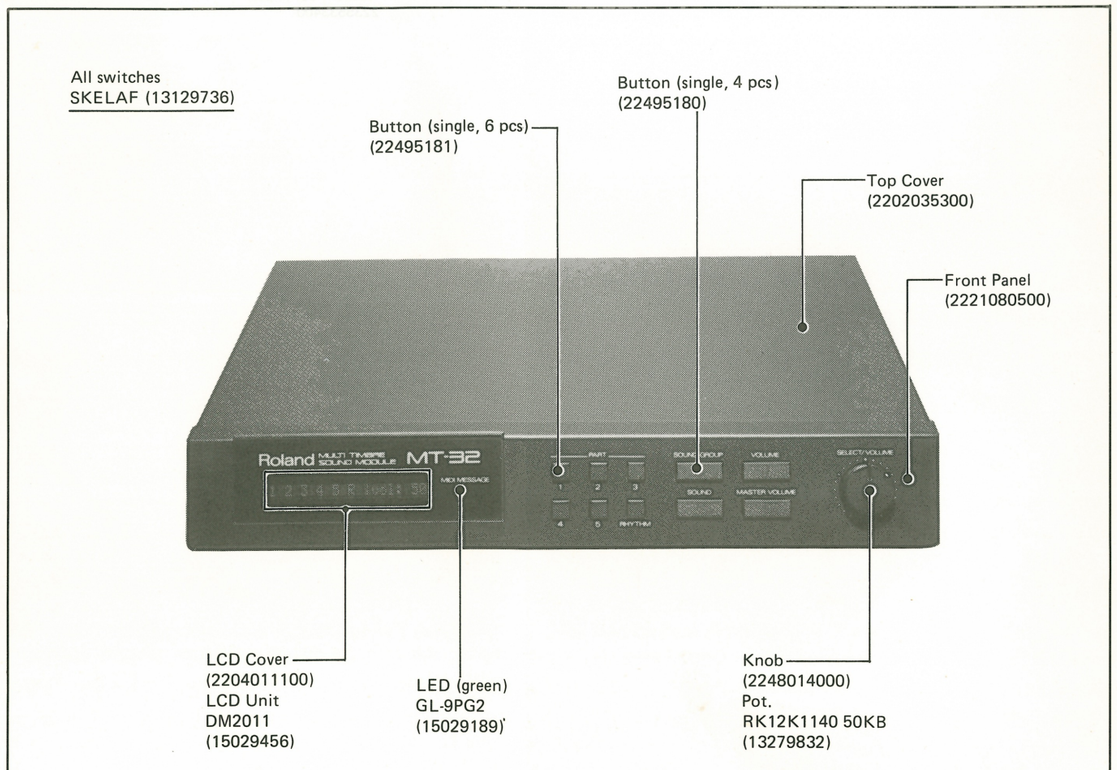
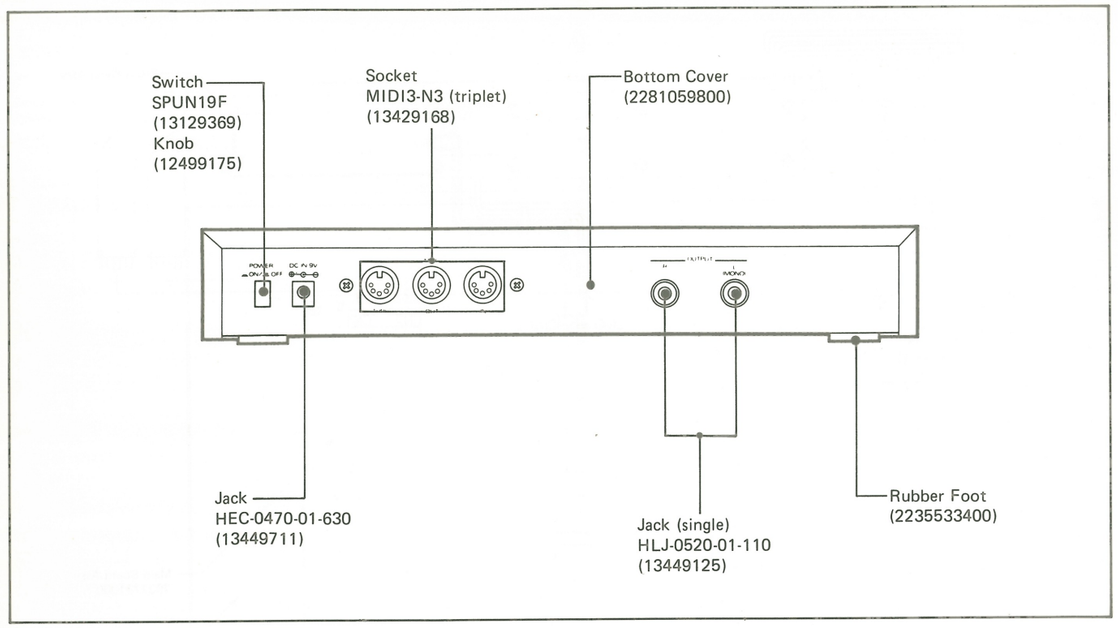
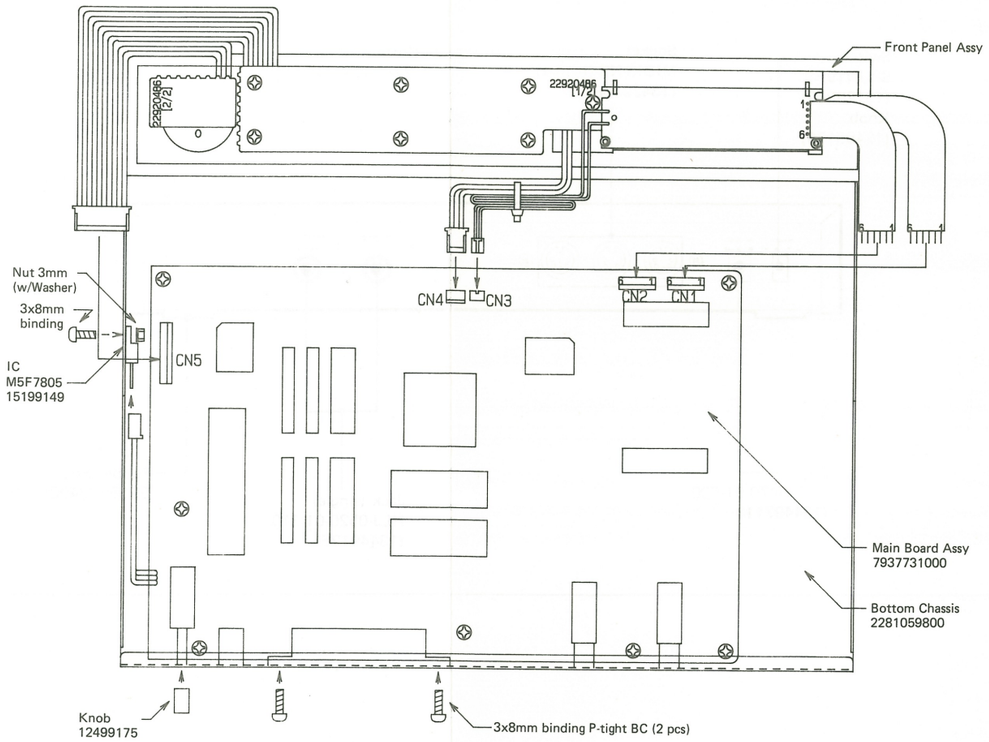
MT-32 SERVICE NOTES *First Edition*

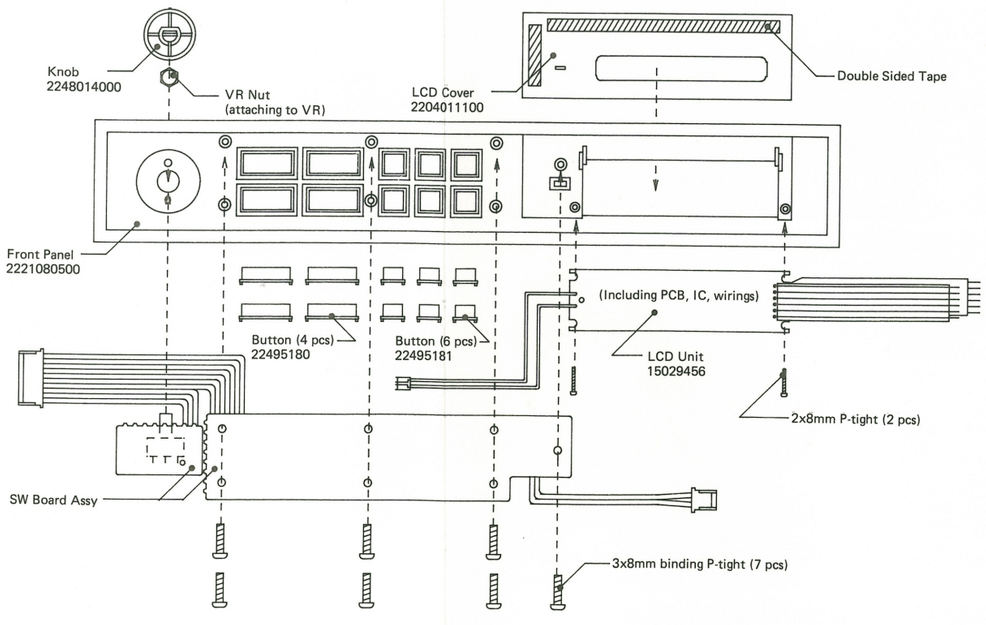
SPECIFICATIONS

Sound Sources	:	32 polyphonic
Preset Tones	:	128
Sampling Frequency	:	32KHz
Data Format	:	15-bit linear
Noise Level	:	–80dBm (IHF-A) or less @25°C (77°F)
Current Draw	:	650mA @9V
Power Consumption	:	10W @100V
(AC adaptor input)		9.5W @117V
		10.5W @220–240V
Dimensions	:	51 (H) x 305 (W) x 220 (D) mm
		2 x 12 x 8-11/16 in
Weight	:	1.53 kg. 3 lb 6 oz
Accessories	:	AC Adaptor
		ACB-100 100V
		ACB-120 117V
		ACB-220 220V
		ACB-240A 240V (Australia)
		ACB-240E 240V (England)
		MIDI Cable (DIN Cord) (1m) 1 pc
		Connection Cord LP-25 2 pcs









Viewing at rear of unit

EXPLODED VIEW

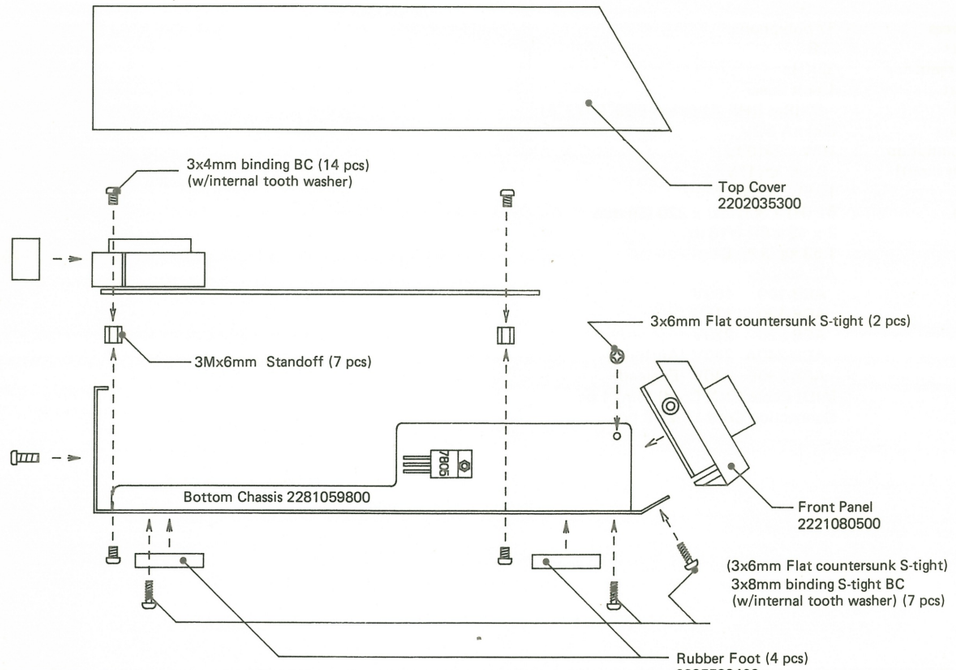
NOTE

When inserting or pulling out flat cable at CN1 or CN2, push lock mechanism at the connector.

分解図

注意

CN1,CN2上でフラットケーブルを抜き差しする場合は、コネクタ上のロックを押して下さい。



PARTS LIST

CASING

2202035300	Top Cover	
2281059800	Bottom Chassis	
2221080500	Front Panel	
2204011100	LCD Cover	

PCB ASSY

7937731000	Main Board	(pcb 2292048700)
7937742000	SW Board (including VR board) VR基板を含む	(pcb 2292048600)

LCD UNIT

15029456	DM2011 (including PCB, IC, Connector and Cable) No replacement for individual parts. PCB,ケーブル,IC,コネクタを含む。これらの単独補修部品はありません。	

BUTTON, KNOB

2248014000	Knob	SELECT/VOLUME
12499175	Knob	POWER
22495181	Button	PART
22495180	Button	SOUND GROUP, VOLUME SOUND, MASTER VOL

SWITCH

13129369	SPUN19F	POWER
13129736	SKELAF	PART, SOUND GROUP SOUND, M.VOL

JACK

13449125	HLT-0520-01-110	OUTPUT
13449711	HEC-0470-01-630	DC IN
13429168	MIDI3-NS (triplet)	MIDI

IC

15179246	C8095-90	CPU	
15229851	MB87136A	LA chip	
15229865	HG61H15B59F	gate array	
15229863	HG61H20R36F	reverb chip	
15219178	PCM54HP	D/A converter	
15179844	TC532000P-7471	2M mask ROM	(WAVE) IC21
15179845	TC532000P-7472	2M mask ROM	(WAVE) IC22
15449107	M5M27C256-A	EP ROM	IC27
15449108	M5M27C256-B	EP ROM	IC26
15449109	M5M27C128-15	EP ROM	(reverb,ROM C) IC13
15179345	M5M4416P-12	D RAM	
15179382	HM6264ALSP-15	S RAM	
15169515	TC74HC00P	quad 2-input NAND	
15169516	TC74HC02P	quad 2-input NOR	
15169514	TC74HC04P	hex inverter	
15169537	TC74HC27P	triple 3-input NOR	
15169334H0	HD74LS05P	hex inverter with open collector output	
15159113H0	HD14051	MUX/DEMUX	
15199159	IR3M03A	DC-DC converter	
15229706S0	PC910	optoisolator	
15189171	M5218P	OP amp	
15189147	NJM-072D	OP amp	
15189188	M5238L	OP amp	
15199149	M5F7805	regulator	

TRANSISTOR

15129172	DTC114T SPT		
15119113	2SA1015GR		
15129136	2SC2878A		

DIODE

15019126	1SS-133T-77		Main Board
15019291	1SR35-400		
15019103	1S2473		SW Board
15029189	GL-9PG2	LED	green

COIL

12449305	330μH	DC-DC converter	
12449272	GM-50510152	line filter	
12399501M1	BL02RN-R62	EMI filter	

XTAL

12389717	12MHz	CPU
12389774	32.768MHz	LA chip

POTENTIOMETER

13279832	RK12K1140 50KB	rotary	SELECT/VOLUME

RESISTOR

13919303	RML S8 333J	3.3KΩx8
13799762	0.24Ω	metal oxide

CAPACITOR

1363915350	470μF/16V	electro
1363915450	1000μF/16V	electro
13649103J0	10μF/16V	bi-polar
13629141	10μF/16V	Phillips 1225109

CONNECTOR, CABLE

13439126	5045-10A	10P (CN5, Main Board)
13439119	5045-03A	3P (CN4, Main Board)
13439333	IL-S-2P-S2T2-EF	2P (CN3, Main Board)
23430525	52011-0610	6P (CN1, CN2, Main Board)
23410578	341-578 (w/leads)	3P (M5F7805-Main Board)
23410577	341-577 (w/leads)	3P (LED-CN4, Main Board)
23410576	341-576 (w/leads)	10P (SW Board-CN5, Main Board)

AC ADAPTOR

12449546	ACB-100	100V
12449547	ACB-120	117V
12449548	ACB-220	220V
12449549	ACB-240A	240A (Australia)
12449564	ACB-240E	240E (England)

MISCELLANEOUS

2215051200	Standoff	3x6mm
2235533400	Rubber Foot	
23485167	MIDI Cable	1m
2343067580	Connection Cord	LP-25

CIRCUIT DESCRIPTIONS

*1 *2 *3 = ①②③ (Fig.1,Table 1)

CPU (IC34, Main board) processes MIDI IN data by running the operational program (stored in ICs 26 and 27) and reading sound parameters and other sound related data (stored in ROMs and RAMs: ICs 26–31). Then the CPU directs the LA chip IC23 to generate and output the necessary sound. The LA chip places the sound data on the data bus (D0–D15) connecting to both the Reverb chip IC17 and DAC IC8. The LA chip works in timesharing: It outputs data on the clock SH1 which in combination with SH2 and SH3 makes channel select code. If a data is to be reproduced as a direct sound only, the chip places the data during time slots 2 and 6. If reverb effect is required, then slots 1 and 5.

The data put out during slot 1(5) is not only accommodated by the reverb chip IC17[*2] but also routed to DMUX[*1] where it is delivered to the correct S/H circuit on the code SH1–SH3, as a direct sound. Its reverb counterparts are placed on the data bus[*3] when time slot 7(8) comes.

回路解説

CPU（IC34）はMIDI INデータをオペレーショナルプログラム（IC26，27）および音のパラメータ・データ（IC26−31）に基づいて処理し、その結果に応じた出力命令（サウンド出力命令）をLA chip（IC23）へ与える。

LA chipは、サウンドデータを、D0−D15から出力するが、方法は時分割式で、SH1に同調させている。

Revを伴なわない音の場合は、タイムスロットの2と6で出力される。Rev を伴う音はスロットの1と5で出力される。後者の場合、データは、Rev chipに取り込まれる[*2]とともに、DMUXへも送られ、[*1] SH1−SH3からなるセレクトコードで目的のS／H回路へダイレクト音として加えられる。一方、Rev chip で得られたリバーブ効果音は、スロット7と8で出力される。[*3]

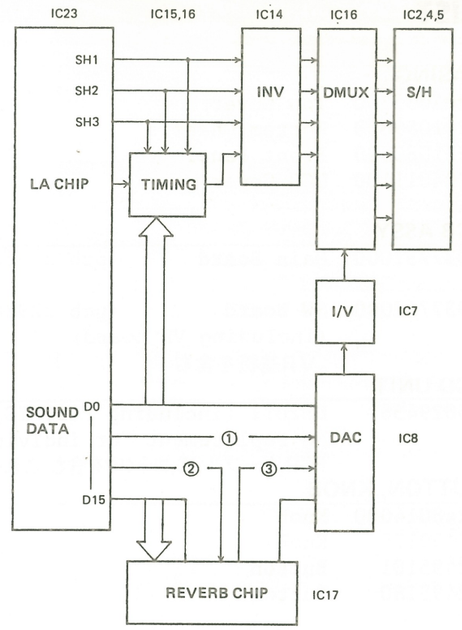
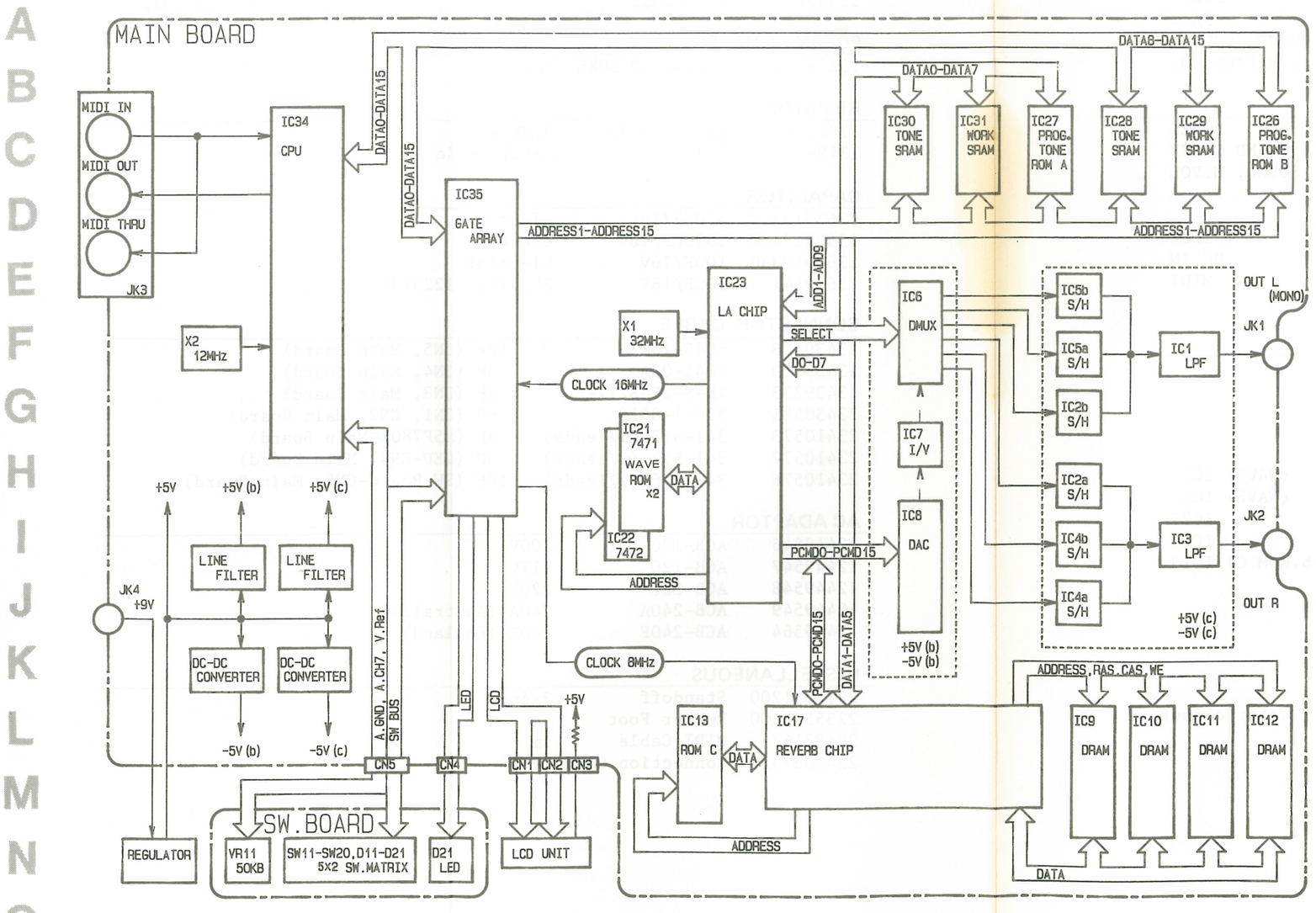


Fig.1

BLOCK DIAGRAM



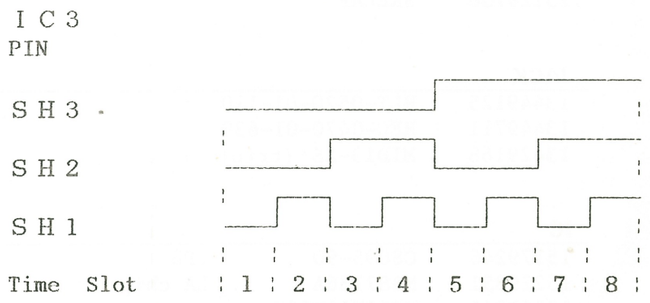


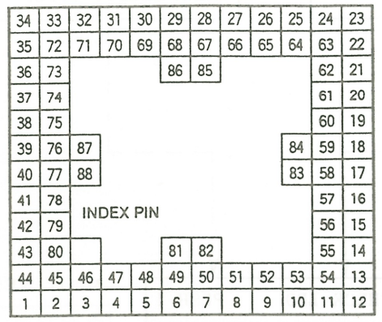
Fig.2

Time Slot	Signal Flow		DMUX Output	
			Pin	Sound
1	①	②	4	Direct R
2	①		2	Direct R
3	no sound			
4				
5	①	②	12	Direct L
6	①		15	Direct L
7	③		14	Rev R
8	③		13	Rev L

Table 1

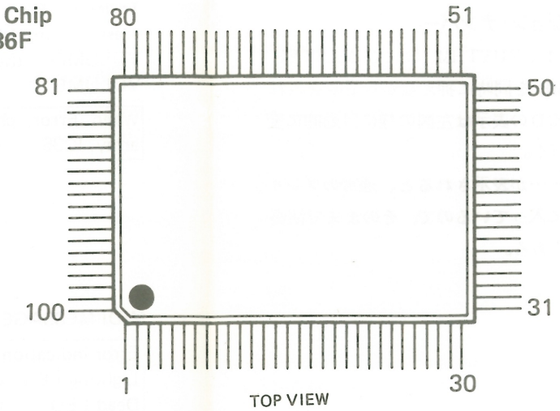
IC DATA

IC23 LA Chip MB87136



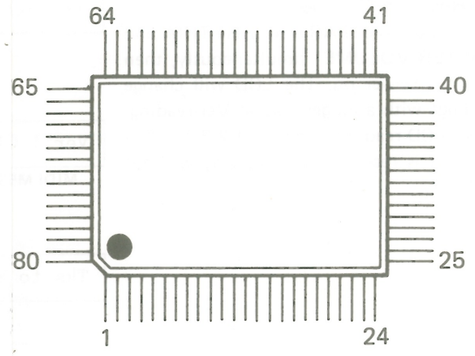
TOP VIEW

IC17 Reverb Chip HG61H20R36F



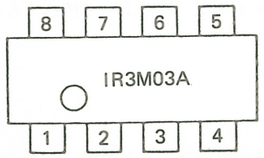
TOP VIEW

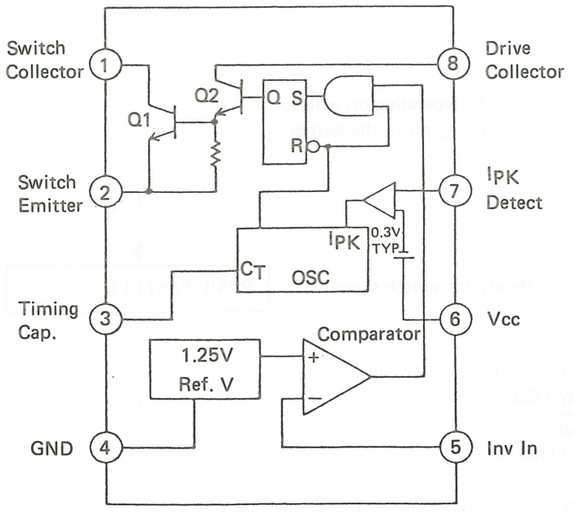
IC35 Gate Array HG61H15B59F



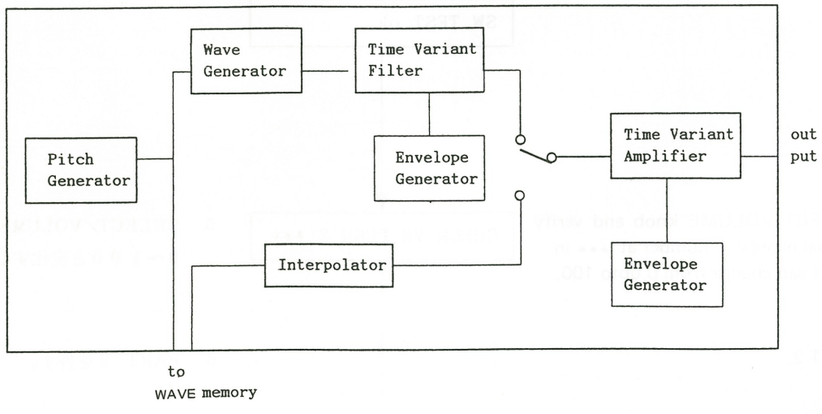
TOP VIEW

IC18, IC19 Regulator IR3M03A

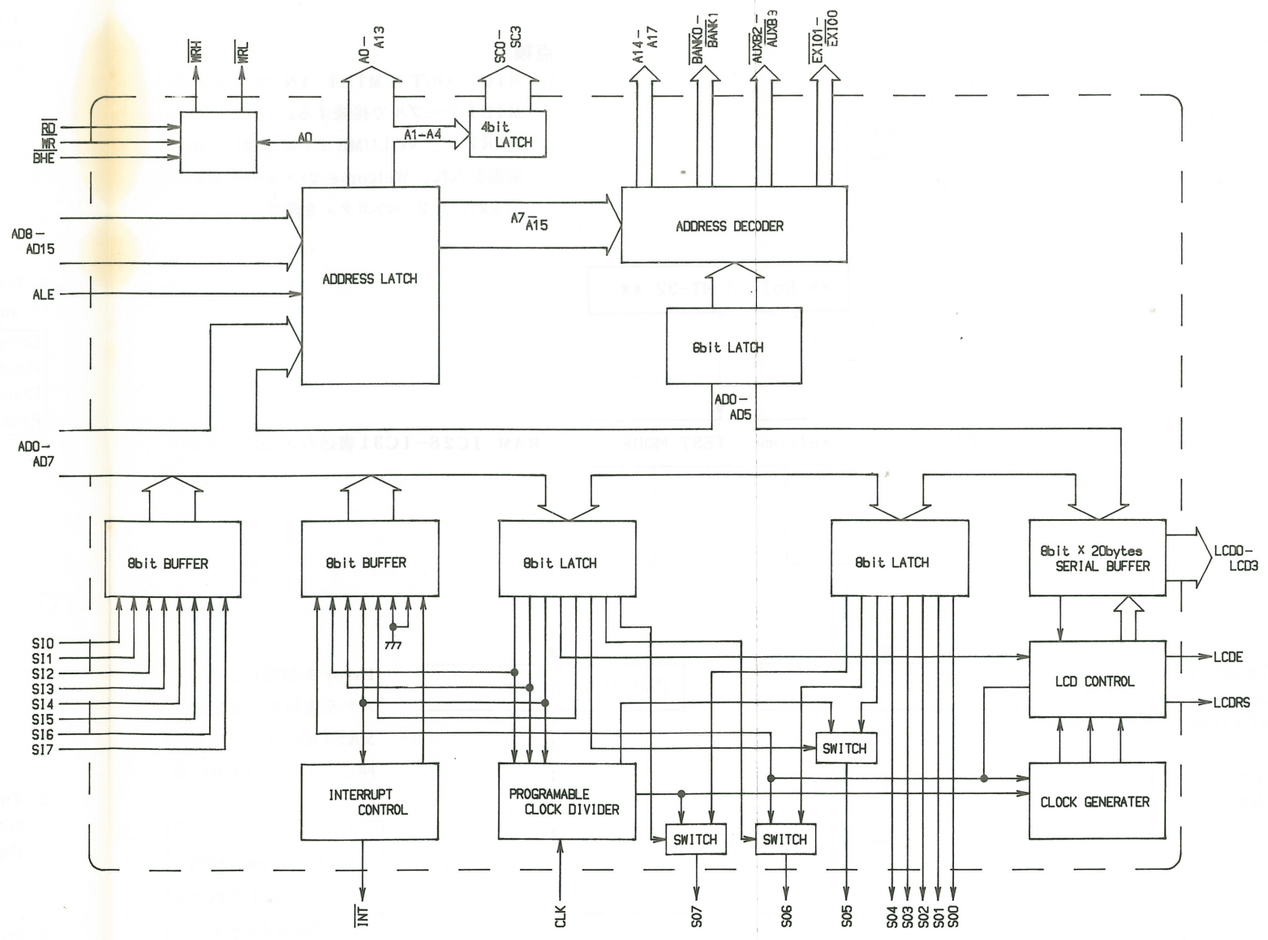




IC23 LA Chip MB87136



BLOCK DIAGRAM



TEST MODE

テストモード

ROM Revision Number

Press and hold PART 4, RHYTHM and MASTER VOLUME simultaneously, then turn the power on. The LCD will change readings with a longer stay at Ver-reading. When LCD reads the sign-on, 1 2 3 4 5 R .., the unit is ready for normal play without repower.

ROMバージョン・ナンバー

PART 4 , RHYTHM および MASTER VOLUME を同時に押えながら電源を入れる。 LCDの表示は左図の様に自動的に変化して行く。

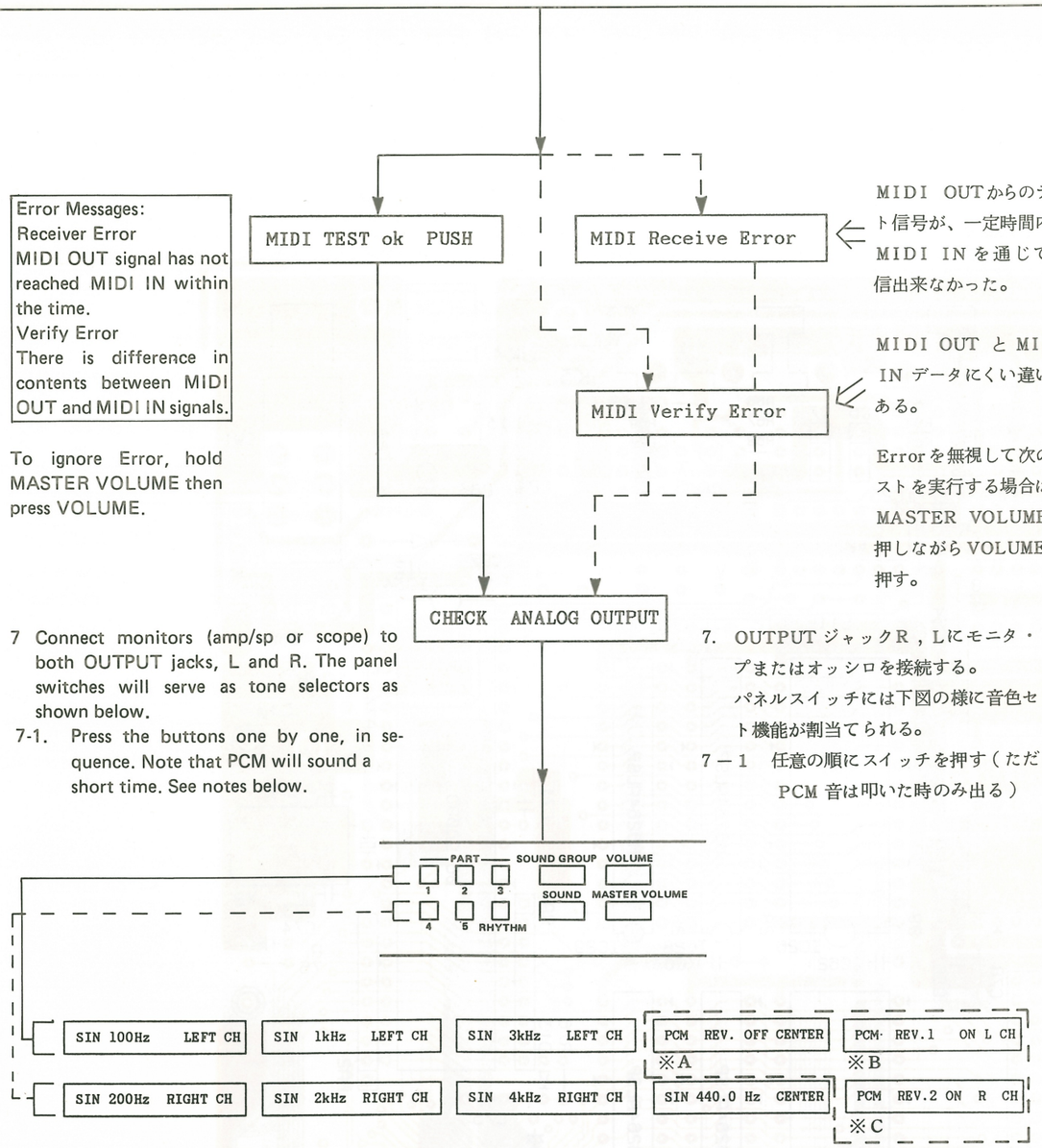
１２３……が表示されると、通常のプレイモードに入っているので、そのままで演奏が可能である。

Checking

1 Hookup together MIDI OUT and MIDI IN sockets with the MIDI cable.
2 Press and hold PART 3 and VOLUME buttons, then apply the power, holding the two buttons until the LCD reads Welcome!

点検

1. MIDI OUTとMIDI IN ソケットをMIDIケーブルで接続する。
2. PART 3 とVOLUMEボタンを押しながら電源を入れ、Welcome のメッセージが表示されたら２つのボタンを離す。



MIDI OUTからのテスト信号が、一定時間内にMIDI INを通じて受信出来なかった。

MIDI OUTとMIDI INデータにくい違いがある。

Errorを無視して次のテストを実行する場合は、MASTER VOLUMEを押しながらVOLUMEを押す。

7 Connect monitors (amp/sp or scope) to both OUTPUT jacks, L and R. The panel switches will serve as tone selectors as shown below.

7-1. Press the buttons one by one, in sequence. Note that PCM will sound a short time. See notes below.

7. OUTPUTジャックR, Lにモニタ・アンプまたはオッシロを接続する。
パネルスイッチには下図の様に音色セレクト機能が割当てられる。

7－1 任意の順にスイッチを押す（ただし、PCM音は叩いた時のみ出る）

NOTES

*A Direct sound only; from both OUTPUTs.

*B Direct and light reverb sounds from OUTPUT L. From R, reverb only.

*C Direct and deep reverb sounds from OUTPUT R. From L, deep reverb only.

440Hz

There is a slight difference in volume between R and L OUTPUTs.

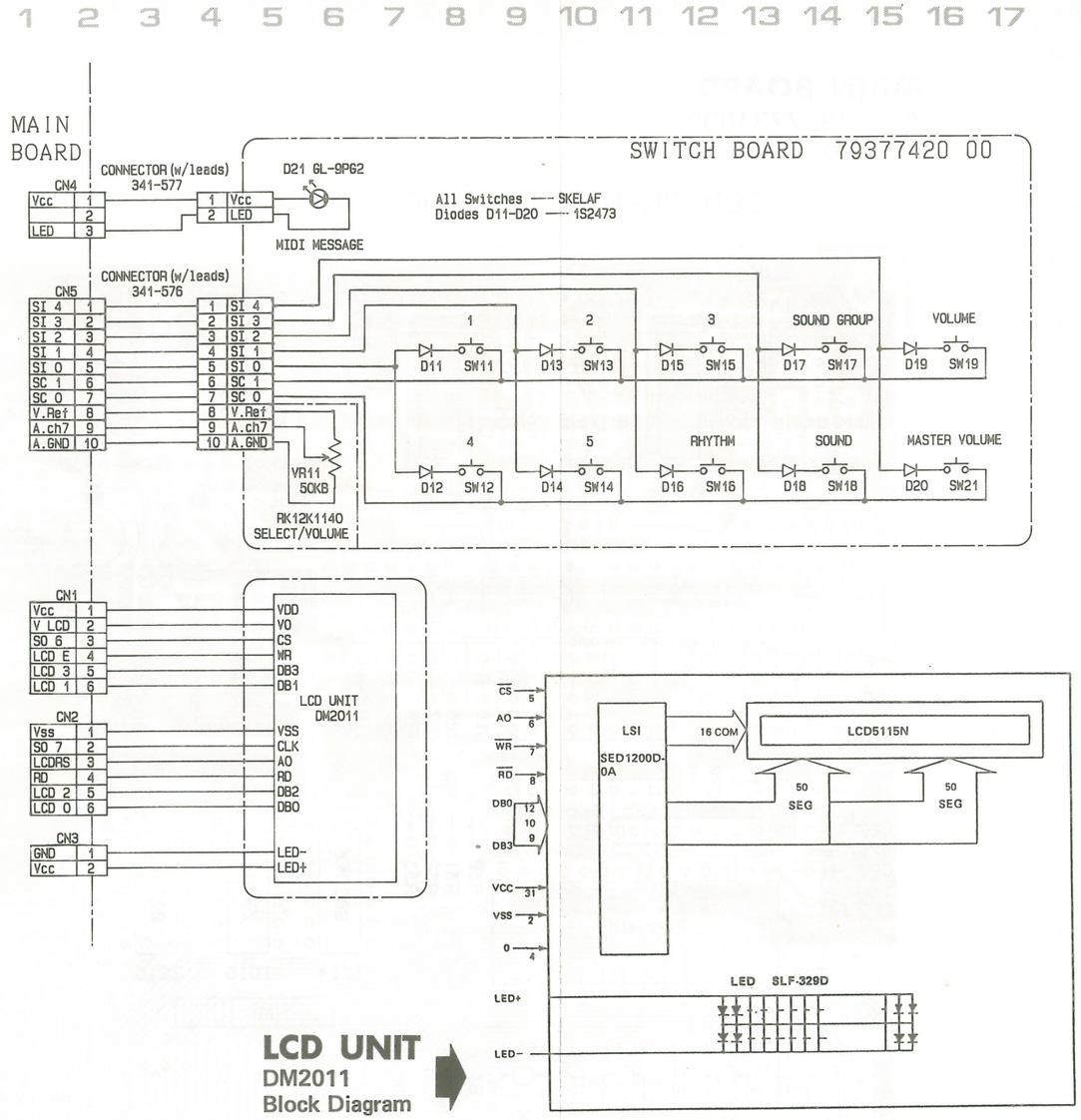
※A……PCM音（TOM）の直接音のみが両方のジャックから出る。

※B……ジャックLからは直接音と、浅いリバーブ音が出る（TOM）
ジャックRからは浅いリバーブ音のみ

※C……ジャックRから直接音と深いリバーブ音が出る（TOM）
ジャックLからは深いリバーブ音のみが出る。

440Hz の出力はLとRで若干差がある。

8. MASTER VOLUME を押しながらVOLUMEを押す。

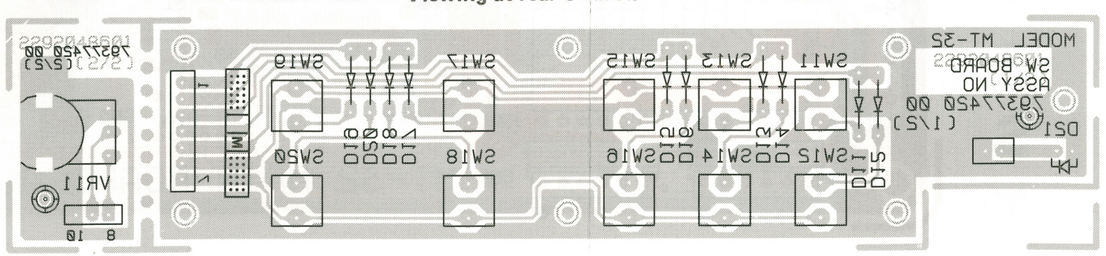


LCD UNIT
DM2011
Block Diagram

VR BOARD
(pcb 22920486 2/2)
Supplied with SW Board

SW BOARD
Assy 793774200
(pcb 2292048600)

Viewing at rear of unit.

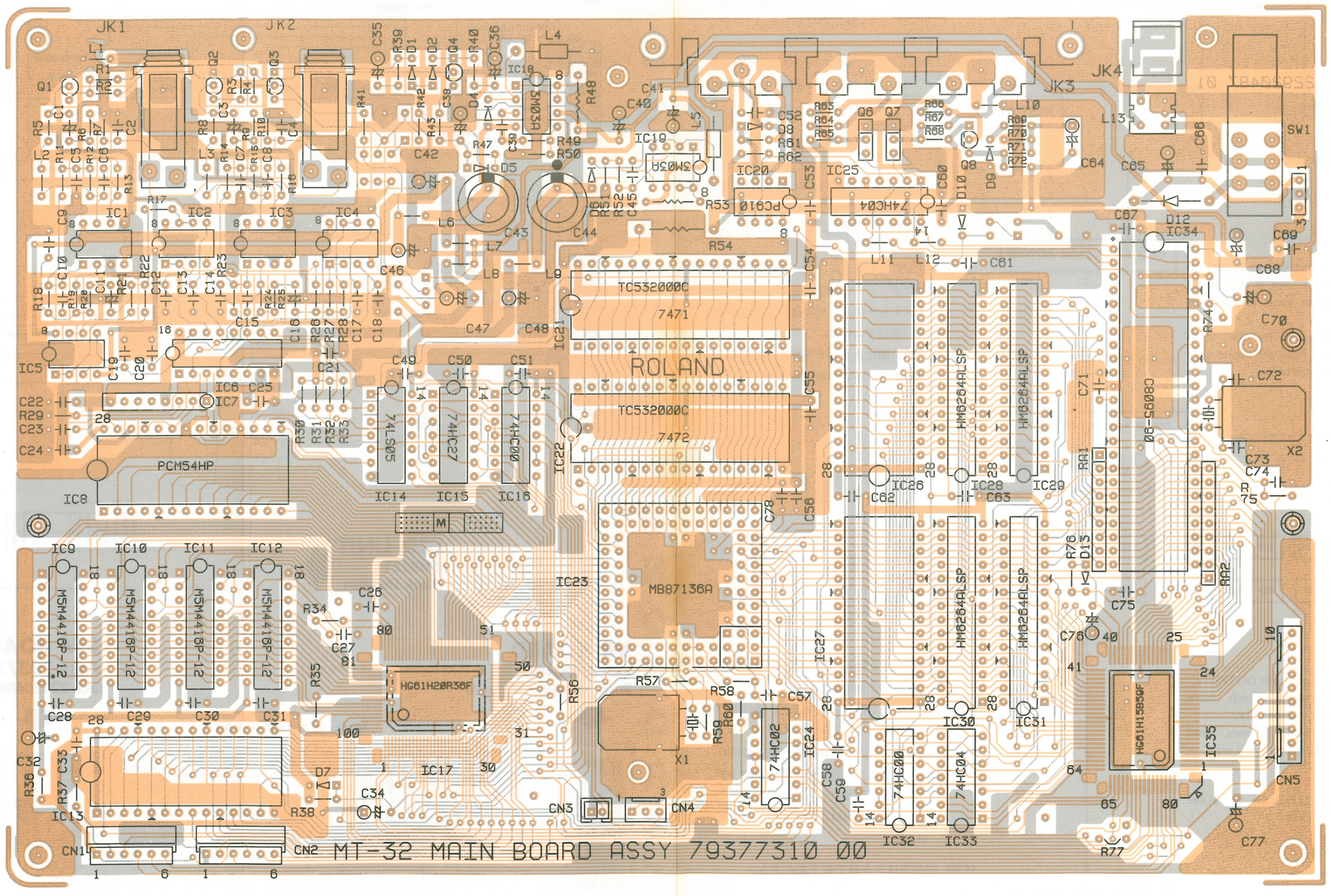


MAIN BOARD

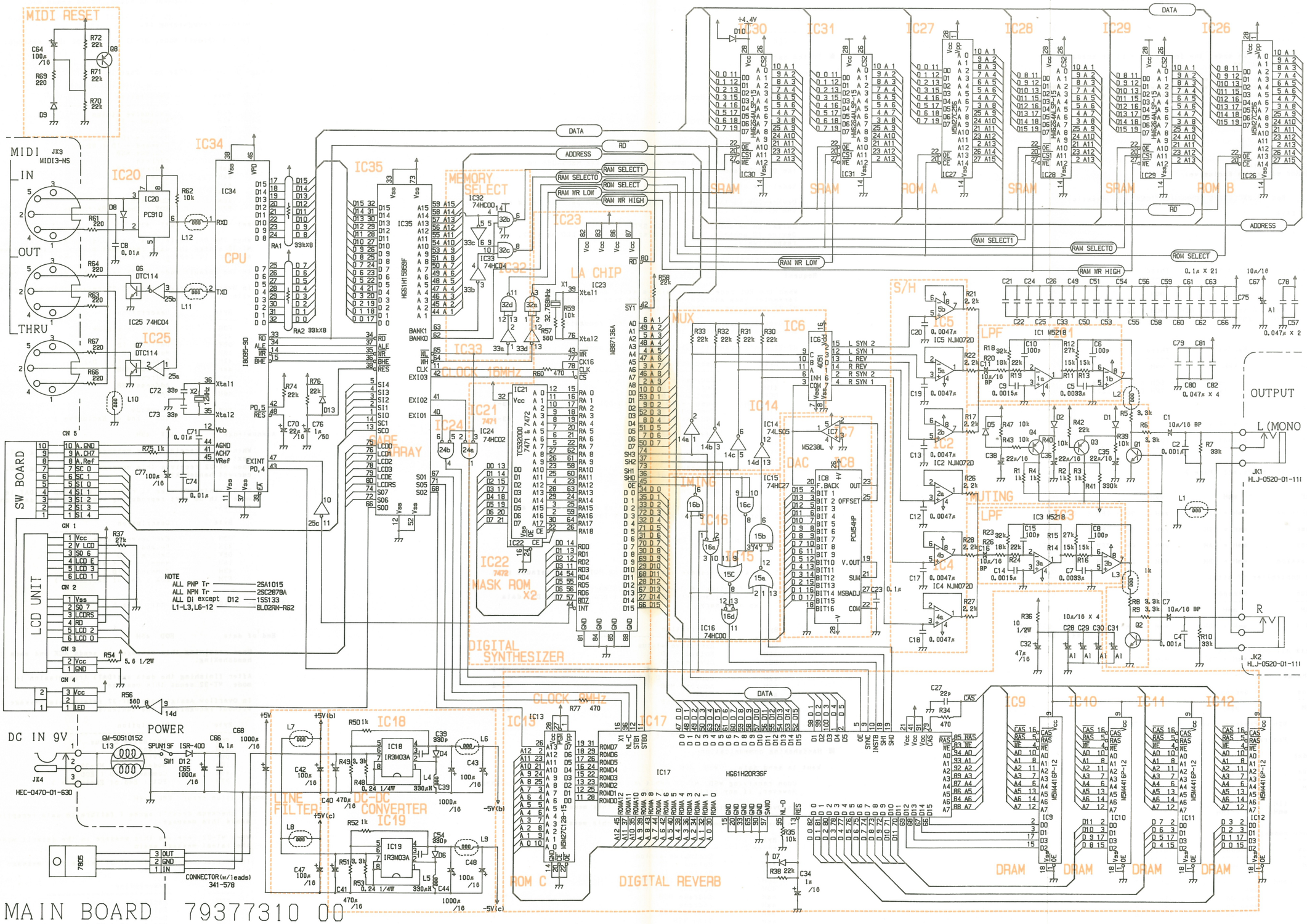
Assy 7937731000

(pcb 2292048700)

COMPONENT SIDE MARKING MAY25



CIRCUIT DIAGRAM



MIDI IMPLEMENTATION

MT-32 MIDI IMPLEMENTATION Version 1.00 Jul. 9 1987

*** MT-32 MIDI IMPLEMENTATION ***
Version 1.00
Jul. 9 1987

1. TRANSMITTED DATA

■ Bypassed message

In Overflow Assign mode, the following MIDI In messages are sent to MIDI Out as

- Channel Voice messages except Note On
- System Exclusive message whose manufacturer ID# is 41H
- Odd Note On(s) left unassigned any voice because all assignable voices are engaged.

■ Created message

System exclusive

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

See "3.EXCLUSIVE COMMUNICATIONS" for details.

2. RECOGNIZED DATA

■ Note event

Note off

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

kkH : Note number 0CH - 6CH (12 - 108)
vvH : ignored

Note on

Status	Second	Third
9nH	kkH	vvH

kkH : Note number 0CH - 6CH (12 - 108)
vvH : Velocity 1H - 7FH (1 - 127)

■ Control change

Continuous controller (14 bits)

Status	Second	Third

BnH	mmH	vvH	
Modulation	mmH = 01H	vvH = 0H - 7FH (0 - 127)	
Volume	mmH = 07H	vvH = 0H - 7FH (0 - 127)	
Panpot	mmH = 0AH	vvH = 0H - 7FH (0 - 127)	
Expression	mmH = 0BH	vvH = 0H - 7FH (0 - 127)	

Continuous controller (7 bits)

Status	Second	Third	
BnH	mmH	vvH	
Hold 1	mmH = 40H	vvH = 0H - 3FH (0 - 63)	OFF
		40H - 7FH (64 - 127)	ON
Resets all controllers	mmH = 79h	vvH = 0	

■ Program change

Status	Second
CnH	ppH

ppH : Program number 0H - 7FH (0 - 127)

Program Change changes Patch.

■ Pitch bender

Status	Second	Third
EnH	llH	mmH

llH : 0H - 7FH (0 - 127)
mmH : 0H - 7FH (0 - 127)

■ Channel mode message

Status	Second	Third
BnH	mmH	00H

mmH :		
All Notes Off	7BH	(123)
Omni Off	7CH	(124)
Omni On	7DH	(124)
Mono On	7EH	(124)
Poly On	7FH	(128)

Recognized as only All Notes Off.
MT-32 does not change mode, but remains in mode 3 (Omni off, Poly).

■ Active sensing

Status

FEH

■ System exclusive

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

3. EXCLUSIVE COMMUNICATIONS

Model-ID# of MT-32 is 16H.

MT-32 can receive/send some of the EXCLUSIVE MESSAGEs in the D-50(Roland synthesizer) format.

Model-ID# of D-50 is 14H.

Device-ID# is the basic channel# of the each part or Unit# of the MT-32

Unit# can be changed in "UNIT# SETUP MODE".
Device ID numbers, 0-31, are displayed on the LCD as 1-32, respectively.

■ One way communication

Request RQ1 11H

When the RQ1 received contains a start address listed in Parameter base address, and address size is 1 or more, MT-32 sends the corresponding data.

In Overflow Assign mode, MT-32 does not recognize RQ1, but passes the message to MIDI OUT.

MT-32 won't transmit RQ1 in the default mode.

Byte	Description	
F0H	Exclusive status	
41H	Roland - ID	
DEV	Device - ID	
16H(14H)	Model - ID (MT-32(D-50))	*3-1
11H	Command - ID (RQ1)	
aaH	Address MSB	*3-2
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Checksum	
F7H	EOX (End of Exclusive)	

Data set DT1 12H

When the DT1 contains a start address as defined in RQ1 above, MT-32 stores the data into that memory location.

MT-32 sends this message upon receiving RQ1 in the default mode.

Additional function in Overflow Assign mode:
MT-32 retransmits DT1 while it processes the DT1 data as necessary.

Byte	Description	
F0H	Exclusive status	
41H	Roland - ID	
DEV	Device - ID	
16H(14H)	Model - ID (MT-32(D-50))	*3-1
12H	Command - ID (DT1)	
aaH	Address MSB	*3-2
aaH	Address	
aaH	Address LSB	
ddH	Data	*3-3
:		
sum	Checksum	
F7H	EOX (End of Exclusive)	

■ Handshaking communication

Want to send data WSD 40H

Upon receiving WSD, MT-32 sends ACK and waits for DATA SET message. However, if any part is reproducing sound, MT-32 sends RJC.

In Overflow Assign mode, MT-32 relays this message to downstream.

In the default mode, MT-32 won't send this message.

Byte	Description	
F0H	Exclusive status	
41H	Roland - ID	
DEV	Device - ID	
16H	Model - ID (MT-32)	
40H	Command - ID (WSD)	
aaH	Address MSB	*3-2
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Checksum	
F7H	EOX (End of Exclusive)	

Request data RQD 41H

When the RQD contains a start address as defined in RQ1 above, MT-32 stores the data into that memory location. However, if any part is reproducing sound, MT-32 sends RJC.

In Overflow Assign mode, MT-32 relays this message to downstream without recognizing it.

In the default mode, MT-32 won't send this message.

Byte	Description	
F0H	Exclusive status	
41H	Roland - ID	
DEV	Device - ID	
16H	Model - ID (MT-32)	
41H	Command - ID (RQD)	
aaH	Address MSB	*3-2
aaH	Address	
aaH	Address LSB	
ssH	Size MSB	
ssH	Size	
ssH	Size LSB	
sum	Checksum	
F7H	EOX (End of Exclusive)	

Data set DAT 42H

When the DAT contains a start address as defined in RQ1 above, MT-32 stores the data into that memory location.However, if any part is reproducing sound, MT-32 sends RJC.

In the default mode, MT-32 sends this data upon receipt of RQD

In Overflow Assign mode, MT-32 relays this message to downstream without recognizing it.

Byte	Description	
F0H	Exclusive status	
41H	Roland - ID	
DEV	Device - ID	
16H	Model - ID (MT-32)	
42H	Command - ID (DAT)	
aaH	Address MSB	*3-2
aaH	Address	
aaH	Address LSB	
ddH	Data	*3-3
:		
sum	Checksum	
F7H	EOX (End of Exclusive)	

Acknowledge ACK 43H

When MT-32 receives this message after sending DAT, it sends the next data.
When MT-32 receives this message after sending EOD, it ends the current handshaking.

MT-32 sends ACK when it receives WSD, RQD or DAT in the default mode with no part reproducing sound and with data checksum proves correct.

Byte	Description
F0H	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H	Model - ID (MT-32)
43H	Command - ID (ACK)
F7H	EOX (End of Exclusive)

End of data EOD 45H

Upon receiving this message, it sends ACK and ends the current handshaking.

After finishing the data set(DAT) transmission in the default mode, MT-32 sends this message.

In Overflow Assign mode, MT-32 relays this message to downstream without recognizing the contents.

Byte	Description
F0H	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H	Model - ID (MT-32)
45H	Command - ID (EOD)
F7H	EOX (End of Exclusive)

Communication error ERR 4EH

If checksum doesn't agree (failure in data reception), MT-32 sends this message.

When MT-32 receives this message in the default mode, it sends the latest message again.

In Overflow Assign mode, MT-32 relays this message to downstream without recognizing it.

Byte	Description
F0H	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H	Model - ID (MT-32)
4EH	Command - ID (ERR)
F7H	EOX (End of Exclusive)

Rejection RJC 4FH

If MT-32 receives WSD while it is reproducing sound, it sends RJC.

When MT-32 receives this message, it ends the current handshaking.

In Overflow Assign mode, MT-32 relays this message to downstream without recognizing it.

Byte	Description
F0H	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H	Model - ID (MT-32)
4FH	Command - ID (RJC)
F7H	EOX (End of Exclusive)

Notes :
*3-1 Both model-IDs are supported. Addresses & parameters are described

in section 4 for model-ID 16H(MT-32) and in section 5 for model-ID 14H(D-50,PG-1000).
*3-2 Address & Size should be the address where data exist.
*3-3 If the data is Partial Reserve Parameter, received data must comprise all the parameters for being recognized.

4. Address mapping of parameters

Addresses are shown in Hexa-decimal, while numbers are given in 7 bits.

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. That is, prameters marked by *4-1 have two offset addresses : one in the table under NOTE *4-1 and the other in Common parameter table or in Partial parameter table.

■ Parameter base address

Temporary area (Accessible on each basic channel)

Start address	Description
00 00 00	Patch Temp Area (part)
01 00 00	Setup Temp Area (rhythm part)
02 00 00	Timbre Temp Area(part) *4-1

Whole part (Accessible on UNIT#)

Start address	Description	
03 00 00	Patch Temp Area (part 1)	
03 00 10	Patch Temp Area (part 2)	
:	:	
03 00 60	Patch Temp Area (part 7)	
03 00 70	Patch Temp Area (part 8)	
03 01 00	Patch Temp Area (rhythm part)	
03 01 10	Setup Temp Area (rhythm part)	
04 00 00	Timbre Temp Area(part 1)	*4-1
04 01 76	Timbre Temp Area(part 2)	*4-1
:	:	
04 0b 44	Timbre Temp Area(part 7)	*4-1
04 0c 3a	Timbre Temp Area(part 8)	*4-1
05 00 00	Patch Memory #1	
05 00 08	Patch Memory #2	
:	:	
05 07 70	Patch Memory #127	

05 07 78	Patch Memory #128	
08 00 00	Timbre Memory #1	*4-1
08 02 00	Timbre Memory #2	*4-1
:	:	
08 7C 00	Timbre Memory #63	*4-1
08 7E 00	Timbre Memory #64	*4-1
10 00 00	System area	
20 00 00	Display	*4-2
7F xx xx	All parameter reset	*4-3

Notes :
*4-1
Structure of "Timbre Temp/Memory" area is as follows.

Sub start address	Description
00 00 00	Common parameter
00 00 0E	Partial parameter (for Partial# 1)
00 00 48	Partial parameter (for Partial# 2)
00 01 02	Partial parameter (for Partial# 3)
00 01 3C	Partial parameter (for Partial# 4)

*4-2 The data sent to this address are recognized as the string of letters in ASCII CODE, and displayed on MT-32 LCD. Cannot be called on RQ1 or RQD.

*4-3 All parameters will be initialized by sending data to this address. Cannot be called on RQ1 or RQD.

■ Common parameter *4-4

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	

■ Partial parameter *4-4

Offset address	Description		
00 00H	0aaa aaaa	WG PITCH COARSE	0 - 96 (C1,C2, - C9)
00 01H	0aaa aaaa	WG PITCH FINE	0 - 100 (-50 - +50)
00 02H	0000 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 000a	WG WAVEFORM	0 - 1 (SQU, SAW)
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	0aaa aaaa	P-ENV VELO SENS	0 - 100
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	P-ENV SUSTAIN LEVEL	0 - 100 (-50 - +50)
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/DIR	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	TVF ENV TIME 4	0 - 100
00 24H	0aaa aaaa	TVF ENV TIME 5	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	TVF ENV LEVEL 3	0 - 100
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
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 (-12 - 0)
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	TVA ENV TIME 4	0 - 100
00 35H	0aaa aaaa	TVA ENV TIME 5	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	TVA ENV LEVEL 3	0 - 100
00 39H	0aaa aaaa	TVA ENV SUSTAIN LEVEL	0 - 100
Total size		00 00 3AH	

■ System area

Offset address	Description		
00 00H	0aaa aaaa	MASTER TUNE	0 - 127 (432.1Hz - 457.6Hz)
00 01H	0000 00aa	REVERB MODE	0 - 3 (Room, Hall, Plate, Tap delay)
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	000a aaaa	MIDI CHANNEL(Part 1)	0 - 16 (1 - 16,OFF)
00 0EH	000a aaaa	MIDI CHANNEL(Part 2)	0 - 16 (1 - 16,OFF)
00 0FH	000a aaaa	MIDI CHANNEL(Part 3)	0 - 16 (1 - 16,OFF)
00 10H	000a aaaa	MIDI CHANNEL(Part 4)	0 - 16 (1 - 16,OFF)
00 11H	000a aaaa	MIDI CHANNEL(Part 5)	0 - 16 (1 - 16,OFF)
00 12H	000a aaaa	MIDI CHANNEL(Part 6)	0 - 16 (1 - 16,OFF)
00 13H	000a aaaa	MIDI CHANNEL(Part 7)	0 - 16 (1 - 16,OFF)
00 14H	000a aaaa	MIDI CHANNEL(Part 8)	0 - 16 (1 - 16,OFF)
00 15H	000a aaaa	MIDI CHANNEL(Part R)	0 - 16 (1 - 16,OFF)
00 16H	0aaa aaaa	MASTER VOLUME	0 - 100
Total size		00 00 17H	

■ Rhythm part setup

Offset address	Description		
00 00H	0aaa aaaa	TIMBRE	0 - 94 (M1-M64,R1-R30,OFF)
00 01H	0aaa aaaa	OUTPUT LEVEL	0 - 100
00 02H	0000 aaaa	PANPOT	0 - 14 (R - L)
00 03H	0000 000a	REVERB SWITCH	0 - 1 (OFF, ON)
Total size		00 00 04H	

■ Patch temp

Offset address	Description		
00 00H	0000 00aa	TIMBRE GROUP	0 - 3 (GROUP A,GROUP B, MEMORY,RHYTHM)
00 01H	00aa aaaa	TIMBRE 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

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00 05H	0000 00aa	ASSIGN MODE	0 - 3 (POLY 1,POLY 2, POLY 3,POLY 4)
00 06H	0000 000a	REVERB SWITCH	0 - 1 (OFF, ON)
00 07H	0xxx xxxx	dummy	
00 08H	0aaa aaaa	OUTPUT LEVEL	0 - 100
00 09H	0000 aaaa	PANPOT	0 - 14 (R - L)
00 0AH	0xxx xxxx	dummy	
:			
00 0FH	0xxx xxxx		
Total size		00 00 10H	

■ Patch memory

Offset address	Description		
00 00H	0000 00aa	TIMBRE GROUP	0 - 3 (GROUP A,GROUP B, MEMORY,RHYTHM)
00 01H	00aa aaaa	TIMBRE NUMBER	0 - 63
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 (POLY 1,POLY 2, POLY 3,POLY 4)
00 06H	0000 000a	REVERB SWITCH	0 - 1 (OFF, ON)
00 07H	0xxx xxxx	dummy	
Total size		00 00 08H	

■ DISPLAY

Offset address	Description		
00H	0aaa aaaa	DISPLAYED LETTER	32 - 127 (ASCII)
:			
13H	0aaa aaaa	DISPLAYED LETTER	
Total size		00 00 14H	

Note :

*4-4
This parameter can be modified from D-50(PG-1000) and results in accessing the address "02-00-00(Timbre Temp Area(part))"

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of MT-32

5. ADDRESS MAPPING OF PARAMETERS (compatible with D-50(PG-1000))

■ Parameter base address

Start address	Description	
00-00-00	Partial 3	(0 - 53)
00-00-40	Partial 4	(64 - 117)
00-01-0A	Upper Common	(138 - 175)
00-01-40	Partial 1	(192 - 245)
00-02-00	Partial 2	(256 - 309)
00-02-4A	Lower Common	(330 - 367)

■ Partial parameters

Offset address			
		Description	
00 00H	0aaa aaaa	WG PITCH COARSE	0 - 72 (C1,C2, - C7)
00 01H	0aaa aaaa	WG PITCH FINE	0 - 100 (-50 - +50)
00 02H	0000 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	0xxx xxxx	dummy	
00 04H	0xxx xxxx	dummy	
00 05H	0000 000a	WG PITCH BENDER SW	0 - 1 (OFF, ON)
00 06H	0000 000a	WG WAVEFORM	0 - 1 (SQU, SAW)
00 07H	0aaa aaaa	WG PCM WAVE #	0 - 99 (1 - 100)
00 08H	0aaa aaaa	WG PULSE WIDTH	0 - 100
00 09H	0000 aaaa	WG PW VELO SENS	0 - 14 (-7 - +7)
00 0AH	0xxx xxxx	dummy	
00 0BH	0xxx xxxx	dummy	
00 0CH	0xxx xxxx	dummy	
00 0DH	0aaa aaaa	TVF CUTOFF FREQ	0 - 100
00 0EH	000a aaaa	TVF RESONANCE	0 - 30
00 0FH	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 10H	0aaa aaaa	TVF BIAS POINT/DIR	0 - 127 (<1A - <7C >1A - >7C)
00 11H	0000 aaaa	TVF BIAS LEVEL	0 - 14 (-7 - +7)

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00 12H	0aaa aaaa	TVF ENV DEPTH	0 - 100
00 13H	0aaa aaaa	TVF ENV VELO SENS	0 - 100
00 14H	0000 0aaa	TVF ENV DEPTH KEYF	0 - 4
00 15H	0000 0aaa	TVF ENV TIME KEYF	0 - 4
00 16H	0aaa aaaa	TVF ENV TIME 1	0 - 100
00 17H	0aaa aaaa	TVF ENV TIME 2	0 - 100
00 18H	0aaa aaaa	TVF ENV TIME 3	0 - 100
00 19H	0aaa aaaa	TVF ENV TIME 4	0 - 100
00 1AH	0aaa aaaa	TVF ENV TIME 5	0 - 100
00 1BH	0aaa aaaa	TVF ENV LEVEL 1	0 - 100
00 1CH	0aaa aaaa	TVF ENV LEVEL 2	0 - 100
00 1DH	0aaa aaaa	TVF ENV LEVEL 3	0 - 100
00 1EH	0aaa aaaa	TVF ENV SUSTAIN LEVEL	0 - 100
00 1FH	0xxx xxxx	dummy	
:			
00 22H	0xxx xxxx	dummy	
00 23H	0aaa aaaa	TVA LEVEL	0 - 100
00 24H	0aaa aaaa	TVA VELO SENS	0 - 100
00 25H	0aaa aaaa	TVA BIAS POINT 1	0 - 127 (<1A - <7C >1A - >7C)
00 26H	0000 aaaa	TVA BIAS LEVEL 1	0 - 12 (-12 - 0)
00 27H	0aaa aaaa	TVA ENV TIME 1	0 - 100
00 28H	0aaa aaaa	TVA ENV TIME 2	0 - 100
00 29H	0aaa aaaa	TVA ENV TIME 3	0 - 100
00 2AH	0aaa aaaa	TVA ENV TIME 4	0 - 100
00 2BH	0aaa aaaa	TVA ENV TIME 5	0 - 100
00 2CH	0aaa aaaa	TVA ENV LEVEL 1	0 - 100
00 2DH	0aaa aaaa	TVA ENV LEVEL 2	0 - 100
00 2EH	0aaa aaaa	TVA ENV LEVEL 3	0 - 100
00 2FH	0aaa aaaa	TVA ENV SUSTAIN LEVEL	0 - 100
00 30H	0xxx xxxx	dummy	
00 31H	0000 0aaa	TVA ENV TIME V_FOLLOW	0 - 4
00 32H	0000 0aaa	TVA ENV TIME KEYF	0 - 4
00 33H	0xxx xxxx	dummy	
00 34H	0xxx xxxx	dummy	
00 35H	0xxx xxxx	dummy	
Total size		00 00 36H	

■ Lower common parameter

Offset address			
		Description	
00 00H	0000 aaaa	Structure of Partial# 1 & 2	0 - 12 (1 - 13)
00 01H	0aaa aaaa	P-ENV VELO SENS(Partial#1)	0 - 100
00 02H	0000 0aaa	P-ENV TIME KEYF(Partial#1)	0 - 4
00 03H	0aaa aaaa	P-ENV TIME 1(Partial#1)	0 - 100
00 04H	0aaa aaaa	P-ENV TIME 2(Partial#1)	0 - 100
00 05H	0aaa aaaa	P-ENV TIME 3(Partial#1)	0 - 100
00 06H	0aaa aaaa	P-ENV TIME 4(Partial#1)	0 - 100
00 07H	0aaa aaaa	P-ENV LEVEL 0(Partial#1)	0 - 100

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00 08H	0aaa aaaa	P-ENV LEVEL 1(Partial#1)	0 - 100 (-50 - +50)
00 09H	0aaa aaaa	P-ENV LEVEL 2(Partial#1)	0 - 100 (-50 - +50)
00 0AH	0aaa aaaa	P-ENV SUS LEVEL(Partial#1)	0 - 100 (-50 - +50)
00 0BH	0aaa aaaa	END LEVEL(Partial#1)	0 - 100 (-50 - +50)
00 0CH	0xxx xxxx	dummy	
00 0DH	0aaa aaaa	P-LFO MOD SENS(Partial#1)	0 - 100
00 0EH	0aaa aaaa	P-LFO MOD SENS(Partial#2)	0 - 100
00 0FH	0xxx xxxx	dummy	
00 10H	0aaa aaaa	P-LFO RATE(Partial#1)	0 - 100
00 11H	0aaa aaaa	P-LFO DEPTH(Partial#1)	0 - 100
00 12H	0xxx xxxx	dummy	
00 13H	0xxx xxxx	dummy	
00 14H	0aaa aaaa	P-LFO RATE(Partial#2)	0 - 100
00 15H	0aaa aaaa	P-LFO DEPTH(Partial#2)	0 - 100
00 16H	0xxx xxxx	dummy	
:			
00 23H	0xxx xxxx	dummy	
00 24H	0000 00aa	PARTIAL MUTE(Partial# 1&2)	0 - 3 (00 - 11)
00 25H	0xxx xxxx	dummy	
Total size		00 00 26H	

■ Upper common parameter

Offset address			
		Description	
00 00H	0000 aaaa	Structure of Partial# 1 & 2	0 - 12 (1 - 13)
00 01H	0aaa aaaa	P-ENV VELO SENS(Partial#3)	0 - 100
00 02H	0000 0aaa	P-ENV TIME KEYF(Partial#3)	0 - 4
00 03H	0aaa aaaa	P-ENV TIME 1(Partial#3)	0 - 100
00 04H	0aaa aaaa	P-ENV TIME 2(Partial#3)	0 - 100
00 05H	0aaa aaaa	P-ENV TIME 3(Partial#3)	0 - 100
00 06H	0aaa aaaa	P-ENV TIME 4(Partial#3)	0 - 100
00 07H	0aaa aaaa	P-ENV LEVEL 0(Partial#3)	0 - 100 (-50 - +50)
00 08H	0aaa aaaa	P-ENV LEVEL 1(Partial#3)	0 - 100 (-50 - +50)
00 09H	0aaa aaaa	P-ENV LEVEL 2(Partial#3)	0 - 100 (-50 - +50)
00 0AH	0aaa aaaa	P-ENV SUS LEVEL(Partial#3)	0 - 100 (-50 - +50)
00 0BH	0aaa aaaa	END LEVEL(Partial#3)	0 - 100 (-50 - +50)
00 0CH	0xxx xxxx	dummy	
00 0DH	0aaa aaaa	P-LFO MOD SENS(Partial#3)	0 - 100
00 0EH	0aaa aaaa	P-LFO MOD SENS(Partial#4)	0 - 100
00 0FH	0xxx xxxx	dummy	
00 10H	0aaa aaaa	P-LFO RATE(Partial#3)	0 - 100
00 11H	0aaa aaaa	P-LFO DEPTH(Partial#3)	0 - 100

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00 12H	0xxx xxxx	dummy	
00 13H	0xxx xxxx	dummy	
00 14H	0aaa aaaa	P-LFO RATE(Partial#4)	0 - 100
00 15H	0aaa aaaa	P-LFO DEPTH(Partial#4)	0 - 100
00 16H	0xxx xxxx	dummy	
:			
00 23H	0xxx xxxx	dummy	
00 24H	0000 00aa	PARTIAL MUTE(Partial# 3&4)	0 - 3 (00 - 11)
00 25H	0xxx xxxx	dummy	
Total size		00 00 26H	

MIDI Implementation Chart

[Multi Timbre Soud Module] Date : Jun.19 1987
Model MT-32 MIDI Implementation Chart Version : 1.00

Function ...	Transmitted	Recognized	Remarks
Basic Default		1 - 16	Memorized
Channel Changed		1 - 16	
Mode Default		Mode 3	
Messages			
Altered	**********		
Note	* 0 - 127	0 - 127	
Number : True voice	**********	12 - 108	
Velocity Note ON	*	o v= 1 - 127	
Note OFF	*	x	
After Key's	*	x	
Touch Ch's	*	x	
Pitch Bender	*	o 0 - 24 semi	
Control 1	*	o	Modulation
7	*	o	Part Volume
10	*	o	Panpot
11	*	o	Expression
Change 12			
:	*	x	
63			
64	*	o	Hold1
65			
:	*	x	
120			
121	*	o	Reset all controllers
Prog Change : True #	*	o 0 - 127	
		0 - 127	
System Exclusive	o *	o	
System : Song Pos	x	x	
Common : Song Sel	x	x	
: Tune	x	x	
System : Clock	x	x	
Real Time : Commands	x	x	
Aux : Local ON/OFF	x	x	
All Notes OFF	x	o (123-127)	
Mes- : Active Sense	x	o	
sages : Reset	x	x	
Notes	* in OVERFLOW MODE, received message goes thru MIDI OUT		

Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO o : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO x : No