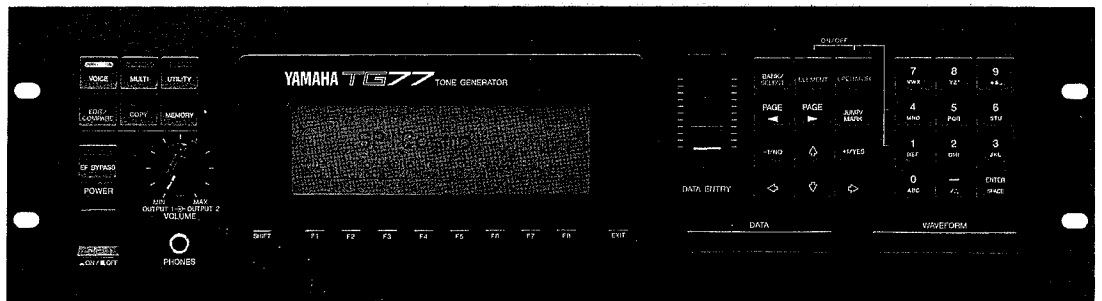


TONE GENERATOR

TG77

SERVICE MANUAL



■ CONTENTS (目次)

SPECIFICATIONS (総合仕様).....	2
PANEL LAYOUT (パネルレイアウト).....	3
BLOCK DIAGRAM (ブロックダイアグラム).....	4
CIRCUIT BOARD LAYOUT & WIRING (ユニットレイアウト & 結線図).....	6
DISASSEMBLY PROCEDURE (分解手順).....	8
LSI PIN DESCRIPTION (LSI 端子機能表).....	13
IC BLOCK DIAGRAM (ICブロック図).....	18
CIRCUIT BOARDS (シート基板図).....	20
TEST PROGRAM (テストプログラム).....	28/49
ERROR MESSAGES (エラーメッセージ).....	67/68
MIDI DATA FORMAT.....	69
MIDI IMPLEMENTATION CHART.....	85
PARTS LIST	

IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

IMPORTANT: Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

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

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

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

ADVARSEL!

Lithiumbatteri. Eksplosionsfare.

Udskiftning må kun foretages af en sagkyndig, og som beskrevet i servicemanualen.

SPECIFICATIONS

Tone generator: Realtime Convolution and Modulation (RCM)

AWM2: 16 bit linear waveform data, maximum 48 kHz sampling frequency

AFM: 6 operators, 45 algorithms, 3 feedback loops, 16 waveforms, modulation from AWM output

Filter: Time variant IIR (infinite impulse response) digital filters, 2 filters for each element (maximum of 8 filters per voice)

Maximum simultaneous notes: 16 notes AWM + 16 notes AFM

Maximum simultaneous timbres: 16

Note assignment: Last note priority, DVA (dynamic voice allocation), SVA (static voice allocation)

DSP effects: (reverb effect + modulation effect) x 2

Reverb effects: 40 types

Modulation effects: 4 types

Memory:

Preset memory: 128 voices, 16 multis

Internal memory: 64 voices, 16 multis

Waveform memory: 2 Mwords (4 Mbytes), 112 sounds

Card slots: parameter data x 1, waveform data x 1

Controllers:

Switches: Power on/off, VOICE, MULTI, UTILITY, EDIT/COMPARE, COPY, MEMORY, EF.BYPASS, SHIFT, function keys F1-F8, EXIT, BANK/SELECT, ELEMENT, OPERATOR, PAGE<, PAGE>, JUMP/MARK, -1/NO, +1/YES, cursor Δ ▽ ◀ ▶, numeric keypad 0-9, minus (-), ENTER

Rotary controls: VOLUME (dual concentric, OUTPUT 1/OUTPUT 2), LCD contrast (on rear panel)

Sliders: DATA ENTRY

Display:

LCD: 240 x 64 pixels (with backlight)

LED: red x 4

Terminals:

Audio output: OUTPUT 1/1+2 (L/MONO, R), OUTPUT 2 (L, R), PHONES, INDIVIDUAL OUTPUT 1-8

MIDI: IN, OUT, THRU

Power requirements:

US and Canadian models: 120V

General model: 220-240V

Power consumption:

US and Canadian models: 28W

General model: 28W

Dimensions:

3U: 480(W) x 132(H) x 390(D) mm
(18-7/8 x 5-1/4 x 15-1/4 inches)

Included items: MIDI cable (3m) x 1

Weight: 8 kg (17 lb 10 oz)

Output levels: measured with a single note (AFM)

1 kHz sine wave, all terminals connected, and volume at maximum

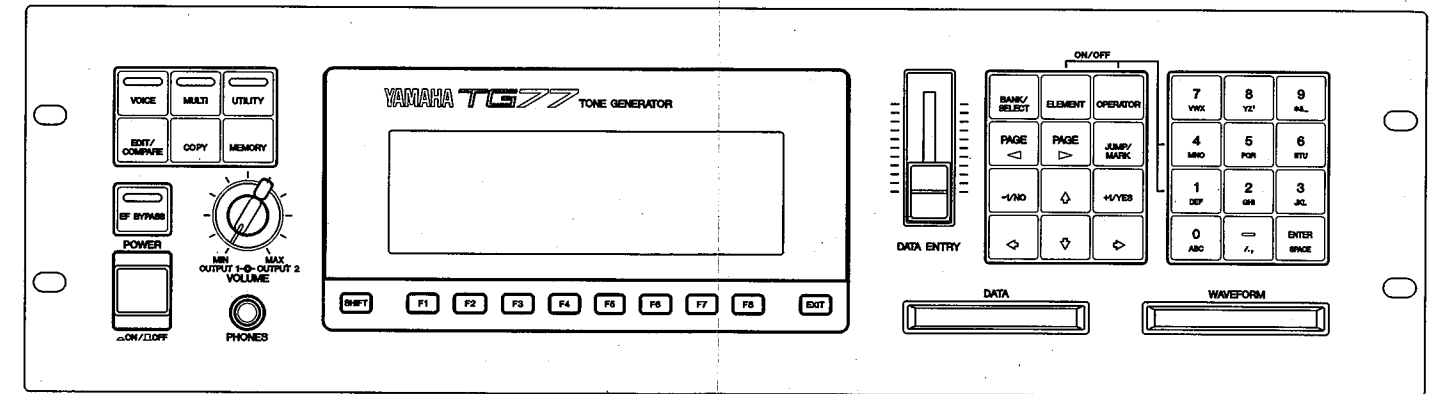
Individual outputs: +5 dBm (10 kΩ)

Headphone: +5 dBm (150 Ω)

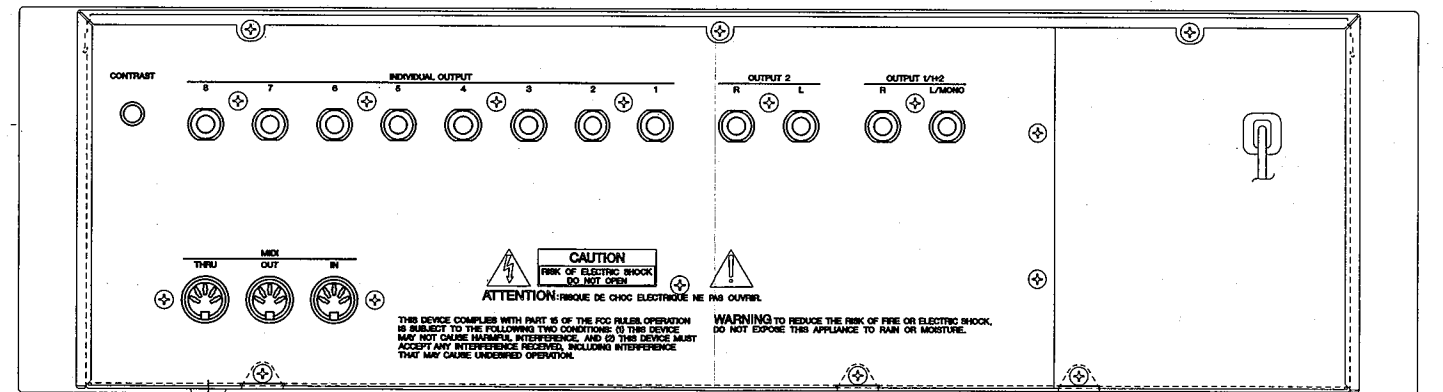
Stereo outputs: -1 dBm (10 kΩ)

PANEL LAYOUT (パネルレイアウト)

● Front Panel (フロントパネル)



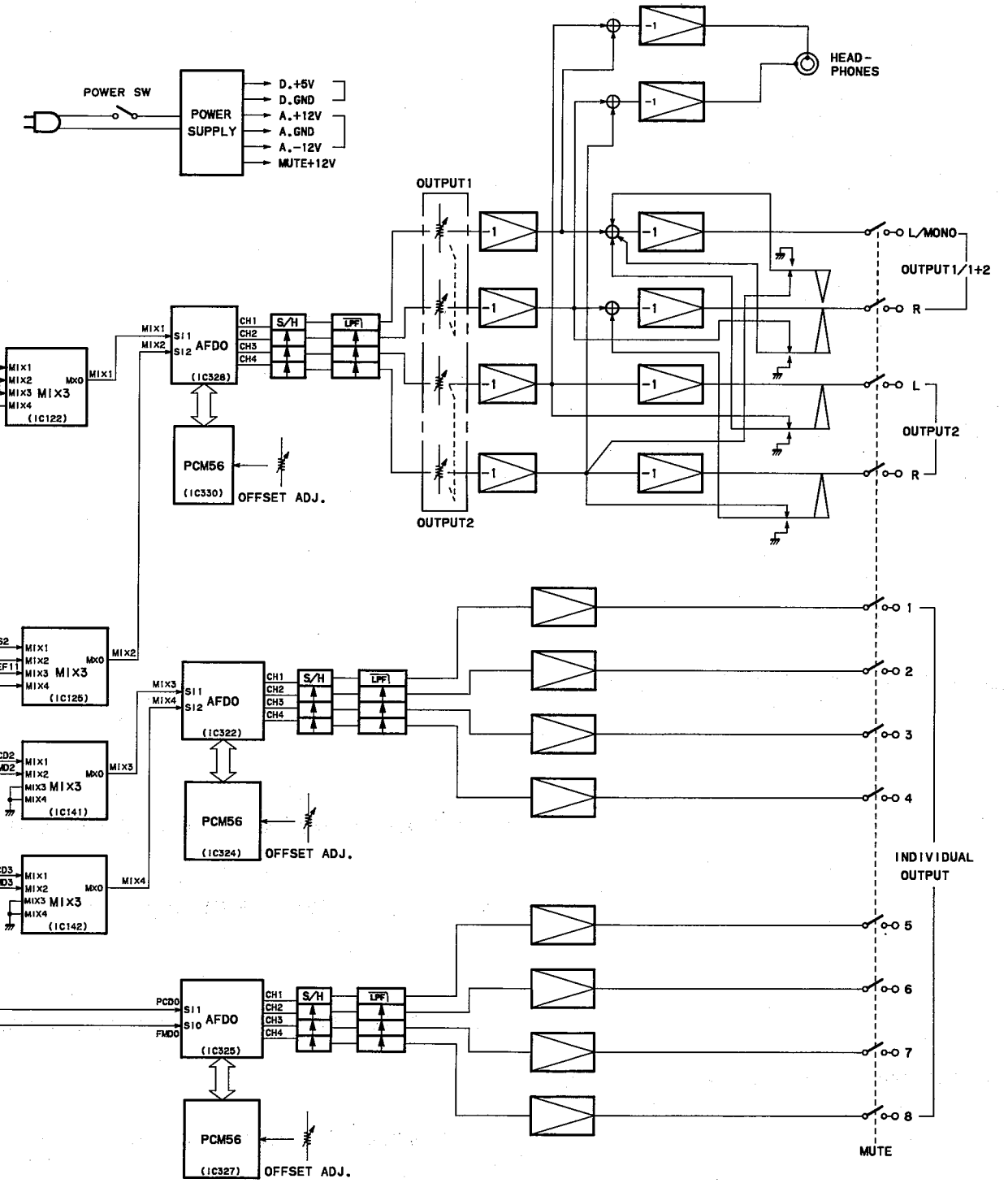
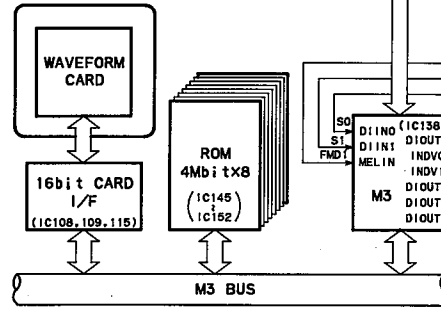
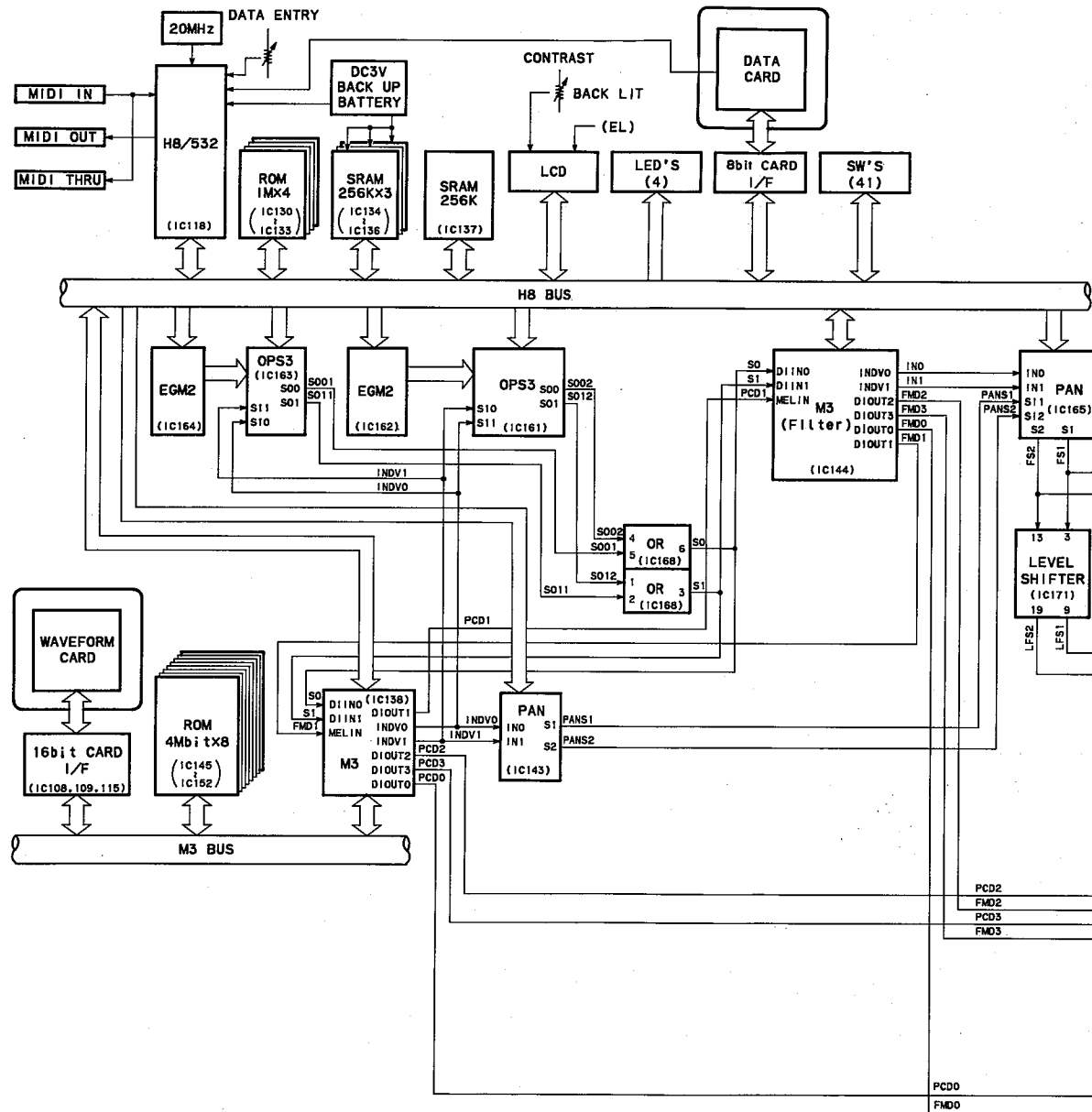
● Rear Panel (リアパネル)



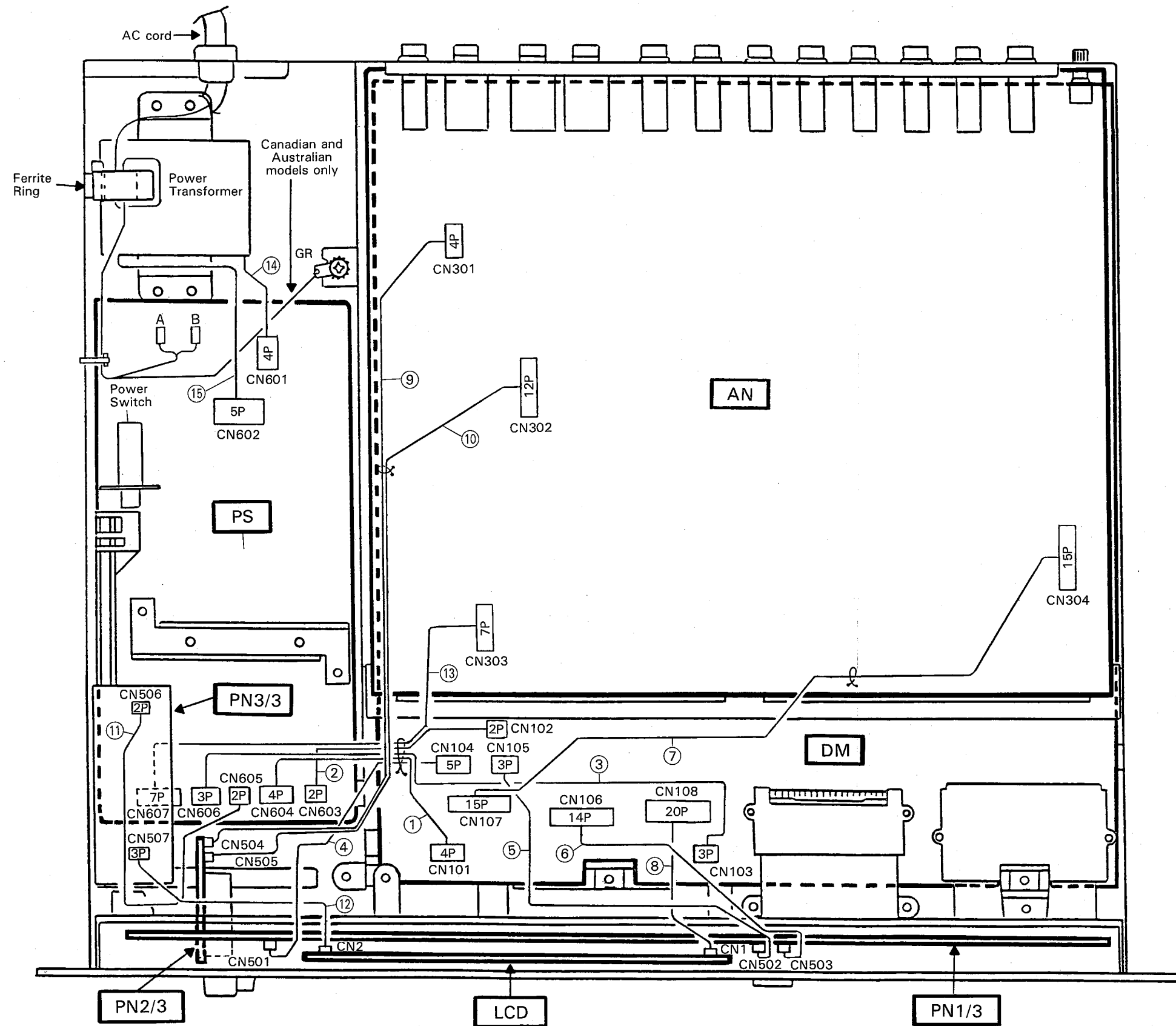
総合仕様

機能	<p>音源</p> <ul style="list-style-type: none"> RCM音源 AWM2: 16ビットリニア波形、サンプリング周波数最大48kHz 1音(エレメント)につき1オクターブ-12dB/octのデジタルフィルターを2個搭載 AFM: 6オペレータ、45アルゴリズム、3系統フィードバック、16波形 AWM2の出力波形による変調が可能 1音(エレメント)につき1オクターブ-12dB/octのデジタルフィルターを2個搭載 <p>フィルター</p> <ul style="list-style-type: none"> 時変形デジタルフィルター×最大8/ボイス 各フィルターはLPP、HPPの切り替えができ、この組合せによりBPPやロールオフ-24dB/octのLPPとしても使用可能 レゾナンス可変で発振領域までカバー <p>最大同時発音数 最大同時音色数 発音形式</p> <ul style="list-style-type: none"> AWM2: 16音 + APM: 16音 16 後着優先 Dynamic Voice Allocation / Static Voice Allocation <p>エフェクタータイプ</p> <ul style="list-style-type: none"> (リバーブ系+モジュレーション系) × 2系統 リバーブ系: 40タイプ モジュレーション系: 4タイプ 	<ul style="list-style-type: none"> Effect bypass 1 Memory select 1 Page 3 Page, Page-, Jump/Mark テンキー 12 0 ~ 9, Enter, - Data Entry 2 Inc, Dec カーソル 4 ←, →, ↑, ↓ Function 10 Function 1~8, Shift, Exit
内部構成	<p>プリセットメモリー インターナルメモリー 波形用メモリー</p> <ul style="list-style-type: none"> ボイス: 128 + マルチ: 16 ボイス: 64 + マルチ: 16 2Mワード (4Mバイト) 楽器音×82 リズム×20 音色パラメータ用×1 MCD64: 1バンク ※1バンク: 64ボイス+16マルチ+1システム 波形用×1 (512Kワード) <p>カードスロット</p> <ul style="list-style-type: none"> 波形用×1 (512Kワード) 	<p>ディスプレイ</p> <p>LCD LED</p> <ul style="list-style-type: none"> 240 × 64 Dots (バックライト付き) 4 (パネルスイッチ内) <p>接続端子</p> <p>音声出力</p> <ul style="list-style-type: none"> 12 Output 1/1+2 (L/Mono, R), Output 2 (L, R) Individual Output 1~8 <p>ヘッドフォン MIDI</p> <ul style="list-style-type: none"> 1 3 IN, OUT, THRU <p>出力レベル</p> <p>ヘッドフォン リア出力端子</p> <ul style="list-style-type: none"> +5dBm (150Ω) Individual Output +5dBm (10kΩ) それ以外のOutput -1dBm (10kΩ) <p>※条件: 1kHz正弦波1音発音 (AFM) / 全ての端子挿入/ボリューム最大</p> <p>電源 (国内)</p> <p>電源電圧 消費電力</p> <ul style="list-style-type: none"> 100V 28W <p>寸法、重量</p> <p>寸法 重量</p> <ul style="list-style-type: none"> 3U: 480(W) × 132(H) × 390(D)mm 8kg <p>付属品</p> <ul style="list-style-type: none"> MIDIケーブル1本 (3m)

■ BLOCK DIAGRAM (ブロックダイアグラム)



■ **CIRCUIT BOARD LAYOUT & WIRING** (ユニットレイアウト & 結線図)

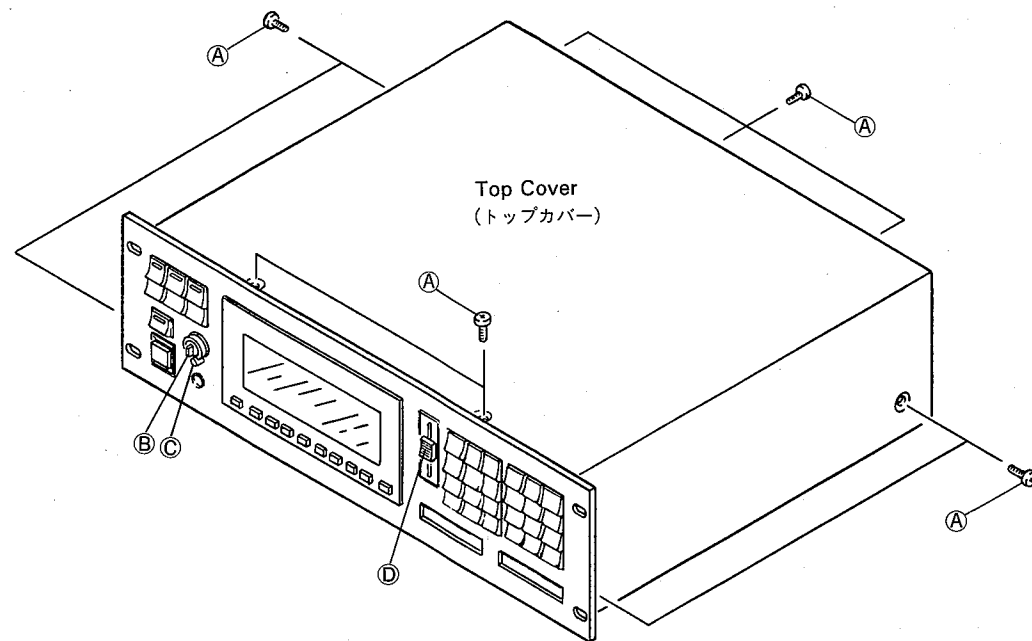


No.	Pins	Destination		Remarks
1	4	DM-CN101	PS-CN604	
2	2	DM-CN102	PS-CN603	
3	3	DM-CN103	PS-CN606	
4	5	DM-CN104	PN1/3-CN501	
5	3	DM-CN105	PN1/3-CN502	
6	14	DM-CN106	PN1/3-CN503	
7	15	DM-CN107	AN-CN304	
8	20	DM-CN108	LCD-CN1	Flat Cable
9	4	PN2/3-CN504	AN-CN301	
10	12	PN2/3-CN505	AN-CN302	
11	2	PN3/3-CN506	PS-CN605	
12	3	PN3/3-CN507	LCD-CN2	
13	7	AN-CN303	PS-CN607	
14	4	PS-CN601	Power Transformer	
15	5	PS-CN602	Power Transformer	

DISASSEMBLY PROCEDURE (分解手順)

1. Top Cover (Refer to Fig.1)

1-1. The Top cover can be removed by removing the nine (9) bonding head screws marked in the figure as A (3.0×6).



(Fig. 1)

2. Front Panel (Refer to Fig.1 and Fig.2)

2-1. Remove the Top cover. (see procedure 1 - Top Cover)

2-2. Pull out the Volume control knobs marked B, C and Slide knob marked D on the Front panel.

2-3. The Front panel can be removed by removing the three (3) flat head screws marked E (3.0×6) and three (3) bind head screws marked F (3.0×8).

1. トップカバーの外し方 (図1 参照)

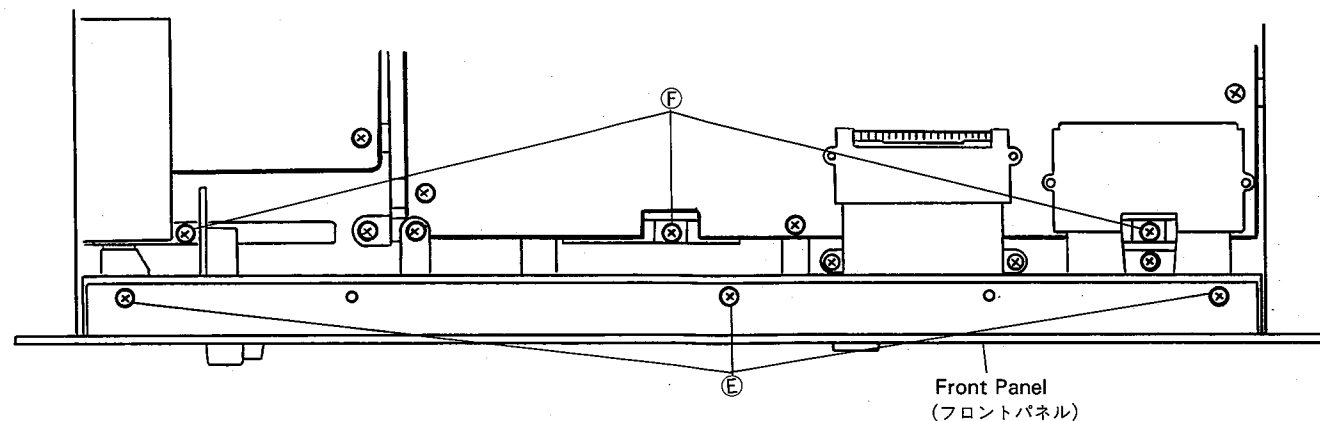
ボンディング小ネジ A (3.0×6) 9本を外し、トップカバーを外します。

2. フロントパネルの外し方 (図1, 2 参照)

2-1. トップカバーを外します。(1項参照)

2-2. フロントパネルより、内つまみ B と外つまみ C とスライドつまみ D を外します。

2-3. 皿小ネジ E (3.0×6) 3本とバインド小ネジ F (3.0×8) 3本を外し、フロントパネルを手前に引き抜きます。



(Fig. 2)

3. LCD Assembly (Refer to Fig.3 and Fig.4)

3-1. Remove the Top cover. (see procedure 1.)

3-2. Remove the Front panel. (see procedure 2.)

3-3. Remove the four (4) bind head screws marked G (4.0×10), the Display assembly can be taken out of the TG77 unit.

3-4. To remove the LCD assembly from the Display assembly, remove the four (4) bind head tapping screws marked H (3.0×8).

3. 液晶ディスプレイの外し方 (図3, 4 参照)

3-1. トップカバーを外します。(1項参照)

3-2. フロントパネルを外します。(2項参照)

3-3. バインド小ネジ G (4.0×10) 4本を外し、ディスプレイ Ass'y を外します。

3-4. バインドタッピングネジ H (3.0×8) 4本を外し、ディスプレイ Ass'y より液晶ディスプレイを外します。

4. PN1/3 Circuit Board (Refer to Fig.3)

4-1. Remove the Top cover. (see procedure 1.)

4-2. Remove the Front panel. (see procedure 2.)

4-3. Remove the Display assembly. (see procedure 3-3)

4-4. Remove the one (1) bind head screw marked I (3.0×8) and take the PN1/3 circuit board out of the sub-panel while pressing the eleven (11) stoppers marked J slightly.

4. PN1/3シートの外し方 (図3 参照)

4-1. トップカバーを外します。(1項参照)

4-2. フロントパネルを外します。(2項参照)

4-3. ディスプレイ Ass'y を外します。

(3-3項参照)

4-4. バインド小ネジ I (3.0×8) 1本を外し、サブパネルのストッパー J 11ヶ所を押しながら、PN1/3シートを手前に引き抜きます。

5. PN2/3 Circuit Board (Refer to Fig.3)

5-1. Remove the Top cover. (see procedure 1.)

5-2. Remove the Front panel. (see procedure 2.)

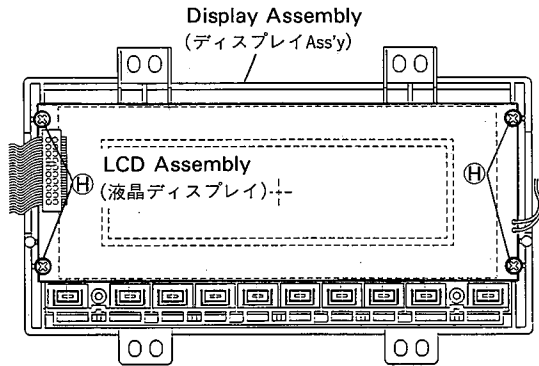
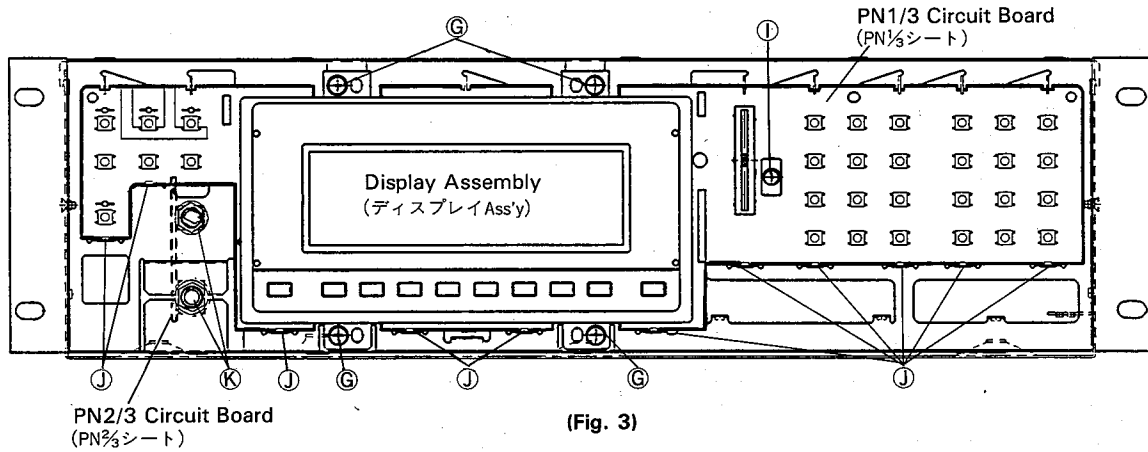
5-3. Remove the two (2) hexagonal nuts marked K, the PN2/3 circuit board can be removed.

5. PN2/3シートの外し方 (図3 参照)

5-1. トップカバーを外します。(1項参照)

5-2. フロントパネルを外します。(2項参照)

5-3. 六角ナット K 2個を外し、PN2/3シートを外します。

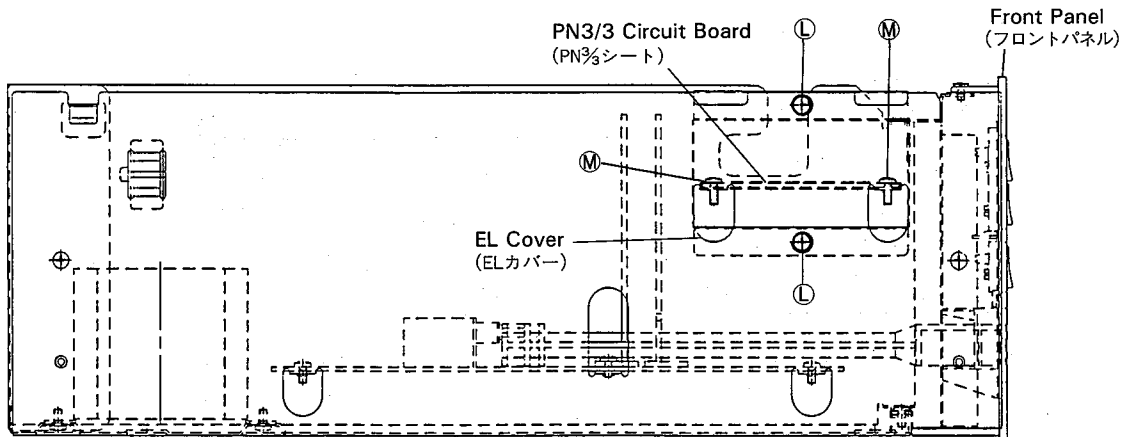


6. PN3/3 Circuit Board (Refer to Fig.5)

- 6-1. Remove the Top cover. (see procedure 1.)
- 6-2. Remove the two (2) flat head screws marked ① (3.0×6) and remove the EL cover.
- 6-3. The PN3/3 circuit board can be removed by removing the two (2) bind head screws marked ② (3.0×8).

6. PN3/3シートの外し方 (図5参照)

- 6-1. トップカバーを外します。(1項参照)
- 6-2. 皿小ネジ①(3.0×6)2本を外し、ELカバーを外します。
- 6-3. バインド小ネジ②(3.0×8)2本を外し、PN3/3シートを外します。

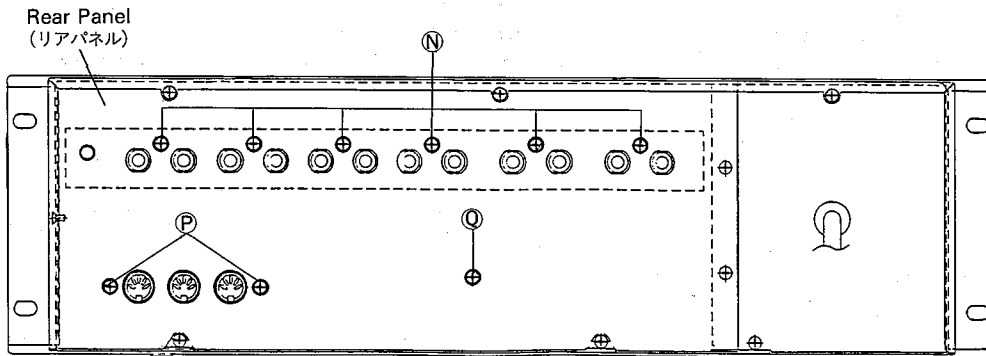


7. AN Circuit Board (Refer to Fig.6 and Fig.7)

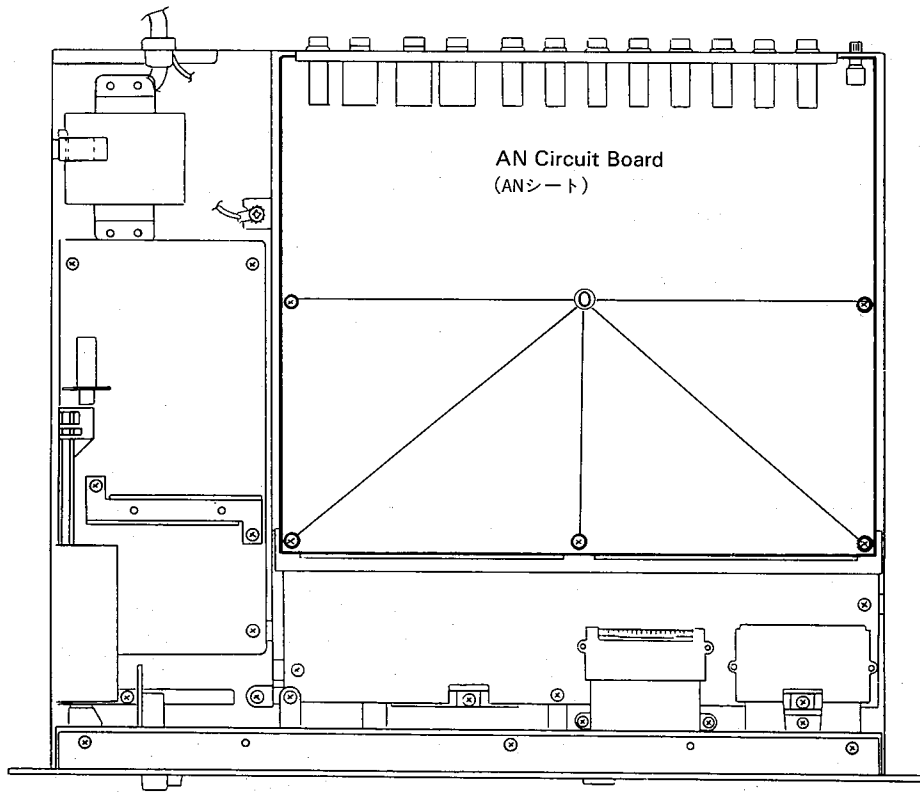
- 7-1. Remove the Top cover. (see procedure 1.)
- 7-2. The AN circuit board can be removed by removing the six (6) bonding head screws marked **Ⓝ** (3.0×6) and five (5) bind head screws marked **Ⓞ** (3.0×8).

7. ANシートの外し方 (図6, 7 参照)

- 7-1. トップカバーを外します。(1項参照)
- 7-2. ボンディング小ネジ Ⓝ (3.0×6)、6本と
バインド小ネジ Ⓞ (3.0×8) 5本を外し、
ANシートを外します。



(Fig. 6)



(Fig. 7)

8. DM Circuit Board (Refer to Fig.6 and Fig.8)

- 8-1. Remove the Top cover. (see procedure 1.)
 8-2. Remove the AN circuit board. (see procedure 7.)
 8-3. The DM circuit board can be removed by removing the two (2) bind head tapping screws marked ⑩ (3.0×8), one (1) bonding head screw marked ⑪ (3.0×6) and eight (8) bind head screws marked ⑫ (3.0×8).

8. DMシートの外し方 (図6, 8 参照)

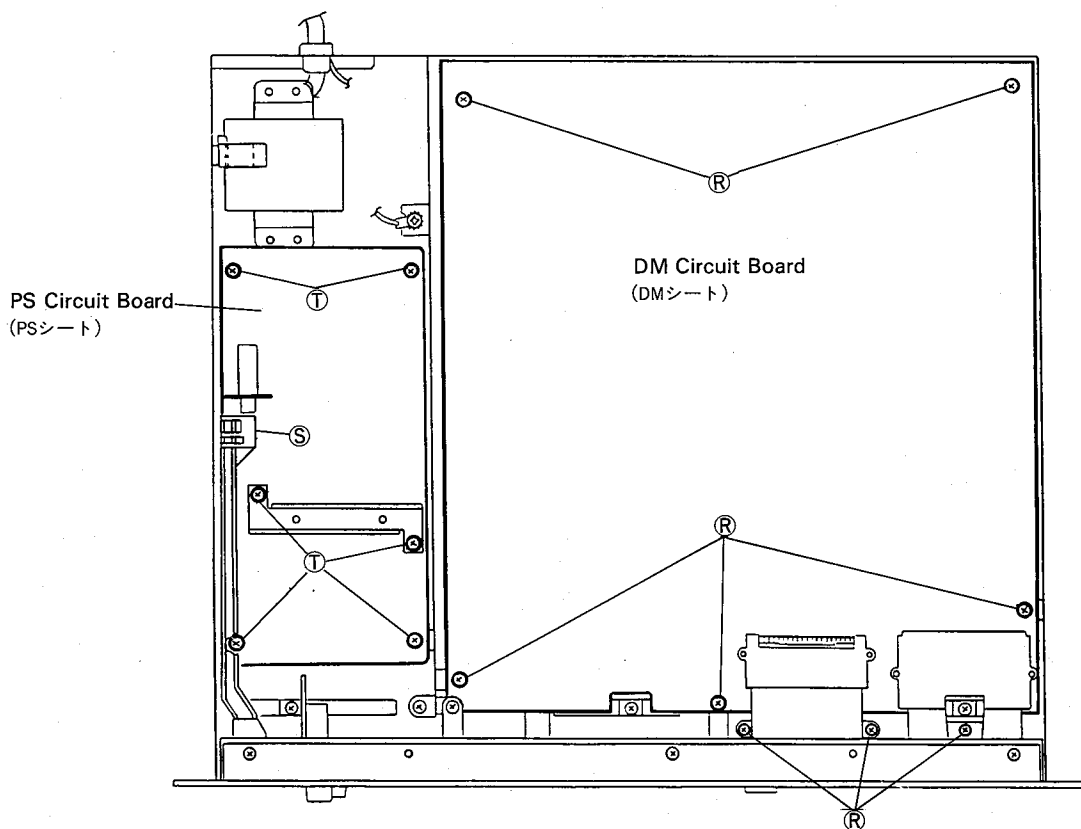
- 8-1. トップカバーを外します。(1項参照)
 8-2. ANシートを外します。(7項参照)
 8-3. バインドタッピングネジ⑩(3.0×8) 2本とボンディング小ネジ⑪(3.0×6) 1本とバインド小ネジ⑫(3.0×8) 8本を外し、DMシートを外します。

9. PS Circuit Board (Refer to Fig.8)

- 9-1. Remove the Top cover. (see procedure 1.)
 9-2. Remove the PN3/3 circuit board (see procedure 6.)
 9-3. Pull out the Push rod marked ⑬.
 9-4. The PS circuit board can be removed by removing the six (6) bind head screws marked ⑭ (3.0×8).

9. PSシートの外し方 (図8 参照)

- 9-1. トップカバーを外します。(1項参照)
 9-2. PN3/3シートを外します。(6項参照)
 9-3. プッシュロッド⑬を一度手前に引き、押し出すようにして外します。
 9-4. バインド小ネジ⑭(3.0×8) 6本外し、PSシートを外します。



(Fig. 8)

LSI PIN DESCRIPTION (LSI 端子機能表)

• HD6475328CP-10 (XH564B00) CPU (Central Processing Unit)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION	
1	XTAL	I	Clock	43	P50/A8	O	Address bus	
2	Vss	I	Ground	44	P51/A9	O		
3	P10/ ϕ	O	System clock	45	P52/A10	O		
4	P11/E	O	Enable	46	P53/A11	O		
5	P12/BACK	O	Bus acknowledge	47	P54/A12	O		
6	P13/BREQ	I	Bus request	48	P55/A13	O		
7	P14/WAIT	I	Wait	49	P56/A14	O		
8	P15/IRQ0	I	Interrupt request 0	50	P57/A15	O		
9	P16/IRQ1	I	Interrupt request 1	51	P60/A16	O		
10	P17/TMO	O	8-bit timer output	52	P61/A17	O		
11	P20/AS	O	Address strobe	53	P62/A18	O		
12	P21/R/W	O	Read/Write	54	P63/A19	O		
13	P22/DS	O	Data strobe	55	Vcc			Power supply
14	P23/RD	O	Read control	56	P70/TMCI	I		8-bit timer clock input
15	P24/WR	O	Write control	57	P71/FT11	I		Free running timer input capture (8-bit timer counter reset input)
16	Vcc		Power supply	58	P72/FT12	I		
17	MD0	I	Mode control	59	P73/FT13/TMRI	I		
18	MD1	I		60	P74/FT0B1/FTC11	O/I		Free running timer output compare B/ Free running timer counter clock
19	MD2	I		61	P75/FT0B2/FTC12	O/I		
20	STBY	I	Standby	62	P76/FT0B3/FTC13	O/I	Free running timer output compare A1 Ground	
21	RES	I	Reset	63	P77/FTOA1	O		
22	NMI	I	Non-maskable interrupt	64	Vss		Analog ground	
23	NC			65	AVss			
24	Vss		Ground	66	P80/AN0	I	Port 8	
25	P30/D0	I/O	Data bus	67	P81/AN1	I		
26	P31/D1	I/O		68	P82/AN2	I		
27	P32/D2	I/O		69	P83/AN3	I		
28	P33/D3	I/O		70	P84/AN4	I		
29	P34/D4	I/O		71	P85/AN5	I		
30	P35/D5	I/O		72	P86/AN6	I		
31	P36/D6	I/O		73	P87/AN7	I		
32	P37/D7	I/O		74	AVcc			Analog power supply
33	P40/A0	O		75	P90/FTOA2	O		Free running timer output compare A2
34	P41/A1	O		76	P91/FTOA3	O	Free running timer output compare A3	
35	P42/A2	O	Address bus	77	P92/PW1	O	Pulse width	
36	P43/A3	O		78	P93/PW2	O		
37	P44/A4	O		79	P94/PW3	O		
38	P45/A5	O		80	P95/TXD	O	Transmit data	
39	P46/A6	O	Ground	81	P96/RXD	I	Receive data	
40	P47/A7	O		82	P97/SCK	I/O	Serial clock	
41	Vss			83	Vss		Ground	
42	Vss			84	EXTAL	I	Clock	

• YM3413 (XE449A00) LDSP (Digital Signal Processor)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION	
1	VDD		DC supply (+5V)	21	A5	O	Address bus	
2	D7	I/O	Data bus	22	A6	O		
3	D6	I/O		23	A7	O		
4	D5	I/O		24	A8	O		
5	D4	I/O		25	A9	O		
6	D3	I/O		26	A10	O		
7	D2	I/O		27	A11	O		
8	D1	I/O		28	A12	O		
9	D0	I/O		29	A13	O		
10	SI0	I	Serial data input	30	A14	O		
11	SI1	I	Sync pulse	31	A15	O		
12	SYW	I		32	A16	O		
13	WE	O	Write enable	33	SO0	O		Serial data output
14	OE	O	Output enable	34	XCLK	I		Clock
15	A0	O	Address bus	35	IC	I		Initial Clear
16	A1	O		36	CRS	I		CD counter reset
17	A2	O		37	CDI	I	CD input	
18	A3	O		38	CDo	O	CD output	
19	A4	O	Ground	39	SO1	O	Serial data output	
20	Vss			40	CLK	I	Clock	

• **YM3415B (XE450B00) LEF (Effect Processor)**

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	V _{DD}		Power supply	21	A7	O	Address bus
2	S _{I0}	I	Serial data input	22	A6	O	
3	S _{I1/TST1}	I		23	A5	O	
4	S _{O0}	O	Serial data input	24	A4	O	
5	S _{O1}	O		25	A3	O	
6	XCLK	I	Clock	26	A2	O	
7	CDO	O	CD data output	27	A1	O	
8	CDI	I	CD data input	28	A0	O	
9	CRS/CE	I	CD counter reset	29	RAS	O	DRAM control
10	WR	I	Write control	30	CAS	O	
11	A/D	I	Address/data parameter select	31	WE	O	WE signal
12	PD0	I/O	Data bus	32	OE	O	OE signal
13	PD1	I/O		33	D3	I/O	Data bus
14	PD2	I/O		34	D2	I/O	
15	PD3	I/O		35	D1	I/O	
16	PD4	I/O		36	D0	I/O	
17	PD5	I/O		37	TST2	I	Internal test
18	PD6	I/O		38	SYW	I	Sync pulse
19	PD7	I/O	39	CLK	I	Clock	
20	V _{SS}		Ground	40	IC	I	Initial clear

• **YM7102 (XG996A00) PAN (Panning Processor)**

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	A0	I	Data bus	41	L8/ACC8	O	L channel data
2	D7	I/O		42	L9/ACC9	O	
3	D6	I/O		43	L10/ACC10	O	
4	D5	I/O		44	L11/ACC11	O	
5	D4	I/O		45	L12/ACC12	O	
6	D3	I/O		46	L13/ACC13	O	
7	D2	I/O		47	L14/ACC14	O	
8	D1	I/O		48	L15/ACC15	O	
9	D0	I/O		49	R0/ACC16	O	
10	IN1	I	Data from OPS	50	R1/ACC17	O	
11	IN0	I	Data from PAN (cathcade input)	51	R2/ACC18	O	
12	S _{I2}	I		52	R3/ACC19	O	
13	S _{I1}	I		53	R4	O	
14	TEGSS	I	Test pin	54	R5	O	
15	TEGS2	I		55	R6	O	
16	TEGS1	I		56	R7	O	
17	TEGS0	I		57	R8	O	
18	NC		Control data for DSP	58	R9	O	
19	CDO	O		59	R10	O	
20	CRS	O		60	R11	O	
21	S1	O		61	R12	O	
22	S2	O		62	R13	O	
23	SYW	O	Sync pulse for DSP	63	R14	O	
24	DSPCLK	O	Clock for DSP	64	R15	O	
25	MODE	I	Output mode (L:16bits DAC H:20bits DAC)	65	NC		
26	IC	I	Initial clear	66	TTIM	I	Test pin
27	SYNC	I	Sync pulse	67	TEG1	I	
28	φ _M	I	Clock	68	TEG0	I	
29	V _{SS}		Ground	69	TRD	I	
30	V _{SS}			70	CS2	I	Chip select
31	V _{DD}		Power supply	71	CS1	I	
32	V _{DD}			72	V _{DD}		Power supply
33	L0/ACC0	O	L channel data	73	CS0	I	
34	L1/ACC1	O		74	A7	I	
35	L2/ACC2	O		75	A6	I	Address bus
36	L3/ACC3	O		76	A5	I	
37	L4/ACC4	O		77	A4	I	
38	L5/ACC5	O		78	A3	I	
39	L6/ACC6	O		79	A2	I	
40	L7/ACC7	O	80	A1	I		

• **YM3029 (XF237A00) AFD0 (Floating Point Converter)**

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	DVDD		Digital power supply (+5V)	15	SHA	I	Sample and hold input (Channel A)
2	LE	O	Latch enable	16	EXG		
3	DAB	O	Channel A/B data output	17	EXG		Exponent ground
4	SYW	I	Sync pulse	18	EXI	I	
5	CLK	I	Clock	19	EXO	O	Exponent input
6	$\phi 1$	O	Clock for DAC	20	AVSS		Exponent output
7	DGND		Digital ground	21	AVDD		Analog power supply (-5V)
8	ADV V		Analog power supply (+5V)	22	S11	I	Analog power supply (+5V)
9	AVSS		Analog power supply (-5V)	23	VLA0	I	Serial data input 1 (Channel A)
10	SHB	I	Sample and hold input (Channel B)	24	VLA1	I	
11	CH4	O	Output (Channel 4)	25	S12	I	Volume level select (Channel A)
12	CH3	O	Output (Channel 3)	26	VLB0	I	
13	CH2	O	Output (Channel 2)	27	VLB1	I	Serial data input 2 (Channel B)
14	CH1	O	Output (Channel 1)	28	4/2	I	
							Volume level select (Channel B)
							Channel number select (4 or 2-channel)

• **YM7103 (XG993A00) EGM2 (Envelope Generator)**

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	A0	I	Address bus	41	NC		Key on data
2	D7	I/O		42	KON	O	
3	D6	I/O		43	E0	O	
4	D5	I/O		44	E1	O	
5	D4	I/O		45	E2	O	
6	D3	I/O		46	E3	O	
7	D2	I/O		47	E4	O	
8	D1	I/O		48	E5	O	
9	D0	I/O		49	E6	O	
10	NC		50	E7	O	Envelope data, Pitch data (portament), Pitch envelope data	
11	TST10	O	51	E8	O		
12	TST9	O	52	E9	O		
13	TST8	O	53	E10	O		
14	TST7	O	54	E11	O		
15	TST6	O	55	E12	O		
16	TST5	O	56	E13	O		
17	TST4	O	57	NC			
18	TST3	O	58	NC			
19	TST2	O	59	NC			
20	TST1	O	60	NC			
21	TST0	O	61	NC			
22	$\phi M0$	O	Clock	62	NC		
23	XTAL	O	Quartz crystal	63	NC		
24	EXTAL	I		64	NC		
25	IC	I	Initial clear	65	NC		
26	SYO	O	Sync pulse	66	NC		
27	SYI	I	Sync pulse	67	NC		
28	$\phi M1$	I	Clock	68	NC		
29	Vss		Ground	69	NC		
30	Vss			70	NC		
31	NC		Power supply	71	TRD	I	Test pin
32	Vdd			72	Vdd		
33	NC		Chip select	73	CS0	I	
34	NC			74	CS1	I	
35	NC			75	CS2	I	
36	TEGS2	I	Test pin	76	A5	I	
37	TEGS1	I		77	A4	I	
38	TEGS0	I		78	A3	I	Address bus
39	TSO1	O	79	A2	I		
40	TSO0	O	80	A1	I		

• **YM7107 (XG994A00) OPS3 (Operator)**

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION	
1	A0	I	Address bus	41	DA8	O	D/A signal (straight binary) (MSB)	
2	D7	I/O		42	DA9	O		
3	D6	I/O	Data bus	43	DA10	O		
4	D5	I/O		44	DA11	O		
5	D4	I/O		45	DA12	O		
6	D3	I/O		46	DA13	O		
7	D2	I/O		47	DA14	O		
8	D1	I/O		48	DA15	O		
9	D0	I/O		49	SH1	O		Sample and hold
10	E13	I		50	SH2	O		
11	E12	I	Envelope data, Pitch envelope data, Pitch data	51	SC0	O		Channel distribution
12	E11	I		52	SC1	O		
13	E10	I		53	SC2	O		
14	E9	I		Serial data (2 compl. 16bits LSB first)	54	SO0		O
15	E8	I			55	SO1		O
16	E7	I			56	NC		
17	E6	I			57	NC		
18	E5	I			58	NC		
19	E4	I			59	NC		
20	E3	I			60	NC		
21	E2	I	61	NC				
22	E1	I	62	NC				
23	E0	I	Phase reset for phase accumulator Initial clear	63	NC			
24	KON	I		64	NC			
25	IC	I	Sync pulse (127C127) Clock	65	NC			
26	NC			66	NC			
27	SYNC	I	Ground	67	NC			
28	ϕ_M	I		68	Vss			
29	Vss		Power supply (LSB)	69	SIO	I	Serial data	
30	Vss			70	S11	I		
31	VDD		Power supply	71	NC			
32	VDD			72	VDD			
33	DA0	O		73	CS0	I	Chip select	
34	DA1	O	74	CS1	I			
35	DA2	O	75	CS2	I			
36	DA3	O	D/A signal (straight binary)	76	A4	I	Address bus	
37	DA4	O		77	A3	I		
38	DA5	O		78	A2	I		
39	DA6	O		79	A1	I		
40	DA7	O		80	Vss			Ground

• **MIX3 (IG156010) Mixer**

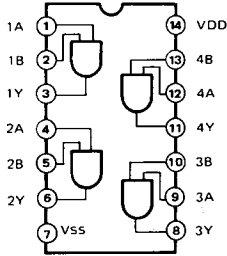
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	MIX1	I	Input from tone generator	9	RES	I	Reset
2	MIX2	I		10	NC		Not used
3	MIX3	I		11	MXD	O	Mixing data output
4	MIX4	I		12	MXC	O	
5	CDI	I	Control data input	13	SYW	I	Synch. pulse
6	CRS	I	CD counter reset	14	XCLK	I	Clock
7	CDO	O	Control data output	15	CLK	I	Master clock
8	VSS		Ground	16	VDD		Power supply

• YM7119 (XG995A00) M3 (AWM Tone Generator & Digital Filter)

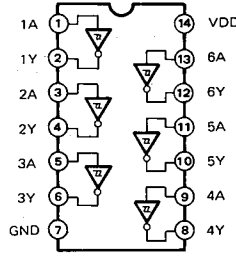
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION		
1	INDV0	O	Individual output 0 (8 channels)	65	WA8	O	Wave memory address bus		
2	INDV1	O	Individual output 1 (8 channels)	66	WA9	O			
3	OPZ	I	MELIN input select (OPZ, PAN)	67	WA10	O			
4	DIOUT0	O	Stereo output (L & R)	68	WA11	O			
5	DIOUT1	O	Assignable output (ch.0 & ch.4)	69	WA12	O			
6	DIOUT2	O	Assignable output (ch.1 & ch.5)	70	WA13	O			
7	DIOUT3	O	Assignable output (ch.2 & ch.6)	71	WA14	O			
8	DIOUT4	O	Assignable output (ch.3 & ch.7)	72	NC				
9	MELIN	I	MEL formatted signal input	73	WA15	O			
10	LSB/MSB	I	Individual output mode select	74	WA16	O			
11	TTPAD0	I/O	(MSB first, LSB first)	75	WA17	O			
12	TTPAD1	I/O		76	WA18	O			
13	NC			77	WA19	O			
14	TTPAD2	I/O		78	WA20	O			
15	TTPAD3	I/O		79	WA21	O			
16	TTPAD4	I/O		80	WA22	O			
17	TTPAD5	I/O		81	WA23	O			
18	NC		Test pin	82	A0	I	CPU address bus		
19	TTPAD6	I/O			83	A1		I	
20	TTPAD7	I/O			84	A2		I	
21	NC				85	A3		I	
22	TTPAD8	I/O			86	A4		I	
23	TTPAD9	I/O			87	A5		I	
24	NC				88	D0		I/O	
25	TTPAD10	I/O			89	NC			
26	TTPAD11	I/O			90	D1		I/O	
27	DIINO	I		Individual input 0 (8 channels)	91	D2		I/O	CPU data bus
28	DIIN1	I		Individual input 1 (8 channels)	92	D3		I/O	
29	WD0	I/O		93	D4	I/O			
30	WD1	I/O		94	D5	I/O			
31	WD2	I/O		95	D6	I/O			
32	WD3	I/O		96	D7	I/O			
33	NC			97	S/HSC0	I			
34	WD4	I/O		98	S/HSC1	I			
35	WD5	I/O		99	S/HSC2	I			
36	WD6	I/O		100	S/HSC3	I			
37	WD7	I/O	Wave memory data	101	S/HEN	O	Sample and hold enable		
38	WD8	I/O			102	S/H0	O	Sample and hold 0~3	
39	WD9	I/O			103	S/H1	O		
40	NC				104	S/H2	O		
41	NC				105	S/HRC A	I	Sample and hold reset A and B	
42	WD10	I/O			106	S/HRC B	I		
43	WD11	I/O			107	IC	I	Initial clear	
44	NC				108	Vss		Ground	
45	WD12	I/O			109	XTAL	O	Clock	
46	WD13	I/O			110	EXTAL	I		
47	WD14	I/O			111	NC		Sync. signal on 2 chips mode	
48	Vss		Ground	112	FCLKOUT	O			
49	VDD		Power supply	113	FCLKIN	I			
50	WD15	I/O		114	NC		6.144MHz clock		
51	MSBW	O	Wave data MSB write signal	115	CLK3	O			
52	LSBW	O	Wave data LSB write signal	116	VDD		Power supply		
53	OE	O	Output enable for wave data	117	SYWIN	I	Sync. signal for MEL format		
54	ODD/EVEN	I	Odd/Even select on 2 chips mode	118	CLKMEL	O	3.072MHz clock for MEL format		
55	SINGLE/DUAL	I	Wave memory single/dual mode	119	NC		Latch enable for PCM56 (DAC)		
56	WA0	O	select (: dual-2 chips mode, : single-1 chip mode)	120	DACLE	O			
57	WA1	O		121	SYWOUT	O	Sync pulse for MEL format		
58	WA2	O		122	SYW64	O	6.144MHz sync. signal		
59	WA3	O		123	IRQ	O	Interrupt request (open drain)		
60	WA4	O	Wave memory address bus	124	CS	I	Chip select		
61	WA5	O			125	R/W	I	Read/Write control	
62	WA6	O			126	CHPIN	I	EG lowest ch. detect	
63	WA7	O			127	CHPOUT	O	EG lowest ch. detect	
64	NC				128	KSYNC	I	Key on sync. signal from AFM	

■ IC BLOCK DIAGRAM (ICブロック図)

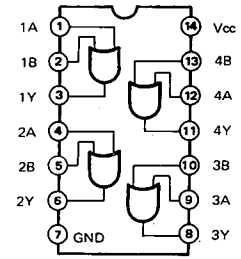
- **SN74ALS08N** (XA876001)
Quad 2 Input AND



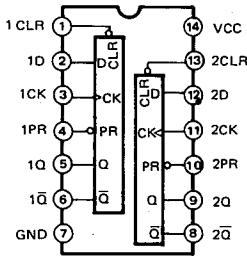
- **SN74HC14N** (IR001450)
Hex Inverter



- **74F32PC** (IG058990)
SN74LS32N (IG049850)
SN74ALS32N (XA055001)
TC74HC32AP (IR003200)
Quad 2 Input OR

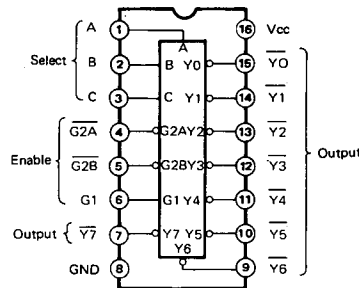


- **SN74ALS74N** (XA196A00)
Dual D-Type Flip-Flop

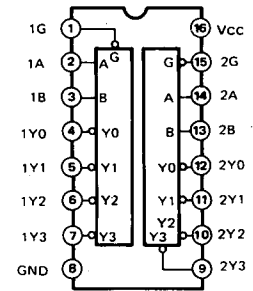


INPUTS			OUTPUTS		
PR	CLR	CLK	D	Q	Q̄
L	H	X	X	H	L
H	L	X	X	L	H
L	L	X	X	H	H
H	H	↑	H	H	L
H	H	↑	L	L	H
H	H	L	X	Q _o	Q̄ _o

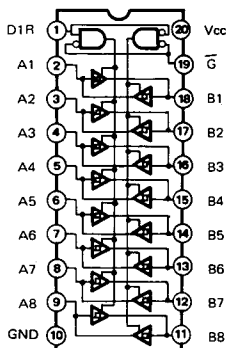
- **74F138PC** (IG120090)
SN74ALS138N (IG149600)
3 to 8 Demultiplexer



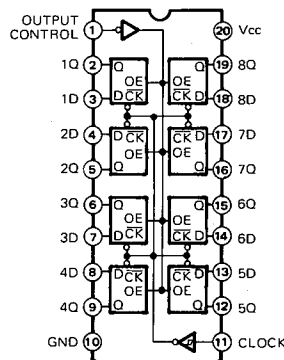
- **SN74HC139N** (IR013950)
Dual 2 to 4 Demultiplexer



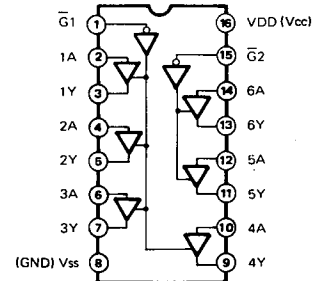
- **SN74LS245** (IG044600)
SN74ALS245AN (IG149900)
SN74HC245N (IR024550)
TC74AC245P (XH608A00)
Octal 3-State Bus Transceiver



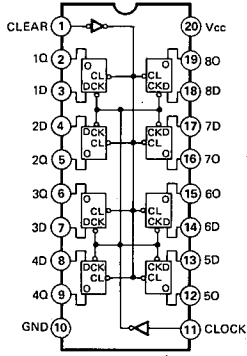
- **SN74HC273N** (IR027350)
Octal D-Type Flip-Flop



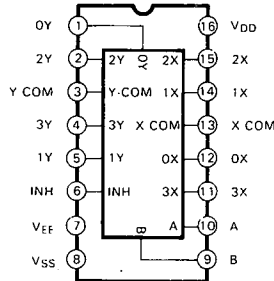
- **SN74HC367N** (IR036750)
Hex 3-State Bus Buffer



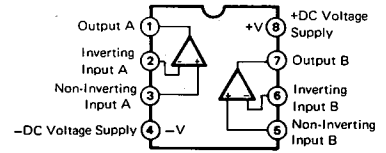
- **SN74HC374N (IR037450)**
Octal 3-State D-Type Flip-Flop



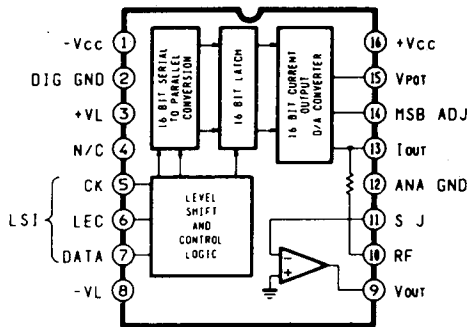
- **TC74HC4052AP (IR405200)**
Differential 4-Channel Multiplexer/Demultiplexer



- **RC4558DV (IG001390)**
NJM4556 (IG042500)
M5238P (XA013001)
Dual Operational Amplifier

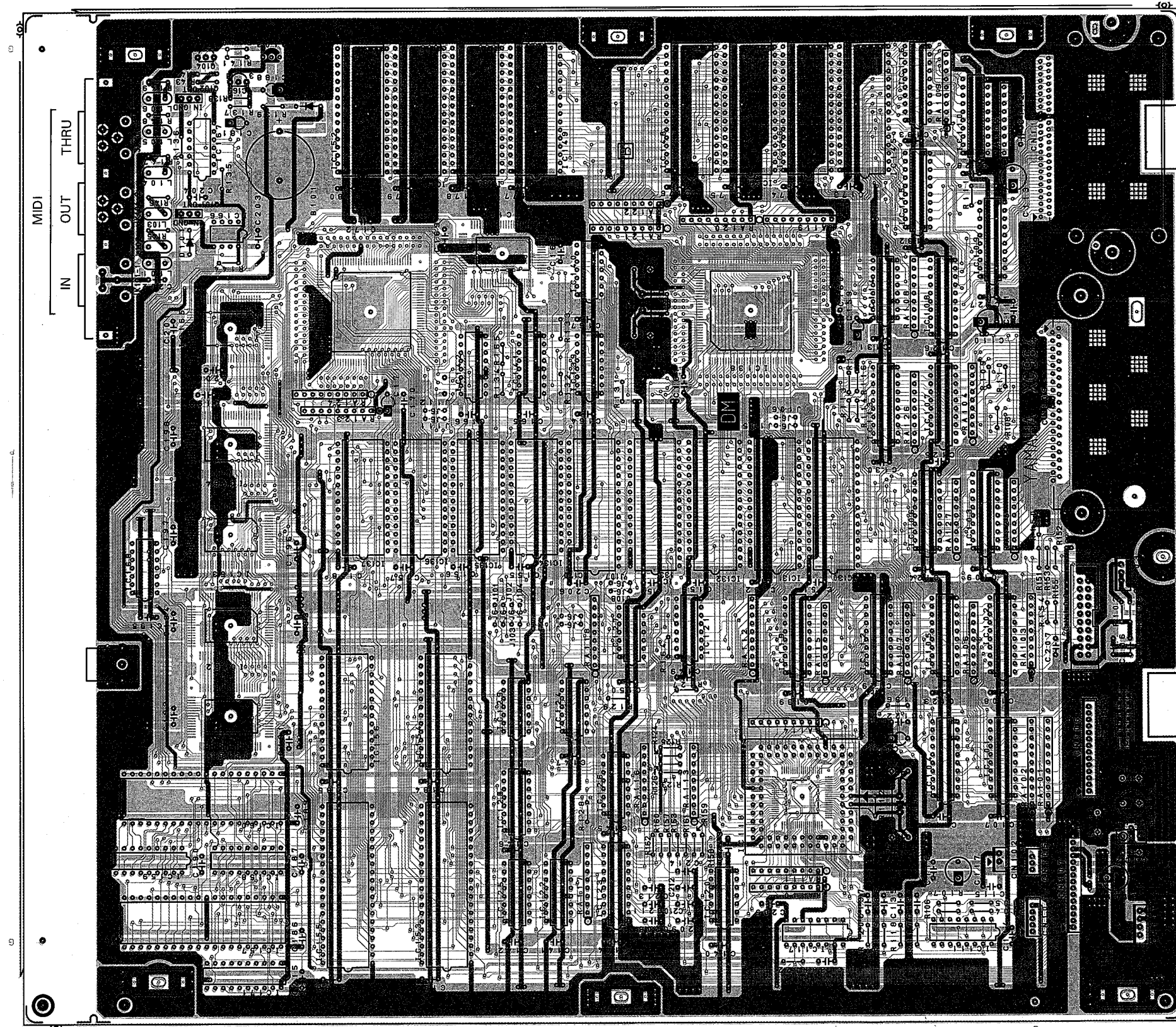


- **PCM56P-Y (XH690A00)**
Digital Analog Converter



■ CIRCUIT BOARDS (シート基板図)

● DM Circuit Board



Notes)

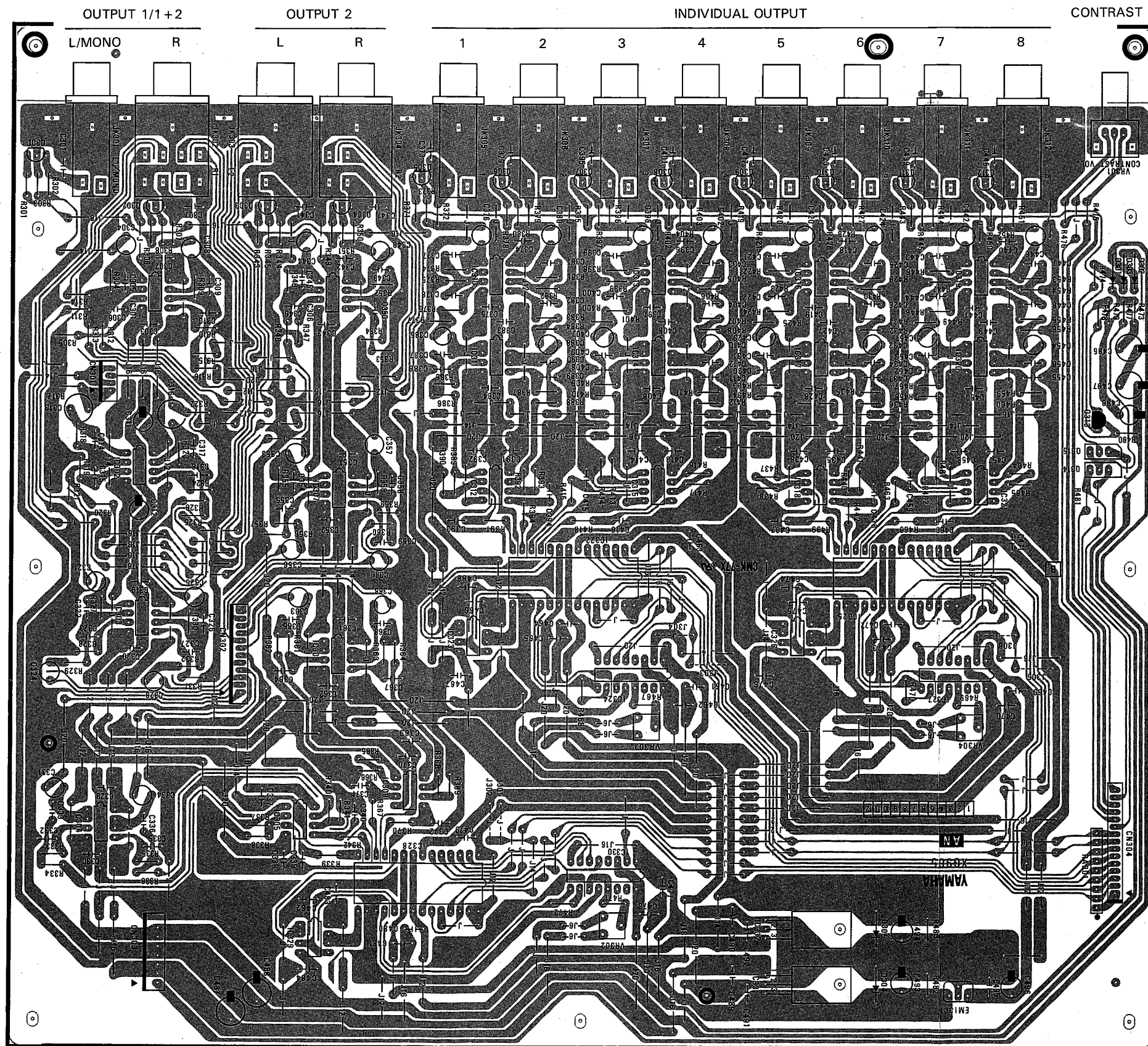
Circuit Board: DM (VJ184800) XG964B0

1. IC
 - IC101, 102, 108, 109, 115: SN74HC245N (IRO24550) TRANSCEIVER
 - IC103, 105-107, 113, 113, 119: SN74ALS245AN (IG149900) BUS TRANSCEIVER
 - IC104: SN74HC374N (IRO37450) D.F.F
 - IC110, 116: SN74LS245 (IG044600) TRANSCEIVER
 - IC111, 139: SN74HC367N (IRO36750) BUS DRIVER
 - IC114: SN74HC139N (IRO139500) DECODER
 - IC117: TC74HC4052AP (IR405200) DEMULTIPLEXER
 - IC118: HD6475328CP10 (XH564800) CPU
 - IC120: SN74ALS74N (XA196A00) F-FLOP
 - IC121, 126: 74F138PC (IG120090) 3-8DECODER
 - IC122, 125, 141, 142: MIX3 (IG156010) MIXER
 - IC123: TC74AC245P (XH608A00) BUS TRANSCEIVER
 - IC124: 74F32PC (IG058990) OR
 - IC127: SN74ALS32N (XA055001) OR
 - IC128: SN74ALS138N (IG149600) DECODER
 - IC129: TC74HC32AP (IRO03200) OR
 - IC130: 104AV100 (XH558B00) EPROM
 - IC131: 104BV100 (XH559B00) EPROM
 - IC132: 104CV100 (XH560B00) EPROM
 - IC133: 104DV100 (XH561B00) EPROM
 - IC134-137: TC55257BPL-10 (XG960A00) SRAM 256K
 - IC138, 144: YM7119 (XG995A00) M3
 - IC140: SN74ALS08N (XA876001) AND
 - IC143, 165: YM7102 (XG996A00) PAN
 - IC145: HN62304BPM17 (XH966A00) ROM-A 4M
 - IC146: HN62304BPH30 (XH026B00) ROM-C 4M
 - IC147: HN62304BPH32 (XH028B00) ROM-E 4M
 - IC148: HN62304BPH34 (XH030B00) ROM-G 4M
 - IC149: HN62304BPM18 (XH967A00) ROM-B 4M
 - IC150: HN62304BPH31 (XH027B00) ROM-D 4M
 - IC151: HN62304BPH33 (XH029B00) ROM-F 4M
 - IC152: HN62304BPH35 (XH031B00) ROM-H 4M
 - IC153, 155: YM3413 (XE449A00) LDSP
 - IC154, 156: TC51832PL-10 (XC628A00) PSRAM 256K
 - IC157, 160: YM3415B (XE450B00) LEF
 - IC158, 159: MB81464-12 (XA457A00) DRAM 256K
 - IC161, 163: YM7107 (XG994A00) OPS3
 - IC162, 164: YM7103 (XG993A00) EGM2
 - IC167: SN74HC14N (IRO01450) INVERTER
 - IC168: SN74LS32N (IG049850) OR
 - IC169: PST518B-2 (IG116200) SYSTEM RESET
 - IC170: 104EV030 (XH562A00) EPROM V0.30
 - IC171: SN74HC273N (IRO27350) D.F.F

2. Photo Coupler
 - IC166: 6N137 (VD473200)
3. Transistor
 - Q103: 2SA950 O, Y (IA095010)
 - Q104: 2SC1815 Y, GR (IC181520)
4. Digital Transistor
 - Q101, 102: DTC143XS TP (VD488500)
5. Diode
 - D101, 102: 1SS133 (IF003450)
6. Resistor Array
 - RA101, 102: RMNG10-472/103J (HZ005000) 4.7K + 10K
 - RA103-127: RGLD8X103J (VE445200) 10KX8
 - RA118: RGLD8X102J (VE444700) 1KX8
7. Tantalum Capacitor
 - C188: 10.0μF 16V M (FP737100)
8. Semiconductive Cera. Cap.
 - 0.1μF 25V Z (VC694800)
9. Coil
 - L101-106: FL5R200QNT 20μ (VB835000)
10. LC Filter
 - EM101: DSS306-93F22321 (VD542700)
11. Quartz Crystal Unit
 - X101: 20.00MHz AT-49 (VI927300)
 - X102: 6.144MHz AT-49 (VH949900)
12. MIDI Connectors
 - JK101: 3 YKF51-5041 (VJ144000) MIDI
13. Connector, Card
 - CN109: 38P (VF821100) DATA
 - CN110: 50P (VH985300) WAVEFORM
14. Lithium Battery
 - B101: CR2032 (VE338400)
15. Jumper Wire (○: installed ×: not installed)

J101	J102	J103	J104	J105	J106	J107	J108	J109	J110
○	×	×	○	○	×	○	×	○	×
J111	J112								
○	×								

● AN Circuit Board



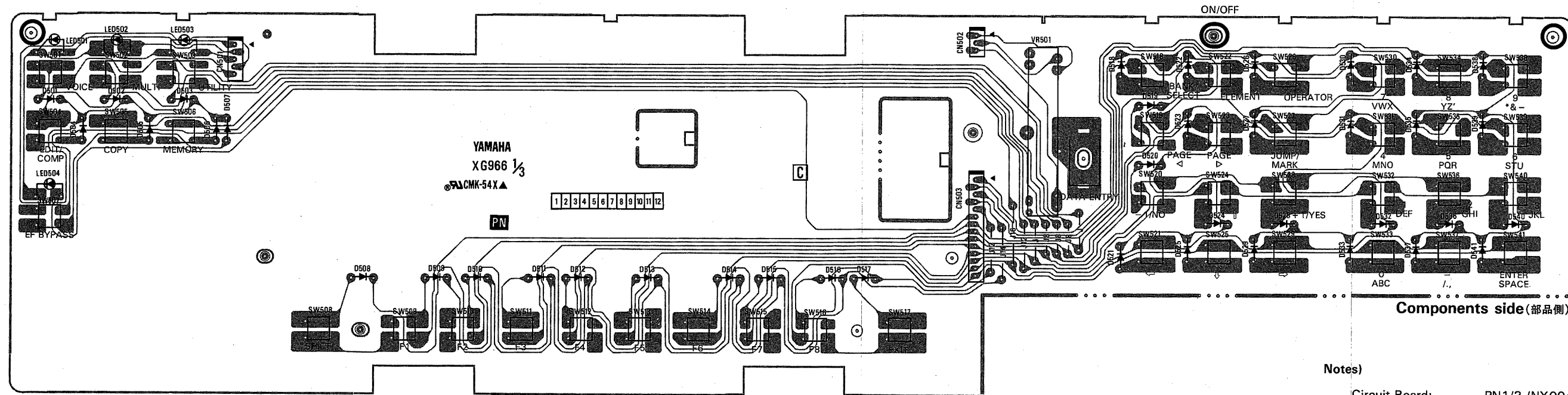
Notes)

- | | | |
|------------------------------|---|---|
| Circuit Board: | AN (VJ185500) XG965B0 | |
| 1. IC | IC301, 303, 304, 306~308, 310, 311, 313, 314, 316, 317, 319, 320:
IC302:
IC305, 309, 312, 315, 318, 321, 323, 326, 329:
IC321:
IC322, 325, 328:
IC324, 327, 330:
IC331: | RC4558DV (IG001390) OP AMP.
NJM4556 (IG042500) OP AMP.

M5238P (XA013001) OP AMP.
NJM7905FA (XD204001) REGULATOR -5V
YM3029 (XF237A00) AFDO
PCM56P-Y (XH690A00) D/A CONVERTER
NJM7805FA (XC719001) REGULATOR +5V |
| 2. Transistor | Q301~312:
Q313: | 2SC2878 A, B (IC287800)
2SA950 O, Y (IA095010) |
| 3. Digital Transistor | Q314, 315: | DTC143XF (VA024600) |
| 4. Diode | D301~303:
D304, 305: | 1SS133 (IF003450)
11ES4 (VB481900) |
| 5. Resistor Array | RA301: | RGLD8X103J (VE445200) 10KX8 |
| 6. Variable Resistor | VR301: | B1.0K EVU-E2A (VI573700) CONTRAST |
| 7. Trimmer Potentiometer | VR302~304: | B100.0K EVN (VB593200) DC OFFSET adj. |
| 8. Semiconductive Cera. Cap. | | 0.1μF 25V Z (VC694800) |
| 9. LC Filter | EMI301: | DSS306-93F223Z1 (VD542700) |
| 10. Phone Jack | JK301, 305~312:
JK302:
JK303, 304: | HLJ0521 (LB202330) OUTPUT 1/1+2 L/MONO
HLJ4306 (LB301780) OUTPUT 1/1+2, 2 L R
HLJ4306 (VI662400) INDIVIDUAL OUTPUT 1-8 |

Components side (部品側)

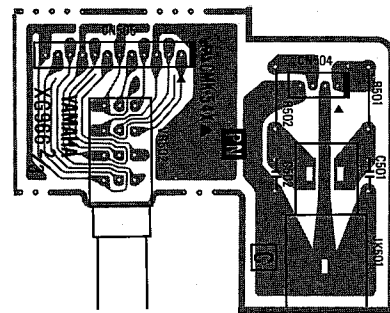
● PN1/3 Circuit Board



Notes)

- | | |
|--------------------------------|---------------------------------------|
| Circuit Board: | PN1/3 (NX004930) XG966C0 |
| 1. Diode
D501 ~ 541: | 1SS133 (IF003450) |
| 2. LED
LED501 ~ 504: | GL1HD212 RED (VG149600) |
| 3. Slide Pot.
VR501: | B10.0K EWA-NFOC (VC250600) DATA ENTRY |
| 4. Push Switch
SW501 ~ 541: | EVQ-QSL04M (VB799000) |

● PN2/3 Circuit Board

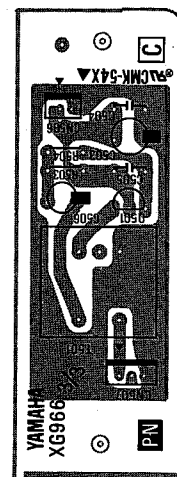


Notes)

- | | |
|--------------------------------|--|
| Circuit Board: | PN2/3 (NX004940) XG966C0 |
| 1. Variable Resistor
VR502: | EVU-Q2AF01A14 (VJ146600) A10KX4 VOLUME OUTPUT 1, 2 |
| 2. Phone Jack
JK501: | HLJ0544 (LB302070) PHONES |

Components side (部品側)

● PN3/3 Circuit Board

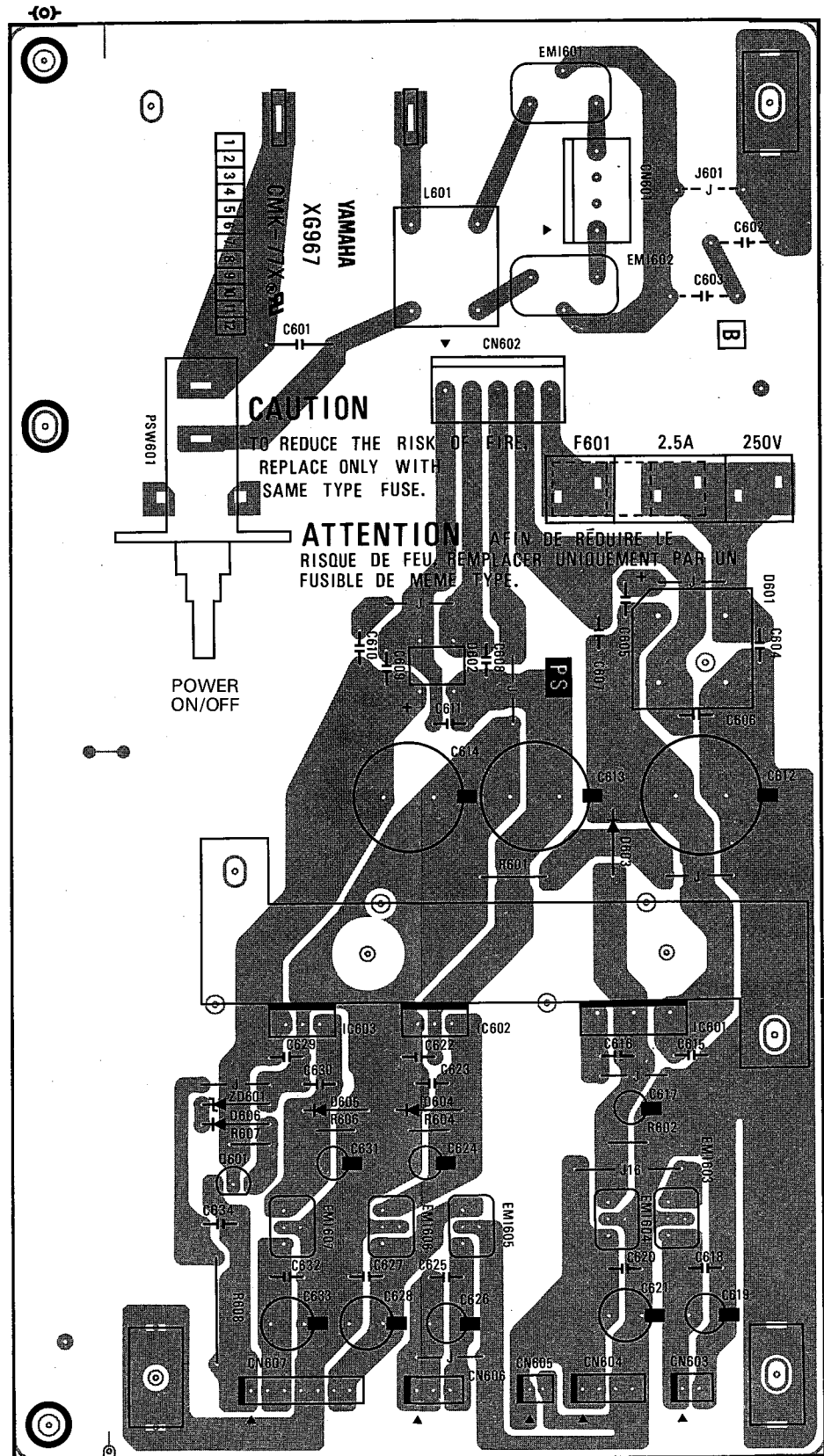


Notes)

- | | |
|--|--------------------------|
| Circuit Board: | PN3/3 (NX004950) XG966C0 |
| 1. Transistor
Q501: | 2SC945A PA (IC094530) |
| 2. Semiconductive Cera. Cap.
C504: | 0.1μF 25V Z (VC694800) |
| 3. DC/AC Inverter Transformer
T501: | D32-49 (VG582600) |

Components side (部品側)

● PS Circuit Board



Components side (部品側)

Notes)

Circuit Board : PS (VJ187300) XG967C0 (J)
 PS (VJ187400) XG967C0 (U, C)
 PS (VJ187500) XG967C0 (H, D, A, B)

1. IC
 IC601: SC-3052V (IG136200) 5V 2A
 IC602: NJM7912FA (XC721001) REGULATOR -12V
 IC603: NJM7812FA (XC720001) REGULATOR +12V
2. Transistor
 Q601: 2SC2120 Y (IC212000)
3. Diode
 D603~605: 11ES4 (VB481900)
 D606: 1SS133 (IF003450)
4. Diode Stack
 D601: 4D4B42 3A 200V (IH001790)
 D602: DF04M 1A 400V (VD488400)
5. Zener Diode
 ZD601: MTZ12C 12.0V (IF008870)
6. Metal Oxide Film Resistor
 R608: 1.0KΩ 1W J (VC734200)
7. Electrolytic Cap.
 C612: 10000μF 16.0V (UJ63A100)
 C613, 614: 2200μF 25.0V (UW949220)
8. Ceramic Cap.
 C601: 0.01μF 400V (FI494100)
 C602~603: 4700pF 400V (VA880100) H, D, A, B
9. Semiconductive Cera. Cap.
 C615, 616, 618, 620, 622, 623, 625, 627, 629, 630, 632, 634: 0.1μF 25V Z (VC694800)
10. Coil
 L601: PLA3021A 3M (GD900760)
11. LC Filter
 EMI603~607: DSS306-93F223Z1 (VD542700)
12. Filter Line
 EMI601, 602: DSR1100 (VI547100)
13. Push Switch
 PSW601: ESB-8236V JUCS (VF576000) POWER
14. Fuse
 F601: 250V 2.50A (KB000420) J
 F601: 250V 2.50A (KB002680) U, C
 F601: T 250V 2.50A S (KB000690) H, D, A, B
15. Jumper Wire
 J601: installed (J, U, C)
 not installed (H, D, A, B)

■ TEST PROGRAM

A. HOW TO ENTER THE TEST PROGRAM

Turn on the power switch of the TG77 and wait until the LCD has initialized and displays a normal operating mode message. While pressing the [VOICE] switch, press and hold the [9] switch then the [ENTER] switch. The TG77 will run the INITIAL TEST routine (refer to the INITIAL TEST section for details) and indicate that you have entered the Test Program by displaying the following message.

```

*** TG77 TEST Ver #.## *** Please Select

Main ROM : Version #.# 1990-05-??

[-1] : AUTO      [+1] : MANUAL

[ COPY ] : Fact.set  [ EXIT ] : Exit
  
```

Use the [-1], [+1], [COPY], or [EXIT] panel switches to select the appropriate test mode. If you press [-1], the auto test mode will be initiated. If you press [+1], the MANUAL test mode will be initiated. If you press [COPY], the TG77 will execute Test 38, "38. Factory settings", and then automatically exit the test mode and return to play mode (refer to Test 38 for details).

If you press [EXIT], you will exit the test mode and return to the play mode. The MANUAL mode is the preferred method of running the test program because it allows you to select or jump to any test and execute it. AUTO mode automatically executes each test in a fixed order. Some of the tests in the AUTO mode are automatically executed due to the nature of the test. In the AUTO mode simply press the [+1] switch to exit and automatically execute the next test or press [EXIT] to abort the test, then press [+1] to automatically execute the next test.

B. PROCEEDING THROUGH THE TESTS

(**MOST OF THESE FUNCTIONS MAINLY PERTAIN TO THE MANUAL TEST MODE**)
When you enter the test program, the following display will appear.

```

*** TG77 TEST Ver #.## *** MODE : MANUAL

* 01 : ROM CHECK
  02 : RAM Read/Write
  03 : RAM Battery
  04 : LCD All On
  05 : LCD All Off
  
```

Use the [+1], [-1], [ENTER], [PAGE>], [PAGE<], [↓], [↑], [EXIT], or the numeric key pad to move through the various tests of the test program.

Pressing: [+1] will execute the test which follows the current test.

[-1] will execute the test which precedes the current test.

[ENTER] will execute the currently selected test.

[PAGE>] will select the page which follows the current test and displays the test items.

[PAGE<] will select the page which precedes the current test and displays the test items.

[↓] will select the test which follows the current test and displays the test items.

[↑] will select the test which precedes the current test and displays the test items.

[EXIT] will execute Test 39, "39. EXIT" (refer to Test 39 for details).

The numeric keys 0 through 9 of the entry pad can be used to enter a two-digit number to directly select a test. Simply enter the number and then press the [ENTER] switch. For example, if you would like to select TEST 6, press [0], [6] then press the [ENTER] switch.

C. TEST SELECTION WHEN AN ERROR IS DETECTED

In each of the following tests listed below, if an NG (No Good) error is detected, the following operations of the test will make the TG77 wait for the entry of a test number. You can then retry the test or perform another test. If you press [EXIT], the TG77 will wait for the entry of a test number.

- | | | |
|-------------------|-------------------------|----------------------|
| 7. Panel switches | 8. Data entry | 9. MIDI IN/OUT |
| 10. Card insert | 12. Card protect switch | 15. Wave card insert |

D. INITIAL TEST

The following tests will be performed automatically when the test program is initiated.

- A. Read/write check for the SRAM (IC137) work area of the DM circuit board.
- B. Checks the interrupt levels of both M3 ICs (IC138 & IC144) of the DM circuit board.

DISPLAY OF TEST RESULTS

If each test checks OK then the Test program proceeds to the Test Program entry display. If Test A is NG the RAM WORK AREA may be at fault and the display will indicate:

```

** IC137(RAM) ERROR, TEST ABOARTED **
    
```

If Test B is NG then the error may be related to one of the M3 IC's IRQ levels. The display will indicate the error by showing the following message:

```

* M3 IRQ CHECK ERROR, TEST ABOARTED *
    
```

EXITING THE TEST

This test automatically proceeds to the Test Program entry display if the items under test are OK. If an error message occurs turn the power off and then on again to exit the test. However, a RAM ERROR may not allow the TG77 to function normally.

TEST PROGRAM TEST 1 – 39 (MANUAL MODE OPERATION)

1. TEST 1: SYSTEM ROM TEST

```

* 01: ROM CHECK
    
```

Performs a read test on the ROM for the following addresses.
 IC170 : 60000h – 6000Fh IC130 : 80000h – 8000Fh
 IC131 : A0000h – A000Fh IC132 : C0000h – C000Fh
 IC133 : E0000h – E000Fh
 (This test checks only 16 bytes.)

DISPLAY OF TEST RESULTS

```

OK      * 01: ROM CHECK                    4:IC133                    OK
        (the number of the last-tested IC)
    
```

or

```

NG      * 01: ROM CHECK                    n:ICxxx                    NG
        (where n = ROM# and xxx = IC #)
    
```

TEST END

Ends after displaying the results.

2. TEST 2: SYSTEM RAM TEST

* 02: RAM Read/Write

Performs a read/write test of RAM on the following addresses.

IC134 : 40000h – 47FFFh

IC135 : 48000h – 4FFFFh

IC136 : 50000h – 57FFFh

IC137 : 58000h – 5FFFFh (Only 1024 bytes)

DISPLAY OF TEST RESULTS

OK * 02: RAM Read/Write 4:IC137 OK

(the number of the last-tested IC)

or

NG * 02: RAM Read/Write n:ICxxx NG

(where n=RAM# and xxx=IC#)

TEST END

Ends after displaying the results. All RAM data is preserved.

3. TEST 3: RAM BACKUP BATTERY TEST

* 03: RAM Battery

This test checks that the voltage of the RAM backup battery is greater than 2.8V and less than 4.2V.

DISPLAY OF TEST RESULTS

OK * 03: RAM Battery 3.2V OK

NG * 03: RAM Battery #.#V Low NG

* 03: RAM Battery #.#V High NG

TEST END

Ends after displaying the test results.

4. TEST 4: LCD – ALL DOTS “ON” TEST

* 04: LCD All On

Check that all dots of the LCD change to black (ON).

DISPLAY OF TEST RESULTS

First, the display indicates “* 04 LCD All On”, then all dots of the LCD change to black (ON).

TEST END

Press [EXIT] to end the test. The display shown below will appear and the TG77 will wait for you to enter a test number.

* 04: LCD All On

5. TEST 5: LCD – ALL DOTS “OFF” TEST

* 05: LCD All Off

Check that all dots change to white (OFF).

DISPLAY OF TEST RESULTS

First, the display indicates “* 05 LCD All OFF”, then all dots of the LCD change to white (OFF).

TEST END

Press [EXIT] to end the test. The display shown below will appear and the TG77 will wait for you to enter a test number.

* 05: LCD All Off

6. TEST 6: LED ON/OFF TEST

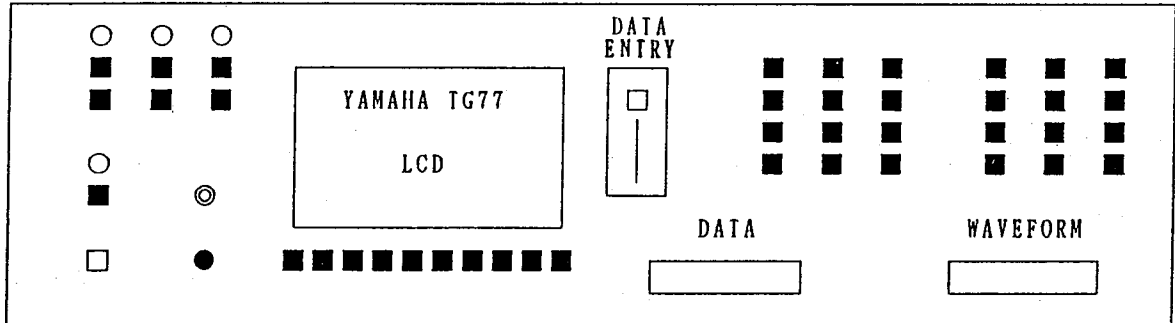
* 06: LED Check

Check that each red LED blinks once in succession from the left end of the unit (refer to the diagram shown below) and then verify that all red LEDs blink together. The currently blinking LEDs will be displayed in the LCD as follows.

* 06 : LED Check Voice On

(e.g. The red Voice LED is blinking)

Check that all LEDs blink.



Note: (○) indicates a red LED. (◎) indicates a level controller.
 (●) indicates a PHONE jack. (□) indicates a POWER switch.
 (■) indicates a push switch.

TEST END

Press [EXIT] to end the test. The TG77 will then be waiting for the entry of a test number.

7. TEST 7: PANEL SWITCH TEST

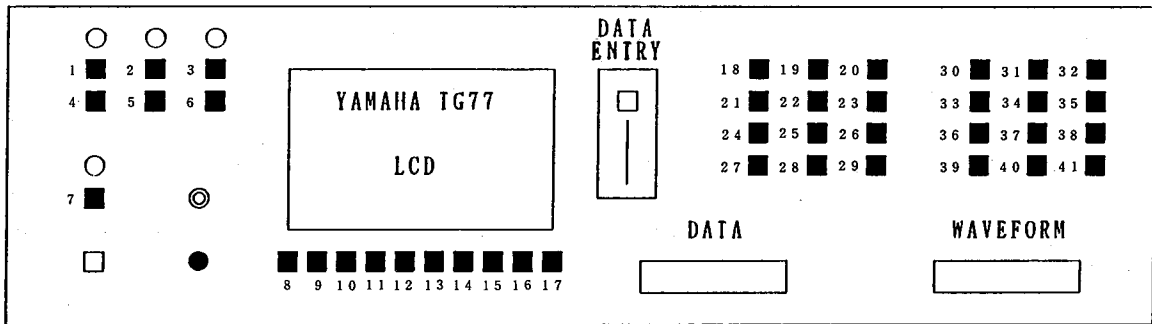
* 07: Panel Switch

Press the panel switches consecutively from the [VOICE] switch to switch [ENTER], according to the order indicated by the LCD display.

* 07: Panel Switch Push Voice

(e.g. When checking [VOICE])

The switch pressing order is displayed in the diagram below. If the switch is OK, a beep will sound and you should proceed to test the next switch. If the wrong switch is pressed an unexpected code is sent from the PKS CPU, and the error message NG will be displayed and no sound will be heard. At this time, if the correct switch is pressed then the proper code is received. You will then be able to proceed to test the next switch. The display will indicate OK, if all switches are good.



Note: (●) indicates a level controller. (○) indicates a red LED.
 (●) indicates a PHONE jack. (□) indicates a POWER switch.
 (■) indicates a push switch.

DISPLAY OF TEST RESULTS

OK * 07: Panel Switch Push Enter OK

NG * 07: Panel Switch Push Voice! ? Err

TEST END

When switch [ENTER] is pressed, OK is displayed and the test will end. During the test, if NG is detected, refer to section B, "B. PROCEEDING THROUGH THE TESTS".

8. TEST 8: DATA ENTRY SLIDER TEST

* 08: Data Entry 00 20-80

According to the target value displayed on the LCD, slowly move the data entry slider. Check that the value changes from 00→20→80→99 and then back down to 80→20→00 (in other words, from the bottom to the top and back down to the bottom).

* 08: Data Entry xx yy

* 08: Data Entry xx yy-zz

(where xx=current value of data entry, yy and zz are the next target values)

DISPLAY OF TEST RESULTS

OK * 08: Data Entry 00 00 OK

NG (No change in display message)

TEST END

After displaying the result, the test will end. If NG is detected during the test, refer to section B, "B. PROCEEDING THROUGH THE TESTS".

9. TEST 9: MIDI TEST

* 09: MIDI (I/O/T)

After connecting the MIDI IN to the MIDI OUT via a MIDI cable, execute the test. The following message will appear on the LCD.

* 09: MIDI (I/O/T) Tx:yy Rx:zz

TEST END

When you press [EXIT] the test will end and the TG77 will wait for a test number to be entered. If an NG error occurs, because unexpected data was received, the test will end at that point. If an NG error occurs because no data was received within a certain time, the test will continue until [EXIT] is pressed.

10. TEST 10: DATA CARD INSERT TEST

* 10: D-Card Insert 0

Insert a RAM card (MCD64) into the DATA card slot and execute the test. Check that when you remove and insert the card back into the slot, the number on the display changes from 0 to 1 and that the OK result is displayed.

DISPLAY OF TEST RESULTS

OK * 10: D-Card Insert 1 OK

NG (No change in display message)

TEST END

After displaying the result, the test will end. If NG is detected during the test, refer to section B, "B. PROCEEDING THROUGH THE TESTS".

11. TEST 11: DATA CARDS READ/WRITE TEST

* 11: D-Card R/Write

This performs a read/write test on the following addresses of the RAM cards (MCD64).

CARD 1 : 20000h – 27FFFh CARD 2 : 28000h – 2FFFFh

Insert a RAM cards (MCD64) with the memory protect turned off and execute the test.

DISPLAY OF TEST RESULTS

OK * 11: D-Card R/Write CARD : 12 OK

NG * 11: D-Card R/Write CARD : x NG

(e.g. if CARD 2 is No Good)

TEST END

After displaying the results, the test will end. All card data is preserved.

12. TEST 12: DATA CARD PROTECT SWITCH TEST

* 12: D-Card Protect 0

Use a RAM card (MCD64) to check that the card protect switch status is being read. Check that when the switch is set from "protect off" to "protect on", the number on the display changes from 0 to 1 and that the OK result is also displayed.

DISPLAY OF TEST RESULTS

OK	* 12: D-Card Protect 1	OK
----	------------------------	----

NG (No change in display)

TEST END

After displaying the result, the test will end. If NG is detected during the test, refer to section B, "B. PROCEEDING THROUGH THE TESTS".

13. TEST 13: RAM BACKUP BATTERY TEST

* 13: D-Card Battery

This test checks that the voltage of the RAM card backup battery.

DISPLAY OF TEST RESULTS

OK	* 13: D-Card Battery #.#V	OK
----	---------------------------	----

NG	* 13: D-Card Battery #.#V Low	NG
----	-------------------------------	----

	* 13: D-Card Battery #.#V High	NG
--	--------------------------------	----

TEST END

Ends after displaying the test results.

14. TEST 14: WAVEFORM CARD INSERT TEST

* 14: W-Card Insert 0

Check that when a waveform card is inserted into the slot, the number on the display changes from 0 to 1 and that the OK result is displayed.

DISPLAY OF TEST RESULTS

OK	* 14: W-Card Insert 1	OK
----	-----------------------	----

NG (No change in display)

TEST END

After displaying the result, the test will end. If NG is detected during the test, refer to section B, "B. PROCEEDING THROUGH THE TESTS".

15. TEST 15: WAVEFORM CARD READ TEST

* 15: W-Card Read

This test is utilized by the factory and it is not intended for field service use.

16. TEST 16: 1 kHz FM SOUND OUTPUT (OUTPUT 1L) TEST

* 16: 1KHz to L1-> L1

Check that the correct signal is output from OUTPUT 1L and PHONES (L) jacks.

The signal route is as follows:

The digital representation of the 1 kHz signal is output from S00 terminal (channel 0) of OPS3 IC (IC163) to DIIN terminal of the M3 IC (IC144) via pin 6 of IC168. From the INDV1 terminal of the M3 IC, the signal sent to the IN1 terminal of the PAN(2) IC (IC165). From the PAN(2) IC, the signal is output from the S1 and S2 terminals. The signal is then sent to the MIX1 inputs of the MIX3 ICs (IC122 and IC125). Now the signal is sent out of the MIX3 ICs via the MXO terminal which feeds the signal to the SI1 and SI2 inputs of the AFDO (FLOATING POINT CONVERTER) IC. The AFDO and the DAC work together to produce the analog that is output from the CH1 (Channel 1) terminal. The signal goes to the analog circuits and is output from the OUTPUT 1L jack. It should be noted that the active low FMSEL signal must be at a 0 volt or LOW logic level in order to output this signal.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1L, OUTPUT 2L, OUTPUT 1R, OUTPUT 2R, and PHONES (L/R) outputs. If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 16: 1KHz to L1-> L1 Output On

Listed below are the specifications and conditions of each output during this test.

OUTPUT 1L : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, -1.0dB \pm 2dB (10k ohm load)

OUTPUT 2L : less than -70dB

OUTPUT 1R : less than -70dB

OUTPUT 2R : less than -70dB

PHONES (L) : 1kHz, sine wave, distortion 0.2% or less, +5.0dB \pm 2dB (150 ohm load)

PHONES (R) : less than -60dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 16: 1KHz to L1-> L1 Output Off

17. TEST 17: 1kHz FM SOUND OUTPUT (OUTPUT 1R) TEST

* 17: 1KHz to R1-> R1

ITEMS TO CHECK

Check that the correct signal is output from OUTPUT 1R and the PHONES (R) jacks.

The basic signal route is the same as it was in TEST 16 except the signal is output from the CH2 (Channel 2) of the AFDO IC.

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1L, OUTPUT 2L, OUTPUT 1R, OUTPUT 2R, and PHONES (L/R) outputs. If necessary, verify the frequency, output waveform, output level, and THD of each output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 17: 1KHz to R1-> R1 Output On

Listed below are the specifications and conditions of each output during this test.

OUTPUT 1R : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, $-1.0\text{dB} \pm 2\text{dB}$ (10k ohm load)
 OUTPUT 2R : less than -70dB
 OUTPUT 1L : less than -70dB
 OUTPUT 2L : less than -70dB
 PHONES (L) : less than -60dB
 PHONES (R) : 1kHz, sine wave, distortion 0.2% or less, $+5.0\text{dB} \pm 2\text{dB}$ (150 ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 17: 1KHz to R1-> R1 Output Off

18. TEST 18: 1kHz FM SOUND OUTPUT (OUTPUT 2L) TEST

* 18: 1KHz to L2-> L2

ITEMS TO CHECK

Check that the correct signal is output from OUTPUT 2L and the PHONES (L) jacks.

The basic signal route is the same as it was in TEST 16 except the signal is output from the CH3 (Channel 3) of the AFDO IC.

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1L, OUTPUT 2L, OUTPUT 1R, OUTPUT 2R, and PHONES (L/R) outputs. If necessary, verify the frequency, output waveform, output level, and THD of each output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 18: 1KHz to L2-> L2 Output On

Listed below are the specifications and conditions of the output during this test.

OUTPUT 2L : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, $-1.0\text{dB} \pm 2\text{dB}$ (10k ohm load)
 OUTPUT 1L : less than -70dB
 OUTPUT 1R : less than -70dB
 OUTPUT 2R : less than -70dB
 PHONES (L) : 1kHz, sine wave, distortion 0.2% or less, $+5.0\text{dB} \pm 2\text{dB}$ (150 ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 18: 1KHz to L2-> L2 Output Off

19. TEST 19: 1kHz FM SOUND OUTPUT (OUTPUT 2R) TEST

* 19: 1KHz to R2-> R2

ITEMS TO CHECK

Check that the correct signal is output from OUTPUT 2R and the PHONES (R) jacks.

The basic signal route is the same as it was in TEST 16 except the signal is output from the CH4 (Channel 4) of the AFDO IC.

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1L, OUTPUT 2L, OUTPUT 1R, OUTPUT 2R, and PHONES (L/R) outputs. If necessary, verify the frequency, output waveform, output level, and THD of each output using the previously specified test equipment (refer

to TEST 16). The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 19: 1KHz to R2-> R2 Output On

Listed below are the specifications and conditions of each output during this test.

OUTPUT 2R : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, - 1.0dB \pm 2dB (10k ohm load)
 OUTPUT 1R : less than - 70dB
 OUTPUT 1L : less than - 70dB
 OUTPUT 2L : less than - 70dB
 PHONES (R) : 1kHz, sine wave, distortion 0.2% or less, + 5.0dB \pm 2dB (150 ohm load)
 INDIVIDUAL OUT 1 : less than - 70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 19: 1KHz to R2-> R2 Output Off

20. TEST 20: 1kHz FM SOUND OUTPUT (OUTPUT 2L OUTPUT 1L) TEST

* 20: 1KHz to L2-> L1

ITEMS TO CHECK

Check that when the plug connected to OUTPUT 2L is pulled out, the signal being output from OUTPUT 2L is now output from OUTPUT 1L. The basic signal route is the same as it was for TEST 18.

Insert the appropriate 1/4" phone plug into OUTPUT 1L and verify, if necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for this test. While sounding, the LCD will display the following message:

* 20: 1KHz to L2-> L1 Output On

The specifications for this test are as follows:

OUTPUT 1L : 1kHz, sine wave, - 1.0dB \pm 2dB (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 20: 1KHz to L2-> L1 Output Off

21. TEST 21: 1kHz FM SOUND OUTPUT (OUTPUT 2R OUTPUT 1R) TEST

* 21: 1KHz to R2-> R1

ITEMS TO CHECK

Check that when the plug connected to OUTPUT 2R is pulled out, the signal being output from OUTPUT 2R is now output from OUTPUT 1R. The basic signal route is the same as it was for TEST 19.

Insert the appropriate 1/4" phone plug into OUTPUT 1R and verify, if necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for this test. While sounding, the LCD will display the following message:

* 21: 1KHz to R2-> R1 Output Off

The specifications for this test are as follows:

OUTPUT 1R : 1kHz, sine wave, $-1.0\text{dB} \pm 2\text{dB}$ (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 21: 1KHz to R2-> R1 Output Off

22. TEST 22: 1kHz FM SOUND OUTPUT (OUTPUT 1R→OUTPUT 1L) TEST

* 22: 1KHz to R1-> L1

ITEMS TO CHECK

Check that when the plug connected to OUTPUT 1R is pulled out, the signal being output from OUTPUT 1R is now output from OUTPUT 1L. The basic signal route is the same as it was for TEST 17.

Insert the appropriate 1/4" phone plug into OUTPUT 1L and verify, if necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for this test. While sounding, the LCD will display the following message:

* 22: 1KHz to R1-> L1 Output On

The specifications for this test are as follows:

OUTPUT 1L : 1kHz, sine wave, $-1.0\text{dB} \pm 2\text{dB}$ (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 22: 1KHz to R1-> L1 Output Off

23. TEST 23: 1kHz FM SOUND OUTPUT (EFFECT 0→OUTPUT 1L) TEST

* 23: Effect_0 to L1

ITEMS TO CHECK

The basic signal route is the same as it was for TEST 16 except that the signal is sent out of CH1 through CH4 (Channels 1 – 4). In other words, a signal is output to OUTPUT 1L, OUTPUT 2L, OUTPUT 1R and OUTPUT 2R. With no 1/4" phone plugs inserted, the signals from these outputs will all be sent to OUTPUT 1L.

Insert the appropriate 1/4" phone plug into OUTPUT 1L only and verify, if necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 16).

The volume control must be set at maximum for this test. While sounding, the LCD will display the following message:

* 23: Effect_0 to L1 Output On

The specifications for this test are as follows:

OUTPUT 1L : 1kHz, sine wave, distortion 0.3% or less, $+11.0\text{dB} \pm 2\text{dB}$ (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 23: Effect_0 to L1  Output Off
```

24. TEST 24: 1kHz FM SOUND OUTPUT (EFFECT 1→OUTPUT 1L) TEST

```
* 24: Effect_1 to L1
```

There are two signal paths for this test. The basic signal path is the same as it was for TEST 16 except for the following:

SIGNAL PATH 1

The signal from the PAN IC is input to pin 2 (SIO terminal) of the LEF (1) IC (IC157) via pin 9 of IC171. The signal is then output from pin 4 (SOO terminal) of the LEF (1) IC to pin 10 (SIO terminal) of the LDSP (1) IC (IC153).

The LDSP(1) IC outputs the signal via pin 33 (SOO terminal) to pin 2 (MIX2 terminal) of MIX3 (1) IC (IC122). This ultimately produces signal output from OUTPUT 1L and OUTPUT 1R.

SIGNAL PATH 2

The signal from the PAN IC is input to pin 2 (SIO terminal) of the LEF (2) IC (IC160) via pin 19 of IC171. The signal is then output from pin 4 (SOO terminal) of the LEF (2) IC to pin 10 (SIO terminal) of the LDSP (2) IC (IC155). The LDSP (2) IC outputs the signal via pin 33 (SOO terminal) to pin 2 (MIX2 terminal) of MIX3 (2) IC (IC125). This ultimately produces signal output from OUTPUT 2L and OUTPUT 2R.

It should be noted that the LEF ICs use their associated DRAM ICs and the LDSP ICs use their associated PSRAM to process the signals for this test.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plug into OUTPUT 1L only and verify, if necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for this test.

While sounding, the LCD will display the following message:

```
* 24: Effect_1 to L1  Output On
```

The specifications for this test are as follows:

OUTPUT 1L : 1kHz, sine wave, distortion 0.3% or less, +11.0dB ± 2dB (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 24: Effect_1 to L1  Output Off
```

25. TEST 25: 1kHz FM SOUND OUTPUT (EFFECT 2→OUTPUT 1L) TEST

```
* 25: Effect-2 to L1
```

There are two signal paths for this test. The basic signal path is the same as it was for TEST 16 except for the following:

SIGNAL PATH 1

The signal from the PAN IC is input to pin 2 (SIO terminal) of the LEF (2) IC (IC160) via pin 19 of IC171. The signal is then output from pin 4 (SOO terminal) of the LEF (2) IC to pin 11 (SI1 terminal) of the LDSP (1) IC (IC153). The LDSP (1) IC outputs the signal via pin 33 (SOO terminal) to pin

11 (SI1 terminal) of the LDSP (2) IC (IC155). From the LDSP (2) IC, pin 33 (SO0 terminal), the signal is output to pin 3 (MIX3 terminal) of MIX3 (1) IC (IC122). This ultimately produces signal output from OUTPUT 1L and OUTPUT 1R.

SIGNAL PATH 2

The signal from the PAN IC is input to pin 2 (SI0 terminal) of the LEF (2) IC (IC160) via pin 19 of IC171. The signal is then output from pin 5 (SO1 terminal) of the LEF (2) IC to pin 4 (MIX4 terminal) of MIX3 (2) IC (IC125). This ultimately produces signal output from OUTPUT 2L and OUTPUT 2R.

It should be noted that the LEF ICs use their associated DRAM ICs and the LDSP ICs use their associated PSRAM to process the signals for this test.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plug into OUTPUT 1L only and verify, if necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 16). The volume control must be set at maximum for this test.

While sounding, the LCD will display the following message:

* 25: Effect-2 to L1 Output On

The specifications for this test are as follows:

OUTPUT 1L : 1kHz, sine wave, distortion 0.3% or less, +10.0dB±2dB (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 25: Effect-2. to L1 Output Off

26. TEST 26: AWM (M3) SOUND OUTPUT TEST

* 26: PCM Check

SIGNAL PATH

This outputs the sound which is stored in addresses 012000h – 01FFFFh of WAVE ROM. The data stored at these addresses is retrieved by the M3(A) IC (IC138) and output via pin 1 (INDV0 terminal, channel 0). The signal from pin 1 is then output to pin 11 (INO terminal) of the PAN(1) IC (IC143). The PAN (1) IC outputs the signal from pins 21 and 22 (S1 and S2 terminals, respectively) and sends the signal to pins 12 and 13 (SI2 and SI1 terminals, respectively) of the PAN (2) IC (IC165). The PAN (2) IC outputs the signal from pins 21 and 22 (S1 and S2 terminals, respectively) to pin 1 (MIX1 terminal) of each MIX3 IC. This ultimately produces signal output from OUTPUT 1L, OUTPUT 1R, OUTPUT 2L, OUTPUT 2R.

ITEMS TO CHECK

Confirm that a AWM signal is being sent to OUTPUT 1L using an amplifier and speaker to monitor the signal. The AWM signal is not a steady tone. While this signal is sounding, the LCD will display the following message:

* 26: PCM Check Output On

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 26: PCM Check Output Off

27. TEST 27: FM SOUND OUTPUT THROUGH M3 IC (AWM) TEST

* 27: FM Thru M3(PCM)

SIGNAL PATH

A sine wave which is frequency swept by the EGM2 (1) IC will cause signals to be alternately output from OUTPUT 1L, OUTPUT 1R, OUTPUT 2L and OUTPUT 2R in a two channel pair sequence. The FMSEL signal to the EGM2 (1) and OPS3 (1) must be at a 1 or HIGH logic level for this test. The appropriate data from EGM2 (1) IC (IC162) is sent to the OPS3 (1) IC (IC161) in order to produce the sound. The OPS3 (1) IC outputs the signals from pins 54 and 55 (SO0, channel 1 and SO1, channel 9) via IC168 (pins 3 and 6) to pins 27 and 28 (terminals DIINO and DIIN1) of the M3 (A) IC (IC138). The M3 (A) IC outputs the signals from pins 1 and 2 (INDV0, channel 5 and INDV1, channel 6) to pins 10 and 11 (IN1 and IN0 terminals) of the PAN (1) IC (IC143). The PAN (1) IC sends the signals out from pins 21 and 22 (S1 and S2 terminals) to pins 12 and 13 (SI2 and SI1 terminals) of the PAN (2) IC (IC165). The PAN (2) IC outputs the signals from pins 21 and 22 (S1 and S2 terminals) to pin 1 (MIX1 terminal) of each MIX3 IC. This ultimately produces signal output from OUTPUT 1L, OUTPUT 1R, OUTPUT 2L, OUTPUT 2R.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plug into OUTPUT 1L and observe the output waveform with an oscilloscope. Check that the level does not change excessively as the output sweeps through its frequency range. The volume control must be set at comfortable listening level for this test. While sounding, the LCD will display the following message.

* 27: FM Thru M3(PCM) Output On

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 27: FM Thru M3(PCM) Output Off

28. TEST 28: FM SOUND OUTPUT THROUGH M3 IC (DIGITAL FILTER) TEST

* 28: FM Thru M3(FM)

SIGNAL PATH

A sine wave which is frequency swept by the EGM2 (2) IC will cause signals to be alternately output from OUTPUT 1L, OUTPUT 1R, OUTPUT 2L and OUTPUT 2R in a two channel pair sequence. The FMSEL signal to the EGM2 (2) and OPS3 (2) must be at a 0 or LOW logic level for this test. The appropriate data from EGM2 (2) IC (IC164) is sent to the OPS3 (2) IC (IC163) in order to produce the sound. The OPS3 (2) IC outputs the signals from pins 54 and 55 (SO0, channel 0 and SO1, channel 8) via IC168 (pins 3 and 6) to pins 27 and 28 (terminals DIINO and DIIN1) of the M3 (B) IC (IC144). The M3 (B) IC outputs the signals from pins 1 and 2 (INDV0, channel 14 and INDV1, channel 15) to pins 10 and 11 (IN1 and IN0 terminals) of the PAN (2) IC (IC165). The PAN (2) IC sends the signals out from pins 21 and 22 (S1 and S2 terminals) to pin 1 (MIX1 terminal) of each MIX3 IC. This ultimately produces signal output from OUTPUT 1L, OUTPUT 1R, OUTPUT 2L, OUTPUT 2R.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plug into OUTPUT 1L and observe the output waveform with an oscilloscope. Check that the level does not change excessively as the output sweeps through its frequency range. The volume control must be set at a comfortable listening level for this test. While sounding, the LCD will display the following message.

* 28: FM Thru M3(FM) Output On

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 28: FM Thru M3(FM) Output Off

29. TEST 29: FM SOUND OUTPUT FEEDBACK THROUGH M3 IC TEST

* 29: Feedback FM->M3

The basic signal path is the same as it was for TEST 27 except for the following: The frequency swept sine wave produced by the EGM2 (1) and OPS3 (1) will be fed back from the M3 (A) IC to the OPS3 (1) IC. As in TEST 27, the output signals will occur alternately in a two channel pair sequence. For this test, the signals from pins 1 and 2 (INDV0 and INDV1 terminals) of M3 (A) IC (IC138) will be fed back to pins 69 and 70 (SIO and SI1 terminals) of OPS3 (1) IC (IC161).

ITEMS TO CHECK

Insert the appropriate 1/4" phone plug into OUTPUT 1L and observe the output waveform with an oscilloscope. Check that the level does not change excessively as the output sweeps through its frequency range. It should be noted that due to the feedback condition of this test there may be a slight amount of distortion present in the output signal. The volume control must be set at a comfortable listening level for this test. While sounding, the LCD will display the following message:

* 29: Feedback FM->M3 Output On

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 29: Feedback FM Output Off

30. TEST 30: 1kHz FM SOUND INDIVIDUAL OUTPUT 1 TEST

* 30: 1KHz Ind-Out 1

Check that the correct signal is output from INDIVIDUAL OUTPUT 1 jack.

The signal route is as follows:

The digital representation of the 1 kHz signal is output from SO0 terminal (channel 0) of OPS3 IC (IC163) to DIINO terminal of the M3 IC (IC144) via pin 6 of the LS32 IC (IC168). From the DIOUT2 of the M3 IC, the signal is then sent to the MIX2 terminal of the MIX3 IC (IC141). Now the signal is sent out of the MIX3 IC via the MXO terminal which feeds the signal to the SI1 terminal of the AFDO IC (IC322).

It should be noted that the active low FMSEL signal must be a 0 volt or LOW logic level in order to output this signal.

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 30: 1KHz Ind-Out 1 On

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 1 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, +5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 2 : less than -70dB

INDIVIDUAL OUTPUT 3 : less than -70dB

INDIVIDUAL OUTPUT 4 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 30: 1KHz Ind-Out 1 Off
```

31. TEST 31: 1kHz AWM SOUND INDIVIDUAL OUTPUT 2 TEST

```
* 31: 1KHz Ind-Out 2
```

Check that the correct signal is output from INDIVIDUAL OUTPUT 2 jack.

The signal route is as follows:

From the DIOU2 of the M3 IC (IC138), the signal is sent to the MIX1 terminal of the MIX3 IC (IC141). The MIX3 IC outputs the signal from the MXO terminal, and sends the signal to the S11 terminal of the AFDO IC (IC322).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

```
* 31: 1KHz Ind-Out 2 On
```

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 1 : less than -70dB

INDIVIDUAL OUTPUT 2 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, +5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 3 : less than -70dB

INDIVIDUAL OUTPUT 4 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 31: 1KHz Ind-Out 2 Off
```

32. TEST 32: 1kHz FM SOUND INDIVIDUAL OUTPUT 3 TEST

```
* 32: 1KHz Ind-Out 3
```

Check that the correct signal is output from INDIVIDUAL OUTPUT 3 jack.

The signal route is as follows:

The digital representation of the 1 kHz signal is output from S00 terminal (channel 0) of OPS3 IC (IC163) to DIINO terminal of the M3 IC (IC144) via pin 6 of the LS32 IC (IC168). From the DIOU3 of the M3 IC, the signal is then sent to the MIX3 terminal of the MIX3 IC (IC142).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

```
* 32: 1KHz  Ind-Out  3 On
```

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 1 : less than -70dB

INDIVIDUAL OUTPUT 2 : less than -70dB

INDIVIDUAL OUTPUT 3 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, +5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 4 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 32: 1KHz  Ind-Out  3 Off
```

33. TEST 33: 1kHz AWM SOUND INDIVIDUAL OUTPUT 4 TEST

```
* 33: 1KHz  Ind-Out  4
```

Check that the correct signal is output from INDIVIDUAL OUTPUT 4 jacks.

The signal route is as follows:

From the DIOUT3 of the M3 IC (IC138), the signal is sent to the MIX1 terminal of the MIX3 IC (IC142). The MIX3 IC outputs the signal from the MXO terminal, and sends the signal to the SI1 terminal of the AFDO IC (IC322).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

```
* 33: 1KHz  Ind-Out  4 On
```

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 1 : less than -70dB

INDIVIDUAL OUTPUT 2 : less than -70dB

INDIVIDUAL OUTPUT 3 : less than -70dB

INDIVIDUAL OUTPUT 4 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, +5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 5 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 33: 1KHz  Ind-Out  4 Off
```

34. TEST 34: 1kHz FM SOUND INDIVIDUAL OUTPUT 5 TEST

```
* 34: 1KHz  Ind-Out  5
```

Check that the correct signal is output from INDIVIDUAL OUTPUT 5 jack.

The signal route is as follows:

The digital representation of the 1 kHz signal is output from S00 terminal (channel 0) of OPS3 IC (IC163) to DIINO terminal of the M3 IC (IC144) via pin 6 of the LS32 IC (IC168). From the DIOU1 terminal of the M3 IC, the signal is then sent to the MELIN terminal of the M3 IC (IC138). The M3 IC outputs the signal from pin 4 (DIOU0 terminal) and sends the signal to S11 terminal of AFD0 IC (IC325).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

```
* 34: 1KHz Ind-Out 5 On
```

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 5 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, + 5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 6 : less than -70dB

INDIVIDUAL OUTPUT 7 : less than -70dB

INDIVIDUAL OUTPUT 8 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 34: 1KHz Ind-Out 5 Off
```

35. TEST 35: 1kHz AWM SOUND INDIVIDUAL OUTPUT 6 TEST

```
* 35: 1KHz Ind-Out 6
```

Check that the correct signal is output from INDIVIDUAL OUTPUT 6 jack.

The signal route is as follows:

From the DIOU0 of the M3 IC (IC138), the signal is sent to the S11 terminal of thr AFD0 IC (IC325).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

```
* 35: 1KHz Ind-Out 6 On
```

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 5 : less than -70dB

INDIVIDUAL OUTPUT 6 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, + 5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 7 : less than -70dB

INDIVIDUAL OUTPUT 8 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

```
* 35: 1KHz Ind-Out 6 Off
```

36. TEST 36: 1kHz FM SOUND INDIVIDUAL OUTPUT 7 TEST

* 36: 1KHz Ind-Out 7

Check that the correct signal is output from INDIVIDUAL OUTPUT 7 jack.

The signal route is as follows:

The digital representation of the 1 kHz signal is output from S00 terminal (channel 0) of OPS3 IC (IC163) to DIINO terminal of the M3 IC (IC144) via pin 6 of the LS32 IC (IC168). From the DIOUO of the M3 IC, the signal is then sent to the S12 terminal of the AFDO IC (IC325).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 36: 1KHz Ind-Out 7 On

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 5 : less than -70dB

INDIVIDUAL OUTPUT 6 : less than -70dB

INDIVIDUAL OUTPUT 7 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, +5.0dB \pm 2dB (10k ohm load)

INDIVIDUAL OUTPUT 8 : less than -70dB

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur;

(1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 36: 1KHz Ind-Out 7 Off

37. TEST 37: 1kHz AWM SOUND INDIVIDUAL OUTPUT 8 TEST

* 37: 1KHz Ind-Out 8

Check that the correct signal is output from INDIVIDUAL OUTPUT 8 jack.

The signal route is as follows:

From the DIOU1 of the M3 IC (IC138), the signal is sent to the MELIN terminal of the M3 IC (IC144). The M3 IC outputs the signal from the DIOUO terminal, and sends the signal to the S12 terminal of the AFDO IC (IC325).

ITEMS TO CHECK

If necessary, verify the frequency, output waveform, output level, and THD of each output using a frequency counter, oscilloscope, AC voltmeter (with 12.47 kHz filter) and distortion meter. The volume control must be set at maximum for these checks. While sounding, the LCD will display the following message:

* 37: 1KHz Ind-Out 8 On

Listed below are the specifications and conditions of each output during this test.

INDIVIDUAL OUTPUT 5 : less than -70dB

INDIVIDUAL OUTPUT 6 : less than -70dB

INDIVIDUAL OUTPUT 7 : less than -70dB

INDIVIDUAL OUTPUT 8 : 1kHz \pm 1.5Hz, sine wave, distortion 0.2%, +5.0dB \pm 2dB (10k ohm load)

TEST END

Press [EXIT] to end the test. After pressing [EXIT] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG77 will wait for the entry of a test number.

* 37: 1KHz Ind-Out 8 Off

38. TEST 38: FACTORY SET TEST

* 38: Factory Set

This test is used to initialize the data listed below to the factory settings:

- Synthesizer system data
- 64-internal voice data
- 16-internal multi data

When this test is executed, the following display will appear.

* 38: Factory Set [NO] or [YES] ?

If you press [YES], the factory preset data will be restored.
If you press [NO], they will not be restored.

DISPLAY OF TEST RESULTS

If factory settings are restored.

OK * 38: Factory Set OK

If not restored there will be no change in the display as shown below.

* 38: Factory Set [NO] or [YES] ?

TEST END

The LCD displays the results, the factory preset data will be restored, and the test will then end. After the factory preset data has been restored, the system data will be as follows:

SYNTH

- Note Shift.....+0
- Fine Tuning+0
- Fixed Velocity.....off
- Velocity Curve0(normal)
- Individual Foot Switch65
- Individual Wheel.....13
- Edit Confirmon
- Kbd Trans Ch1
- Voice Recv Ch.....omn
- Local on/off.....on
- Note on/offall
- Device Numberall
- Bulk Protecton
- Program Change.....normal


```

----- Greeting Message -----
"Create YOUR sound !"
" ...I'm ready"

----- PAN Factory Set -----
11~132                      = P1 ~P32

----- MCT Factory Set -----
I 1                          = P62 (Far East)
I 2                          = P63 (Blue)

----- VOICE -----
I-A01~D16                    =P1-A01~D16

----- MULTI -----
I-A01~D16                    =P1-A01~D16
    
```

39. TEST 39: EXIT TEST PROGRAM

* 39: Exit

When this is executed, the following display will appear.

* 39: Exit [NO] or [YES] ?

To exit the test program mode, press the [YES] switch. To remain in the test program mode press the [NO] switch. This will cause the TG77 to wait for the entry of a test number.

DISPLAY OF TEST RESULTS

If test mode is not exited.

* 39: Exit [NO] or [YES] ?

■テストプログラム

A. テストエントリー

本体の電源立ち上げ後、数秒待ち、次の操作をする。

[VOICE]を押しながら[9]を押しさらに[ENTER]を押すと、次の画面が表示される。

```

*** IG77 TEST Ver #.## *** Please Select

Main ROM : Version #.# 1990-05-??

[-1] : AUTO      [+1] : MANUAL

[ COPY ] : Fact.set  [EXIT] : Exit
  
```

[-1]、[+1]、[COPY]および[EXIT]を使用してテストモードの選択を行う。

[+1]を押すと、マニュアルモードで、テストにエントリーされる。

[COPY]を押すと、“38. ファクトリーセット”を実行した後、自動的にテストモードから抜け、プレイモードになる。

[EXIT]を押すとテストモードを抜け、プレイモードになる。

B. テストの進め方

テストにエントリーすると、まず、次の画面が表示される。

```

*** IG77 TEST Ver #.## *** MODE : MANUAL

* 01 : ROM CHECK
  02 : RAM Read/Write
  03 : RAM Battery
  04 : LCD All On
  05 : LCD All Off
  
```

[+1]、[-1]、[ENTER]、[PAGE>]、[PAGE<]、[EXIT]、[TEN KEY]を使用してテストを進める。

[+1]を押すと、現在選択されているテストの次のテストが実行される。

[-1]を押すと、現在選択されているテストの一つ前のテストが実行される。

[ENTER]を押すと、現在選択されているテストが実行される。

[PAGE>]を押すと、現在選択されているテストの次のページが選択され、テスト項目が表示される。

[PAGE<]を押すと、現在選択されているテストの一つ前のページが選択され、テスト項目が表示される。

[↓]を押すと、現在選択されているテストの次のテストが選択され、テスト項目が表示される。

[↑]を押すと、現在選択されているテストの一つ前のテストが選択され、テスト項目が表示される。

[EXIT]を押すと、“39. EXIT”が実行される。

[TEN KEY 0]から[TEN KEY 9]を使用して、2桁の数字を入力することにより、テストの選択が行える。

NGと判断した時のテストの進めかた

次の各テストにおいて、NGと判断した場合、以下に示す操作により、テストナンバー待ち状態にでき、もう一度テストを行うか、他のテストを行う事が出来る。

7. パネルスイッチ
8. データエントリー
9. MIDI IN/OUT
10. カードインサート
12. カードプロテクトスイッチ
15. ウェーブカードインサート

[EXIT]を押すと、テストナンバー待ち状態となる。
ただし、“7. パネルスイッチ”の[EXIT]のテストの場合には、この方法は、対応していない。

0. INITIAL TEST

テストに使用するSRAMワークエリア。
DMシートM3×2よりのIRQ DM BUS TEST。
テストプログラムエントリー時、自動的に実施。

判定結果の表示

OK 特に無し
NG *WORK RAM ERROR

** IC137(RAM) ERROR, TEST ABOARTED **

*M3 IRQ

* M3 IRQ CHECK ERROR, TEST ABOARTED *

テストの終了方法
電源の再投入

1. SYSTEM ROM

* 01: ROM CHECK

ROMのリードテストを行う。次の4つのアドレスに対してテストを行う。

IC170 =h'60000-h'6000F
IC130 =h'80000-h'8000F
IC131 =h'A0000-h'A000F
IC132 =h'C0000-h'C000F
IC133 =h'E0000-h'E000F
(ROMテストは16byteのみCheck)

判定結果の表示

OK * 01: ROM CHECK 4:IC133 OK

(最後にテストしたICの番号)

NG * 01: ROM CHECK n:ICxxx NG

(ROM n がNGの場合、xxx : NGとなったICの番号)

テストの終了方法
判定を表示、出力して終了する。

2. SYSTEM RAM

* 02: RAM Read/Write

RAMのリード/ライトテストを行う。次の4つのアドレスに対してテストを行う。

IC134 =h'40000-h'47FFF
IC135 =h'48000-h'4FFFF
IC136 =h'50000-h'57FFF
IC137 =h'58000-h'5FFFF(1024byteのみCheck)

判定結果の表示

OK	* 02: RAM Read/Write	4:IC137	OK
(最後にテストしたICの番号)			
NG	* 02: RAM Read/Write	n:ICxxx	NG
(RAM n がNGの場合、xxx : NGとなったICの番号)			

テストの終了方法

判定を表示、出力して終了する。

すべての RAMのデータは保存される。

3. Battery

* 03: RAM Battery

RAMバックアップバッテリー電圧が、2.8V以上、4.1V以下を確認する。

判定結果の表示

OK	* 03: RAM Battery	3.2V	OK
NG	* 03: RAM Battery	#. #V Low	NG
	* 03: RAM Battery	#. #V High	NG

テストの終了方法

判定を表示、出力して終了する。

4. LCDドット黒

* 04: LCD All On

全ドットが黒に変化していることを確認する。
コントラスト調整が出来る事。

テストの終了方法

[EXIT]を押すと、テストは終了し、次の画面を表示して、テストナンバー待ち状態になる。

* 04: LCD All On

5. LCDドット白

* 05: LCD All Off

全ドットが白に変化していることを確認する。

テストの終了方法

[EXIT]を押すと、テストは終了し、次の画面を表示して、テストナンバー待ち状態になる。

* 05: LCD All Off

6. LED順次点灯・全点灯

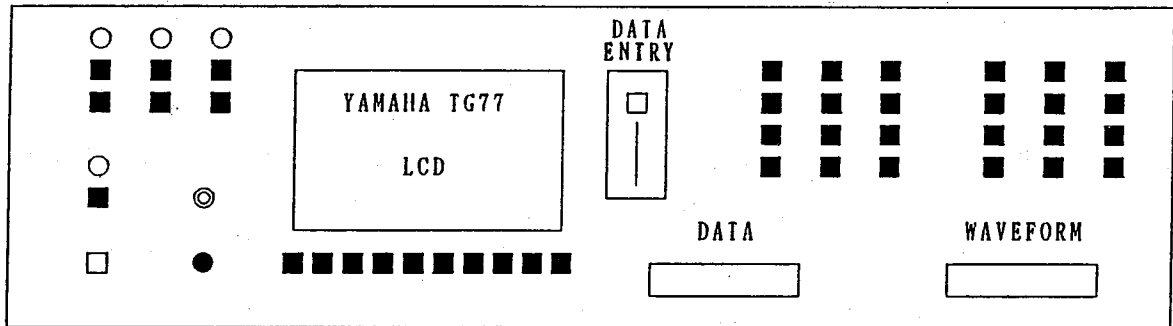
* 06: LED Check

下図の左から順に赤LEDが1回点滅した後、すべての赤色のLEDが同時に点灯することを確認する。現在点滅しているLEDが以下の様にLCDに表示される。

* 06 : LED Check Voice On

(Voiceの赤色のLEDが点滅している場合)

すべてのLEDが点滅することを確認する。



注) ◎印は、VOLUMEを示す。○印は、単色のLEDを示す。

●印は、PHONE端子を示す。□印は、POWER SWITCHを示す。■印は、PUSH SWITCHを示す。

テストの終了方法

[EXIT]を押すと、その時点の各LEDの全点灯でテストは終了し、テストナンバー待ち状態になる。

7. パネルスイッチ

* 07: Panel Switch

[VOICE]から[ENTER]までのパネルスイッチを、以下の様なLCDの表示に従ってON/OFFする。

* 07: Panel Switch Push Voice

([Voice]のチェックの場合)

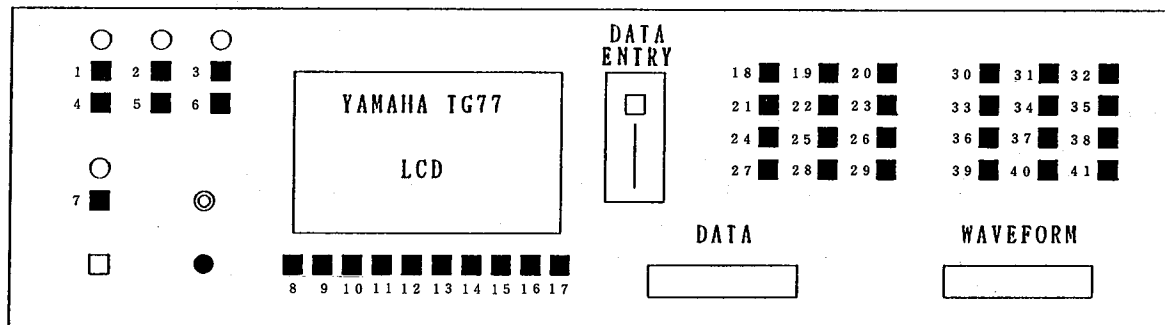
チェックの順序を下図に示す。

正常な場合、「ピッ」と発音して、次のスイッチのテストに進む。

期待されないコードがPKSより送られると、NGが表示され発音しない。

その後、正しいコードが受信されると、次のスイッチのテストに進む。

すべてのスイッチが正常であれば、OKが表示される。



注) ◎印は、VOLUMEを示す。○印は、単色のLEDを示す。

●印は、PHONE端子を示す。□印は、POWER SWITCHを示す。■印は、PUSH SWITCHを示す。

判定結果の表示

OK	* 07: Panel Switch	Push Enter	OK
NG	* 07: Panel Switch	Push Voicel? Err	

テストの終了方法

[ENTER]までチェックすると、OKが表示され、テストは終了する。

テスト途中で、NGと判断した場合の処理方法は、「B. テストの進めかた」を参照のこと。

8. データエントリー

* 08: Data Entry	00	20-80
------------------	----	-------

データエントリーを、以下の様なLCD表示に従って00-20-80-99-80-20-00(下-上-下)と滑らかに動かす。

* 08: Data Entry	xx	yy
------------------	----	----

* 08: Data Entry	xx	yy-zz
------------------	----	-------

xx ;現在のデータエントリーの値

yy, yy-zz ;次の目標値

引っ掛りがなく、数字が滑らかに変化し、OKの判定が出ることを確認する。

判定結果の表示

OK	* 08: Data Entry	00	00	OK
NG	表示なし			

テストの終了方法

判定を表示、出力して終了する。

テスト途中で、NGと判断した場合の処理方法は、「B. テストの進めかた」を参照のこと。

9. MIDI IN/OUT

* 09: MIDI (I/O/T)

IN、OUTをMIDIケーブルで接続した後、テストを実行する。

LCDには、以下の様に表示が行われる。

* 09: MIDI (I/O/T)	Tx:yy	Rx:zz
--------------------	-------	-------

テストの終了方法

[EXIT]を押すと、テストは終了し、テストナンバー待ち状態になる。

期待されないデータが受信されたため、NGとなった場合、その時点でテストは終了する。

一定時間内に受信が終了しないため、NGとなった場合は、[EXIT]が押されるまでテストは続けられる。

10. カードインサート

* 10: D-Card Insert	0
---------------------	---

テスト用カード(MCD 64)をスロットに挿入し、テストを実行する。カードを抜いて再度入れた時、数字が0から1に変化し、OKの判定が出ることを確認する。

判定結果の表示

OK	* 10: D-Card Insert 1	OK
NG	表示なし	

テストの終了方法

判定を表示、出力して終了する。

テスト途中で、NGと判断した場合の処理方法は、「B. テストの進めかた」を参照のこと。

11. カードリードライト

* 11: D-Card R/Write

テスト用カード(MCD 64)を使用して、次の2つのアドレスに対してカードのリード/ライトテストを行う。

CARD 1 = h'20000 - h'27FFF

CARD 2 = h'28000 - h'2FFFF

メモリープロテクトをオフにしたテスト用カード(MCD 64)を差し込み、テストを実行させる。

判定結果の表示

OK	* 11: D-Card R/Write CARD : 12	OK
NG	* 11: D-Card R/Write CARD : x	NG

(CARD 2が NG の場合)

テストの終了方法

判定を表示、出力して終了する。

すべてのCARD上のデータは保存される。

12. カードプロテクトスイッチ

* 12: D-Card Protect 0

テスト用カード(MCD 64)を使用して、カードプロテクトスイッチの状態を読み込めることを確認する。スイッチを操作して、プロテクトオフからプロテクトオンの状態にした時、数字が0から1に変化しOKの判定が出ることを確認する。

判定結果の表示

OK	* 12: D-Card Protect 1	OK
NG	表示なし	

テストの終了方法

判定を表示、出力して終了する。

テスト途中で、NGと判断した場合の処理方法は、「B. テストの進めかた」を参照のこと。

13. カードバッテリー

* 13: D-Card Battery

RAMバックアップバッテリー電圧が、測定できることを確認する。

判定結果の表示

OK	* 13: D-Card Battery #.#V	OK
----	---------------------------	----

NG	* 13: D-Card Battery #.#V Low	NG
----	-------------------------------	----

	* 13: D-Card Battery #.#V High	NG
--	--------------------------------	----

テストの終了方法

判定を表示、出力して終了する。

14. ウェーブカードインサート

* 14: W-Card Insert	0
---------------------	---

テスト用ウェーブカードをスロットに入れた時、数字が0から1に変化し、OKの判定が出ることを確認する。

判定結果の表示

OK	* 14: W-Card Insert 1	OK
----	-----------------------	----

NG 表示なし

テストの終了方法

判定を表示、出力して終了する。

テスト途中で、NGと判断した場合の処理方法は、“B. テストの進めかた”を参照のこと。

15. ウェーブカードリード

* 15: W-Card Read

本テストは、工業出荷検査用のため、ここでは実行しません。

16. 1kHz OUTPUT1-L 発音(FM)

* 16: 1KHz to L1-> L1

OUTPUT1-LおよびPHONES(L)より正常な信号が出力されていることを確認する。

なお信号源は、FMSEL=0-OPS(IC163)のSO0(CH0)-LS32(IC168)の6番ピン-M3(IC144)のINDV1(CH13)-PAN(IC165)のS1, S2のルートを使っている。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-R、PHONES(L)、PHONES(R)共にジャックを差し込み、各出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 16: 1KHz to L1-> L1 Output On

チェック項目

OUTPUT1-L ; 1kHz±1.5Hz、sine波、歪率 0.2%、-1.0 ±2dbm(負荷10kohm)

OUTPUT2-L ; -70dbm以下

OUTPUT1-R ; -70dbm以下

OUTPUT2-R ; -70dbm以下

PHONES(L) ; 1kHz、sine波、歪率 0.2%、+5.0±2dbm(負荷150ohm)

PHONES(R) ; -60dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 16: 1KHz to L1-> L1 Output Off

17. 1kHz OUTPUT1-R 発音(FM)

* 17: 1KHz to R1-> R1

OUTPUT1-Rおよび PHONES(R)より正常な信号が出力されていることを確認する。
なお信号源は、TEST 16と同じ。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-R、PHONES(L)、PHONES(R)共にプラグを差し込み、各出力の出力波形、出力レベルを、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 17: 1KHz to R1-> R1 Output On

チェック項目

OUTPUT1-R ; 1kHz、sine波、歪率 0.2%、 $-1.0 \pm 2\text{dbm}$ (負荷10kohm)
OUTPUT1-L ; -70dbm 以下
OUTPUT2-R ; -70dbm 以下
OUTPUT2-L ; -70dbm 以下
PHONES(R) ; 1kHz、sine波、歪率0.2%、 $+5.0 \pm 2\text{dbm}$ (負荷150ohm)
PHONES(L) ; -60dbm 以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 17: 1KHz to R1-> R1 Output Off

18. 1kHz OUTPUT2-L 発音(FM)

* 18: 1KHz to L2-> L2

OUTPUT2-LおよびPHONES(L)より正常な信号が出力されていることを確認する。
なお信号源は、TEST 16と同じ。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-R、PHONES(L)、PHONES(R)共にプラグを差し込み、各出力の出力波形、出力レベルをオシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 18: 1KHz to L2-> L2 Output On

チェック項目

OUTPUT2-L ; 1kHz、sine波、歪率 0.2%、 $-1.0 \pm 2\text{dbm}$ (負荷10kohm)
OUTPUT1-L ; -70dbm 以下
OUTPUT1-R ; -70dbm 以下
OUTPUT2-R ; -70dbm 以下
PHONES(L) ; 1kHz、sine波、歪率0.2%、 $+5.0 \pm 2\text{dbm}$ (負荷150ohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 18: 1KHz to L2-> L2 Output Off

19. 1kHz OUTPUT2-R 発音(FM)

* 19: 1KHz to R2-> R2

OUTPUT2-Rおよび PHONES(R)より正常な信号が出力されていることを確認する。

なお信号源は、TEST 16と同じ。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-R、PHONES(L)、PHONES(R)共にプラグを差し込み、各出力の出力波形、出力レベルをオシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 19: 1KHz to R2-> R2 Output On

チェック項目

OUTPUT2-R ; 1kHz波、sine波、歪率0.2%、 -1.0 ± 2 dbm(負荷10kohm)

OUTPUT1-L ; -70 dbm以下

OUTPUT2-L ; -70 dbm以下

OUTPUT1-R ; -70 dbm以下

PHONES(R) ; 1kHz、sine波、歪率0.2%、 $+5.0 \pm 2$ dbm(負荷150ohm)

IND-OUT 1 ; -70 dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 19: 1KHz to R2-> R2 Output Off

20. L MONO

* 20: 1KHz to L2-> L1

OUTPUT2-Lより出力されている信号がOUTPUT2-Lのプラグを抜いた時、OUTPUT1-Lより出力されることを確認する。なお信号源は、TEST 16と同じ。

OUTPUT1-Lにプラグを差し込み、出力波形、出力レベルを、オシロスコープ、レベル計(12.47kHzフィルター付き)で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 20: 1KHz to L2-> L1 Output On

チェック項目

OUTPUT1-L ; 1kHz、sine波、 -1.0 ± 2 dbm(負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 20: 1KHz to L2-> L1 Output Off

21. R MONO

* 21: 1KHz to R2-> R1

OUTPUT2-Rより出力されている信号がOUTPUT2-Rのプラグを抜いた時、OUTPUT1-Rより出力されることを確認する。なお信号源は、TEST 16と同じ。

OUTPUT1-Rにプラグを差し込み、出力波形、出力レベルを、オシロスコープ、レベル計(12.47kHzフィルター付き)で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 21: 1KHz to R2-> R1 Output Off

チェック項目

OUTPUT1-R ; 1kHz, sine波, $-1.0 \pm 2\text{dbm}$ (負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 21: 1KHz to R2-> R1 Output Off

22. L R MONO

* 22: 1KHz to R1-> L1

OUTPUT1-Rより出力されている信号がOUTPUT1-Rのプラグを抜いた時、OUTPUT1-Lより出力されることを確認する。なお信号源は、TEST 16と同じ。

OUTPUT1-Lにプラグを差し込み、出力波形、出力レベルを、オシロスコープ、レベル計 (12.47kHzフィルター付き) で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 22: 1KHz to R1-> L1 Output On

チェック項目

OUTPUT1-L ; 1kHz, sine波, $-1.0 \pm 2\text{dbm}$ (負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 22: 1KHz to R1-> L1 Output Off

23. Effect 0 to L1

* 23: Effect_0 to L1

MIX3(IC122)の1番ピン、MIX3(IC125)の1番ピンに入力された同レベルの信号が、L1, R1, L2, R2に出力される。なお信号源は、TEST 16と同じ。

OUTPUT1-Lにプラグを差し込み (他はオープン)、出力波形、出力レベルを、オシロスコープ、レベル計 (12.47kHz フィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 23: Effect_0 to L1 Output On

チェック項目

OUTPUT1-L ; 1kHz, sine波, 歪率 0.3%, $+11.0 \pm 2\text{dbm}$ (負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 23: Effect_0 to L1 Output Off

24. Effect 1 to L1

* 24: Effect_1 to L1

LEF (IC157) のSI0-LDSP (IC153) のSI0-MIX3 (IC122) の2番ピンを通った信号が、L1, R1より又、LEF (IC160) のSI0-LDSP (IC155) のSI0-MIX3 (IC125) の2番ピンを通った信号が、L2, R2よりそれぞれ同信号レベルで出力される。

なおLEF及びLDSPは、それぞれのDRAM, PSRAMを通して信号が出力されている。

信号源は、FMSEL=0-OPS (IC163) のSO0 (CH0)-LS32 (IC168) の6番ピン-M3 (IC144) のINDV1 (CH13)-PAN (IC165) のS1, S2のルートを使っています。

OUTPUT1-Lにプラグを差し込み(他はオープン)、出力波形、出力レベルを、オシロスコープ、レベル計 (12.47kHz フィルター付き)、歪率計で観測する。

マスターボリュームは max とする。発音中は、LCD 表示が以下の様になる。

```
* 24: Effect_1 to L1 Output On
```

チェック項目

OUTPUT1-L ; 1kHz, sine波、歪率 0.3%、+11.0±2dbm(負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

```
* 24: Effect_1 to L1 Output Off
```

25. Effect 2 to L1

```
* 25: Effect-2 to L1
```

LEF (IC160) のSI0-LDSP (IC153) のSI1-LDSP (IC155) のSI1-MIX3 (IC122) の3番ピンを通った音が、L1, R1より又、LEF (IC160) のSI0-MIX3 (IC125) の4番ピンを通った音が、L2, R2よりそれぞれ同信号レベルで出力される。

なおLEF及びLDSPは、それぞれのDRAM, PSRAMを通して信号が出力されている。

信号源は、TEST 16と同じ。

OUTPUT1-Lに、プラグを差し込み(他はオープン)、出力波形、出力レベルをオシロスコープ、レベル計(12.47 kHz フィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下のようになる。

```
* 25: Effect-2 to L1 Output On
```

チェック項目

OUTPUT1-L ; 1kHz, sine波、歪率 0.3%、+10.0±2dbm (負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

```
* 25: Effect-2 to L1 Output Off
```

26. AWM Check

```
* 26: PCM Check
```

WAVE ROM 012000番地~01FFFF番地に記録されている音を、M3 (IC138), INDV0端子 (CH0) より、PAN (IC143) S1, S2-PAN (IC165) S1, S2を通してL1, R1, L2, R2に出力する。

OUTPUT1-L に、プラグを差し込み(他はオープン)、OUTPUT1-Lの出力波形を観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

```
* 26: PCM Check Output On
```

チェック項目

聴感

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 26: PCM Check Output Off

27. FM Thru M3(AWM)

* 27: FM Thru M3(PCM)

EGMで周波数SWEEPされた正弦波をL1, R1, L2, R2各端子より2ch分交互に出力する。音源は、FMSEL=1-EGM(IC162)-OPS(IC161)のSO0(CH1), SO1(CH9)-M3(IC138)のINDV0(CH5), INDV1(CH6)-PAN(IC143)のS1, S2-PAN(IC165)のS1,S2-MIX3(IC122)の1番ピン, MIX3(IC125)の1番ピンのルートを使用している。

OUTPUT1-Lにプラグを差し込み(他はオープン)、出力波形を観測する。又、レベルが周波数SWEEPに対し著しく変化しない事を確認する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 27: FM Thru M3(PCM) Output On

チェック項目

聴感

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 27: FM Thru M3(PCM) Output Off

28. FM Thru M3(FM)

* 28: FM Thru M3(FM)

EGMで周波数 SWEEPされた正弦波をL1, R1, L2, R2各端子より2ch分交互に出力する。音源は、FMSEL=0-EGM(IC164)-OPS(IC163)のSO0(CH0), SO1(CH8)-M3(IC144)のINDV0(CH14),INDV1(CH15)-PAN(IC165)のS1, S2-MIX(IC122)の1番ピン, MIX(IC125)の1番ピンのルートを使用している。

OUTPUT1-Lにプラグを差し込み(他はオープン)、出力波形を観測する。又、レベルが周波数SWEEPに対し著しく変化しない事を確認する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 28: FM Thru M3(FM) Output On

チェック項目

聴感

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 28: FM Thru M3(FM) Output Off

29. Feedback FM→M3

* 29: Feedback FM→M3

EGMで周波数SWEEPされた正弦波が、M3を通してフィードバックされる。2ch分交互に出力される。音源は、TEST 27と同じ、但しM3(IC138)のINDV0, INDV1の信号がOPS(IC161)のSI0,SI1端子にフィードバックされる。

OUTPUT1-Lにプラグを差し込み(他はオープン)、出力波形を観測する。
特にフィードバックされて歪みっぽい音である事を確認する。
マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 29: Feedback FM->M3 Output On

チェック項目

聴感

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 29: Feedback FM Output Off

30. 1kHz INDIVIDUAL OUTPUT 1 発音(FM)

* 30: 1KHz Ind-Out 1

INDIVIDUAL OUTPUT 1 より正常な信号が出力されていることを確認する。

なお信号源は、FMSEL=0-OPS(IC163)のSO0(CH0)-LS32(IC168)の6番ピン-M3(IC144)のDIOOUT2-MIX3(IC141)の2番ピンのルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 30: 1KHz Ind-Out 1 On

チェック項目

INDIVIDUAL OUTPUT 1 ; 1kHz \pm 1.5Hz、sine波、歪率 0.2%、+5.0 \pm 2dbm(負荷10kohm)

INDIVIDUAL OUTPUT 2 ; -70dbm以下

INDIVIDUAL OUTPUT 3 ; -70dbm以下

INDIVIDUAL OUTPUT 4 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 30: 1KHz Ind-Out 1 Off

31. 1kHz INDIVIDUAL OUTPUT 2 発音(AWM)

* 31: 1KHz Ind-Out 2

INDIVIDUAL OUTPUT 2 より正常な信号が出力されていることを確認する。

なお信号源は、M3(IC138)のDIOOUT2-MIX3(IC141)の1番ピンのルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 31: 1KHz Ind-Out 2 On

チェック項目

INDIVIDUAL OUTPUT 1 ; -70dbm以下
 INDIVIDUAL OUTPUT 2 ; 1kHz±1.5Hz、sine波、歪率 0.2%、+5.0 ±2dbm(負荷10kohm)
 INDIVIDUAL OUTPUT 3 ; -70dbm以下
 INDIVIDUAL OUTPUT 4 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 31: 1KHz Ind-Out 2 Off

32. 1kHz INDIVIDUAL OUTPUT 3 発音(FM)

* 32: 1KHz Ind-Out 3

INDIVIDUAL OUTPUT 3 より正常な信号が出力されていることを確認する。

なお信号源は、FMSEL=0-OPS(IC163)のSO0(CH0)-LS32(IC168)の6番ピン-M3(IC144)のDIOU3-MIX3(IC142)の2番ピンのルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 32: 1KHz Ind-Out 3 On

チェック項目

INDIVIDUAL OUTPUT 1 ; -70dbm以下
 INDIVIDUAL OUTPUT 2 ; -70dbm以下
 INDIVIDUAL OUTPUT 3 ; 1kHz±1.5Hz、sine波、歪率 0.2%、+5.0 ±2dbm(負荷10kohm)
 INDIVIDUAL OUTPUT 4 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 32: 1KHz Ind-Out 3 Off

33. 1kHz INDIVIDUAL OUTPUT 4 発音(AWM)

* 33: 1KHz Ind-Out 4

INDIVIDUAL OUTPUT 4 より正常な信号が出力されていることを確認する。

なお信号源は、M3(IC138)のDIOU3-MIX3(IC142)の1番ピンのルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 33: 1KHz Ind-Out 4 On

チェック項目

INDIVIDUAL OUTPUT 1 ; -70dbm以下
 INDIVIDUAL OUTPUT 2 ; -70dbm以下
 INDIVIDUAL OUTPUT 3 ; -70dbm以下
 INDIVIDUAL OUTPUT 4 ; 1kHz±1.5Hz、sine波、歪率 0.2%、+5.0 ±2dbm(負荷10kohm)
 INDIVIDUAL OUTPUT 5 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

```
* 33: 1KHz Ind-Out 4 Off
```

34. 1kHz INDIVIDUAL OUTPUT 5 発音(FM)

```
* 34: 1KHz Ind-Out 5
```

INDIVIDUAL OUTPUT 5 より正常な信号が出力されていることを確認する。

なお信号源は、FMSEL=0-OPS(IC163)のSO0(CH0)-LS32(IC168)の6番ピン-M3(IC144)のDIOOUT1-M3(IC138)のDIOOUT0ルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

```
* 34: 1KHz Ind-Out 5 On
```

チェック項目

INDIVIDUAL OUTPUT 5 ; 1kHz \pm 1.5Hz、sine波、歪率 0.2%、+5.0 \pm 2dbm(負荷10kohm)

INDIVIDUAL OUTPUT 6 ; -70dbm以下

INDIVIDUAL OUTPUT 7 ; -70dbm以下

INDIVIDUAL OUTPUT 8 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

```
* 34: 1KHz Ind-Out 5 Off
```

35. 1kHz INDIVIDUAL OUTPUT 6 発音(AWM)

```
* 35: 1KHz Ind-Out 6
```

INDIVIDUAL OUTPUT 6 より正常な信号が出力されていることを確認する。

なお信号源は、M3(IC138)のDIOOUT0のルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

```
* 35: 1KHz Ind-Out 6 On
```

チェック項目

INDIVIDUAL OUTPUT 5 ; -70dbm以下

INDIVIDUAL OUTPUT 6 ; 1kHz \pm 1.5Hz、sine波、歪率 0.2%、+5.0 \pm 2dbm(負荷10kohm)

INDIVIDUAL OUTPUT 7 ; -70dbm以下

INDIVIDUAL OUTPUT 8 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

```
* 35: 1KHz Ind-Out 6 Off
```


36. 1kHz INDIVIDUAL OUTPUT 7 発音(FM)

* 36: 1KHz Ind-Out 7

INDIVIDUAL OUTPUT 7 より正常な信号が出力されていることを確認する。

なお信号源は、FMSEL=0-OPS(IC163)のSO0(CH0)-M3(IC144)のDIOOUT0のルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 36: 1KHz Ind-Out 7 On

チェック項目

INDIVIDUAL OUTPUT 5 ; -70dbm以下

INDIVIDUAL OUTPUT 6 ; -70dbm以下

INDIVIDUAL OUTPUT 7 ; 1kHz±1.5Hz、sine波、歪率 0.2%、+5.0 ±2dbm(負荷10kohm)

INDIVIDUAL OUTPUT 8 ; -70dbm以下

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 36: 1KHz Ind-Out 7 Off

37. 1kHz INDIVIDUAL OUTPUT 8 発音(AWM)

* 37: 1KHz Ind-Out 8

INDIVIDUAL OUTPUT 8 より正常な信号が出力されていることを確認する。

なお信号源は、M3(IC138)のDIOOUT1-M3(IC144)のDIOOUT0のルートを使っている。

出力の周波数、出力波形、出力レベルを周波数カウンタ、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。

マスターボリュームはmaxとする。発音中は、LCD表示が以下の様になる。

* 37: 1KHz Ind-Out 8 On

チェック項目

INDIVIDUAL OUTPUT 5 ; -70dbm以下

INDIVIDUAL OUTPUT 6 ; -70dbm以下

INDIVIDUAL OUTPUT 7 ; -70dbm以下

INDIVIDUAL OUTPUT 8 ; 1kHz±1.5Hz、sine波、歪率 0.2%、+5.0 ±2dbm(負荷10kohm)

テストの終了方法

[EXIT]を押すと、次の画面を表示し、発音は終了し、テストナンバー待ち状態になる。

* 37: 1KHz Ind-Out 8 Off

38. ファクトリーセット

* 38: Factory Set

次のデータを、イニシャルデータにセットする。

シンセサイザーシステム

インターナル64ボイス

インターナル16マルチ

テストを実行すると、次の画面が表示される。

* 38: Factory Set [NO] or [YES] ?

[YES]を押すと、ファクトリーセットされる。
 [NO]を押すと、セットされない。

判定結果の表示

セットされた場合

* 38: Factory Set OK

セットされなかった場合

* 38: Factory Set [NO] or [YES] ?

テストの終了方法

判定を表示、出力して終了する。

ファクトリーセット終了後、次に示すシステムデータがセットされる。

SYNTH

Note Shift.....+0
 Fine Tuning.....+0.
 Fixed Velocity.....off
 Velocity Curve.....0(normal)
 Individual Foot Switch.....65
 Individual Wheel.....13
 Edit Confirm.....on
 Kbd Trans Ch.....1
 Voice Recv Ch.....omn
 Local on/off.....on
 Note on/off.....all
 Device Number.....all
 Bulk Protect.....on
 Program Change.....normal

----- **Greeting Message** -----

"Create YOUR sound!"
 "...I'm ready"

----- **PAN Factory Set** -----

11~132 = P1 ~P32

----- **MCT Factory Set** -----

I 1 = P62(Far East)
 I 2 = P63(Blue)

----- **VOICE** -----

I-A01~D16 =P1-A01~D16

----- **MULTI** -----

I-A01~D16 =P1-A01~D16

39. EXIT

* 39: Exit

テストを実行すると、次の画面が表示される。

* 39: Exit

[NO] or [YES] ?

[YES]を押すと、テストモードから抜ける。

[NO]を押すと、テストナンバー待ち状態になる。

判定結果の表示

テストモードから抜けなかった場合

* 39: Exit

[NO] or [YES] ?

[YES]を押すと、テストモードから抜ける。

[NO]を押すと、テストナンバー待ち状態になる。

■ ERROR MESSAGES

MIDI

MIDI buffer full !

When the TG77 attempted to receive or transmit a large amount of MIDI data, its handling capacity was exceeded.

MIDI data error !

An error occurred when receiving MIDI data.

MIDI checksum err !

An error occurred when receiving bulk data.

Device number is off !

Since the device number is off, bulk data cannot be transmitted or received.

Device number mismatch !

Since the device numbers did not match, the bulk data was not received.

Data card

Data card not ready !

The data card is not correctly inserted into the slot.

Card protected !

Since the memory protect switch of the card is on, data cannot be saved to the card.

Illegal format !

The card is the wrong format.

Verify error !

The data was not correctly saved.

Wave card

Wave card not ready !

The wave card is not correctly inserted into the slot.

Different wave card (ID=) !

The wave card which is inserted is not the one used by the voice or multi.

ID Number mismatch !

A multi includes voices which use two or more wave cards.

Battery

Change internal battery !

The internal backup battery needs to be replaced.

Change card battery !

The card backup battery needs to be replaced.

Other

Use bank D !

4 element voices can be stored (or copied) only to bank D.

Illegal mark !

You attempted to mark a display which does not allow marking.

■ エラーメッセージ

MIDI関係	
ディスプレイ表示	メッセージの内容
MIDI buffer full !	一度に多量のMIDIデータが送受信されたため、送受信ができません。データ量を減らしてください。
MIDI data error !	MIDIデータを受信した際、異常がありました。
MIDI checksum err !	バルクデータの受信の際、異常がありました。
Device number is off !	デバイスナンバーがオフになっているため、バルクデータの送受信ができません。
Device number mismatch !	デバイスナンバーのチャンネルが一致していないため、バルクデータの受信ができません。

データカード関係	
ディスプレイ表示	メッセージの内容
Data Card not ready !	カードが本体に正しくセットされていません。
Card protected !	カード自体のプロテクトスイッチがオンになっているため、データのセーブができません。
Illegal format !	カードのフォーマットが違います。
Verify error !	カードのセーブが正しく行われていません。

ウェイブカード関係	
ディスプレイ表示	メッセージの内容
Wave card not ready !	ウェイブカードが本体に正しくセットされていません。
Different wave card (ID=) !	プレイしようとしているボイスで使用されるべきウェイブフォームは、現在カードスロットにセットされているものと異なるウェイブフォームカードのものです。
ID Number mismatch !	マルチを構成しているボイスが必要とするウェイブフォームカードのIDが混在しています。(同時には1つのウェイブフォームカードしか使用できません)

電池関係	
ディスプレイ表示	メッセージの内容
Change internal battery !	本体内のバックアップバッテリーが寿命です。
Change card battery !	カードのバックアップバッテリーが寿命です。

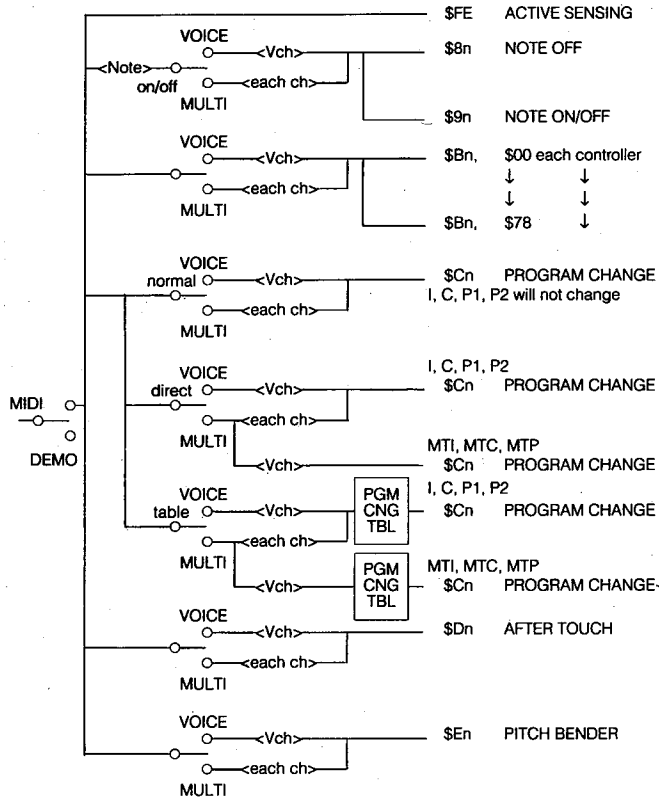
その他	
ディスプレイ表示	メッセージの内容
Use bank D !	4エレメントタイプのボイスは、バンクDにしかストアできません。
Illegal mark !	現在の画面には、マークすることはできません。

MIDI DATA FORMAT

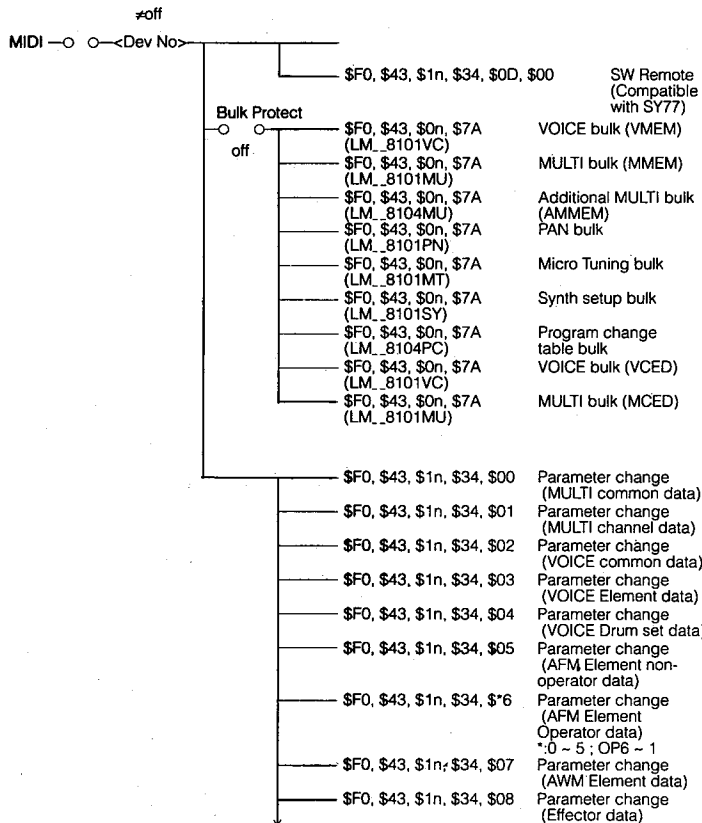
2. Synthesizer mode

2.1 MIDI reception/transmission block diagram

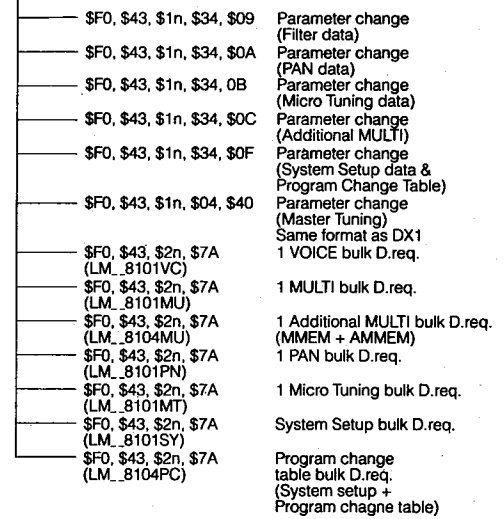
< MIDI reception conditions > 1/2
 Vch Voice Receive ch.



< MIDI reception conditions > 2/2



(continue)



Dev No = Device Number

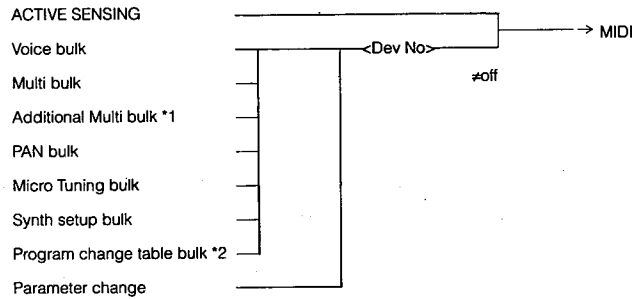
VCED = Voice edit buffer

MCED = Multi edit buffer

VMEM = Voice memory

MMEM = Multi memory

AMMEM = Additional Multi memory



*1 Additional Multi bulk data is transmitted together with Multi bulk data.

*2 Program Change Table bulk data is transmitted together with Synth setup bulk data.

(continue)

2.2 Channel messages

2.2.1 Reception

2.2.1.1 Note on/off

Received note range = C-2 . . . G8
 Velocity range = 1 . . . 127 (note on only)

* A system setup parameter allows selection of
 normal = receive all note numbers
 odd = receive odd note numbers
 even = receive even note numbers

2.2.1.2 Control change

The following parameters can be controlled via MIDI.

cntrl #	parameter	data rng
0-120	Pitch Modulation	0...127
0-120	Amplitude Modulation	0...127
0-120	Filter Modulation	0...127
0-120	Pan LFO Modulation	0...127
0-120	Cutoff Bias	0...127
0-120	Pan Bias	0...127
0-120	EG Bias	0...127
0-120	Volume (assignable)	0...127
5	Portamento Time	0...127
7	Volume	0...127
64	Sustain Switch	0...127
65	Portamento Switch	0...127

2.2.1.3 Program change

When a program change is received, the TG77 will operate as follows.
 A system setup parameter allows the following four modes of reception.

- 1) off : program changes will not be received.
- 2) normal
 : When in voice mode, program change data 00...63 correspond to voices 01...64. INTERNAL, CARD, or PRESET will not change. Program change data 64...127 will not be received.
 When in multi mode, program change data 00-63 correspond to voices 01-64, and program change data 64...79 correspond to multis 01...16. INTERNAL, CARD, or PRESET will not change. Program change data 80...127 will not be received.
- 3) direct
 : Program change data 00...116 will function the same as in normal mode. Program change data 117 and above are used to switch modes as follows, and when the following program change 00...116 is received, the mode and voice will be selected.

pgm change
 data value

- # 117 Voice Mode PRESET2
- # 118 Multi Mode Voice PRESET2
- # 119 Multi Mode Voice INTERNAL or CARD
 (whichever is currently selected by the MULTI)
- # 120 Multi Mode Voice CARD or INTERNAL
 (whichever is currently selected by the MULTI)
- # 121 Multi Mode Voice PRESET1
- # 122 Voice Mode INTERNAL
- # 123 Voice Mode CARD
- # 124 Voice Mode PRESET1
- # 125 Multi Mode Multi INTERNAL
- # 126 Multi Mode Multi CARD
- # 127 Multi Mode Multi PRESET

However, when the receiving device is in Voice mode, #118...#121 will be interpreted as

- #118 → #117
- #119 → #122
- #120 → #123
- #121 → #124

and will be received while remaining in Voice mode.

4) table

: Programs will be selected as specified by the contents of the table, including the selection of Voice/Multi or Internal/Card/Preset (1,2).

2.2.1.4 Pitch bend

Only the MSB of the pitch bend is received.

2.2.1.5 Aftertouch

Channel aftertouch is received. Individual aftertouch is not received.

2.2.1.6 Channel mode messages

Not received

3. System exclusive messages

3.1 Parameter changes

The TG77 transmits and receives the following 15 types of parameter changes. (16: Remote Switch is only received.) Also, when 16: Remote Switch is received, the corresponding display will appear just as if the switch had actually been pressed.

- 1). Multi Common Data parameter change
- 2). Multi Channel Data parameter change
- 3). Voice Common Data parameter change
- 4). Voice Element Data parameter change
- 5). Voice Drum Set Data parameter change
- 6). AFM Element Common Data parameter change
- 7). AFM Element Operator Data parameter change
- 8). AWM Element Data parameter change
- 9). Effect Data parameter change
- 10). Filter Data parameter change
- 11). PAN Data parameter change
- 12). Micro Tuning Data parameter change
- 13). System Setup Data parameter change
- 14). Additional Multi Data parameter change
- 15). Program Change Table parameter change
- 16). Switch Remote parameter change

Except for turning the Device Number off, it is not possible to turn off reception of parameter changes for the various MIDI switches.

3.1.1 Multi Common Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000000 00
00000000 00
00000000 00
00000000 00
000ppppp ppppp =Table 1-1, N2
00000000 00
0vvvvvvv vvvvvvv=ascii
11110111 F7
    
```

This message modifies Multi Common data (multi name) one parameter at a time. When this message is received, the following will occur.

- Voice Play mode : ignore
- Voice Edit mode : ignore
- Multi Play mode : move to Multi Edit mode and receive
- Multi Edit mode : receive
- Voice Edit mode in Multi : receive
- Utility mode (Voice mode) : ignore
- Utility mode (Multi mode) : move to Voice Edit mode and receive

3.1.2 Multi Channel Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000001 01
0000cccc cccc = Voice Channel Number
00000000 00
000ppppp ppppp = Table 1-2, N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies the channel data of a multi one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : ignore
Voice Edit mode      : ignore
Multi Play mode      : move to Multi Edit mode and receive
Multi Edit mode      : receive
Voice Edit mode in Multi : receive
Utility mode (Voice mode) : ignore
Utility mode (Multi mode) : move to Voice Edit mode and receive
    
```

3.1.3 Voice Common Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000010 02
00000000 00
00000000 00
0ppppppp ppppppp = Table 1-3, N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies voice common data one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : move to Voice Edit mode and receive
Voice Edit mode      : receive
Multi Play mode      : ignore
Multi Edit mode      : ignore
Voice Edit mode in Multi : receive
Utility mode (Voice mode) : move to Voice Edit mode and receive
Utility mode (Multi mode) : ignore
    
```

3.1.4 Voice Element Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000011 03
0ee00000 ee = Element Number
00000000 00
0000pppp pppp = Table 1-4, N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies voice element data one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : if the specified element exists, move to
                        Voice. Edit mode and receive. If not, ignore.
Voice Edit mode      : if the specified element exists, receive. If
                        not, ignore.
Multi Play mode      : ignore
Multi Edit mode      : ignore
Voice Edit mode in Multi : same as for Voice Edit mode
Utility mode (Voice mode) : same as for Voice Play mode
Utility mode (Multi mode) : ignore
    
```

3.1.5 Voice Drum Set Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000100 04
0nnmmmmn nnnmmmm = MIDI Note Number
00000000 00
0000pppp pppp = Table 1-5, N2
0000000v v = Data Value ( MSB )
0vvvvvvv vvvvvvv = Data Value ( LS7bits )
11110111 F7
    
```

This message modifies voice drum set data one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : if originally a drum set, move to Voice Edit
                        mode and receive. If not, ignore.
Voice Edit mode      : if originally a drum set, receive. If not,
                        ignore.
Multi Play mode      : ignore
Multi Edit mode      : ignore
Voice Edit mode in Multi : same as for Voice Edit mode
Utility mode (Voice mode) : same as for Voice Play mode
Utility mode (Multi mode) : ignore
    
```

3.1.6 AFM Element Common Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000101 05
0ee00000 ee = Element Number
00000000 00
000ppppp ppppp = Table 1-6 N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies AFM element common data one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : if the specified element exists and is AFM,
                        move to Voice Edit mode and receive. If not,
                        ignore.
Voice Edit mode      : if the specified element exists and is AFM,
                        receive. If not, ignore.
Multi Play mode      : ignore
Multi Edit mode      : ignore
Voice Edit mode in Multi : same as Voice Edit mode
Utility mode (Voice mode) : same as Voice Play mode
Utility mode (Multi mode) : ignore
    
```

3.1.7 AFM Element Operator Enable parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000101 05
0ee00000 ee = Element Number
01111111 7F
01111111 7F
00000000 00
00vvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies AFM operator enable data one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : if the specified element exists and is AFM,
                        move to Voice Edit mode and receive. If not,
                        ignore.
Voice Edit mode      : if the specified element exists and is AFM,
                        receive. If not, ignore.
Multi Play mode      : ignore
Multi Edit mode      : ignore
Voice Edit mode in Multi : same as Voice Edit mode
Utility mode (Voice mode) : same as Voice Play mode
Utility mode (Multi mode) : ignore
    
```


3.1.8 AFM Element Operator Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00001110 ooo = 6 (Operator Number)
0ee00000 ee = Element Number
00000000 00
00pppppp pppppp = Table 1-7, N2
0000000v v = Data Value (MSB)
0vvvvvvv vvvvvvv = Data Value (LS7bits)
11110111 F7
    
```

This message modifies AFM operator parameter data one parameter at a time. When this message is received, the following will occur.

- Voice Play mode : if the specified element exists and is AFM, move to Voice Edit mode and receive. If not, ignore.
- Voice Edit mode : if the specified element exists and is AFM, receive. If not, ignore.
- Multi Play mode : ignore
- Multi Edit mode : ignore
- Voice Edit mode in Multi : same as in Voice Edit mode
- Utility mode (Voice mode) : same as in Voice Play mode
- Utility mode (Multi mode) : ignore

3.1.9 AWM Element Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00000111 07
0ee00000 ee = Element Number
00000000 00
0ppppppp ppppppp = Table 1-8, N2
0000000v v = Data Value (MSB)
0vvvvvvv vvvvvvv = Data Value (LS7bits)
11110111 F7
    
```

This message modifies AWM element data one parameter at a time. When this message is received, the following will occur.

- Voice Play mode : if the specified element exists and is AWM, move to Voice Edit mode and receive. If not, ignore.
- Voice Edit mode : if the specified element exists and is AWM, receive. If not, ignore.
- Multi Play mode : ignore
- Multi Edit mode : ignore
- Voice Edit mode in Multi : same as in Voice Edit mode
- Utility mode (Voice mode) : same as in Voice Play mode
- Utility mode (Multi mode) : ignore

3.1.10 Effect Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00001000 08
00000000 00
00000000 00
000ppppp pppppp = Table 1-9, N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies effect data one parameter at a time. When this message is received, the following will occur.

- Voice Play mode : move to Voice Edit mode and receive
- Voice Edit mode : receive
- Multi Play mode : move to Multi Edit mode and receive
- Multi Edit mode : receive
- Voice Edit mode in Multi : receive. Modify the Multi effect.
- Utility mode (Voice mode) : same as in Voice Play mode
- Utility mode (Multi mode) : same as in Multi Play mode

3.1.11 Filter Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00001001 09
0ee00fff ee = Element Number, fff = filter Number
00000000 00
00pppppp pppppp = Table 1-10, N2
0000000v v = Data Value (MSB)
0vvvvvvv vvvvvvv = Data Value (LS7bits)
11110111 F7
    
```

This message modifies filter data one parameter at a time. When this message is received, the following will occur.

- Voice Play mode : if the specified element exists, move to Voice Edit mode and receive. If not, ignore.
- Voice Edit mode : if the specified element exists, receive. If not, ignore.
- Multi Play mode : ignore
- Multi Edit mode : ignore
- Voice Edit mode in Multi : same as in Voice Edit mode
- Utility mode (Voice mode) : same as in Voice Play mode
- Utility mode (Multi mode) : ignore

3.1.12 PAN Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00001010 0A
000mnnnn mnnnn = Memory Number
00000000 00
000ppppp pppppp = Table 1-11, N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies dynamic pan data one parameter at a time. When this message is received, the mode will not change, and the pan data of the specified memory will be modified.

3.1.13 Micro Tuning Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00001010 0B
000mnnnn mnnnn = Memory Number
0000000p p = Table 1-12, N1
0ppppppp ppppppp = Table 1-12, N2
0vvvvvvv vvvvvvv = Data Value (MS 7bits)
0vvvvvvv vvvvvvv = Data Value (LS 7bits)
11110111 F7
    
```

This message modifies micro tuning data one parameter at a time. When this message is received, the mode will not change, and the micro tuning data of the specified memory will be modified.

3.1.14 System Setup Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn = Device Number
00110100 34
00001111 0F
00000000 00
00000000 00
0ppppppp ppppppp = Table 1-13, N2
00000000 00
0vvvvvvv vvvvvvv = Data Value
11110111 F7
    
```

This message modifies system setup data one parameter at a time. When this message is received, the mode will not change.

3.1.15 Additional Multi Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn =Device Number
00110100 34
00001100 0C
0000cccc cccc =Voice Channel Number
00000000 00
000ppppp ppppp =Table 1-14, N2
00000000 00
0vvvvvvv vvvvvv=Data Value
11110111 F7
    
```

This message modifies additional multi channel data one parameter at a time. When this message is received, the following will occur.

```

Voice Play mode      : ignore
Voice Edit mode      : ignore
Multi Play mode      : move to Multi Edit mode
Multi Edit mode      : receive
Voice Edit mode in Multi : receive
Utility mode (Voice mode) : ignore
Utility mode (Multi mode) : move to Multi Edit mode and receive
    
```

3.1.16 Program Change Table parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn =Device Number
00110100 34
00001111 0F
00000000 00
000000pp pp =Table 1-15, N1
0ppppppp pppppp=Table 1-15, N2
00000000 00
0vvvvvvv vvvvvv=Data Value
11110111 F7
    
```

This message modifies Program Change Table data one parameter at a time. This message is received regardless of the mode.

3.1.17 Switch Remote parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn =Device Number
00110100 34
00001101 0D
00000000 00
00000000 00
0ppppppp pppppp=Table 1-16, N2
00000000 00
0vvvvvvv vvvvvv=Data Value
11110111 F7
    
```

This message is only received, and allows remote control of all panel switches. The message will have the same effect as if that switch had been pressed. Reception of this data cannot be turned off by MIDI switch settings except for Device Number Off.

4. Bulk dump

Reception is possible at any time except while selecting the first song for demo playback, and during demo playback. Transmission will occur when the MIDI Utility "Bulk Dump" is executed, or when a dump request message is received.

4.1 Voice data bulk dump

There are nine types of voice data bulk dump as follows.

- 1). 1AFM Voice bulk dump
- 2). 2AFM Voice bulk dump
- 3). 4AFM Voice bulk dump
- 4). 1AWM Voice bulk dump
- 5). 2AWM Voice bulk dump
- 6). 4AWM Voice bulk dump
- 7). 1AFM_1AWM Voice bulk dump
- 8). 2AFM_2AWM Voice bulk dump
- 9). Drum_set Voice bulk dump

```

0 11110000 F0
1 01000011 43
2 0000nnnn nnnn =Device Number
3 01111010 7A
4 0bbbbbbb ]byte count
5 0bbbbbbb ]
6 01001100 4C (ascii "L")
7 01001101 4D (ascii "M")
8 00100000 20 (ascii " ")
9 00100000 20 (ascii " ")
10 00111000 38 (ascii "8")
11 00110001 31 (ascii "1")
12 00110000 30 (ascii "0")
13 00110001 31 (ascii "1")
14 01010110 56 (ascii "V")
15 01000011 43 (ascii "C")
16 00000000 00
↓ ↓
29 00000000 00
30 0ttttttt tttttt =Memory_type
31 00mmmmmm =Memory Number
32 0ddddddd ddddd =data
↓ ↓
0sssssss ssssss =check_sum
11110111 F7
    
```

MIDI Utility 1 Voice Bulk transmission

```

Memory__type = 7F
Memory Number = 00
    
```

MIDI Utility Vc & Mlt Bulk or 64 Voices Bulk transmission

```

Memory__type = 00 (INT)
Memory Number = start from 0 and transmit
consecutively to 63. (In the case of
Vc&Mlt, successively transmit
Multis 0-15 immediately after this.)
    
```

1 Voice Bulk transmission by Dump Request

```

Memory__type = 00 (INT)
02 (PRESET1)
03 (PRESET2)
7F (Edit_Buffer)
Memory Number = 0~63 (the number specified by
the Dump Request)
    
```

For reception, data will be processed as Edit_buffer when the Memory__type is 7F, and as INTERNAL for other cases.

* For details of the bulk dump data and dump request format, refer to table 2.

4.2 Multi data bulk dump

```

0 11110000 F0
1 01000011 43
2 0000nnnn nnnn =Device Number
3 01111010 7A
4 0bbbbbbb ]byte count
5 0bbbbbbb ]
6 01001100 4C (ascii "L")
7 01001101 4D (ascii "M")
8 00100000 20 (ascii " ")
9 00100000 20 (ascii " ")
10 00111000 38 (ascii "8")
11 00110001 31 (ascii "1")
12 00110000 30 (ascii "0")
13 00110001 31 (ascii "1")
14 01001101 4D (ascii "M")
15 01010101 55 (ascii "U")
16 00000000 00
↓ ↓
29 00000000 00
30 0ttttttt tttttt =Memory_type
31 00mmmmmm =Memory Number
32 0ddddddd ddddd =data
↓ ↓
0sssssss ssssss =check_sum
11110111 F7
    
```

MIDI Utility 1 Multi Bulk transmission

```

Memory__type = 7F
Memory Number = 00
    
```

MIDI Utility Vc & Mlt Bulk or 16 Multi Bulk transmission

```

Memory__type = 00 (INT)
Memory Number = start from 0 and transmit
consecutively to 15. (In the case of
Vc&Mlt, successively transmit
Voices 0-63 immediately after this.)
    
```

1 Multi Bulk transmission by Dump Request

Memory__type = 00 (INT)
 02 (PRESET)
 7F (Edit_Buffer)
 Memory Number = 0~15 (the number specified by the Dump Request)

For reception, data will be processed as Edit_buffer when the Memory__type is 7F, and as INTERNAL for other cases.

* For details of the bulk dump data and dump request format, refer to table 3.

4.3 Additional multi data bulk dump

```

0  11110000  F0
1  01000011  43
2  0000nnnn  nnnn =Device Number
3  01111010  7A
4  0bbbbbbb  ] byte count
5  0bbbbbbb  ]
6  01001100  4C (ascii "L")
7  01001101  4D (ascii "M")
8  00100000  20 (ascii " ")
9  00100000  20 (ascii " ")
10 00111000  38 (ascii "8")
11 00110001  31 (ascii "1")
12 00110000  30 (ascii "0")
13 00110100  34 (ascii "4")
14 01001101  4D (ascii "M")
15 01010101  55 (ascii "U")
16 00000000  00
↓
29 00000000  00
30 0ttttttt  tttttt=Memory_type
31 00mmmmmm  mmmmm =Memory Number
32 0ddddd    dddddd=data
↓
0sssssss  ssssss=check_sum
11110111  F7
    
```

MIDI Utility 1 Multi Bulk transmission

Memory_type = 7F
 Memory Number = 00

MIDI Utility Vc & Mlt Bulk or 16 Multi Bulk transmission

Memory_type = 00 (INT)
 Memory Number = start from 0 and transmit consecutively to 15. (In the case of Vc&Mlt, successively transmit Voices 0~63 immediately after this.)

1 Multi Bulk transmission by Dump Request

Memory_type = 00 (INT)
 02 (PRESET)
 7F (Edit buffer)
 Memory number = 0~15 (the number specified by the Dump Request)

For reception, data will processed as Edit_buffer when the Memory_type is 7F, and as INTERNAL in other cases.

* For details of the bulk dump data and dump request format, refer to table 4.

4.4 Pan data bulk dump

```

0  11110000  F0
1  01000011  43
2  0000nnnn  nnnn = Device Number
3  01111010  7A
4  0bbbbbbb  ] byte count
5  0bbbbbbb  ]
6  01001100  4C (ascii "L")
7  01001101  4D (ascii "M")
8  00100000  20 (ascii " ")
9  00100000  20 (ascii " ")
10 00111000  38 (ascii "8")
11 00110001  31 (ascii "1")
12 00110000  30 (ascii "0")
13 00110100  34 (ascii "4")
14 01010000  50 (ascii "P")
15 01001110  4E (ascii "N")
16 00000000  00
↓
29 00000000  00
30 0ttttttt  tttttt=Memory_type
31 00mmmmmm  mmmmm = Memory Number
32 0ddddd    dddddd=data
↓
0sssssss  ssssss=check_sum
11110111  F7
    
```

MIDI Utility Vc & Mlt Bulk or PAN Bulk transmission

Memory__type = 00 (INT)
 Memory Number = start from 0 and transmit consecutively to 31

PAN Bulk transmission by Dump Request

Memory-type = 00 (INT)
 02 (PRESET)
 Memory Number = 0~63 (the number specified by the Dump Request)

For reception, bits 5 and 6 of Memory__type and Memory Number will be ignored, and the data will be processed as INTERNAL.

* For details of the bulk dump data and dump request format, refer to table 5.

4.5 Micro tuning data bulk dump

```

0  11110000  F0
1  01000011  43
2  0000nnnn  nnnn =Device Number
3  01111010  7A
4  0bbbbbbb  ] byte count
5  0bbbbbbb  ]
6  01001100  4C (ascii "L")
7  01001101  4D (ascii "M")
8  00100000  20 (ascii " ")
9  00100000  20 (ascii " ")
10 00111000  38 (ascii "8")
11 00110001  31 (ascii "1")
12 00110000  30 (ascii "0")
13 00110001  31 (ascii "1")
14 01001101  4D (ascii "M")
15 01010100  54 (ascii "T")
16 00000000  00
↓
29 00000000  00
30 00000000  00 =Memory_type
31 00mmmmmm  mmmmm =Memory Number
32 0ddddd    dddddd=data
↓
0sssssss  ssssss=check_sum
11110111  F7
    
```

MIDI Utility Vc & Mlt Bulk or Micro Tuning Bulk transmission

Memory__type = 00 (INT)
 Memory Number = start from 0 and transmit consecutively to 1

PAN Bulk transmission by Dump Request

Memory__type = 00 (INT)
 02 (PRESET)
 Memory Number = 0~63 (the number specified by the Dump Request)

For reception, bits 1~6 of Memory__type and Memory Number will be ignored, and the data will be processed as INTERNAL.

* For details of the bulk dump data and dump request format, refer to table 6.

4.6 System setup data bulk dump

```

0  11110000  F0
1  01000011  43
2  0000nnnn  nnnn = Device Number
3  01111010  7A
4  0bbbbbbb  ] byte count
5  0bbbbbbb  ]
6  01001100  4C (ascii "L")
7  01001101  4D (ascii "M")
8  00100000  20 (ascii " ")
9  00100000  20 (ascii " ")
10 00111000  38 (ascii "8")
11 00110001  31 (ascii "1")
12 00110000  30 (ascii "0")
13 00110001  31 (ascii "1")
14 01010011  53 (ascii "S")
15 01011001  59 (ascii "Y")
16 00000000  00
↓
31 00000000  00
32 0ddddd    dddddd=data
↓
0sssssss  ssssss=check_sum
11110111  F7
    
```

* For details of the bulk dump data and dump request format, refer to table 7.

4.7 Program change table data bulk dump

0	11110000	F0	
1	01000011	43	
2	0000nnnn	nnnn	=Device Number
3	01111010	7A	
4	0bbbbbbb		byte count
5	0bbbbbbb		
6	01001100	4C	(ascii "L")
7	01001101	4D	(ascii "m")
8	00100000	20	(ascii " ")
9	00100000	20	(ascii " ")
10	00111000	38	(ascii "8")
11	00110001	31	(ascii "1")
12	00110000	30	(ascii "0")
13	00110100	34	(ascii "4")
14	01010000	50	(ascii "P")
15	01000011	43	(ascii "C")
16	00000000	00	
↓	↓	↓	
31	00000000	00	
32	0ddddddd	ddddddd	=data
↓	↓	↓	
	0sssssss	sssssss	=check_sum
	11110111	F7	

* For details of the bulk dump data and dump request format, refer to table 8.

5. Status FE (active sensing)

a) Transmission

Transmit FE at intervals of approximately 170 msec.

b) Reception

Once FE has been received, if no MIDI data arrives for an interval longer than approximately 300 msec, the MIDI receive buffer is cleared, and if any keys remain on, they will be turned off.

< Table 1-1 >

MIDI Parameter Change table (Multi mode Common Data)

\$F0, \$43, \$1n, \$34, \$00, \$00, \$00, N2, \$00, V2, \$F7

Note) n : Device Number
V2 : parameter value

[header section]

	N2	data name	data range	note
0	00	MNAM 0	ascii	---Multi Voice Set Name---
1	01	MNAM 1	ascii	" * " "
2	02	MNAM 2	ascii	" * " "
3	03	MNAM 3	ascii	" * " "
4	04	MNAM 4	ascii	" * " "
5	05	MNAM 5	ascii	" * " "
6	06	MNAM 6	ascii	" * " "
7	07	MNAM 7	ascii	" * " "
8	08	MNAM 8	ascii	" * " "
9	09	MNAM 9	ascii	" * " "
10	0A	MNAM10	ascii	" * " "
11	0B	MNAM11	ascii	" * " "
12	0C	MNAM12	ascii	" * " "
13	0D	MNAM13	ascii	" * " "
14	0E	MNAM14	ascii	" * " "
15	0F	MNAM15	ascii	" * " "
16	10	MNAM16	ascii	" * " "
17	11	MNAM17	ascii	" * " "
18	12	MNAM18	ascii	" * " "
19	13	MNAM19	ascii	" * " "

< Table 1-2 >

MIDI Parameter Change table (Multi mode Channel Data)

\$F0, \$43, \$1n, \$34, \$01, T2, \$00, N2, \$00, V2, \$F7

Note) n : Device Number
T2 : voice channel number
V2 : parameter value

[channel data]

	V2	data name	data range	note
0	00	OFVCSW OUT0CH OUT1CH	b6 ; off/on b0 ; off/on b1 ; off/on	---Stereo Output 1 Select--- Off_voice_switch Output 1 select Output 2 select
1	01	VMEM	int, crd, p1, p2	Voice Memory select
2	02	VNUM	0 ~ 63	Voice number
3	03	VOL	0 ~ 127	Volume
4	04	MTUN	-64 ~ +63(o/b)	Tuning
5	05	MNSF	-64 ~ +63(o/b)	Note shift
6	06	STPAN	voice, -31 ~ +31 (o/b)	Multi Static PAN

Note) (o/b) ; offset binary

< Table 1-3 >

MIDI Parameter Change table (Voice data common data)

\$F0, \$43, \$1n, \$34, \$02, \$00, \$00, N2, \$00, V2, \$F7

Note) n : channel number
V2 : parameter value

[header data]

	N2	data name	data range	note
0	00	ELMODE	0; 1AFM_mono 1; 2AFM_mono 2; 4AFM_mono 3; 1AFM_poly 4; 2AFM_poly 5; 1AWM_poly 6; 2AWM_poly 7; 4AWM_poly 8; 1AFM_1AWM_poly 9; 2FM_2PCM_poly 10; DRUM_SET	---Element Select Mode---
1	01	VNAM0	ascii	---Voice Name---
2	02	VNAM1	ascii	" * " "
3	03	VNAM2	ascii	" * " "
4	04	VNAM3	ascii	" * " "
5	05	VNAM4	ascii	" * " "
6	06	VNAM5	ascii	" * " "
7	07	VNAM6	ascii	" * " "
8	08	VNAM7	ascii	" * " "
9	09	VNAM8	ascii	" * " "
10	0A	VNAM9	ascii	" * " "

[Controllers]

	N2	data name	data range	note
11	28	WPBR	0 ~ 12	---Pitch Bend---
12	29	ATPBR	-12 ~ +12 (s m)	Wheel Pitch Bend Range After_Touch Pitch Bend Range
13	2A	PMASN	0 ~ 121	---Pitch Modulation---
14	2B	PMRNG	0 ~ 127	Device Assign (MIDI control #) Modulation range
15	2C	AMASN	0 ~ 121	---Amplitude Modulation---
16	2D	AMRNG	0 ~ 127	Device Assign (MIDI control #) Modulation range
17	2E	FMASN	0 ~ 121	---Filter Modulation---
18	2F	FMRNG	0 ~ 127	Device Assign (MIDI control #) Modulation range
19	30	PNLASN	0 ~ 121	---PAN Modulation---
20	31	PNLRNG	0 ~ 127	Note) Valid only when Multi is selected Device Assign (MIDI control #) Modulation range
21	32	COASN	0 ~ 121	---Filter Cut_off Bias---
22	33	CORNG	0 ~ 127	Device Assign (MIDI control #) Cut_off range
23	34	PNBASN	0 ~ 121	---PAN Bias---
24	35	PNBRNG	0 ~ 127	Note) Valid only when Multi is selected Device Assign (MIDI control #) Bias range
25	36	EGBASN	0 ~ 121	---EG Bias---
26	37	EGBRNG	0 ~ 127	Device Assign (MIDI control #) Bias range
27	38	VVLASN	0 ~ 121	---Voice Volume---
28	39	VVLLML	0 ~ 127	Device Assign (MIDI control #) Volume Limit Low

Note) For the above Device Assigns, 121 will select After Touch.

[Only for Normal]

	N2	data name	data range	note
29	3A	MCTUN	0-65	Micro Tuning table select
30	3B	RNDP	0-7	Random Pitch fluctuation
31 32	3C 3D	PORM POS	0, 1 0-127	---Portamento--- Note) Valid only when the mode is only FM element. Mode Time
33	3E	INDOUT OUTSELO OUTSEL1	b5~2 : off, 1~8 b0 : off/on b1 : off/on	Individual Output Select Output 1 select Output 2 select
34	3F	VVOL	0-127	Voice Volume

Note) (s/m) ; sign magnitude

< Table 1-4 >

MIDI Parameter Change table (Normal Voice Element Data)

\$F0, \$43, \$1n, \$34, \$03, T2, \$00, N2, \$00, V2, \$F7

Note) n : Device Number
V2 : parameter value
T2 : 0, el, e0, 0, 0, 0, 0

e1	e0	
0	0	Element 1
0	1	Element 2
1	0	Element 3
1	1	Element 4

	N2	data name	data range	note
0	00	ELVL	0-127	Element Level
1	01	ELDT	-7 ~ +7 (s m)	Element Detune
2	02	ELNS	-64 ~ +63 (o b)	Element Note Shift
3	03	ENLL	0-127 (note #)	---Element Note Limit---
4	04	ENLH	0-127 (note #)	Low Limit High Limit
5	05	EVLL	0-127 (note #)	---Element Velocity Limit---
6	06	EVLH	0-127 (note #)	Low Limit High Limit
7	07	PANNM	0-95	PAN data set table select Note) Valid only when Multi is selected
8	08	MCTEN OUTSELO OUTSEL1	b0 : 0-1 b1 : 0-1 b2 : 0-1	Micro Tuning switch Output Select 1 Output Select 2

Note) (s/m) ; sign magnitude
(o/b) ; offset binary

< Table 1-5 >

MIDI Parameter Change table (Drum_Set)

\$F0, \$43, \$1n, \$34, \$04, T2, \$00, N2, V1, V2, \$F7

Note) n : channel number
T2 : MIDI note number
N2 : parameter value
V1 : MSB of parameter value (for parameters other than VAV*, V1 will be \$00)
V2 : LSB of parameter value

	N2	data name	data range	note
0	00	ALTGRP OUT1 OUT0	b6 : 0-1 b1 : 0-1 b0 : 0-1	Alternate group Output 2 select Output 1 select
1	01	WSRC	0-2	Wave Source
2	02	WAV	0-max.255	Wave Number (V1, MSB V2, LS7bits)
3	03	WVL	0-127	Wave Volume
4	04	WTN	-64 ~ +63 (o b)	Wave Tuning
5	05	WNS	-48 ~ +36 (o b)	Wave Note Shift
6	06	WPN	-31 ~ +31 (o b)	Static PAN

Note) (o/b) ; offset binary

< Table 1-6 >

MIDI Parameter Change table (AFM Element Common)

\$F0, \$43, \$1n, \$34, \$05, T2, \$00, N2, \$00, V2, \$F7

Note) n : Device Number
N2 : parameter number
V2 : parameter value

T2	
\$00	Element 1
\$20	Element 2
\$40	Element 3
\$60	Element 4

	N2	data name	data range	note
0	00	ALGNUM	0-44	(127 is free algorithm number. Algorithm only via MIDI)
1	01	FPR1	0-63	---Pitch EG---
2	02	FPR2	0-63	key_on Rate 1
3	03	FPR3	0-63	key_on Rate 2
4	04	FPRR1	0-63	key_on Rate 3
5	05	FPL0	-64 ~ +63 (o b)	key_off Rate 1
6	06	FPL1	-64 ~ +63 (o b)	key_on Level 0
7	07	FPL2	-64 ~ +63 (o b)	key_on Level 1
8	08	FPL3	-64 ~ +63 (o b)	key_on Level 2
9	09	FPLR1	-64 ~ +63 (o b)	key_on Level 3
10	0A	FPEGR	0:8oct, 1:2oct, 2:1oct, 3:1/2oct	key_off Level 1
11	0B	FPRS	0-7	Range
12	0C	FVPSW	off on	Rate Scaling Velocity Switch
13	0D	FLFSPD	0-99	---multi LFO---
14	0E	FLFDLY	0-99	Speed
15	0F	FLFPMD	0-127	Delay time
16	10	FLFAMD	0-127	Pitch Modulation Depth
17	11	FLFFMD	0-127	Amplitude Modulation Depth
18	12	FLFWAV	0-5	Filter Modulation Depth
19	13	FLINTP	0-99	Wave
20	14	reserve		Initial Phase
21	15	SLFWD	0-3	---Sub LFO---
22	16	SLFS	0-127	Wave
23	17	SLFDM	delay decay	Speed
24	18	SLFDT	0-99	delay mode decay mode
25	19	SLPMD	0-127	Delay time decay time Pitch Modulation Depth

< Table 1-7 >

MIDI Parameter Change table (AFM Element Common)

\$F0, \$43, \$1n, \$34, T1, T2, \$00, N2, V1, V2, \$F7

Note) n : Device Number
N2 : parameter number
V1 : MSB of parameter value
V2 : LSB of parameter value

T1		T2	
\$06	OP6	\$00	Element 1
\$16	OP5	\$20	Element 2
\$26	OP4	\$40	Element 3
\$36	OP3	\$60	Element 4
\$46	OP2		
\$56	OP1		

	N2	data name	data range	note
0	00	R1	0-63	EG key_on Rate 1
1	01	R2	0-63	EG key_on Rate 2
2	02	R3	0-63	EG key_on Rate 3
3	03	R4	0-63	EG key_on Rate 4
4	04	RR1	0-63	EG key_off Rate 1
5	05	RR2	0-63	EG key_off Rate 2
6	06	L1	0-63	EG key_on Level 1
7	07	L2	0-63	EG key_on Level 2
8	08	L3	0-63	EG key_on Level 3
9	09	L4	0-63	EG key_on Level 4
10	0A	RL1	0-63	EG key_off Level 1
11	0B	RL2	0-63	EG key_off Level 2
12	0C	SLP	0-3	EG Sustain Loop Point
13	0D	HT	0-63	EG key_on Hold Time
14	0E	LO	0-63	EG key_on Level 0
15	0F	RS	-7 ~ +7 (s m)	EG Rate Scaling
16	10	FAMS	0-7	Amplitude Modulation Sens.
17	11	VSON	-7 ~ +7 (s m)	Velocity Sensitivity
18	12	reserve		
19	13	ALGSRC0	V2 b3-0 : 0-10	oscillator input0 Source
		ALGSRC1	V1 b0, V2 b6-4 : 0-10	oscillator input1 Source
20	14	ALGDST	V2 b1,0 : 0-3	oscillator output Destination
		OACSRC0	V2 b3,2 : 0-2	Out_Accumulator input 0 Source
		OACSRC1	V2 b4 : 0-1	Out_Accumulator input 1 Source
21	15	SHIFT0	V2 b5-3 : 0-7	oscillator input 0 Shift value
		SHIFT1	V2 b2-0 : 0-7	oscillator input 1 Shift value
22	16	COR	0-7	output level Correction
23	17	PWAVE	0-15	Waveform of oscillator
24	18	FMLPMS	V2 b4-2 : 0-7	M_LFO Pitch Modulation Sens.
		PES	V2 b1 : 0-1	Pitch EG Switch
		FPM	V2 b0 : 0-1	frequency Mode
25	19	KOE	V1 b0 : 0-1	initial phase set Enable
		PHASE	V2 b6-0 : 0-127	initial Phase of oscillator
26	1A	FPD	-15 ~ +15 (s m)	Pitch Detune

	N2	data name	data range	note
27	1B	TL	0 - 127	out_level
28	1C	BP1	0 - 127 (note #)	out_level scaling Break Point
29	1D	BP2	0 - 127 (note #)	out_level scaling Break Point
30	1E	BP3	0 - 127 (note #)	out_level scaling Break Point
31	1F	BP4	0 - 127 (note #)	out_level scaling Break Point
32	20	EGOS1	-128 ~ +127 (2bytes)	out_level offset (BP1)
33	21	EGOS2	-128 ~ +127 (2bytes)	out_level offset (BP2)
34	22	EGOS3	-128 ~ +127 (2bytes)	out_level offset (BP3)
35	23	EGOS4	-128 ~ +127 (2bytes)	out_level offset (BP4)
36	24	RVSW	off on	Rate Velocity Switch
37	25	FPC		frequency Course
38	26	FPF		frequency Fine

< Table 1-8 >

MIDI Parameter Change table (AWM Element)

\$F0, \$43, \$1n, \$34, \$07, T2, \$00, N2, V1, V2, \$F7

Note) n : Device Number
 N2 : parameter number
 V1 : MSB of parameter value
 V2 : LSB of parameter value
 T2 : table at right

T2	
\$00	Element 1
\$20	Element 2
\$40	Element 3
\$60	Element 4

[AWM generator unit]

	N2	data name	data range	note
0	00	WSOURCE	0-2	AWM Wave Source
1	01	AWMWAVE	V1: MSB1bit V2: LS7bits	AWM Wave number
2	02	PPM	normal fixed	frequency Mode
3	03	PNOTE	0-127	fixed mode note #
4	04	PPF	-64 ~ +63	frequency Fine
5	05	PMLPMS	0-7	pitch modulation sensitivity
6	06	PPR1	0-63	---Pitch EG--- key_on Rate 1
7	07	PPR2	0-63	key_on Rate 2
8	08	PPR3	0-63	key_on Rate 3
9	09	PPRR1	0-63	key_off Rate 1
10	0A	PPL0	-64 ~ +63 (o b)	key_on Level 0
11	0B	PPL1	-64 ~ +63 (o b)	key_on Level 1
12	0C	PPL2	-64 ~ +63 (o b)	key_on Level 2
13	0D	PPL3	-64 ~ +63 (o b)	key_on Level 3
14	0E	PPRL1	-64 ~ +63 (o b)	key_off Level 1
15	0F	PPEGR	1:2oct, 2:1oct, 3:1/2oct	Range
16	10	PPRS	-7 ~ +7	Rate Scaling
17	11	PVPSW	off-on	Velocity Switch
18	12	PLFSPD	0-99	---multi LFO--- Speed
19	13	PLFDLY	0-99	Delay time
20	14	PLPFMD	0-127	Pitch Modulation Depth
21	15	PLFAMD	0-127	Amplitude Modulation Depth
22	16	PLFFMD	0-127	Filter Modulation Depth
23	17	PLFWAV	0-5	Wave
24	18	PLINTP	0-99	Initial Phase
25	19	reserve		

[Amplitude EG data]

	N2	data name	data range	note
25	4F	PAEGMD	normal hold	EG mode
26	50	PAR1	0-63	key_on Rate 1 (attack hold)
27	51	PAR2	0-63	key_on Rate 2 (decay)
28	52	PAR3	0-63	key_on Rate 3
29	53	PAR4	0-63	key_on Rate 4 (decay)
30	54	PARR1	0-63	key_off Rate 1 (release)
31	55	PAL2	0-63	key_on Level 2 (decay)
32	56	PAL3	0-63	key_on Level 3 (decay)
33	57	PARS	-7 ~ +7	rate scaling
34	58	PABP1	0-127 (note #)	out_level scaling Break Point
35	59	PABP2	0-127 (note #)	out_level scaling Break Point
36	5A	PABP3	0-127 (note #)	out_level scaling Break Point
37	5B	PABP4	0-127 (note #)	out_level scaling Break Point
38	5C	PAOS21	-128 ~ +127 (2bytes)	out_level scaling offset
39	5D	PAOS22	-128 ~ +127 (2bytes)	out_level scaling offset
40	5E	PAOS23	-128 ~ +127 (2bytes)	out_level scaling offset
41	5F	PAOS24	-128 ~ +127 (2bytes)	out_level scaling offset
42	60	PAVSON	-7 ~ +7 (s m)	Velocity Sensitivity
43	61	PARVSW	off on	Attack Rate Velocity Switch
44	62	PAMS	-7 ~ +7 (s m)	amplitude modulation sens.

< Table 1-9 >

MIDI Parameter Change table (Effect Data)

\$F0, \$43, \$1n, \$34, \$08, \$00, \$00, N2, \$00, V2, \$F7

Note) n : Device Number
 V2 : parameter value

	N2	data name	data range	note
0	00	EFMODE	0-3	mode select
1	01	CHR1TYPE	0-4	Chorus Effect 1 Type
2	02	CHR1BLNC	0-100	Chorus Effect 1 Balance
3	03	CHR1OLVL	0-100	Chorus Effect 1 Output Level
4	04	CHR1PRM1		Chorus Effect 1 Parameter 1
5	05	CHR1PRM2		Chorus Effect 1 Parameter 2
6	06	CHR1PRM3		Chorus Effect 1 Parameter 3
7	07	CHR1PRM4		Chorus Effect 1 Parameter 4
8	08	CHR2TYPE	0-4	Chorus Effect 2 Type
9	09	CHR2BLNC	0-100	Chorus Effect 2 Balance
10	0A	CHR2OLVL	0-100	Chorus Effect 2 Output Level
11	0B	CHR2PRM1		Chorus Effect 2 Parameter 1
12	0C	CHR2PRM2		Chorus Effect 2 Parameter 2
13	0D	CHR2PRM3		Chorus Effect 2 Parameter 3
14	0E	CHR2PRM4		Chorus Effect 2 Parameter 4
15	0F	REV1TYPE	0-4	Reverb Effect 1 Type
16	10	REV1BLNC	0-100	Reverb Effect 1 Balance
17	11	REV1OLVL	0-100	Reverb Effect 1 Output Level
18	12	REV1PRM1		Reverb Effect 1 Parameter 1
19	13	REV1PRM2		Reverb Effect 1 Parameter 2
20	14	REV1PRM3		Reverb Effect 1 Parameter 3
21	15	REV2TYPE	0-4	Reverb Effect 2 Type
22	16	REV2BLNC	0-100	Reverb Effect 2 Balance
23	17	REV2OLVL	0-100	Reverb Effect 2 Output Level
24	18	REV2PRM1		Reverb Effect 2 Parameter 1
25	19	REV2PRM2		Reverb Effect 2 Parameter 2
26	1A	REV2PRM3		Reverb Effect 2 Parameter 3
27	1B	ST_MIX1		Stereo Mix 1
28	1C	ST_MIX2		Stereo Mix 2

< Table 1-10 >

MIDI Parameter Change table (Filter Data)

\$F0, \$43, \$1n, \$34, \$09, T2, \$00, N2, V1, V2, \$F7

Note) n : Device Number
 N2 : parameter number
 V1 : MSB of parameter value
 V2 : LSB of parameter value
 T2 : O, E, E, E, O, O, N, N, N
 table at right

E		N	
00	Element 1	000	AFM filt. 1
01	Element 2	001	AFM filt. 2
10	Element 3	010	AFM common
11	Element 4	011	AWM filt. 1
		100	AWM filt. 2
		101	AWM common

[filter 1 & 2]

	N2	data name	data range	note
0	00	FTYPE	lpf/(hpf)/thr	filter type
1	01	FCTOF	0-127	cut_off frequency
2	02	FMODE	EG, LFO, EG-VA	filter mode
3	03	FR1	0-63	key_on Rate 1
4	04	FR2	0-63	key_on Rate 2
5	05	FR3	0-63	key_on Rate 3
6	06	FR4	0-63	key_on Rate 4
7	07	FRR1	0-63	key_off Rate 1
8	08	FRR2	0-63	key_off Rate 2
9	09	FL0	-64 ~ +63 (o/b)	key_on cut_off Level 0
10	0A	FL1	-64 ~ +63 (o/b)	key_on cut_off Level 1
11	0B	FL2	-64 ~ +63 (o/b)	key_on cut_off Level 2
12	0C	FL3	-64 ~ +63 (o/b)	key_on cut_off Level 3
13	0D	FL4	-64 ~ +63 (o/b)	key_on cut_off Level 4
14	0E	FRL1	-64 ~ +63 (o/b)	key_off cut_off Level 1
15	0F	FRL2	-64 ~ +63 (o/b)	key_off cut_off Level 2
16	10	FRS	-7 ~ +7	rate scaling
17	11	FBP1	0-127 (note #)	c_off_lvl scaling Break Point
18	12	FBP2	0-127 (note #)	c_off_lvl scaling Break Point
19	13	FBP3	0-127 (note #)	c_off_lvl scaling Break Point
20	14	FBP4	0-127 (note #)	c_off_lvl scaling Break Point
21	15	FOS1	-128 ~ +127 (2bytes)	c_off_lvl scaling offset
22	16	FOS2	-128 ~ +127 (2bytes)	c_off_lvl scaling offset
23	17	FOS3	-128 ~ +127 (2bytes)	c_off_lvl scaling offset
24	18	FOS4	-128 ~ +127 (2bytes)	c_off_lvl scaling offset

[filter common]

	N2	data name	data range	note
25	32	FRES	0-99	resonance
26	33	FVSON	-7 ~ +7 (s/m)	Velocity Sensitivity
27	34	FCMS	-7 ~ +7 (s/m)	Cut_off modulation sensitivity

< Table 1-11 >

MIDI Parameter Change table (Pan Data)

\$F0, \$43, \$1n, \$34, \$0A, T2, \$00, N2, \$00, V2, \$F7

Note) n : Device Number
 T2 : Memory number
 N2 : parameter number
 V2 : parameter value

	N2	data name	data range	note
0	00	PNSCSEL	velocity, note #, LFO	PAN source select
1	01	PNSCDPT	0~99	PAN source depth
2	02	PNDT	0~63	---EG--- key_on/Hold Time
3	03	PNR1	0~63	key_on Rate 1
4	04	PNR2	0~63	key_on Rate 2
5	05	PNR3	0~63	key_on Rate 3
6	06	PNR4	0~63	key_on Rate 4
7	07	PNRR1	0~63	key_off Rate 1
8	08	PNRR2	0~63	key_off Rate 2
9	09	PNL0	-32~+31 (o/b)	key_on Level 0
10	0A	PNL1	-32~+31 (o/b)	key_on Level 1
11	0B	PNL2	-32~+31 (o/b)	key_on Level 2
12	0C	PNL3	-32~+31 (o/b)	key_on Level 3
13	0D	PNL4	-32~+31 (o/b)	key_on Level 4
14	0E	PNRL1	-32~+31 (o/b)	key_off Level 1
15	0F	PNRL2	-32~+31 (o/b)	key_off Level 2
16	10	PNSLP	0~3	repeat segment
17	11	PNNAM0	ascii	---Dynamic PAN Name---
18	12	PNNAM1	ascii	" * " " "
19	13	PNNAM2	ascii	" * " " "
20	14	PNNAM3	ascii	" * " " "
21	15	PNNAM4	ascii	" * " " "
22	16	PNNAM5	ascii	" * " " "
23	17	PNNAM6	ascii	" * " " "
24	18	PNNAM7	ascii	" * " " "
25	19	PNNAM8	ascii	" * " " "
26	1A	PNNAM9	ascii	" * " " "

Note) (o/b) ; offset binary (invert the sign_bit of the 2's_complement)

< Table 1-12 >

MIDI Parameter Change table (Micro Tuning Data)

\$F0, \$43, \$1n, \$34, \$0B, T2, N1, N2, V1, V2, \$F7

Note) n : Device Number
 V1 : MS7bits of parameter value
 T2 : memory number
 V1 : LS7bits of parameter value

	N1	N2	data name	data range	note
0	00	00	MCTC_-2	0~10794	C_-2
1	00	02	MCTC#_-2	0~10794	C#_-2
2	00	04	MCTD_-2	0~10794	D_-2
3	00	06	MCTD#_-2	0~10794	D#_-2
4	00	08	MCTE_-2	0~10794	E_-2
5	00	0A	MCTE#_-2	0~10794	E#_-2
6	00	0C	MCTF_-2	0~10794	F_-2
7	00	0E	MCTF#_-2	0~10794	F#_-2
8	00	10	MCTG_-2	0~10794	G_-2
9	00	12	MCTG#_-2	0~10794	G#_-2
10	00	14	MCTA_-2	0~10794	A_-2
11	00	16	MCTA#_-2	0~10794	A#_-2
12	00	18	MCTB_-2	0~10794	B_-2
13	00	1A	MCTC_-1	0~10794	C_-1
14	00	1C	MCTC#_-1	0~10794	C#_-1
15	00	1E	MCTD_-1	0~10794	D_-1
16	00	20	MCTD#_-1	0~10794	D#_-1
17	00	22	MCTE_-1	0~10794	E_-1
18	00	24	MCTE#_-1	0~10794	E#_-1
19	00	26	MCTG_-1	0~10794	G_-1
20	00	28	MCTG#_-1	0~10794	G#_-1
21	00	2A	MCTA_-1	0~10794	A_-1
22	00	2C	MCTA#_-1	0~10794	A#_-1
23	00	2E	MCTB_-1	0~10794	B_-1
24	00	30	MCTC_0	0~10794	C_0
25	00	32	MCTC#_0	0~10794	C#_0
26	00	34	MCTD_0	0~10794	D_0
27	00	36	MCTD#_0	0~10794	D#_0
28	00	38	MCTE_0	0~10794	E_0
29	00	3A	MCTE#_0	0~10794	E#_0
30	00	3C	MCTF_0	0~10794	F_0
31	00	3E	MCTF#_0	0~10794	F#_0
32	00	40	MCTG_0	0~10794	G_0
33	00	42	MCTG#_0	0~10794	G#_0
34	00	44	MCTA_0	0~10794	A_0
35	00	46	MCTA#_0	0~10794	A#_0

	N1	N2	data name	data range	note
36	00	48	MCTC_1	0~10794	C_1
37	00	4A	MCTC#_1	0~10794	C#_1
38	00	4C	MCTD_1	0~10794	D_1
39	00	4E	MCTD#_1	0~10794	D#_1
40	00	50	MCTE_1	0~10794	E_1
41	00	52	MCTE#_1	0~10794	E#_1
42	00	54	MCTF_1	0~10794	F_1
43	00	56	MCTF#_1	0~10794	F#_1
44	00	58	MCTG_1	0~10794	G_1
45	00	5A	MCTG#_1	0~10794	G#_1
46	00	5C	MCTA_1	0~10794	A_1
47	00	5E	MCTA#_1	0~10794	A#_1
48	00	60	MCTB_1	0~10794	B_1
49	00	62	MCTC_2	0~10794	C_2
50	00	64	MCTC#_2	0~10794	C#_2
51	00	66	MCTD_2	0~10794	D_2
52	00	68	MCTD#_2	0~10794	D#_2
53	00	6A	MCTE_2	0~10794	E_2
54	00	6C	MCTE#_2	0~10794	E#_2
55	00	6E	MCTF_2	0~10794	F_2
56	00	70	MCTF#_2	0~10794	F#_2
57	00	72	MCTG_2	0~10794	G_2
58	00	74	MCTG#_2	0~10794	G#_2
59	00	76	MCTA_2	0~10794	A_2
60	00	78	MCTA#_2	0~10794	A#_2
61	00	7A	MCTB_2	0~10794	B_2
62	00	7C	MCTC_3	0~10794	C_3
63	00	7E	MCTC#_3	0~10794	C#_3
64	01	00	MCTD_3	0~10794	D_3
65	01	02	MCTD#_3	0~10794	D#_3
66	01	04	MCTE_3	0~10794	E_3
67	01	06	MCTE#_3	0~10794	E#_3
68	01	08	MCTF_3	0~10794	F_3
69	01	0A	MCTF#_3	0~10794	F#_3
70	01	0C	MCTG_3	0~10794	G_3
71	01	0E	MCTG#_3	0~10794	G#_3
72	01	10	MCTA_3	0~10794	A_3
73	01	12	MCTA#_3	0~10794	A#_3
74	01	14	MCTB_3	0~10794	B_3
75	01	16	MCTC_4	0~10794	C_4
76	01	18	MCTC#_4	0~10794	C#_4
77	01	1A	MCTD_4	0~10794	D_4
78	01	1C	MCTD#_4	0~10794	D#_4
79	01	1E	MCTE_4	0~10794	E_4
80	01	20	MCTE#_4	0~10794	E#_4
81	01	22	MCTF_4	0~10794	F_4
82	01	24	MCTF#_4	0~10794	F#_4
83	01	26	MCTG_4	0~10794	G_4
84	01	28	MCTG#_4	0~10794	G#_4
85	01	2A	MCTA_4	0~10794	A_4
86	01	2C	MCTA#_4	0~10794	A#_4
87	01	2E	MCTB_4	0~10794	B_4
88	01	30	MCTC_5	0~10794	C_5
89	01	32	MCTC#_5	0~10794	C#_5
90	01	34	MCTD_5	0~10794	D_5
91	01	36	MCTD#_5	0~10794	D#_5
92	01	38	MCTE_5	0~10794	E_5
93	01	3A	MCTE#_5	0~10794	E#_5
94	01	3C	MCTF_5	0~10794	F_5
95	01	3E	MCTF#_5	0~10794	F#_5
96	01	40	MCTG_5	0~10794	G_5
97	01	42	MCTG#_5	0~10794	G#_5
98	01	44	MCTA_5	0~10794	A_5
99	01	46	MCTA#_5	0~10794	A#_5
100	01	48	MCTB_5	0~10794	B_5
101	01	4A	MCTC_6	0~10794	C_6
102	01	4C	MCTC#_6	0~10794	C#_6
103	01	4E	MCTD_6	0~10794	D_6
104	01	50	MCTD#_6	0~10794	D#_6
105	01	52	MCTE_6	0~10794	E_6
106	01	54	MCTE#_6	0~10794	E#_6
107	01	56	MCTF_6	0~10794	F_6
108	01	58	MCTF#_6	0~10794	F#_6
109	01	5A	MCTG_6	0~10794	G_6
110	01	5C	MCTG#_6	0~10794	G#_6
111	01	5E	MCTA_6	0~10794	A_6
112	01	60	MCTA#_6	0~10794	A#_6
113	01	62	MCTB_6	0~10794	B_6
114	01	64	MCTC_7	0~10794	C_7
115	01	66	MCTC#_7	0~10794	C#_7
116	01	68	MCTD_7	0~10794	D_7
117	01	6A	MCTD#_7	0~10794	D#_7
118	01	6C	MCTE_7	0~10794	E_7
119	01	6E	MCTE#_7	0~10794	E#_7
120	01	70	MCTF_7	0~10794	F_7
121	01	72	MCTF#_7	0~10794	F#_7
122	01	74	MCTG_7	0~10794	G_7
123	01	76	MCTG#_7	0~10794	G#_7
124	01	78	MCTA_7	0~10794	A_7
125	01	7A	MCTA#_7	0~10794	A#_7
126	01	7C	MCTB_7	0~10794	B_7
127	01	7E	MCTC_8	0~10794	C_8
128	02	00	MTNAM0	ascii	---Micro Tuning Name---
129	02	01	MTNAM1	ascii	" * " " "
130	02	02	MTNAM2	ascii	" * " " "
131	02	03	MTNAM3	ascii	" * " " "
132	02	04	MTNAM4	ascii	" * " " "
133	02	05	MTNAM5	ascii	" * " " "
134	02	06	MTNAM6	ascii	" * " " "
135	02	07	MTNAM7	ascii	" * " " "
136	02	08	MTNAM8	ascii	" * " " "
137	02	09	MTNAM9	ascii	" * " " "

<Table 1-16>

MIDI Parameter Change table (Switch Remote)
 \$F0, \$43, \$1n, \$34, \$0D, \$00, \$00, N2, \$00, V2, \$F7

Note) n ; Device Number
 N2 ; parameter number
 V2 ; parameter value

data range : off (\$00~\$3F), on (\$40~\$7F)

N2	sw. #	note	N2	sw. #	note
0	00	PSW 1	35.	23	PSW36
1	01	PSW 2	36	24	PSW37
2	02	-	37	25	PSW38
3	03	-	38	26	PSW39
4	04	PSW 5	39	27	PSW40
5	05	PSW 6	40	28	PSW41
6	06	PSW 7	41	29	PSW42
7	07	PSW 8	42	2A	PSW43
8	08	-	43	2B	PSW44
9	09	-	44	2C	PSW45
10	0A	-	45	2D	PSW46
11	0B	-	46	2E	-
12	0C	-	47	2F	-
13	0D	-	48	30	-
14	0E	-	49	31	-
15	0F	PSW16	50	32	-
16	10	PSW17	51	33	-
17	11	PSW18	52	34	-
18	12	PSW19	53	35	-
19	13	PSW20	54	36	-
20	14	PSW21	55	37	-
21	15	PSW22	56	38	-
22	16	PSW23	57	39	-
23	17	PSW24	58	3A	-
24	18	PSW25	59	3B	-
25	19	PSW26	60	3C	-
26	1A	PSW27	61	3D	-
27	1B	PSW28	62	3E	-
28	1C	PSW29	63	3F	-
29	1D	PSW30	64	40	-
30	1E	PSW31	65	41	-
31	1F	PSW32	66	42	-
32	20	PSW33	67	43	-
33	21	PSW34	68	44	-
34	22	PSW35	69	45	-
			70	46	PSW71
			71	47	PSW72
			72	48	PSW73
			73	49	PSW74
					MEMORY BANK/SELECT
					OP
					EL

*1 Switches 2, 3, 8-14 and 46-69 have no function.

<Table 2>

Voice Bulk Dump

Note) Memory_type internal : \$00
 preset 1 : \$02
 preset 2 : \$03
 Edit_Buffer : \$7F (Memory# is transmitted as \$00, ignored when receiving.)

When receiving Bulk_dump, if Memory_type is other than \$7F, this is processed as Internal.

Note) Memory # \$00 ~ \$0F : Bank_A1 ~ 16
 \$10 ~ \$1F : Bank_B1 ~ 16
 \$20 ~ \$2F : Bank_C1 ~ 16
 \$30 ~ \$3F : Bank_D1 ~ 16

Note) When receiving Bulk_dump, bit 6 of Memory# is ignored.

(1) 1AFM

data	Element1 data	Element1 data
0	\$F0	Table 1-7, 00~26
1	\$43	OP6_R1
2	\$0N	↓
3	\$7A	107 ↓
4	byte count	↓
5	L	125 reserve
6	M	126 OP6_ALGSRG (MSB)
7	-	127 OP6_ALGSRG (low 7bits)
8	-	128 OP6_ALGDST
9	-	↓
10	8	132 OP6_FMPMS
11	1	133 OP6_KOE
12	0	134 OP6_PHASE
13	1	135 OP6_FPD
14	V	↓
15	C	140 OP6_BP4
↓	↓	141 OP6_EGOS1 (MSB)
29	↓	142 OP6_EGOS1 (low 7bits)
30	Memory_type	143 OP6_EGOS2 (MSB)
31	Memory#	144 OP6_EGOS2 (low 7bits)
↓	↓	145 OP6_EGOS3 (MSB)
32	\$00 or \$03 (ELMODE)	146 OP6_EGOS3 (low 7bits)
33	VNAME	147 OP6_EGOS4 (MSB)
↓	↓	148 OP6_EGOS4 (low 7bits)
43	EFMODE	149 OP6_RVSW
↓	↓	150 OP6_FPC
72	WPBR	151 OP6_FPF
↓	↓	↓
95	VVOL	152 Table 1-7, 00~26
↓	↓	OP5_R1
96	AWMID high 7bit	↓
97	AWMID low 7bit	197 Table 1-7, 00~26
↓	↓	OP4_R1
98	ELVLO	↓
↓	↓	242 Table 1-7, 00~26
106	MCTENO	OP3_R1
↓	↓	↓
		287 Table 1-7, 00~26
		OP2_R1
		↓
		332 Table 1-7, 00~26
		OP1_R1
		↓

(2) 2AFM

data	Element1 data	Element2 data
0	\$F0	116
1	\$43	↓
2	\$0N	472
3	\$7A	↓
4	byte count	Same as (1) 1AFM 107~463
5	L	Element2 data
6	M	473
7	-	↓
8	-	829
9	-	↓
10	8	Same as (1) 1AFM 107~463
11	1	830 check_sum
12	0	831 \$F7
13	1	↓
14	V	↓
15	C	↓
16	↓	↓
29	↓	↓
30	Memory_type	↓
31	Memory#	↓
↓	↓	↓
32	\$01 or \$04 (ELMODE)	↓
33	↓	↓
↓	↓	↓
97	↓	↓
↓	↓	↓
98	Table 1-4, 00~08	↓
↓	ELVLO	↓
106	MCTENO	↓
↓	↓	↓
107	Table 1-4, 00~08	↓
↓	ELVL1	↓
115	MCTEN1	↓

(3) 4AFM

Note) Memory# ; \$30-\$3F

When receiving, cancel if Memory# is other than the above.

data		Element1 data	
0	\$F0	134	Same as (1) 1AFM 107-463
1	\$43	↓	
2	\$0N	↓	
3	\$7A	490	
4	byte count	Element2 data	
5	↓	491	Same as (1) 1AFM 107-463
6	L	↓	
7	M	↓	
8	-	847	
9	-	Element3 data	
10	8	848	Same as (1) 1AFM 107-463
11	1	↓	
12	0	↓	
13	1	1204	
14	V	Element4 data	
15	C	1205	Same as (1) 1AFM 107-463
16	↓	↓	
29	↓	1561	
30	Memory_type	1562	
31	Memory#	1563	\$F7
32	\$02 (ELMODE)	Table 1-4, 00-08	
33	↓	ELVLO	
97	↓	MCTENO	
98	Table 1-4, 00-08	Table 1-4, 00-08	
106	ELVLO	ELVL1	
107	↓	MCTEN1	
115	MCTEN1	Table 1-4, 00-08	
116	Table 1-4, 00-08	ELVL2	
124	↓	MCTEN2	
125	Table 1-4, 00-08	ELVL3	
133	↓	MCTEN3	

(4) 1AWM

data		Element1 data	
0	\$F0	107	Table 1-8, 00-19 WSOURCE
1	\$43	108	
2	\$0N	109	
3	\$7A	110	
4	byte count	↓	
5	↓	134	
6	L	↓	Same as (1) 1AFM 403-463
7	M	↓	
8	-	194	
9	-	Table 1-8, 4F-62	
10	8	195	PAEGMD
11	1	↓	
12	0	207	
13	1	↓	
14	V	208	
15	C	↓	
16	↓	209	
29	↓	210	
30	Memory_type	↓	
31	Memory#	211	
32	\$05 (ELMODE)	↓	
33	↓	212	
97	↓	213	
98	Table 1-4, 00-08	↓	
106	ELVLO	214	
107	↓	215	
115	MCTEN1	↓	
116	Table 1-4, 00-08	216	
124	ELVL2	↓	
125	Table 1-4, 00-08	217	
133	ELVL3	↓	
133	MCTEN3	218	
		219	check_sum
		220	

(5) 2AWM

data		Element1 data	
0	\$F0	116	Same as (4) 1AWM 107-218
1	\$43	↓	
2	\$0N	↓	
3	\$7A	227	
4	byte count	Element2 data	
5	↓	228	Same as (4) 1AWM 107-218
6	L	↓	
7	M	↓	
8	-	339	
9	-	Element3 data	
10	8	340	check_sum
11	1	341	
12	0	Table 1-4, 00-08	
13	1	ELVLO	
14	V	MCTENO	
15	C	Table 1-4, 00-08	
16	↓	ELVL1	
29	↓	MCTEN1	
30	Memory_type	Table 1-4, 00-08	
31	Memory#	ELVLO	
32	\$06 (ELMODE)	MCTENO	
33	↓	Table 1-4, 00-08	
97	↓	ELVL1	
98	Table 1-4, 00-08	ELVL1	
106	ELVLO	MCTENO	
107	Table 1-4, 00-08	ELVL1	
115	MCTEN1	MCTEN1	

(6) 4AWM

data		Element1 data	
0	\$F0	134	Same as (4) 1AWM 107-218
1	\$43	↓	
2	\$0N	↓	
3	\$7A	245	
4	byte count	Element2 data	
5	↓	246	Same as (4) 1AWM 107-218
6	L	↓	
7	M	↓	
8	-	357	
9	-	Element3 data	
10	8	358	Same as (4) 1AWM 107-218
11	1	↓	
12	0	↓	
13	1	469	
14	V	Element4 data	
15	C	470	Same as (4) 1AWM 107-218
16	↓	↓	
29	↓	584	
30	Memory_type	582	
31	Memory#	583	\$F7
32	\$07 (ELMODE)	Table 1-4, 00-08	
33	↓	ELVLO	
97	↓	MCTENO	
98	Table 1-4, 00-08	Table 1-4, 00-08	
106	ELVLO	ELVL1	
107	↓	MCTEN1	
115	MCTEN1	Table 1-4, 00-08	
116	Table 1-4, 00-08	ELVL2	
124	↓	MCTEN2	
125	Table 1-4, 00-08	ELVL3	
133	↓	MCTEN3	

(7) 1AFM_1AWM

data		Element1 data	
0	\$F0	116	Same as (1) 1AFM 107~463
1	\$43	↓	
2	\$0N	472	
3	\$7A		
4	byte count		
5	L		
6	M		
7	-		
8	-	473	Same as (4) 1AWM 107~218
9	-	↓	
10	8	584	
11	1		
12	0		
13	1		
14	V		
15	C		
16	↓		
17	\$00		
29	Memory_type		
30	Memory#		
31			
32	\$08 (ELMODE)		
33	↓		
34	Same as		
35	(1) 1AFM 33-97		
36	↓		
37	↓		
38	↓		
98	Table 1-4, 00-08		
99	ELVLO		
100	↓		
106	MCTENO		
107	Table 1-4, 00-08		
108	ELVL1		
109	↓		
115	MCTEN1		

(8) 2AFM_2AWM

Note) Memory# ; \$30~\$3F
When receiving, cancel if Memory# is other than the above.

data		Element1 data	
0	\$F0	134	Same as (1) 1AFM 107~463
1	\$43	↓	
2	\$0N	490	
3	\$7A		
4	byte count		
5	L		
6	M		
7	-		
8	-	491	Same as (1) 1AFM 107~463
9	-	↓	
10	8	847	
11	1		
12	0		
13	1		
14	V		
15	C		
16	↓		
17	\$00		
29	Memory_type		
30	Memory#		
31			
32	\$09 (ELMODE)		
33	↓		
34	Same as		
35	(1) 1AFM 33-97		
36	↓		
37	↓		
98	Table 1-4, 00-08		
99	ELVLO		
100	↓		
106	MCTENO		
107	Table 1-4, 00-08		
108	ELVL1		
109	↓		
115	MCTEN1		
116	Table 1-4, 00-08		
117	ELVL2		
118	↓		
124	MCTEN2		
125	Table 1-4, 00-08		
126	ELVL3		
127	↓		
133	MCTEN3		

(9) Drum_set

Note) Memory# ; \$30~\$3F
When receiving, cancel if Memory# is other than the above.

data		Drum_set data		Drum_set data	
0	\$F0	98	ALTC_1, OUT *C_1	194	ALTC_2, OUT *C_2
1	\$43	99	WSRCC_1	↓	↓
2	\$0N	100	WAVC_1 (MSB)	↓	↓
3	\$7A	101	WAVC_1 (low 7bits)	↓	↓
4	byte count	102	WVLC_1	290	ALTC_3, OUT *C_3
5	L	103	WTNC_1	↓	↓
6	M	104	WNCS_1	↓	↓
7	-	105	WPNC_1	↓	↓
8	-	106	ALTC≠1, OUT *C≠1	386	ALTC_4, OUT *C_4
9	-	↓	↓	↓	↓
10	8	114	ALTD_1, OUT *D_1	↓	↓
11	1	↓	↓	↓	↓
12	0	122	ALTD≠1, OUT *D≠1	482	ALTC_5, OUT *C_5
13	1	↓	↓	↓	↓
14	V	130	ALTE_1, OUT *E_1	↓	↓
15	C	↓	↓	↓	↓
16	↓	138	ALTF_1, OUT *F_1	578	ALTC_6, OUT *C_6
17	\$00	↓	↓	↓	↓
29	Memory_type	146	ALTF≠1, OUT *F≠1	585	WPNC_6
30	Memory#	↓	↓	↓	↓
31		154	ALTG_1, OUT *G_1	586	check_sum
32	\$0A (ELMODE)	162	ALTG≠1, OUT *G≠1	587	\$F7
33	↓	↓	↓		
34	Same as	170	ALTA_1, OUT *A_1		
35	(1) 1AFM 33-71	↓	↓		
36	↓	178	ALTA≠1, OUT *A≠1		
37	↓	↓	↓		
72	\$00	186	ALTB_1, OUT *B_1		
73	↓	↓	↓		
88	VVLASN				
89	VVLLML				
90	↓				
91	\$00				
92	↓				
95	AWMID high 7				
96	AWMID low 7				
97					

(10) dump_request

data	
0	\$F0
1	\$43
2	\$2N
3	\$7A
4	L
5	M
6	-
7	-
8	8
9	1
10	0
11	1
12	V
13	C
14	↓
15	\$00
16	↓
27	Memory type
28	Memory #
29	Memory #
30	\$F7

< Table 3 >

Multi Bulk Dump

Note) Memory_type internal ; \$00
 preset ; \$02
 Edit_Buffer ; \$7F (Memory\$ is transmitted as \$00, ignored when receiving.)

When receiving Bulk_dump, processed as Internal if Memory_type is other than \$7F.

Note) Memory# \$00~\$0F : INT 1-16

Note) When receiving Bulk_dump, bits 6-4 of Memory# are ignored.

data		data		dump_request	
0	\$F0	90	Table 1-2, 00-06	0	\$F0
1	\$43	↓	OFVCSW_0. OUT*CH_0	1	\$43
2	\$0N	97	OFVSW_1. OUT*CH_1	2	\$2N
3	\$7A	104	OFVCSW_2. OUT*CH_2	3	\$7A
4	□ byte count	111	OFVCSW_+3. OUT*CH_3	4	L
5	L	118	OFVCSW_4. OUT*CH_4	5	M
6	M	125	OFVCSW_5. OUT*CH_5	6	-
7	-	132	OFVCSW_6. OUT*CH_6	7	-
8	-	139	OFVCSW_7. OUT*CH_7	8	8
9	-	146	OFVCSW_8. OUT*CH_8	9	1
10	8	153	OFVCSW_9. OUT*CH_9	10	0
11	1	160	OFVCSW10. OUT*CH10	11	1
12	0	167	OFVCSW11. OUT*CH11	12	M
13	1	174	OFVCSW12. OUT*CH12	13	U
14	M	181	OFVCSW13. OUT*CH13	14	□
15	U	188	OFVCSW14. OUT*CH14	15	\$00
16	↓	195	OFVCSW15. OUT*CH15	27	Memory_type
17	□ \$00	201	STPAN15	28	Memory#
29	Memory_type	202	check_sum	29	\$F7
30	Memory#	203	\$F7	30	
31	Memory#			31	
32	Table 1-9, 00-13				
↓	MNAM0				
51	↓ MNAM19				
52	Table 1-9, 00-1C				
↓	EFMODE				
80	↓ ST_MIX2				

<Table 4>

Additional Multi Bulk Dump

Note) Memory_type internal ; \$00
 preset ; \$02

Edit_buffer; \$7F (memory # is transmitted as \$00,
 ignored when receiving)

When receiving Bulk_dump, processed as Internal if Memory_type
 is other than \$7F.

Note) Memory # \$00-\$0F ; INT1-16

Note) When receiving Bulk_dump, bits 6-4 of Memory # are ignored.

data		dump_request	
0	\$F0	0	\$F0
1	\$43	1	\$43
2	\$0N	2	\$2N
3	\$7A	3	\$7A
4	□ byte count	4	L
5	L	5	M
6	M	6	-
7	-	7	-
8	-	8	8
9	-	9	1
10	8	10	0
11	1	11	4
12	0	12	M
13	4	13	U
14	M	14	□
15	U	15	\$00
16	↓	27	Memory_type
17	□ \$00	28	Memory#
29	Memory_type	30	\$F7
30	Memory#		
31	Memory#		
32	Table 1-14, 00-21		
↓	ASNMODE		
65	↓ AWMELM15		
66	check_sum		
67	\$F7		

<Table 5>

Pan Bulk Dump

Note) Memory_type internal ; \$00
 preset ; \$02

When receiving Bulk_dump, processed as Internal regardless of
 the Memory_type.

Note) Memory# \$00-\$1F : INT 1-32

Note) When receiving Bulk_dump, bits 6, 5 of Memory# are ignored.

data		dump_request	
0	\$F0	0	\$F0
1	\$43	1	\$43
2	\$0N	2	\$2N
3	\$7A	3	\$7A
4	□ byte count	4	L
5	L	5	M
6	M	6	-
7	-	7	-
8	-	8	8
9	-	9	1
10	8	10	0
11	1	11	1
12	0	12	P
13	1	13	N
14	P	14	□
15	N	15	\$00
16	↓	27	Memory_type
17	□ \$00	28	Memory#
29	Memory_type	29	\$F7
30	Memory#	30	
31	Memory#	31	
32	Table 1-11, 00-1A		
↓	PNSCSEL		
58	↓ PNNAM9		
59	check_sum		
60	\$F7		

<Table 6>

Micro Tuning Bulk Dump

Note) Memory_type internal : \$00
 preset : \$02

When receiving Bulk_dump, processed as Internal regardless of
 Memory_type.

Note) Memory# \$00-\$01 : INT 1-2

Note) When receiving Bulk_dump, bits 6-1 of Memory# are ignored.

data		dump_request	
0	\$F0	0	\$F0
1	\$43	1	\$43
2	\$0N	2	\$2N
3	\$7A	3	\$7A
4	□ byte count	4	L
5	L	5	M
6	M	6	-
7	-	7	-
8	-	8	8
9	-	9	1
10	8	10	0
11	1	11	1
12	0	12	M
13	1	13	T
14	M	14	□
15	T	15	\$00
16	↓	27	Memory_type
17	□ \$00	28	Memory#
29	Memory_type	29	\$00
30	Memory#	30	\$00
31	Memory#	31	\$F7
32	table 1-12, 0000-017E		
↓	MCTC__2 (high 7bits)		
33	↓ MCTC__2 (low 7bits)		
286	↓ MCTG_8 (high 7bits)		
287	↓ MCTG_8 (low 7bits)		
288	table 1-12, 0200-0209		
↓	MTNAM_1		
297	↓ MTNAM10		
298	check_sum		
299	\$F7		

<Table 7>

System Setup Bulk Dump

data		dump_request	
0	\$F0	0	\$F0
1	\$43	1	\$43
2	\$ON	2	\$2N
3	\$7A	3	\$7A
4	byte count	4	L
5	byte count	5	M
6	L	6	-
7	M	7	-
8	-	8	8
9	-	9	1
10	8	10	0
11	1	11	1
12	0	12	S
13	0	13	Y
14	S	14	byte count
15	Y	14	\$00
16	byte count	29	byte count
17	\$00	30	\$F7
18	\$00	31	
32	Table 1-13, 00-35		
↓	GRTMSU_0		
85	PGCMOD		
86	reserve		
↓			
95	reserve		
96	check_sum		
97	\$F7		

<Table 8>

Program Change Table Bulk Dump

data		dump_request	
0	\$F0	0	\$F0
1	\$43	1	\$43
2	\$ON	2	\$2N
3	\$7A	3	\$7A
4	byte count	4	L
5	byte count	5	M
6	L	6	-
7	M	7	-
8	-	8	8
9	-	9	1
10	8	10	0
11	1	11	4
12	0	12	P
13	4	13	C
14	P	14	byte count
15	C	14	\$00
16	byte count	29	byte count
17	\$00	30	\$F7
18	\$00	31	
32	Table 1-15, 0041-0240		
↓	PGMTYPO		
287	PGMNUM127		
288	check_sum		
289	\$F7		

Function ...	Transmitted	Recognized	Remarks
:Basic Default	: x	: 1 - 16	: memorized
:Channel Changed	: x	: 1 - 16	:
: Mode Default	: x	: 1,2,3,4	: memorized
: Mode Messages	: x	: x	:
: Mode Altered	: *****	: x	:
:Note	: x	: 0 - 127	:
:Number : True voice:	: *****	: 1 - 127	:
:Velocity Note ON	: x	: o v=1-127	:
: Note OFF	: x	: x	:
:After Key's	: x	: x	:
:Touch Ch's	: x	: o	:
:Pitch Bender	: x	: o 0-12 semi	:7 bit resolution:
: Control 1	: x	: o	:Modulation wheel:
: Control 2	: x	: o	:Breath control
: Control 4	: x	: o	:Foot control
: Control 6	: x	: o	:Data entry knob
: Change 7	: x	: o	:Volume
: Change 64	: x	: o	:Sustain
: Change 65	: x	: o	:Portamento
: Change 96	: x	: o	:Data entry +1
: Change 97	: x	: o	:Data entry -1
: 0 - 6	: x	: o	:Assignable
: 8 - 120	: x	: o	:Assignable
: Prog	: x	: o 0-127	*1 :assignable
:Change : True #	: *****	: *2	:
:System Exclusive	: o	*3 : o	*3 :voice etc.
:System : Song Pos	: x	: x	:
: : Song Sel	: x	: x	:
:Common : Tune	: x	: x	:
:System :Clock	: x	: x	:
:Real Time :Commands	: x	: x	:
:Aux :Local ON/OFF	: x	: x	:
: :All Notes OFF	: x	: x	:
:Mes- :Active Sense	: o	: o	:
:sages:Reset	: x	: x	:
Notes: *1 ; receive if program change sw is not off.			
*2 ; voice : 0 - 63 , multi : 0 - 15			
(if program change sw is not "table")			
*3 ; transmit/receive if device No. is not off.			

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

STONE GENERATOR

TG77

PARTS LIST

Notes DESTINATION ABBREVIATIONS

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

ELECTRICAL PARTS (電気部品)

Ref. No.	Part No.	Description	部品名	Remarks	ランク	
**	VJ184800	Circuit Board	DM	DMシート	TG77	82
	VJ185500	Circuit Board	AN	ANシート		33
	NX004930	Circuit Board	PN1/3	PN1/3シート		
	NX004940	Circuit Board	PN2/3	PN2/3シート		
	NX004950	Circuit Board	PN3/3	PN3/3シート		
**	VJ187300	Circuit Board	PS	PSシート	J U,C H,D,A,B	16
	VJ187400	Circuit Board	PS	PSシート		16
	VJ187500	Circuit Board	PS	PSシート		17
*	VJ184800	Circuit Board	DM	DMシート		82
**	IG118200	IC	PST518B-2	IC	SYSTEM RESET	04
	IG044600	IC	SN74LS245	IC	TRANSCEIVER	08
	IG049850	IC	SN74LS32N	IC	OR	03
	IG058990	IC	74F32PC	IC	OR	04
	IG120090	IC	74F138PC	IC	3-8DECODER	06
	**	IG149600	IC	SN74ALS138N	IC	DECODER
IG149900		IC	SN74ALS245AN	IC	BUS TRANSCEIVER	07
IG156010		IC	MIX3	IC	MIXER	05
IRO01450		IC	SN74HC14N	IC	INVERTER	05
IRO03200		IC	TC74HC32AP	IC	OR	03
**		IRO13950	IC	SN74HC139N	IC	DECODER
	IRO24550	IC	SN74HC245N	IC	TRANSCEIVER	06
	IRO27350	IC	SN74HC273N	IC	D.FF	05
	IRO36750	IC	SN74HC367N	IC	BUS DRIVER	06
	IRO37450	IC	SN74HC374N	IC	D.FF	06
	**	IR405200	IC	TC74HC4052AP	IC	DEMULTIPLEXER
XA055001		IC	SN74ALS32N	IC	OR	03
XA196A00		IC	SN74ALS74N	IC	F-FLOP	02
XA876001		IC	SN74ALS08N	IC	AND	03
XH608A00		IC	TC74AC245P	IC	BUS TRANSCEIVER	05
**		XH564B00	IC	HD6475328CP10	IC	CPU
	XH966A00	IC	HN62304BPM17	IC	ROM-A 4M	
	XH967A00	IC	HN62304BPM18	IC	ROM-B 4M	
	XH026B00	IC	HN62304BPH30	IC	ROM-C 4M	16
	XH027B00	IC	HN62304BPH31	IC	ROM-D 4M	16
	**	XH028B00	IC	HN62304BPH32	IC	ROM-E 4M
XH029B00		IC	HN62304BPH33	IC	ROM-F 4M	16
XH030B00		IC	HN62304BPH34	IC	ROM-G 4M	16
XH031B00		IC	HN62304BPH35	IC	ROM-H 4M	16
XH558B00		IC	104AV102	IC	EPROM V1.02	
**		XH559B00	IC	104BV102	IC	EPROM V1.02
	XH560B00	IC	104CV102	IC	EPROM V1.02	
	XH561B00	IC	104DV102	IC	EPROM V1.02	
	XH562B00	IC	104EV102	IC	EPROM V1.02	
	XE449A00	IC	YM3413	IC	LDSP	10
	**	XE450B00	IC	YM3415B	IC	LEF
XG993A00		IC	YM7103	IC	EGM2	13
XG994A00		IC	YM7107	IC	OPS3	13
XG995A00		IC	YM7119	IC	M3	18
XG996A00		IC	YM7102	IC	PAN	10
**		XA457A00	IC	MB81464-12	IC	DRAM 256K
	XC628A00	IC	TC51832PL-10	IC	PSRAM 256K	09
	XG960A00	IC	TC55257BPL-10	IC	SRAM 256K	13
	VD473200	Photo Coupler	6N137	フォトカプラ		05
	IA095010	Transistor	2SA950 O.Y	トランジスタ		03
	**	IC181520	Transistor	2SC1815 Y,GR	トランジスタ	
VD488500		Digital Transistor	DTC143XS TP	デジタルトランジスタ		03
IF003450		Diode	1SS133	ダイオード		01
HZ005000		Resistor Array	RMNG10-472/103J	抵抗アレイ		02
VE444700		Resistor Array	RGLD8X102J	抵抗アレイ		01
**		VE445200	Resistor Array	RGLD8X103J	抵抗アレイ	
	FP737100	Tantalum Capacitor	10.0μF 16V M	タンタルコン		02
	VC694800	Semiconductive Cera. Cap.	0.1μF 25V Z	半導体セラコン		01
	VB835000	Coil	FL5R200QNT 20μ	コイル		01
	VD542700	LC Filter	DSS306-93F223Z1	LCフィルター		01
	**	VH949900	Quartz Crystal Unit	6.144MHz AT-49	水晶振動子	
VI927300		Quartz Crystal Unit	20.00MHz AT-49	水晶振動子		03
VJ144000		MIDI Connectors	3 YKF51-5041	複合コネクタ	MIDI	04
VF821100		Connector, Card	38P	ICカード用コネクタ	DATA	06
VH985300		Connector, Card	50P	ICカード用コネクタ	WAVEFORM	08
**		VE338400	Lithium Battery	CR2032	リチウム電池	
	BB807110	Earth Terminal	L	アース金具		02
**	VJ185500	Circuit Board	AN	ANシート		33
	IG001390	IC	RC4558DV	IC	OP AMP.	03
**	IG042500	IC	NJM4556	IC	OP AMP.	04
	XA013001	IC	M5238P	IC	OP AMP.	04
	XC719001	IC	NJM7805FA	IC	REGULATOR +5V	03
	XD204001	IC	NJM7905FA	IC	REGULATOR -5V	03

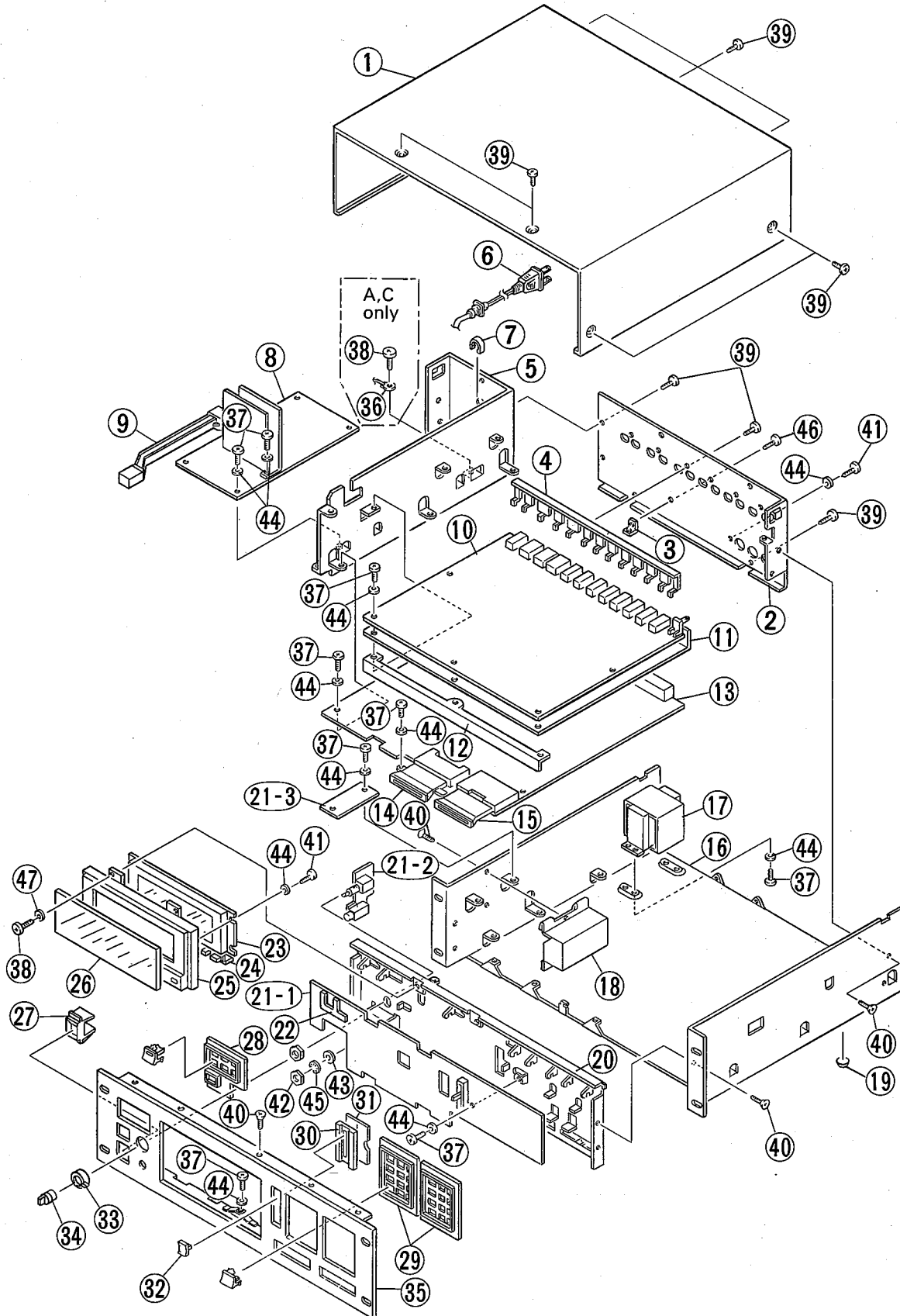
* New Parts (新規部品)

ランク : Japan only

Ref. No.	Part No.	Description	部品名	Remarks	ランク	
	XH690A00	IC	PCM56P-Y	I C	D/A CONVERTER	07
	XF237A00	IC	YM3029	I C	D/A CONVERTER	09
	IA095010	Transistor	2SA950 0.Y	トランジスタ		03
	IC287800	Transistor	2SC2878 A.8	トランジスタ		03
	VA024600	Digital Transistor	DTC143XF	デジタルトランジスタ		03
	VB481900	Diode	11ES4	ダイオード		01
	IF003450	Diode	ISS133	ダイオード		01
	VE445200	Resistor Array	RGLD8X103J	抵抗アレイ	10KX8	01
	VI573700	Variable Resistor	B1.0K EVU-E2A	ロータリオリューム	CONTRAST	02
	VB593200	Trimmer Potentiometer	B100.0K EVN	半固定オリューム	DC OFFSET adj.	01
	VC694800	Semiconductive Cera. Cap.	0.1μF 25V Z	半導体セラコン		01
	VD542700	LC Filter	DSS306-93F223Z1	L C フィルター		01
	LB202330	Phone Jack	HLJ0521	ホーンジャック	OUTPUT 1/1+2 L	02
	LB301780	Phone Jack	HLJ4306	ホーンジャック	OUTPUT 1.2 L R	03
	VI662400	Phone Jack	HLJ4306	ホーンジャック	INDIVIDUAL OUT	02
*	VJ221100	Angle Bracket JK		J K アングル		03
*	NX004930	Circuit Board	PN1/3	P N 1 / 3 シート		
	IF003450	Diode	ISS133	ダイオード		01
	VG149600	LED	GL1HD212 RED	L E D		01
	VC250600	Slide Pot.	B10.0K EWA-NFOC	スライドオリューム	DATA ENTRY	03
	VB799000	Push Switch	EVU-QSLO4M	プッシュスイッチ		01
*	NX004940	Circuit Board	PN2/3	P N 2 / 3 シート		
	VJ146600	Variable Resistor	EVU-Q2AF01A14	ロータリオリューム	A10KX4 VOLUME	08
	LB302070	Phone Jack	HLJ0544	ホーンジャック	PHONES	03
*	NX004950	Circuit Board	PN3/3	P N 3 / 3 シート		
	IC094530	Transistor	2SC945A PA	トランジスタ		03
	VC694800	Semiconductive Cera. Cap.	0.1μF 25V Z	半導体セラコン		01
	VG582600	DC/AC Inverter Transformer	D32-49	DC/ACインバータトランス		07
*	VJ187300	Circuit Board	PS	P S シート	J	16
*	VJ187400	Circuit Board	PS	P S シート	U.C	16
*	VJ187500	Circuit Board	PS	P S シート	H.D.A.B	17
	IG136200	IC	SC-3052V	I C	5V 2A	06
	XC720001	IC	NJM7812FA	I C	REGULATOR +12V	03
	XC721001	IC	NJM7912FA	I C	REGULATOR -12V	03
	IC212000	Transistor	2SC2120 Y	トランジスタ		03
	VB481900	Diode	11ES4	ダイオード		01
	IF003450	Diode	ISS133	ダイオード		01
	IH001790	Diode Stack	4D4B42 3A 200V	ダイオードスタック		04
	VD488400	Diode Stack	DF04M 1A 400V	ダイオードスタック		02
	IF008870	Zener Diode	MTZ12C 12.0V	ダイオード		01
*	VC734200	Metal Oxide Film Resistor	1.0KΩ 1W J	酸化金属被膜抵抗		01
	UV949220	Electrolytic Cap.	2200μF 25.0V	ケミコン		03
	UJ63A100	Electrolytic Cap.	10000μF 25.0V	ケミコン		04
	FI494100	Ceramic Cap.	0.01μF 400V	規格認定コン		01
	VA880100	Ceramic Cap.	4700pF 400V	規格認定コン	H.D.A.B	01
	VC694800	Semiconductive Cera. Cap.	0.1μF 25V Z	半導体セラコン		01
	GD900760	Coil	PLA3021A 3M	コイル		06
	VD542700	LC Filter	DSS306-93F223Z1	L C フィルター		01
	VI547100	Filter Line	DSR1100	L C フィルターライン		02
	VF576000	Push Switch	ESB-8236V JUCS	プッシュスイッチ	POWER	03
	KB000420	Fuse	250V 2.50A	ヒューズ	J	01
	KB002680	Fuse	250V 2.50A	ヒューズ	U.C	03
	KB000690	Fuse	T 250V 2.50A S	ヒューズ	H.D.A.B	02
	LB201530	Fuse Holder	PC-FH1	ヒューズホルダ		01
*	VJ187700	LCD Assembly		液晶ディスプレイ		
*	XG968A00	Power Transformer		電源トランス	J	11
*	XG969B00	Power Transformer		電源トランス	U.C	
*	XG970A00	Power Transformer		電源トランス	H.D.A.B	12
	VD279200	AC Cord	2P 7A 2.5m	電源コード	J	04
	VD279400	AC Cord	2P 10A 2.5m	電源コード	U	06
	VD279500	AC Cord	3P 10A 2.5m	電源コード	C	07
	VD280400	AC Cord	2P 2.5A 2.5m	電源コード	H,D	06
	VH890400	AC Cord	2P 6.0A 2.5m	電源コード	B	08
	VD279700	AC Cord	3P 7.5A 2.5m	電源コード	A	06
	VC362700	Ferrite Core	FR25/15/12-1400	フェライトコア		04
	LA003690	Lug Terminal		ラグ端子	C.A	01

* New Parts (新規部品)

OVERALL ASSEMBLY (総組立)

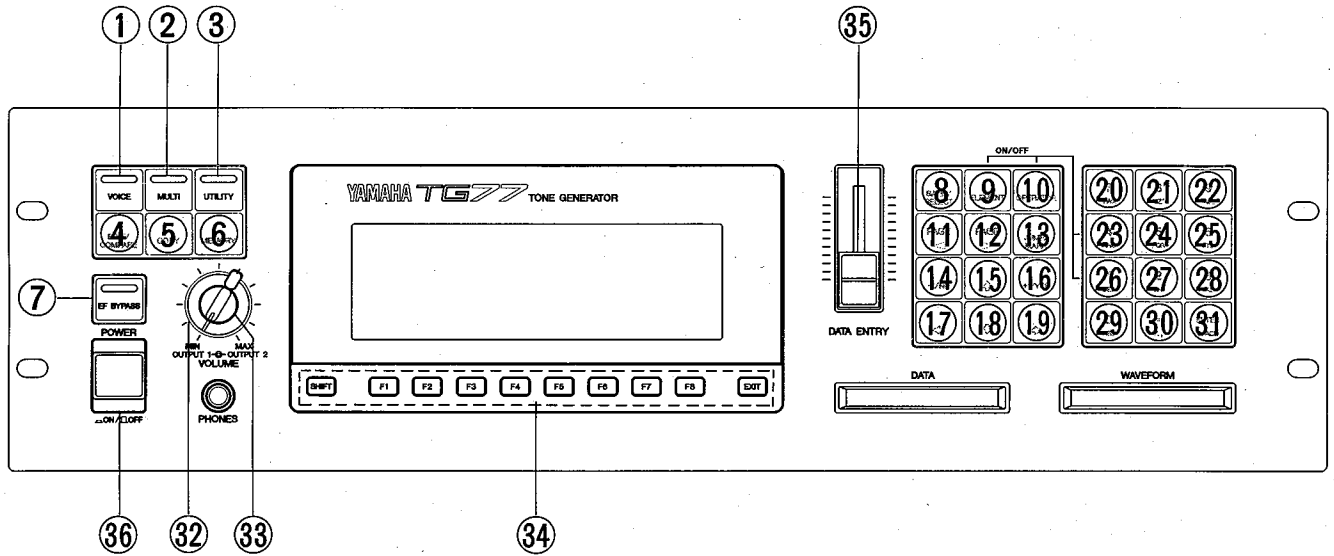


Ref. No.	Part No.	Description	部品名	Remarks	ランク
* 1	VJ220700	Top Cover	トップカバー	TG77	10
* 2	VJ220900	Rear Panel	リアパネル		07
3	BB807110	Erath Terminal	アース金具		02
* 4	VJ221100	Angle Bracket JK	JKアングル		03
* 5	VJ221000	Stay	ステー	J	07
* 5	VJ267700	Stay	ステー	U	07
* 5	VJ272300	Stay	ステー	C	07
* 5	VJ272400	Stay	ステー	H, B, A	07
6	VD279200	AC Cord	電源コード	J	04
6	VD279400	AC Cord	電源コード	U	06
6	VD279500	AC Cord	電源コード	C	07
6	VD280400	AC Cord	電源コード	H, D	06
6	VH890400	AC Cord	電源コード	B	08
6	VD279700	AC Cord'	電源コード	A	06
7	CB811230	Cord Strain Relief	コードストッパー	U	02
7	CB806850	Cord Strain Relief	コードストッパー	C	02
7	CB072750	Cord Strain Relief	コードストッパー	H, D, B	01
7	CB032840	Cord Strain Relief	コードストッパー	A	01
* 8	VJ187300	Circuit Board	PS	J	16
* 8	VJ187400	Circuit Board	PS	U, C	16
* 8	VJ187500	Circuit Board	PS	H, B, A, D	17
9	VF888700	Push Rod	プッシュロッド	POWER ON/OFF	02
* 10	VJ185500	Circuit Board	AN		33
* 11	VJ221700	Insulation Sheet	アースフィルム		07
* 12	VJ221200	Angle, AN	ANアングル		03
* 13	VJ184800	Circuit Board	DM		82
14	VI616100	Card Guide	カードガイド		03
15	VI616200	Card Guide	カードガイド		03
16	VJ220800	Bottom Cover	ボトムカバー		10
* 17	XG968A00	Power Transformer	電源トランス	J	11
* 17	XG969B00	Power Transformer	電源トランス	U, C	
* 17	XG970A00	Power Transformer	電源トランス	H, B, A, D	12
* 18	VJ221400	EL Cover	ELカバー		03
19	CB037120	Foot	スベリ座		01
* 20	VJ220600	Sub Panel	サブパネル		06
21		Circuit Board	PN		
* 21-1	NX004930	Circuit Board	PN1/3		
* 21-2	NX004940	Circuit Board	PN2/3		
* 21-3	NX004950	Circuit Board	PN3/3		
* 22	VJ291800	Partition	パーティション		01
* 23	VJ187700	LCD Assembly	液晶ディスプレイ		
24	VH811500	Fanction Keys	ファンクションキー	SHIFT, F1-8, EXIT	03
25	VH811400	Escutcheon, LCD	LCDエスカッション		05
* 26	VJ221800	LCD Cover	LCD保護板		06
* 27	VJ221900	Escutcheon, Power Switch	パワースイッチエスカッション		03
* 28	VJ221500	Escutcheon	エスカッション		
* 29	VJ221600	Escutcheon	エスカッション		
30	VH810000	Escutcheon, Slide Volume	スライドボリュームエスカッション		02
31	VH810100	Dust Proof Cloth-1	防塵クロス(1)		01
32	VB774000	Knob	ツマミ	DATA ENTRY	01
33	VF888500	Knob	外ツマミ	VOLUME OUTPUT2	02
34	VF888400	Knob	内ツマミ	VOLUME OUTPUT1	02
* 35	VJ220500	Panel	パネル		12
36	LA003690	Lug Terminal	ラゲ端子	C, A	01
37	ED330086	Bind Head Screw	3.0X8 FCM3BL		01
38	ED340106	Bind Head Screw	4.0X10 FCM3BL		01
* 39	VJ670500	Bonding Head Screw	3.0X8 FCM3BL		01
40	EB330066	Flat Head Screw	3.0X6 FCM3BL		01
41	EI330086	Bind Head Tapping Screw	3.0X8 FCM3BL		01
42	VC364900	Hexagonal Nut	φ9.0 FCM3BL		01
43	LX200010	Flat Washer	9X14X0.5 FCM3BL		01
44	EV413036	Toothed Lock Washer	φ3.0 ZMC2BL		01
45	EV410098	Toothed Lock Washer	φ9.0 ZMC2BL		01
46	VJ268400	Bonding Head Screw	3.0X6 FCM3BL		01
47	EV413046	Toothed Lock Washer	φ4.0 ZMC2BL		01
		* Accessory MIDI Cable	3m	* 付属品 MIDIケーブル	1

* New Parts (新規部品)

ランク : Japan only

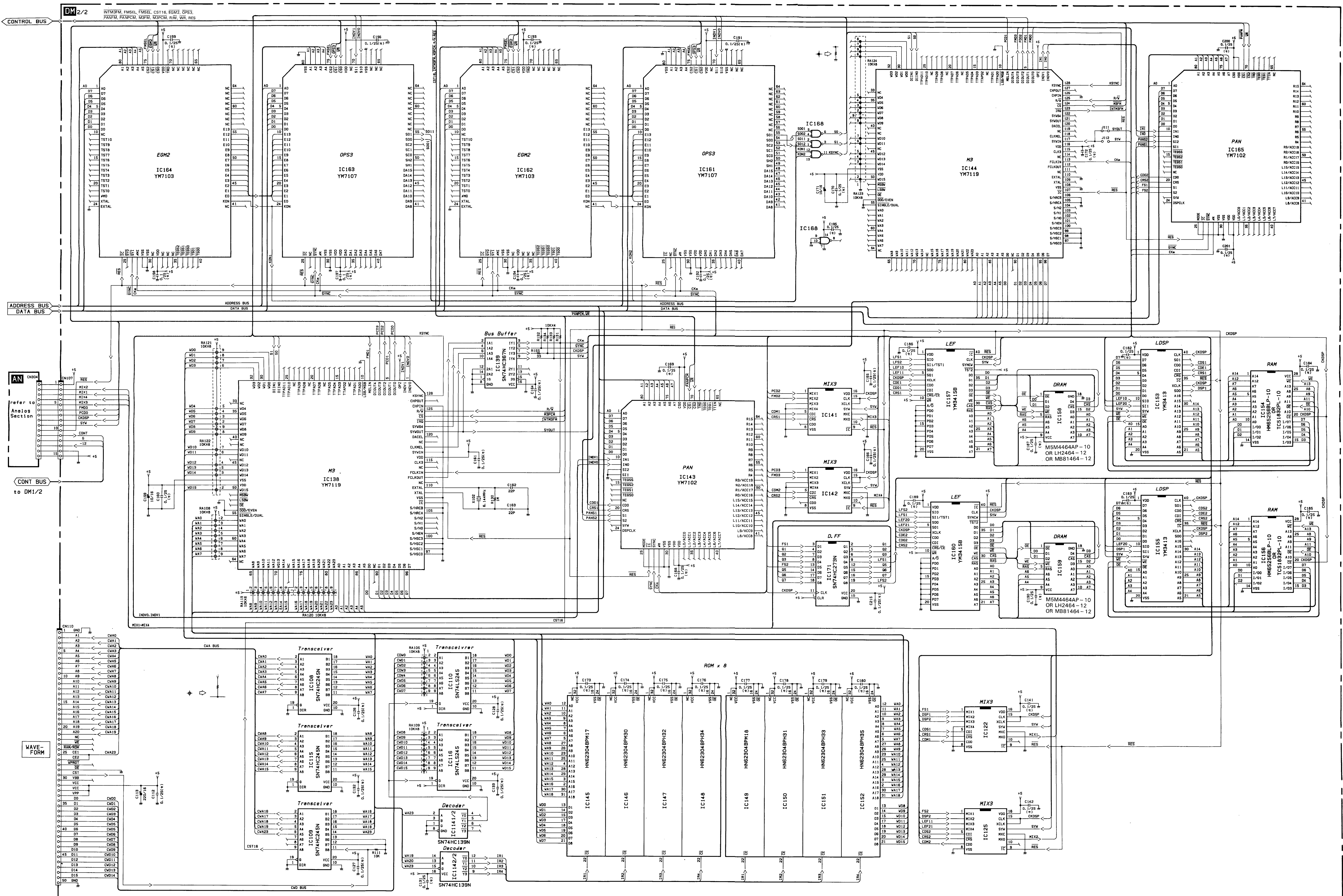
FRONT PANEL KNOBS (フロントパネルツマミ)

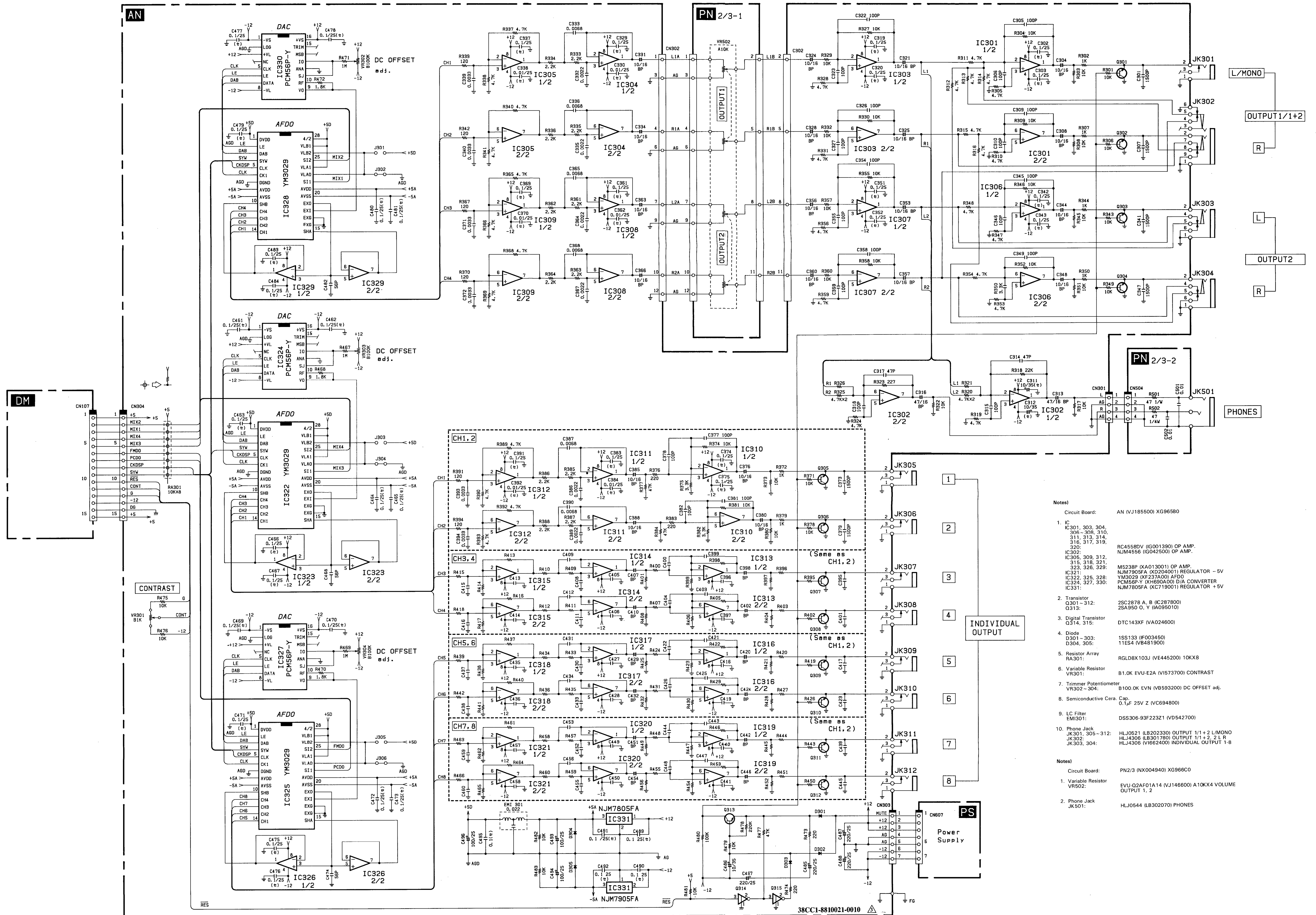


Ref. No.	Part No.	Description	部品名	Remarks	ランク	
1	VI679200	Push Button	with Lens	ボ ッ シ ュ ボ タ ン	VOICE TG77	02
2	VJ679300	Push Button	with Lens	ブ ッ シ ュ ボ タ ン	MULTI	02
3	VJ282400	Push Button	with Lens	ブ ッ シ ュ ボ タ ン	UTILITY	
4	VJ282600	Push Button		ブ ッ シ ュ ボ タ ン	EDIT/COMPARE	
5	VJ282700	Push Button		ブ ッ シ ュ ボ タ ン	COPY	
6	VI679600	Push Button		ブ ッ シ ュ ボ タ ン	MEMORY	02
7	VJ282500	Push Button	with Lens	ブ ッ シ ュ ボ タ ン	EF BYPASS	
8	VJ282800	Push Button		ブ ッ シ ュ ボ タ ン	BANK/SELECT	
9	VJ283000	Push Button		ブ ッ シ ュ ボ タ ン	ELEMENT	
10	VJ282900	Push Button		ブ ッ シ ュ ボ タ ン	OPERATOR	
11	VJ283100	Push Button		ブ ッ シ ュ ボ タ ン	PAGE (Left)	
12	VJ283200	Push Button		ブ ッ シ ュ ボ タ ン	PAGE (Right)	
13	VJ283300	Push Button		ブ ッ シ ュ ボ タ ン	JUMP/MARK	
14	VI680400	Push Button		ブ ッ シ ュ ボ タ ン	-1/NO	02
15	VJ283400	Push Button		ブ ッ シ ュ ボ タ ン	↑	
16	VI680600	Push Button		ブ ッ シ ュ ボ タ ン	+1/YES	02
17	VI680500	Push Button		ブ ッ シ ュ ボ タ ン	←	02
18	VJ283500	Push Button		ブ ッ シ ュ ボ タ ン	↓	
19	VI680700	Push Button		ブ ッ シ ュ ボ タ ン	→	02
20	VJ283600	Push Button		ブ ッ シ ュ ボ タ ン	7 VWX	
21	VJ283700	Push Button		ブ ッ シ ュ ボ タ ン	8 YZ'	
22	VJ283800	Push Button		ブ ッ シ ュ ボ タ ン	9 *#-	
23	VJ283900	Push Button		ブ ッ シ ュ ボ タ ン	4 MNO	
24	VJ284000	Push Button		ブ ッ シ ュ ボ タ ン	5 PQR	
25	VJ284100	Push Button		ブ ッ シ ュ ボ タ ン	6 STU	
26	VJ284200	Push Button		ブ ッ シ ュ ボ タ ン	1 DEF	
27	VJ284300	Push Button		ブ ッ シ ュ ボ タ ン	2 GHI	
28	VJ284400	Push Button		ブ ッ シ ュ ボ タ ン	3 JKL	
29	VJ284500	Push Button		ブ ッ シ ュ ボ タ ン	0 ABC	
30	VJ284600	Push Button		ブ ッ シ ュ ボ タ ン	- / . ,	
31	VJ284700	Push Button		ブ ッ シ ュ ボ タ ン	ENTER SPACE	
32	VF888500	Knob		外 ツ マ ミ	VOLUME OUTPUT2	02
33	VF888400	Knob		内 ツ マ ミ	VOLUME OUTPUT1	02
34	VH811500	Function Keys		フ ン クション キー	SHIFT, F1-8, EXIT	03
35	VB774000	Knob		ツ マ ミ	DATA ENTRY	01
36	VF888700	Push Rod		ブ ッ シ ュ ロ ッ ド	POWER ON/OFF	02

* New Parts (新規部品)

ランク : Japan only





Notes

- Circuit Board: AN (VJ185500) XG96580
- IC IC301, 303, 304, 306-308, 310, 311, 313, 314, 316, 317, 319, 320: RC4558DV (IG001390) OP AMP. NJM4556 (IG042500) OP AMP.
 - IC302: M5238P (XA013001) OP AMP. NJM7905FA (X2304001) REGULATORY -5V. YM3029 (XF237A00) AFDO. PCM5BP-Y (XHS0A00) D/A CONVERTER. NJM7805FA (XC719001) REGULATORY +5V.
 - Transistor Q301-312: 2SC2878 A, B (IC287800). 2SA950 O, V (IA095010).
 - Digital Transistor Q314, 315: DTC143XF (VA024600).
 - Diode D301-303: 1S5133 (IF003450). D304, 305: 11E54 (WB481900).
 - Resistor Array RA301: RGLD8X103J (VE445200) 10KX8.
 - Variable Resistor VR301: B1.0K EVU-E2A (V157300) CONTRAST.
 - Trimmer Potentiometer VR302-304: B100.0K EVN (V593200) DC OFFSET adj.
 - Semiconductive Cera. Cap. C477: 25V 2 (VC694800).
 - LC Filter EM1301: DSS306-93F22321 (VD542700).
 - Phone Jack JK301, 305-312: HLJ0521 (LB202300) OUTPUT 1/1+2 L/MONO. HLJ4306 (LB301780) OUTPUT 1/1+2, 2 L R. JK303, 304: HLJ4305 (V662400) INDIVIDUAL OUTPUT 1-8.

Notes

- Circuit Board: PN/23 (NX004940) XG966C0
- Variable Resistor VR502: EVU-Q2AF01A14 (VJ148600) A10KX4 VOLUME OUTPUT 1, 2.
 - Phone Jack JK501: HLJ0544 (LB302070) PHONES.

INDIVIDUAL OUTPUT

Power Supply

38CC1-8810021-0010