

# MT-32 SERVICE NOTES Second Edition

## SPECIFICATIONS

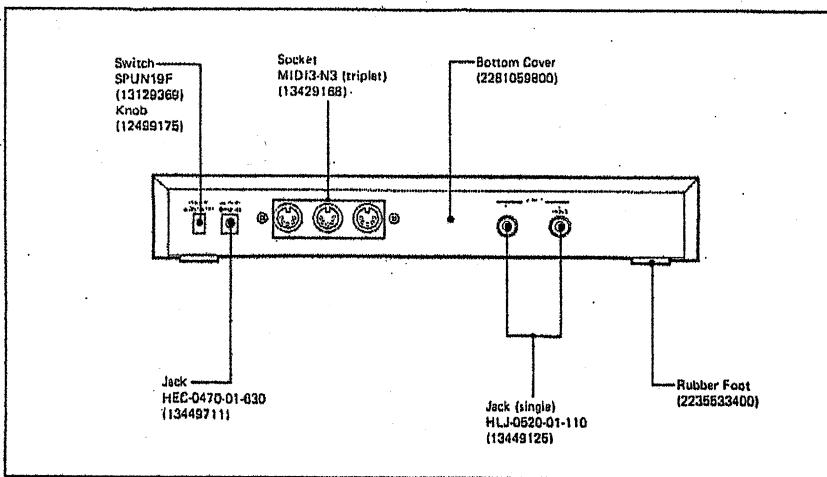
Sound Sources	: 32 polyphonic
Preset Tones	: 128
Sampling Frequency	: 32KHz
Data Format	: 16-bit linear
Noise Level	: -80dBm (IHF-A) or less @25°C (77°F)
Current Draw	: 850mA @9V
Power Consumption (AC adaptor input)	: 10W @100V 9.5W @117V 10.5W @220-240V
Dimensions	: 51 (H) x 305 (W) x 220 (D) mm 2 x 12 x 8-11/16 in (including feet) (ゴム足を含む)
Weight	: 1.5 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 Card LP-26 2 pcs

This Service Note includes the contents and corrections on the First Edition and makes it obsolete.

本サービスノートには第一版の内容および訂正が含まれていますので、第一版は廃版とします。

PLEASE SEE PAGE 13 FOR CHANGE INFORMATION.

13頁の変更案内を参考して下さい。



Additional contents start from Page 13.

Major design changes involved are as follows and effective on — Products with SN 851400 & UP.

- LA Chip MB87136A  
from 80-pin PGA (Pin Grid Array) type to 100-pin flat type
- Wave ROM  
from 2M x 2 to 4M x 2
- Re-layout of Main Board to accommodate the new chips

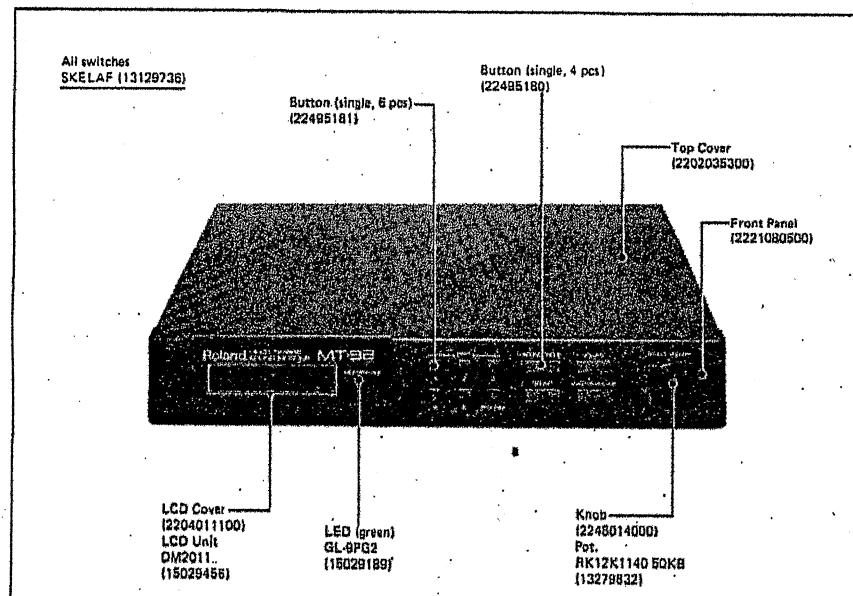
The PCB, as a complete assembly, is compatible with its predecessor.

第2版で追加された内容は13頁以降に掲載されています。

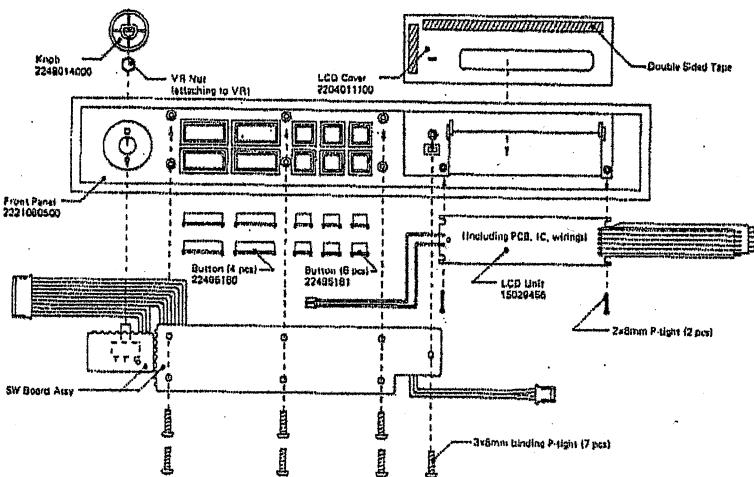
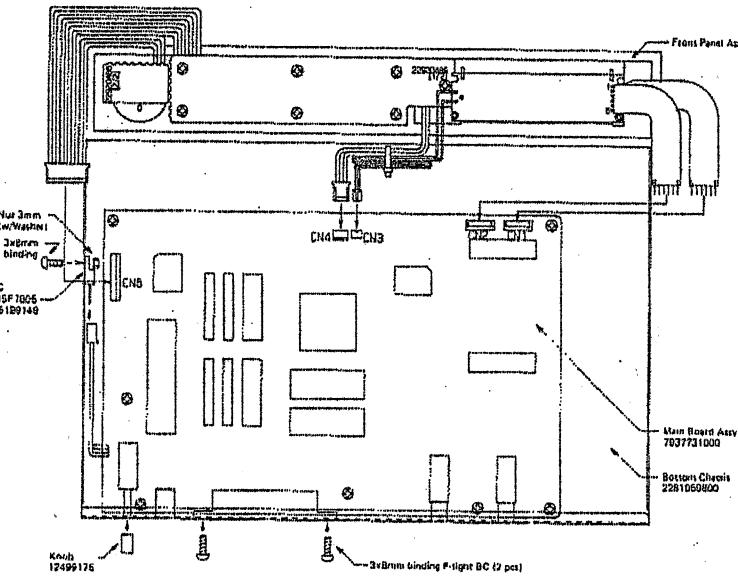
製品スペック上の大きな変更内容は下記の通りで新基板(100以降の製品に適用されます。

- LAチップ MB87136A  
80ピンPGAタイプから100ピンフラットタイプへ
- Wave ROM  
2M×2から4M×2へ

これに伴なう新基板のパターン、シルク変更  
(新旧基板は完全に互換性があります。)



## EXPLODED VIEW

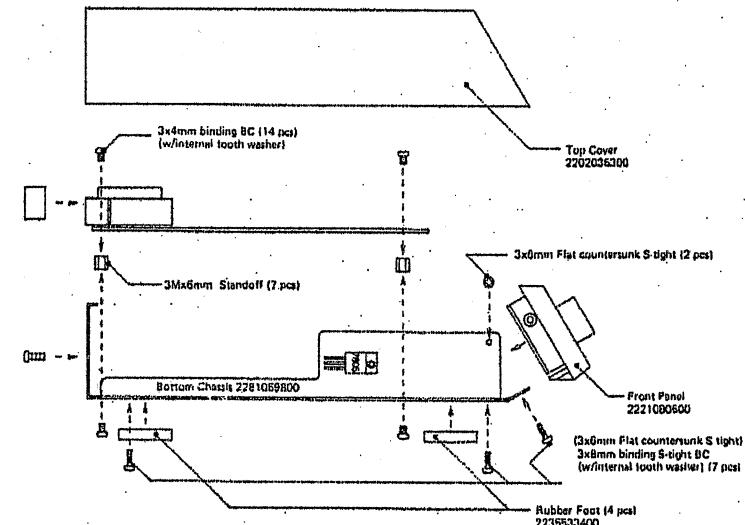


Viewing at rear of unit

## 分解図

### NOTE

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



The factory supplies EP-ROM with MASK-ROM as a program proves qualified for permanent implementation. Such MASK-ROMs employed on the Micro-System products or similar products are listed below.

Each of these MASK-ROMs is compatible with its EP-ROM counterpart. Note that one-half of memory space in the 2180 (HN623251PC21) is left unused when the option working mode of 1780 (M5M27512415).

**IMPLEMENTATION**      **COMPARISON**      **MASK-ROM**

IMPLEMENTATION	COMPARISON	MASK-ROM
15449117 M5M2751250-A	1027	HN623251PC18 ROM-A
15449118 M5M2751250-B	1028	HN623251PC19 ROM-B
15449119 M5M2751251	1033	HN623251PC21 ROM-C

## 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。これらの単独修理部品はありません。

### 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 HIT-0520-01-110	OUTPUT
13449711 HEC-0470-01-630	DC IN
13429168 MIDI3-N8 (triplet)	MIDI

### IC

15179246 CB095-90	CPU	
15229851 MB887136A	LA chip	
15229865 HG61H15B59F	gate array	
15229863 HG61H20R36F	reverb chip	
15219178 PCM54HP	D/A converter	
15179844 TCG32000P-7471	2M mask ROM	(WAVE) IC21
15179845 TCG32000P-7472	2M mask. ROM	(WAVE) IC22
15449107 MSM27C256-A	EP ROM	IC27
15449108 MSM27C256-B	EP ROM	IC26
15449109 MSM27C128-15	EP ROM	(reverb,ROM C) IC13
15179345 MSM4416P-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	
15169334R0 HD74LS05P	hex inverter with open collector output	
15159113H0 HD14051	MUX/DEMUX	
15199159 IR3M03A	DC-DC converter	
1522970650 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 IS2473	SW Board
15029189 GL-9PG2 LED	green

### COIL

12449305 330uH	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
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### RESISTOR

13919303 RML S8 333J	3.3kΩx8
13799762 0.24Ω	metal oxide

### CAPACITOR

1363915380 470μF/16V	electro
1363915480 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 1L-S-2P-S2T2-EF	2P (CN3, Main Board)
23410525 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

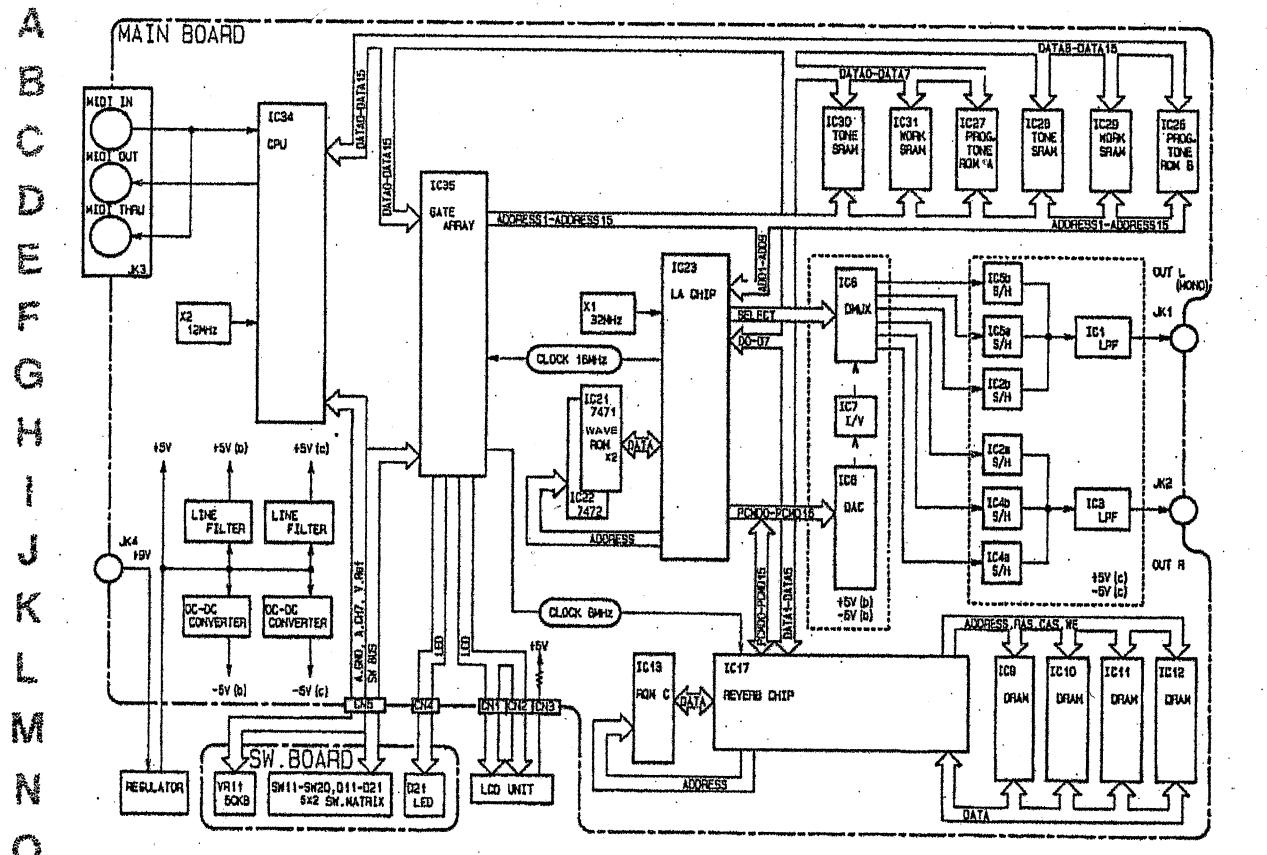
2215051200 Standoff	3x6mm
2235533400 Rubber Foot	
23485167 MIDI Cable	1m
2343067580 Connection Cord	LP-25

## **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 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.

## **BLOCK DIAGRAM**



回路解説

CPU(1C34)はMIDI INデータをオペレーションプログラム(1C26, 27)および音のパラメータ・データ(1C26-31)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(1C28)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<sup>\*1</sup>とともに、**DUMA**へも送られ、SII1-SII3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>

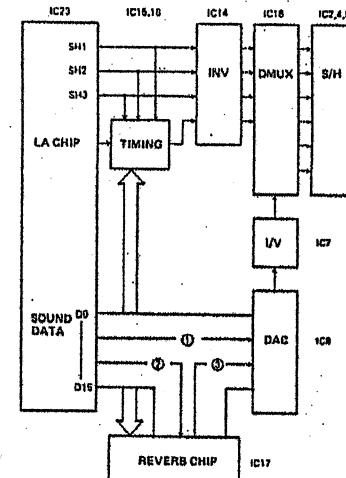


Fig. 7

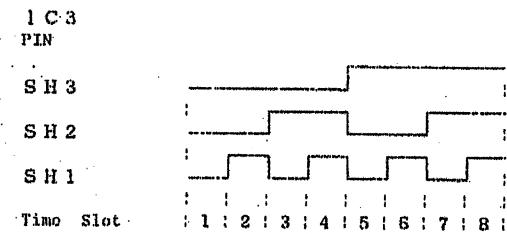


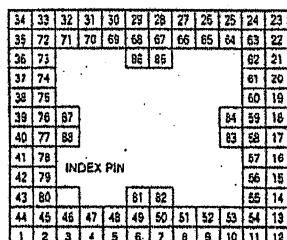
Fig.2

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

Table 1

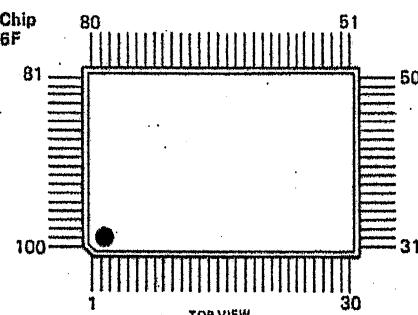
IC DATA

IC23 LA Chip  
MB87136

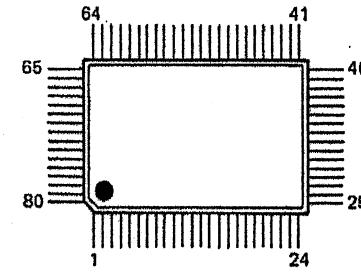


TOP VIEW

IC17 Reverb Chi  
HG61H20R36F

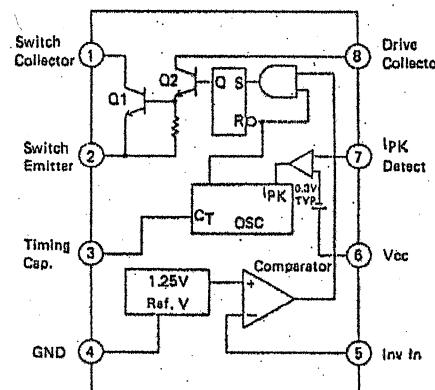
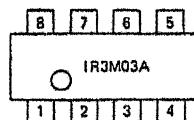


IC35 Gate Array  
HG61H15B59F

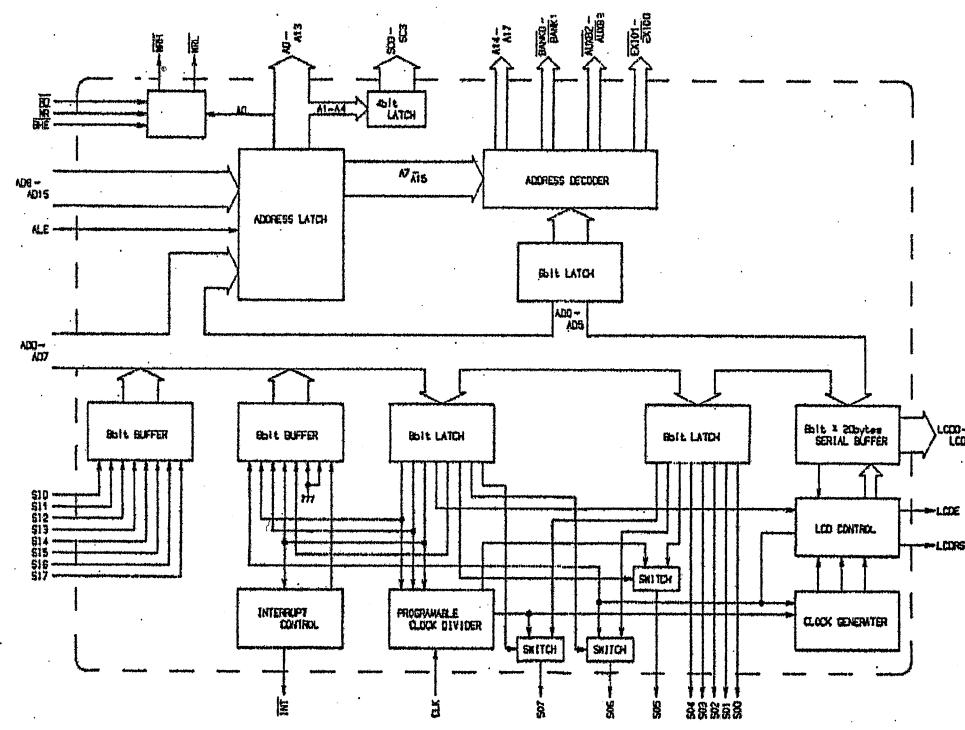


TOP VIEW

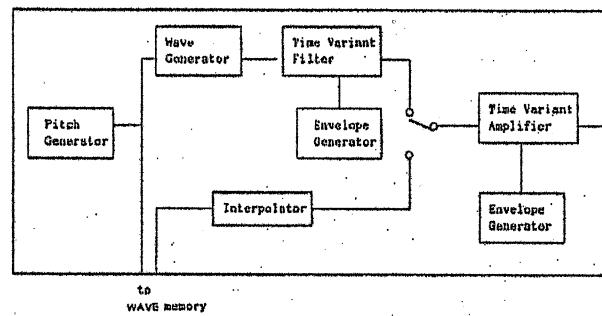
IC18, IC19 Regulator  
IR3M03A



## BLOCK DIAGRAM



IC23 LA Chip  
MB87136

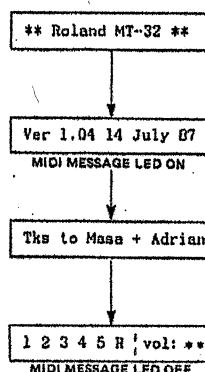


## TEST MODE

## 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.



### 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。

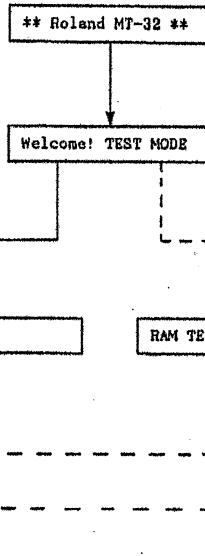
1 2 3 .....が表示されると、通常のプレイモードに入っているので、そのまま演奏が可能である。

### 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。



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

When Error, check:  
RAMs: IC28-IC31  
Gate array: IC35  
Buss between IC36 and the RAMs.

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PART1を押すタイミングによって消灯することもある)

スイッチの読み込みテスト開始

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

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

4. 表示に従ってボタンを押していく。

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)

SW TEST ok

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

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

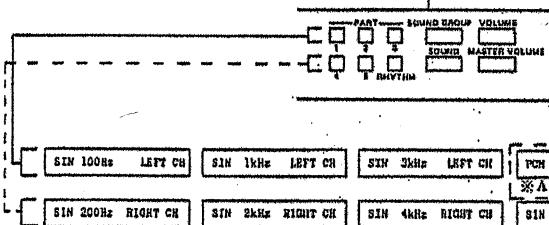
6. PART 2を押す。

**Error Messages:**  
Receiver Error  
MIDI OUT signal has not reached MIDI IN within the time.  
Verify Error  
There is difference in contents between MIDI DUT and MIDI IN signals.

To ignore Error, hold MASTER VOLUME then press VOLUME.

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.



#### 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

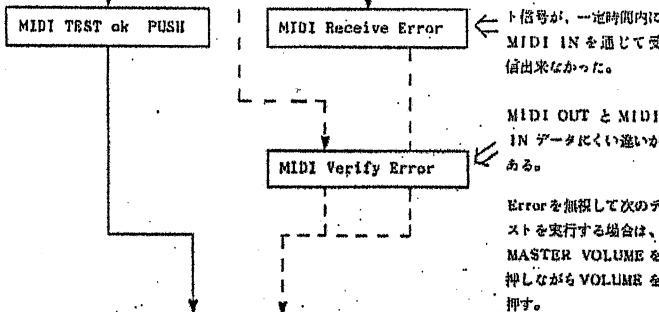
※C……ジャックRから直接音と深いリバーブ音が出る(TOM)

ジャックLからは深いリバーブ音のみが出る。

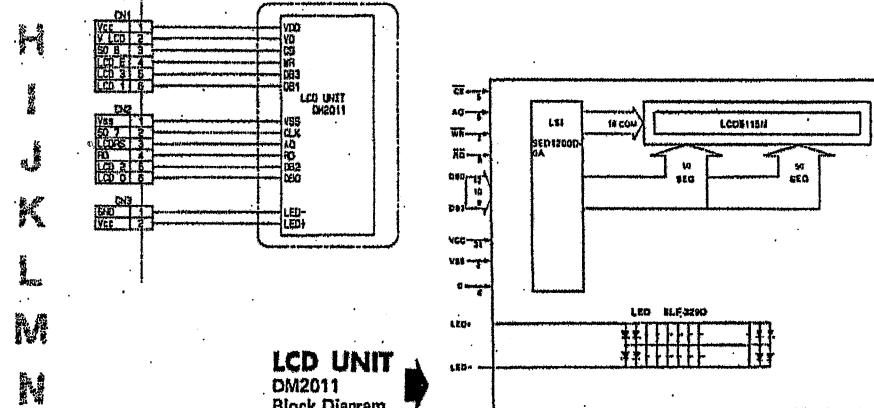
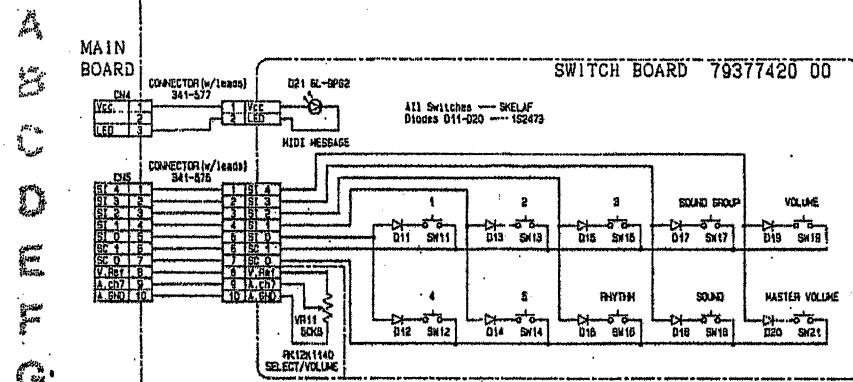
440Hz の出力はLとRで若干差がある。

Play Mode

8. MASTER VOLUME を押しながら



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



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

## **MAIN BOARD**

Assy 7937731000  
(pcb 2292048700)

#### Prior to

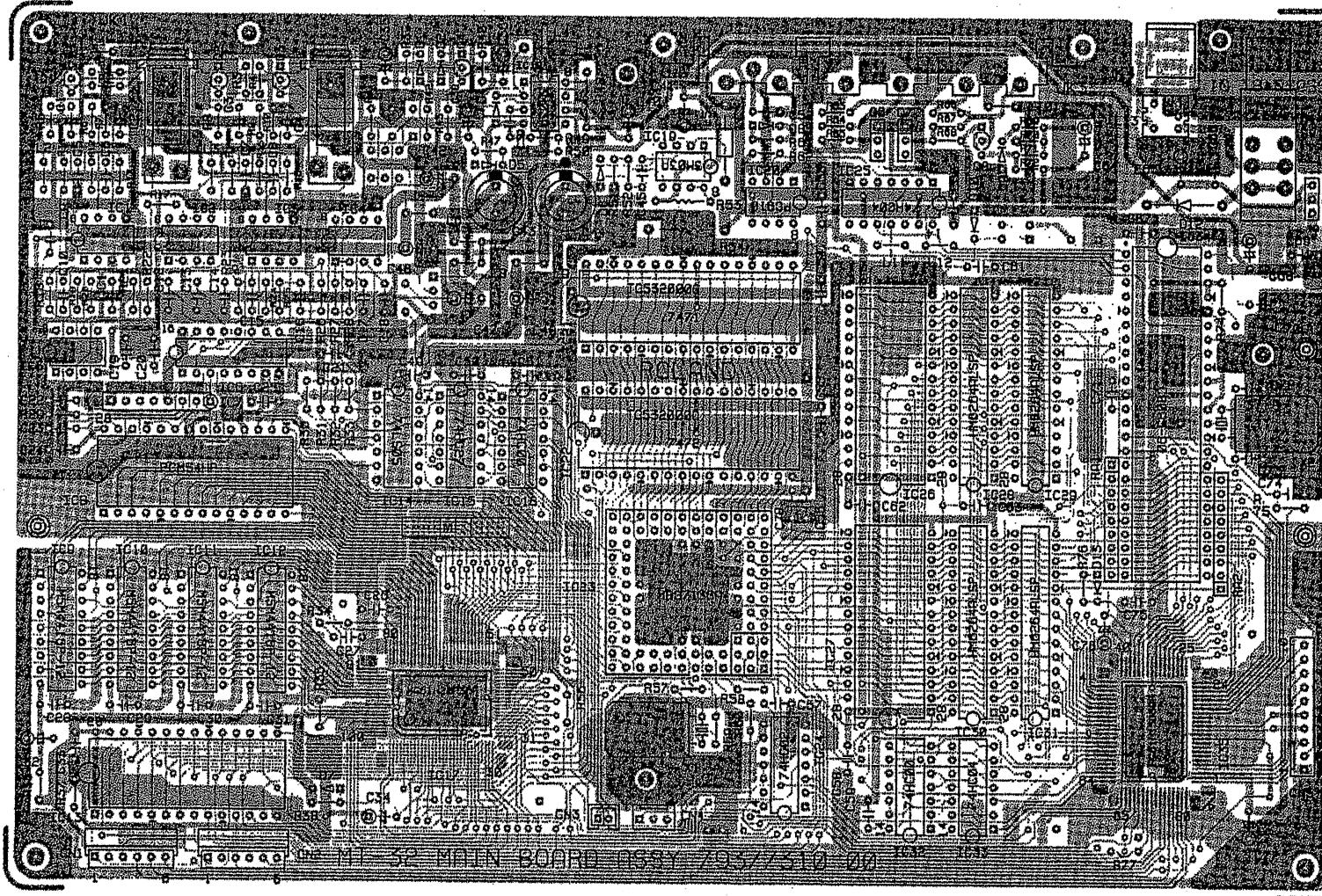
**Prior to**

Prior to  
SN851400 COMPONENT SIDE MARKING MAY25

Idle resistors R65 and R66:  
10 k $\Omega$  across base and collector of Q6 and Q7  
These resistors are found on either the in-circuit  
diagram or layout prints because of inefficacy.

最後 R65 オーバー VDM  
R6.07 のコレクタと比較しては100回のついていも音量がありますが  
(音量上には差異なし)、無くとも音量上若しく見えありません。  
したがって、初期製品では重複されています。

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



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

## CIRCUIT DIAGRAM Prior to SN851400

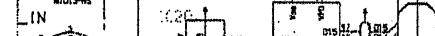
MIDI INPUT



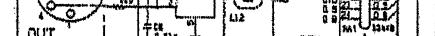
MIDI OUTPUT



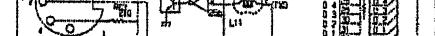
MIDI THRU



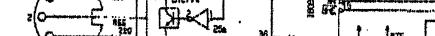
SW BOARD



LCD UNIT



POWER



MAIN BOARD

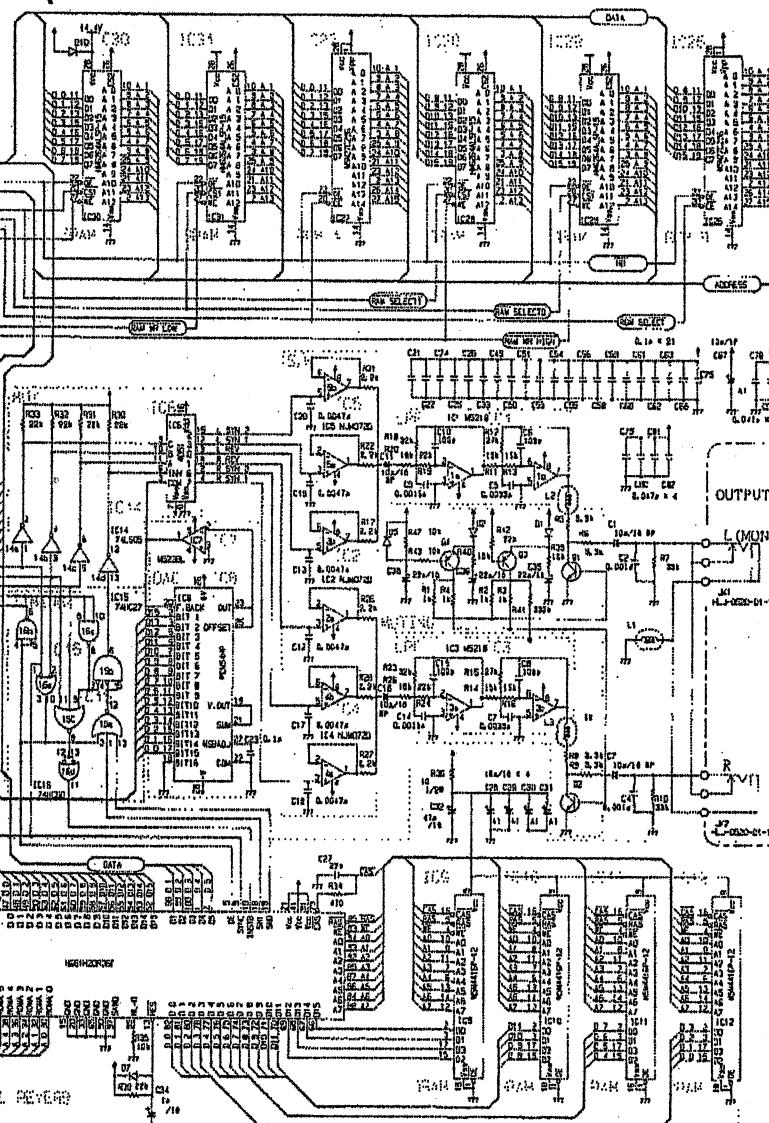


NOTE	REMARK
P.3	Reconnecting to pin 2 of IC20
P.4	Pin 3 of IC20
E.3	Reversed pin No. 102(A) (A = A.G., 2 = A, C/D, ..., 10 = E, G)
P.3	Reversed pin No. 103(B) (A = VCC, 1 = LBD)
P.10	IC49, IC50 Reversed location (GND)
S.13	IC49 Reverses IC50
G.20	None
H.35	IC66, IC67 None
H.31	IC66, IC67 None
J.21	IC14a, IC14b None
J.22	IC14a, IC14b None
J.23	IC14a, IC14b None
N.12	IC49, IC50 Reversed location (GND)
N.20	IC49, IC50 Reversed location (GND)

## CORRECTION

Refer to the table left for corrections on the circuit diagram below.

左の回路図訂正表を参照して下さい。



MAIN BOARD 79377310.00

# MIDI IMPLEMENTATION

MULTI TIMBRE SOUND MODULE  
MODEL MT-32

JUN. 1984 14:12H  
Version 1.07

## 1. TRANSMITTED DATA

### Bypassed messages

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

- Channel Voice messages except Note On
- Old Note On (e) left unchanged any voice because all assignable voices are engaged.

### Created message

#### System exclusive

**Status**  
FOH : System Exclusive  
FTH : EOX (End of System Exclusive)

See "EXCLUSIVE COMMUNICATIONS" for details.

## 2. RECOGNIZED DATA

### Note event

#### Note off

Status	Second	Third
Off	vvII	vvIII
On	vvII	00H

kkII : Note number 0CH - 0CIE (12 - 108)  
vvII : Ignored

#### Note on

Status	Second	Third
Off	vvII	vvIII
On	kkII	vvIII

kkII : Note number 0CH - 0CIE (12 - 108)  
vvII : Velocity 1H - 7FH (1 - 127)

### Control change

#### Continuous controller (14 bits)

Status	Second	Third
Unit	vvII	vvIII
Modulation	mmII=01H	vvII=0H - 7FH (0 - 127)
Volume	mmII=07H	vvII=0H - 7FH (0 - 127)
Panpot	mmII=0AH	vvII=0H - 7FH (0 - 127)
Expression	mmII=0BH	vvII=0H - 7FH (0 - 127)

#### Continuous controller (7 bits)

Status	Second	Third
Unit	vvII	
Hold I	mmII=40H	vvII=0H - 20H (0 - 63) OFF 40H - 7FH (64 - 127) ON
Resets all controllers	mmII=79H	vvII=0

### Program change

Status	Second	Third
Unit	vvII	
ppII : Program number	0H - 7FH (0 - 127)	

Program Change changes Patch.

### Pitch bender

Status	Second	Third
Unit	vvII	mmII
		HH : 0H - 7FH (0 - 127) mmII : 0H - 7FH (0 - 127)

## ■ Channel mode message

Status	Second	Third
--------	--------	-------

amII : All Notes Off 7DH (12a)  
Omni Off 7CII (124)  
Omni On 7DI (125)  
Mono On 7BI (126)  
Poly On 7FI (127)

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

## ■ Active sensing

**Status**

FSII

## ■ System exclusive

**Status**

FOH : System Exclusive

FTH : EOX (End of System Exclusive)

## 3. EXCLUSIVE COMMUNICATIONS

Model-ID of MT-32 is 10H.

MT-32 can receive/send some of the EXCLUSIVE MESSAGES in the D-60 (Roland synthesizer) format.

Model-ID of D-60 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 RQI 11H

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

MT-32 won't transmit RQI.

Byte	Description
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H (14H)	Model-ID (MT-32 (D-60))
11H	Command-ID (RQI)
vvII	Address MSB
vvIII	Address LSB
vvII	Size MSB
vvIII	Size LSB
vvII	Size LSD
sum	CHECKSUM
FTH	EOX (End of Exclusive)

Data set DTI 12H

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

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

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

Byte	Description
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H (14H)	Model-ID (MT-32 (D-60))
12H	Command-ID (DTI)
vvII	Address MSB
vvIII	Address LSB
vvII	Data
sum	CHECKSUM
FTH	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 RIC.

MT-32 won't send this message.

Byte	Description
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H	Model-ID (MT-32)
40H	Command-ID (WSD)
vvII	Address MSB
vvIII	Address LSB
vvII	Size MSB
vvIII	Size LSB
vvII	Size LSD
sum	CHECKSUM
FTH	EOX (End of Exclusive)

Request data RQD 41H

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

MT-32 won't send this message.

Byte	Description
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H	Model-ID (MT-32)
41H	Command-ID (RQD)
vvII	Address MSB
vvIII	Address LSB
vvII	Size MSB
vvIII	Size LSB
vvII	Size LSD
sum	CHECKSUM
FTH	EOX (End of Exclusive)

Data set DAT 42H

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

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

Byte	Description
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H	Model-ID (MT-32)
42H	Command-ID (DAT)
vvII	Address MSB
vvIII	Address LSB
vvII	Data
sum	CHECKSUM
FTH	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
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H	Model-ID (MT-32)
43H	Command-ID (ACK)
FTH	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 (DATA) transmission, MT-32 sends this message.

Byte	Description
FOH	Exclusive status
41H	Roland-ID
DRV	Device-ID
10H	Model-ID (MT-32)

## Communication error ERR 4EH

If checksum doesn't agree (failure in data reception), MT-32 sends this message.  
When MT-32 receives this message, it sends the latest message again.

Byte	Description
FOH	Exclusive status
41H	Hardware-ID
DEV	Device-ID
10H	Model-ID (MT-32)
40H	Command-ID (ERR)
F7H	EOX (End of Exclusive)

## Rejection RJQ 4FH

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

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

Byte	Description
FOH	Exclusive status
41H	Hardware-ID
DEV	Device-ID
10H	Model-ID (MT-32)
40H	Command-ID (RJQ)
F7H	EOX (End of Exclusive)

- Notes:**
- \*3-1 Each model-ID's are supported. Addresses & parameters are described in section 4 for model-ID 16H(MT-32) and in section 5 for model-ID 14H (D-80, PC-100).
  - \*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. The total Partial Reserve in all the parts must be less than 32.

## 4. Address mapping of parameters

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

Address binary	MSB Data xxxx	LSB 7 bit hex	MSB Data xxxx	LSB 0000cccc
		AA	0000	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, \*4-2 have their offset addresses given in the table under NOTE# \*4-1, \*4-2 and the value is Rhythmic Setup table, in Common parameter table or in Partial parameter table.

## Parameter base address

### Temporary area (Accessible on each basic channel)

Start address	Description
02 00 00	Timbre Temp Area (part 1-8) *4-3

### Whole part (Accessible on UNIT#1)

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 10	Setup Temp Area (synthesizer part) *4-1
04 00 00	Timbre Temp Area (part 1) *4-2
04 01 76	Timbre Temp Area (part 2) *4-3
04 01 44	Timbre Temp Area (part 3) *4-2
04 02 3a	Timbre Temp Area (part 4) *4-2
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 *4-2
08 00 08	Timbre Memory #2 *4-2
08 1C 00	Timbre Memory #3 *4-2
08 7E 00	Timbre Memory #4 *4-2
10 00 00	System area
20 00 00	Display *4-3
7F xx xx	All parameter reset *4-4

## Common parameter \*4-6

Offset address	Description
00H	Data xxxx TONE NAME 1 32-127 (ASCII)
1	
0AH	Data xxxx Structure of Partials 14x3 0-12 (1-13)
0BH	Data xxxx Structure of Partials 38x4 0-12 (1-13)
0CH	Data xxxx PARTIAL MUTE 0-15 (0000-1111)
0DH	Data xxxx ENV MODE 0-1 (Normal/No sustain)
Total size	00 00 00H

00 30H	0000 Data	TVA ENV TIME V_FOLLOWO-4
00 31H	0000 Data	TVA ENV TIME 1 0-100
00 32H	0000 Data	TVA ENV TIME 2 0-100
00 33H	0000 Data	TVA ENV TIME 3 0-100
00 34H	0000 Data	TVA ENV TIME 4 0-100
00 35H	0000 Data	TVA ENV TIME 5 0-100
00 36H	0000 Data	TVA ENV LEVEL 1 0-100
00 37H	0000 Data	TVA ENV LEVEL 2 0-100
00 38H	0000 Data	TVA ENV LEVEL 3 0-100
00 39H	0000 Data	TVA ENV SUSTAIN LEVEL 0-100
Total size	00 00 3AH	

## System area

Offset address	Description	
00 00H	0000 Data	MASTER TUNE 0-127 (432.0Hz-466.0Hz)
00 01H	0000 Data	REVERB MODE 0-3 (Normal, Mix, Tap9 delay)
00 02H	0000 Data	REVERB TIME 0-7 (1-8)
00 03H	0000 Data	REVERB LEVEL 0-7
00 04H	0000 Data	PARTIAL RESERVE (Part 1) 0-32 *4-6
00 05H	0000 Data	PARTIAL RESERVE (Part 2) 0-32 *4-6
00 06H	0000 Data	PARTIAL RESERVE (Part 3) 0-32 *4-6
00 07H	0000 Data	PARTIAL RESERVE (Part 4) 0-32 *4-6
00 08H	0000 Data	PARTIAL RESERVE (Part 5) 0-32 *4-6
00 09H	0000 Data	PARTIAL RESERVE (Part 6) 0-32 *4-6
00 0AH	0000 Data	PARTIAL RESERVE (Part 7) 0-32 *4-6
00 0BH	0000 Data	PARTIAL RESERVE (Part 8) 0-32 *4-6
00 0CH	0000 Data	PARTIAL RESERVE (Part 9) 0-16 (1-16 OFF)
00 0DH	0000 Data	MIDI CHANNEL (Part 1) 0-16 (1-16 OFF)
00 0EH	0000 Data	MIDI CHANNEL (Part 2) 0-16 (1-16 OFF)
00 0FH	0000 Data	MIDI CHANNEL (Part 3) 0-16 (1-16 OFF)
00 10H	0000 Data	MIDI CHANNEL (Part 4) 0-16 (1-16 OFF)
00 11H	0000 Data	MIDI CHANNEL (Part 5) 0-16 (1-16 OFF)
00 12H	0000 Data	MIDI CHANNEL (Part 6) 0-16 (1-16 OFF)
00 13H	0000 Data	MIDI CHANNEL (Part 7) 0-16 (1-16 OFF)
00 14H	0000 Data	MIDI CHANNEL (Part 8) 0-16 (1-16 OFF)
00 15H	0000 Data	MIDI CHANNEL (Part 9) 0-16 (1-16 OFF)
00 16H	0000 Data	MASTER VOLUME 0-100
Total size	00 00 1FH	

## Rhythm setup

Offset address	Description	
00 00H	0000 Data	TIMBRE (M1-M8, R1-R8) 0-84
00 01H	0000 Data	OUTPUT LEVEL 0-100
00 02H	0000 Data	PANPOT 0-14 (R-L)
00 03H	0000 Data	REVERB SWITCH 0-1 (OFF,ON)
Total size	00 00 04H	

## Patch temp

Offset address	Description	
00 00H	0000 Data	TIMBRE GROUP (GROUP A, GROUP B, MEMORY, RHYTHM) 0-3
00 01H	0000 Data	TIMBRE NUMBER 0-65
00 02H	0000 Data	KBY SHIFT 0-16 (1-21 + 2)
00 03H	0000 Data	PINE TUNE 0-100
00 04H	0000 Data	HINGER RANGE 0-21 (-50-+50)
00 05H	0000 Data	ABSGN MODE 0-3
00 06H	0000 Data	POLY LIPOLY 2(POLY SIMPLY 4) 0-16 (OFF,ON)
00 07H	0000 Data	REVERB SWITCH 0-1 (OFF,ON)
00 08H	0000 Data	dummy
00 09H	0000 Data	OUTPUT LEVEL 0-100
00 0AH	0000 Data	PANPOT 0-14 (R-L)
00 0BH	0000 Data	dummy
Total size	00 00 10H	

### ■ Patch memory

Offset address	Description	
00 00H	0000 0000	TIMING GROUP (GROUP ADDRESS BY WORD LENGTH)
00 01H	00aa aa00	TIME NUMBER
00 02H	00aa 0aa0	KEY SHIFT
00 03H	0aae 0aa0	FINE TUNE
00 04H	0000 0aa0	WAVELENGTH RANGE
00 05H	0000 00aa	ADDRESS MODE
		(WAVELENGTH, ADDRESS, ADDRESS MODE)
00 06H	0000 0000	REVERSE SWITCH
00 07H	00xx xxxx	shunny 00 00 0001
Total size		(OPTION)

DISPLAY

Offset address	Description	
0011	0000 0000	DISPLAYED LETTER
1		32-127 (ASCII)
1011	0000 0000	DISPLAYED LETTER
Total size	00 00 140	

Notes:  
\* 4-1  
Structure of "Custom Taxes" can be found in

Offset address	Description
00 00 00	Rhythm Setup (for Key# 24)
00 00 04	Rhythm Setup (for Key# 25)
00 00 08	Rhythm Setup (for Key# 26)
00 00 0C	Rhythm Setup (for Key# 27)
00 00 10	Rhythm Setup (for Key# 28)
:	:
00 01 7B	Rhythm Setup (for Key# 86)
00 01 7C	Rhythm Setup (for Key# 87)

Structure of "Timbre Tamp/Memory" area is as follow

Sub start address	Description
00 00 00	Common parameter
00 00 0C	Partial parameter (for Partition 1)
00 00 45	Partial parameter (for Partition 2)

\*4-3 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 BO1 or BS0.

All parameters will be initialized by sending data to this address.  
Cannot be called in ROM mode.

\*4-5 This parameter can be modified from D=50 (PC=100%) and results in accessing the address "02-00-00" (Timber Termn Area Inactive) of INT 20.

**Pardat Reserves** should be simultaneously assigned to all the 9 parts by one

## **5. ADDRESS MAPPING OF PARAMETERS**

(compatible with D-50 (PG-1000))

#### ■ Parameter base address

Start address	Description
00-00-00	Partial 3 (0-63)
00-00-40	Partial 4 (64-117)
00-01-00	Upper Common (118-175)
00-01-40	Partial 5 (186-343)
00-02-00	Partial 2 (264-380)
00-02-4A	Lower Common (380-387)

### ■ Partial parameters

Offset address	Description	
00 00H	0000 0000	WG PITCH COARSE
00 01H	0000 0000	WG PITCH FINE
00 02H	0000 0000	WG PITCH KEYPULLOW

### **Lower common parameter**

Offset address	Description	
00 00H	0000 xxxx	Structure of Partial# 1&2 0-12 (1-13)
00 01H	0000 xxxx	P-ENV VELD SENS (Partial#1) 0-100
00 02H	0000 xxxx	P-ENV TIME MEVF (Partial#1) 0-100
00 03H	0000 xxxx	P-ENV TIME L (Partial#1) 0-100
00 04H	0000 xxxx	P-ENV TIME 2 (Partial#1) 0-100
00 05H	0000 xxxx	P-ENV TIME 3 (Partial#1) 0-100
00 06H	0000 xxxx	P-ENV TIME 4 (Partial#1) 0-100
00 07H	0000 xxxx	P-ENV LEVEL 0 (Partial#1) 0-100
00 08H	0000 xxxx	P-ENV LEVEL 1 (Partial#1) (-50-+100)
00 09H	0000 xxxx	P-ENV LEVEL 2 (Partial#1) (-50-+80)
00 0AH	0000 xxxx	P-ENV BUS LEVEL (Partial#1) 0-100
00 0BH	0000 xxxx	END LEVEL (Partial#1) 0-100
00 0CH	0000 xxxx	dummy (-50-+100)
00 0DH	0000 xxxx	P-LFO MOO SENS (Partial#1) 0-100
00 0EH	0000 xxxx	P-LFO MOD SENS (Partial#2) 0-100
00 0FH	0000 xxxx	dummy
00 10H	0000 xxxx	P-LFO RATE (Partial#1) 0-100
00 11H	0000 xxxx	P-LFO DEPTH (Partial#1) 0-100
00 12H	0000 xxxx	dummy
00 13H	0000 xxxx	dummy
00 14H	0000 xxxx	P-LFO HATR (Partial#2) 0-100
00 15H	0000 xxxx	P-LFO DEPTH (Partial#2) 0-100
00 16H	0000 xxxx	dummy
:		
00 23H	0000 xxxx	dummy
00 24H	0000 xxxx	PARTIAL MUTE (Partial# 1&2) 0-3 (00-11)
00 30H	0000 xxxx	dummy
Total size	00 00 30H	

### **Upper common parameter**

Offset address	Description	
00 0011	00Hh xxxx	Structure of Partials S#4 0-13 (4-13)
00 0111	00Hh xxxx	P-ENV VELO SENS (Partial#13) 0-100
00 0211	0000 00aa	P-ENV TIME KEYF (Partial#13) 0-4
00 0311	00aa 00aa	P-ENV TIME 1 (Partial#3) 0-100
00 0411	00aa 00aa	P-ENV TIME 2 (Partial#3) 0-100
00 0511	00aa 00aa	P-ENV TIME 3 (Partial#3) 0-100
00 0611	00aa 00aa	P-ENV TIME 4 (Partial#3) 0-100
00 0711	00aa 00aa	P-ENV LEVEL 0 (Partial#3) 0-100
00 0811	00aa 00aa	P-ENV LEVEL 1 (Partial#3) (-50-+100) (-50-+100)
00 0911	00aa 00aa	P-ENV LEVEL 2 (Partial#3) 0-100 (-50-+100)
00 0A11	00aa 00aa	P-ENV SUS LEVEL (Partial#3) 0-100 (-50-+100)
00 0B11	00aa 00aa	DDN LEVEL (Partial#3) 0-100 (-50-+50)
00 0C11	00xx xxxx	dummy
00 0D11	00xx xxxx	P-LFO MOD SENS (Partial#3) 0-100
00 0E11	00xx xxxx	P-LFO MOD SENS (Partial#4) 0-100
00 0F11	00xx xxxx	dummy
00 1011	00xx xxxx	P-LFO RATE (Partial#3) 0-100
00 1111	00xx xxxx	P-LFO DEPTH (Partial#3) 0-100
00 1211	00xx xxxx	dummy
00 1311	00xx xxxx	P-LFO RATE (Partial#4) 0-100
00 1411	00xx xxxx	P-LFO DEPTH (Partial#4) 0-100
00 1511	00xx xxxx	dummy
00 1611	00xx xxxx	dummy
;		
00 2311	00xx xxxx	dummy
00 2411	00xx xxxx	PARTIAL MUTE (Partial# S#4) 0-13 (0-11)
00 2511	00xx xxxx	dummy
Total size		00.00.5641

MULTI FRAME SOUND MODULE  
MODEL MT-23

MIDI Implementation Guide

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## CHANGE INFORMATION

### EFF. SN 823200 ROM Program Revision

IC27 ROM A Ver. 1.04 to Ver. 1.05  
IC26 ROM B

Change the taper of VOLUME control by changing the programs in the ROMs.

Result: Smoother volume change in response to VOLUME setting change.

### EFF. SN 836200 ROM Program Revision

IC27 ROM A Ver. 1.05 to Ver. 1.06  
IC26 ROM B

To reset Bender Control change in rhythm section when A11 Parameter Reset (MIDI) is received or Active Sensing is not recognized.

To not change displays even Display Change exclusive MIDI message is recognized unless the current mode is Master Volume Input mode (e.g. Power-up default).

### EFF. SN 838700 ROM Program Revision

IC27 ROM A Ver. 1.06 to Ver. 1.07  
IC26 ROM B

For stable program operation.

If the program won't start after replacing SRAM IC29 or 31, use ROMs of Ver. 1.07.

### EFF. SN 851400 LA Chip, ROM Changes

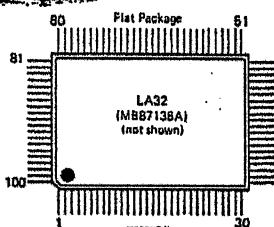
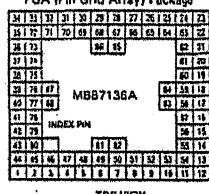
From	To	Note
IC23 MB87136A 80-pin PGA (Pin Grid Array) package (PN 15229851)	IC36 MB87136A 100-pin flat package (labelled LA32 for distinction.) (PN 15229896)	Pin-for-pin incompatible ピン数異なるため互換性なし
ROM A IC27 EPROM HSM27C256-A (PN 15449107)	MASK ROM (Ver. 1.07) HN623258PH18 (PN 15449122)	Compatible 互換性あり
ROM B IC26 EPROM HSM27C256-B (PN 15449108)	Mask ROM (Ver. 1.07) HN623258PH19 (PN 15449123)	Compatible 互換性あり
ROM C IC13 EPROM HSM27C128-15 128Kbyte (PN 15449109)	Mask ROM HN623237PC21 256Kbyte (PN 15179857)	Interchangeable 差換可能
WAVE ROM 2Mbyte TC532000P-7471 IC21 (PN 15179844) TC532000P-7472 IC22 (PN 15179845)	4Mbyte TC534000P IC37 (PN 15449121)	Incompatible 互換性なし
Main Board Assy 7937731000	Assy 7937741000	Compatible 互換性あり

## 変更案内

製番832200以降 ROMバージョンアップ  
○Ver. 1.04→Ver. 1.05  
マスター・ボリュームによる音量変化を聴感上自然なものとする。

Assy Number  
From 7937731000  
to 793741000

PGA (Pin Grid Array) Package

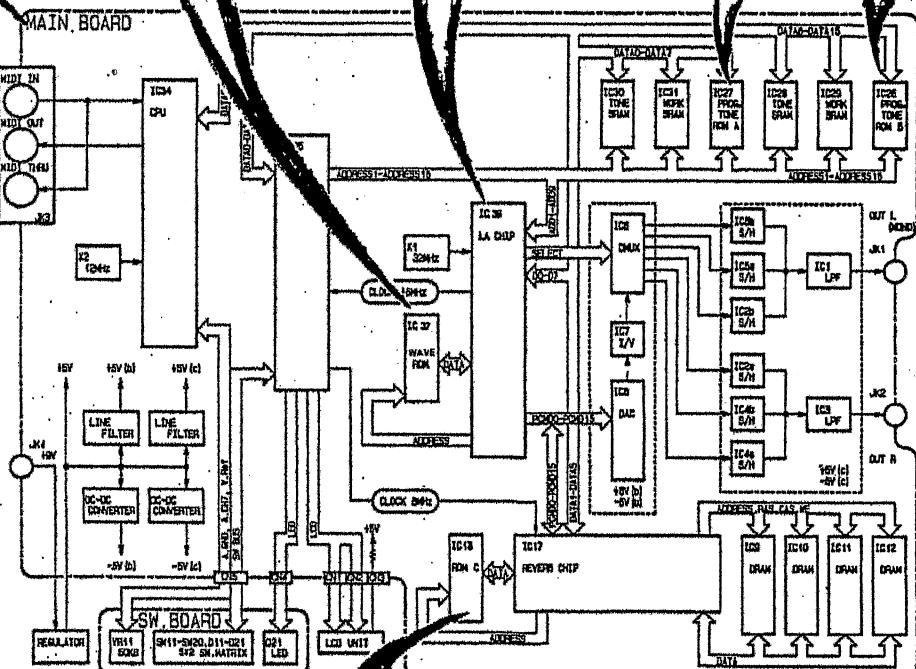


From two 2M ROMs  
to one 4M ROM  
ICs 21, 22 to IC37  
2M ROM 2ヶ使用から  
4M 1ヶ使用へ  
IC21, 22からIC37へ

From 80-pin package to 100-pin.  
From IC No. 23 to 36

80ピンパッケージから100ピンへ  
IC23からIC36へ(旧製品と区別するため、パッケージの表示はLA32)

From EP ROM to Mask ROM  
EP ROMからマスクROMへ



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

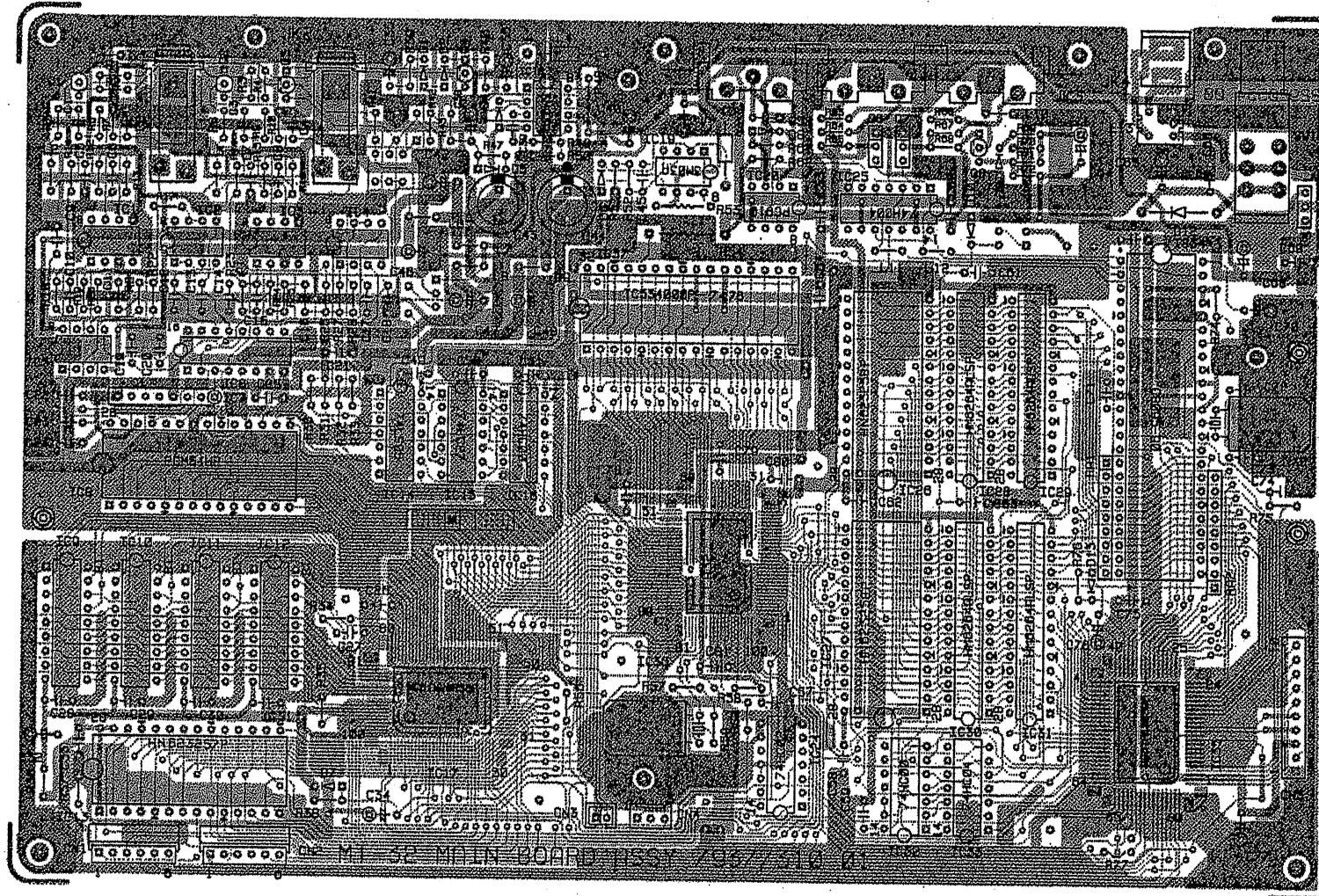
**MAIN BOARD**  
**A SN 851400-UP**  
**Assy 793741000**  
**B (pcb 2292053400)**

Joint Resistors R65 and R66  
10 kΩ between -5V and collectors of Q6 and Q7  
These resistors are found on either the current  
diagram or later products because of inaccuracy.

抵抗 R65 および R66  
Q6とQ7のコレクタと-5Vに10kΩの joint が存在しますが  
回路図上には記載なし。それでも基板上に実装されています。  
したがって、基板番号では記載されていません。

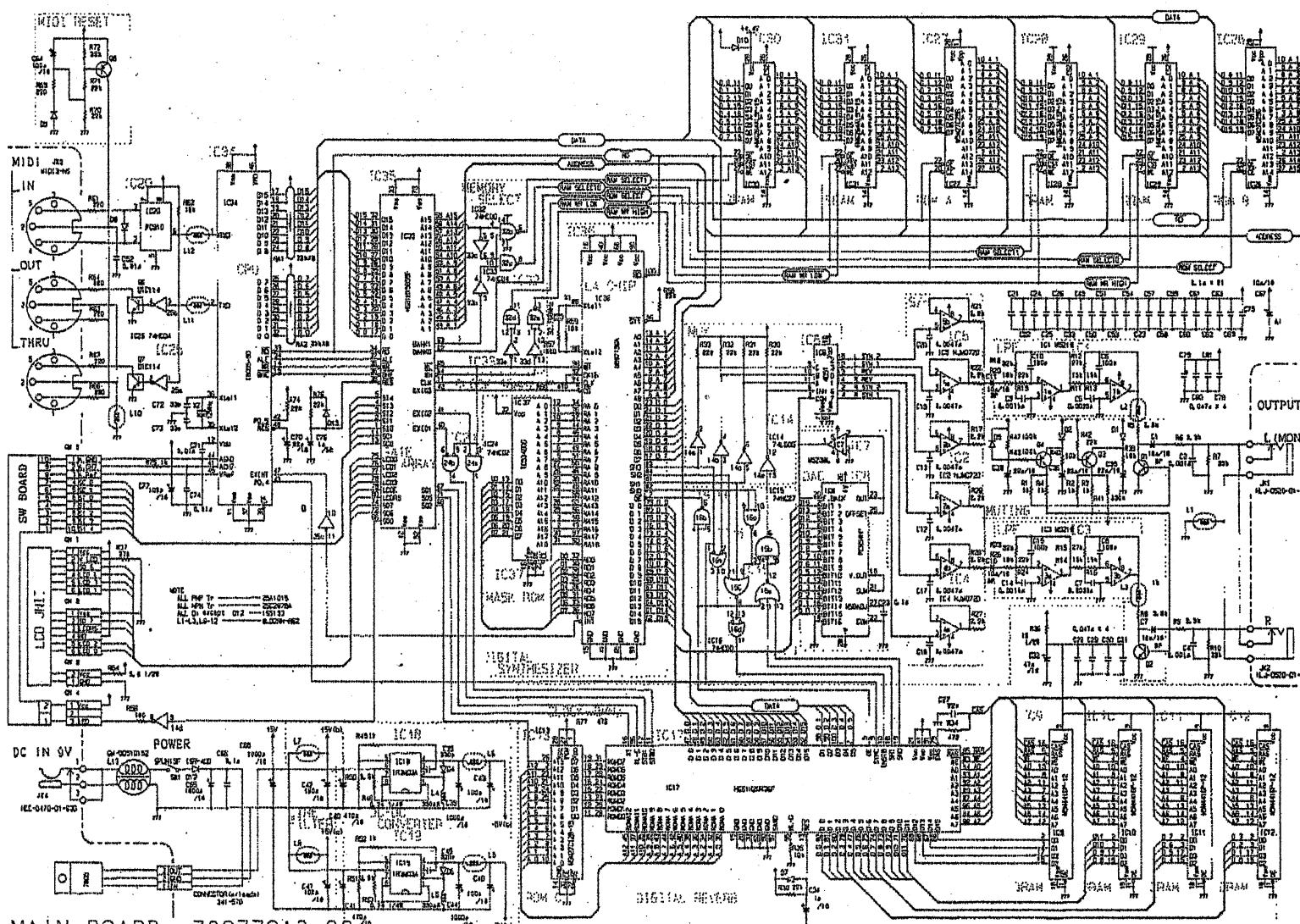
Compatible with 7937731000

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



## **CIRCUIT DIAGRAM**

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



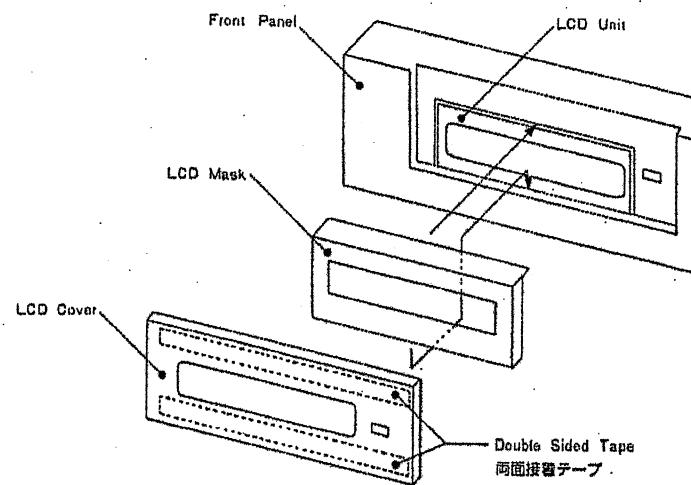
## PROTECTING LCD AGAINST STATIC

The following are protective means against static.  
Modification No. 2 should be done on the unit which  
occasionally has faulty display due to static accumula-  
tion on the LCD cover.

### 1. Adding LCD Mask

EFF. SN 836200-UP

Also effective on retrofit units in production and  
inventory only.



### 2. Grounding LCD Frame

EFF. SN 851400-UP

This modification also works on units in the field.

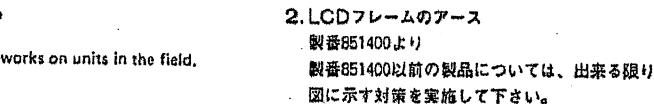
## LCD静電対策

下記2種類の変更はLCD表示を静電気から保護する  
ためのものです。「表示が消える」といった症状が出  
る場合(LCDカバーを布で拭いた時など)は2番目の  
対策を講じて下さい。

### 1. LCDマスク追加

製番836200より

出荷済製品の一部にも実施。



## PARTS LIST (SN 851400-UP)

For the remaining parts see page 3.  
その他の部品については3頁参照。

### CASING

#### LCD Mask

#### IC

I5229896	MB87136A (Labelled LA32)	LA chip 100-pin	IC36
15449121	TC534000P	4M mask ROM (WAVE)	IC37
15449122	HN623258PH18	256K mask ROM (ROM A)	IC27
15449123	HN623258PH19	256K mask ROM (ROM B)	IC26
15449857	HN623257PC21	256K mask ROM (ROM C)	IC13

#### PCB ASSY

7937741000 Main Board (pcb 2292053400)  
As an assembly compatible with 7937731000  
基板完成品は、7937731000と互換性あり。

#### IC CHANGE

#### IC変更

IC35 (Main Board), Gate Array  
EFF SN 903900-UP

IC35 (メインボード) ゲートアレイ  
製番 903900 より

From 15229866 HG61H15B5 9 F を  
to 15239106 HG61H15B7 2 F へ

#### NOTE:

Upper compatible 7 2 F can be  
substituted for 5 9 F. The  
reverse does not hold true.

#### 注

上位コンパチなので 7 2 F を 5 9 F の  
代わりに使用することはできますが、  
逆は不可能です。

Roland®  
17059373

