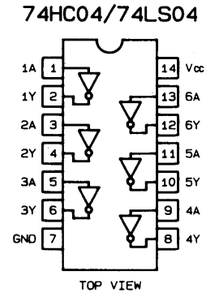

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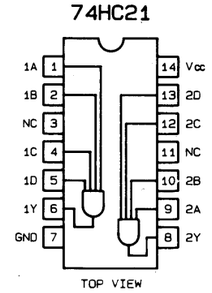

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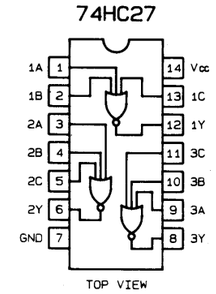
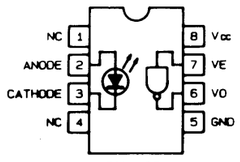
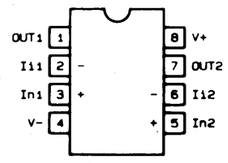


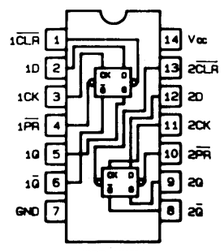
PC-910



BA15218F μPC4062G μPC4570G M5238FP



74HC74



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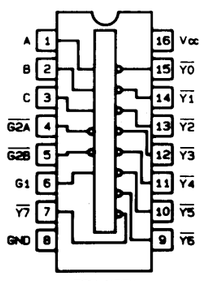

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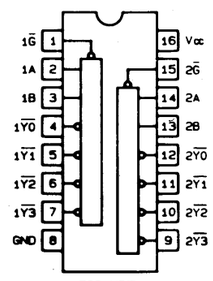

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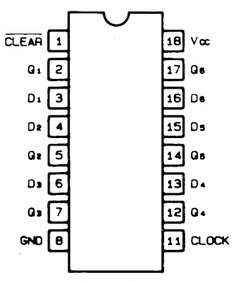

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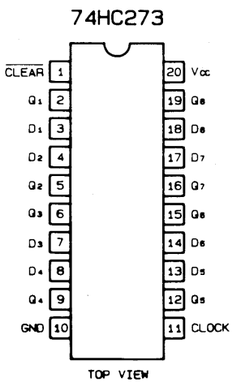
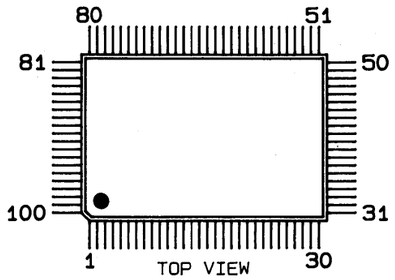


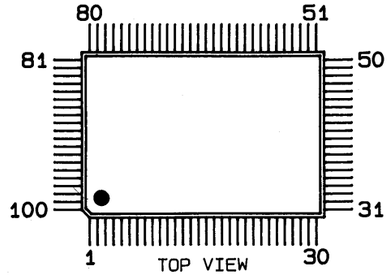
SYNTHE CUSTOM IC
LA32



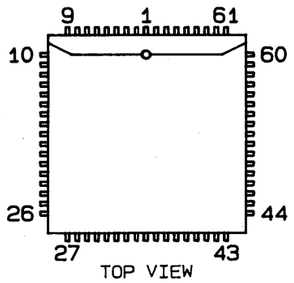
PIN.NO.	PIN NAME	I/O	DESCRIPTION
1	$\overline{INT}$	O	Interrupt output インタラプト　出力端子
2	$\overline{OE}$	I	Output enable input アウトプット・イネーブル入力端子
3, 16, 28 40, 53, 66 78, 97	V_{DD}	–	+5 V
4, 27, 39 42, 54, 77 85, 87, 89 95, 97, 99	——	–	Not used 未使用
5	$\overline{CS}$	I	Chip select チップ・セレクト入力端子
6 - 14	A0-8	I	Connect to CPU address bus CPU とのアドレス・バス
15, 41, 65, 91,	V_{SS}	–	GND
17 - 24	D0-7	I/O	Connect to CPU data bus CPU とのデータ・バス
25, 26, 29 - 33, 36	RD0-7	I	Connect to ROM data bus ROM とのデータ・バス
34, 35, 37, 38, 43 - 50 55 - 60	RA0-19	O	Connect to ROM address bus ROM とのアドレス・バス

PIN.NO.	PIN NAME	I/O	DESCRIPTION
61 - 64, 67 - 76, 79, 80	O0-15	O	Data output データ・アウトプット・バス
81 - 84	SH0-3	O	Not used 未使用
86	X1	I/O	Xtal input （32.768 MHz） 水晶振動子（32.768 MHz）接続端子
88	X2	I/O	Xtal input 水晶振動子（32.768 MHz）接続端子
92	16M	O	Output frequency is one half of master clock マスター・クロックを 1 回分周した周波数を出力
93	32M	O	The same frequency as that of master clock マスター・クロックと同じ周波数を出力
94	CKIN	I	Iutput frequency is a combination of the master clock and one half of master clock マスター・クロックと 1 回分周した周波数を入力
96	$\overline{SYI}$	I	Sync signal input シンク信号入力端子
98	$\overline{WR}$	I	Write pulse input ライト・パルス入力端子
100	$\overline{RD}$	I	Read pulse input リード・パルス入力端子

REVERB CUSTOM IC
HG61H20R36F

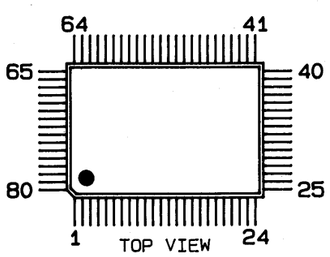


CPU
8097BH



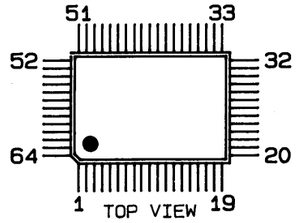
PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O
1	Vcc	-	21	P1.2	I/O	41	$\overline{BHE}$	O	61	$\overline{RD}$	O
2	$\overline{EA}$	I	22	P1.3	I/O(NC)	42	P2.4	I/O	62	ALE	O
3	NMI	I	23	P1.4	I/O(NC)	43	READY	I (NC)	63	INST	O (NC)
4	ACH3	I	24	HSI.0	I	44	P2.3	I/O	64		I
5	ACH1	I	25	HSI.1	I	45	AD15	I/O	65	CLKOUT	O (NC)
6	ACH0	I	26	HSI.2	I (NC)	46	AD14	I/O	66	XTAL2	I
7	ACH2	I	27	HSI.3	I (NC)	47	AD13	I/O	67	XTAL1	I
8	ACH6	I	28	HSO.0	O (NC)	48	AD12	I/O	68	VSS	-
9	ACH7	I	29	HSO.1	O (NC)	49	AD11	I/O			
10	ACH5	I	30	P1.5	I/O	50	AD10	I/O			
11	ACH4	I	31	P1.6	I/O	51	AD9	I/O			
12	ANGND	-	32	P1.7	I/O	52	AD8	I/O			
13	VREF	-	33	P2.6	I/O	53	AD7	I/O			
14	VPD	-	34	HSO.2	O (NC)	54	AD6	I/O			
15	EXTINT	I	35	HSO.3	O (NC)	55	AD5	I/O			
16	$\overline{RESET}$	I	36	VSS	-	56	AD4	I/O			
17	RXD	I	37	VBB	-	57	AD3	I/O			
18	TXD	O	38	P2.7	I/O	58	AD2	I/O			
19	P1.0	I/O	39	P2.5	I/O	59	AD1	I/O			
20	P1.1	I/O	40	$\overline{WR}$	O	60	AD0	I/O			

GATE ARRAY
HG61H15B72F



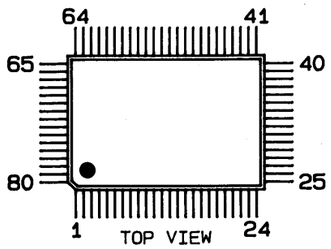
PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O
1	SI0	I	21	AD4	I	41	$\overline{EXIO2}$	O	61	A17	O
2	SI1	I	22	AD5	I	42	$\overline{EXIO3}$	O	62	$\overline{BANK0}$	O
3	SI2	I	23	AD6	I	43	A0	O	63	$\overline{BANK1}$	O
4	SI3	I	24	AD7	I	44	A1	O	64	$\overline{WR\ H}$	O
5	SI4	I	25	AD8	I	45	A2	O	65	$\overline{WR\ L}$	O
6	SI5	I	26	AD9	I	46	A3	O	66	SO0	O
7	SI6	I	27	AD10	I	47	A4	O	67	SO1	O
8	SI7	I	28	AD11	I	48	A5	O	68	SO2	O
9	$\overline{AUXB2}$	O	29	AD12	I	49	A6	O	69	SO3	O
10	$\overline{AUXB3}$	O	30	AD13	I	50	A7	O	70	SO4	O
11	CLK	I	31	AD14	I	51	A8	O	71	SO5	O
12	GND	-	32	AD15	I	52	GND	-	72	SO6	O
13	SC0	O	33	VCC	-	53	A9	O	73	VCC	-
14	SC1	O	34	$\overline{RD}$	I	54	A10	O	74	SO7	O
15	SC2	O	35	$\overline{WR}$	I	55	A11	O	75	LCD0	O
16	SC3	O	36	$\overline{BHE}$	I	56	A12	O	76	LCD1	O
17	AD0	I	37	ALE	I	57	A13	O	77	LCD2	O
18	AD1	I	38	$\overline{RES}$	I	58	A14	O	78	LCD3	O
19	AD2	I	39	$\overline{INT}$	O	59	A15	O	79	LCDE	O
20	AD3	I	40	$\overline{EXIO1}$	O	60	A16	O	80	LCDRS	O

GATE ARRAY
μPD65005G-62



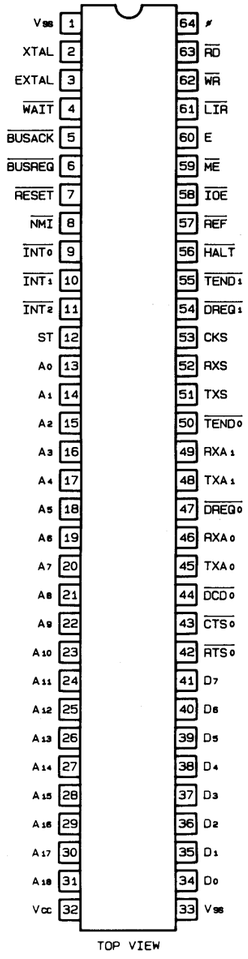
PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O
1	NC	-	17	NC	-	33	NC	-	49	NC	-
2	NC	-	18	NC	-	34	NC	-	50	CD0	I/O
3	AD7	I/O	19	A13	I	35	CA5	O	51	CD1	I/O
4	AD6	I/O	20	A12	I	36	CA6	O	52	CD2	I/O
5	AD5	I/O	21	A11	I	37	CA7	O	53	CD3	I/O
6	AD4	I/O	22	A10	I	38	CA8	O	54	CD4	I/O
7	AD3	I/O	23	A9	I	39	CA9	O	55	CD5	I/O
8	AD2	I/O	24	A8	I	40	CA10	O	56	CD6	I/O
9	AD1	I/O	25	SEL	I (LOW)	41	CA11	O	57	CD7	I/O
10	AD0	I/O	26	Vss	-	42	CA12	O	58	Vss	-
11	Vss	-	27	VDD	-	43	CA13	O	59	VDD	-
12	VDD	-	28	CA0	O	44	CA14	O	60	BATT	I (LOW)
13	ALE	I	29	CA1	O	45	MR	O	61	SENS	I (NC)
14	$\overline{WR}$	I	30	CA2	O	46	CWR	O	62	RCS	I
15	$\overline{RD}$	I	31	CA3	O	47	CCS	O	63	$\overline{CS}$	I
16	A14	I	32	CA4	O	48	CRD	O	64	NC	-

GATE ARRAY
MB63H149



PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O	PIN NO.	NAME	I/O
1	T7	O	21	BR9	I	41	AD7	I/O	61	RA1	O
2	BR0	I	22	MK9	I	42	CA8	I	62	RA10	O
3	MK0	I	23	BR10	I	43	CA9	I	63	RA2	O
4	BR1	I	24	MK10	I	44	CA10	I (LOW)	64	$\overline{ROE}$	I/O
5	MK1	I	25	RES	I	45	CS	I	65	RA3	O
6	BR2	I	26	$\overline{EXCK}$	I/O	46	XT1	I	66	$\overline{RWE}$	O
7	MK2	I	27	E	I (HIGH)	47	XT2	O (NC)	67	RA4	O
8	BR3	I	28	INT	O	48	ASEL	O (NC)	68	RA9	O
9	MK3	I	29	AS	I	49	MOD1	I (HIGH)	69	RA5	O
10	BR4	I	30	$\overline{CRES}$	O (NC)	50	MOD2	I (LOW)	70	RA8	O
11	MK4	I	31	$\overline{CRNW}$	I	51	RD3	I/O	71	RA6	O
12	Vss	-	32	SRCK	O (NC)	52	Vss	-	72	RA7	O
13	BR5	I	33	VDD	-	53	RD4	I/O	73	VDD	-
14	MK5	I	34	AD0	I/O	54	RD2	I/O	74	T0	O
15	BR6	I	35	AD1	I/O	55	RD5	I/O	75	T1	O
16	MK6	I	36	AD2	I/O	56	RD1	I/O	76	T2	O
17	BR7	I	37	AD3	I/O	57	RD6	I/O	77	T3	O
18	MK7	I	38	AD4	I/O	58	RD0	I/O	78	T4	O
19	BR8	I	39	AD5	I/O	59	RD7	I/O	79	T5	O
20	MK8	I	40	AD6	I/O	60	RA0	O	80	T6	O

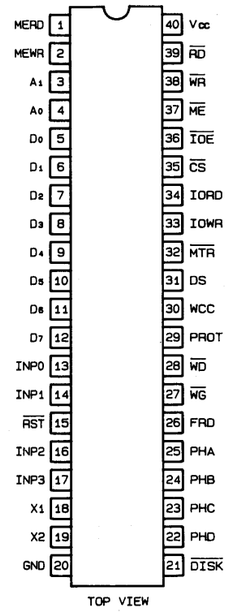
CPU HD64180



TOP VIEW

PIN. No.	PIN NAME	I/O	PIN. No.	PIN NAME	I/O	PIN. No.	PIN NAME	I/O	PIN. No.	PIN NAME	I/O
1	Vss	—	17	A_4	O	33	Vss	—	49	RXA_1	I
2	XTAL	I	18	A_5	O	34	D_0	I/O	50	$\overline{TEND_0}$	O
3	EXTAL	I	19	A_6	O	35	D_1	I/O	51	TXS	O
4	$\overline{WAIT}$	I	20	A_7	O	36	D_2	I/O	52	RXS	I
5	$\overline{BUSACK}$	O	21	A_8	O	37	D_3	I/O	53	CKS	I/O
6	$\overline{BUSREQ}$	I	22	A_9	O	38	D_4	I/O	54	$\overline{DREQ_1}$	I
7	$\overline{RESET}$	I	23	A_{10}	O	39	D_5	I/O	55	$\overline{TEND_1}$	O
8	$\overline{NMI}$	I	24	A_{11}	O	40	D_6	I/O	56	$\overline{HALT}$	O
9	$\overline{INT_0}$	I	25	A_{12}	O	41	D_7	I/O	57	$\overline{REF}$	O
10	$\overline{INT_1}$	I	26	A_{13}	O	42	$\overline{RTS_0}$	O	58	$\overline{IOE}$	O
11	$\overline{INT_2}$	I	27	A_{14}	O	43	$\overline{CTS_0}$	I	59	$\overline{ME}$	O
12	ST	O	28	A_{15}	O	44	$\overline{DCD_0}$	I	60	E	O
13	A_0	O	29	A_{16}	O	45	TXA_0	O	61	$\overline{LIR}$	O
14	A_1	O	30	A_{17}	O	46	RXA_0	I	62	$\overline{WR}$	O
15	A_2	O	31	A_{18}	O	47	$\overline{DREQ_0}$	I	63	$\overline{RD}$	O
16	A_3	O	32	Vcc	—	48	TXA_1	O	64	φ	O

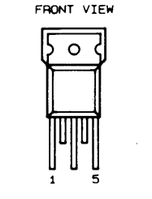
FDD CONTROLER M60012-0110



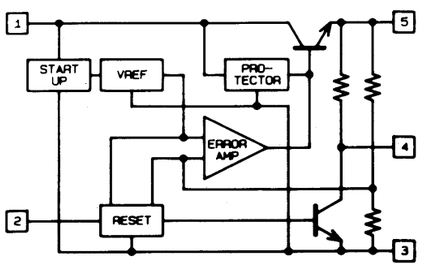
TOP VIEW

PIN. No.	PIN NAME	I/O	DESCRIPTION	PIN. No.	PIN NAME	I/O	DESCRIPTION
1	MERD	O	ANDed ME and RD of CPU outputs (unused) CPU から出力される ME と RD の論理積出力（未使用）	27	$\overline{WG}$	O	Write gate signal L=write; H=read ライト・ゲート信号出力 書込み "L" 読出し "H"
2	MEWR	O	ANDed ME and WR of CPU outputs (unused) CPU から出力される ME と WR の論理積出力（未使用）	28	$\overline{WD}$	O	Data to be Written onto the disk ライト・データ信号出力
3, 4	A1, A0	I	Connect to CPU address bus CPU とのアドレス・バス	29	PROT	I	Write protect switch output H=protected (current increased) メディアのライトプロテクト状況入力 プロテクトの時"H"
5-12	D_0-D_7	I/O	Connect to CPU data bus CPU とのデータ・バス	30	WCC	O	Write current control signal H=inner ライト電流制御信号出力 内周側 "H"
13	INP0	I	External input 0 (unused) 外部入力 0（未使用）	31	DS	O	LED drive signal to drive unit H=light ドライブの LED 点灯信号出力 点灯 "H"
14	INP1	I	External input 1 (unused) 外部入力 1（未使用）	32	$\overline{MTR}$	O	Motor control signal H=rotate ドライブ・モーターの制御信号出力 回転 "L"
15	$\overline{RST}$	I	Reset input リセット入力	33	IOWR	O	ANDed IOE and WR of CPU outputs (unused) CPU の IOE と WR の論理積出力（未使用）
16	INP2	I	External input 2 (unused) 外部入力 2（未使用）	34	IORD	O	ANDed IOE and RD of CPU outputs (unused) CPU の IOE と RD の論理積出力（未使用）
17	INP3	I	External input 3 (unused) 外部入力 3（未使用）	35	$\overline{CS}$	I	Chip select input チップ・セレクト入力
18, 19	X1, X2	I/O	Xtal input (4MHz) 水晶振動子（4 MHz）	36	$\overline{IOE}$	I	I/O control signal IO 制御信号入力
20	GND	—	GND	37	$\overline{ME}$	I	Memory control signal (unused) メモリー制御信号入力（未使用）
21	$\overline{DISK}$	I	Drive unit status input L=media exists ドライブの状況入力 メディアが入っていたら "L" になる	38	$\overline{WR}$	I	Write control signal of CPU CPU の書込み制御信号入力
22-25	PHD, PHC PHB, PHA	I	Signals read off the disk ステップモータの駆動パルス出力	39	$\overline{RD}$	I	Read control signal of CPU CPU の読込み制御信号入力
26	FRD	I	Drive pulses to step motor ドライブの読出し信号入力	40	Vcc	—	+5V

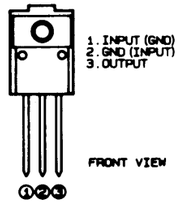
L78MR05R



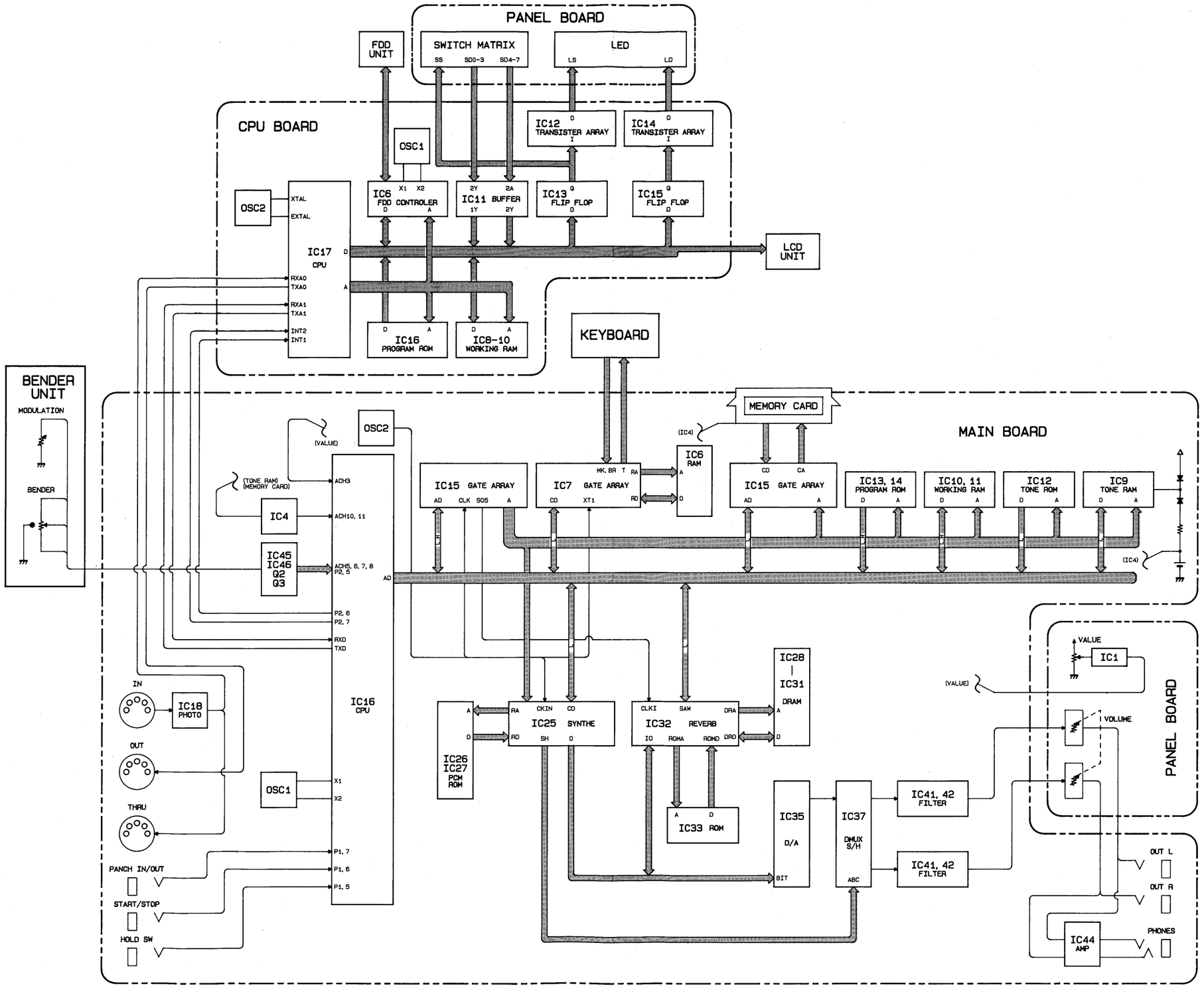
1. INPUT
2. DELAY CAPACITOR
3. GND
4. RESET OUTPUT
5. OUTPUT



BA17805 L78M12ML (L79M12ML)



BLOCK DIAGRAM



TEST MODE

Leave all sockets and card slot disengaged except for AC inlet.

テストを行なう前は，ペダルの接続やメモリー・カードを挿入しない。

Press and hold EXIT and EDIT buttons and then switch the power on.

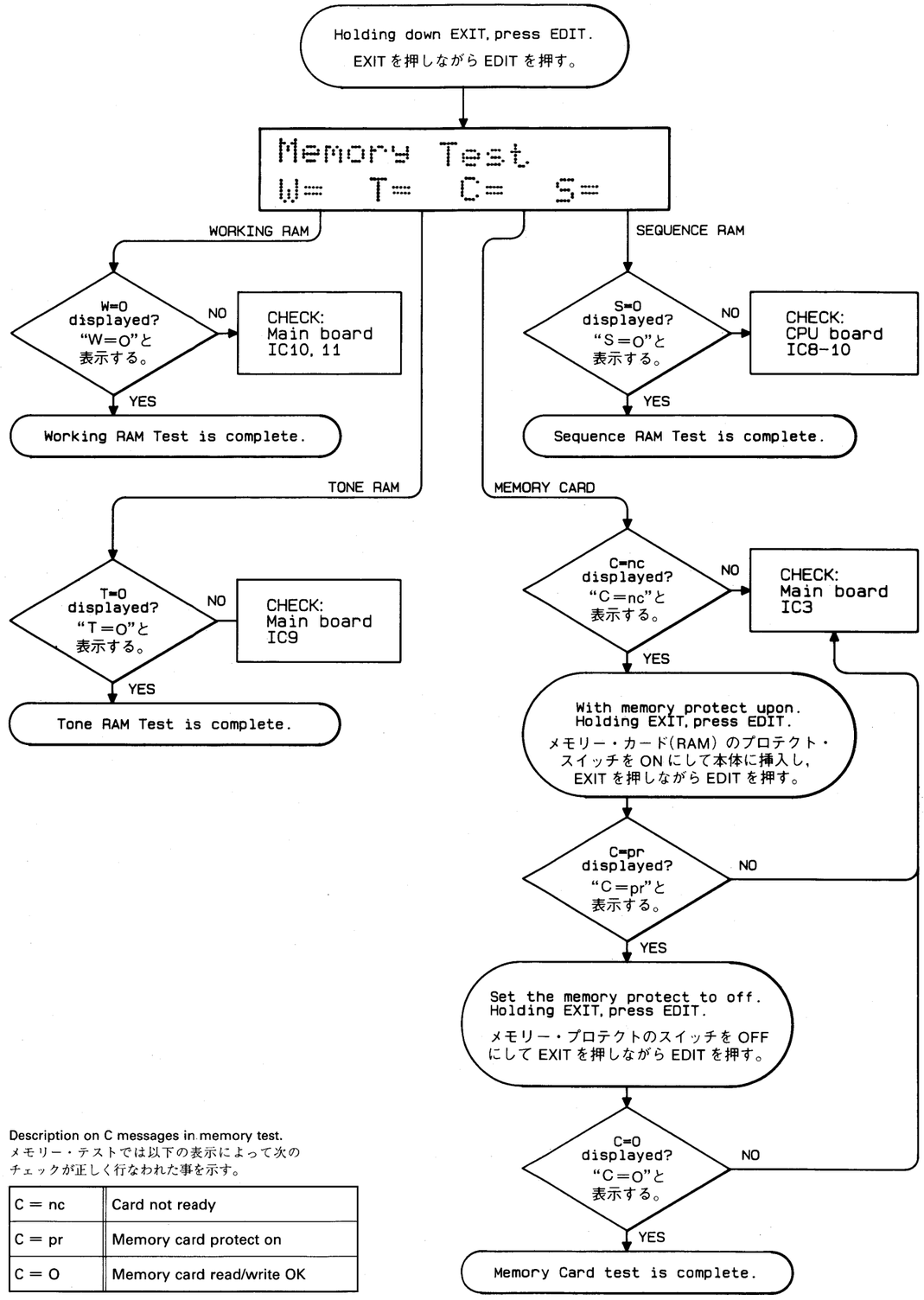
EXIT と EDIT を押しながら電源を投入。

```
Select  Mode
EXIT + ***button
```

During the test mode the following buttons serve as test selector button.
テスト・モードに入ると，以下のボタン操作で各テスト・モードに移る。

EXIT + EDIT	Memory test
EXIT + MULTI/PERFORMANCE	FDD TEST
EXIT + TUNE	A/D test, switch test
EXIT + MIDI	Keyboard test
EXIT + COMPARE	D/A Adjust, PCM wave test
EXIT + WRITE	All LCD dots cleared
EXIT + DATA TRANSFER	All LCD dots light
EXIT + ENTER	LED test

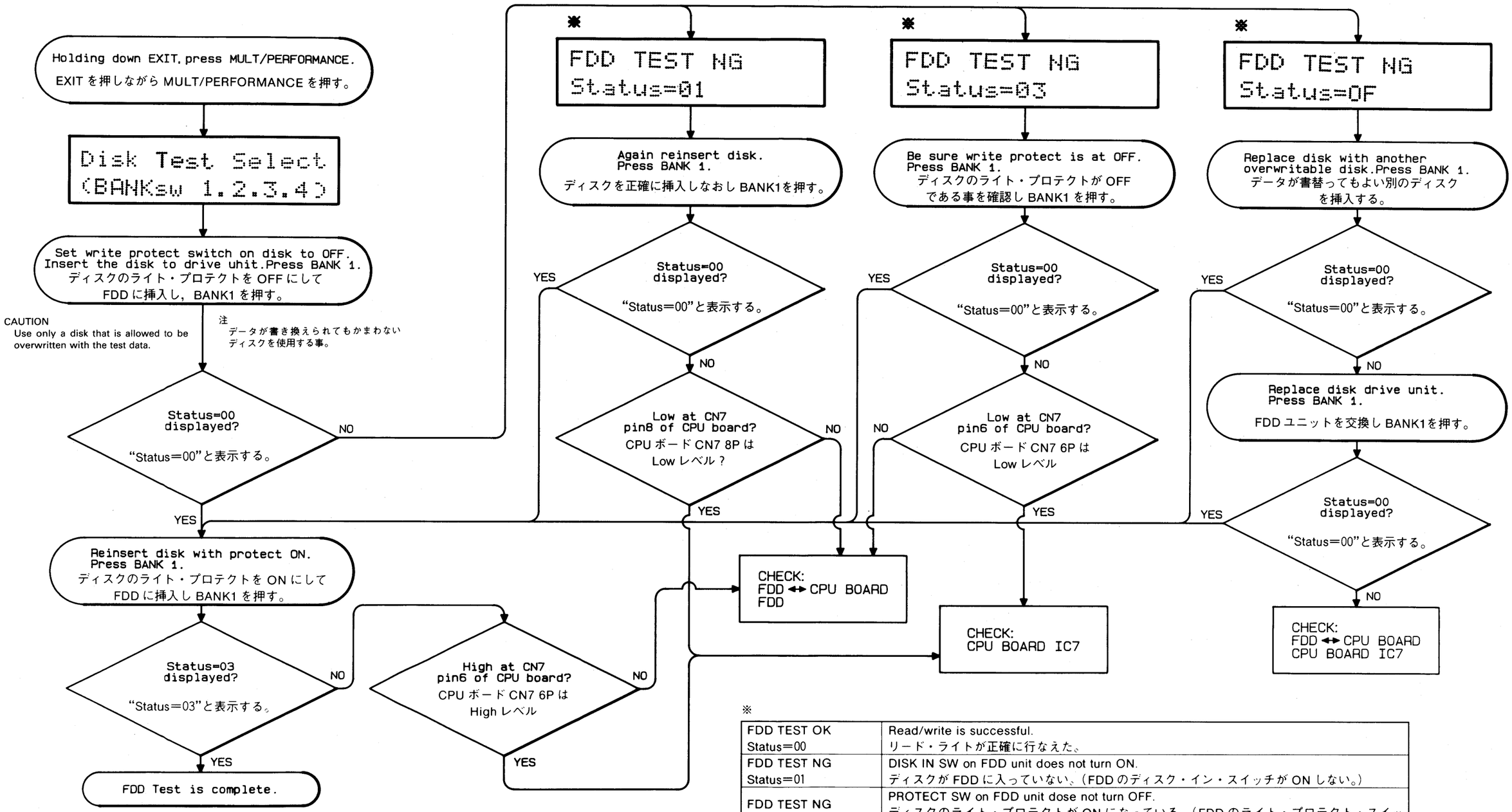
MEMORY TEST



Description on C messages in memory test.
メモリー・テストでは以下の表示によって次のチェックが正しく行なわれた事を示す。

C = nc	Card not ready
C = pr	Memory card protect on
C = O	Memory card read/write OK

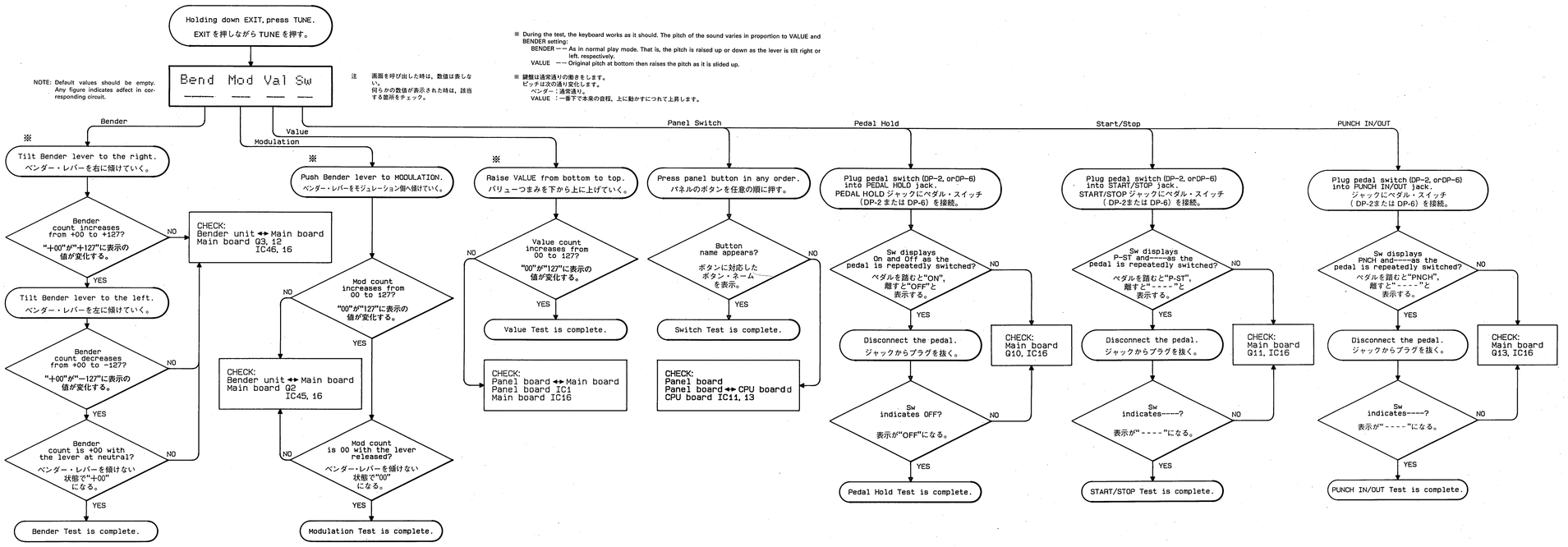
FDD TEST



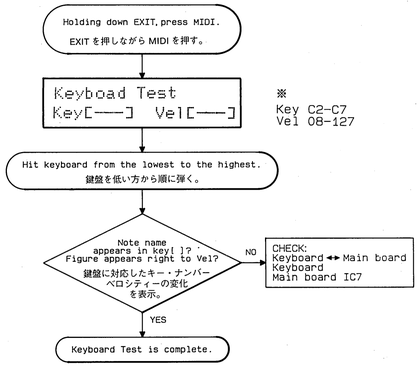
※

FDD TEST OK Status=00	Read/write is successful. リード・ライトが正確に行なえた。
FDD TEST NG Status=01	DISK IN SW on FDD unit does not turn ON. ディスクが FDD に入っていない。(FDD のディスク・イン・スイッチが ON しない。)
FDD TEST NG Status=03	PROTECT SW on FDD unit dose not turn OFF. ディスクのライト・プロテクトが ON になっている。(FDD のライト・プロテクト・スイッチが ON になっている。)
FDD TEST NG Status=0F	Read/write operation fails. リード・ライトが正確に行なえない。

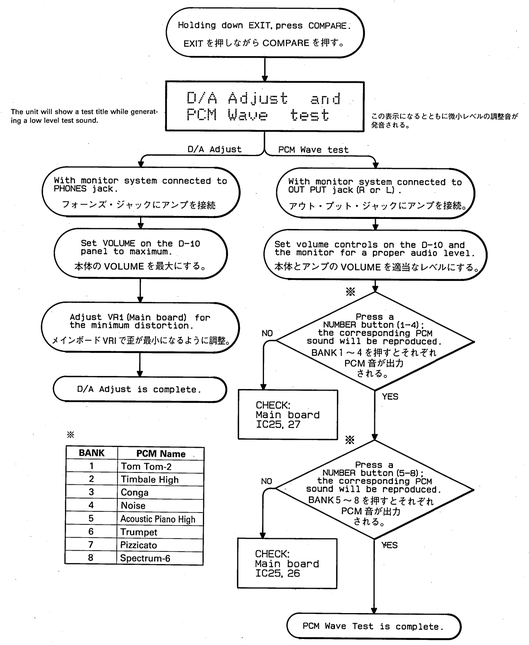
A/D CONVERTER, SWITCH TEST



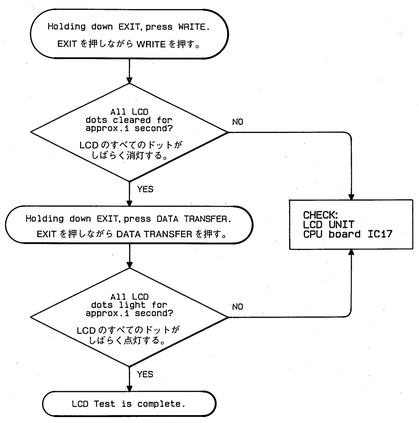
KEYBOARD TEST



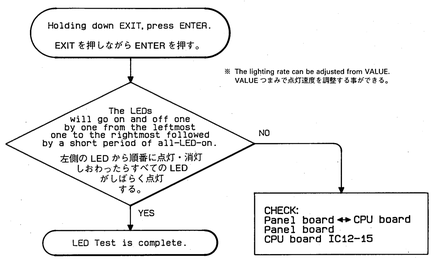
D/A ADJUSTMENT AND PCM WAVE TEST



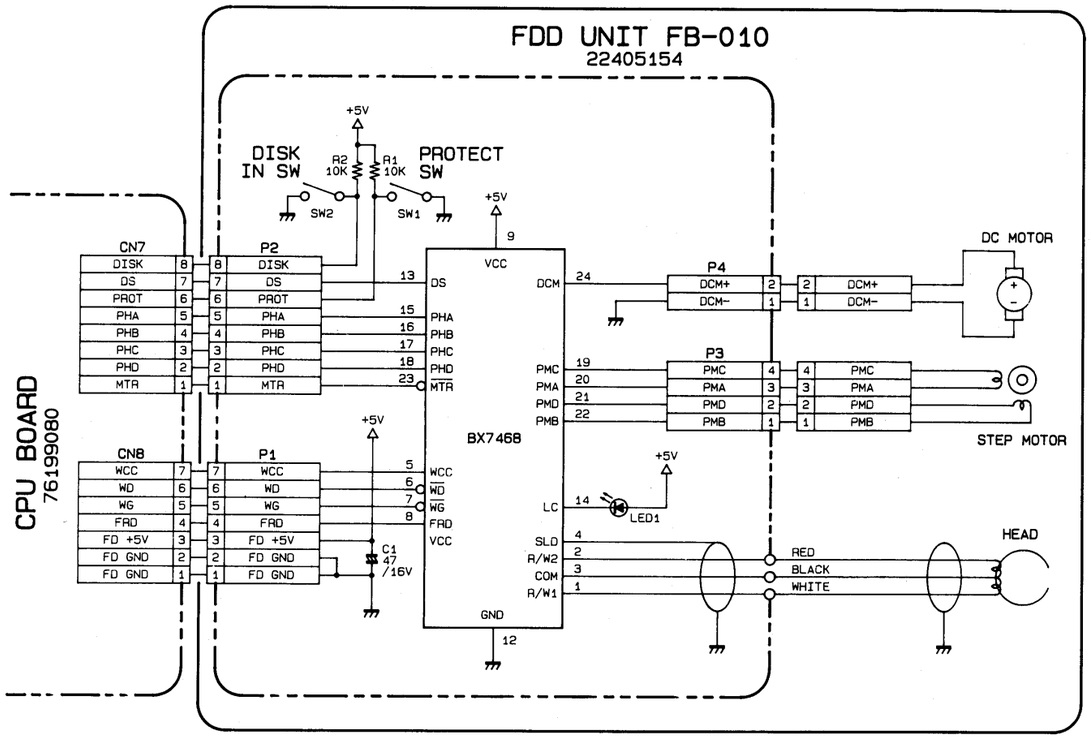
LCD TEST



LED TEST

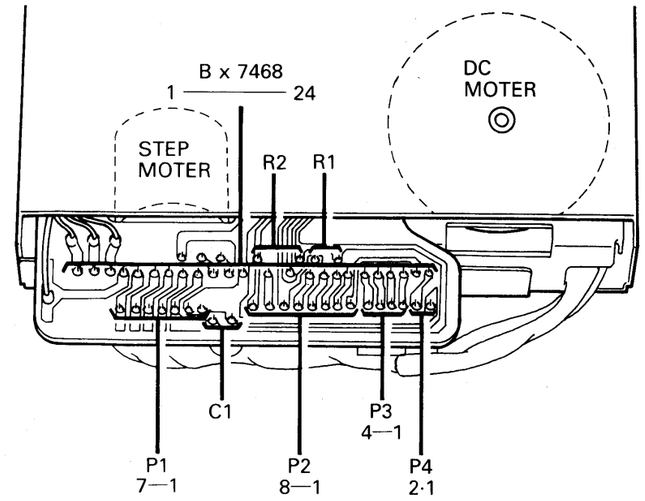


FDD DESCRIPTIONS



	PIN No.	PIN NAME	I/O	DESCRIPTION
P1	1, 2	FD GND	—	GND
	3	5V	—	+5V
	4	FRD	O	Pulse train of pulse data read off the disk. ディスクから読出されたアナログ信号をパルスに変換したもので，パルス列を転送する。
	5	$\overline{WG}$	I	Low level at this pin enables the data passing through WD pin to be written onto the disk. At high the disk is allowed to be read. “L”の時に書き込み回路を動作可能な状態にし，WD 信号によるデータがディスク面に記録される。また，この信号が“H”の時はドライブは読みだし状態となる。
	6	$\overline{WD}$	I	Pulse train of data to be written onto the disk. ディスク面に書き込むデータのパルス列を入力する。
	7	WCC	I	Switches amunt of recording corrents. H=inner (higher current) 記録電流の切り替えを行う。“H”のとき内周側。
P2	1	MTR	I	During low enables the motor to run. “L”の時，DC モーターが回転する。
	2, 3, 4, 5	PHD PHC PHB PHA	I	Two-phase driving pulses to step motor for head shift. 磁気ヘッド移動用ステップモーターに対し，2 相励磁方式の駆動パルスを入力する。
	6	PROT	O	High level when disk is write protected. ディスクのプロテクトが ON の時“H”となる。
	7	DS	I	High level at this pin keeps LED lit. “H”の時，LED が点灯する。
	8	$\overline{DISK}$	O	Low when a disk is inserted into drive unit. ドライブにディスクが挿入されていると“L”となる。

No field serviceable parts inside.
Replace by a unit.
交換はユニット単位で行ってください。
個別部品の補修用は用意されていません。



ERROR MESSAGES

Disk Error 1 Exit	The disk has been removed during operation. (The FDD P2 no. 8 pin has changed from “low” to “high” during operation.) 動作中にディスクが抜かれた。 （動作中に FDD の P 2　8 ピンが“Low”から“High”になった。）
Disk Error 2 Exit	The disk has been replaced during operation. (The FDD P2 no. 8 pin has changed from “low” to “high” and back to “low” again during operation.) 動作中にディスクが入れ換えられた。（動作中に FDD の P 2　8 ピンが“Low”から“High”になり，ふたたび“Low”になった。）
Disk Error 3 Exit	The disk write-protect is engaged during input/writing. (The FDD P2 no. 6 pin has changed from “low” to “high” during operation.) 書き込み中にディスクのライト・プロテクト・オンを感知した。 （書き込み中に FDD の P 2　6 ピンが“Low”から“High”になった。）
Disk Error 4 Exit	Does not read/write properly. 読み書きが正確に行なわれなかった。
Disk Error 5 Exit	The disk has been removed during input/writing. (The FDD P2 no. 8 pin has changed from “low” to “high” during operation.) 書き込み中にディスクが抜かれた。（書き込み中に FDD の P 2　8 ピンが“Low”から“High”になった。）
Disk Error 6 Exit	The disk is full. 書き込み場所が不足した。
Disk Error 7 Exit	FDD-CPU board communications link has been broken. CPU ボードと FDD の通信が出来なくなった。
Disk Error 8 Exit	Data is erased during operation. 動作中にデータが消えてしまった。
Disk Error 9 Exit	The amount of data is too small to be read in. 読み込むべきデータ・サイズが不足している。

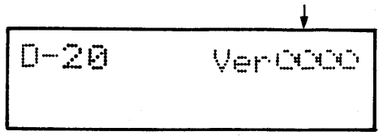
INDENTIFYING ROM (IC13, 14) VERSION NUMBER

バージョン・ナンバーの確認

Press and hold EDIT and DATA TRANSFER and then turn the switch on.

EDIT と DATA TRANSFER を押しながら，電源オン。

Version Number



RECOVERING TONE RAM DATA

データの設定

When the backup battery or RAM (Main Board IC9) has been replaced, take the following steps.

Holding down TUNE/FUNCTION and WRITE, turn the switch on:
All the factory preset data except for programmable tone data are initialized to the original value.

バッテリーや TONE RAM（Main Board IC9）の交換などで，TONE RAM のデータが失われた場合に次の操作を行なう。

TUNE/FUNCTION と WRITE を押しながら電源を ON するとプログラマブルトーン以外のデータが工場出荷時の値にイニシャライズされる。
プログラマブルトーンについては，プリセットトーン（b グループ）の値がコピーされる。

Programmable Tone
In the above sequence preset tone data of "a" group is copied into IC9.
To copy the factory programmable tone data, prepare the memory card (D-10/20 FACTORY PRESET) and then follow the procedure described below.

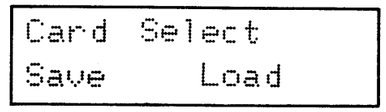
プログラマブルトーンを工場出荷時の値にするには，右に示す手順に従って，メモリ・カード（D-10/20 FACTORY PRESET CARD）をインターナルメモリにロードする。

Insert a Memory Card (D-10/20 FACTORY PRESET CARD) into the card slot.

カード・スロットにメモリー・カード（D-10/20ファクトリー・プリセットカード）を挿入。

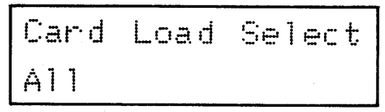
Press DATA TRANSFER.

DATA TRANSFER を押す。



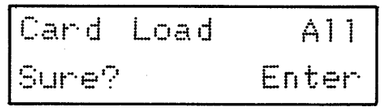
Press UPPER to select Load.

UPPER を押す。Load が選択される。



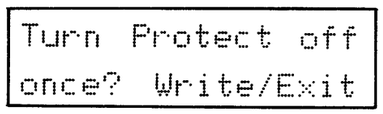
Press LOWER.

LOWER を押す。



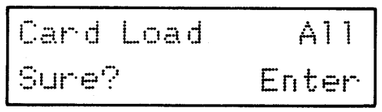
Press ENTER.

ENTER を押す。



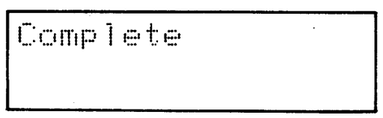
Press WRITE to temprarily turn off the Memory protect.

WRITE を押すと，メモリープロテクトが一時的に解徐される。



Press ENTER.

ENTER を押す。



When the data has been transferred properly, the display reads "Complete", then returns to the Play mode indication.
(Memory Protect is automatically returned to ON.)

データが正しく転送されると "Complete" と表示された後，通常の画面になる。
（メモリー・プロテクトは自動的に ON に戻る。）

CHANGE INFORMATION

PROM

PROMs Ver. 1.02-UP
PROM A (Main board IC14)
PROM B (Main board IC13)
PROM C (CPU board IC16)

PROMs of Ver. 1.02 and up contains modified program which cures the following problems.

Ver. EF. SN	What is improved
1.01 911900	1] When engaging the Sequencer in Multi Mode, the All Notes Off messages do not appear correctly when multiple Parts are entered in MIDI ch. 2] The hold information output at time of sequencer mute and hold information from the foot pedal do not correctly appear on the same MIDI channel. 3] On the Midi function screen, when changing the part receive channel while running the Sequencer, treatment such as Notes off to the MIDI OUT is not carried out, causing continuous sound to occur. 4] At completion times of the Sequencer REC and DUB, a "Please Wait" message appears, but carrying out such operations as hitting the keyboard, moving the Bender, or moving the VALUE knob causes the D-20 to reset. 5] By stipulating Key On REC using the DISPLAY _ button, an operation like that of overdub occurs. 6] When the message "MIDI Buffer Full" appears during REC and DUB, all sequence data is erased. 7] Resets/Starts begin (starts from Meas 1) with the foot pedal at time of Rhythm Track REC. 8] A tone sounds even when Output level is set to 0. 9] Unit runs out of control if rhythm bulk data is received when in Play mode. 10] When the Sequencer is running, the rhythm stops if Rhythm Exclusive data is received but the Sequencer keeps running. 11] When the Clock mode is set to MIDI (external synchrony) and quantize operation is carried out, thereafter the internal Clock is affected. 12] If continuous start is carried out immediately after the power is turned on, 0 transmits 3 meaningless bytes to MIDI OUT. 13] If continuous Play is carried out after quantizing, or after unit has been set to the first bar with the VALUE knob, or after nothing has been stored with Key On Overdub and stopped, play occurs at a bar different from the one indicated. 14] With the Sequencer Overdub, when previous data contains a PC (Program Change) and overdubbing begins from that point, the PC cannot enter with the Dub and Overdubbing is carried out while playing from the middle of the count, the sound is interrupted/staccato. 15] If the bar is changed during Key On REC or the Start button is pushed during Dub and the unit put into the standby mode, the Rhythm (the Metronome) and the Sequencer synchrony is disrupted. 16] If play occurs with a "Sure?" message on the screen during Pan/Volume Overdub, the initial Pan value may not display. 17] If play occurs with a "Sure?" message on the screen during Pan/Volume Overdub, the unit will sound at volume 100.
*** 1.10 (1.02) 927200**	1] Metronome can be started from Track 8 REC screen or Part 8/Rhythm switching screen in External REC mode. But once runs, metronome cannot stop. 2] When in External REC mode, the D-20 keeps the selected track LED red and won't function correctly. 3] Ending External REC with a key held down and releasing it after Ext. REC mode transmits MIDI Note Off without the preceding Note On. 4] Pressing A/B button during External REC mode cannot let the unit run as directed, but only showing Timbre (Patch) number. 5] When calling Metronome setting screen during the sequencer REC and DUB mode and resetting the metronome from Count In to REC & Play with the BEAT at 0 (zero), P-88 rhythm pattern sounds one measure takes over metronome click. 6] If only one volume data is contained as a Fade Out together with other data, it sets the sound level to the minimum at the end of the song. This Fade Out remains effective even in later Rest-start, keeping sounds at minimum volume. 7] RAM initializing in the test mode. Releasing TUNE and WRITE buttons soon after (within 1 second) the LCD displays ≪Now Initializing≫ fails to initialize the RAM.

* Ver.1.02 is for old TONE ROM and Ver.1.10 for new TONE ROM, contents of new and old are the same.

TONE ROM

Tone ROM LH5310 (Main board IC12)
From LH531097 to LH5310DJ
EFF: SN 927200-UP
Reason: As described below.

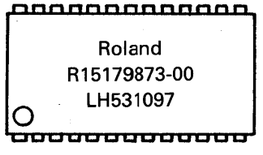
1] Improvement in Preset Tone
Minute modification without change in Tone name.
2] Improvement in performance data (rearrangement) in ROM Play (factory preset)
Minute modification: No change in song name and song sequence.

CAUTIONS on REPLACEMENTS of PROMs and TONE ROMs

PROMs A, B and C on a unit must be of the same version.
A combination of PROMs and TONE ROMs must be as follows:

TONE ROM	PROM
LH531097 (PN 15179873)	Ver. 1.0x
LH5310DJ (new) (PN 15179904)	Ver. 1.1x

NOTE: Although PROM Ver. 1.1x can work with old TONE ROM, intervals between songs or reverb effects differ to some extent from those with Ver. 1.0x.



OLD TONE ROM

NEW TONE ROM

変更案内

PROM

D-20では発表後，PROM A（Main Board IC14），PROM B（Main Board IC13），PROM C（CPU Board IC16）が，バージョン・アップされ下記に示す問題点が改良されています。

注　PROM A，B，C は，同一バージョンに揃えてください。また，TONE ROM LH5310（Main Board IC12）との組合せにも注意してください。（TONE ROM 変更の項参照）

Ver. EF. SN	改良点
1.01 **91190**	1】マルチ・モードでシーケンサーを動作させる場合に，複数のパートを同じ MIDI ch にするとオール・ノート・オフ・メッセージが正しく出ない。 2】シーケンサーのミュート時に出力されるホールド情報とフットペダルによるホールド情報が，同じ MIDI チャンネルだと正しく出ない。 3】MIDI ファンクション画面で，シーケンサーを走らせながらパートの受信チャンネルを変更した場合，MIDI OUT に対してノート・オフ等の処置がなされていないので，鳴りっぱなしが発生する。 4】シーケンサーの REC や DUB 等の終了時“Please Wait”と表示されるが，この時に Keyboard を弾く，ベンダーを動かす，バリュー・ノブを動かす等の操作を行うと D-20がリセットしてしまう。 5】キー・オン・REC を DISPLAY ▼ボタンを使って指定すると，オーバーダブの様な動作になってしまう。 6】REC や DUB の際中に，“MIDI Buffer Full”が表示された場合，すべてのシーケンス・データが消える。 7】リズム・トラック・REC 時，フット・ペダルでリセット・スタート（Meas 1 からスタート）してしまう。 8】アウトプット・レベルを 0 にしても音が出る音色がある。 9】プレイ・モード時にリズムのバルク・データを受信すると暴走する。 10】シーケンサーが走っているときに，リズムのエクスクルーシブ情報を受信するとリズムは停止するが，シーケンサーは走ったままになる。 11】クロック・モードを MIDI（外部同期）に設定していて，クオンタイズ操作を行ったらその後内部クロックも反映してしまうようになる。 12】電源投入後すぐにコンティニュー・スタートすると MIDI OUT に意味のない 0 が 3 bytes 送信される。 13】クオンタイズした後や，バリュー・ボタンで 1 小節目にセットした後や，キー・オン・オーバー・ダブで何もイベントを記憶せずにストップした後にコンティニュー・プレイを行うと，表示されている小節と違う所からプレイすることがある。 14】シーケンサーのオーバー・ダブの場合に，前のデータに PC（プログラム・チェンジ）が入っていて，その場所からオーバー・ダブする時，ダブでは PC は入れずカウント中から弾きながらオーバー・ダブに入ると，発音が途切れる音がある。 15】キー・オン REC または DUB でスタート・ボタンを押して待機状態の時に小節を変更すると，リズム（メトロノーム）とシーケンサーの同期がずれてしまう。 16】パン/ボリュウムのオーバー・ダブで“Sure？”画面でプレイすると，始めのパンの値が表示されないことがある。 17】パン/ボリュウムのオーバー・ダブで“Sure？”画面でプレイすると，ボリュウム100の状態から鳴り出す。
＊ 1.10 (1.02) **927200**	1】トラック 8 またはエクスターナル REC のパート 8 /リズムの選択画面で，メトロノームをスタートできるがストップできない。 2】エクスターナル REC モードに入ったら，トラックの LED が赤で点灯したままで，その後の動作（エクスターナル REC 動作）がおかしい。 3】エクスターナル REC を Keyboad を押さえた状態で終了し，key を離すとノート・オンのないノート・オフが MIDI OUT される。 4】エクスターナル REC 時に，A/B ボタンを押すとティンバー（パッチ）ナンバーが表示される。 5】シーケンサーの REC 及び DUB の最中に，メトロノームの設定画面を表示させ，ビートを 0 にしてメトロノームを Count In から REC & Play に変更すると，突然一小節だけ P-88のリズム・パターンが鳴る。 6】シーケンサーのプレイで，演奏データの最後にだけボリューム・データがフェード・アウトの処理のために入っていたりした場合，曲の最後ではボリュームが最小になるので，そのままリセット・スタートしたら音が出ないという事態になる。 7】テスト・モードの RAM イニシャライズの時，LCD に≪Now Initializing≫と表示直後にボタン（TUNE とWRITE）を離すと，イニシャライズされない。

＊ Ver.1.10は新 TONE ROM，Ver.1.02は旧 TONE ROM 用で内容は同一です。

TONE ROM

発売後下記に示す内容の変更があり TONE ROM LH5310（MAIN BOARD IC12）の変更がシリアル・ナンバー927200より行われています。

1】プリセット・トーンの改良
　細部の改良でトーン・ネーム等も変更ありません。
2】ROM プレイの演奏データの変更
　細部の改良で曲名，曲順等の変更はありません。
　旧 TONE ROM は不完全なプロトタイプでデータ作成したため作曲者の意図を十分反映できなかったところがあり，データ作成者にリアレンジしてもらった。
注】TONE ROM, PROM を交換する際は下記を参考にし，組合せに注意してください。

TONE ROM	PROM
旧 TONE ROM LH531097（15179873）	Ver1.0x
新 TONE ROM LH5310DJ（15179904）	Ver1.1x

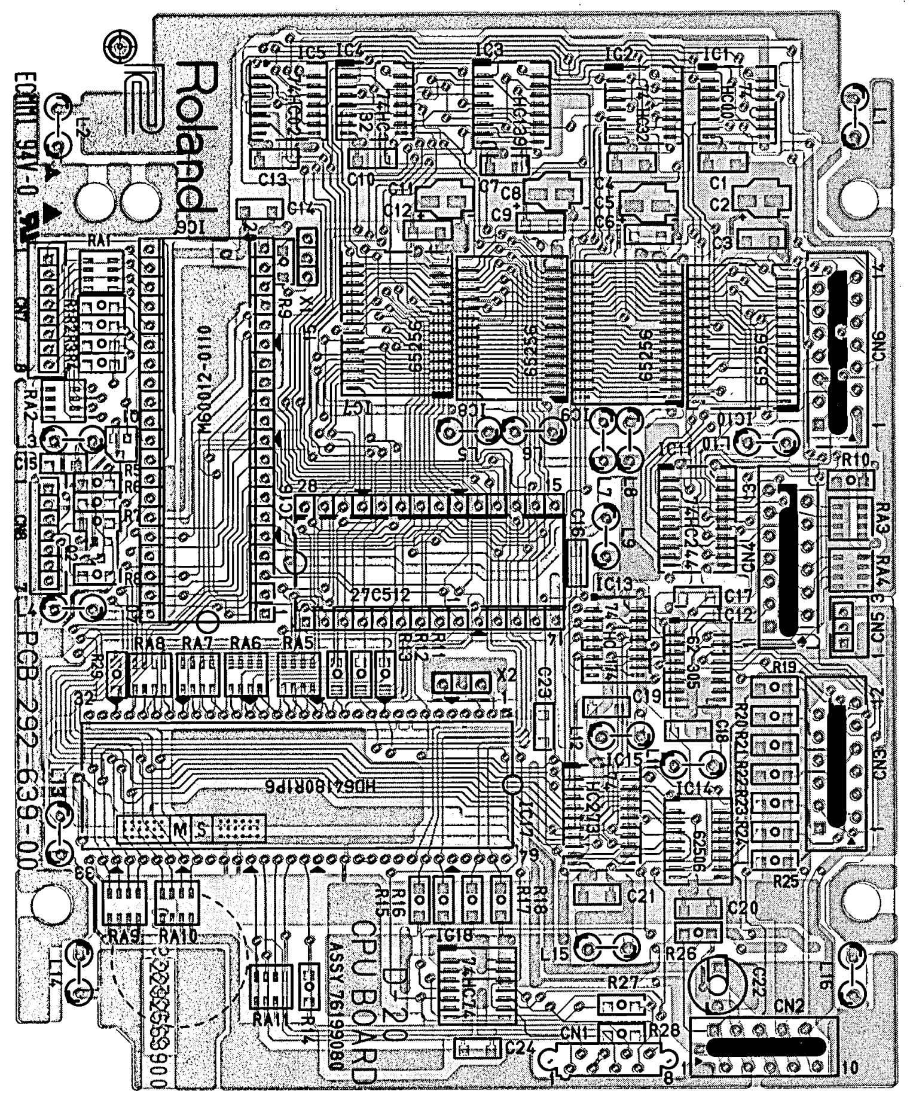
PROM Ver1.10 は，旧 TONE ROM（15179873）でも動作しますが，ROM プレイで曲間の時間とリバーブのかかり具合が（Ver1.0x のものと）少し変わります。
なお，PROM Ver1.0x は新 TONE ROM とは一緒に使えません。

旧 TONE ROM

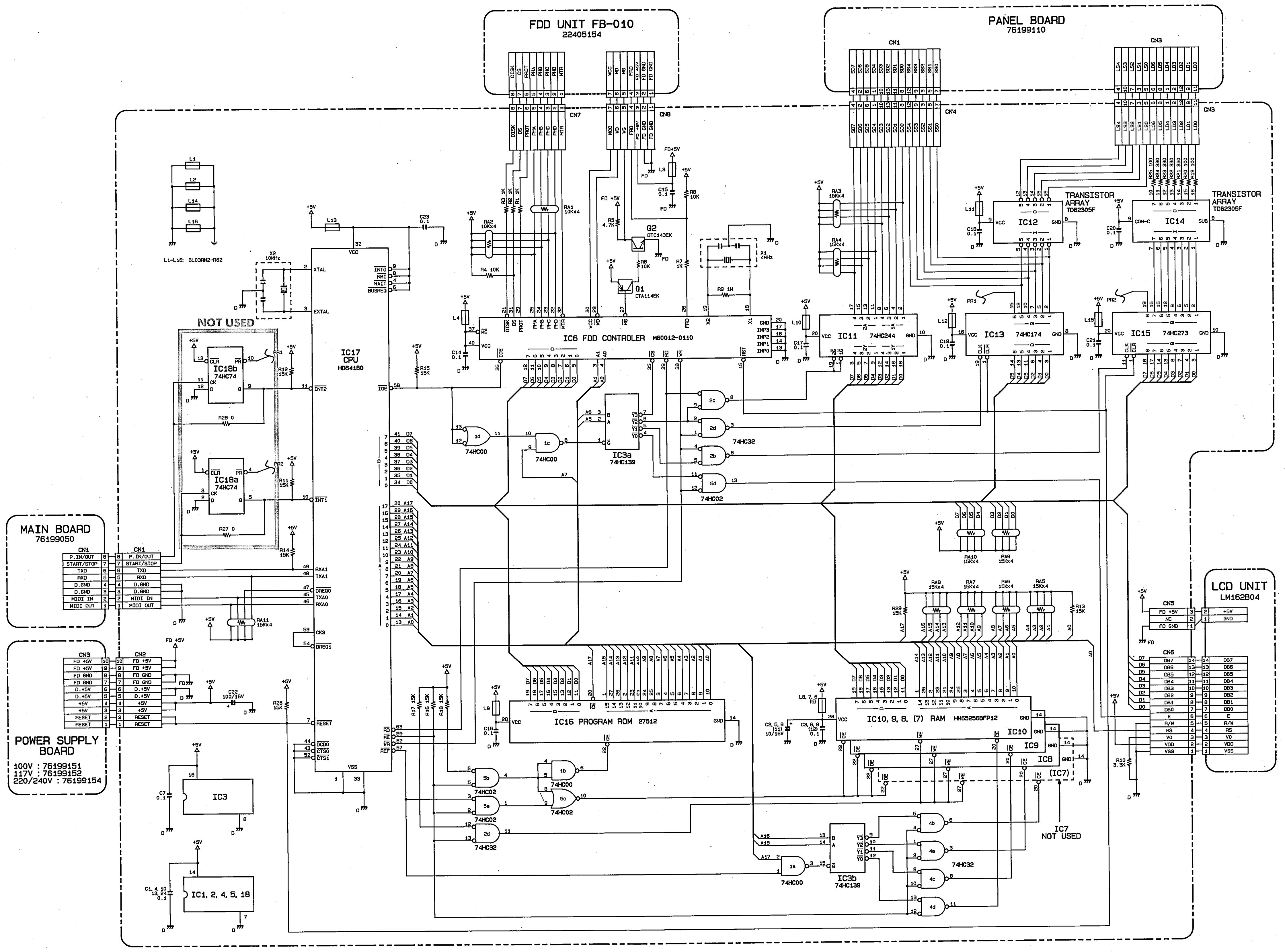
新 TONE ROM

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

A B C D E F G H I J K L M N O P Q R S T U



from Component Side



Main Board
D-10 ← → D-20
Substitution

Since D-10 and D-20 main boards are based on the same a circuit design they can be converted to the other.

In the event where substitution of D-10 main board for D-10 (and vice versa) becomes necessary, refer to the table below for modification information.

NOTES:
Parts defined as "not used" in the table are parts that become unnecessary when used for the other model, but still can remain mounted without causing ill effect.
On the contrary, parts "not allowed to exist" will harmuful to circuit function if not removed.

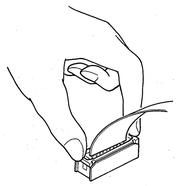
メインボード
D-10← →D-20
流用について

D-10と D-20 のメインボードの基本構成は同じですので比較的簡単に転用することが出来ます。

D-10のメインボードを D-20（または逆方向）へ流用する必要が生じた場合は，下表を参照して改造を行ってください。

注：
表中の"未使用"部品は不要ですが，取り外さなくても別段支障を生じません。一方"無用"部品をそのまま残して置くと，回路に悪影響を及ぼします。

Part Name	D-10		D-20	
IC1 (TD62506F)	used	使用	not used	未使用
IC2 (TD62305F)	used	使用	not used	未使用
IC5 (74HC 138)	used	使用	not used	未使用
IC13 (ROM B)	Replace	交換		
IC14 (ROM A)				
Q13 (DTC124EK)	not used	未使用	used	使用
FL3 (DSS306-55F223Z16)	not allowed to exist	無用	used	使用
FL39, 40 (SBT-0460)	not used	未使用	used	使用
R1-7 (33Ω)	used	使用	not used	未使用
R12 (3.3KΩ)	used	使用	not used	未使用
R29, 30 (0Ω)	used	使用	not allowed to exist	無用
R98(22KΩ)	not used	未使用	used	使用
R99 (10KΩ)	not used	未使用	used	使用
C99 (100PF)	not used	未使用	used	使用
CN1 (52004-0810)	not used	未使用	used	使用
CN4 (52004-1210)	used	使用	not used	未使用
CN5 (52004-1310)	used	使用	not used	未使用
CN6 (52004-1410)	used	使用	not used	未使用
CN7 (IL-S-10P-S2T2-EF)	used	使用	not used	未使用
JK6 (YKB21-5012)	not allowed to exist	無用	used	使用



To disconnect the cable —
While pressing down the both ends of the connector as shown below, pull out the cable.
ケーブルの抜き方
コネクターの両端を下に押さえながらケーブルを抜きます。

ADVARSEL!
Lithiumbatteri. Eksplosionsfare.
Udskiftning må kun foretages af en sagkyndig, og som beskrevet i servicemanual.

Lithium batteri må kun udskiftes med samme type og fabrikat.

ADVARSEL!
Lithiumbatteri. Fare for eksplotion.
Må bare skiftes av kvalifisert tekniker som beskrevet i servicemanualen.

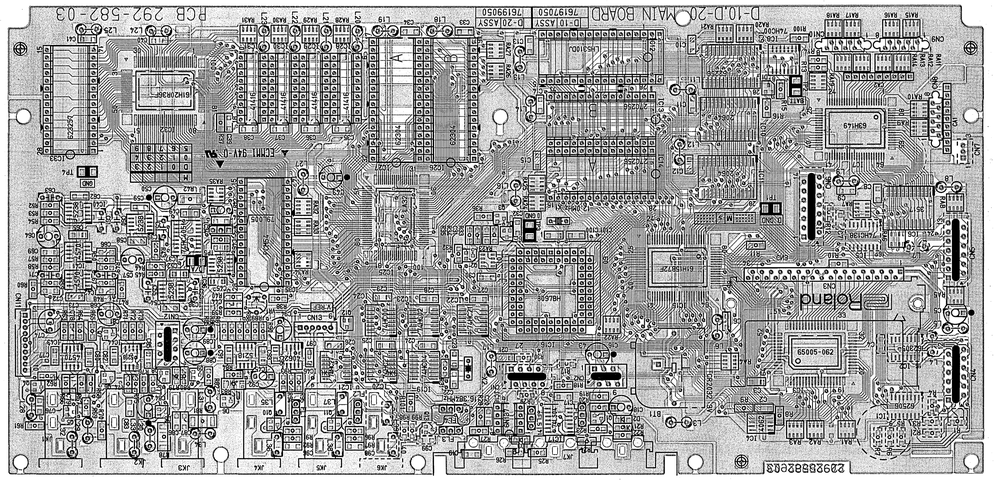
Lithium batteri må kun utskiftes med samme type og fabrikat.

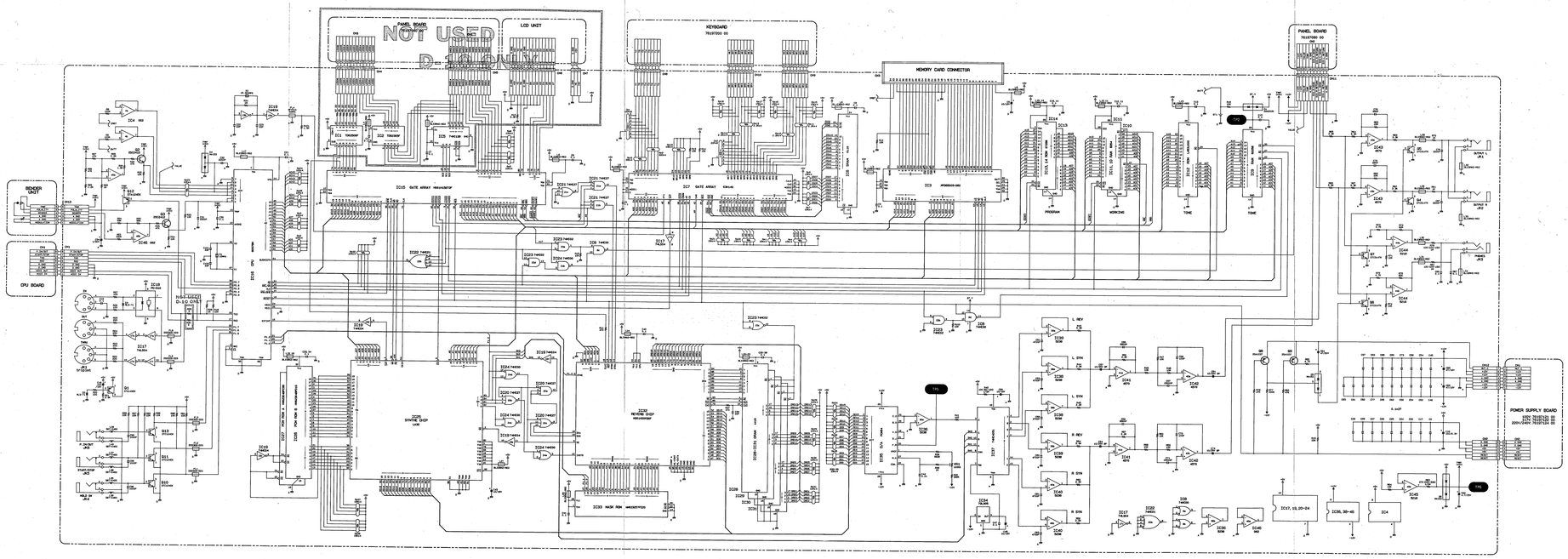
VARNING!
Lithiumbatteri. Explosionsrisk.
Får endast bytas av behörig servicetekniker, Se instruktioner i servicemanualen.

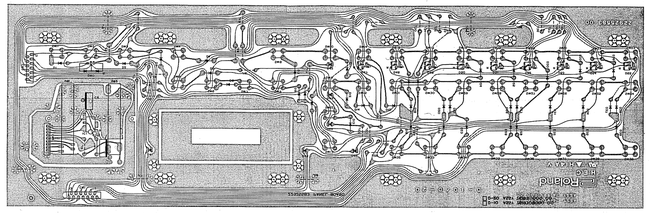
Lithium batteri för endast ersättes med samme typ och fabrikat.

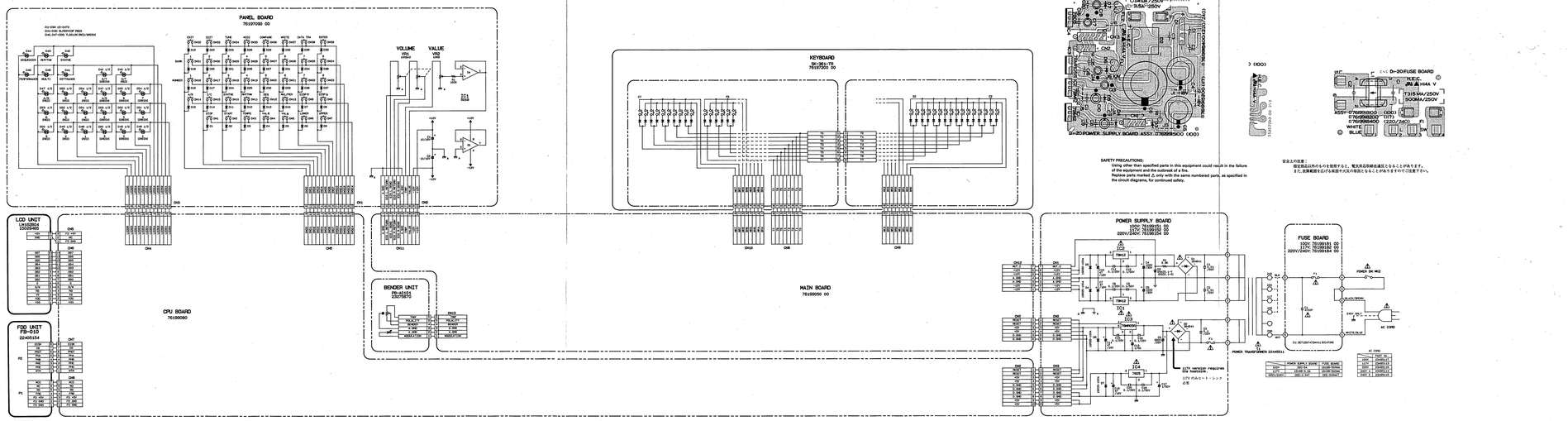
VAROITUS!
Lithiumparisto. Räjähdysvaara.
Pariston saa vaihtaa ainoastaan alan ammottimies.

Kun vaihat lithium paristo KÄYTÄ saman valmistajan samaa tyyppiä.




NOT USED
D-110 ONLY
PANEL BOARD
LCD UNIT
KEYBOARD
MEMORY CARD CONNECTOR
RENDER UNIT
CPU BOARD
PANEL BOARD
POWER SUPPLY BOARD




PANEL BOARD
76197000 00
VOLUME
VOL
VALUE
VOL
KEYBOARD
SK-88LITE
76197200 00
CPU BOARD
76199000
LCD UNIT
LM150S01
15050000
FDD UNIT
FB-010
22400154
BENDER UNIT
PB-88181
23070870
MAIN BOARD
76199050 00
POWER SUPPLY BOARD
110V 76199181 00
220V 240V 76199182 00
220V/240V 76199184 00
FUSE BOARD
110V 76199183 00
220V 76199185 00
220V/240V 76199186 00
POWER TRANSFORMER 22400224
AC CORD
D-20POWER SUPPLY BOARD ASSY 76199800 (00)
D-20FUSE BOARD
ASSY-07699350 (00)
07699360 (00)
07699380 (00)
WHITE
BLUE
T315 MA/250V
500MA/250V
(220/240)
SW
SAFETY PRECAUTIONS:
Using other than specified parts in this equipment could result in the failure of the equipment and the outbreak of a fire.
Replace parts marked Δ only with the same numbered parts, as specified in the circuit diagrams, for continued safety.
安全上の注意：
指定部品以外のものを使用すると、電気系品質維持速度となることがあります。
また、故障範囲をひげる範囲や火災の原因となることがありますのでご注意下さい。

LINEAR SYNTHESIZER
MODEL D−20

MIDI Implementation

Date : Sep. 10. 1987
Version : 1.00

1. TRANSMITTED DATA (Synthesizer Section)

■Note Event

Note off

Status	Second	Third
9nH	kkH	00H

kk=Note number 18H−6CH (24−108)
n=MIDI channel 0H−FH (1−16)

Note on

Status	Second	Third
9nH	kkH	vvH

kk=Note number 18H−6CH (24−108)
vv=Velocity 01H−7FH (1−127)
n=MIDI channel 0H−FH (1−16)

■Control Change

Modulation depth

Status	Second	Third
BnH	01H	vvH

vv=Modulation depth 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

In Performance mode, transmitted when MIDI Modulation function is on.
In Multi timbral mode, transmitted on both upper and lower MIDI TX channels of the keybbard.
D−20 does not transmit this message repeatedly if both channels are the same.

Hold−1

Status	Second	Third
BnH	40H	vvH

vv=00H (0) : Off
vv=7FH (127) : On
n=MIDI channel 0H−FH (1−16)

In Performance mode, transmitted when MIDI Hold function is 0.
In Multi timbral mode, transmitted on the MIDI TX channel of upper and lower sides of the keyboard.
D−20 does not transmit this message repeatedly if both channels are the same.

Reset all controllers

Status	Second	Third
BnH	79H	00H

n=MIDI channel 0H−FH (1−16)

Transmitted upon changing modes (Performance←→Multi timbral) or MIDI channels (on the previous channel).

■Program Change

Patch/Timbre change

Status	Second
CnH	ppH

pp=Program number 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

In Performance mode, transmitted when MIDI Program change function is on.
In Multi timbral mode and when the LCD is showing the status of either of upper or lower keybord, transmitted on the MIDI TX channel assigned to the keyboard.

pp	A/B	BANK	NUMBER
00H (00)	A	1	1
:	:	:	:
3FH (63)	A	8	8
40H (64)	B	1	1
:	:	:	:
7FH (127)	B	8	8

■Pitch Bender Change

Pitch bender

Status	Second	Third
EnH	vvH	vvH

vv vv=Pitch bender change value
n=MIDI channel 0H−FH (1−16)

In Performance mode, transmitted when MIDI Bender function is on.
In Multi timbral mode, transmitted on the MIDI TX channel of both upper and lower sides of keyboard.
Transmitted only once if both TX channles are the same.

■Mode Message

All notes off

Status	Second	Third
BnH	7BH	00H

n=MIDI channel 0H−FH (1−16)

When MIDI All notes off function is on, will be transmitted upon release of all the keys after pressing a key (s).

OMNI off

Status	Second	Third
BnH	7CH	00H

n=MIDI channel 0H−FH (1−16)

Transmitted on power−up or when MIDI TX channel is changed to the new channel (always accompanied by "POLY").
In Multi timbral mode, transmitted on the MIDI TX channel of both upper side and lower side of keyboard.
Transmitted only once if both channels are the same.

Poly

Status	Second	Third
BnH	7FH	00H

n=MIDI channel 0H−FH (1−16)

Transmitted on power−up or when MIDI TX channel is changed to the new channel.
(Always accompanied by "OMNI OFF".)
In Multi timbral mode, transmitted on the MIDI TX channel of both upper side and lower side of keyboard.
Transmitted only once if both channels are the same.

■Exclusive

Status
F0H : System exclusive
F7H : EOX (End of exclusive)

A set of Patch/Timbre parameters is transmitted when MIDI Patch dump function is on.
The contents in Device−ID is either of the following two : unit number and MIDI channel number. The type of the information in the Device−ID can be determined from the display mode :

When display is showing,
(in Multi timbral mode)
Part −−− unit number less 1
Keyboard status −−− MIDI channel less 1
(in Performance mode)
unit number less 1
Also used for Bulk dump/load operation.
Refer to Section 7 for details.

■Active Sensing

Status
FEH : Active sensing

Transmitted for checking MIDI connection between D−20 and external equipment.
Cannot be transmitted during disk operation in data transfer mode.

2. TRANSMITTED DATA (Rhythm Section)

■Note Event

Note off

Status	Second	Third
9nH	kkH	00H

kk=Note number 18H−6CH (24−108)
n=MIDI channel 0H−FH (1−16)

Note on

Status	Second	Third
9nH	kkH	vvH

kk=Note number 18H−6CH (24−108)
vv=Velocity 01H−7FH (1−127)
n=MIDI channel 0H−FH (1−16)

ransmitted on the MIDI channel being assigned to rhythm part when a rhythm pattern is played in internal clock mode.

■Exclusive

Status
F0H : System exclusive
F7H : EOX (End of exclusive)

Used for Bulk dump/load operation.
Refer to Section 7 for details.

■Timing Clock

Status
F8H

Transmitted only when Clock mode is Internal.

■Start

Status
FAH

Transmitted only when in Internal clock mode.
Panel operation : Press Start button while holding Stop button.

■Continue

Status
FBH

Transimitted only when in Internal clock mode.
Panel operation : Press Start button.

■Stop

Status
FCH

Transimitted only when in Internal clock mode.
Panel operation : Press Stop button.

3. TRANSMITTED DATA (Sequencer Section)

The sequencer has 9 tracks : 8 for 8 synth parts and one for sog of rhythm.

3.1 TRANSMITTED VOICE MESSAGES IN PLAYBACK

Muting a track will enable D−20 to transmit data stored in that track −−− on the MIDI channel set by MIDI function in Multi timbral mode.

■Note Event

Note off

Status	Second	Third
9nH	kkH	00H

kk=Note number 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Note on

Status	Second	Third
9nH	kkH	vvH

kk=Note number 00H−7FH (0−127)
vv=Velocity 01H−7FH (1−127)
n=MIDI channel 0H−FH (1−16)

■Control Change

Modulation depth

Status	Second	Third
BnH	01H	vvH

vv=Modulation depth 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Data entry

Status	Second	Third
BnH	06H	vvH

vv=Value of RPC 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Main volume

Status	Second	Third
BnH	07H	vvH

vv=Volume value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Panpot

Status	Second	Third
BnH	0AH	vvH

vv=Panpot value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Expression

Status	Second	Third
BnH	0BH	vvH

vv=Expression 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Hold−1

Status	Second	Third
BnH	40H	vvH

vv=00H−3FH (0−63) : Off
vv=40H−7FH (64−127) : On
n=MIDI channel 0H−FH (1−16)

RPC LSB

Status	Second	Third
BnH	64H	vvH

vv=LSB of the parameter number cntrolled by RPC 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

RPC MSB

Status	Second	Third
BnH	65H	vvH

vv=MSB of the parameter number controlled by RPC 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

■Program Change

Patch/Timbre change

Status	Second
CnH	ppH

pp=Program number 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

■Pitch Bender Change

Pitch bender

Status	Second	Third
EnH	vvH	vvH

vv vv=Pitch bender change value
n=MIDI channel 0H−FH (1−16)

3.2 GENERATED MESSAGES

■Mode Message

All notes off

Status	Second	Third
BnH	7BH	00H

n=MIDI channel 0H−FH (1−16)

Transmitted when all notes in a muted track have been turned off with MIDI All Notes Off function set at On. Transmitted channel : Set by MIDI function in Multi timbral mode.

■Timing Clock

Status
F8H

Transmitted only when in Internal clock mode.

■Start

Status
FAH

Transmitted only when in Internal clock mode.
Panel operation : Press Start button while holding Stop button.

■Continue

Status
FBH

Transimitted only when in Internal clock mode.
Panel operation : Press Start button.

■Stop

Status
FCH

Transimitted only when in Internal clock mode.
Panel operation : Press Stop button.

4. RECOGNIZED RECEIVE DATA (Synthesizer Section)

■Note Event

Note off

Status	Second	Third
8nH	kkH	vvH
9nH	kkH	00H

kk=Note number 00H−7FH (0−127)
vv=Velocity ignored
n=MIDI channel 0H−FH (1−16)

Note on

Status	Second	Third
9nH	kkH	vvH

kk=Note number 00H−7FH (0−127)
vv=Velocity 01H−7FH (1−127)
n=MIDI channel 0H−FH (1−16)

Note numbers outside of the range 12−108 are transposed to the nearest octave inside the range.

■Control Change

Modulation depth

Status	Second	Third
BnH	01H	vvH

vv=Modulation depth 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

In Performance mode, recognized when MIDI Modulation function is on.
In Multi timbral mode, always recognized.

Data entry

Status	Second	Third
BnH	06H	vvH

vv=Value of RPC 00H−18H (0−24)
n=MIDI channel 0H−FH (1−16)

Recognized a a value corresponding to the parameter specified by RPC.
See RPC MSB section.

Main volume

Status	Second	Third
BnH	07H	vvH

vv=Volume value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

In Performance mode, recognized when MIDI Volume function is on.
In Multi timbral mode, always recognized.
Can control the volume of the Parts played through the same MIDI channel.
The maximum volume is determined by the Volume knob and Expression message.

Panpot

Status	Second	Third
BnH	0AH	vvH

vv=Panpot value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Ignored when in Performance mode.
Moving direction of sound is as follows.

0=LEFT, 63=CENTER, 127=RIGHT

Expression

Status	Second	Third
BnH	0BH	vvH

vv=Expression 00H−7FH (0−127)
n=MIDI chnnel 0H−FH (1−16)

Can control the volume of the parts played through the same MIDI channel.
The maximum volume is determined by the Volume knob and Main volume message.

Hold−1

Status	Second	Third
BnH	40H	vvH

vv=00H−3FH (0−63) : Off
vv=40H−7FH (64−127) : On
n=MIDI channel 0H−FH (1−16)

In Performance mode, recognized when MIDI Hold function is on.
In Multi timbral mode, always recognized.

RPC LSB

Status	Second	Third
BnH	64H	vvH

vv=LSB of the parameter number controlled by RPC
n=MIDI channel 0H−FH (1−16)

See RPC MSB section.

RPC MSB

Status	Second	Third
BnH	65H	vvH

vv=MSB of the parameter number controlled by RPC
n=MIDI channel 0H−FH (1−16)

Using MIDI RPC, parameters can be changed by Control change message. RPC MSB and LSB specify the parameter to be controlled, while Data entry sets the parameter value.

RPC MSB	RPC LSB	Data entry	Description
00H	00H	vvH	Bender Range (vv=0−24)

Reset all controllers

Status	Second	Third
BnH	79H	00H

n=MIDI channel 0H−FH (1−16)

When Reset all controllers is recognized, controllers are set to the following value.

Controller	Setting
Modulation Depth	OFF (0)
Main Volume	MAX (127)
Expression	MAX (127)
Hold1	OFF (0)
Pitch Bender Change	CENTER

■Program Change

Patch/Timbre change

Status	Second
CnH	ppH

pp=Program number 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

In Performance mode, recognized when MIDI Prog. Change function is on and the Patch is changed.
In Multi timbral mode, always recognized and the Timbre is changed.
Cannot switch between Internal and Card through MIDI Program change message.

pp	A/B	BANK	NUMBER
00H (00)	A	1	1
:	:	:	:
3FH (63)	A	8	8
40H (64)	B	1	1
:	:	:	:
7FH (127)	B	8	8

■Pitch Bender Change

Pitch bender

Status	Second	Third
EnH	vvH	vvH

vv vv=Pitch bender change value
n=MIDI channel 0H−FH (1−16)

In Performance mode, recognized when MIDI Bender function is on.
In Multi timbral mode, always recognized.

■Mode Message

Local control

Status	Second	Third
BnH	7AH	vvH

vv=00H (0) : Off
vv=7FH (127) : On
n=MIDI Channel 0H−FH (1−16)

Reconized in performance mode only.

All notes off

Status	Second	Third
BnH	7BH	00H

n=MIDI channel 0H−FH (1−16)

When All notes off is recognized, all the notes which have been turned on by Note on message are turned off.

OMNI off

Status	Second	Third
BnH	7CH	00H

n=MIDI channel 0H−FH (1−16)

Recognized as All notes off only.
The D−20 stays in MODE 3.

OMNI on

Status	Second	Third
BnH	7DH	00H

n=MIDI channel 0H−FH (1−16)

Recognized as All notes off only.
The D−20 stays in MODE 3.

MONO

Status	Second	Third
BnH	7EH	mmH

mm=MONO channel range ignored
n=MIDI channel 0H−FH (1−16)

Recognized as All notes off only.
The D−20 stays in MODE 3.

POLY

Status	Second	Third
BnH	7FH	00H

n=MIDI channel 0H−FH (1−16)

Recognized as All notes off only.
The D−20 stays in mode 3.

■Exclusive

Status
F0H : System exclusive
F7H : EOX (End of exclusive)

A set of Patch/Timbre parameters will be received when MIDI Exclusive function is on.
When in Multi timbral mode and if Device−ID contains "MIDI Channel number less 1", the timbre parameters enter into the parts of the same MIDI channel; if Device −ID contains "Unit number less 1", into the parts specified by address in the exclusive message.
In performance mode "Unit number less 1" is effective.

Also used for Bulk dump/load operation.
Refer to Section 7 for details.

■Active Sensing

Status
FEH : Active sensing

Having received this message, the D−20 expects to accept status or data in sequence, at least within 300ms intervals. If the unitfails to receive a message 300ms after the previous one, it judges there is a problem somewhere in MIDI path, muting the current sound and stopping 300ms−interval monitoring of incoming signal.

5. RECOGNIZED RECEIVE DATA (Rhythm Section)

■Note Event

Note off

Status	Second	Third
8nH	kkH	vvH
9nH	kkH	00H

kk=Note number 18H−6CH (24−108)
vv=Velocity ignored
n=MIDI channel 0H−FH (1−16)

Note on

Status	Second	Third
9nH	kkH	vvH

kk=Note number 18H−6CH (24−108)
vv=Velocity 01H−7FH (1−127)
n=MIDI channel 0H−FH (1−16)

Note numbers outside of the range 24−108 are ignored.

■Control Change

Data entry

Status	Second	Third
BnH	06H	vvH

vv=Value of RPC 00H−18H (0−24)
n=MIDI channel 0H−FH (1−16)

Recognized as a value corresponding to the parameter specified by RPC.

Main volume

Status	Second	Third
BnH	07H	vvH

vv=Volume value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Can control the volume of the Rhythm section.
The maximum volume is determined by the Volume knob setting and Expression message.

Expression

Status	Second	Third
BnH	0BH	vvH

vv=Expression 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Can control the volume of the Rhythm section.
The maximum volume is determined by the volume knob setting and Main volume message.

RPC LSB

Status	Second	Third
BnH	64H	vvH

vv=LSB of parameter number controlled by RPC
n=MIDI channel 0H−FH (1−16)

See RPC MSB section.

RPC MSB

Status	Second	Third
BnH	65H	vvH

vv=MSB of parameter number controlled by RPC
n=MIDI channel 0H−FH (1−16)

Using MIDI RPC, parameters can be changed by Control change messages. RPC MSB and LSB specify the parameter to be controlled, and Data entry shows the parameter value.

RPC MSB	RPC LSB	Data entry	Description
00H	00H	vvH	Bener Range (vv=0−24)

Reset all controllers

Status	Second	Third
BnH	79H	00H

When Reset All Controllers is recognized, each of the following controllers is set as follows.

Controller	setting
Main volume	MAX (127)
Expression	MAX (127)
Pitch bender change	CENTER

■Pitch Bender Change

Pitch bender

Status	Second	Third
EnH	vvH	vvH

vv vv=Pitch bender change value
n=MIDI channel 0H−FH (1−16)

■Exclusive

Status
F0H : System exclusive
F7H : EOX (End of exclusive)

Used for Bulk dump/load operation.
Refer to Section 7 for details.

■Timing Clock

Status
F8H

Recognized only when Clock mode is MIDI.

■Start

Status
FAH

Recognized only when Clock mode is MIDI.

■Continue

Status
FBH

Recognized only when Clock mode is MIDI.

■Stop

Status
FCH

Recognized only when Clock mode is MIDI.

6. RECOGNIZED RECEIVE DATA (Sequencer Section)

6.1 RECORDED MESSAGES

During external recording, each of the following messages is recorded onto the track assigned to the MIDI channel in a part. The MIDI channel is the channel set by MIDI function in Multi timbral mode.

■Note Event

Note off

Status	Second	Third
8nH	kkH	vvH
9nH	kkH	00H

kk=Note number 00H−7FH (0−127)
vv=Velocity ignored
n=MIDI channel 0H−FH (1−16)

Note on

Status	Second	Third
9nH	kkH	vvH

kk=Note number 00H−7FH (0−127)
vv=Velocity 01H−7FH (1−127)
n=MIDI channel 0H−FH (1−16)

■Control Change

Modulation depth

Status	Second	Third
BnH	01H	vvH

vv=Modulation depth 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Data entry

Status	Second	Third
BnH	06H	vvH

vv=Value of RPC 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Main volume

Status	Second	Third
BnH	07H	vvH

vv=Volume value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Panpot

Status	Second	Third
BnH	0AH	vvH

vv=Panpot value 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Expression

Status	Second	Third
BnH	0BH	vvH

vv=Expression 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

Hold−1

Status	Second	Third
BnH	40H	vvH

vv=00H−3FH (0−63) : Off
vv=40H−7FH (64−127) : On
n=MIDI channel 0H−FH (1−16)

RPC LSB

Status	Second	Third
BnH	64H	vvH

vv=LSB of the parameter number controlled by RPC 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

RPC MSB

Status	Second	Third
BnH	65H	vvH

vv=MSB of the parameter number controlled by RPC 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

■Program Change

Patch/Timbre change

Status	Second
CnH	ppH

pp=Program number 00H−7FH (0−127)
n=MIDI channel 0H−FH (1−16)

■Pitch bender change

Pitch bender

Status	Second	Third
EnH	vvH	vvH

vv vv=Pitch bender change value
n=MIDI channel 0H−FH (1−16)

6.2 RECOGNIZED DATA IN RECORDING

During external recording, following messages are recognized but not memorized as performance information. Receiving channel : MIDI channel set by MIDI function in Multi timbral mode.

■Mode Message

All notes off

Status	Second	Third
BnH	7BH	00H

n=MIDI channel 0H−FH (1−16)

This message causes the D−20 to generate and retain Note off events for the notes turned on by MIDI.

OMNI off

Status	Second	Third
BnH	7CH	00H

n=MIDI channel 0H−FH (1−16)

OMNI on

Status	Second	Third
BnH	7DH	00H

n=MIDI channel 0H−FH (1−16)

MONO

Status	Second	Third
BnH	7EH	mmH

mm=MONO channel range ignored
n=MIDI channel 0H−FH (1−16)

POLY

Status	Second	Third
BnH	7FH	00H

n=MIDI channel 0H−FH (1−16)

OMNI off, OMNI on, POLY and MONO are recognized as All notes off only.

6.3 Recognized Synchronizing Messages

■Timing Clock

Status
F8H

Recognized only when Clock mode is MIDI.

■ Start

Status
FAH

Recognized only when Clock mode is MIDI.

■ Continue

Status
FBH

Recognized only when Clock mode is MIDI.

■ Stop

Status
FCH

Recognized only when Clock mode is MIDI.

7. EXCLUSIVE COMMUNICATION

A set of parameters of a patch or timbre can be transmitted to/from D-20 using one way MIDI exclusive message.
Bulk dumping/loading of internal memory can be performed using either of one way or handshaking communication.

Model-ID# in the exclusive message : 16H
In addition to usual MIDI channel, each D-20 can be provided with a unique ID# called unit # through which any part is made accesible independently of its MIDI channel.

MIDI channel : 1-16 Unit # : 17-32
Whether to use MIDI channel or unit # is dependent on apllication -- refer to dscription on each message.

NOTE : MIDI standard states that channel starts with "0". So the actualDevice # is a number that is "1" substracted from the above-mentioned channel number or unit #.

■ One- Way Communication

Request data RQ1 11H

When the RQ1 received contains start address listed in the Parameter base address table ; and address size is 1 or more, D-20 sends the data stored in that address location and the subsequent locations, if any.

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	
16H	Model ID	
11H	Command ID	
aaH	Address MSB	*7-1
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Check sum	
F7H	End of exclusive	

Data set 1 DT1 12H

When D-20 is receiver :

a. D-20 recognizes this message when it ha a unit # (17-32) which is indicated on MIDI function display. If the address speified in the message corresponds to the current mode (Performance or Multi timbral) parameter base address, D-20 stores the data into that and subsequent address locations.
Device-ID# = MIDI channel # less 1 or Unit # less 1

b. When D-20 receives this message while executing one way bulk loading in data transfer mode with or without having unit # ; And if the address specified in the message corresponds to one of the following parameter base addresses, D-20 stores coming data into that and subsequent address locations.
Timbre memory
Patch memory
Tone memory
Rhythm setup
Rhythm pattern
Rhythm track
System area
Device-ID# -----
When unit # is specified by MIDI function : Unit # less 1. If not specifed : 10H

When D-20 is transmitter :

a. With unit # (17-32) set
Transmits data directed by RQ1.
Device-ID# = Unit # less 1

b. 1) With unit # (17-32) set and Patch dump on (Performance mode) Modifying timbre from the D-20 panel causes it to send program change message and parameter data of a patch.

b. 2) With unit # (17-32) set and Timbre dump on (Multi timbral mode) Modifying timbre from the D-20 panel causes it to send program change message and parameter data of a timbre.
Device-ID# :
Performance mode -- Unit # less 1
Multi timbral mode ----
LCD is showing part status : Unit # less 1
LCD is showing keyboard : Transmitting channel number less 1

c. D-20 sends this message when one way dump is executed in Data transfer mode.
Transferable addresses :
Timbre memory
Patch memory
Tone memory
Rhythm setup
Rhythm pattern
Rhythm track
System area
Device-ID# :
Wiith Unit # set --- Unit # less 1
Without Unit # ----- 10H

Refer to Section 8 Parameter Address Map for transferable parameters.

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	
16H	Model ID	
12H	Command ID	
aaH	Address MSB	*7-1
aaH	Address	
aaH	Address LSB	
ddH	Data	*7-2
:	:	
sum	Check sum	
F7H	End of exclusive	

■ Handshake Communication

Bulk dump/load to an from D-20 through handshaking communication in Data transfer mode starts with the following message.

Device-ID# :
With Unit # set ---- Unit # less 1
Without Unit # ----- 10H

Addresses containabale in the bulk dump/ load messages :
Timbre memory
Patch memory
Tone memory
Rhythm setup
Rhythm pattern
Rhythm track
System area

Want to send data WSD 40H

D-20 sends acknowledge upon receiving this message and waits for coming data.

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	
16H	Model ID	
40H	Command ID	
aaH	Address MSB	*7-1
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Check su	
F7H	End of exclusive	

Request data RQD 41H

When the RQD received contains start address listed in the Parameter base address table ; and the address size is 1 or more, D-20 sends the data stored in that and subsequent address locations, if any.

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	Device ID	
16H	Model ID	
41H	Command ID	
aaH	Address MSB	*7-1
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Check sum	
F7H	End of exclusive	

Data set DAT 42H

When the DAT received contains address listed in the Parameter base address table, D-20 stores the data into that address location.

Byte	Description	
F0H	Exclusive status	
41H	Manufactures ID (Roland)	
DEV	DeviceID	
16H	Model ID	
42H	Command ID	
aaH	Address MSB	*7-1
aaH	Address	
aaH	Address LSB	
ddH	Data	*7-2
:	:	
sum	Check sum	
F7H	End of exclusive	

Acknowledge ACK 43H

Upon receiving this message in reply to DAT, D-20 sends the next data ; when recives in reply to EOD, ceases current handshaking communication.
D-20 sends this message upon receipt of WSD or DAT.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
16H	Model ID
43H	Command ID
F7H	End of exclusive

End of data EOD 45H

Upon receipt of this message, D-20 sends acknowledge and terminates the current handshaking communication.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
16H	Model ID
45H	Command ID
F7H	End of exclusive

Communication error ERR 4EH

Should failure in data reception occur (e.g. disagreement of checksum), D-20 sends this message.
If D-20 receives this message, it sends the last message again.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
16H	Model ID
4EH	Command ID
F7H	End of exclusive

Rejection RJC 4FH

D-20 ends communication upon receipt of this message.

Byte	Description
F0H	Exclusive status
41H	Manufactures ID (Roland)
DEV	Device ID
16H	Model ID
4FH	Command ID
F7H	End of exclusive

*7-1 Address and size must specify the address where data exist.
*7-2 If the receiving data are system partial parameters, D-20 recognizes these data only after it has received all he partial reserve parameters. (See *8-8 System area.)

8. PARAMETER ADDRESS MAP

Addresses are shown in 7-bit hexadecimal.

Address	MSB		LSB
Binary	0aaa aaaa	0bbb bbbb	0ccc cccc
7-bit hex.	AA	BB CC	

The actual address of a parameter in a block is the sum of the start address of each block and one or more offset address.
Parameters marked by *8-1 have two offset addresses : one in the table in *8-1 and the other one in the Common parameter table or in the Partial parameter table.

■ Parameter base address

Temporary area (Accessible on each basic channel)

Start address	Description		
00 00 00	Timbre Temporary Area	(synth part)	*8-3
01 00 00	Setup Temporary Area	(rhythm part)	*8-2
02 00 00	Tone Temporary Area	(synth part)	*8-1

Whole part (Accessible on UNIT#)

Start address	Description		
03 00 00	Timbre Temporary Area	(part 1)	*8-3
03 00 10	Timbre Temporary Area	(part 2)	
:	:	:	
03 00 60	Timbre Temporary Area	(part 7)	
03 00 70	Timbre Temporary Area	(part 8)	
03 01 00	Timbre Temporary Area	(rhythm part)	
03 01 10	Rhythm Setup Temporary Area		*8-2
03 04 00	Patch Temporary Area		*8-4
04 00 00	Tone Temporary Area	(part 1/upper)	*8-1
04 01 76	Tone Temporary Area	(part 2/lower)	
:	:	:	
04 0B 44	Tone Temporary Area	(part 7)	
04 0D 3A	Tone Temporary Area	(part 8)	
05 00 00	Timbre Memory #1		*8-5
05 00 08	Timbre Memory #2		
:	:		
05 07 70	Timbre Memory #127		
05 07 78	Timbre Memory #128		
07 00 00	Patch Memory #1		*8-4
07 00 26	Patch Memory #2		
:	:		
07 25 34	Patch Memory #127		
07 25 5A	Patch Memory #128		
08 00 00	Tone Memory #1		*8-1
08 02 00	Tone Memory #2		
:	:		
08 7C 00	Tone Memory #63		
08 7E 00	Tone Memory #64		
09 00 00	Rhythm Setup #1		*8-2
09 00 04	Rhythm Setup #2		
:	:		
09 02 4C	Rhythm Setup #84		
09 02 50	Rhythm Setup #85		
0A 00 00	Rhythm Pattern P-51		*8-6
0A 04 4C	Rhythm Pattern P-52		
:	:		
0B 09 68	Rhythm Pattern P-87		
0B 0E 34	Rhythm Pattern P-88		
0C 00 00	Rhythm Track		*8-7
10 00 00	System Area		*8-8
20 00 00	Display		*8-9
40 00 00	Write Request		*8-10

Notes :

*8-1 Tone Temporary area/Tone Memory

Start address	Description		
00 00 00	Common parameter		*8-1-1
00 00 0E	Partial parameter	(for Partial# 1)	*8-1-2
00 00 48	Partial parameter	(for Partial# 2)	
00 01 02	Partial parameter	(for Partial# 3)	
00 01 3C	Partial parameter	(for Partial# 4)	

Total size = 00 01 76H

*8-1-1 Common parameter

Offset address		Description	
00H	0aaa aaaa	TONE NAME 1	32-127 (ASCII)
:	:	:	
09H	0aaa aaaa	TONE NAME 10	
0AH	0000 aaaa	Structure of Partial# 1&2	0-12 (1-13)
0BH	0000 aaaa	Structure of Partial# 3&4	0-12 (1-13)
0CH	0000 aaaa	PARTIAL MUTE	0-15 (0000-1111)
0DH	0000 000a	ENV MODE	0-1 (Normal, No sustain)

Total size = 00 00 0EH

*8-1-2 Partial parameter

Offset address		Description	
00 00H	0aaa aaaa	WG PITCH COARSE	0-96 (C1-C9)
00 01H	0aaa aaaa	WG PITCH FINE	0-100 (-50-+50)
00 02H	000a aaaa	WG PITCH KEYFOLLOW	0-16 (-1, -1/2, -1/4, 0, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 5/4, 3/2, 2, s1, s2)
00 03H	0000 000a	WG PITCH BENDER SW	0-1 (OFF, ON)
00 04H	0000 00aa	WG WAVEFORM/PCM BANK	0-3 (SQU/1, SAW/1, SQU/2, SAW/2)
00 05H	0aaa aaaa	WG PCM WAVE #	0-127 (1-128)
00 06H	0aaa aaaa	WG PULSE WIDTH	0-100
00 07H	0000 aaaa	WG PW VELO SENS	0-14 (-7-+7)
00 08H	0000 aaaa	P-ENV DEPTH	0-10
00 09H	0000 00aa	P-ENV VELO SENS	0-3
00 0AH	0000 0aaa	P-ENV TIME KEYF	0-4
00 0BH	0aaa aaaa	P-ENV TIME 1	0-100
00 0CH	0aaa aaaa	P-ENV TIME 2	0-100
00 0DH	0aaa aaaa	P-ENV TIME 3	0-100
00 0EH	0aaa aaaa	P-ENV TIME 4	0-100
00 0FH	0aaa aaaa	P-ENV LEVEL 0	0-100 (-50-+50)
00 10H	0aaa aaaa	P-ENV LEVEL 1	0-100 (-50-+50)
00 11H	0aaa aaaa	P-ENV LEVEL 2	0-100 (-50-+50)
00 12H	0aaa aaaa	dummy (for MT-32)	
00 13H	0aaa aaaa	END LEVEL	0-100 (-50-+50)
00 14H	0aaa aaaa	P-LFO RATE	0-100
00 15H	0aaa aaaa	P-LFO DEPTH	0-100
00 16H	0aaa aaaa	P-LFO MOD SENS	0-100
00 17H	0aaa aaaa	TVF CUTOFF FREQ	0-100
00 18H	000a aaaa	TVF RESONANCE	0-30
00 19H	0000 aaaa	TVF KEYFOLLOW	0-14 (-1, -1/2, -1/4, 0, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 5/4, 3/2, 2)
00 1AH	0aaa aaaa	TVF BIAS POINT	0-127 (<1A-<7C >1A->7C)
00 1BH	0000 aaaa	TVF BIAS LEVEL	0-14 (-7-+7)
00 1CH	0aaa aaaa	TVF ENV DEPTH	0-100
00 1DH	0aaa aaaa	TVF ENV VELO SENS	0-100
00 1EH	0000 0aaa	TVF ENV DEPTH KEYF	0-4
00 1FH	0000 0aaa	TVF ENV TIME KEYF	0-4
00 20H	0aaa aaaa	TVF ENV TIME 1	0-100
00 21H	0aaa aaaa	TVF ENV TIME 2	0-100
00 22H	0aaa aaaa	TVF ENV TIME 3	0-100
00 23H	0aaa aaaa	dummy (for MT-32)	
00 24H	0aaa aaaa	TVF ENV TIME 4	0-100
00 25H	0aaa aaaa	TVF ENV LEVEL 1	0-100
00 26H	0aaa aaaa	TVF ENV LEVEL 2	0-100
00 27H	0aaa aaaa	dummy (for MT-32)	
00 28H	0aaa aaaa	TVF ENV SUSTAIN LEVEL	0-100
00 29H	0aaa aaaa	TVA LEVEL	0-100
00 2AH	0aaa aaaa	TVA VELO SENS	0-100 (-50-+50)
00 2BH	0aaa aaaa	TVA BIAS POINT 1	0-127 (<1A-<7C >1A->7C)
00 2CH	0000 aaaa	TVA BIAS LEVEL 1	0-12 (-12-0)
00 2DH	0aaa aaaa	TVA BIAS POINT 2	0-127 (<1A-<7C >1A->7C)
00 2EH	0000 aaaa	TVA BIAS LEVEL 2	0-12
00 2FH	0000 0aaa	TVA ENV TIME KEYF	0-4
00 30H	0000 0aaa	TVA ENV TIME V-FOLLOW	0-4
00 31H	0aaa aaaa	TVA ENV TIME 1	0-100
00 32H	0aaa aaaa	TVA ENV TIME 2	0-100
00 33H	0aaa aaaa	TVA ENV TIME 3	0-100
00 34H	0aaa aaaa	dummy (for MT-32)	
00 35H	0aaa aaaa	TVA ENV TIME 4	0-100
00 36H	0aaa aaaa	TVA ENV LEVEL 1	0-100
00 37H	0aaa aaaa	TVA ENV LEVEL 2	0-100
00 38H	0aaa aaaa	dummy (for MT-32)	
00 39H	0aaa aaaa	TVA ENV SUSTAIN LEVEL	0-100

Total size = 00 00 3AH

◎Example of RQ1 and DT1 application.... 1

Unit number is set at 17 in this example.

Sending the following data string lets D-20 send Part 2/Lower tone data from the temporary area.

F0 41 10 16 11 04 01 76 00 01 76 0E F7

*8-2 Rhythm Setup

Offset address		Description	
00 00H	0aaa aaaa	TONE	0-127 (i01-i64 , r01-r63 OFF)
00 01H	0aaa aaaa	OUTPUT LEVEL	0-100
00 02H	0000 aaaa	PANPOT	0-14 (L-R)
00 03H	0000 000a	REVERB SWITCH	0-1 (OFF, ON)

Total size = 00 00 04H

*8-3 Timbre temporary area

D-20 accepts the data for the area below only in Multi timbral mode.

Offset address		Description	
00 00H	0000 00aa	TONE GROUP	0-3 (a, b, i, r)
00 01H	00aa aaaa	TONE NUMBER	0-63 (1-64)
00 02H	00aa aaaa	KEY SHIFT	0-48 (-24-+24)
00 03H	0aaa aaaa	FINE TUNE	0-100 (-50-+50)
00 04H	000a aaaa	BENDER RANGE	0-24
00 05H	0000 00aa	ASSIGN MODE	0-3 (POLY1, POLY2, POLY3, POLY4)
00 06H	0000 000a	REVERB SWITCH	0-1 (OFF, ON)
00 07H	0000 0000	dummy (ignored if received)	
00 08H	0aaa aaaa	OUTPUT LEVEL	0-100
00 09H	0000 aaaa	PANPOT	0-14 (L-R)
00 0AH	0000 0000	dummy (ignored if received)	
:	:	:	
00 0FH	0000 0000	dummy	

Total size = 00 00 10H

*8-4 Patch Temporary area/ Patch Memory

D-20 accepts the data for Patch temporary area only in Performance mode.

Offset address		Description	
00 00H	0000 00aa	KEY MODE	0-2 (whole, dual, split)
00 01H	00aa aaaa	SPLIT POINT	0-61 (C2-C#7)
00 02H	0000 00aa	LOWER TONE GROUP	0-3 (a, b, i, r)
00 03H	00aa aaaa	LOWER TONE NUMBER	0-63 (1-64)
00 04H	0000 00aa	UPPER TONE GROUP	0-3 (a, b, i, r)
00 05H	00aa aaaa	UPPER TONE NUMBER	0-63 (1-64)
00 06H	00aa aaaa	LOWER KEY SHIFT	0-48 (-24-+24)
00 07H	00aa aaaa	UPPER KEY SHIFT	0-48 (-24-+24)
00 08H	0aaa aaaa	LOWER FINE TUNE	0-100 (-50-+50)
00 09H	0aaa aaaa	UPPER FINE TUNE	0-100 (-50-+50)
00 0AH	000a aaaa	LOWER BENDER RANGE	0-24
00 0BH	000a aaaa	UPPER BENDER RANGE	0-24
00 0CH	0000 00aa	LOWER ASSIGN MODE	0-3 (POLY1, POLY2, POLY3, POLY4)
00 0DH	0000 00aa	UPPER ASSIGN MODE	0-3 (POLY1, POLY2, POLY3, POLY4)
00 0EH	0000 000a	LOWER REVERB SWITCH	0-1 (OFF, ON)
00 0FH	0000 000a	UPPER REVERB SWITCH	0-1 (OFF, ON)
00 10H	0000 aaaa	REVERB MODE	0-8 (Room1/2, Hall1/2, Plate, Delay1/2/3, OFF)
00 11H	0000 0aaa	REVERB TIME	0-7 (1-8)
00 12H	0000 0aaa	REVERB LEVEL	0-7
00 13H	0aaa aaaa	U/L BALANCE	0-100 (L max<-->U max)
00 14H	0aaa aaaa	PATCH LEVEL	0-100
00 15H	0aaa aaaa	PATCH NAME CHAR.1	32-127 (ASCII CODE)
:	:	:	
00 24H	0aaa aaaa	PATCH NAME CHAR.16	
00 25H	0000 0000	dummy (ignored if received)	

Total size = 00 00 26H

◎Example of RQ1 and DT1 application 2

Unit # is set at 17 in this example.

When D-20 receive the following messages in Performance mode, it sends Patch data from the temprorary area.

F0 41 10 16 11 03 04 00 00 00 26 53 F7

*8-5 Timbre memory

Offset address		Description	
00 00H	0000 00aa	TONE GROUP	0-3 (a, b, i, r)
00 01H	00aa aaaa	TONE NUMBER	0-63 (1-64)
00 02H	00aa aaaa	KEY SHIFT	0-48 (-24-+24)
00 03H	0aaa aaaa	FINE TUNE	0-100 (-50-+50)
00 04H	000a aaaa	BENDER RANGE	0-24
00 05H	0000 00aa	ASSIGN MODE	0-3 (POLY1, POLY2, POLY3, POLY4)
00 06H	0000 000a	REVERB SWITCH	0-1 (OFF, ON)
00 07H	0000 0000	dummy (ignored if received)	

Total size = 00 00 08H

*8-6 Rhythm pattern

The data listed below are divided-by-two 8-bit data and sent/received as two 4-bit data. (bbbbaaaa→0000aaaa, 0000bbbb)
Events are listed in an ascending order.

Offset address		Description	
00 00H	0000 0aaa	TIME	0-7 (1/4, 2/4, 3/4, 4/4, 5/4, 6/4, 7/4, 8/4)
00 01H	0000 0000		
00 02H	0000 aaaa	TOTAL # OF NOTES	0-96
00 03H	0000 0bbb		
00 04H	0000 0000	dummy (ignored if received)	
00 05H	0000 0000	dummy	
00 06H	EVENT # 1	*8-6-1	
00 0CH	EVENT # 2		
:	:		
04 3AH	EVENT #95		
04 40H	EVENT #96		
04 46H	0000 1111	END MARK	
04 47H	0000 1111		
04 48H	0000 0000	dummy (ignored if received)	
04 49H	0000 0000	dummy	
04 4AH	0000 0000	dummy (ignored if received)	
04 4BH	0000 0000	dummy	

Total size = 00 04 4CH

*8-6-1 Event

Offset address		Description	
00 00H	0000 aaaa	STEP	0-191
00 01H	0000 bbbb		
00 02H	0000 aaaa	NOTE NUMBER	24-108
00 03H	0000 0bbb		
00 04H	0000 aaaa	VELOCITY	1-127
00 05H	0000 0bbb		

*8-7 Rhythm track

Offset address		Description	
00 00H	0aaa aaaa	TRACK LENGTH LSB	0-500
00 01H	0000 00aa	TRACK LENGTH MSB	
00 02H	0aaa aaaa	Pattern 1	0-63, 64-71 (P-11 - P-88, Blank 1-8)
:	:	:	
03 75H	0aaa aaaa	Pattern 500	

Total size = 00 03 76H

*8-8 System area

When All is selected for bulk dump/load in data transfer mode, data in this area are transmitted or received together with associated sound data and rhythm data.

Partial reserve must be sent as a package of 9 parts, which in total, should contain no more than 32 partials.

Offset address		Description	
00 00H	0aaa aaaa	MASTER TUNE	0-127 (432.1Hz-457.6Hz)
00 01H	0000 aaaa	REVERB MODE	0-8 (Room1/2, Hall1/2, Plate, Delay1/2/3, OFF)
00 02H	0000 0aaa	REVERB TIME	0-7 (1-8)
00 03H	0000 0aaa	REVERB LEVEL	0-7
00 04H	00aa aaaa	PARTIAL RESERVE (Part 1)	0-32
00 05H	00aa aaaa	PARTIAL RESERVE (Part 2)	0-32
00 06H	00aa aaaa	PARTIAL RESERVE (Part 3)	0-32
00 07H	00aa aaaa	PARTIAL RESERVE (Part 4)	0-32
00 08H	00aa aaaa	PARTIAL RESERVE (Part 5)	0-32
00 09H	00aa aaaa	PARTIAL RESERVE (Part 6	0-32
00 0AH	00aa aaaa	PARTIAL RESERVE (Part 7)	0-32
00 0BH	00aa aaaa	PARTIAL RESERVE (Part 8)	0-32
00 0CH	00aa aaaa	PARTIAL RESERVE (Part R)	0-32
00 0DH	0000 0000	dummy (for D-110)	
:	:	:	
00 20H	0000 0000	dummy (for D-110)	
00 21H	0aaa aaaa	OUTPUT LEVEL (Part 1)	0-100
00 22H	0aaa aaaa	OUTPUT LEVEL (Part 2)	0-100
00 23H	0aaa aaaa	OUTPUT LEVEL (Part 3)	0-100
00 24H	0aaa aaaa	OUTPUT LEVEL (Part 4)	0-100
00 25H	0aaa aaaa	OUTPUT LEVEL (Part 5)	0-100
00 26H	0aaa aaaa	OUTPUT LEVEL (Part 6)	0-100
00 27H	0aaa aaaa	OUTPUT LEVEL (Part 7)	0-100
00 28H	0aaa aaaa	OUTPUT LEVEL (Part 8)	0-100
00 29H	0aaa aaaa	OUTPUT LEVEL (Part R)	0-100
00 2AH	0000 aaaa	PANPOT (Part 1)	0-14
00 2BH	0000 aaaa	PANPOT (Part 2)	0-14
00 2CH	0000 aaaa	PANPOT (Part 3)	0-14
00 2DH	0000 aaaa	PANPOT (Part 4)	0-14
00 2EH	0000 aaaa	PANPOT (Part 5)	0-14
00 2FH	0000 aaaa	PANPOT (Part 6)	0-14
00 30H	0000 aaaa	PANPOT (Part 7)	0-14
00 31H	0000 aaaa	PANPOT (Part 8)	0-14

Total size = 00 00 32H

◎Example of RQ1 and DT1 application 3

Unit # is set at 17 in this example.

The byte string shown below will set Partial reserve of each part as follows:
Part 1 ..... 8 Part 3 thru 8 0
Part 2 ..... 10 Rhythm part 8

F0 41 10 16 12 10 00 04 00 08 0A 00 00 00 00 00 00 08 52 F7

*8-9 DISPLAY

D-20 deciphers incoming data and sends them to the LCD as a string of ASCII code characters.
The display data in this area cannot be brought outside D-20 through MIDI message, such as RQ1 and DT1.

Offset address		Description	
00H	0aaa aaaa	DISPLAYED LETTER	32-127 (ASCII)
:	:	:	
1FH	0aaa aaaa	DISPLAYED LETTER	

Total size = 00 00 20H

*8-10 Write Request

This message simulates write switch: D-20 stores the data of each part in the temporary area into individual memory locations specified by two byte data.
Timbre write is effective only in Multi timbral mode; Patch write only in Performance mode.
The data in this area cannot be brought outside D-20 through MIDI message, such as RQ1 and DT1.
D-20 returs the result to the transmitter.

Offset address		Description	
00 00H	00aa aaaa	Tone Write (part 1/upper)	0-63 (01-64)
00 01H	0000 000a		0, 1 (Internal, Card)
00 02H	00aa aaaa	Tone Write (part 2/lower)	
00 03H	0000 000a		
: .	:	:	
00 0EH	00aa aaaa	Tone Write (part 8)	
00 0FH	0000 000a		
01 00H	0aaa aaaa	Timbre Write (part 1)	0-127 (A11-B88)
01 01H	0000 000a		0, 1 (Internal, Card)
01 02H	0aaa aaaa	Timbre Write (part 2)	
01 03H	0000 000a		
:	:	:	
01 0EH	0aaa aaaa	Timbre Write (part 8)	
01 0FH	0000 000a		
03 00H	0aaa aaaa	Patch Write	0-127 (A11-B88)
03 01H	0000 000a		0, 1 (Internal, Card)
10 00H	0000 00aa	Result	0-3

0=Function Completed
1=Card Not Ready
2=Write Protected
3=Incorrect Mod

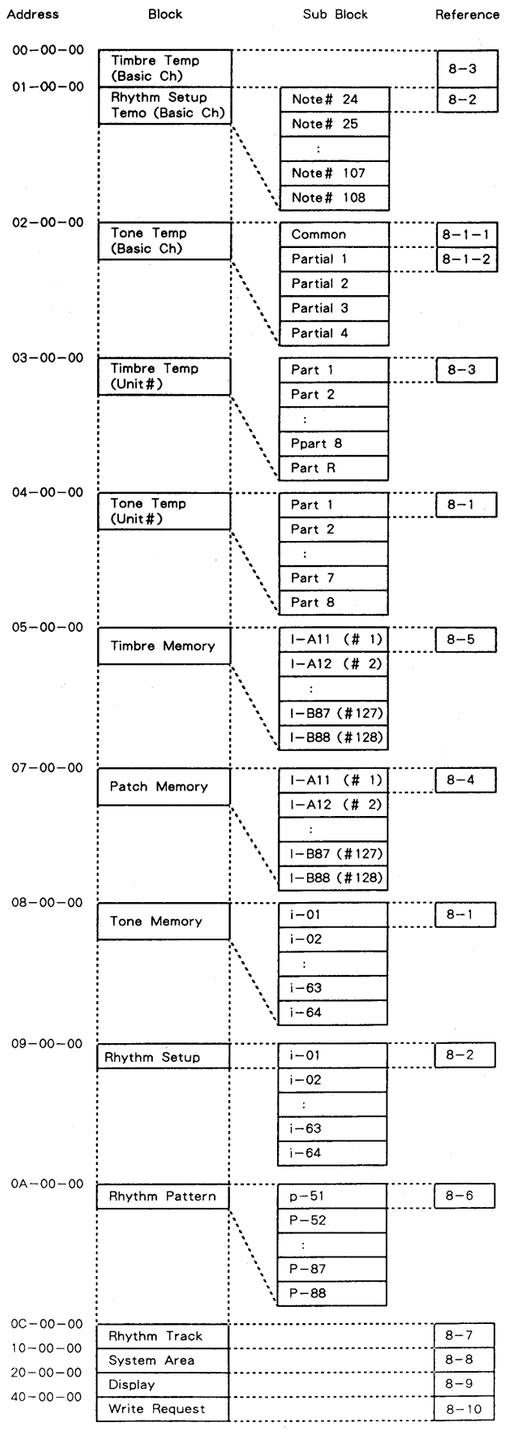
◎Example of RQ1 and DT1 application 4

Unit # is set at 17 in this example.

Sending the following byte string will enable D-20 to write data in Part 3 in temporary data into I-B24.

F0 41 10 16 12 40 01 04 4B 00 70 F7

Address Map



LINEAR SYNTHESIZER (Multi Timbral mode, Synthesizer section)
MODEL D-20

MIDI Implementation Chart

Date : Mar. 3. 1988
Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic Channel	Default	×	1-16	Memorized
	Changed	×	1-16	
Mode	Default	×	Mode 3	
	Messages	×	×	
	Altered	*********		
Note Number		×	0-127	
	True Voice	*********	12-108	
Velocity	Note ON	×	○ v=1-127	
	Note OFF	×	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		×	○ 0-24 semi	9 bit resolution
Control Change	1	×	○	Modulation
	6	×	**	Data entry
	7	×	○	Volume
	10	×	○	Panpot
	11	×	○	Expression
	64	×	○	Hold 1
	100, 101	×	** (0)	RPC LSB, MSB
	121	×	○	Reset all controllers
Prog Change		×	○ 0-127	
	True #	*********	0-127	
System Exclusive		*	*	Tone Parameter
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	×	×	
	Commands	×	×	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	×	○ (123-127)	
	Active Sense	×	○	
	Reset	×	×	
Notes		* Can be set to ○ or × manually. ** RPC=Registered parameter control number. RPC #0 : Pitch bend sensitivity Parameter values are given by Data Entry.		

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

LINEAR SYNTHESIZER (Multi Timbral mode, Keyboard section)
MODEL D−20

MIDI Implementation Chart

Date : Mar. 3. 1988
Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic	Default	1−16	×	Memorized
Channel	Changed	1−16	×	(upper/lower)
Mode	Default	Mode 3	×	
	Messages	POLY, OMNI OFF	×	
	Altered	*********		
Note Number		24−108	×	
	True Voice	*********	×	
Velocity	Note ON	○ v=1−127	×	
	Note OFF	× 9n v=0	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		**	×	
Control Change	1	**	×	Modulation
	64	**	×	Hold 1
	121	**	×	Reset all controllers
Prog Change		○ 0−127	×	
	True #	*********		
System Exclusive		×	×	
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	×	×	
	Commands	×	×	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	* (123)	×	
	Active Sense	○	×	
	Reset	×	×	
Notes		* Can be set to ○ or × manually. ** Transmitted to both upper/lower MIDI TX channels.		

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

○ : Yes
× : No

LINEAR SYNTHESIZER (Performance mode)
MODEL D−20

MIDI Implementation Chart

Date : Mar. 3. 1988
Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic	Default	1−16	1−16	Memorized
Channel	Changed	1−16	1−16	
Mode	Default	Mode 3	Mode 3	
	Messages	POLY, OMNI OFF	×	
	Altered	*********		
Note Number		24−108	0−127	
	True Voice	*********	12−108	
Velocity	Note ON	○ v=1−127	○ v=1−127	
	Note OFF	× 9n v=0	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		*	* 0−24 semi	9 bit resolution
Control Change	1	*	*	Modulation
	6	×	***	Data entry
	7	×	*	Volume
	11	×	○	Expression
	64	*	*	Hold 1
	100, 101	×	*** (0)	RPC LSB, MSB
	121	○	○	Reset all controllers
Prog Change		* 0−127	○ 0−127	
	True #	*********	0−127	
System Exclusive		**	**	Tone Parameter
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	×	×	
	Commands	×	×	
Aux Message	Local ON/OFF	×	○	
	All Notes OFF	**	○ (123−127)	
	Active Sense	○	○	
	Reset	×	×	
Notes		* Can be set to ○ or × manually, and memorized. ** Can be set to ○ or × manually *** RPC=Registered parameter control number. RPC #0 : Pitch bend sensitivity Parameter values are given by Data Entry.		

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

○ : Yes
× : No

LINEAR SYNTHESIZER (Rhythm section)
MODEL D-20

MIDI Implementation Chart

Date : Mar. 3. 1988
Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic	Default	1-16	1-16	Memorized
Channel	Changed	1-16	1-16	
Mode	Default	Mode 3	Mode 3	
	Messages	POLY, OMNI OFF	×	
	Altered	*********		
Note Number		24-108	24-108	
	True Voice	*********	24-108	
Velocity	Note ON	○ v=1-127	○ v=1-127	
	Note OFF	× 9n v=0	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		×	* 0-24 semi	9 bit resolution
Control Change	6	×	**	Data entry
	7	×	*	Volume
	11	×	○	Expression
	100, 101	×	** (0)	RPC LSB, MSB
	121	×	○	Reset all controllers
Prog Change		×	×	
	True #	*********		
System Exclusive		○	***	Setup & Song data
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	○ (Clock mode=INT)	○ (Clock mode=MIDI)	
	Commands	○ (Clock mode=INT)	○ (Clock mode=MIDI)	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	×	○	
	Active Sense	×	○	
	Reset	×	×	
Notes		* Performance mode-Can be set to ○ or × manually and memorized. Multi Timbral mode-Always received. ** RPC=Registered parameter control number. RPC #0 : Pitch bend sensitivity *** Can be set to ○ or × manually.		

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

○ : Yes
× : No

LINEAR SYNTHESIZER (Sequencer section)
MODEL D-20

MIDI Implementation Chart

Date : Mar. 3. 1988
Version : 1.00

Function...		Transmitted	Recognized	Remarks
Basic	Default	* 1-16	* 1-16	Memorized
Channel	Changed	×	×	
Mode	Default	×	Mode 3	
	Messages	×	×	
	Altered	*********		
Note Number		0-127	0-127	
	True Voice	*********	0-127	
Velocity	Note ON	***	○ v=1-127	
	Note OFF	× 9n v=0 (***)	×	
After Touch	Key's	×	×	
	Ch's	×	×	
Pitch Bender		***	○	
Control Change	1	***	○	Modulation
	6	***	○	Data entry
	7	***	○	Volume
	10	***	○	Panpot
	11	***	○	Expression
	64	***	○	Hold 1
	100, 101	***	○	RPC LSB, MSB
Prog Change		***	○ 0-127	
	True #	*********	0-127	
System Exclusive		×	×	
System Common	Song Pos	×	×	
	Song Sel	×	×	
	Tune	×	×	
System Real Time	Clock	○ (Clock mode=INT)	○ (Clock mode=MIDI)	
	Commands	○ (Clock mode=INT)	○ (Clock mode=MIDI)	
Aux Message	Local ON/OFF	×	×	
	All Notes OFF	****	○ (123-127)	
	Active Sense	×	×	
	Reset	×	×	
Notes		* Channel number of a part. ** Can be set to ○ or × manually. *** Transmitted when the track is muted. **** Can be set to ○ or × manually. Only the data in a muted track is made transferable.		

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

○ : Yes
× : No