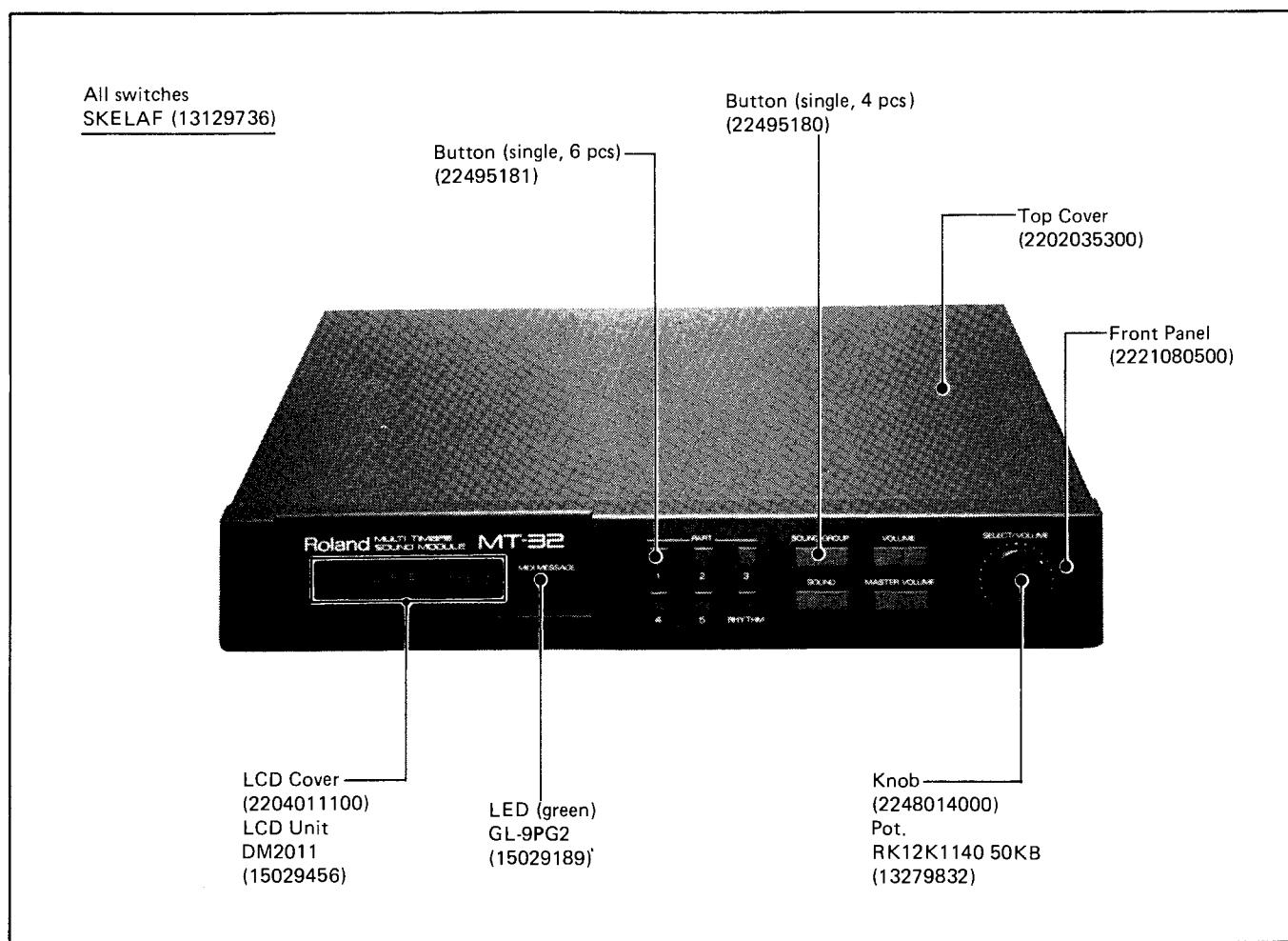
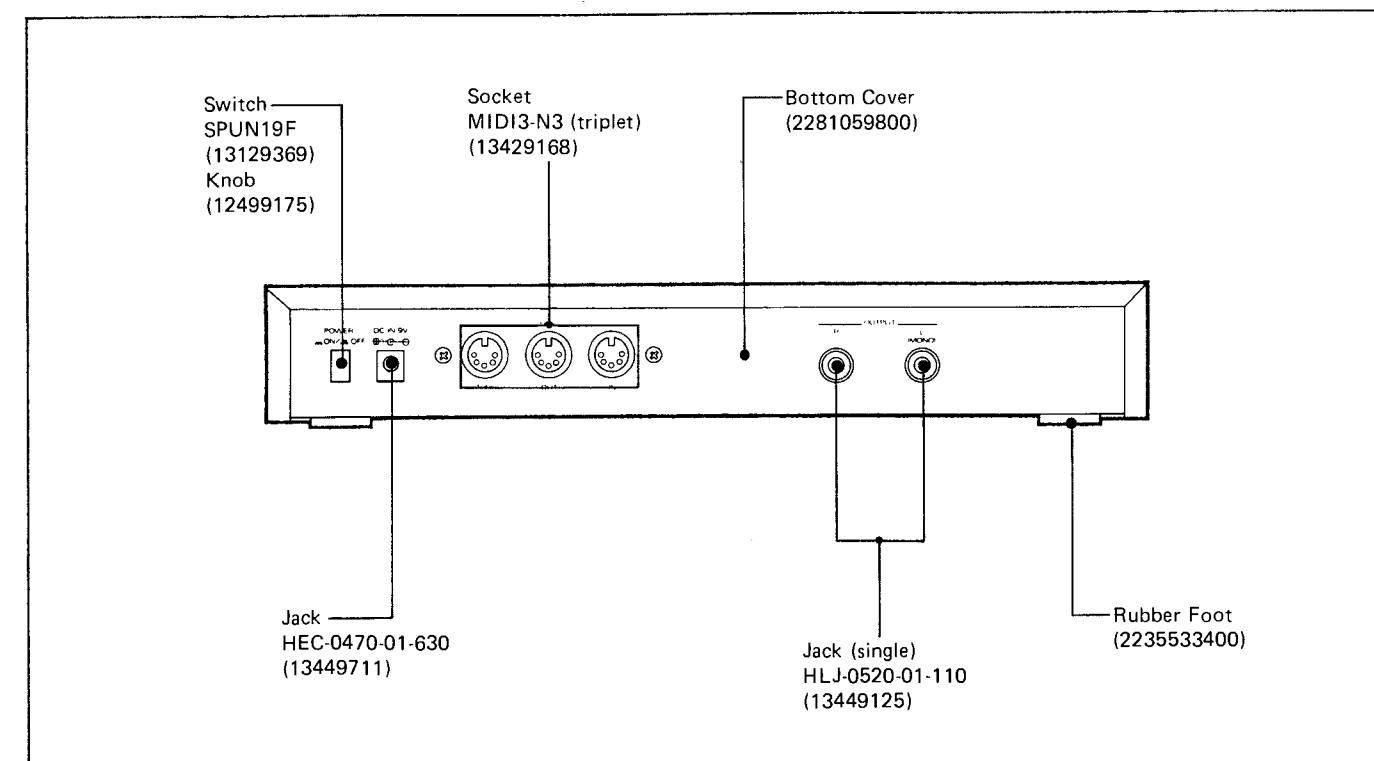


# MT-32 SERVICE NOTES

First Edition

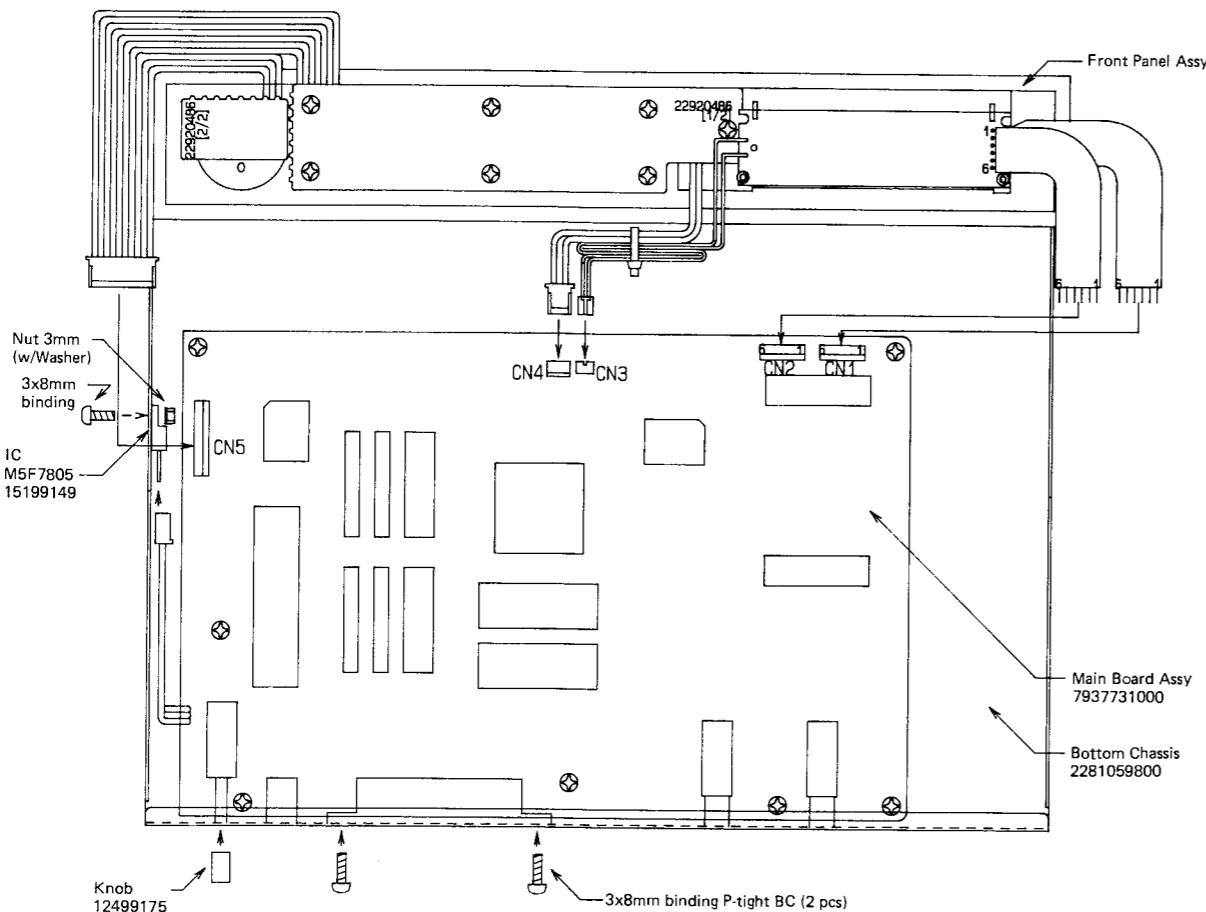
## SPECIFICATIONS

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 (AC adaptor input)	: 10W @100V 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



## EXPLODED VIEW

## 分解図

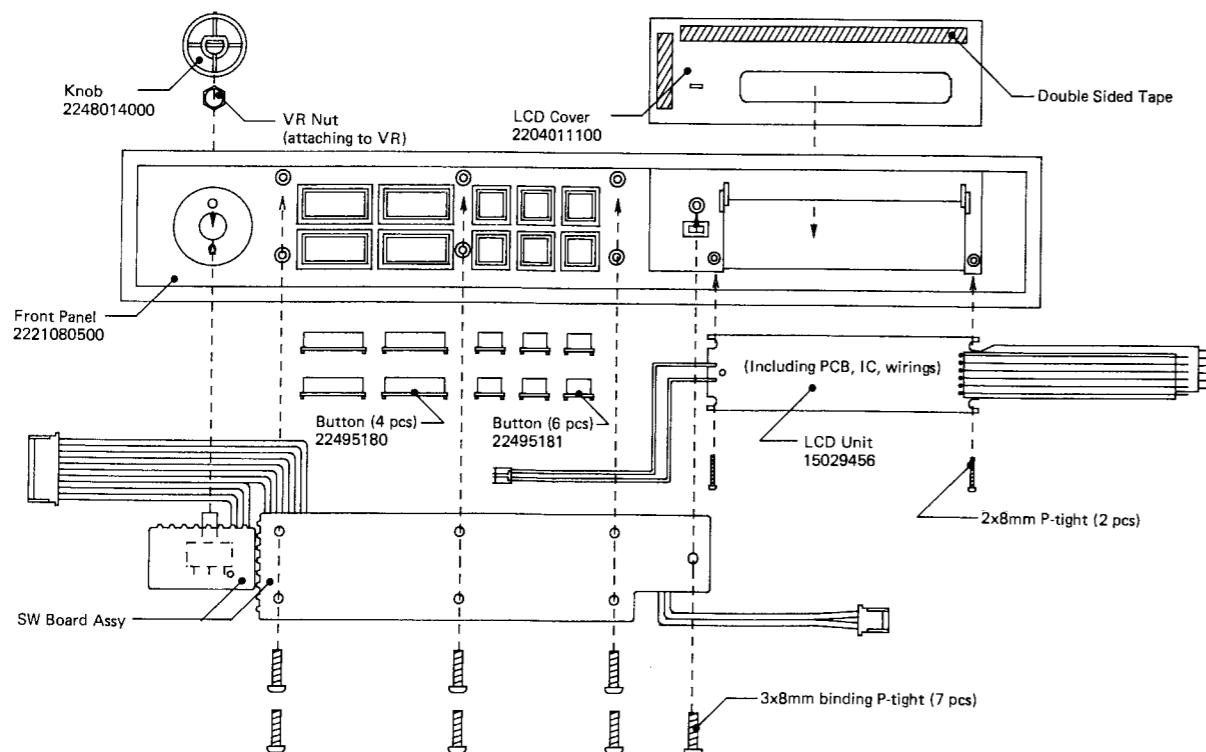
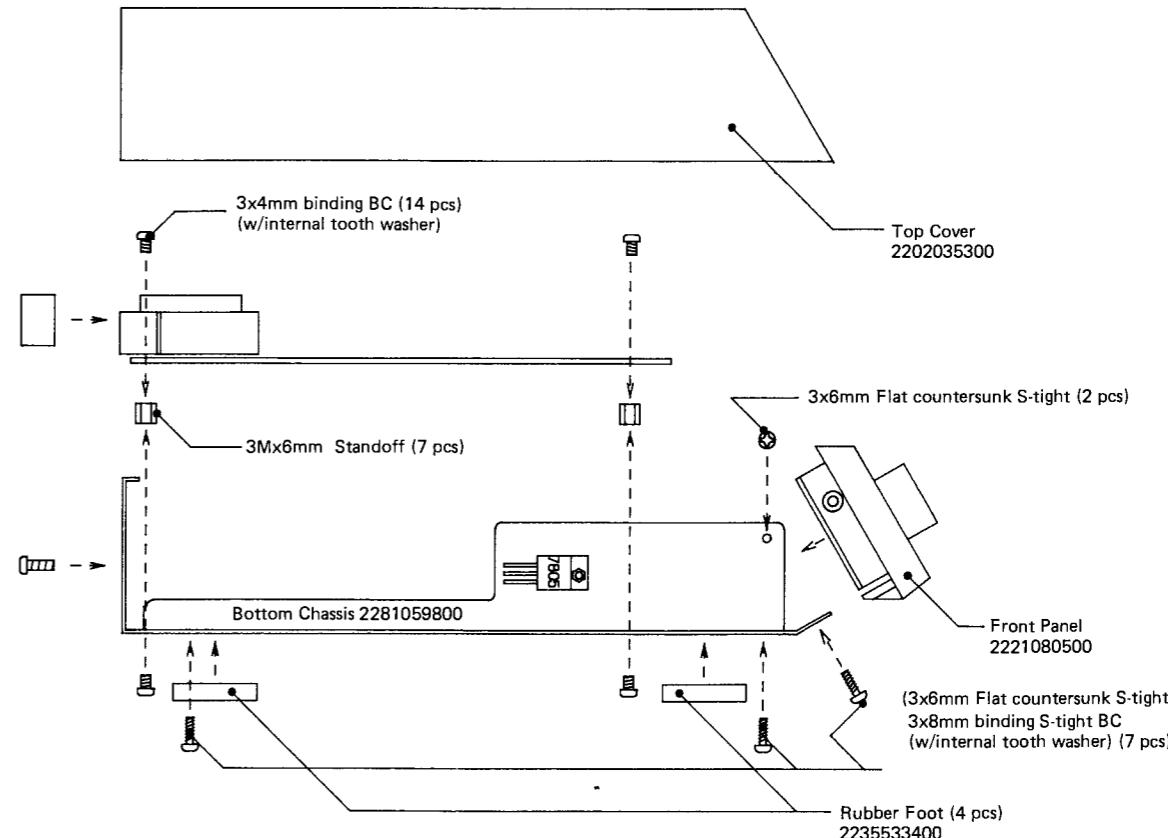


## NOTE

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

## 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。



Viewing at rear of unit

**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	(pcb 2292048600) (including VR board) VR基板を含む
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
15179845	TC532000P-7472	2M mask ROM
15449107	M5M27C256-A	EP ROM
15449108	M5M27C256-B	EP ROM
15449109	M5M27C128-15	EP ROM
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	ISS-133T-77	Main Board
15019291	1SR35-400	
15019103	1S2473	SW Board
15029189	GL-9PG2	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		
13639153S0	470μF/16V	electro
13639154S0	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
23430675S0	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 but also routed to DMUX 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 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ンプログラム (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 に取り込まれるとともに、DMUX へも送られ、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。<sup>\*2</sup>

<sup>\*3</sup> SH1–SH3, as a direct sound. Its reverb counterparts are placed on the data bus when time slot 7(8) comes.

## BLOCK DIAGRAM

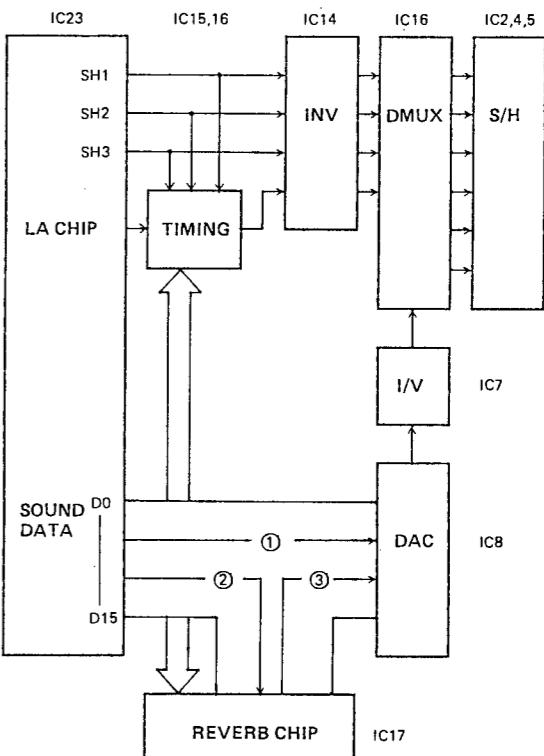
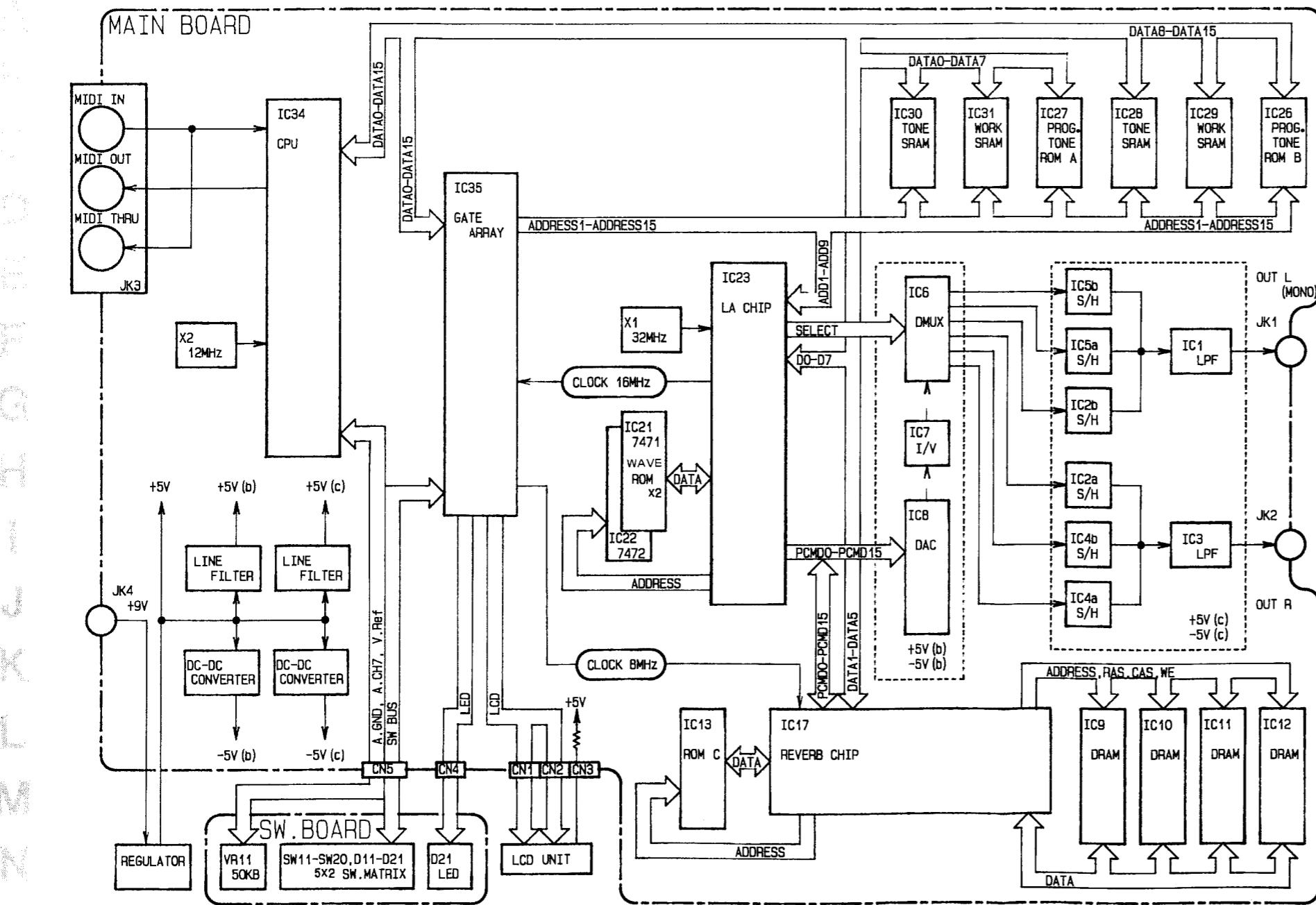


Fig.1

I C 3  
PIN  
S H 3  
S H 2  
S H 1  
Time Slot

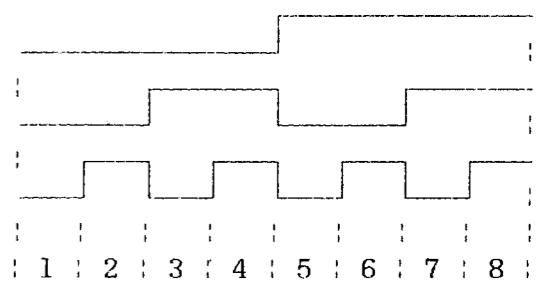


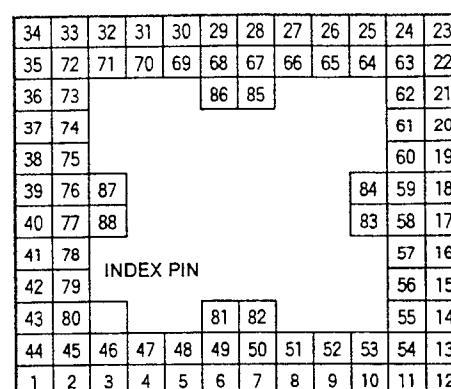
Fig.2

Time Slot	Signal Flow		DMUX Output	
	Pin	Sound	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

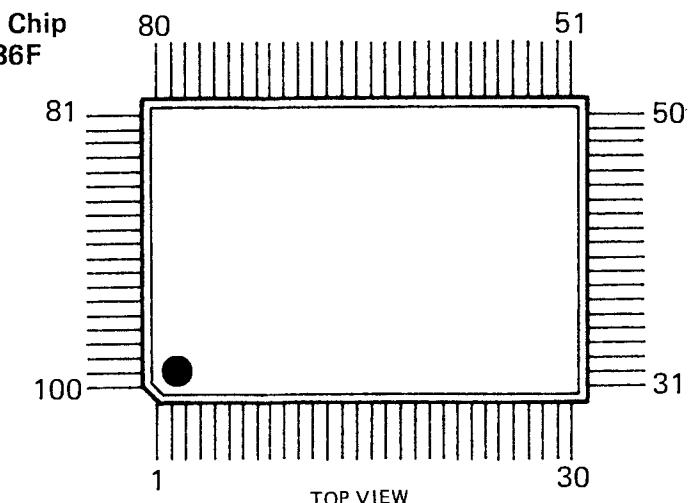
IC DATA

IC23 LA Chip  
MB87136



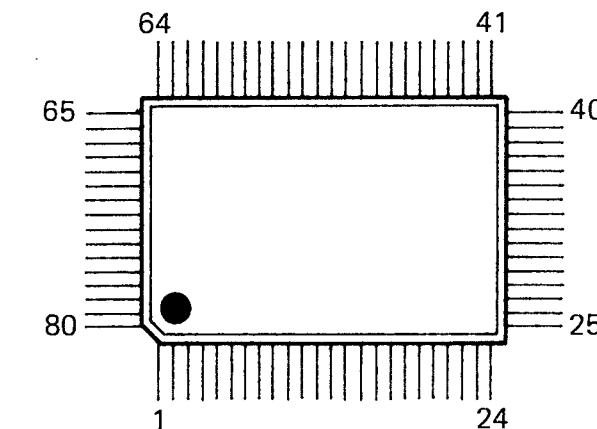
#### TOP VIEW

**IC17 Reverb Chip  
HG61H20R36F**



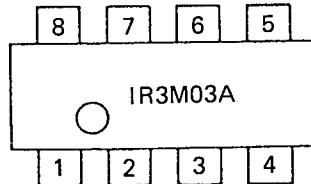
#### TOP VIEW

IC35 Gate Array  
HG61H15B59F



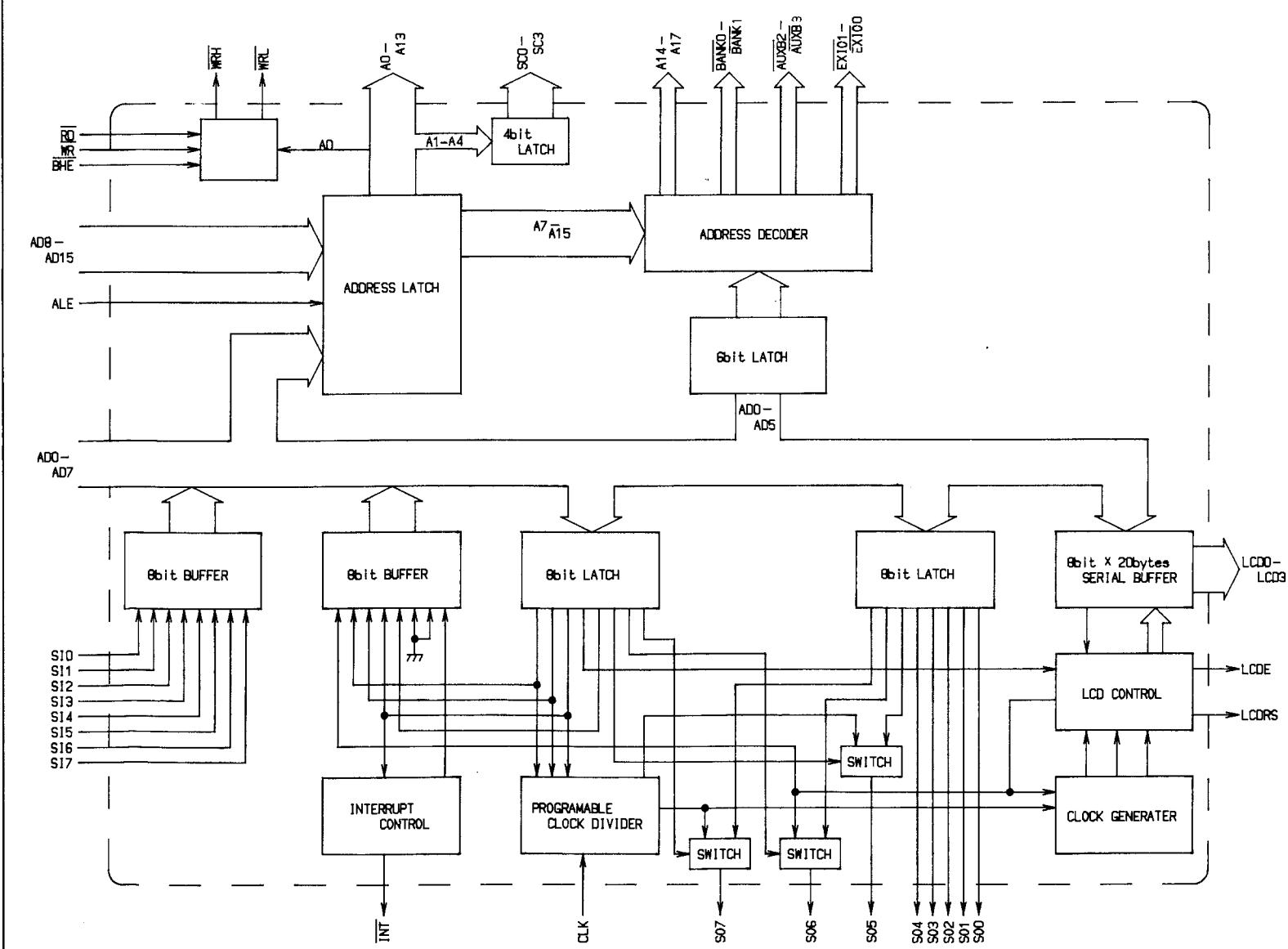
TOP VIEW

**IC18, IC19 Regulator  
IR3M03A**

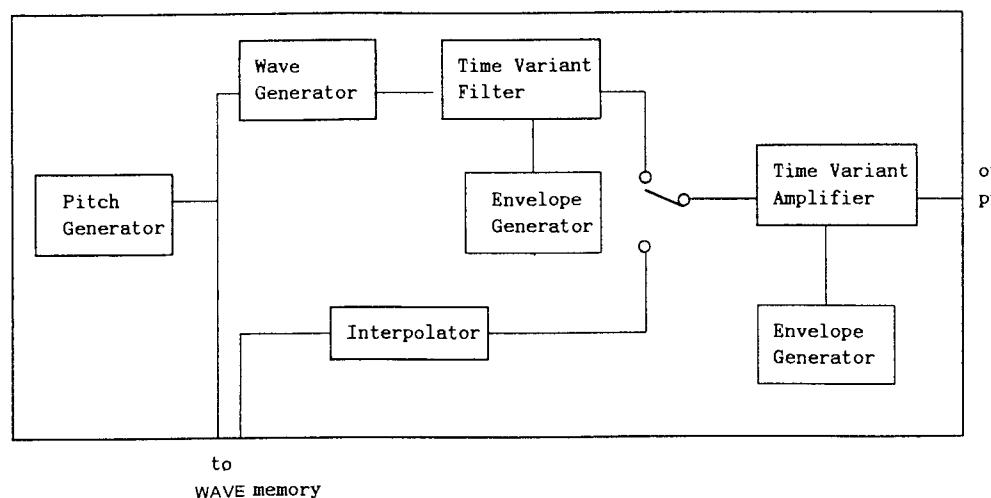


The diagram illustrates the internal logic of the 74137 integrated circuit. It features a central oscillator section labeled 'OSC' with a 'CT' component. The oscillator's output is connected to a 'Comparitor' (Comparator) and a 'IPK' (Invertible Pulse Generator) section. The 'IPK' section includes a '0.3V TYP.' reference voltage source and a 'Q1' and 'Q2' switch pair. The 'Comparitor' section uses a '1.25V Ref. V' source. The circuit is powered by a 'Vcc' supply at pin 6 and grounded at pin 4. The outputs are labeled 'IPK Detect' at pin 7 and 'Inv In' at pin 5. The inputs are labeled 'Switch Collector' at pin 1, 'Switch Emitter' at pin 2, and 'Timing Cap.' at pin 3.

## BLOCK DIAGRAM



IC23 LA Chip  
MB87136



**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.

**\*\* Roland MT-32 \*\***

Ver 1.04 14 July 87

MIDI MESSAGE LED ON

Tks to Masa + Adrian

1 2 3 4 5 R | vol: \*\*

MIDI MESSAGE LED OFF

**ROMバージョン・ナンバー**

PART 4, RHYTHM および MASTER VOLUME を同時に押し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。

1 2 3 .....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。

Writing/reading RAMs IC28-IC31

**\*\* Roland MT-32 \*\***

RAM IC28-IC31書き込み／読み出し中

To ignore Error message, press and hold MASTER VOLUME, then press VOLUME.

When Error, check:  
RAMs: IC28-IC31  
Gate array: IC35  
Buss between IC35 and the RAMs.

**RAM TEST ok****RAM TEST Error**

Error を無視し、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。

要点検  
RAM: IC28-IC31  
ゲートアレイ: IC35  
両者間のバスライン

To ignore Error message, press and hold MASTER VOLUME, then press VOLUME.

When Error, check gate array, IC35.

**BANK SELECT ok****BANK SELECT Error**

Error を無視し、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。

要点検  
ゲートアレイ: IC35

MIDI MESSAGE LED should blink

Error indication  
Lighting LED: Check IC24  
Dead LED: Check LED, IC24 and Connector CN4.

**CHECK LED PUSH 1**

MIDI MESSAGE LEDが点滅する。

エラー  
点灯..... IC24(HC02)点検  
消灯..... LED, IC24, コネクタ CN4 点検

3 Press PART 1.

The LED might go off depending on which half cycle of the scanning pulse the switch has been pressed.

Ready for switch scanning

**PUSH PART[1]**

3. PART 1を押す。

(MIDI MESSAGE LEDは PART 1を押すタイミングによって消灯することもある)

4. 表示に従ってボタンを押して行く。

エラー  
表示が変わらない場合  
要点検  
パネルスイッチ、パネルダイオード、IC35  
(ゲートアレイ)

4 Press the panel switches one by one as indicated by LCD.

Error indication  
Reading won't change  
Check:  
Panel switches, panel diode, IC35.

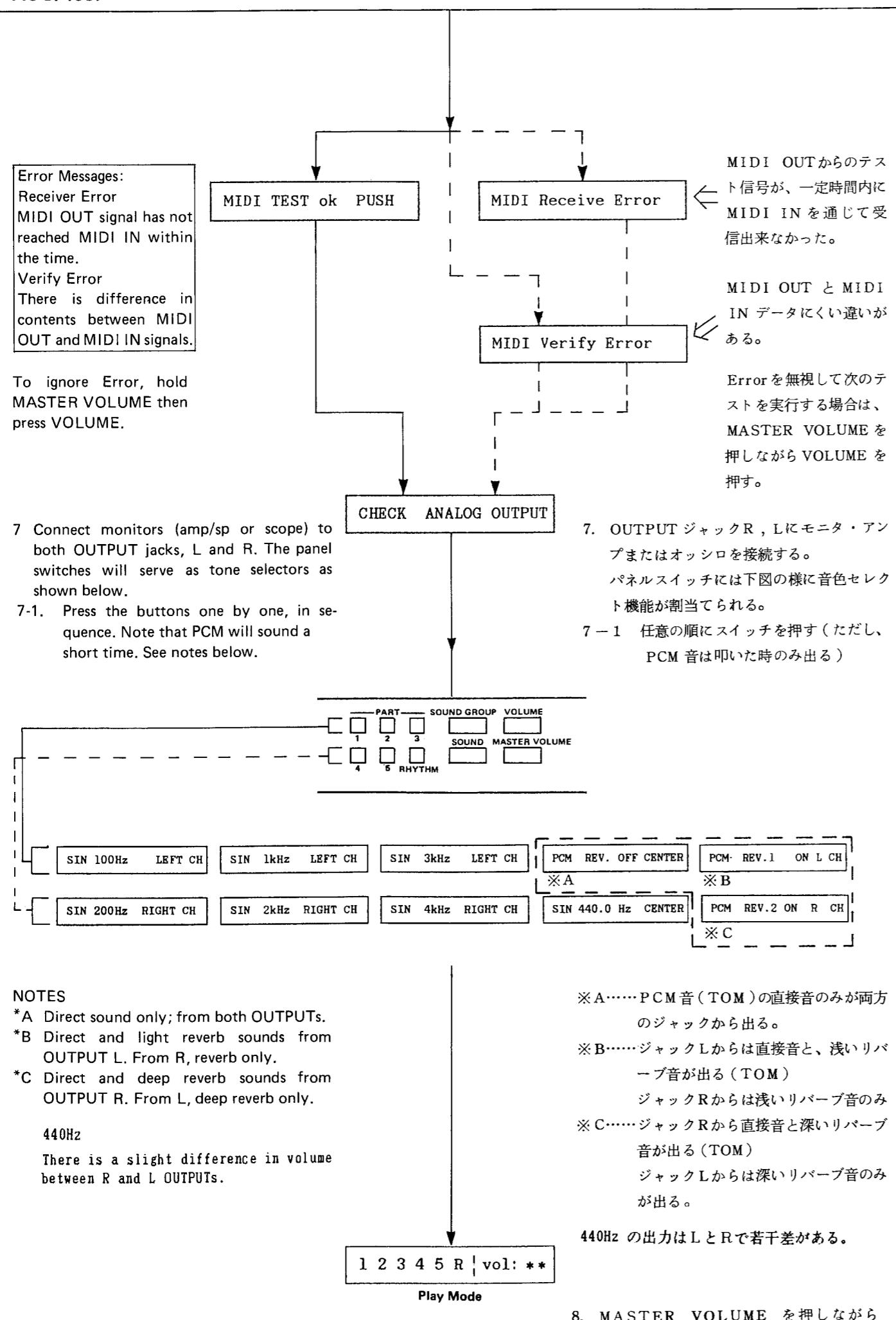
**SW TEST ok**

5 Turn SELECT/VOLUME knob and verify proportional change in number at \*\*\* in the LCD. It can change from 0 upto 100.

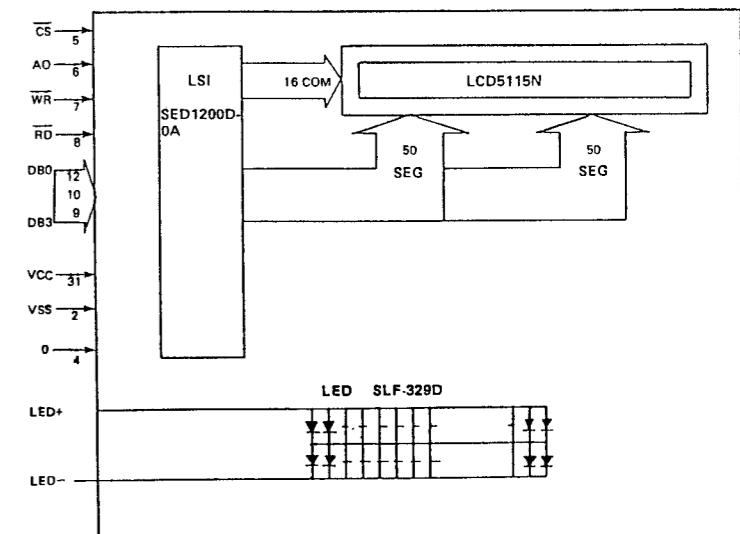
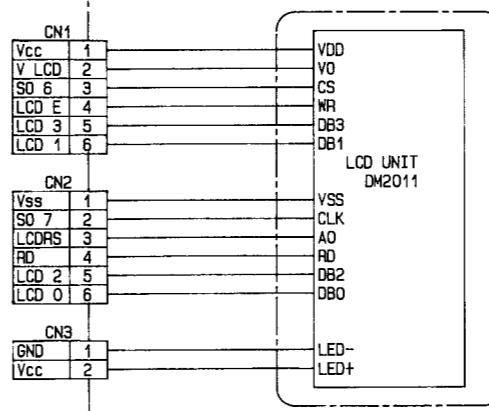
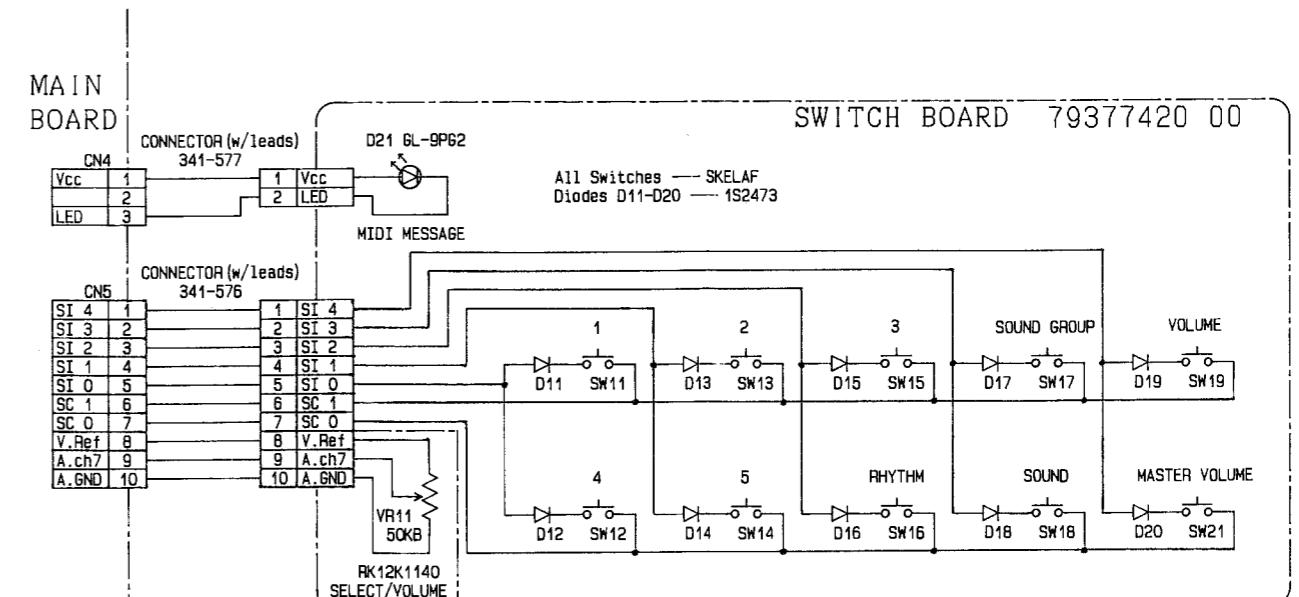
**CHECK VR PUSH 2:\*\*\***

5. SELECT/VOLUMEをまわし、\*\*\*が0～100と変化することを確認。

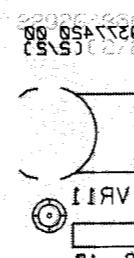
6. PART 2を押す。



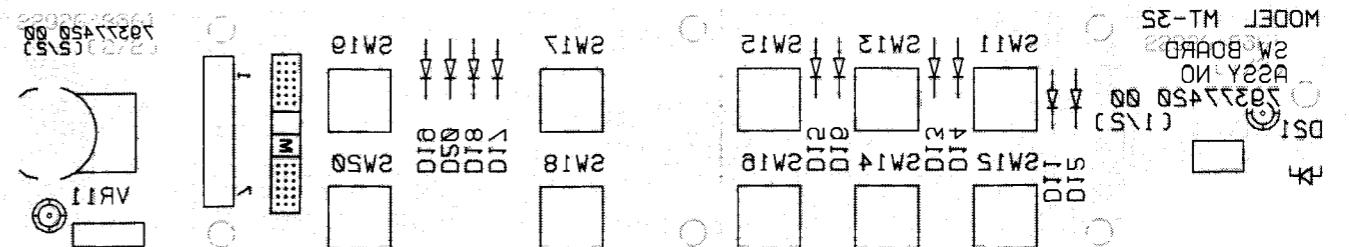
8. MASTER VOLUME を押しながら VOLUMEを押す。



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



Viewing at rear of unit.

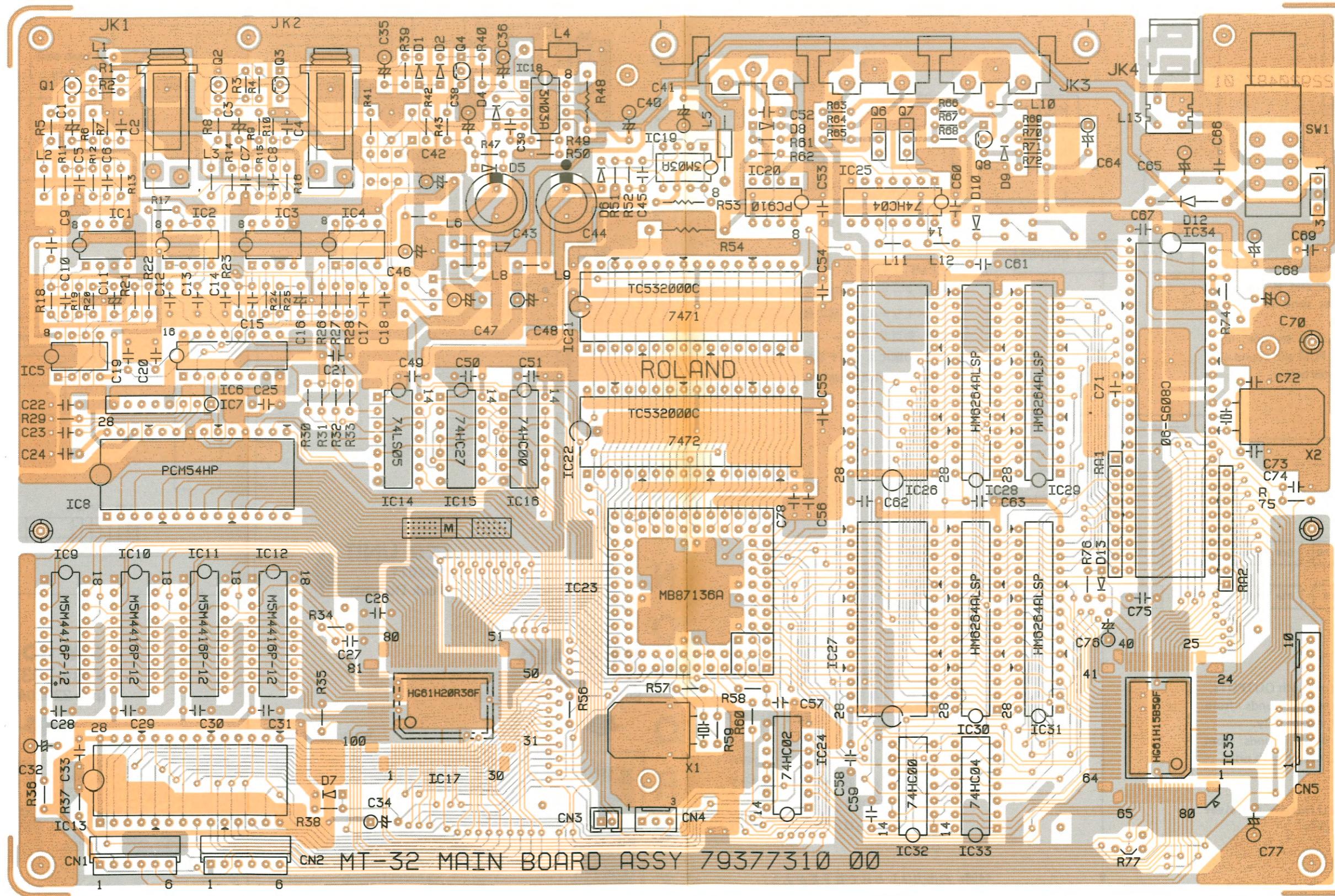


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

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

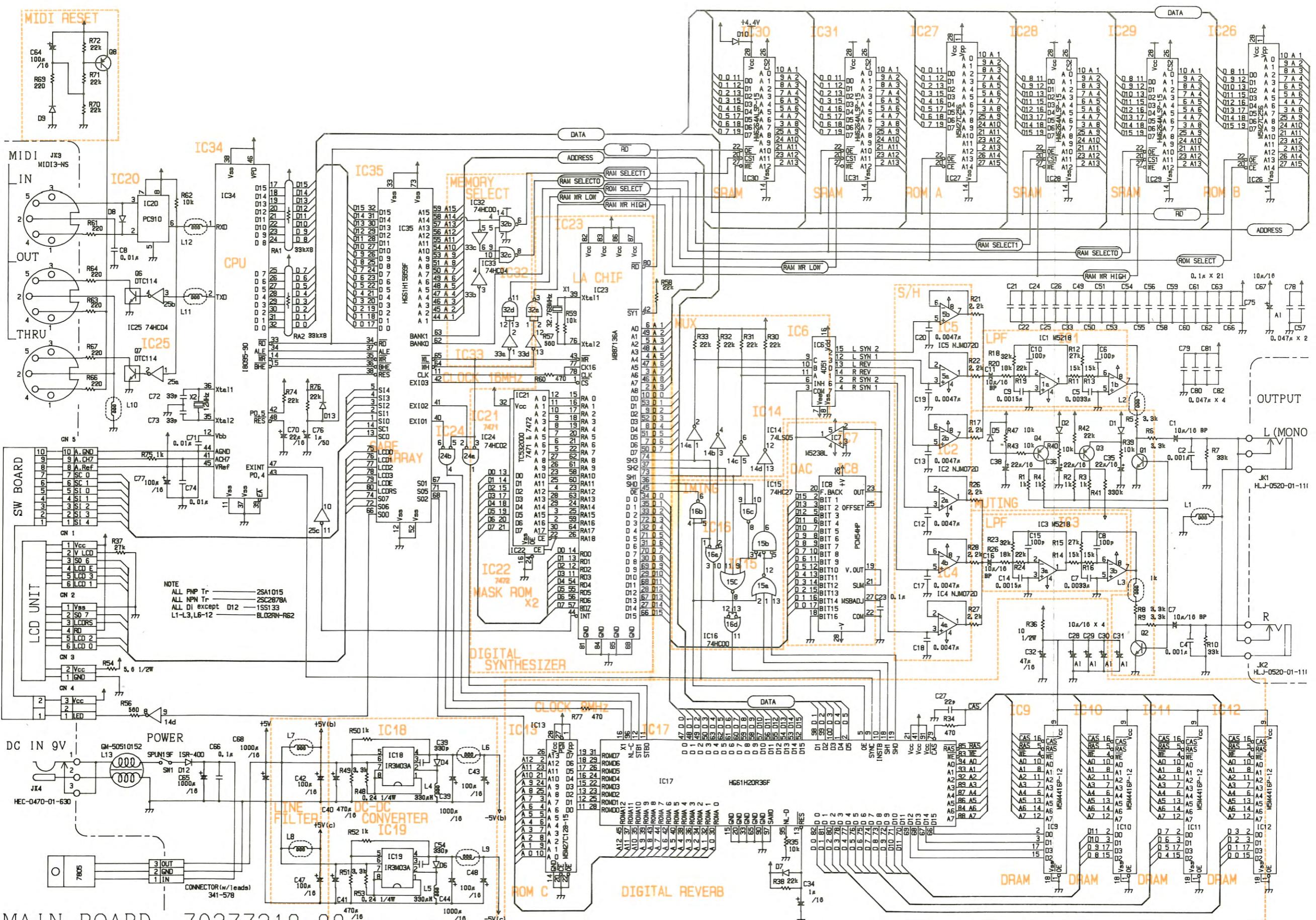
**MAIN BOARD**  
Assy 7937731000  
(pcb 2292048700)

COMPONENT SIDE MARKING MAY25



## CIRCUIT DIAGRAM

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



MAIN BOARD 79377310 00

## 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  
-----  
FOH : 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
-----	-----	-----

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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	Third
-----	-----	-----
CnH	ppH	

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

Program Change changes Patch.

#### ■ Pitch bender

Status	Second	Third
-----	-----	-----
EnH	11H	mmH

11H : 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

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#### -----

##### FEH

#### ■ System exclusive

##### Status

-----  
FOH : 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

FOH	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H	Model - ID ( MT-32 )
41H	Command - ID ( RQ1 )
aaH	Address MSB
aaH	Address LSB
ssH	Size MSB
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.

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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

FOH	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H(14H)	Model - ID ( MT-32(D-50) )
11H	Command - ID ( DT1 )
aaH	Address MSB
aaH	Address LSB
ssH	Size MSB
ssH	Size LSB
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

FOH	Exclusive status
41H	Roland - ID
DEV	Device - ID
16H	Model - ID ( MT-32 )
40H	Command - ID ( WSD )
aaH	Address MSB
aaH	Address
aaH	Address LSB
ssH	Size MSB
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.

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Byte	Description
------	-------------

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
------	-------------

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
------	-------------

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#### 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
------	-------------

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
------	-------------

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  
FOH 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

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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

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

Address | MSB | ... | LSB  
=====|=====|=====|=====|=====|=====|  
binary | Oaaa aaaa | Obbb bbbb | Occc 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, parameters 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 0d 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

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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   Oaaa aaaa	TONE NAME 1 32 - 127 (ASCII)
09H   Oaaa aaaa	TONE NAME 10
0AH   0000 aaaa	Structure of Partial# 1 & 2 0 - 12 (1 - 13)
OBH   0000 aaaa	Structure of Partial# 3 & 4 0 - 12 (1 - 13)
OCH   0000 aaaa	PARTIAL MUTE 0 - 15 (0000 - 1111)
ODH   0000 000a	ENV MODE 0 - 1 (Normal, No sustain)
Total size	00 00 0Eh

00 2FH   0000 0aae	TVA ENV TIME KEYF 0 - 4
00 30H   0000 0aae	TVA ENV TIME 1 0 - 100
00 32H   0aae aaaa	TVA ENV TIME 2 0 - 100
00 33H   0aae aaaa	TVA ENV TIME 3 0 - 100
00 34H   0aae aaaa	TVA ENV TIME 4 0 - 100
00 35H   0aae aaaa	TVA ENV TIME 5 0 - 100
00 36H   0aae aaaa	TVA ENV LEVEL 1 0 - 100
00 37H   0aae aaaa	TVA ENV LEVEL 2 0 - 100
00 38H   0aae aaaa	TVA ENV LEVEL 3 0 - 100
00 39H   0aae aaaa	TVA ENV SUSTAIN LEVEL 0 - 100
Total size	00 00 3AH

#### ■ System area

Offset address	Description
00 00H   Oaae aaaa	MASTER TUNE 0 - 127 (<32.1Hz - 457.6Hz)
00 01H   0000 00aa	REVERB MODE 0 - 3 (Room, Hall, Plate, Tap delay)
00 02H   0000 0aae	REVERB TIME 0 - 7 (1 - 8)
00 03H   0000 0aae	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

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00 0AH   00ae aaaa	PARTIAL RESERVE (Part 7) 0 - 32
00 0BH   00ae aaaa	PARTIAL RESERVE (Part 8) 0 - 32
00 0CH   00ae aaaa	PARTIAL RESERVE (Part R) 0 - 32
00 0DH   00aa aaaa	MIDI CHANNEL(Part 1) 0 - 16 (1 - 16, OFF)
00 0EH   00aa aaaa	MIDI CHANNEL(Part 2) 0 - 16 (1 - 16, OFF)
00 0FH   00aa aaaa	MIDI CHANNEL(Part 3) 0 - 16 (1 - 16, OFF)
00 10H   00aa aaaa	MIDI CHANNEL(Part 4) 0 - 16 (1 - 16, OFF)
00 11H   00aa aaaa	MIDI CHANNEL(Part 5) 0 - 16 (1 - 16, OFF)
00 12H   00aa aaaa	MIDI CHANNEL(Part 6) 0 - 16 (1 - 16, OFF)
00 13H   00aa aaaa	MIDI CHANNEL(Part 7) 0 - 16 (1 - 16, OFF)
00 14H   00aa aaaa	MIDI CHANNEL(Part 8) 0 - 16 (1 - 16, OFF)
00 15H   00aa aaaa	MIDI CHANNEL(Part R) 0 - 16 (1 - 16, OFF)
00 16H   0aae aaaa	MASTER VOLUME 0 - 100
Total size	00 00 17H

#### ■ Rhythm part setup

Offset address	Description
00 00H   Oaae aaaa	TIMBRE 0 - 94 (M1-M64,R1-R30,OFF)
00 01H   Oaaa 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   00aa aaaa	FINE TUNE 0 - 100 (-50 - +50)
00 04H   00aa aaaa	BENDER RANGE 0 - 24

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00 1DH   Oaaa aaaa	TVF ENV VELO SENS 0 - 100
00 1EH   0000 Caaa	TVF ENV DEPTH KEYF 0 - 4
00 1FH   0000 0aae	TVF ENV TIME KEYF 0 - 4
00 20H   Oaaa aaaa	TVF ENV TIME 1 0 - 100
00 21H   Oaaa aaaa	TVF ENV TIME 2 0 - 100
00 22H   Oaaa aaaa	TVF ENV TIME 3 0 - 100
00 23H   Oaaa aaaa	TVF ENV TIME 4 0 - 100
00 24H   Oaaa aaaa	TVF ENV TIME 5 0 - 100
00 25H   Oaaa aaaa	TVF ENV LEVEL 1 0 - 100
00 26H   Oaaa aaaa	TVF ENV LEVEL 2 0 - 100
00 27H   Oaaa aaaa	TVF ENV LEVEL 3 0 - 100
00 28H   Oaaa aaaa	TVF ENV SUSTAIN LEVEL 0 - 100
00 29H   Oaaa aaaa	TVF LEVEL 0 - 100
00 2AH   Oaaa aaaa	TVF VELO SENS 0 -

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00 05H	0000 00aa	ASSIGN MODE	0 - 3 (POLY 1,POLY 2, POLY 3,POLY 4)
00 06H	0000 00aa	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	1 00 00 10H		

00 0DH	0aaa aaaa	TVF CUTOFF FREQ	0 - 100
00 0EH	0000 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

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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 aaaa	TVF ENV DEPTH KEYF	0 - 4
00 15H	0000 aaaa	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	TVB BIAS POINT 1	0 - 127 (<1A - <7C >1A - >7C)
00 26H	0000 aaaa	TVB 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 1 00 00 36H

## ■ Lower common parameter

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 - +60)
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 1 00 00 26H

## ■ Upper common parameter

+-----+   Offset     address     Description   +-----+	+-----+   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)

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+-----+   Offset     address     Description   +-----+	+-----+   Offset     address     Description   +-----+
	00 12H   0xxx xxxx   dummy
	00 13H   0xxx xxxx   dummy
	00 14H   0aaa aaaa   P-LFO RATE(Partial#4) 0 - 100
	00 16H   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 1 00 00 26H

## MIDI Implementation Chart

[ Multi Timbre Sound Module ]	Date : Jun.19 1987


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