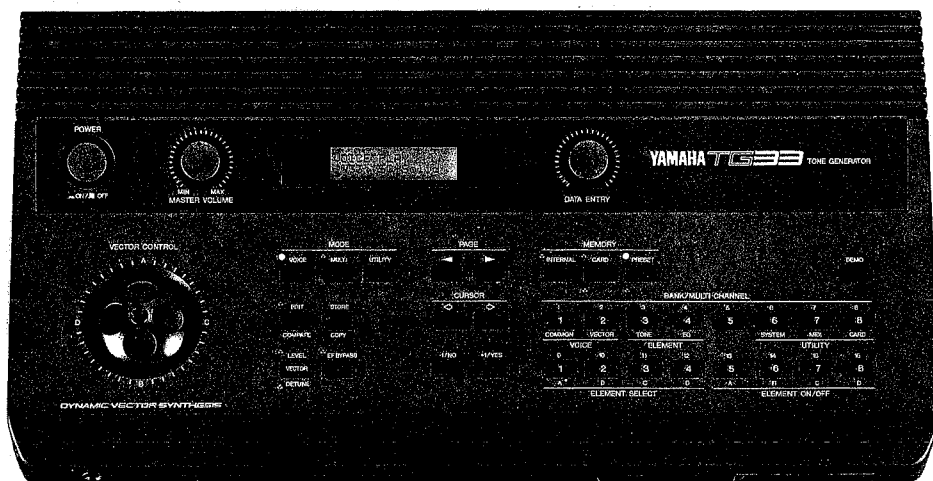


TONE GENERATOR

TG33

SERVICE MANUAL



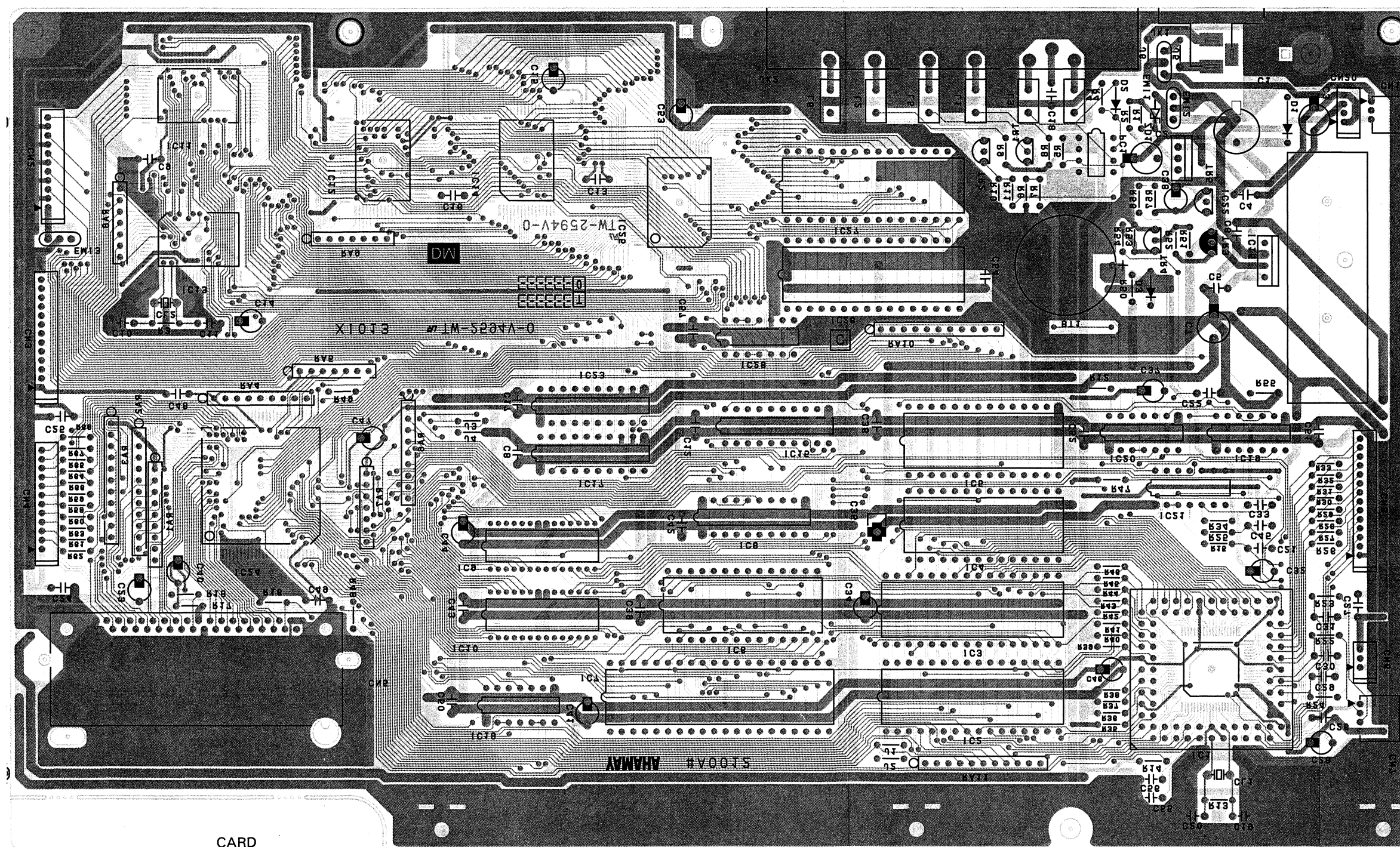
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■ CIRCUIT BOARDS (シート基板図)

● DM Circuit Board

THRU MIDI OUT IN DC10V 700mA IN



CARD

Pattern side (パターン側)



Notes)

Circuit Board:	DM (V.
1. IC	
IC 1:	HD647
IC 2:	O12AV
IC 3:	O12BV
IC 4:	M5M5
IC 5:	LC366
IC 6:	TC518
IC 7:	YM341
IC 8:	TMC57
IC 9, 10:	TMC34
IC11~14:	TMC34
IC15:	TC74A
IC16:	PQ05R
IC17, 23:	TC74H
IC18:	TC74A
IC19:	TC74A
IC20:	SN74H
IC21:	TC74H
IC22:	PST511
IC24:	LC920
IC25:	LC920
IC26:	HN623
IC27:	HN623
IC28:	TC40H
2. Photo Coupler	
PC 1:	6N137
3. Transistor	
TR 1, 2:	2SC17
TR 3:	2SA10
TR 4:	2SC18
TR 5:	2SD88
4. Diode	
D 1:	11ES4
D 2, 3:	1SS13
5. Zener Diode	
ZD 1:	MTZ9.
6. Resistor Array	
RA 1, 4, 6:	RGLD8
RA 2, 3, 10, 11:	RGLD1
RA 5, 7~9:	RMLS6
7. Electrolytic Cap.	
C 1:	2200μF
C 2, 3:	220μF
C 7:	470μF
8. Tantalum Capacitor	
C35:	4.7μF
9. Semiconductive Cera. Cap.	
C 4~6, 8, 9, 12, 13, 16, 17, 24~27, 29~31, 36, 39, 42, 43, 48~52, 54, 57:	0.1μF
10. Coil	
L 1~6:	FL5R2C
11. EMI Filter	
EMI 1~3:	LS MT
12. Quartz Crystal Unit	
CL 1:	20MHz
CL 2:	12.8MI
13. Connector	
JK 1:	X-G92
14. DIN Connector	
JK 2:	3P YKF
15. Lithium Battery	
BT 1:	CR203
16. Connector, Card	
CN 5:	38P (V

MIDI
THRU OUT IN DC10V 700mA IN

Notes)

Circuit Board:

DM (VJ789400) XI013C0

1. IC
IC 1:
IC 2:
IC 3:
IC 4:
IC 5:
IC 6:
IC 7:
IC 8:
IC 9, 10:
IC11 ~ 14:
IC15:
IC16:
IC17, 23:
IC18:
IC19:
IC20:
IC21:
IC22:
IC24:
IC25:
IC26:
IC27:
IC28:
2. Photo Coupler
PC 1:
3. Transistor
TR 1, 2:
TR 3:
TR 4:
TR 5:
4. Diode
D 1:
D 2, 3:
5. Zener Diode
ZD 1:
6. Resistor Array
RA 1, 4, 6:
RA 2, 3, 10, 11:
RA 5, 7~9:
7. Electrolytic Cap.
C 1:
C 2, 3:
C 7:
8. Tantalum Capacitor
C35:
9. Semiconductive Cera. Cap.
C 4~6, 8, 9, 12, 13,
16, 17, 24~27,
29~31, 36, 39, 42,
43, 48~52, 54, 57:
10. Coil
L 1~6:
11. EMI Filter
EMI 1~3:
12. Quartz Crystal Unit
CL 1:
CL 2:
13. Connector
JK 1:
14. DIN Connector
JK 2:
15. Lithium Battery
BT 1:
16. Connector, Card
CN 5:
- HD6475328CP-10 (XI119A00) CPU <H8/532>
012AV030 (XI117A00) EPROM A 1M Ver 0.3
012BV030 (XI118A00) EPROM B 1M Ver 0.3
M5M5255BP-10LL (XH080A00) SRAM 256K
LC3664RL-12 (XG517A00) SRAM 64K
TC51832PL-10 (XC628A00) PSRAM 256K
YM3413 (XE449A00) LDSP
TMC57800N (XG662A00) MIX5
TMC3489NL (XE755A00) SFC
TMC3493APH (XF987A00) GEW5
TC74AC245P (XH608A00) BUS TRANSCEIVER
PQ05RF1 (XI124A00) REGULATOR 5V 1A
TC74HC245AP (IRO24500) BUS BUFFER
TC74AC08P (XG656A00) AND
TC74AC04P (XG655A00) INVERTER
SN74HC14N (IRO01450) INVERTER
TC74HC4066AP (IR406600) A-SWITCH
PST518B-2 (IG116200) SYSTEM RESET
LC92030C-477 (XI074A00) GATE ARRAY SP33
LC92018B-476 (XI045A00) GATE ARRAY RI54
HN62324BPC68 (XI796A00) ROM 4M VOICE
HN62324BPC69 (XI797A00) ROM 4M VOICE
TC40HC004P (IG051000) INVERTER
- 6N137 (VD473200)
- 2SC1740S R,S (IC174070)
2SA1015 O, Y (IA101570)
2SC1815 Y,GR (IC181580)
2SD880 O, Y (ID088000)
- 11ES4 (VB481900)
1SS133 (IF003450)
- MTZ9.1A 9.1V (VA095500)
- RGLD8X103J (VE445200) 10K x 8
RGLD10X103J (VH564300) 10K x 10
RMLS6J103 (HZ004650) 10K x 6
- 2200μF 16V (VH603700)
220μF 16V (UJ138220)
470μF 10V (UJ828470)
- 4.7μF 16V M (FP736470)
- 0.1μF 16V M (FZ004100)
- FL5R200QNT 20μ (VB835000)
- LS MT Y223NB 0.022 (FZ006970)
- 20MHz AT-49 (VI927300)
12.8MHz AT-49 (VI460600)
- X-G9242 (VH303600) DC 10V 700mA IN
- 3P YKF51-5046 (VI466400) MIDI
- CR2032 (VE338400)
- 38P (VF821100) CARD

CN1			
Pin No.	Pin Name	Wire Color	Destination
1	PSW	RE	Power Switch
2	NC	—	—
3	PSW	WH	Power Switch

CN2			
Pin No.	Pin Name	Wire Color	Destination
1	+5D	RE	JKAN-CN1-1
2	GND	BL	JKAN-CN1-2
3	SRO2	WH	JKAN-CN1-3
4	GND	BL	JKAN-CN1-4
5	SRO1	WH	JKAN-CN1-5
6	GND	BL	JKAN-CN1-6
7	CLK MEL	WH	JKAN-CN1-7
8	GND	BL	JKAN-CN1-8
9	SYW	WH	JKAN-CN1-9
10	GND	BL	JKAN-CN1-10
11	IC	BL	JKAN-CN1-11

CN3			
Pin No.	Pin Name	Wire Color	Destination
1	Vss	RE	LCD-CN1-1
2	Vdd	WH	LCD-CN1-2
3	RS	WH	LCD-CN1-3
4	R/W	WH	LCD-CN1-4
5	E	WH	LCD-CN1-5
6	D0	WH	LCD-CN1-6
7	D1	WH	LCD-CN1-7
8	D2	WH	LCD-CN1-8
9	D3	WH	LCD-CN1-9
10	D4	WH	LCD-CN1-10
11	D5	WH	LCD-CN1-11
12	D6	WH	LCD-CN1-12
13	D7	WH	LCD-CN1-13

CN4			
Pin No.	Pin Name	Wire Color	Destination
1	Vcc	RE	PN-CN1-1
2	DET	WH	PN-CN1-2
3	LEV	WH	PN-CN1-3
4	EFB	WH	PN-CN1-4
5	EDT	WH	PN-CN1-5
6	VOI	WH	PN-CN1-6
7	MUL	WH	PN-CN1-7
8	CRL	WH	PN-CN1-8
9	INT	WH	PN-CN1-9
10	CRH	WH	PN-CN1-10
11	PRH	WH	PN-CN1-11
12	PRL	WH	PN-CN1-12

CN20			
Pin No.	Pin Name	Wire Color	Destination
1	AG2	RE	JKAN-CN4-1
2	+VA	WH	JKAN-CN4-2
3	+8A	WH	JKAN-CN4-3
4	AG1	WH	JKAN-CN4-4

IC2, IC3	J1	J2	J3	J4
EP ROM	x	o	o	x
MASK ROM (2M)	o	x	x	o

CN5			
Pin No.	Pin Name	Wire Color	Destination
1	GND	—	CARD-1
2	NC	—	CARD-2
3	NC	—	CARD-3
4	D3	—	CARD-4
5	D4	—	CARD-5
6	D5	—	CARD-6
7	D6	—	CARD-7
8	D7	—	CARD-8
9	CE1	—	CARD-9
10	A10	—	CARD-10
11	OE	—	CARD-11
12	A11	—	CARD-12
13	A9	—	CARD-13
14	A8	—	CARD-14
15	A13	—	CARD-15
16	A14	—	CARD-16
17	WE	—	CARD-17
18	NC	—	CARD-18
19	CST	—	CARD-19
20	Vcc	—	CARD-20
21	A16	—	CARD-21
22	A15	—	CARD-22
23	A12	—	CARD-23
24	A7	—	CARD-24
25	A6	—	CARD-25
26	A5	—	CARD-26
27	A4	—	CARD-27
28	A3	—	CARD-28
29	A2	—	CARD-29
30	A1	—	CARD-30
31	A0	—	CARD-31
32	D0	—	CARD-32
33	D1	—	CARD-33
34	D2	—	CARD-34
35	MR	—	CARD-35
36	NC	—	CARD-36
37	Vbb	—	CARD-37
38	GND	—	CARD-38

CN6			
Pin No.	Pin Name	Wire Color	Destination
1	+5V	RE	JKAN-CN7-1
2	D.E	WH	JKAN-CN7-2
3	GND	WH	JKAN-CN7-3

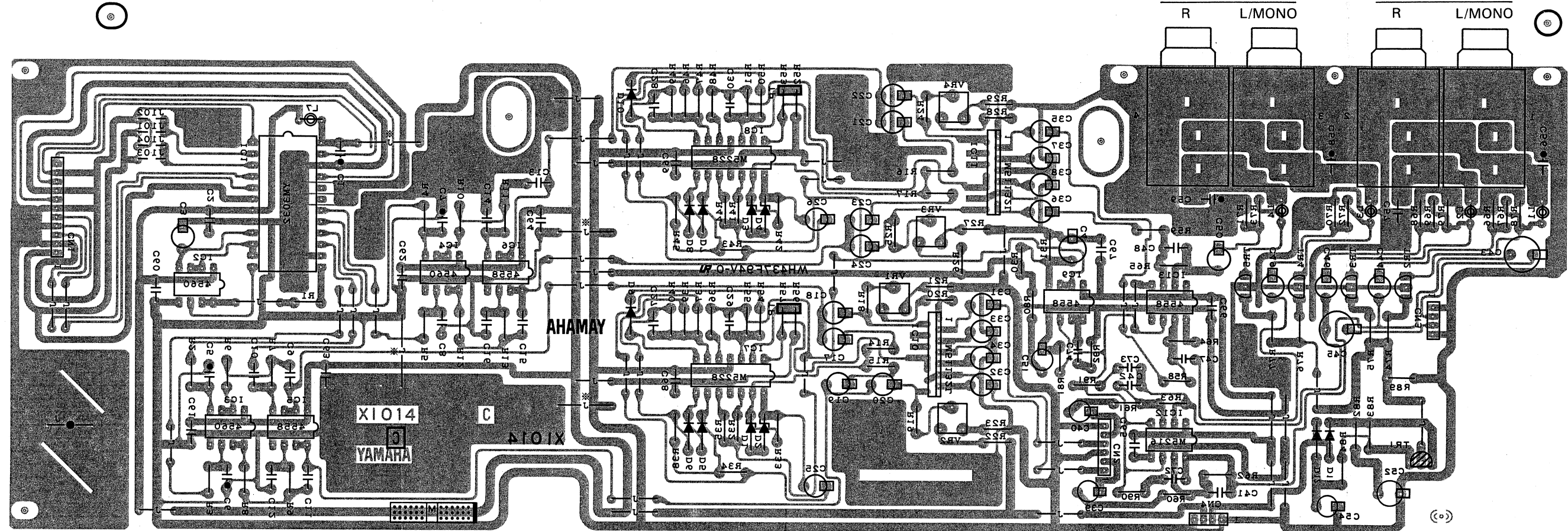
CN7			
Pin No.	Pin Name	Wire Color	Destination
1	+5V	RE	VECTOR control Ass'y
2	V-Y	YE	VECTOR control Ass'y
3	V-X	OR	VECTOR control Ass'y
4	GND	BL	VECTOR control Ass'y

CN8			
Pin No.	Pin Name	Wire Color	Destination
1	GND	RE	PN-CN2-1
2	P15	WH	PN-CN2-2
3	P93	WH	PN-CN2-3
4	P92	WH	PN-CN2-4
5	P91	WH	PN-CN2-5
6	P90	WH	PN-CN2-6
7	P77	WH	PN-CN2-7
8	P76	WH	PN-CN2-8
9	P75	WH	PN-CN2-9
10	P74	WH	PN-CN2-10
11	P73	WH	PN-CN2-11
12	P72	WH	PN-CN2-12
13	P71	WH	PN-CN2-13
14	P70	WH	PN-CN2-14

Pattern side (パターン側)

ピングネジ)

● JKAN 1/4 Circuit Board



Pattern side (パターン側)

Notes)

- Circuit Board: JKAN1/4 (X1014C0)
- IC
IC 1: YM3032 (XG411A00) DAL3
IC 2~4: NJM4560ED (IG040000) OP AMP.
IC 5, 6, 9, 13: RC4558DV (IG001390) OP AMP.
IC 7, 8: M5228P (XF123A00) OP AMP. 4ch
IC10, 11: M51132L (XE470001) VCA
IC12: NJM4556 (IG042500) OP AMP. 2ch
 - Transistor
TR 1: 2SA1015 Y (IA101520)
TR 2~5: 2SC2878 A, B (IC287800)
 - Diode
D 5~12: 1SS133 (IF003450)
 - Zener Diode
D 1~4: RD3.6EB1 3.6V (IF001660)
 - Trimmer Potentiometer
VR 1~4: B10K EVN (VA024800)
 - Electrolytic Cap.
C43, 52~55: 220μF 16V (FZ006950)
 - Semiconductive Cera. Cap.
C 1, 2, 60~69: 0.1μF 16V M (FZ004100)
 - Coil
L 1~4, 7: FL5R200QNT 20μH (VB835000)
 - Phone Jack
JK 1~4: HLJ4306 Mono (VE742000) OUTPUT

10. Jumper wire, R89

J101	J102	J103	J104	marked *	R89
x	o	o	x	x (4 pcs)	x

(o: installed x: not installed)

JKAN 1/4 CN1

Pin No.	Pin Name	Wire Color	Destination
1	+5D	RE	DM-CN2-1
2	D.G	BL	DM-CN2-2
3	SRO2	WH	DM-CN2-3
4	D.G	BL	DM-CN2-4
5	SRO1	WH	DM-CN2-5
6	D.G	BL	DM-CN2-6
7	CLK	WH	DM-CN2-7
8	D.G	BL	DM-CN2-8
9	SYW	WH	DM-CN2-9
10	D.G	BL	DM-CN2-10
11	IC	BL	DM-CN2-11

JKAN 1/4 CN2

Pin No.	Pin Name	Wire Color	Destination
1	INL	SRE-RE	JKAN-CN6-1
2	OUTL	SRE-WH	JKAN-CN6-2
3	AG	SRES	JKAN-CN6-3
4	IN R	SOR-RE	JKAN-CN6-4
5	OUT R	SOR-WH	JKAN-CN6-5
6	AG	SORS	JKAN-CN6-6

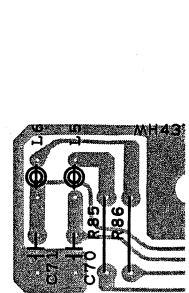
JKAN 1/4 CN3

Pin No.	Pin Name	Wire Color	Destination
1	AG	SRES	JKAN-CN5-1
2	HPL	SRE	JKAN-CN5-2
3	HPR	SOR	JKAN-CN5-3
4	AG	SORS	JKAN-CN5-4

JKAN 1/4 CN4

Pin No.	Pin Name	Wire Color	Destination
1	AG2	RE	DM-CN20-1
2	+VA	WH	DM-CN20-2
3	+8A	WH	DM-CN20-3
4	AG1	WH	DM-CN20-4

● JKAN 2/4



Cor

● JKAN 3/4

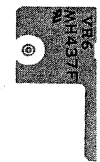
MAST



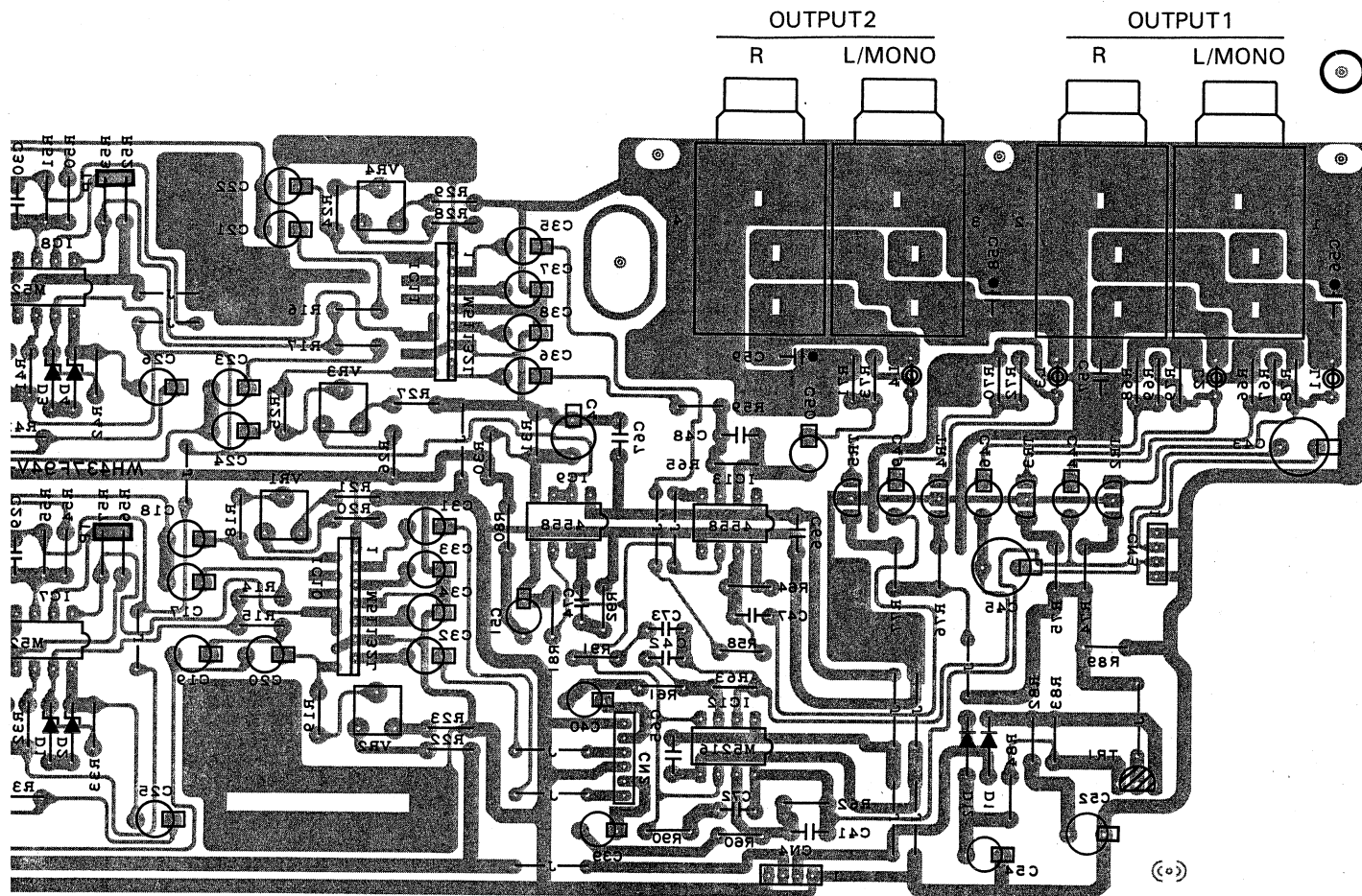
Pattern

● JKAN 4/4

DA



Pattern



Pattern side (パターン側)

JKAN 1/4 CN1

Pin No.	Pin Name	Wire Color	Destination
1	+5D	RE	DM-CN2-1
2	D.G	BL	DM-CN2-2
3	SRO2	WH	DM-CN2-3
4	D.G	BL	DM-CN2-4
5	SRO1	WH	DM-CN2-5
6	D.G	BL	DM-CN2-6
7	CLK	WH	DM-CN2-7
8	D.G	BL	DM-CN2-8
9	SYW	WH	DM-CN2-9
10	D.G	BL	DM-CN2-10
11	IC	BL	DM-CN2-11

JKAN 1/4 CN4

Pin No.	Pin Name	Wire Color	Destination
1	AG2	RE	DM-CN20-1
2	+VA	WH	DM-CN20-2
3	+8A	WH	DM-CN20-3
4	AG1	WH	DM-CN20-4

JKAN 1/4 CN2

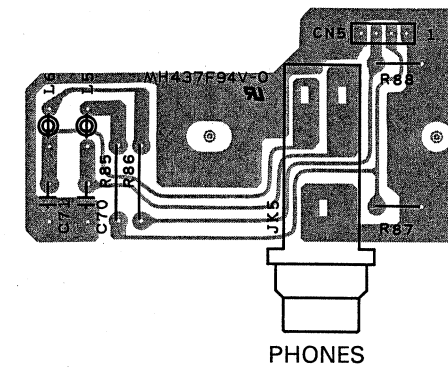
Pin No.	Pin Name	Wire Color	Destination
1	INL	SRE-RE	JKAN-CN6-1
2	OUTL	SRE-WH	JKAN-CN6-2
3	AG	SRES	JKAN-CN6-3
4	IN R	SOR-RE	JKAN-CN6-4
5	OUT R	SOR-WH	JKAN-CN6-5
6	AG	SORS	JKAN-CN6-6

JKAN 1/4 CN3

Pin No.	Pin Name	Wire Color	Destination
1	AG	SRES	JKAN-CN5-1
2	HPL	SRE	JKAN-CN5-2
3	HPR	SOR	JKAN-CN5-3
4	AG	SORS	JKAN-CN5-4

ked *	R89
4 pcs)	x

- **JKAN 2/4 Circuit Board**



Components side (部品側)

Notes)

Circuit Board: JKAN2/4 XI014C0

1. Coil
L 5, 6: FL5R200QNT 20 μ H (VB935000)
2. Phone Jack
JK 5: HLJ0521 Stereo (LB203090) PHONES

JKAN 2/4 CN5

Pin No.	Pin Name	Wire Color	Destination
1	AG	SRES	JKAN-CN3-1
2	HPL	SRE	JKAN-CN3-2
3	HPR	SOR	JKAN-CN3-3
4	AG	SORS	JKAN-CN3-4

Notes)

Circuit Board: JKAN3/4 XI014C0

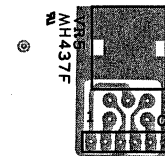
1. Variable Resistor
VR 5: A10K $\times$ 2 (VF636100) MASTER VOLUME

JKAN 3/4 CN6

Pin No.	Pin Name	Wire Color	Destination
1	IN L	SRE-RE	JKAN-CN2-1
2	OUT L	SRE-WH	JKAN-CN2-2
3	AG	SRES	JKAN-CN2-3
4	IN R	SOR-RE	JKAN-CN2-4
5	OUT R	SOR-WH	JKAN-CN2-5
6	AG	SORS	JKAN-CN2-6

- **JKAN 3/4 Circuit Board**

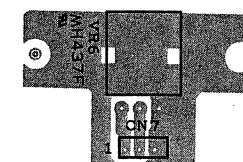
MASTER VOLUME



Pattern side (パターン側)

- **JKAN 4/4 Circuit Board**

DATA ENTRY



Pattern side (パターン側)

Notes)

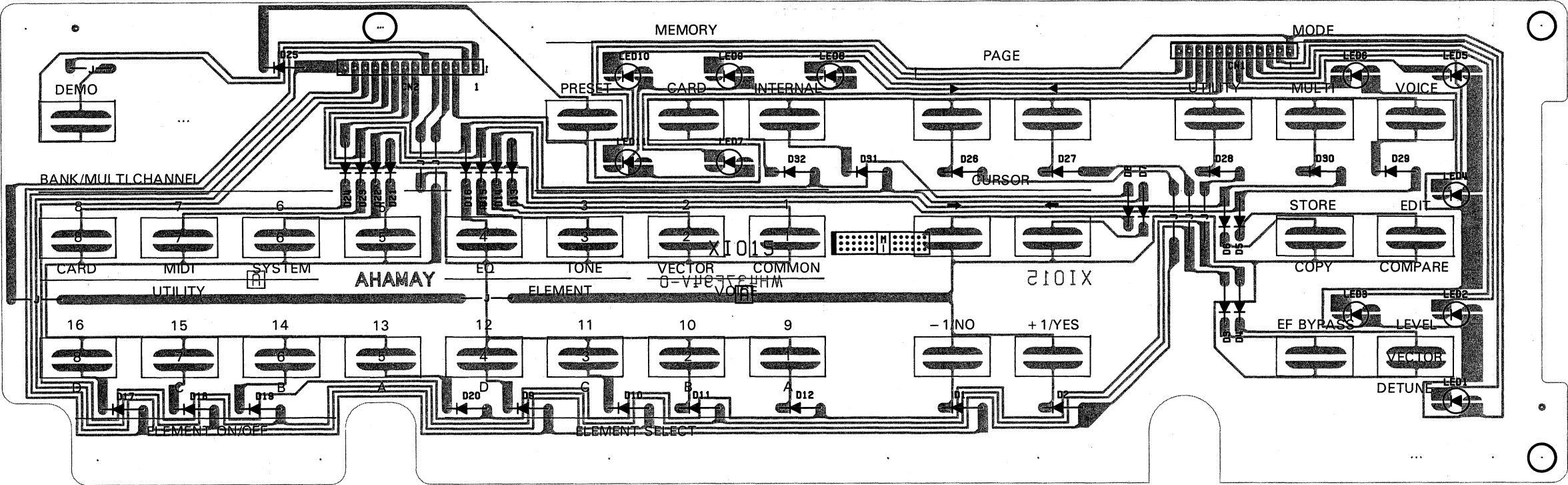
Circuit Board: JKAN4/4 XI014C0

1. Variable Resistor
VR 6: B10K RK09K113 (VJ789500) DATA ENTRY

JKAN 4/4 CN7

Pin No.	Pin Name	Wire Color	Destination
1	+ 5V	RE	DM-CN6-1
2	D.E	WH	DM-CN6-2
3	GND	WH	DM-CN6-3

● PN Circuit Board



Components side (部品側)

- Notes)
- Circuit Board: PN (VJ789200) XI015A0
 - 1. Diode
D 1~33: 1SS133 (IF003450)
 - 2. LED
LED 1~11: SLZ-181B09T6 RE (VI813100)

PN		CN1	
Pin No.	Pin Name	Wire Color	Destination
1	Vcc	RE	DM-CN4-1
2	DET	WH	DM-CN4-2
3	LEV	WH	DM-CN4-3
4	EFB	WH	DM-CN4-4
5	EDT	WH	DM-CN4-5
6	VOI	WH	DM-CN4-6
7	MUL	WH	DM-CN4-7
8	CRL	WH	DM-CN4-8
9	INT	WH	DM-CN4-9
10	CRH	WH	DM-CN4-10
11	PRH	WH	DM-CN4-11
12	PRL	WH	DM-CN4-12

PN		CN2	
Pin No.	Pin Name	Wire Color	Destination
1	GND	RE	DM-CN8-1
2	P15	WH	DM-CN8-2
3	Ca	WH	DM-CN8-3
4	Cb	WH	DM-CN8-4
5	Cc	WH	DM-CN8-5
6	Cd	WH	DM-CN8-6
7	P77	WH	DM-CN8-7
8	P76	WH	DM-CN8-8
9	P75	WH	DM-CN8-9
10	P74	WH	DM-CN8-10
11	P73	WH	DM-CN8-11
12	P72	WH	DM-CN8-12
13	P71	WH	DM-CN8-13
14	P70	WH	DM-CN8-14

■ TEST PROGRAM (テストプログラム)

A. HOW TO ENTER THE TEST PROGRAM

Turn on the power switch of the TG33 and wait for a few seconds.
While pressing the [VOICE] switch, press and hold the [DEMO] switch then the [16] switch. The TG33 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.

TG33 TEST ENTRY
V#. ## XX/XXX/XX

Use the [-1], [COPY], or [EF BYPASS] panel switches to select the appropriate test mode. If you press [-1], the auto test mode will be initiated. If you press [COPY], the TG33 will execute Test 18, "18. Factory settings", and then automatically exit the test mode and return to play mode (refer to Test 18 for details). If you press [EF BYPASS], you will exit the test mode and return to the play mode.

B. PROCEEDING THROUGH THE TESTS

When you enter the test program, the following display will appear.

00: TEST NO. ?
AUTO MODE

The [1] through [16] keys of the [BANK/MULTI CHANNEL] can be used to enter a two-digit number to directly select a test. Simply enter the number using one of these keys, the test will start from that number in succession. For example, if you would like to start from TEST 6, press [6] switch. If the [DEMO] switch is pressed without selecting the test number by using these keys, the TG33 will execute the Test 1, "1. Battery".
NOTE: Test 17 can not be selected directly by this operation.

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[DEMO]を押しさらに[16]を押すと、次の画面が表示される。

EFB-EXT CPY-FACT
-1-AUT

[-1]、[COPY]および[EF BYPASS]を使用してテストモードの選択を行う。
[-1]を押すと、オートモードでテストにエントリーされる。
[COPY]を押すと、"18. 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てプレイモードになる。
[EF BYPASS]を押すとテストモードを抜け、直前の画面に戻る。この時、ファクトリーセットは実行されない。

B. テストの進め方

テストにエントリーすると、次の画面が表示される。

[BANK/MULTI CHANNEL] (1)-(16)を使用して、テスト番号と同じ数字を押すことで、ダイレクトにテストの選択が行なえる。
但し、"17. 32音発音" は、ダイレクト選択が出来ない。
そして即座に、その設定したテストナンバーより、テストナンバー順に、自動的にテストが実行される。
何も設定せずに[DEMO]を押すと、"1. Battery" より、テストナンバー順に自動的にテストが実行される。
エラーが発生した場合、エラー表示を行ってテストは止まる。

TEST SELECTION WHEN AN ERROR IS DETECTED

If an NG (No Good) error is detected in each of tests, the display will indicate the error message and the system will stop at that step. Following operations will proceed the TG33 to the next step. You can then retry the test or perform another test.
Pressing: [DEMO] will re-execute the current test again.
[+1] will execute the test which follows the current test.
[EF BYPASS] will execute Test 19, "19. EXIT" (refer to Test 19 for details).

INITIAL TEST

Performs a read/write test of RAM on the following addresses when the test program is initiated.
IC1: 0FB80h-0FF7Fh
IC4: 40000h-47FFFh
IC5: 50000h-51FFFh

DISPLAY OF TEST RESULTS
NG

00: RAM R/W
ICxxx NG

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

TEST PROGRAM 1 - 19

TEST 1. RAM BACKUP BATTERY TEST

01: BATTERY

This test checks that the voltage of the RAM backup battery is greater than 2.9V and less than 3.6V.

この場合、[DEMO]、[+1]または[EF BYPASS]のいずれかのスイッチにより、エラー処理を行う。
[DEMO]を押すと、エラーが発生したテストより、再び自動的にテストが実行される。
[+1]を押すと、エラーが発生したテストの次のテストより、再び自動的にテストが実行される。
[EF BYPASS]を押すと、"19. EXIT" が実行される。

イニシャルテスト

RAMテスト

テストプログラムエントリー時、自動的にRAMの次の3つのアドレスに対して、リード/ライトテストを行う。
IC1 = 0FB80h-0FF7Fh
IC4 = 40000h-47FFFh
IC5 = 50000h-51FFFh

判定結果の表示
NG

(where xxx = IC #)
(xxxx ; NG となったICの番号)

このテストが実行されても、すべてのRAMのデータは、保存される。

テストプログラム1~19
テスト1. BATTERYテスト

RAMバックアップバッテリー電圧が、2.9V以上、3.5V以下を確認する。

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.

WARNING: CHEMICAL CONTENT NOTICE!

The solder used in the production of this product contains LEAD. In addition, other electrical/electronic and/or plastic (where applicable) components may also contain traces of chemicals found by the California Health and Welfare Agency (and possibly other entities) to cause cancer and/or birth defects or other reproductive harm.

DO NOT PLACE SOLDER, ELECTRICAL/ELECTRONIC OR PLASTIC COMPONENTS IN YOUR MOUTH FOR ANY REASON WHAT SO EVER!

Avoid prolonged, unprotected contact between solder and your skin! When soldering, do not inhale solder fumes or expose eyes to solder/flux vapor!.

If you come in contact with solder or components located inside the enclosure of this product, wash your hands before handling food.

■ SPECIFICATIONS

Tone Generator Systems: AWM (Advanced Wave Memory) & FM (Frequency Modulation)

Internal Memory: Wave ROM; 128 preset AWM & 256 preset FM waveforms

Preset ROM; 128 preset voices

Internal RAM; 64 user voices & 16 user multi setups

External Memory: Voice & Multi data; MCD64 or MCD32 — write & read

Displays: 16-character × 2-line backlit LCD

Controls: MASTER VOLUME, VECTOR CONTROL

Keys & Switches: POWER ON/OFF; MODE VOICE, MULTI and UTILITY; EDIT/COMPARE; STORE/COPY; VECTOR PLAY LEVEL/DETUNE; EF BYPASS ON/OFF; PAGE ◀ and ▶; CURSOR ◀ and ▶; -1/NO and +1/YES; MEMORY INTERNAL, CARD and PRESET; BANK/MULTI CHANNEL 1-16 (VOICE COMMON and VECTOR; ELEMENT TONE and EG; UTILITY SYSTEM, MIDI and CARD; ELEMENT SELECT A, B, C and D; ELEMENT ON/OFF A, B, C and D)

Connectors: DC 10V IN; PHONES; OUTPUT 1 (L/MONO, R) and OUTPUT 2 (L/MONO, R)

MIDI Connectors: IN, OUT, THRU

Power Requirement/Consumption: DC 10V, 700 mA

Dimensions (W × H × D): 439 × 80.4 × 229.9 mm

Weight: 2.8 kg

■ 総合仕様

音源：①方式：ダイナミック・ベクター・シンセシス/

(AWM音源+FM音源)×2系列

②波形メモリー：AWM=128種、FM=256種

③最大同時発音数：AWM×1+FM×1=32音ポリ

AWM×2+FM×2=16音ポリ

④マルチ・ティンバー数：最大16ボイス

(DVA機能付き)

⑤音色構成：1ボイス=2/4エレメント

エフェクト：リバーブ系×16種

内部メモリー：プリセット：128ボイス+16マルチ

インターナル：64ボイス+16マルチ

外部メモリー：別売メモリー・カードMCD32(64ボイス+16マルチ+1システム)、MCD64(128ボイス+32マルチ+2システム)

音色データ供給：別売音色ROMカード

コントローラー：ジョイスティック型ベクター・コントローラー

データ・エントリー・ボリューム

マスター・ボリューム

ディスプレイ：16文字×2行LCD (バックライト付き)

接続端子：アウトプット1 (L/MONO-R)

アウトプット2 (L/MONO-R)

DC12V (700mA) イン

MIDI端子：IN-OUT-THRU

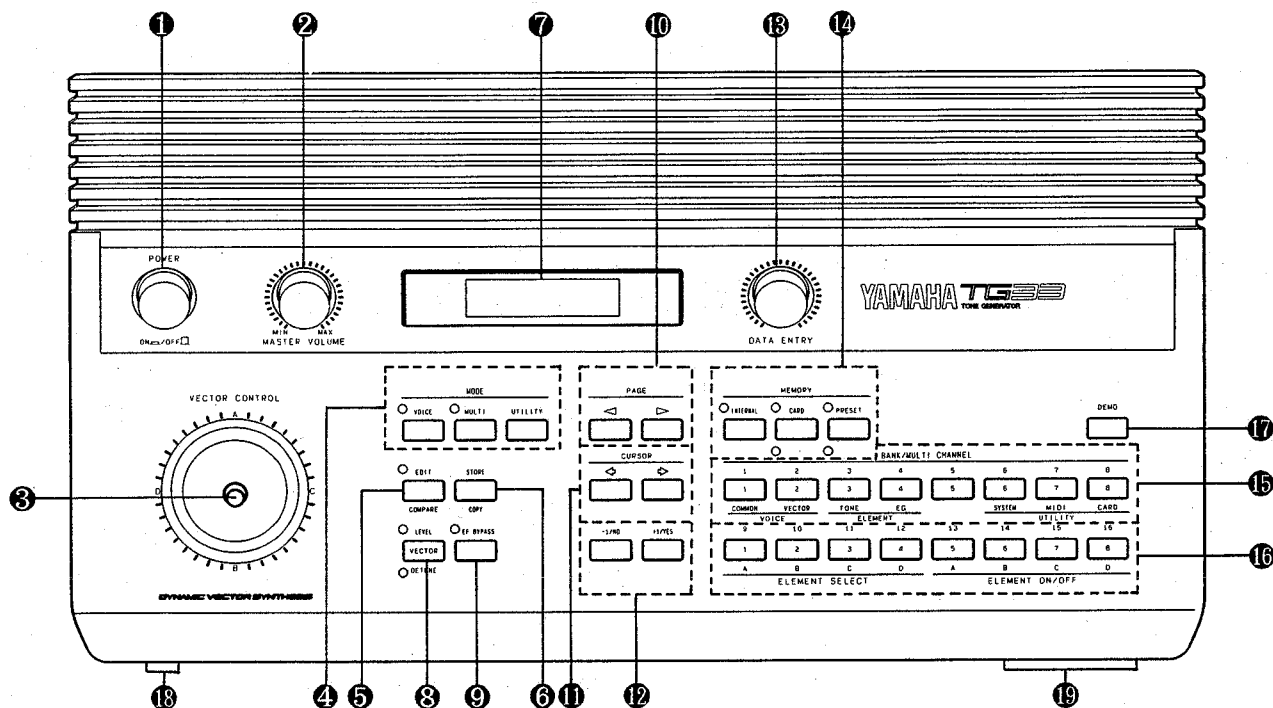
寸法・重量：439W×230Dmm・2.8kg

付属品：電源アダプター PA-3、ラックマウントアダプター×2

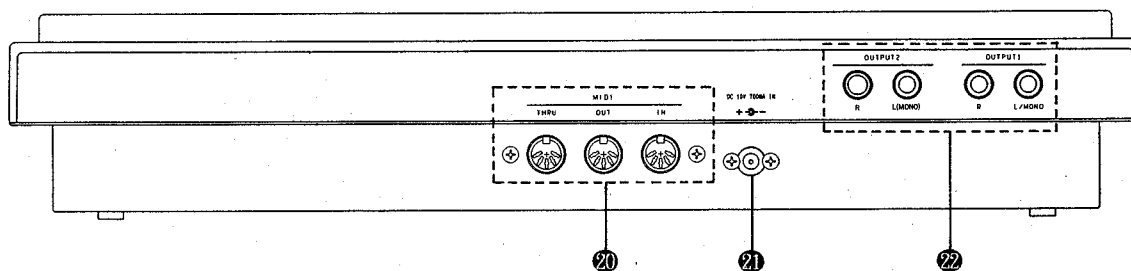
※TG33の音色データはSY22と互換性があります。エフェクトデータは異なります。なお、マルチのデータは読み込みません。

■ PANEL LAYOUT (パネルレイアウト)

● Front Panel



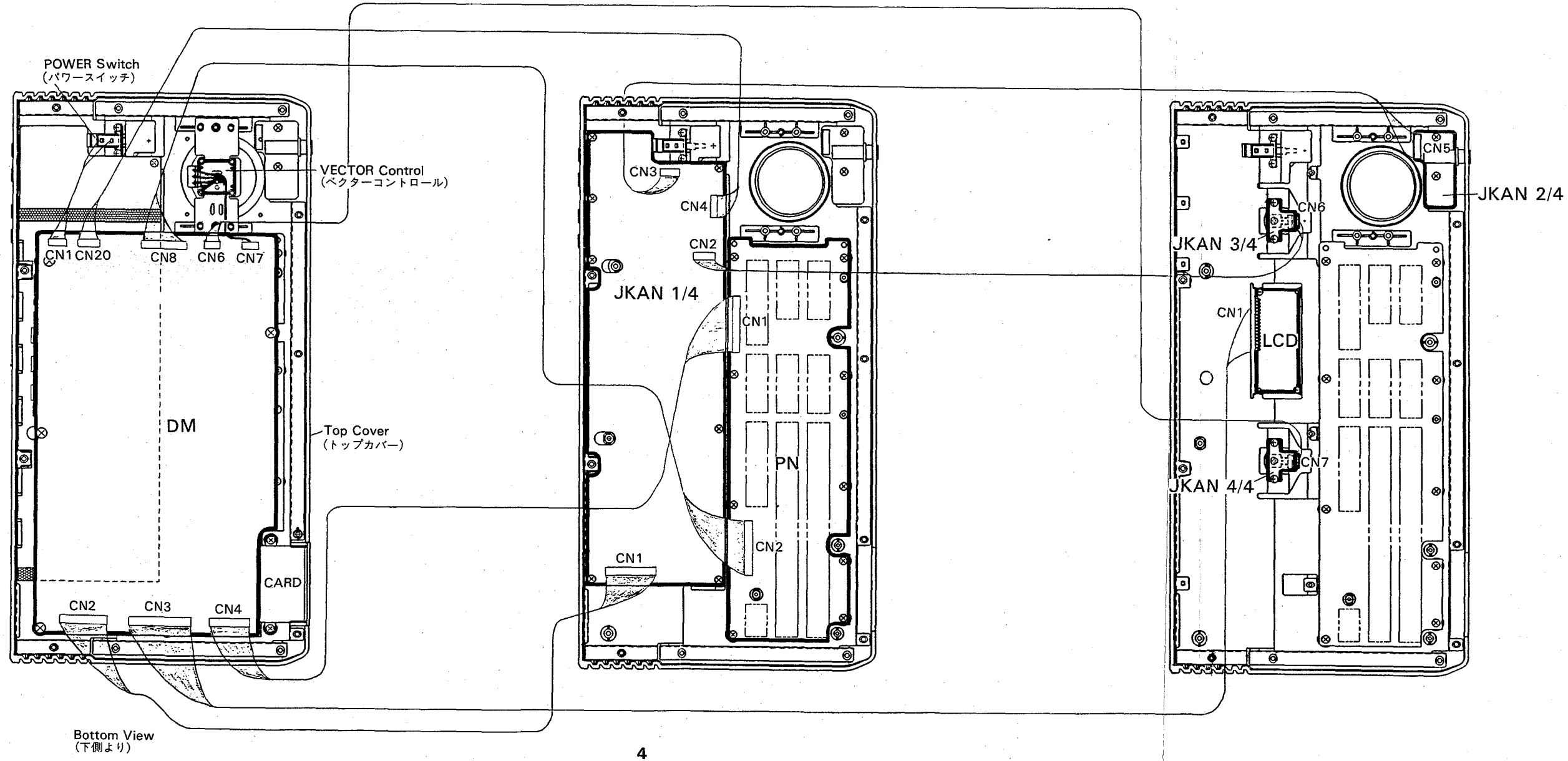
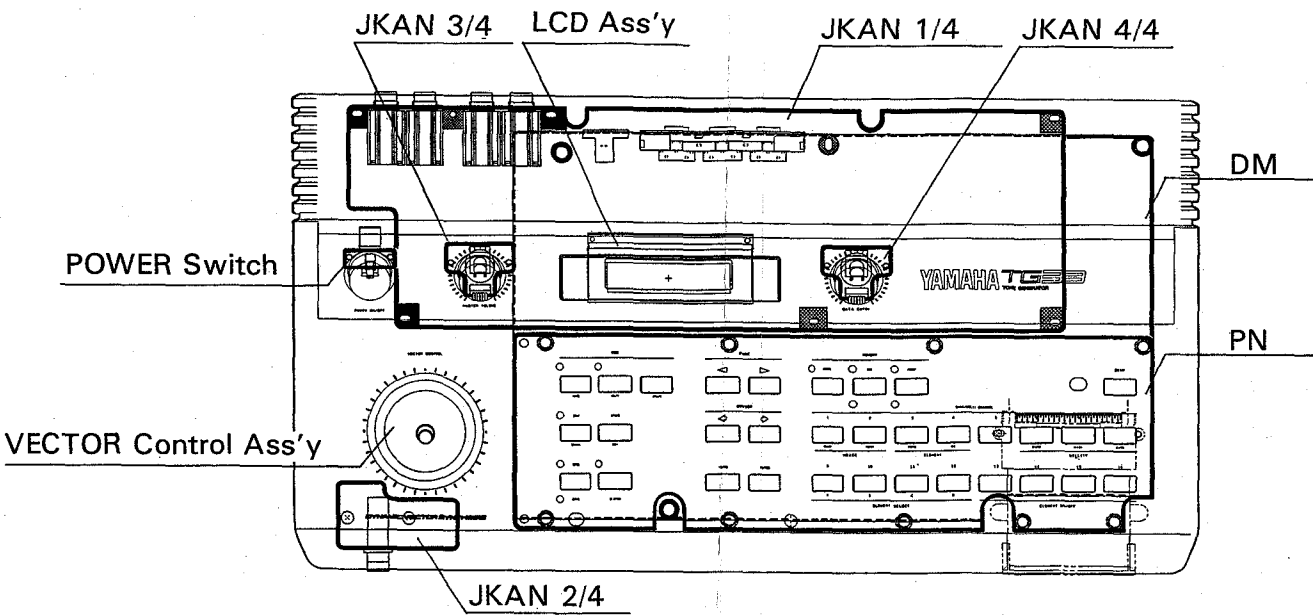
● Rear Panel



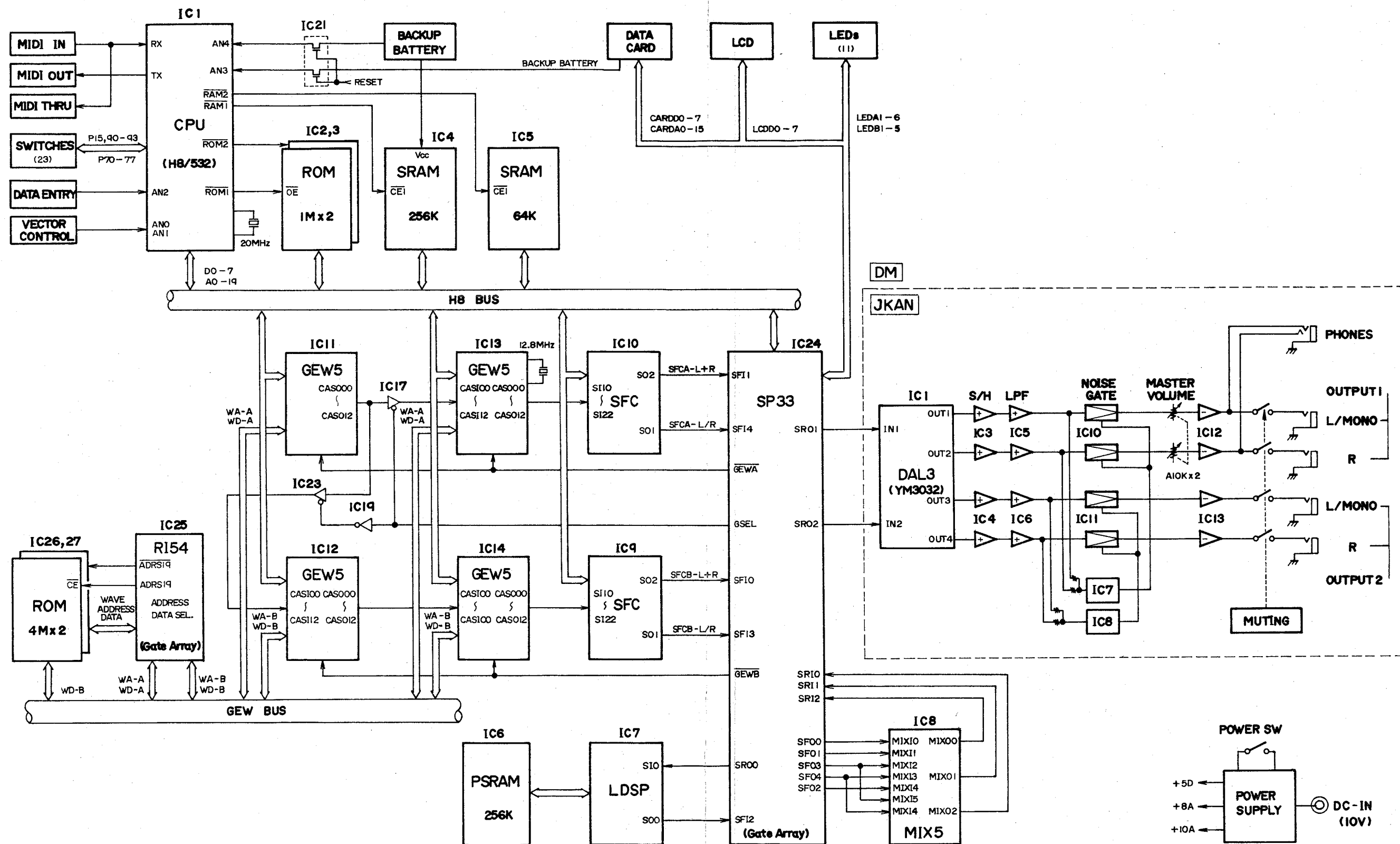
- ① [POWER] Switch
- ② [MASTER VOLUME] Control
- ③ [VECTOR CONTROL]
- ④ MODE Keys
[VOICE] Key & Indicator
[MULTI] Key & Indicator
[UTILITY] Key
- ⑤ [EDIT/COMPARE] Key & Indicator
- ⑥ [STORE/COPY] Key
- ⑦ Liquid Crystal Display Panel (LCD)
- ⑧ [VECTOR] Key & LEVEL/DETUNE Indicators
- ⑨ [EF BYPASS] Key & Indicator
- ⑩ PAGE [◀] and [▶] Keys

- ⑪ CURSOR [↔] and [⇒] Keys
- ⑫ [- 1/NO] and [+ 1/YES] Keys
- ⑬ [DATA ENTRY] Control
- ⑭ [INTERNAL], [CARD] and [PRESET] Keys & Indicators
- ⑮ ⑯ [BANK/MULTI CHANNEL] Select, Edit/Utility Mode Access, and Element Control Keys
- ⑰ [DEMO] Key
- ⑱ PHONES Jack
- ⑲ Card Slot
- ⑳ MIDI IN, OUT and THRU Connectors
- ㉑ DC 10V 700mA IN Jack
- ㉒ OUTPUT 1 and OUTPUT 2 (R and L/MONO) Jacks

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



■ BLOCK DIAGRAM (ブロックダイアグラム)



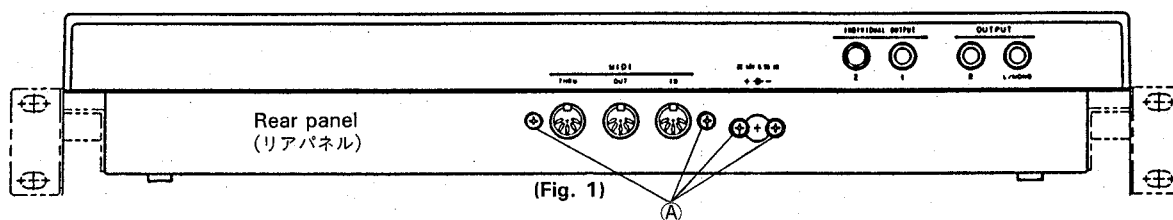
■ DISASSEMBLY PROCEDURE (分解手順)

1. Bottom Cover Removal

1-1. Remove the four (4) screws marked in the figure as ① (3.0×8 pan head tapping screw) and twelve (12) screws marked ② (4.0×10 pan head tapping screw) and two (2) screws marked ③ (4.0×10 pan head tapping screw), then the bottom cover can be removed. (Refer to Fig. 1 and Fig. 2)

1. ボトムカバーの外し方

1-1. ①のネジ4本 (3.0×8 ナベタッピングネジ) と②のネジ12本 (4.0×10ナベタッピングネジ) と③のネジ2本 (4.0×10ナベタッピングネジ) を外し、ボトムカバーを外します。(図1、2 参照)



2. Vector Control Assembly Removal

2-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)

2-2. After the bottom cover has been removed, the VECTOR control assembly can be removed.

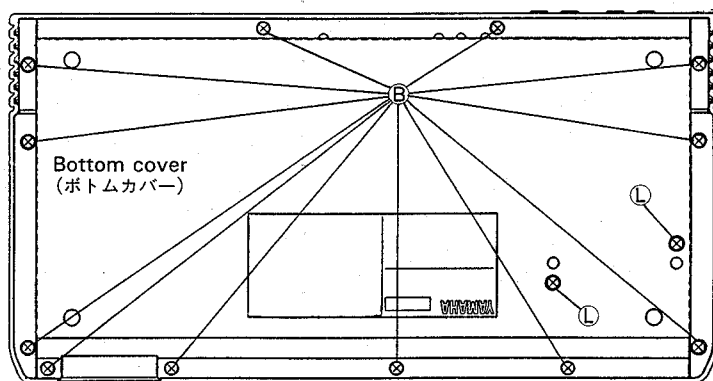
* The VECTOR control assembly is attached to the bottom cover using the two (2) screws marked ④ (4.0×10 pan head tapping screw). (Refer to Fig. 2)

2. ベクターコントロールAss'yの外し方

2-1. ボトムカバーを外します。(1項参照)

2-2. ボトムカバーを外すと、ベクターコントロールAss'yを外すことができます。

* ベクターコントロールAss'yは、ボトムカバー上の④のネジ2本 (4.0×10ナベタッピングネジ) で固定されています。(図2 参照)



(Fig. 2)

3. DM Circuit Board Removal

3-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)

3-2. Remove the two (2) screws marked ⑥ (3.0×8 pan head tapping screw) and four (4) screws marked ⑦ (4.0×10 pan head tapping screw), then the DM circuit board can be removed. (Refer to Fig. 3)

* After the DM circuit board has been removed, the shield sheet can be removed. (Refer to Fig. 3)

3. DMシートの外し方

3-1. ボトムカバーを外します。(1項参照)

3-2. ⑥のネジ2本 (3.0×8 ナベタッピングネジ) と⑦のネジ4本 (4.0×10ナベタッピングネジ) を外し、DMシートを外します。(図3 参照)

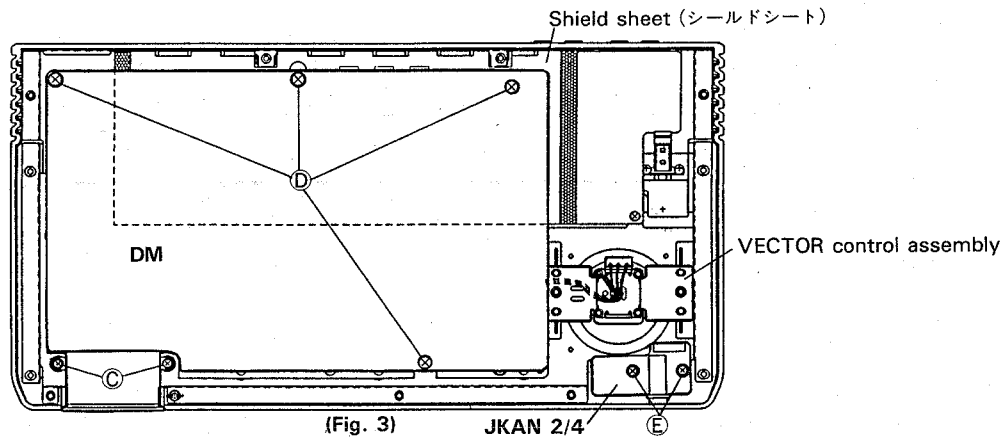
* DMシートを外すと、シールドシートを外すことができます。

4. JKAN2/4 Circuit Board Removal

- 4-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 4-2. Remove the two (2) screws marked ⑤ (3.0×8 bind head tapping screw), then the JKAN2/4 circuit board can be removed. (Refer to Fig. 3)

4. JKAN2/4シートの外し方

- 4-1. ボトムカバーを外します。(1項参照)
- 4-2. ⑤のネジ2本 (3.0×8 バインドタッピングネジ) を外し、JKAN2/4シートを外します。(図3参照)

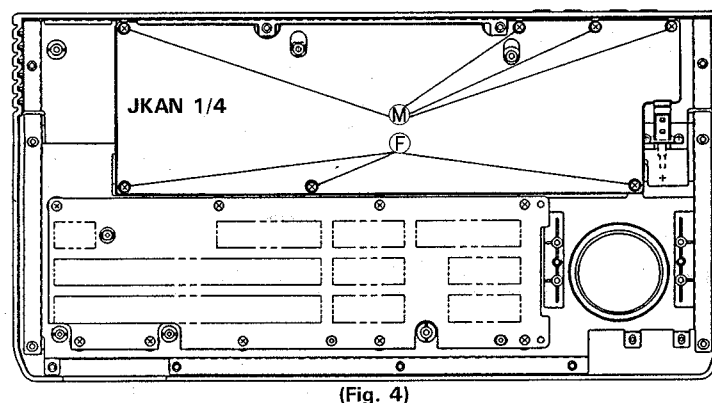


5. JKAN1/4 Circuit Board Removal

- 5-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 5-2. Remove the DM circuit board. (see procedure 3 - DM Circuit Board Removal)
- 5-3. Remove the three (3) screws marked ⑥ (3.0×8 bind head tapping screw) and four (4) screws marked ⑦ (3.0×8 bind head screw), then the JKAN1/4 circuit board can be removed. (Refer to Fig. 4)

5. JKAN1/4シートの外し方

- 5-1. ボトムカバーを外します。(1項参照)
- 5-2. DMシートを外します。(3項参照)
- 5-3. ⑥のネジ3本 (3.0×8 バインドタッピングネジ) と⑦のネジ4本 (3.0×8 バインド小ネジ) を外し、JKAN1/4シートを外します。(図4参照)



6. PN Circuit Board removal

- 6-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 6-2. Remove the DM circuit board. (see procedure 3 - DM Circuit Board Removal)
- 6-3. Remove the nine (9) screws marked ⑧ (3.0×8 bind head tapping screw), then the PN circuit board can be removed. (Refer to Fig. 5)

6. PNシートの外し方

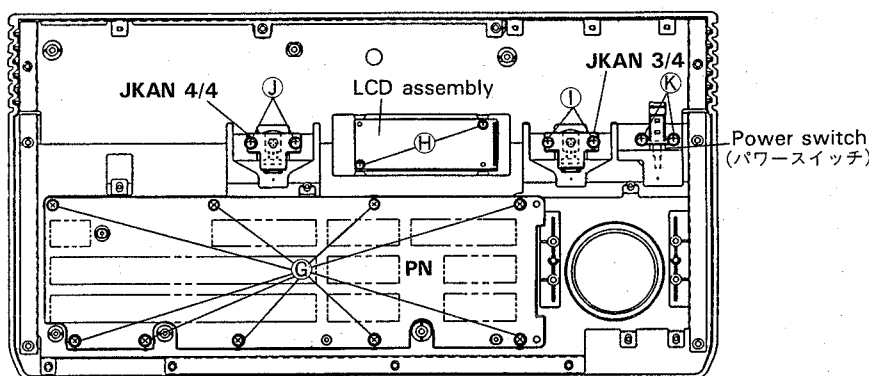
- 6-1. ボトムカバーを外します。(1項参照)
- 6-2. DMシートを外します。(3項参照)
- 6-3. ⑧のネジ9本 (3.0×8 バインドタッピングネジ) を外し、PNシートを外します。(図5参照)

7. LCD Assembly Removal

- 7-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 7-2. Remove the DM circuit board. (see procedure 3 - DM Circuit Board Removal)
- 7-3. Remove the two (2) screws marked ㊸ (2.3×6 bind head tapping screw), then the LCD assembly can be removed. (Refer to Fig. 5)

7. LCD Ass'yの外し方

- 7-1. ボトムカバーを外します。(1項参照)
- 7-2. DMシートを外します。(3項参照)
- 7-3. JKAN1/4シートを外します。(5項参照)
- 7-4. ㊸のネジ2本 (2.3×6 バインドタッピングネジ) を外し、LCD Ass'yを外します。(図5参照)



(Fig. 5)

8. JKAN3/4 Circuit Board Removal

- 8-1. Pull out the MASTER VOLUME control knob located on the control panel. (Refer to Fig. 6)
- 8-2. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 8-3. Remove the DM circuit board. (see procedure 3 - DM Circuit Board Removal)
- 8-4. Remove the JKAN1/4 circuit board. (see procedure 5 - JKAN1/4 Circuit Board Removal)
- 8-5. Remove the two (2) screws marked ① (3.0×8 bind head screw), then the JKAN3/4 circuit board can be removed. (Refer to Fig. 5)

8. JKAN3/4シートの外し方

- 8-1. フロントパネル上のマスターボリュームツマミ (MASTER VOLUME) 1個を引き抜きます。(図6参照)
- 8-2. ボトムカバーを外します。(1項参照)
- 8-3. DMシートを外します。(3項参照)
- 8-4. JKAN1/4シートを外します。(5項参照)
- 8-5. ①のネジ2本 (3.0×8 バインド小ネジ) を外し、JKAN3/4シートを外します。(図5参照)

9. JKAN4/4 Circuit Board Removal

- 9-1. Pull out the DATA ENTRY knob located on the control panel. (Refer to Fig. 6)
- 9-2. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 9-3. Remove the DM circuit board. (see procedure 3 - DM Circuit Board Removal)
- 9-4. Remove the JKAN1/4 circuit board. (see procedure 5 - JKAN1/4 Circuit Board Removal)
- 9-5. Remove the two (2) screws marked ② (3.0×8 Bind head screw), then the JKAN4/4 circuit board can be removed. (Refer to Fig. 5)

9. JKAN4/4シートの外し方

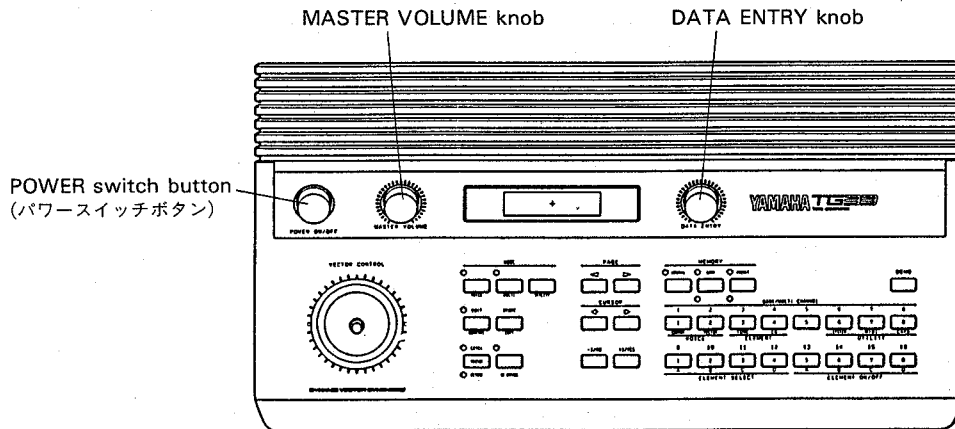
- 9-1. フロントパネル上のデータエントリーツマミ (DATA ENTRY) 1個を引き抜きます。(図6参照)
- 9-2. ボトムカバーを外します。(1項参照)
- 9-3. DMシートを外します。(3項参照)
- 9-4. JKAN1/4シートを外します。(5項参照)
- 9-5. ②のネジ2本 (3.0×8 バインド小ネジ) を外し、JKAN4/4シートを外します。(図5参照)

10. Power Switch Removal

- 10-1. Pull out the POWER switch button located on the control panel. (Refer to Fig. 6)
- 10-2. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)
- 10-3. Remove the DM circuit board. (see procedure 3 - DM Circuit Board Removal)
- 10-4. Remove the JKAN1/4 circuit board. (see procedure 5 - JKAN1/4 Circuit Board Removal)
- 10-5. Remove the two (2) screws marked ⑧ (3.0 × 8 flat head screw), then the power switch can be removed. (Refer to Fig. 5)

10. パワースイッチの外し方

- 10-1. フロントパネル上のパワースイッチボタン (POWER) 1個を引き抜きます。(図6参照)
- 10-2. ボトムカバーを外します。(1項参照)
- 10-3. DMシートを外します。(3項参照)
- 10-4. JKAN1/4シートを外します。(5項参照)
- 10-5. ⑧のネジ2本 (3.0 × 8 皿小ネジ) を外し、パワースイッチを外します。(図5参照)



(Fig. 6)

LSI PIN DESCRIPTION (LSI端子機能表)

• HD6475328CP-10 <H8/532> (X1119A00) 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	Power supply
12	P21/R/W	O	Read/Write	54	P63/A19	O	
13	P22/DS	O	Data strobe	55	Vcc	I	
14	P23/RD	O	Read control	56	P70/TMC1	I	
15	P24/WR	O	Write control	57	P71/FT11	I	
16	Vcc	I	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	
19	MD2	I		61	P75/FT0B2/FTC12	O/I	Free running timer output compare B/ Free running timer counter clock
20	STBY	I	Standby	62	P76/FT0B3/FTC13	O/I	
21	RES	I	Reset	63	P77/FT0A1	O	Free running timer output compare A1
22	NMI	I	Non-maskable interrupt	64	Vss	I	Ground
23	NC	I		65	AVss	I	Analog ground
24	Vss	I	Ground	66	P80/ANO	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	I	Analog power supply
33	P40/A0	O	Address bus	75	P90/FT0A2	O	Free running timer output compare A2
34	P41/A1	O		76	P91/FT0A3	O	Free running timer output compare A3
35	P42/A2	O		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		81	P96/RXD	I	Receive data
40	P47/A7	O		82	P97/SCK	I/O	Serial clock
41	Vss	I	Ground	83	Vss	I	Ground
42	Vss	I		84	EXTAL	I	Clock

• YM3413 (XE449A00) LDSP (Digital Signal Processor)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	VDD	I	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	SIO	I	Serial data input	30	A14	O	Serial data output Clock Initial Clear CD counter reset CD input CD output Serial data output Clock
11	S11	I		31	A15	O	
12	SYW	I	Sync pulse	32	A16	O	
13	WE	O	Write enable	33	SO0	O	
14	OE	O	Output enable	34	XCLK	I	
15	A0	O	Address bus	35	IC	I	
16	A1	O		36	CRS	I	
17	A2	O		37	CDI	I	
18	A3	O		38	CD0	O	
19	A4	O		39	SO1	O	
20	Vss	I	Ground	40	CLK	I	

• **TMC3493PH** (XF987A00) GEW5 (AWM and FM Tone Generator)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	CASIO0	I	Cascade in A	41	MAE	O	Memory address enable
2	V _{DD}		Power supply (+5V)	42	V _{DD}		Power supply
3	D0	I/O	CPU data bus	43	MRD	O	Memory read control
4	D1	I/O		44	MWR	O	Memory write control
5	D2	I/O		45	MD7	I/O	External memory data bus
6	D3	I/O		46	MD6	I/O	
7	D4	I/O		47	MD5	I/O	
8	D5	I/O		48	MD4	I/O	
9	D6	I/O		49	MD3	I/O	
10	D7	I/O		50	MD2	I/O	
11	A0	I	CPU address bus	51	MD1	I/O	
12	A1	I		52	MD0	I/O	
13	CS	I		53	MUTE	O	Analog mute control
14	WR	I	Chip select	54	IC	I	Initial clear
15	RD	I	Write control	55	SYO	O	Synch. pulse input
16	SM	I	Read control	56	SYI	I	Synch. pulse output
17	TEST1	I	Slave/Master select	57	XCLK	O	3.2MHz
18	TEST2	I	Test pin	58	CLC	I	MCLK in/out select
19	MA0	O	External memory address bus	59	MCLK	I/O	6.4MHz
20	MA1	O		60	V _{DD}		Power supply
21	MA2	O		61	XOUT	O	Clock
22	MA3	O		62	XIN	I	
23	V _{SS}		Ground	63	V _{SS}		Ground
24	MA4	O		64	SO12	O	PSD3 format output B
25	MA5	O		65	SO11	O	
26	MA6	O		66	SO10	O	
27	MA7	O		67	SO02	O	PSD3 format output A
28	MA8	O		68	SO01	O	
29	MA9	O		69	SO00	O	
30	MA10	O	External memory address bus	70	CASO12	O	Cascade out B (SFC/RFL format-linear)
31	MA11	O		71	CASO11	O	
32	MA12	O		72	CASO10	O	
33	MA13	O		73	CASO02	O	Cascade out A (SFC/RFL format-linear)
34	MA14	O		74	CASO01	O	
35	MA15	O		75	CASO00	O	
36	MA16	O		76	CASI12	I	Cascade in B (serial sum)
37	MA17	O		77	CASI11	I	
38	MA18	O		78	CASI10	I	
39	MA19	O		79	CASI02	I	Cascade in A (serial sum)
40	MA20	O		80	CASI01	I	

• **TM3489NL** (XE755A00) SFC (Signal Format Converter)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	SI12	I	Serial data input	15	D4	I/O	Data bus
2	SI11	I		16	D5	I/O	
3	SI10	I		17	D6	I/O	
4	SI20	I		18	D7	I/O	
5	SI21	I		19	WR	I	Write control
6	SI22	I		20	CS	I	Chip select
7	V _{SS}		Ground	21	V _{DD}		DC supply
8	V _{SS}			22	V _{DD}		
9	TST1	I	Test input	23	CLK	I	Clock
10	CDO	O	CD data output	24	SYW	I	Synchro pulse
11	D0	I/O	Data bus	25	IC	I	Initial clear
12	D1	I/O		26	TST2	O	Test output
13	D2	I/O		27	SO2	O	Serial data output
14	D3	I/O		28	SO1	O	

• **YM3032** (XG411A00) DAL3 (Digital Analog Converter Logic 3)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	DV _{DD}		Power supply	13	to Buff	O	Analog output to buffer amp.
2	SYW	I	Synch. pulse	14	MP	I	Middle point 1/2 V _{DD} bias
3	DGND		Digital ground	15	RC	O	Bias compensation
4	CLK	I	Clock	16	RB	O	Bias-R
5	NC		Analog signal output	17	AGND		Analog ground
6	NC			18	AV _{DD}		Analog power supply
7	OUT4	O		19	LMTEM	I	Limiter enable
8	OUT3	O		20	IN1	I	Digital data input
9	OUT2	O	Chip test	21	IN2	I	
10	OUT1	O		22	SEL1	I	Data shift
11	NS	I		23	SEL2	I	
12	COM	I		24	IC	I	Initial clear

• LC92018B-476 (XIO45A00) RI54 (Gate Array)

PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	ADRA20	I	Wave memory address bus (A)	51	ADRS15	O	Wave memory address bus
2	ADRA19	I		52	ADRS4	O	
3	ADRA18	I		53	ADRS14	O	
4	ADRA17	I		54	ADRS5	O	
5	ADRA16	I		55	ADRS13	O	
6	ADRA15	I		56	ADRS6	O	
7	ADRA14	I		57	ADRS12	O	
8	ADRA13	I		58	ADRS7	O	
9	ADRA12	I		59	ADRS11	O	
10	ADRA11	I		60	ADRS8	O	
11	ADRA10	I		61	ADRS10	O	
12	ADRA9	I		62	ADRS18	O	
13	ADRA8	I		63	ADRS9	O	
14	ADRA7	I		64	ADRS19	O	
15	ADRA6	I		65	ADRS19	O	
16	ADRA5	I		66	ADRS20	O	
17	ADRA4	I		67	ADRS20	O	
18	ADRA3	I		68	DATB0	I	Wave memory data bus (B)
19	ADRA2	I		69	DATB1	I	
20	ADRA1	I		70	DATB2	I	
21	ADRA0	I		71	DATB3	I	
22	ADRB20	I	Wave memory address bus (B)	72	DATB4	I	
23	ADRB19	I		73	DATB5	I	
24	ADRB18	I		74	DATB6	I	
25	ADRB17	I		75	DATB7	I	
26	ADRB16	I		76	DATA0	O	Wave memory data bus (A)
27	ADRB15	I		77	DATA1	O	
28	ADRB14	I		78	DATA2	O	
29	ADRB13	I		79	DATA3	O	
30	ADRB12	I		80	DATA4	O	
31	ADRB11	I		81	DATA5	O	
32	ADRB10	I		82	DATA6	O	
33	ADRB9	I		83	DATA7	O	
34	ADRB8	I		84	SYW	I	Synch. signal
35	ADRB7	I		85	MCLK	I	Master clock
36	ADRB6	I		86	A2	I	Address bus for address decode
37	ADRB5	I		87	A3	I	
38	ADRB4	I		88	A18	I	
39	ADRB3	I	Ground Power supply	89	VDD	I	Power supply
40	VSS	I		90	VSS	I	Ground
41	VDD	I		91	A19	I	Address bus for address decode
42	ADRB2	I	Wave memory address bus (B)	92	AS	I	Address strobe
43	ADRB1	I		93	SFC	O	SFC enable
44	ADRB0	I		94	GEW5C	O	GEW5-A chip enable
45	ADRS0	O	Wave memory address bus	95	GEW5B	O	GEW5-B chip enable
46	ADRS1	O		96	GEW5A	O	GEW5-C chip enable
47	ADRS17	O		97	DEV	O	
48	ADRS2	O		98	RAM	O	RAM chip enable
49	ADRS16	O		99	PSRAM	O	PSRAM chip enable
50	ADRS3	O		100	ROM	O	ROM chip enable

• **LC92030C-477 (X1074A00) SP33 (Gate Array)**

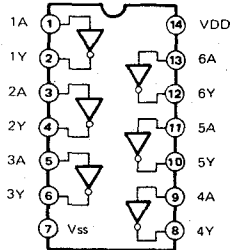
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	VDD		Power supply	65	Vdd		Power supply
2	WAIT	O	Wait control	66	SF12	I	MEL formatted voice data
3	CARD-D0	I/O	Memory card data bus	67	SF13	I	
4	CARD-D1	I/O		68	SF14	I	
5	CARD-D2	I/O		69	SF00	O	MEL formatted voice data edited at this chip.
6	CARD-D3	I/O		70	SF01	O	
7	CARD-D4	I/O		71	SF02	O	
8	CARD-D5	I/O		72	SF03	O	
9	CARD-D6	I/O	Memory card address bus	73	SF04	O	Mixed voice data edited at this chip.
10	CARD-D7	I/O		74	SRI0	I	
11	CARD-A0	O		75	SRI1	I	
12	CARD-A1	O		76	SRI2	I	Mixed voice data
13	CARD-A2	O		77	SRO0	O	
14	CARD-A3	O		78	SRO1	O	
15	CARD-A4	O	Ground	79	SRO2	O	Master clock
16	CARD-A5	O		80	XCLK	I	
17	Vss			81	Vss		
18	CARD-A6	O		82	CRS	I	Counter reset
19	CARD-A7	O		83	CDI	I	Control data input
20	CARD-A8	O		84	CDO	O	Control data output
21	CARD-A9	O		85	CLK	I	Clock for control data
22	CARD-A10	O	Memory card address bus	86	SYWI	I	Synch signal
23	CARD-A11	O		87	SYWO	O	Reversed synch signal
24	CARD-A12	O		88	R/W	I	Read/Write control
25	CARD-A13	O		89	RAM1	O	RAM1 chip enable
26	CARD-A14	O		90	RAM2	O	RAM2 chip enable
27	CARD-A15	O		91	ROM1	O	ROM1 chip enable
28	CARD-WE	O	Memory card write enable	92	ROM2	O	ROM2 chip enable
29	CARD-OE	O	Memory card output enable	93	ROM3	O	ROM3 chip enable
30	CARD-CE	O	Memory card chip enable	94	SYSCLK	I	System clock
31	LED-A1	O	LED drive (A)	95	A19	I	Address bus
32	LED-A2	O		96	A18	I	
33	Vss			97	Vss		Ground
34	LED-A3	O	LED drive (A)	98	RA17	I	
35	LED-A4	O		99	A17	I	
36	LED-A5	O		100	A16	I	Address bus
37	LED-A6	O	LED drive (B)	101	A15	I	
38	LED-B1	O		102	A14	I	
39	LED-B2	O		103	A13	I	
40	LED-B3	O		104	A12	I	
41	LED-B4	O		105	A11	I	
42	LED-B5	O		106	A10	I	
43	AS	I	Address strove	107	A9	I	Power supply
44	LCD-D0	I/O	Data bus for LCD driver	108	A8	I	
45	LCD-D1	I/O		109	A7	I	
46	LCD-D2	I/O		110	A6	I	
47	LCD-D3	I/O		111	A5	I	
48	LCD-D4	I/O	Power supply	112	A4	I	
49	Vdd			113	Vdd		
50	LCD-D5	I/O		114	A3	I	Address bus
51	LCD-D6	I/O		115	A2	I	
52	LCD-D7	I/O	Data bus for LCD driver	116	A1	I	
53	LCD-E	I/O		117	A0	I	
54	GEWA	O		118	D7	I/O	
55	GEWB	O		119	D6	I/O	
56	SFC	O		120	D5	I/O	Data bus
57	FDC	O		121	D4	I/O	
58	LEDC	O	\$0A000- \$0AFF decode out	122	D3	I/O	
59	PAGE3	O	\$30000- \$3FFFF decode out	123	D2	I/O	
60	PAGE7	O	\$70000- \$7FFFF decode out	124	D1	I/O	
61	RES	I	Reset	125	D0	I/O	
62	GSEL	O	Master/slave switching	126	WR	I	Write control
63	SF10	I	MEL formatted voice data	127	RD	I	Read control
64	SF11	I		128	DS	I	Data strobe

• **TMC57800N (XG662A00) MIX5 (Mixer)**

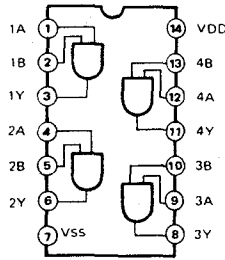
PIN NO.	NAME	I/O	FUNCTION	PIN NO.	NAME	I/O	FUNCTION
1	MX17	I	Signal data input	11	SYW	I	Synch. pulse
2	MX16	I		12	CDO	O	Control data output
3	MX15	I		13	XCLK	I	Clock
4	MX14	I		14	CDI	I	Control data input
5	MX13	I		15	CRS	I	Counter reset
6	MX12	I		16	MX00	O	Signal data output
7	MX11	I		17	MX01	O	
8	MX10	I	Clock	18	MX02	O	
9	CLK	I		19	MX03	O	Power supply
10	Vss		Ground	20	Vdd		

■ IC BLOCK DIAGRAM (ICブロック図)

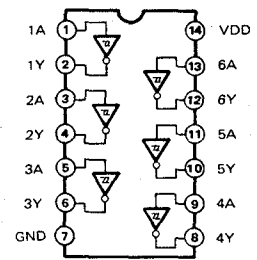
- **TC74AC04P** (XG655A00)
TC40H004P (IG051000)
Hex Inverter



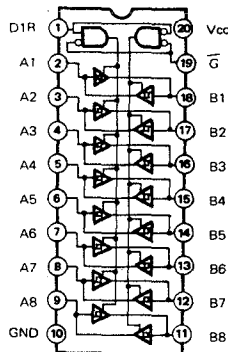
- **TC74AC08P** (IG656A00)
Quad 2 Input AND



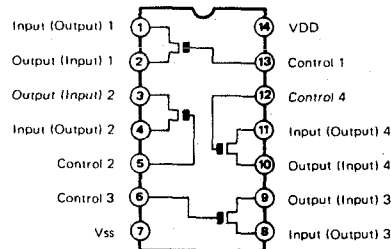
- **SN74HC14N** (IR001450)
Hex Inverter



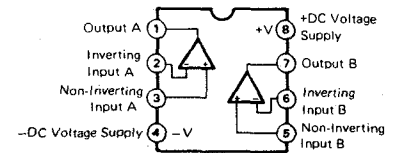
- **TC74HC245P** (IR024500)
TC74AC245P (XH608A00)
Octal 3-State Bus Transceiver



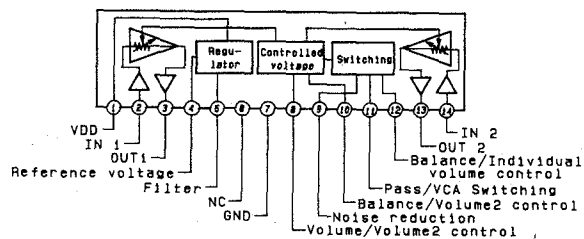
- **TC74HC4066AP** (IR406600)
Quad Bilateral Switch



- **NJM4560ED** (IG040000)
RC4558DV (IG001390)
M5228P (XF123A00)
NJM4556 (IG042500)
Dual Operational Amplifier



- **M51132L** (XE470001)



C

201

DISPLAY OF TEST RESULTS

判定結果の表示

OK

01: BATTERY	OK
-------------	----

NG

01: BATTERY	xxxxx NG
-------------	----------

(where xxxxx = HIGH or LOW)

(xxxxx ; HIGH 又は LOW で示される。)

TEST END

Ends after displaying the test results.

テストの終了方法

判定を表示、出力して終了する。

TEST 2. LCD — ALL DOTS "ON AND OFF" TEST

Check that all dots of the LCD blink.

テスト 2. LCDテスト

全ドットが黒と白にブリンクしていることを、確認する。

TEST END

Press [+ 1] to end the test and you will then be able to proceed to test the next program.

テストの終了方法

[+1]を押すと、テストは終了し次のテストへ進む。

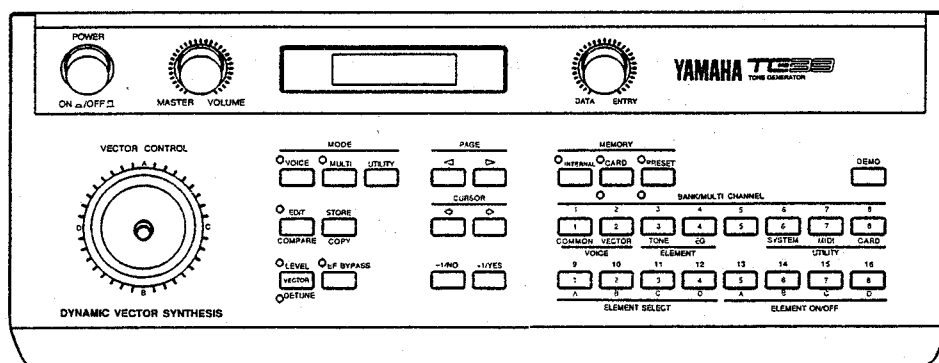
TEST 3. LED ON/OFF TEST

テスト 3. LED順次点灯、全点灯テスト

03: LED

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.

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繰り返し行うので、LEDの点滅を目で見て確認する。



TEST END

Press [+ 1] to end the test and you will then be able to proceed to test the next program.

テストの終了方法

[+1]を押すと、次のテストへ進む。

TEST 4. PANEL SWITCH TEST

テスト 4. パネルスイッチテスト

04: PANEL SWITCH

Press the panel switches consecutively from the [VOICE] switch to switch [16], according to the order indicated by the LCD display.

[VOICE]から[16]までのパネルスイッチを、以下のよう LCD の表示に従って ON/OFF し、パネルスイッチが正常に動作することを、確認する。

04: PANEL SWITCH
VOICE

(e.g. When checking [VOICE])

([Voice]のチェックの場合)

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, 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.

チェックの順序を下図に示す。

正常な場合、“ボー”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。

DISPLAY OF TEST RESULTS

判定結果の表示

OK

04: PANEL SWITCH
XXXXXX

(where xxxxx = next switch name should be pressed.)

NG

04: PANEL SWITCH
VOICE NG

(xxxxx; 次に押されるべきスイッチ名)

TEST END

When switch [16] 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”.

テストの終了方法

[16]までチェックすると、OK が表示され、テストは終了する。

テストの途中で 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。

TEST 5. DATA ENTRY TEST

テスト 5. データエントリーテスト

05: DATA ENTRY

Rotate the data entry knob to the right as indicated by the LCD display.

Check that the value on the LCD changes from 00→20→80→99→80→20→00 (in other words, first rotate to the right then to the left).

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(左から右回転-左回転)と滑らかに動かし、データエントリーが、正常に動作することを確認する。

```

05: DATA ENTRY
xx  yyyy

```

(where xx=current value, yyyy=next target direction, "RIGHT" or "LEFT")

xx ;現在のデータエントリーの値

yyyy ;目標方向 (RIGHT/LEFT)

DISPLAY OF TEST RESULTS

判定結果の表示

OK

```

05: DATA ENTRY
00                      OK

```

NG

(No change in display message)

表示なし

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".

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。

TEST 6. VECTOR CONTROL TEST

テスト6. ベクターコントロールテスト

```

06: VECTOR CONT

```

According to the target direction displayed on the LCD, slowly move the vector control.

Check that the value changes from 00 to 99 then to 00 and to 99 then back to 00 (in other words, center to up then to down and to right then to left and then back to center).

ベクターコントロールを、以下の様なLCD表示に従って、00-20-80-99-80-20-00-20-80-99-80-20-00(UP-DOWN-RIGHT-LEFT)とスティックを動かし、ベクターコントロールが、正常に動作することを確認する。

```

06: VECTOR CONT
xx  yyyy

```

(where xx=current value, yyyy=next target direction, "RIGHT" or "LEFT" or "UP" or "DOWN")

xx ;現在のデータエントリーの値

yyyy ;目標方向 (RIGHT/LEFT/UP/DOWN)

DISPLAY OF TEST RESULTS

判定結果の表示

OK

```

06: VECTOR CONT
                        OK
  
```

NG

(No change in display message)
表示なし

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".

テストの終了方法

判定を表示、出力して終了する。

テストの途中で、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。

TEST 7. INSERT TEST

テスト 7. カードインサートテスト

```

07: CARD INSERT
  
```

Insert a RAM card (MCD64) into the 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.

MCD64 メモリーカードを使用して、カードレディーの状態を読み込めることを確認する。

MCD64 メモリーカードを抜いて再度入れた時、LCDに表示されている数字が0から1に変化し、OKの判定が出ることを確認する。

DISPLAY OF TEST RESULTS

判定結果の表示

OK

```

07: CARD INSERT
1                        OK
  
```

NG

(No change in display message)
表示なし

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".

テストの終了方法

判定を表示、出力して終了する。

テストの途中で、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。

TEST 8. DATA CARD READ/WRITE TEST

テスト 8. カードリードライトテスト

```

08: CARD R/W
  
```

This performs a read/write test on the following addresses of the RAM card.

CARD 1: 20000h-27FFFh (BANK 1)

CARD 2: 28000h-2FFFFh (BANK 2)

MCD64 メモリーカードを使用して、カードの次の2つのアドレスに対してリード/ライトテストを行う。

CARD 1=20000h-27FFFh (Bank 1)

CARD 2=28000h-27FFFh (Bank 2)

メモリープロテクトをオフにしたMCD64 メモリーカードを差し込み、テストを実行させる。

Insert a RAM card with the memory protect turned off and execute the test.

DISPLAY OF TEST RESULTS

判定結果の表示

OK

```

08: CARD R/W
                                OK
  
```

NG

```

08: CARD R/W
      CARD 2  NG
  
```

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

(CARD2がNGの場合)

TEST END

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

テストの終了方法

判定を表示、出力して終了する。

すべてのカード上のデータは、保存される。

TEST 9. DATA CARD PROTECT SWITCH TEST

テスト 9. カードプロテクトスイッチテスト

```

09: CARD PROTECT
  
```

Use a RAM card 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.

MCD64 メモリーカードを使用して、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、LCDに表示されている数字が0から1に変化し、OKの判定が出ることを確認する。

DISPLAY OF TEST RESULTS

判定結果の表示

OK

```

09: CARD PROTECT
      1                                OK
  
```

(No change in display)

NG

表示なし

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".

テストの終了方法

判定を表示、出力して終了する。

テストの途中で、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。

TEST 10. CARD BATTERY TEST

テスト10. カードバッテリーテスト

```

10: CARD BATTERY
  
```

This test checks that the voltage of the card backup battery is adequate.

RAM カード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。

DISPLAY OF TEST RESULTS

判定結果の表示

OK 10: CARD BATTERY
OK

NG 10: CARD BATTERY
LO NG

(When the voltage of card backup is too low.)

NG 10: CARD BATTERY
HI NG

(When the voltage of card backup is too high.)

NG 10: CARD BATTERY
IS NG

(When a RAM card is not inserted to the slot.)

(カードが差してない場合)

TEST END
Ends after displaying the test results.

テストの終了方法
判定を表示、出力して終了する。

TEST 11. WAVE ROM ROM TEST

テスト11. WAVE ROMテスト

11: WAVE ROM SUM

Performs a read test on the ROMs, IC26 and IC27.

WAVE ROM(IC26、IC27)のリードテストを行う。

DISPLAY OF TEST RESULTS

判定結果の表示

OK 11: WAVE ROM SUM
OK

NG 11: WAVE ROM SUM
W-ROM ICxxx NG

(where xxx = IC #)

(ROM n がNG の場合、xxx ; NG となったICの番号)

TEST END
Ends after displaying the results.

テストの終了方法
判定を表示、出力して終了する。

TEST 12. 1 kHz FM SOUND OUTPUT
(OUTPUT 1-L/MONO) TEST

テスト12. 1kHz OUTPUT1-L 発音 (FM)

12: 1KHz L1

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

ITEMS TO CHECK

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1-L/MONO, OUTPUT 2-L, OUTPUT 1-R, OUTPUT 2-R, 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:

12: 1KHz L1
OUTPUT ON

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

OUTPUT 1-L/MONO: 1kHz $\pm$ 1.5Hz, sine wave, distortion 0.2%, 0.0dBm $\pm$ 2dB (10k ohm load)
OUTPUT 2-L: less than -60dBm
OUTPUT 1-R: less than -68dBm
OUTPUT 2-R: less than -60dBm
PHONES (L): 1kHz, sine wave, distortion 0.2% or less, +4.0dBm $\pm$ 2dB (150 ohm load)
PHONES (R): less than -62dBm

TEST END

Press [+1] to end the test. After pressing [+1] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG33 will proceed to the next test.

12: 1KHz L1
OUTPUT OFF

TEST 13. 1 kHz FM SOUND OUTPUT (OUTPUT 1-R) TEST

13: 1KHz R1

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。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-R、PHONES(L,R)共にプラグを差し込み、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表示が以下のようになる。

チェック項目

OUTPUT1-L: 1kHz $\pm$ 1.5Hz、sine波、歪率 0.2%以下、+0.0 $\pm$ 2dBm(負荷10k Ω)

OUTPUT2-L: -60dBm以下

OUTPUT1-R: -68dBm以下

OUTPUT2-R: -60dBm以下

PHONES(L): 1kHz、sine波、歪率 0.2%以下、+4.0 $\pm$ 2dBm(負荷150 Ω)

PHONES(R): -62dBm以下

テストの終了方法

[+1]を押すと、次の画面を表示し、発音を終了して次のテストに移行。

テスト13. 1kHz OUTPUT1-R 発音 (FM)

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

ITEMS TO CHECK

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1-L/MONO, OUTPUT 2-L, OUTPUT 1-R, OUTPUT 2-R, 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:

13: 1KHz R1
OUTPUT ON

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

OUTPUT 1-L/MONO: less than -68dBm
OUTPUT 2-L: less than -60dBm
OUTPUT 1-R: 1kHz $\pm$ 1.5Hz, sine wave, distortion 0.2%, 0.0dBm $\pm$ 2dB (10k ohm load)
OUTPUT 2-R: less than -60dBm
PHONES (L): less than -62dBm
PHONES (R): 1kHz, sine wave, distortion 0.2% or less, +4.0dBm $\pm$ 2dB (150 ohm load)

Check that when the plug connected to OUTPUT 1-R is pulled out, the signal being output from OUTPUT 1-L is now -6.0dBm $\pm$ 2.0dB.

TEST END

Press [+1] to end the test. After pressing [+1] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG33 will proceed to the next test.

13: 1KHz R1
OUTPUT OFF

TEST 14. 1 kHz FM SOUND OUTPUT (OUTPUT 2-L) TEST

14: 1KHz L2

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。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-R、PHONES(L,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表示が以下のようになる。

チェック項目

OUTPUT1-R ; 1kHz、sine波、歪率 0.2%以下、+0.0 $\pm$ 2dBm(負荷10k Ω)

OUTPUT1-L ; -68dBm以下

OUTPUT2-R ; -60dBm以下

OUTPUT2-L ; -60dBm以下

PHONES(R) ; 1kHz、sine波、歪率0.2%以下、+4.0 $\pm$ 2dBm(負荷150 Ω)

PHONES(L) ; -62dBm以下

OUTPUT1-L ; OUTPUT1-R ジャックを抜いた時、-6.0dBm $\pm$ 2.0dBm

テストの終了方法

[+1]を押すと、次の画面を表示し、発音は終了し、次のテストに移行。

14. 1kHz OUTPUT2-L 発音 (FM)

Check that the correct signal is output from OUTPUT 2-L jacks.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1-L/MONO, OUTPUT 2-L, OUTPUT 1-R, and OUTPUT 2-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:

14: 1KHz L2
OUTPUT ON

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

OUTPUT 1-L/MONO: less than -90dBm

OUTPUT 2-L: 1kHz ± 1.5 Hz, sine wave, distortion 0.2%, 0.0dBm ± 2 dB (10k ohm load)

OUTPUT 1-R: less than -90dBm

OUTPUT 2-R: less than -68dBm

TEST END

Press [+1] to end the test. After pressing [+1] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG33 will proceed to the next test.

14: 1KHz L2
OUTPUT OFF

TEST 15. 1 kHz FM SOUND OUTPUT (OUTPUT 2-R) TEST

OUTPUT2-Lより、正常な信号が出力されていることを確認する。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-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表示が以下ようになる。

チェック項目

OUTPUT2-L ; 1kHz、sine波、歪率 0.2%以下、
+0.0 $\pm$ 2dBm(負荷10k Ω)

OUTPUT1-L ; -90dBm以下

OUTPUT1-R ; -90dBm以下

OUTPUT2-R ; -68dBm以下

テストの終了方法

[+1]を押すと、次の画面を表示し、発音は終了し、次のテストに移行。

15: 1KHz R2

15. 1kHz OUTPUT2-R 発音 (FM)

Check that the correct signal is output from OUTPUT 2-R jacks.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plugs into each output jack and check OUTPUT 1-L/MONO, OUTPUT 2-L, OUTPUT 1-R, and OUTPUT 2-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:

15: 1KHz R2
OUTPUT ON

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

OUTPUT 1-L/MONO: less than -90dBm
OUTPUT 2-L: less than -68dBm
OUTPUT 1-R: less than -90dBm
OUTPUT 2-R: 1kHz $\pm$ 1.5Hz, sine wave, distortion 0.2%, 0.0dBm $\pm$ 2dB (10k ohm load)

Check that when the plug connected to OUTPUT 2-R is pulled out, the signal being output from OUTPUT 2-L is now -6.0dBm $\pm$ 2.0dB.

TEST END

Press [+1] to end the test. After pressing [+1] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG33 will proceed to the next test.

15: 1KHz R2
OUTPUT OFF

TEST 16. 1kHz FM SOUND OUTPUT (EFFECT $\rightarrow$ OUTPUT 1-L) TEST

テスト16. Effect

16: EFFECT

OUTPUT2-Rより、正常な信号が出力されていることを確認する。

OUTPUT1-L、OUTPUT2-L、OUTPUT1-R、OUTPUT2-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フイルター付き)、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表示が以下ようになる。

チェック項目

OUTPUT2-R ; 1kHz、sine波、歪率0.2%以下、
+0.0 $\pm$ 2dBm(負荷10k Ω)

OUTPUT1-L ; -90dBm以下

OUTPUT2-L ; -68dBm以下

OUTPUT1-R ; -90dBm以下

OUTPUT2-L ; OUTPUT2-R ジャックを抜いた時、
-6.0 $\pm$ 2dBm

テストの終了方法

[+1]を押すと、次の画面を表示し、発音は終了し、次のテストに移行。

Check that the effected signal is output from OUTPUT 1-L/MONO jacks.

ITEMS TO CHECK

Insert the appropriate 1/4" phone plug into OUTPUT 1-L/MONO 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 12). The volume control must be set at maximum for this test. While sounding, the LCD will display the following message:

```
15: EFFECT
OUTPUT ON
```

The specifications for this test are as follows:

OUTPUT L1: 1kHz, sine wave, distortion 0.2% or less, -12.0dBm $\pm$ 2dB (10k ohm load)

チェック項目

OUTPUT1-L ; 1kHz, sine波、歪率 0.2%以下、
-12.0 $\pm$ 2dBm (負荷10k Ω)

TEST END

Press [+1] to end the test. After pressing [+1] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG33 will proceed to the next test.

テストの終了方法

[+1]を押すと、次の画面を表示し、発音は終了し、次のテストに移行。

```
16: EFFECT
OUTPUT OFF
```

TEST 17. 32 SOUND GENERATION TEST

テスト17. 32音発音

```
17:32 Voice Out
IC      CH
```

Check that the 32 notes correctly sound every 0.5 sec. at the OUTPUT 1-L and OUTPUT 1-R outputs.

ITEMS TO CHECK

Attach an amplifier/speakers system to OUTPUT 1-L/MONO and OUTPUT 1-R outputs and monitor the sine wave signals that are output from the speaker to check by ear whether the signal is correctly output. If necessary, the frequency, output waveform, output level, and THD of this output using the previously specified test equipment (refer to TEST 12). The volume control must be set at comfortable listening level for this test. While sounding, the LCD will display the following message:

OUTPUT1-L、OUTPUT1-R より、32音の発音チャンネルがサイン波形にて正常に発音することを確認する。

1.IC14 1ch-8ch	} OUTPUT Lch AWM-element
2.IC12 1ch-8ch	
3.IC13 1ch-8ch	} OUTPUT Rch FM-element
4.IC11 1ch-8ch	

発音約0.5秒、間隔約0.1秒で繰り返し発音されるので、聴感にて左右のモニタースピーカーより、32音が正常に発音されていることを確認する。必要ならオシロスコープ観測する。

発音中は、LCD表示が以下の様になる。

```
17:32 Voice Out
IC xx CH yy
```

(where xx=IC # of currently sending note, yy=channel #)

xx; 現在発音しているIC番号

yy; 現在発音しているチャンネル番号

TEST END

Press [+1] to end the test. After pressing [+1] three things occur; (1) the following display will appear, (2) the sound will stop and (3) the TG33 will proceed to the next test.

テストの終了方法

[+1]を押すと、次の画面を表示し、発音は終了し、次のテストに移行。

```
17:32 Voice Out
OUTPUT OFF
```

TEST 18. FACTORY SET TEST

テスト18. ファクトリーセット

```
18:FACTORY SET
```

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

Synthesizer system data

Internal voice data

Internal multi data

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

次のデータを、工場出荷データにセットする。

シンセサイザーシステム

インターナルボイス

インターナルマルチ

ファクトリーセットしない場合は、テスト用の音色データが残る。

テストを実行すると、次の画面が表示される。

```
18: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 and the test voice data will remain in the memory

DISPLAY OF TEST RESULTS

If factory settings are restored.

[YES]を押すとファクトリーセットされて

テスト19へ移行、すなわちEXITする。

[NO]を押すとセットされず

テスト19へ移行、すなわちEXITする。

判定の結果

セットされた場合

```
18:FACTORY SET
OK
```

TEST END

The LCD displays the results, the factory preset data will be restored or not, and the system will then proceed to Test 19, "19. EXIT" (refer to Test 19 for details).

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。

----- SYNTHSIZER -----

MASTER TUNE: +0
 TRANSPOSE: +0
 CONTROLLER RESET: HOLD
 VOICE RECEIVE CHANNEL: OMNI
 VECTOR CONTROL CHANNEL: 1
 PROGRAM CHANGE: ON
 EXCLUSIVE: OFF
 DEVICE NUMBER: ALL

----- VOICE -----

I-11—I-88: P1-11—P1-88

----- MULTI -----

I-11—I-18: FACTORY SET DATA
 I-21—I-28: INITIAL MULTI DATA × 8

TEST 19. EXIT TEST

When this is executed, you will exit the test mode and return to the play mode.

テスト19. EXIT

テストが実行されると、テストモードから抜ける。

■ MIDI DATA FORMAT

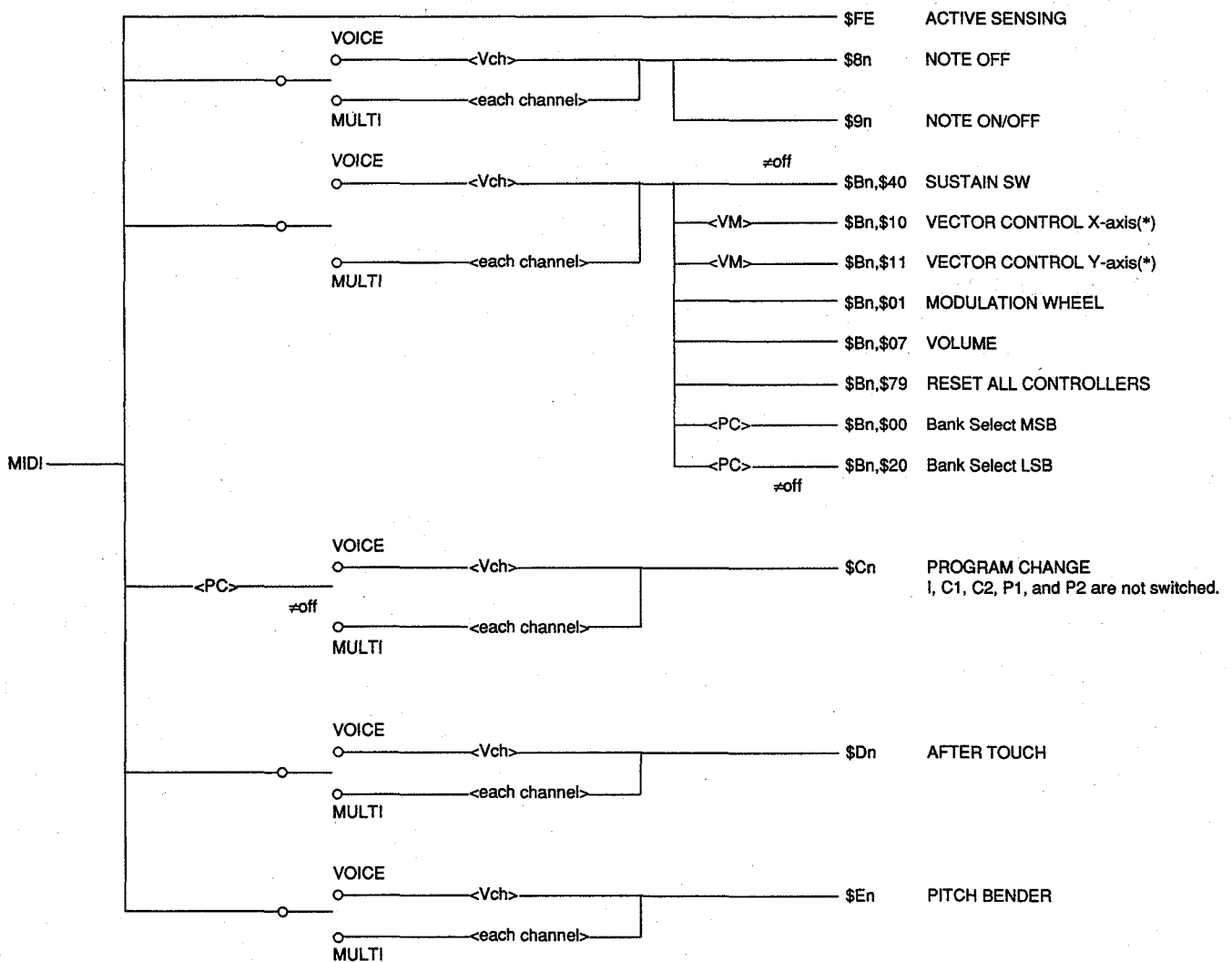
1. MIDI reception/transmission block diagram

<MIDI reception conditions> 1/2

Vch Voice Receive ch.

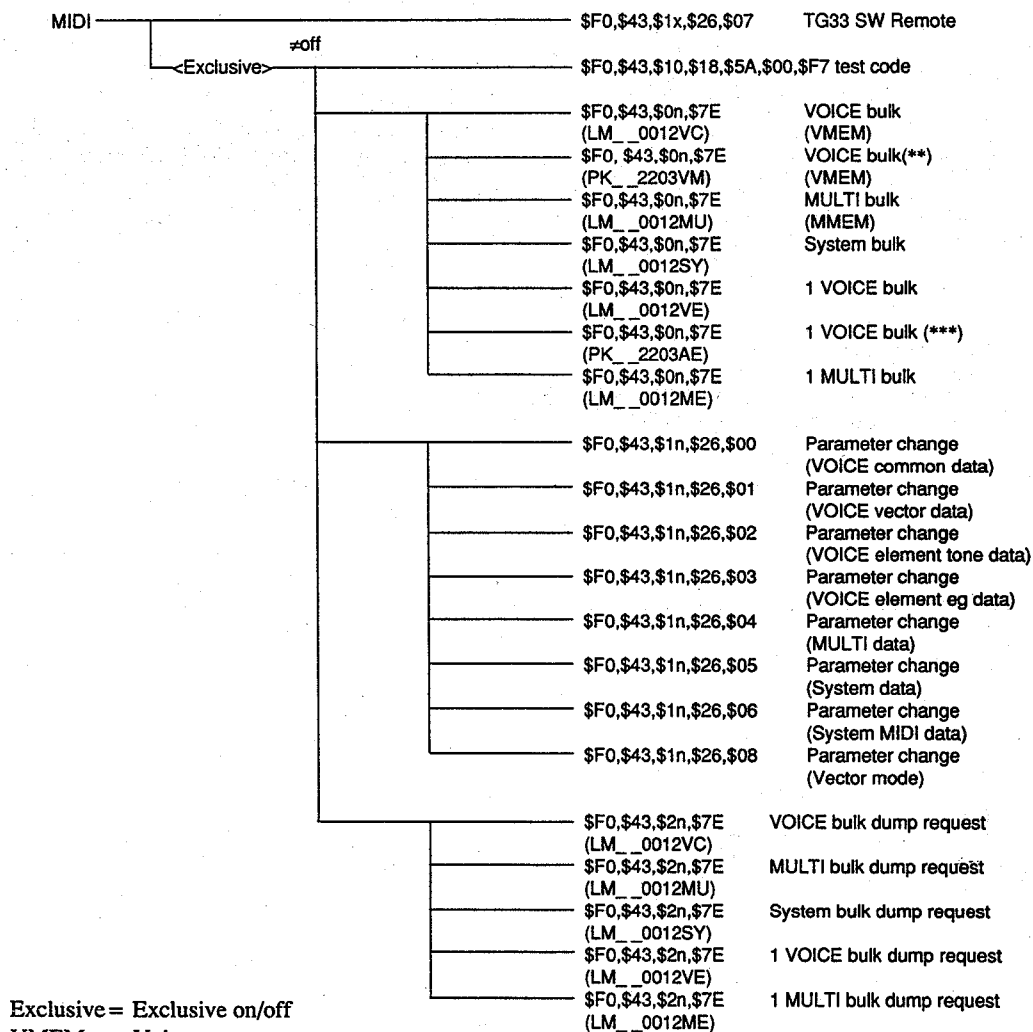
PC Program Change on/off

VM Vector Mode off/level/detune



(*) In the case of MULTI, only the channel which matches the vector channel can be received.

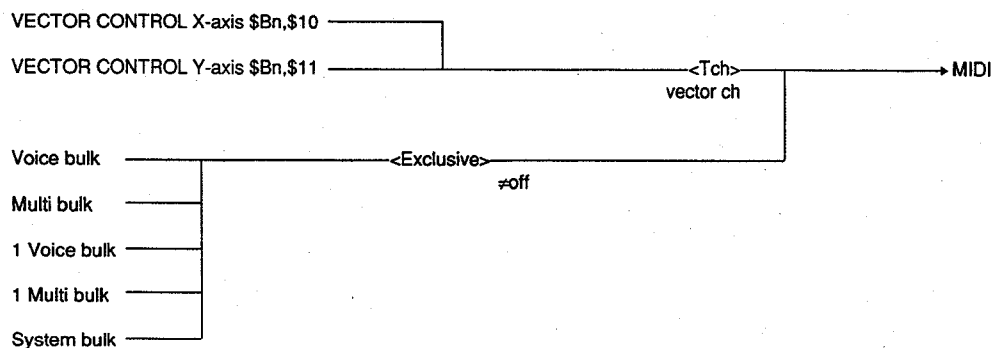
<MIDI reception conditions> 2/2



(**) Only 64 voice data of SY22 is expanded into the TG33 format and is received.

(***) Only 1 voice data of SY22 is expanded into the TG33 format and is received.

<MIDI transmission conditions>



2. Channel messages

2.1 Transmission

2.1.1 Control change

Data is output to the MIDI port when you operate the following controller.

cntrl#	parameter	data rng
16	Vector control X-axis	0~127
17	Vector control Y-axis	0~127

2.2 Reception

2.2.1 Note on/off

Reception note range = C2~G8

Velocity range = 1~127 (Only note on can be received for velocity.)

2.2.2 Control change

The following parameters can be controlled via MIDI.

cntrl#	parameter	data rng	
0	Bank Select MSB	0...127	#
1	Modulation Wheel	0...127	
7	Volume	0...127	
16	Vector Control X-axis	0...127	
17	Vector Control Y-axis	0...127	
32	Bank Select LSB	0...127	#
64	Sustain Switch	0...127	
121	Reset All Controllers	0	

The following Bank Select Data can be used for changing mode and the mode and voice are changed when receiving the succeeding program changes 00~79.

bank select data value	HEX	14bit
* #2	(0x0002)	Voice Mode PRESET1
* #0	(0x0000)	Voice Mode INTERNAL
* #1	(0x0001)	Voice Mode CARD1
* #5	(0x0005)	Voice Mode PRESET2
* #4	(0x0004)	Voice Mode CARD2
* #16	(0x0010)	Multi Mode Multi INTERNAL
* #17	(0x0011)	Multi Mode Multi CARD1
* #20	(0x0014)	Multi Mode Multi CARD2
* #34	(0x0022)	Multi Mode Voice PRESET1
* #32	(0x0020)	Multi Mode Voice INTERNAL or CARD1 (CARD2) (the one selected by MULTI currently)
* #33	(0x0021)	Multi Mode Voice CARD1 (CARD2) or INTERNAL (the one selected by MULTI currently)
* #37	(0x0025)	Multi Mode Voice PRESET2

However, when the receiving device is in Voice mode, #32~#34, #37 will be interpreted as

#32 → #0
 #33 → #1
 #34 → #2
 #37 → #5

and will be received while remaining in Voice mode.

When 0~79 are received as the Program Change Data immediately after the Bank Select Data is received, the Mode, Voice, and Multi are switched according to the above table.

However, when the Bank Select Data is those other than 16, 17, and 20, the succeeding Program Change Data must be equal to 0~63.

In the similar manner, when the Bank Select Data is 16, 17, and 20, the succeeding Program Change Data must be equal to 64~79.

Those marked by an asterisk mark (*) are valid only when data is received through the Voice Receive Channel.

2.2.3 Program change

When a program change is received, this unit operates as follows. The Utility System allows the following two types of reception modes.

- 1) off: No program changes are received.
- 2) on

[Voice Play Mode]

When the Program Change Data 0~63 are received, the Media selection stays as it is, thus switching only the voice numbers 11~88.

The Program Change Data 64~127 are ignored.

Only the Program Change Data received through the voice Receive Channel is valid.

[Multi Play Mode]

When the Program Change Data 0~63 are received, the Media of Voice corresponding to that Channel stays as it is, thus switching to the Voice 11~88.

When the Program Change Data 64~79 is received through the Voice Receive Channel, the Media selection stays as it is, thus switching to the Multi 11~28.

The Program Change Data 80~127 are ignored.

[Multi Edit Mode]

It is the same as in the case of the Multi Play Mode. However, the Program Change Data 64~79 are ignored.

[Cautions]

- In the case of the Voice Edit Mode, even if the Voice program change and multi program change are received, they are ignored.
- In the case of the Multi Edit Mode, when the Voice (mode) program change and multi program change are received, they are ignored.
- When data is received in Utility Mode, Voice Play or Multi Play mode is selected, thus receiving data.
- No data is received during Vector recording, Compare, Card load/save execution, and Bulk transmit execution.

2.2.4 Pitch bend

Reception of pitch bend is operated at the MSB side only.

2.2.5 After touch

2.2.6 Channel mode message

No data is received.

3. System exclusive message

3.1 Parameter change

This unit receives the following 9 types of parameter changes. Also, when 8). Remote Switch is received, the corresponding display will appear just as if the switch had actually be pressed.

- 1) Voice Common Data parameter change
- 2) Voice Vector Data parameter change
- 3) Voice Element Tone Data parameter change
- 4) Voice Element Envelope Data parameter change
- 5) Multi Data parameter change
- 6) System Data parameter change
- 7) System MIDI Data parameter change
- 8) Switch Remote parameter change
- 9) Vector Mode parameter change

Reception of parameter change cannot be turned off by each MIDI switch other than Exclusive = off.

8) The Switch Remote parameter change can be received even if the exclusive is off.

[Cautions]

- No data is received during Vector recording, Compare, Card load/save execution, and Bulk transmit execution.

3.1.1 Voice Common Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000000 00
0aaaaaaa aaaaaa - ST of appended table 1-1
00000000 00
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-1
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-1
0000000d d - (MSB) B1 of appended table 1-1
0ddddd dddddd - (LSB7bits) B2 of appended table 1-1
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7

```

This message is used to change the Voice Common Data for each parameter.

When this message is received, the following automatically results.

- Voice Play Mode : Shifts to Voice Edit Mode and receives data (Screen shift).
- Voice Edit Mode : The Mode stays as it is, receiving data (Screen shift).
- Multi Play Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
- Multi Edit Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
- Utility Mode : Shifts to the Voice Edit mode and receives data (Screen shift).

3.1.2 Voice Vector Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000001 01
0aaaaaaa aaaaaa - ST of appended table 1-2
00000000 00
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-2
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-2
0000000d d - (MSB) B1 of appended table 1-2
0ddddd dddddd - (LSB7bits) B2 of appended table 1-2
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7

```

This message is used to change the Voice Common Data for each parameter.

When this message is received, the following results automatically.

- Voice Play Mode : Shifts to Voice Edit Mode and receives data (Screen shift).
- Voice Edit Mode : The Mode stays as it is, receiving data (Screen shift).
- Multi Play Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
- Multi Edit Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
- Utility Mode : Shifts to the Voice Edit mode and receives data (Screen shift).

3.1.3 Voice Element Tone Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000010 02
0aaaaaaa aaaaaa - ST of appended table 1-3
000000bb bb - Element Number
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-3
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-3
0000000d d - (MSB) B1 of appended table 1-3
0ddddd dddddd - (LSB7bits) B2 of appended table 1-3
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7

```

This message is used to change the Voice Element Tone Data for each parameter.

When this message is received, the following results automatically.

- Voice Play Mode : Shifts to Voice Edit Mode and receives data (Screen shift).
- Voice Edit Mode : The Mode stays as it is, receiving data (Screen shift).
- Multi Play Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
- Multi Edit Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
- Utility Mode : Shifts to the Voice Edit mode and receives data (Screen shift).

[Cautions]

When the element C data is received in the A-B (2 element) mode, only the screen changes to the element A. When the element D data is received, only the screen changes to the element B. If there is no parameter agreeing with the corresponding element, it is ignored.

3.1.4 Voice Element Envelope Data parameter change

```

11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000011 03
0aaaaaaa aaaaaa - ST of appended table 1-4
000000bb bb - Element Number
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-4
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-4
0000000d d - (MSB) B1 of appended table 1-4
0ddddd dddddd - (LSB7bits) B2 of appended table 1-4
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7

```

This message is used to change the Voice Element Envelope Data for each parameter.

When this message is received, the following results automatically.

Voice Play Mode : Shifts to Voice Edit Mode and receives data (Screen shift).
Voice Edit Mode : The Mode stays as it is, receiving data (Screen shift).
Multi Play Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
Multi Edit Mode : Shifts to the Voice Edit Mode and receives data (Screen shift).
Utility Mode : Shifts to the Voice Edit mode and receives data (Screen shift).

[Cautions]

When the element C data is received in the A-B (2 element) mode, only the screen changes to the element A. When the element D data is received, only the screen changes to the element B.

3.1.5 Multi Data parameter change

```
11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000100 04
0aaaaaaa aaaaaa - ST of appended table 1-5
0000bbbb bbbb - Channel Number
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-5
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-5
0000000d d - (MSB) B1 of appended table 1-5
0ddddd dddddd - (LSB7bits) B2 of appended table 1-5
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7
```

This message is used to change the Multi Data for each parameter.

When this message is received, the following results automatically.

Voice Play Mode : Shifts to Multi Edit Mode and receives data (Screen shift).
Voice Edit Mode : Shifts to Multi Edit Mode and receives data (Screen shift).
Multi Play Mode : Shifts to Multi Edit Mode and receives data (Screen shift).
Multi Edit Mode : The Mode stays as it is, receiving data (Screen shift).
Utility Mode : Shifts to the Multi Edit Mode and receives data (Screen shift).

[Cautions]

The Channel Number is ignored if not the parameter for each channel.

3.1.6 System Data parameter change

```
11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000101 05
0aaaaaaa aaaaaa - ST of appended table 1-6
00000000 00
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-6
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-6
0000000d d - (MSB) B1 of appended table 1-6
0ddddd dddddd - (LSB7bits) B2 of appended table 1-6
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7
```

This message is used to change the System Data for each parameter.

When this message is received, the following results automatically.

Voice Play Mode : Shifts to Utility System Mode and receives data (Screen shift).
Voice Edit Mode : Shifts to Utility System Mode and receives data (Screen shift).
Multi Play Mode : Shifts to Utility System Mode and receives data (Screen shift).
Multi Edit Mode : Shifts to Utility System Mode and receives data (Screen shift).
Utility Mode : The Mode stays as it is, receiving data (Screen shift).

3.1.7 System MIDI Data parameter change

```
11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00000100 06
0aaaaaaa aaaaaa - ST of appended table 1-7
00000000 00
0ccccccc ccccc - (MSB7bits) F1 of appended table 1-7
0ccccccc ccccc - (LSB7bits) F2 of appended table 1-7
0000000d d - (MSB) B1 of appended table 1-7
0ddddd dddddd - (LSB7bits) B2 of appended table 1-7
0000000v v - Data Value (MSB)
0vvvvvvv vvvvvv - Data Value (LSB7bits)
11110111 F7
```

This message is used to change the System MIDI Data for each parameter.

When this message is received, the following results automatically.

Voice Play Mode : Shifts to Utility System Mode and receives data (Screen shift).
Voice Edit Mode : Shifts to Utility System Mode and receives data (Screen shift).
Multi Play Mode : Shifts to Utility System Mode and receives data (Screen shift).
Multi Edit Mode : Shifts to Utility System Mode and receives data (Screen shift).
Utility Mode : The Mode stays as it is, receiving data (Screen shift).

3.1.8 Switch Remote parameter change

```
11110000 F0
01000011 43
0001xxxx xxxx - don't care
00100110 26
00000111 07
0sssssss ssssss - CD of appended table 1-8
11110111 F7
```

All panel switches can be remotely controlled. This message has the same effect as pressing the corresponding switch.

3.1.9 Vector Mode parameter change

```
11110000 F0
01000011 43
0001nnnn nnnn - Device Number
00100110 26
00001000 08
000000ss ss=0:OFF, 1:LEVEL, 2:DETUNE
11110111 F7
```

Switches the Vector Mode to OFF (=Auto), LEVEL, or DETUNE. However, no data is received in the case of the VOICE VECTOR EDIT, COMPARE VOICE, COMPARE MULTI, and DEMO.

4. Bulk dump

Reception is enabled in cases other than Vector recording, Comparing, Card load/save execution, and Bulk transmit execution. Transmission is executed when the "Bulk Transmit" of UTILITY MIDI is executed or Dump Request is received.

4.1 Voice data bulk dump

4.1.1 64 voice data

```

11110000 F0
01000011 43
0000nnnn nnnn - Device Number
01111110 7E
0bbbbbbb BYTE count(MSB)
0bbbbbbb BYTE count(LSB)
01001100 4C(ascii"L")
01001101 4D(ascii"M")
00100000 20(ascii" ")
00100000 20(ascii" ")
00110000 30(ascii"0")
00110000 30(ascii"0")
00110001 31(ascii"1")
00110010 32(ascii"2")
01010110 56(ascii"V")
01000011 43(ascii"C")
0ddddd dddddd VOICE DATA
↓ (Appended table 2)
0ddddd dddddd (00-03)
0sssssss ssssss CHECK SUM
-----100 msec WAIT-----
0bbbbbbb BYTE count(MSB)
0bbbbbbb BYTE count(LSB)
0ddddd dddddd VOICE DATA
↓ (Appended table 2)
0ddddd dddddd (04-07)
0sssssss ssssss CHECK SUM
-----100 msec WAIT-----

```

Byte count shows this area.

Check sum is 2's complement 7bits sum of their data bytes.

As shown in the above, voice data is divided (four voices in a set) and transmitted. Always keep 100 msec or more between transmission.

```

↓ ↓
11110111 F7

```

- ◆ Reception data is written into the Internal Voice Memory (VMEM).
- ◆ See Appended table 2 for details on each bulk dump data and dump request format. The MIDI data format is different from that on the actual memory since the data size is equal to 7 bits.

4.1.2 1 voice data

```

11110000 F0
01000011 43
0000nnnn nnnn - Device Number
01111110 7E
0bbbbbbb BYTE count(MSB)
0bbbbbbb BYTE count(LSB)
01001100 4C(ascii"L")
01001101 4D(ascii"M")
00100000 20(ascii" ")
00100000 20(ascii" ")
00110000 30(ascii"0")
00110000 30(ascii"0")
00110001 31(ascii"1")
00110010 32(ascii"2")
01010110 56(ascii"V")
01000101 45(ascii"E")
0ddddd dddddd VOICE DATA
↓ (Appended table 2)
0ddddd dddddd
0sssssss ssssss CHECK SUM
11110111 F7

```

Byte count shows this area.

Check sum is 2's complement 7bits sum of their data bytes.

- ◆ Reception data is written into Voice Edit Buffer (VCED) and is handled as being edited.
- ◆ See Appended table 2 for details on each bulk data and bulk request format. The MIDI data format is different from that on the actual memory since the data size is equal to 7 bits.

4.1.3 SY22 64 voice data

Only 64 voice data out of the SY22 ALL V/M BULK DUMP are expanded into the TG33 format and received. The 16 MULTI Data is ignored. See the SY22 reference for details on data format.

- ◆ The reception data is written into the Internal Voice Memory (VMEM).

4.1.4 SY22 1 voice data

The SY22 1 VOICE BULK DUMP is expanded into the TG33 format and is received. See the SY22 reference for details on data format.

- ◆ The reception data is written into the Voice Edit Buffer (VCED) and is handled as being edited.

4.2 Multi data bulk dump

4.2.1 16 multi data

```

11110000 F0
01000011 43
0000nnnn nnnn - Device Number
01111110 7E
0bbbbbbb BYTE count(MSB)
0bbbbbbb BYTE count(LSB)
01001100 4C(ascii"L")
01001101 4D(ascii"M")
00100000 20(ascii" ")
00100000 20(ascii" ")
00110000 30(ascii"0")
00110000 30(ascii"0")
00110001 31(ascii"1")
00110010 32(ascii"2")
01001101 4D(ascii"M")
01010101 55(ascii"U")
0ddddd dddddd MULTI DATA
↓ (Appended table 3)
0ddddd dddddd (00-15)
0sssssss ssssss CHECK SUM
11110111 F7

```

Byte count shows this area.

Check sum is 2's complement 7bits sum of their data bytes.

- ◆ The reception data is written into the Internal Multi Memory (MMEM).
- ◆ See Appended table 3 for details on each bulk data and bulk request format. The MIDI data format is different from that on the actual memory since the data size is equal to 7 bits.

4.2.2 1 multi data

```

11110000 F0
01000011 43
0000nnnn nnnn - Device Number
01111110 7E
0bbbbbbb BYTE count(MSB)
0bbbbbbb BYTE count(LSB)
01001100 4C(ascii"L")
01001101 4D(ascii"M")
00100000 20(ascii" ")
00100000 20(ascii" ")
00110000 30(ascii"0")
00110000 30(ascii"0")
00110001 31(ascii"1")
00110010 32(ascii"2")
01001101 4D(ascii"M")
01000101 45(ascii"E")
0ddddd dddddd MULTI DATA
↓ (Appended table 3)
0ddddd dddddd
0sssssss ssssss CHECK SUM
11110111 F7

```

Byte count shows this area.

Check sum is 2's complement 7bits sum of their data bytes.

- ◆ The reception data is written into the Multi Edit Buffer (MCED) and is handled as being edited.
- ◆ See Appended table 3 for details on each bulk data and bulk request format. The MIDI data format is different from that on the actual memory since the data size is equal to 7 bits.

4.3 System data bulk dump

```
11110000 F0
01000011 43
0000nnnn nnnn - Device Number
01111110 7E
0bbbbbbb BYTE count(MSB)
0bbbbbbb BYTE count(LSB)
01001100 4C(ascii"L")
01001101 4D(ascii"M")
00100000 20(ascii" ")
00100000 20(ascii" ")
00110000 30(ascii"0")
00110000 30(ascii"0")
00110001 31(ascii"1")
00110010 32(ascii"2")
01010011 53(ascii"S")
01011001 59(ascii"Y")
0ddddddd ddddddd SYSTEM DATA
↓ ↓ (Appended table 4)
0ddddddd ddddddd
0sssssss sssssss CHECK SUM
11110111 F7
```

Byte count shows this area.

Check sum is 2's compliment 7bits sum of their data bytes.

◆ See Appended table 4 for details on each bulk data and bulk request format. The MIDI data format is different from that on the actual memory since the data size is equal to 7 bits.

5. Status FE (Active Sensing)

- a) Transmission
No transmission
- b) Reception
If no signal arrives through MIDI port for approximately 300 msec or more after receiving the FE once, the MIDI reception buffer is cleared and the remaining key-on data is keyed off.

<Table 1-1>

MIDI Parameter Change table (Voice Common)

\$F0, \$43, \$1n, \$26, \$00, \$ST, \$00, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$00	\$01	\$7E	CONFIGURATION	\$00:A-B, \$01:A-B-C-D
1	\$01	\$00	\$01	\$01	\$7F	EFFECT TYPE	0:Rev Hall 1:Rev Room 2:Rev Plate 3:Rev Club 4:Rev Metal 5:Delay 1 6:Delay 2 7:Delay 3 8:Doubler 9:Ping_Pong 10:Pan Ref 11:Early Ref 12:Gate Rev 13:Dly&Rev 1 14:Dly&Rev 2 15:Dist&Rev
2	\$02	\$00	\$02	\$01	\$7F	EFFECT BALANCE	0~127
3	\$02	\$00	\$06	\$01	\$7F	EFFECT SEND LEVEL	0~127
4	\$09	\$00	\$0C	\$01	\$7F	VOICE NAME 1	32~127 (ASCII)
5	\$09	\$00	\$0D	\$01	\$7F	VOICE NAME 2	32~127 (ASCII)
6	\$09	\$00	\$0E	\$01	\$7F	VOICE NAME 3	32~127 (ASCII)
7	\$09	\$00	\$0F	\$01	\$7F	VOICE NAME 4	32~127 (ASCII)
8	\$09	\$00	\$10	\$01	\$7F	VOICE NAME 5	32~127 (ASCII)
9	\$09	\$00	\$11	\$01	\$7F	VOICE NAME 6	32~127 (ASCII)
10	\$09	\$00	\$12	\$01	\$7F	VOICE NAME 7	32~127 (ASCII)
11	\$09	\$00	\$13	\$01	\$7F	VOICE NAME 8	32~127 (ASCII)
12	\$03	\$00	\$14	\$01	\$7F	PITCH BEND RANGE	0~12
13	\$06	\$00	\$15	\$01	\$3F	AFTER TOUCH LEVEL	\$00:off, \$40:on
14	\$05	\$00	\$15	\$01	\$5F	AFTER TOUCH PM	\$00:off, \$20:on
15	\$05	\$00	\$15	\$01	\$6F	AFTER TOUCH AM	\$00:off, \$10:on
16	\$04	\$00	\$15	\$01	\$7D	MODULATION WHEEL PM	\$00:off, \$02:on
17	\$04	\$00	\$15	\$01	\$7E	MODULATION WHEEL AM	\$00:off, \$01:on
18	\$06	\$00	\$16	\$01	\$7F	PITCH BIAS	-12~+12 (2's comp)
19	\$01	\$00	\$17	\$01	\$7F	EG DELAY RATE	0:0~127:99
20	\$07	\$00	\$18	\$01	\$7F	EG ATTACK RATE	\$C1:-99~\$00:0 -99~\$3F:+99
21	\$07	\$00	\$19	\$01	\$7F	EG RELEASE RATE	\$C1:-99~\$00:0 -99~\$3F:+99

[Cautions]

The Element EG Delay Rate screen appears when the EG DELAY RATE is received.

<Table 1-2>

MIDI Parameter Change table (Voice Vector)

\$F0, \$43, \$1n, \$26, \$01, \$ST, \$00, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$00	\$01	\$7F	LEVEL SPEED	0:160msec 1:10msec :
1	\$03	\$00	\$01	\$01	\$7F	DETUNE SPEED	15:150msec 0:160msec 1:10msec : 15:150msec
2	\$02	\$00	\$02	\$01	\$7F	LEVEL TIME 1	0~253, 255:End
3	\$02	\$00	\$03	\$01	\$7F	LEVEL X-AXIS 1	0:-31~-31:+0~62:+31
4	\$02	\$00	\$04	\$01	\$7F	LEVEL Y-AXIS 1	0:-31~-31:+0~62:+31
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
128	\$02	\$01	\$00	\$01	\$7F	LEVEL TIME 43	0~253, 254:Repeat, 255:End
129	\$02	\$01	\$01	\$01	\$7F	LEVEL X-AXIS 43	0:-31~-31:+0~62:+31
130	\$02	\$01	\$02	\$01	\$7F	LEVEL Y-AXIS 43	0:-31~-31:+0~62:+31
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
149	\$02	\$01	\$15	\$01	\$7F	LEVEL TIME 50	0~253, 254:Repeat, 255:End
150	\$02	\$01	\$16	\$01	\$7F	LEVEL X-AXIS 50	0:-31~-31:+0~62:+31
151	\$02	\$01	\$17	\$01	\$7F	LEVEL Y-AXIS 50	0:-31~-31:+0~62:+31
152	\$05	\$01	\$18	\$01	\$7F	DETUNE TIME 1	0~253, 255:End
153	\$05	\$01	\$19	\$01	\$7F	DETUNE X-AXIS 1	0:-31~-31:+0~62:+31
154	\$05	\$01	\$1A	\$01	\$7F	DETUNE Y-AXIS 1	0:-31~-31:+0~62:+31
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
254	\$02	\$01	\$7E	\$01	\$7F	LEVEL TIME 35	0~253, 254:Repeat, 255:End
255	\$02	\$01	\$7F	\$01	\$7F	LEVEL X-AXIS 35	0:-31~-31:+0~62:+31
256	\$02	\$02	\$00	\$01	\$7F	LEVEL Y-AXIS 35	0:-31~-31:+0~62:+31
:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:
299	\$05	\$02	\$2B	\$01	\$7F	DETUNE TIME 50	0~253, 254:Repeat, 255:End
300	\$05	\$02	\$2C	\$01	\$7F	DETUNE X-AXIS 50	0:-31~-31:+0~62:+31
301	\$05	\$02	\$2D	\$01	\$7F	DETUNE Y-AXIS 50	0:-31~-31:+0~62:+31

<Table 1-3>

MIDI Parameter Change table (Voice Element Tone)

\$F0, \$43, \$1n, \$26, \$02, \$ST, \$0b, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

b ; element number 0:Element A, 1:Element B, 2:Element C, 3:Element D

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

(1) Element A or C

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$00	\$01	\$7F	WAVE TYPE	0~127
1	\$01	\$00	\$01	\$01	\$7F	FREQUENCY SHIFT	-12~+12 (2's comp)
2	\$05	\$00	\$02	\$01	\$0F	AFTER TOUCH SENSITIVITY	\$50:-3 \$60:-2 \$70:-1 \$00:+0 \$10:+1 \$20:+2 \$30:+3 \$06:-5 \$07:-4 \$08:-3 \$09:-2 \$0A:-1 \$00:+0 \$01:+1 \$02:+2 \$03:+3 \$04:+4 \$05:+5
3	\$04	\$00	\$02	\$01	\$70	VELOCITY SENSITIVITY	\$00:saw down \$20:triangle \$40:square \$60:sample & hold \$80:saw up
4	\$07	\$00	\$03	\$00	\$1F	LFO TYPE	\$00~\$1F
5	\$09	\$00	\$03	\$01	\$60	LFO SPEED	0:0~127:99
6	\$08	\$00	\$04	\$01	\$7F	LFO DELAY	127:0~0:99
7	\$08	\$00	\$05	\$01	\$7F	LFO RATE	\$00~\$0F
8	\$07	\$00	\$06	\$01	\$70	LFO AM	\$00~\$1F
9	\$07	\$00	\$07	\$01	\$60	LFO PM	\$00:left \$01:left center \$02:center \$03:right center \$04:right
10	\$03	\$00	\$08	\$01	\$78	PAN	127:0~0:99
11	\$02	\$00	\$09	\$01	\$7F	VOLUME	

(2) Element B or D

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$16	\$01	\$7F	WAVE TYPE	0~255
1	\$01	\$00	\$17	\$01	\$7F	FREQUENCY SHIFT	-12~+12 (2's comp)
2	\$05	\$00	\$18	\$01	\$0F	AFTER TOUCH SENSITIVITY	\$50:-3 \$60:-2 \$70:-1 \$00:+0 \$10:+1 \$20:+2 \$30:+3 \$06:-5 \$07:-4 \$08:-3 \$09:-2 \$0A:-1 \$00:+0 \$01:+1 \$02:+2 \$03:+3 \$04:+4 \$05:+5
3	\$04	\$00	\$18	\$01	\$70	VELOCITY SENSITIVITY	\$00:saw down \$20:triangle \$40:square \$60:sample & hold \$80:saw up
4	\$07	\$00	\$19	\$00	\$1F	LFO TYPE	\$00~\$1F
5	\$09	\$00	\$19	\$01	\$60	LFO SPEED	0:0~127:99
6	\$08	\$00	\$1A	\$01	\$7F	LFO DELAY	127:0~0:99
7	\$08	\$00	\$1B	\$01	\$7F	LFO RATE	\$00~\$0F
8	\$07	\$00	\$1C	\$01	\$70	LFO AM	\$00~\$1F
9	\$07	\$00	\$1D	\$01	\$60	LFO PM	\$00:left \$01:left center \$02:center \$03:right center \$04:right
10	\$03	\$00	\$1E	\$01	\$78	PAN	\$00~\$07
11	\$06	\$00	\$1F	\$01	\$78	FEED BACK	127:0~0:99
12	\$06	\$00	\$21	\$01	\$7F	TONE LEVEL	127:0~0:99
13	\$02	\$00	\$2D	\$01	\$7F	VOLUME	127:0~0:99

<Table 1-4>

MIDI Parameter Change table (Voice Element Envelope)

\$F0, \$43, \$1n, \$26, \$03, \$ST, \$0b, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

b ; element number 0:Element A, 1:Element B, 2:Element C, 3:Element D

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

(1) Element A or C

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$08	\$01	\$0F	TYPE	\$00:user \$10:preset \$20:piano \$30:guitar \$40:pluck \$50:brass \$60:strings \$70:organ \$00:1~\$F0:16
1	\$07	\$00	\$0B	\$00	\$0F	LEVEL SCALING	\$00:1~\$07:8
2	\$08	\$00	\$0B	\$01	\$78	RATE SCALING	\$00:off, \$80:on
3	\$01	\$00	\$0C	\$00	\$7F	DELAY ON/OFF	\$00:0~\$3F:99
4	\$03	\$00	\$0C	\$01	\$40	ATTACK RATE	\$00:0~\$3F:99
5	\$04	\$00	\$0D	\$01	\$40	DECAY1 RATE	\$00:0~\$3F:99
6	\$05	\$00	\$0E	\$01	\$40	DECAY2 RATE	\$00:0~\$3F:99
7	\$06	\$00	\$0F	\$01	\$40	RELEASE RATE	\$00:0~\$3F:99
8	\$02	\$00	\$10	\$01	\$00	INITIAL LEVEL	\$7F:0~\$00:99
9	\$03	\$00	\$11	\$01	\$00	ATTACK LEVEL	\$7F:0~\$00:99
10	\$04	\$00	\$12	\$01	\$00	DECAY1 LEVEL	\$7F:0~\$00:99
11	\$05	\$00	\$13	\$01	\$00	DECAY2 LEVEL	\$7F:0~\$00:99

(2) Element B or D

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$1E	\$01	\$0F	TYPE	\$00:user \$10:preset \$20:piano \$30:guitar \$40:pluck \$50:brass \$60:strings \$70:organ \$00:1~\$F0:16
1	\$07	\$00	\$2F	\$00	\$0F	LEVEL SCALING	\$00:1~\$07:8
2	\$08	\$00	\$2F	\$01	\$78	RATE SCALING	\$00:off, \$80:on
3	\$01	\$00	\$30	\$00	\$7F	DELAY ON/OFF	\$00:0~\$3F:99
4	\$03	\$00	\$30	\$01	\$40	ATTACK RATE	\$00:0~\$3F:99
5	\$04	\$00	\$31	\$01	\$40	DECAY1 RATE	\$00:0~\$3F:99
6	\$05	\$00	\$32	\$01	\$40	DECAY2 RATE	\$00:0~\$3F:99
7	\$06	\$00	\$33	\$01	\$40	RELEASE RATE	\$00:0~\$3F:99
8	\$02	\$00	\$34	\$01	\$00	INITIAL LEVEL	\$7F:0~\$00:99
9	\$03	\$00	\$35	\$01	\$00	ATTACK LEVEL	\$7F:0~\$00:99
10	\$04	\$00	\$36	\$01	\$00	DECAY1 LEVEL	\$7F:0~\$00:99
11	\$05	\$00	\$37	\$01	\$00	DECAY2 LEVEL	\$7F:0~\$00:99

<Table 1-5>

MIDI Parameter Change table (Multi)

\$F0, \$43, \$1n, \$26, \$04, \$ST, \$0b, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

b ; channel number

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

	ST	F1	F2	B1	B2	data name	data range
0	\$08	\$00	\$00	\$01	\$7F	EFFECT TYPE	0:Rev Hall 1:Rev Room 2:Rev Plate 3:Rev Club 4:Rev Metal 5:Delay 1 6:Delay 2 7:Delay 3 8:Doubler 9:Ping_Pong 10:Pan Ref 11:Early Ref 12:Gate Rev 13:Dly&Rev 1 14:Dly&Rev 2 15:Dist&Rev
1	\$09	\$00	\$01	\$01	\$7F	EFFECT BALANCE	0~127
2	\$0A	\$00	\$05	\$01	\$7F	GROUP1 EFFECT SEND LEVEL	0~127
3	\$0A	\$00	\$06	\$01	\$7F	GROUP2 EFFECT SEND LEVEL	0~127
4	\$07	\$00	\$07	\$01	\$7D	GROUP2 OUTPUT SELECT	\$00:out1, \$02:out2
5	\$07	\$00	\$07	\$01	\$7E	GROUP1 OUTPUT SELECT	\$00:out1, \$01:out2
6	\$0B	\$00	\$0D	\$01	\$7F	MULTI NAME 1	32~127 (ASCII)
7	\$0B	\$00	\$0E	\$01	\$7F	MULTI NAME 2	32~127 (ASCII)
8	\$0B	\$00	\$0F	\$01	\$7F	MULTI NAME 3	32~127 (ASCII)
9	\$0B	\$00	\$10	\$01	\$7F	MULTI NAME 4	32~127 (ASCII)
10	\$0B	\$00	\$11	\$01	\$7F	MULTI NAME 5	32~127 (ASCII)
11	\$0B	\$00	\$12	\$01	\$7F	MULTI NAME 6	32~127 (ASCII)
12	\$0B	\$00	\$13	\$01	\$7F	MULTI NAME 7	32~127 (ASCII)
13	\$0B	\$00	\$14	\$01	\$7F	MULTI NAME 8	32~127 (ASCII)
14	\$05	\$00	\$15	\$01	\$7F	ASSIGN MODE	0:32/0, 1:24/8, 2:16/16

	ST	F1	F2	B1	B2	data name	data range
0	\$00	\$00	\$00	\$01	\$77	<The same structure in the order of channels 1~16 in the following> VOICE SWITCH	\$00:off voice, \$08:on
1	\$06	\$00	\$00	\$01	\$7B	SEND GROUP	\$00:group1, \$04:group2
2	\$00	\$00	\$01	\$01	\$7F	VOICE MEMORY	0:Internal (Card1, Card2) 1:Preset1 2:Preset2
3	\$00	\$00	\$02	\$01	\$7F	VOICE NUMBER	0~63
4	\$01	\$00	\$03	\$01	\$7F	VOLUME	127:0~0.99
5	\$02	\$00	\$04	\$01	\$7F	DETUNE	-50~+50 (2's comp)
6	\$03	\$00	\$05	\$01	\$7F	NOTE SHIFT	-24~+24 (2's comp)
7	\$04	\$00	\$06	\$01	\$7F	PAN	0:left 1:left center 2:center 3:right center 4:right 5:voice

<Table 1-6>

MIDI Parameter Change table (System)

\$F0, \$43, \$1n, \$26, \$05, \$ST, \$00, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

	ST	F1	F2	B1	B2	data name	data range
0	\$01	\$00	\$04	\$01	\$7F	TRANSPOSE	-12~+12 (2's comp)
1	\$00	\$00	\$05	\$01	\$7F	MASTER TUNE	-50~+50 (2's comp)
2	\$02	\$00	\$01	\$01	\$77	CONTROLLER RESET	\$00:hold, \$08:reset

<Table 1-7>

MIDI Parameter Change table (System MIDI)

\$F0, \$43, \$1n, \$26, \$06, \$ST, \$00, \$F1, \$F2, \$B1, \$B2, \$V1, V2, \$F7

Note) n ; device number

V1 ; MSB of parameter value

V2 ; LSB 7bits of parameter value

	ST	F1	F2	B1	B2	data name	data range
0	\$03	\$00	\$00	\$01	\$7F	DEVICE NUMBER	0~15, 16:all
1	\$03	\$00	\$01	\$01	\$7B	EXCLUSIVE ON/OFF	\$00:off, \$04:on
2	\$02	\$00	\$01	\$01	\$7C	PROGRAM CHANGE	\$00:off, \$01:on
3	\$00	\$00	\$02	\$01	\$7F	VOICE RECEIVE CHANNEL	0~15, 16:omni
4	\$01	\$00	\$03	\$01	\$7F	VECTOR CHANNEL	0~15

<Table 1-8>

MIDI Parameter Change table (Switch Remote)

\$F0, \$43, \$1x, \$26, \$07, \$CD, \$F7

Note) x ; don't care

	CD	switch
0	\$00	VECTOR
1	\$02	←
2	\$03	→
3	\$04	+1
4	\$05	-1
5	\$06	VOICE
6	\$07	MULTI
7	\$08	EDIT/COMPARE
8	\$09	STORE/COPY
9	\$0A	CARD
10	\$0B	INTERNAL
11	\$0C	PRESET
12	\$0D	BANK SELECT 1
13	\$0E	BANK SELECT 2
14	\$0F	BANK SELECT 3
15	\$10	BANK SELECT 4
16	\$11	BANK SELECT 5

	CD	switch
17	\$12	BANK SELECT 6
18	\$13	BANK SELECT 7
19	\$14	BANK SELECT 8
20	\$15	PROGRAM SELECT 1
21	\$16	PROGRAM SELECT 2
22	\$17	PROGRAM SELECT 3
23	\$18	PROGRAM SELECT 4
24	\$19	PROGRAM SELECT 5
25	\$1A	PROGRAM SELECT 6
26	\$1B	PROGRAM SELECT 7
27	\$1C	PROGRAM SELECT 8
28	\$1D	DEMO
29	\$1E	UTILITY
30	\$21	PAGE <
31	\$22	PAGE >
32	\$25	EFFECT BYPASS

<Appended table 2>

The data format of each voice of (64) voice bulk is the same as that of 1 voice bulk. Only those with data at the MSB are 2-byte data.

Mb7-Mb1-'0000000'

ADRS(HEX)	Mb0	Lb7	Lb6	Lb5	Lb4	Lb3	Lb2	Lb1	Lb0
00	0	0	0	0	0	0	0	DRM	2/4
01	0	0	0	0	0	0	0	0	EFFECT
02	0	0	0	0	0	0	0	0	EFFECT BALANCE
03	0	0	0	0	0	0	0	0	((don't care))
04	0	0	0	0	0	0	0	0	((don't care))
05	0	0	0	0	0	0	0	0	((don't care))
06	0	0	0	0	0	0	0	0	EFFECT SEND
07	0	0	0	0	0	0	0	0	((don't care))
08	0	0	0	0	0	0	0	0	((don't care))
09	0	0	0	0	0	0	0	0	((don't care))
0A	0	0	0	0	0	0	0	0	((don't care))
0B	0	0	0	0	0	0	0	0	((don't care))
0C	0	0	0	0	0	0	0	0	NAME 1
0D	0	0	0	0	0	0	0	0	NAME 2
0E	0	0	0	0	0	0	0	0	NAME 3
0F	0	0	0	0	0	0	0	0	NAME 4
10	0	0	0	0	0	0	0	0	NAME 5
11	0	0	0	0	0	0	0	0	NAME 6
12	0	0	0	0	0	0	0	0	NAME 7
13	0	0	0	0	0	0	0	0	NAME 8
14	0	0	0	0	0	0	0	0	PITCH BEND R
15	0	0	0	0	0	0	0	0	AFTER TUCH- PIT -WHEEL
16	17	→	0	0	0	0	0	0	LEV PM AM 0 TYP PM AM
17	18	→	0	0	0	0	0	0	AFTER PITCH
18	19	→	0	0	0	0	0	0	EG DELAY RATE
19	1A	→	0	0	0	0	0	0	COMMON ENV. ATTACK
1B	1C	→	0	0	0	0	0	0	COMMON ENV. RELEASE
***** ELEMENT A *****									
1D	1E	→	0	0	0	0	0	0	WAVE NO.
1F	20	→	0	0	0	0	0	0	FREQUENCY SHIFT
21	22	→	0	0	0	0	0	0	AFTER SNS- VELOCITY TYP
23	24	→	0	0	0	0	0	0	LFO TYP LFO SPEED
25	26	→	0	0	0	0	0	0	LFO DELAY TIME
27	28	→	0	0	0	0	0	0	LFO DELAY RATE
29	2A	→	0	0	0	0	0	0	AM AM DEPTH
2B	2C	→	0	0	0	0	0	0	PM PM DEPTH
2D	2E	→	0	0	0	0	0	0	EG TYPE 0 PAN
2F	30	→	0	0	0	0	0	0	VOLUME
31	32	→	0	0	0	0	0	0	DT2 DT1
33	34	→	0	0	0	0	0	0	L.SCALING RATE SCALING
35	36	→	0	0	0	0	0	0	EG AR
37	38	→	0	0	0	0	0	0	EG D1R
39	3A	→	0	0	0	0	0	0	EG D2R
3B	3C	→	0	0	0	0	0	0	EG RR
3D	3E	→	0	0	0	0	0	0	EG IL
3F	40	→	0	0	0	0	0	0	EG AL
41	42	→	0	0	0	0	0	0	EG D1L
43	44	→	0	0	0	0	0	0	EG D2L
45	46	→	0	0	0	0	0	0	((don't care))
47	48	→	0	0	0	0	0	0	((don't care))
49	4A	→	0	0	0	0	0	0	WAVE NO.
4B	4C	→	0	0	0	0	0	0	FREQUENCY SHIFT
4D	4E	→	0	0	0	0	0	0	AFTER SNS- VELOCITY TYP
4F	50	→	0	0	0	0	0	0	LFO TYP LFO SPEED
51	52	→	0	0	0	0	0	0	LFO DELAY TIME
53	54	→	0	0	0	0	0	0	LFO DELAY RATE
55	56	→	0	0	0	0	0	0	AM AM DEPTH
57	58	→	0	0	0	0	0	0	PM PM DEPTH
59	5A	→	0	0	0	0	0	0	EG TYPE 0 PAN
5B	5C	→	0	0	0	0	0	0	VOLUME
5D	5E	→	0	0	0	0	0	0	DT2 DT1
5F	60	→	0	0	0	0	0	0	L.SCALING RATE SCALING
61	62	→	0	0	0	0	0	0	EG AR
63	64	→	0	0	0	0	0	0	EG D1R
65	66	→	0	0	0	0	0	0	EG D2R
67	68	→	0	0	0	0	0	0	EG RR
69	6A	→	0	0	0	0	0	0	EG IL
6B	6C	→	0	0	0	0	0	0	EG AL
6D	6E	→	0	0	0	0	0	0	EG D1L
6F	70	→	0	0	0	0	0	0	EG D2L
71	72	→	0	0	0	0	0	0	((don't care))
73	74	→	0	0	0	0	0	0	((don't care))
75	76	→	0	0	0	0	0	0	WAVE NO.
77	78	→	0	0	0	0	0	0	FREQUENCY SHIFT
79	7A	→	0	0	0	0	0	0	AFTER SNS- VELOCITY TYP
7B	7C	→	0	0	0	0	0	0	LFO TYP LFO SPEED
7D	7E	→	0	0	0	0	0	0	LFO DELAY TIME
7F	80	→	0	0	0	0	0	0	LFO DELAY RATE
81	82	→	0	0	0	0	0	0	AM AM DEPTH
83	84	→	0	0	0	0	0	0	PM PM DEPTH
85	86	→	0	0	0	0	0	0	EG TYPE 0 PAN
87	88	→	0	0	0	0	0	0	VOLUME
89	8A	→	0	0	0	0	0	0	DT2 DT1
8B	8C	→	0	0	0	0	0	0	L.SCALING RATE SCALING
8D	8E	→	0	0	0	0	0	0	EG AR
8F	90	→	0	0	0	0	0	0	EG D1R
91	92	→	0	0	0	0	0	0	EG D2R
93	94	→	0	0	0	0	0	0	EG RR
95	96	→	0	0	0	0	0	0	EG IL
97	98	→	0	0	0	0	0	0	EG AL
99	9A	→	0	0	0	0	0	0	EG D1L
9B	9C	→	0	0	0	0	0	0	EG D2L
9D	9E	→	0	0	0	0	0	0	((don't care))
9F	9F	→	0	0	0	0	0	0	((don't care))

58	0	-----M EG D2L-----
59	5A	CFX 0 --C WAVE-- --C MULTI--
5B	0	-----VOLUME-----
5C	0	0 -C DT2- --C DT1--
5D	5E	→ 0 C L.SCALING -C RATE SCALING
5F	60	CDY 0 0 -----C EG AR-----
61	62	→ 0 MAX -----C EG D1R-----
63	0	0 -----C EG D2R-----
64	0	0 -----C EG RR-----
65	0	0 -----C EG IL-----
66	0	0 -----C EG AL-----
67	0	0 -----C EG D1L-----
68	0	0 -----C EG D2L-----
69	0	0 -----((don't care))-----
6A	0	0 -----((don't care))-----
***** ELEMENT C *****		
6B	0	-----WAVE NO.-----
6C	:	:
6D	:	:
6E	:	:
6F	:	:
85	0	-----EG D2L-----
86	0	-----((don't care))-----
87	0	-----((don't care))-----
***** ELEMENT D *****		
88	89	0 -----WAVE NO.-----
8A	:	:
8B	:	:
8C	:	:
8D	:	:
8E	0	-----C EG D2L-----
8F	0	-----((don't care))-----
8A	0	-----((don't care))-----
***** VECTOR *****		
89	0	0 0 0 0 --LEVEL SPEED--
8A	0	0 0 0 0 --DETUNE SPEED--
***** LEVEL VECTOR *****		
8B	8C	→ 0 --LEVEL TIME INTERVAL STEP--
8D	0	-----LEVEL X-axis-----
8E	0	-----LEVEL Y-axis-----
8F	:	:
8A	:	:
***** DETUNE VECTOR *****		
8B	8C	→ 0 --DETUNE TIME INTERVAL STEP--
8D	0	-----DETUNE X-axis-----
8E	0	-----DETUNE Y-axis-----
8F	:	:
8A	:	:
24A	0	-----DETUNE Y-axis-----

VOICE bulk dump request

	data
0	\$F0
1	\$43
2	\$2n
3	\$7E
4	L
5	M
6	—
7	—
8	0
9	0
10	1
11	2
12	V
13	C
14	\$F7

1 VOICE bulk dump request

	data
0	\$F0
1	\$43
2	\$2n
3	\$7E
4	L
5	M
6	—
7	—
8	0
9	0
10	1
11	2
12	V
13	E
14	\$F7

n: device number

<Appended table 3>

The data format of each voice of (64) voice bulk is the same as that of 1 voice bulk. Only those with data at the MSB are 2-byte data.

Mb7~Mb1='00000000'

ADRS(HEX)	Mb0	Lb7	Lb6	Lb5	Lb4	Lb3	Lb2	Lb1	Lb0
00	0	0	0	0	---	EFFECT	----		
01	0	---	EFFECT	BALANCE	----				
02	0	---	((don't care))	----					
03	0	---	((don't care))	----					
04	0	---	((don't care))	----					
05	0	---	GROUP1	EFFECT	SEND	----			
06	0	---	GROUP2	EFFECT	SEND	----			
07	0	0	0	0	0	0	1/2	1/2	
08	0	---	((don't care))	----					
09	0	---	((don't care))	----					
0A	0	---	((don't care))	----					
0B	0	---	((don't care))	----					
0C	0	---	((don't care))	----					
0D	0	---	NAME	1	----				
0E	0	---	NAME	2	----				
0F	0	---	NAME	3	----				
10	0	---	NAME	4	----				
11	0	---	NAME	5	----				
12	0	---	NAME	6	----				
13	0	---	NAME	7	----				
14	0	---	NAME	8	----				
15	0	0	0	0	0	0	ASIN	--	
16	0	---	((don't care))	----					
17	0	---	((don't care))	----					
18	0	---	((don't care))	----					
19	0	---	((don't care))	----					
1A	0	---	((don't care))	----					
1B	0	---	((don't care))	----					
1C	0	---	((don't care))	----					
1D	0	---	((don't care))	----					
1E	0	---	((don't care))	----					
1F	0	---	((don't care))	----					
***** CHANNEL 1 *****									
GRP									
20	0	0	0	0	0	VSW	1/2	0	0
21	0	0	0	0	0	0	0	MED	--
22	0	0	---	VOICE	NUMBER	----			
23	0	---	VOLUME	----					
24	25	→	0	---	DETUNE	----			
26	27	→	0	---	NOTE	SHIFT	----		
28	0	0	0	0	0	---	PAN	----	
29	0	---	((don't care))	----					
2A	0	---	((don't care))	----					
***** CHANNEL 2 *****									
2B	0	0	0	0	0	VSW	1/2	0	0
:									
33	0	0	0	0	0	---	PAN	----	
34	0	---	((don't care))	----					
35	0	---	((don't care))	----					
***** CHANNEL 3 *****									
36	0	0	0	0	0	VSW	1/2	0	0
:									
3E	0	0	0	0	0	---	PAN	----	
3F	0	---	((don't care))	----					
40	0	---	((don't care))	----					
***** CHANNEL 4 *****									
41	0	0	0	0	0	VSW	1/2	0	0
:									
49	0	0	0	0	0	---	PAN	----	
4A	0	---	((don't care))	----					
4B	0	---	((don't care))	----					
***** CHANNEL 5 *****									
4C	0	0	0	0	0	VSW	1/2	0	0
:									
54	0	0	0	0	0	---	PAN	----	
55	0	---	((don't care))	----					
56	0	---	((don't care))	----					
***** CHANNEL 6 *****									
57	0	0	0	0	0	VSW	1/2	0	0
:									
5F	0	0	0	0	0	---	PAN	----	

60	0	---	((don't care))	----					
61	0	---	((don't care))	----					
***** CHANNEL 7 *****									
62	0	0	0	0	0	VSW	1/2	0	0
:									
6A	0	0	0	0	0	---	PAN	----	
6B	0	---	((don't care))	----					
6C	0	---	((don't care))	----					
***** CHANNEL 8 *****									
6D	0	0	0	0	0	VSW	1/2	0	0
:									
75	0	0	0	0	0	---	PAN	----	
76	0	---	((don't care))	----					
77	0	---	((don't care))	----					
***** CHANNEL 9 *****									
78	0	0	0	0	0	VSW	1/2	0	0
:									
80	0	0	0	0	0	---	PAN	----	
81	0	---	((don't care))	----					
82	0	---	((don't care))	----					
***** CHANNEL 10 *****									
83	0	0	0	0	0	VSW	1/2	0	0
:									
8B	0	0	0	0	0	---	PAN	----	
8C	0	---	((don't care))	----					
8D	0	---	((don't care))	----					
***** CHANNEL 11 *****									
8E	0	0	0	0	0	VSW	1/2	0	0
:									
96	0	0	0	0	0	---	PAN	----	
97	0	---	((don't care))	----					
98	0	---	((don't care))	----					
***** CHANNEL 12 *****									
99	0	0	0	0	0	VSW	1/2	0	0
:									
A1	0	0	0	0	0	---	PAN	----	
A2	0	---	((don't care))	----					
A3	0	---	((don't care))	----					
***** CHANNEL 13 *****									
A4	0	0	0	0	0	VSW	1/2	0	0
:									
AC	0	0	0	0	0	---	PAN	----	
AD	0	---	((don't care))	----					
AE	0	---	((don't care))	----					
***** CHANNEL 14 *****									
AF	0	0	0	0	0	VSW	1/2	0	0
:									
B7	0	0	0	0	0	---	PAN	----	
B8	0	---	((don't care))	----					
B9	0	---	((don't care))	----					
***** CHANNEL 15 *****									
BA	0	0	0	0	0	VSW	1/2	0	0
:									
C2	0	0	0	0	0	---	PAN	----	
C3	0	---	((don't care))	----					
C4	0	---	((don't care))	----					
***** CHANNEL 16 *****									
C5	0	0	0	0	0	VSW	1/2	0	0
:									
CD	0	0	0	0	0	---	PAN	----	
CE	0	---	((don't care))	----					
CF	0	---	((don't care))	----					

MULTI bulk dump request

	data
0	\$F0
1	\$43
2	\$2n
3	\$7E
4	L
5	M
6	—
7	—
8	0
9	0
10	1
11	2
12	M
13	U
14	\$F7

1 MULTI bulk dump request

	data
0	\$F0
1	\$43
2	\$2n
3	\$7E
4	L
5	M
6	—
7	—
8	0
9	0
10	1
11	2
12	M
13	E
14	\$F7

n: device number

<Table 4>

System bulk dump

Only those with data at the MSB are 2-byte data.

Mb7-Mb1-'0000000'										

ADRS(HEX)		Mb0	Lb7	Lb6	Lb5	Lb4	Lb3	Lb2	Lb1	Lb0

00			0	0	0	---DEVICE NUMBER---				
						C.R EXC P.C				
01	02	1	0	1	1	1	h/r	SW	0	SW
	03		0	0	0	-VOICE RECEIVE CH--				
	04		0	0	0	0	---VECTOR CH---			
05	06	↑	0	-----TRANPOSE-----						
07	08	↑	0	-----MASTER TUNE-----						

bulk dump request

	data
0	\$F0
1	\$43
2	\$2n
3	\$7E
4	L
5	M
6	—
7	—
8	0
9	0
10	1
11	2
12	S
13	Y
14	\$F7

n: device number

YAMAHA [Tone Generator]

Date :13-JUL-1990

Model TG33

MIDI Implementation Chart

Version : 1.00

Function ...		Transmitted	Recognized	Remarks
Basic	Default	: 1 - 16	: 1 - 16	: memorized
Channel	Changed	: 1 - 16	: 1 - 16	:
Mode	Default	: 3	: 1,3	: memorized
	Messages	: x	: x	:
	Altered	: *****	: x	:
Note		: x	: 0 - 127	:
Number	: True voice	: *****	: 19 - 114	:
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	0	: x	: o	: Bank Select MSB
	1	: x	: o	: Modulation Wheel
	7	: x	: o	: Volume
	16	: o	: o	*1: Vector X-axis
	17	: o	: o	*1: Vector Y-axis
Change	32	: x	: o	: Bank Select LSB
	64	: x	: o	: Sustain
Reset All Cntrls		: x	: o	:
Prog		: x	: o 0-79	: with Bank Select
Change	: True #	: *****	:	*2:
System Exclusive		: o	*3: o	*3: Voice Parameters
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	: x	: o	:
sages	: Reset	: x	: x	:
Notes:	*1	; receive if vector switch is on.		
	*2	; voice : 11 - 88 , multi : 11 - 28		
	*3	; transmit/receive if exclusive switch is on.		
Mode 1	: OMNI ON, POLY	Mode 2	: OMNI ON, MONO	o : Yes
Mode 3	: OMNI OFF, POLY	Mode 4	: OMNI OFF, MONO	x : No

■ ERROR MESSAGES (エラーメッセージ)

Change int bat!

The internal memory backup battery voltage has dropped to an unsafe level.

内蔵のバックアップバッテリーの電圧値が、規定値以下になっている。

Card not ready!

You have attempted to perform a data card operation (save, load, format, etc.) while no data card is present in the TG33 card slot.

カードプロテクトスイッチがONのまま、データカードへのセーブあるいはデータカードのフォーマットを実行した。

Card protected!

You have attempted to perform an operation that writes to the data card (save or format) while the card protect switch is ON.

カードプロテクトスイッチがONのまま、データカードへのセーブあるいはデータカードのフォーマットを実行した。

Card not format!

You have attempted to save or load using a card that has not been properly formatted for use with TG33.

TG33用にフォーマットされていないカードを使用して、セーブやロードを実行した。

Change Card Bank

You have attempted to save to, compare or format a 32k card while card bank 2 (C₂) is selected.

32Kのカードを使用中に、“バンク 2”を選んでセーブ、コンペアあるいはフォーマットを実行した。

Change card bat!

The data card battery is low and must be replaced.

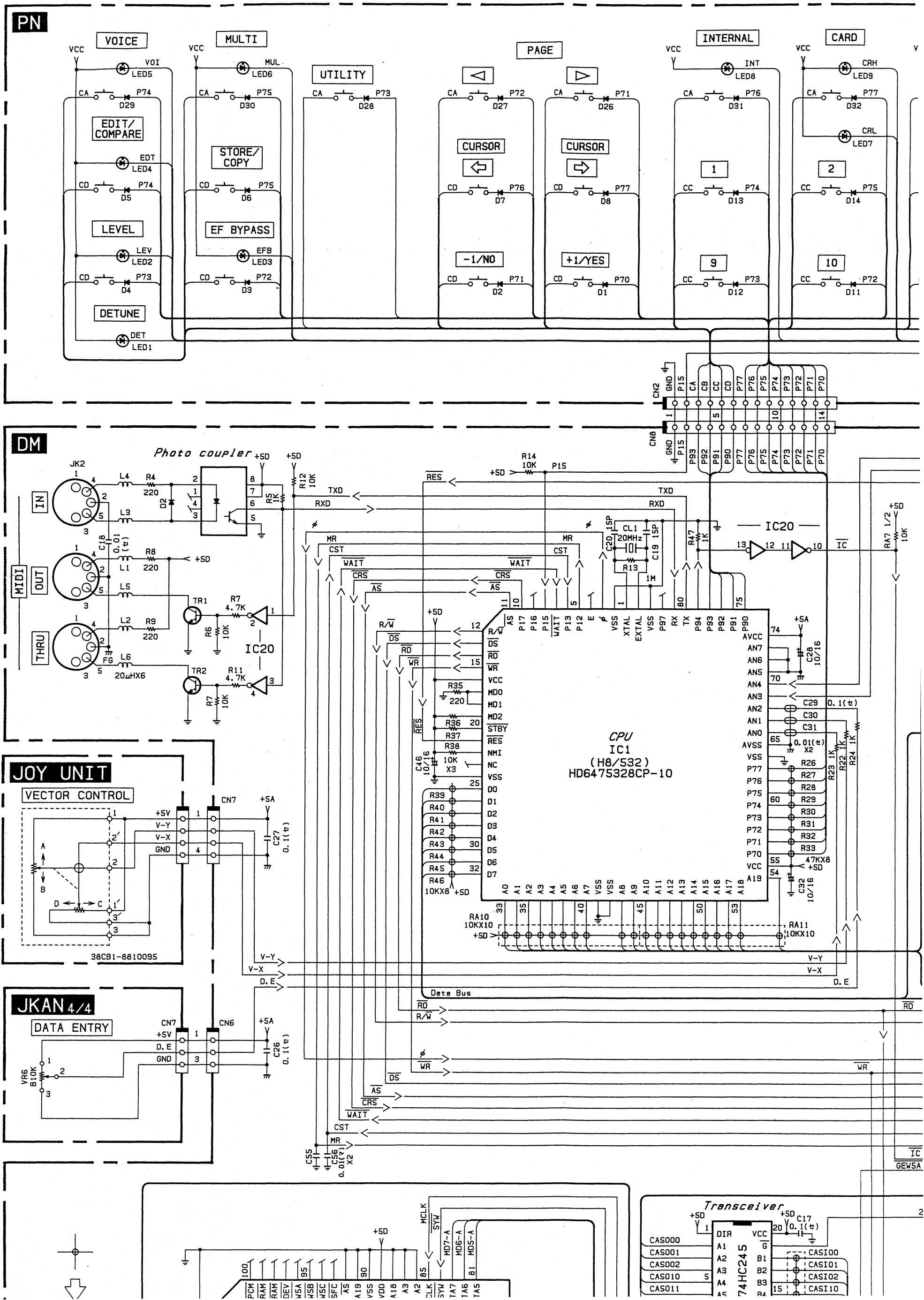
データカードのバックアップバッテリーの電圧値が、規定値以下になっている。

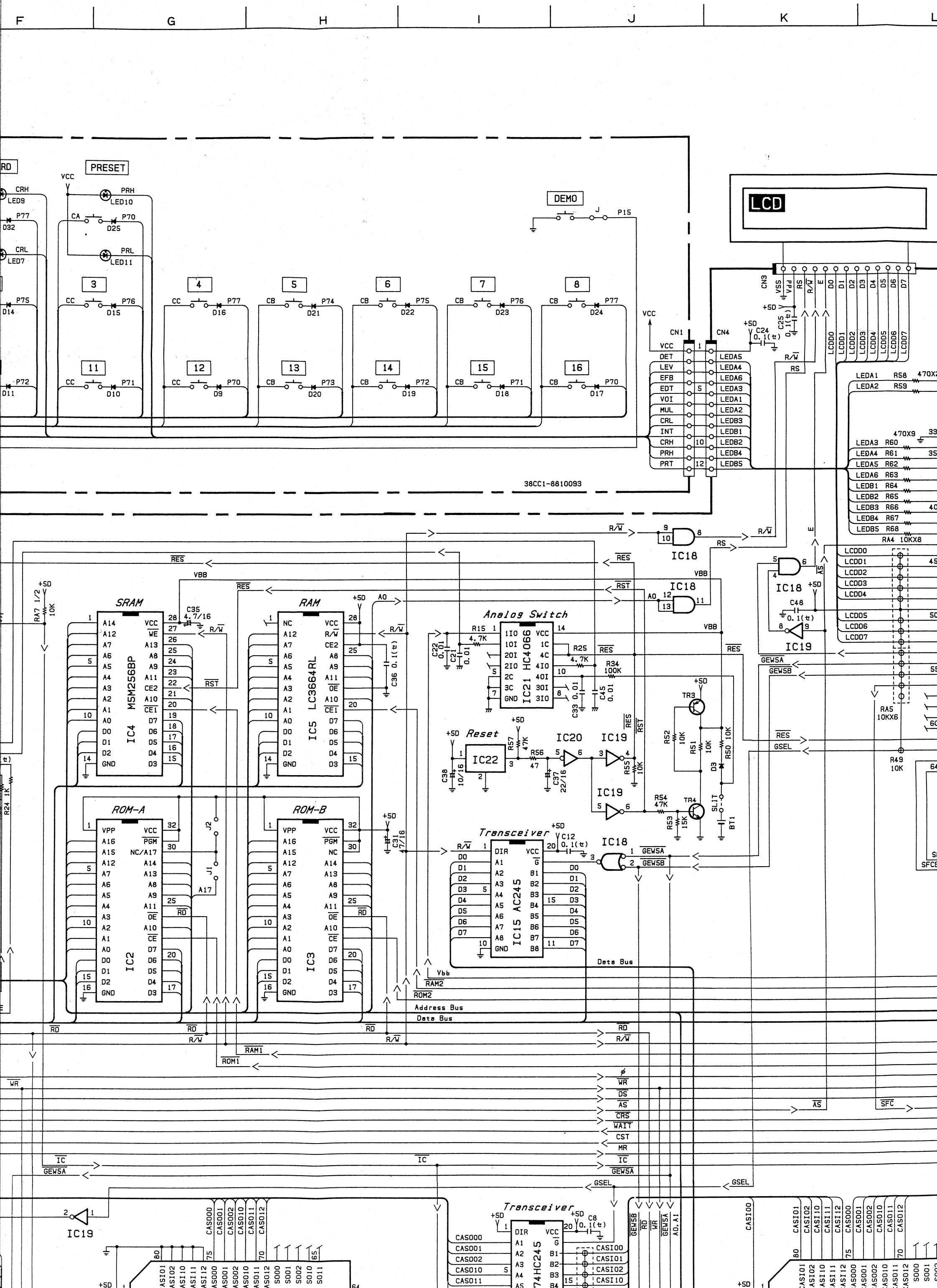
Verify error!

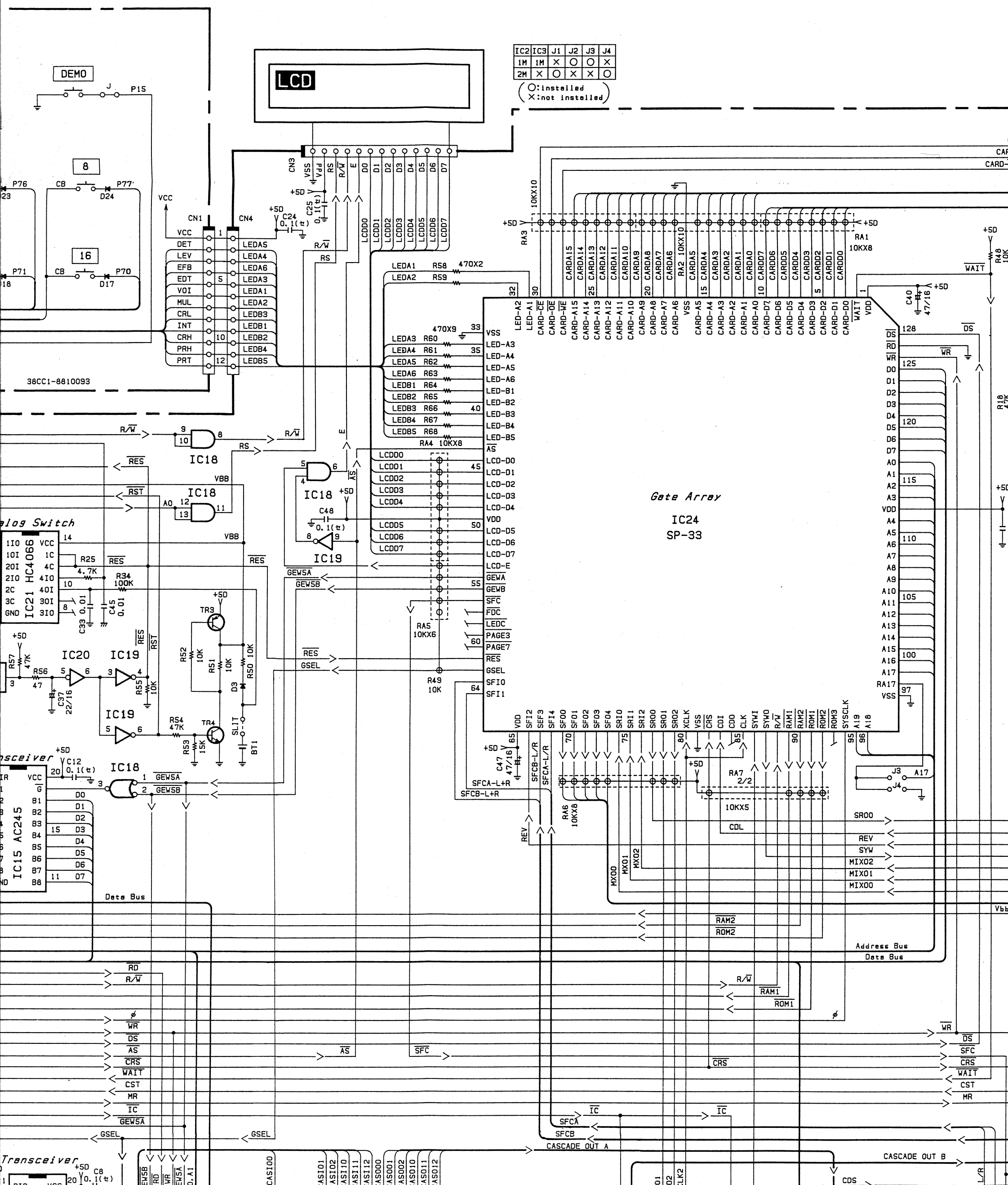
Unrecognizable data has been received by the TG33.

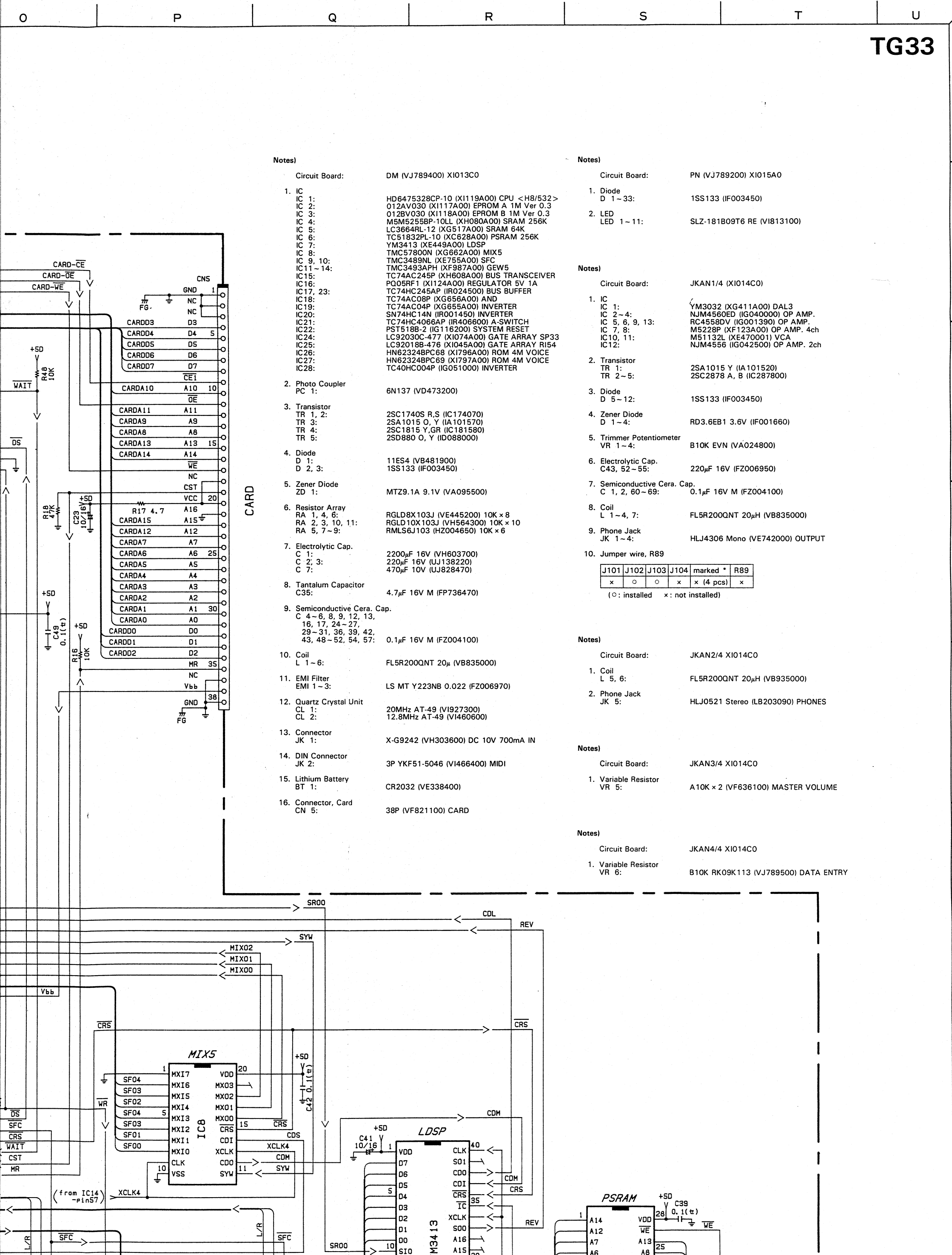
認識できないデータが受信された。

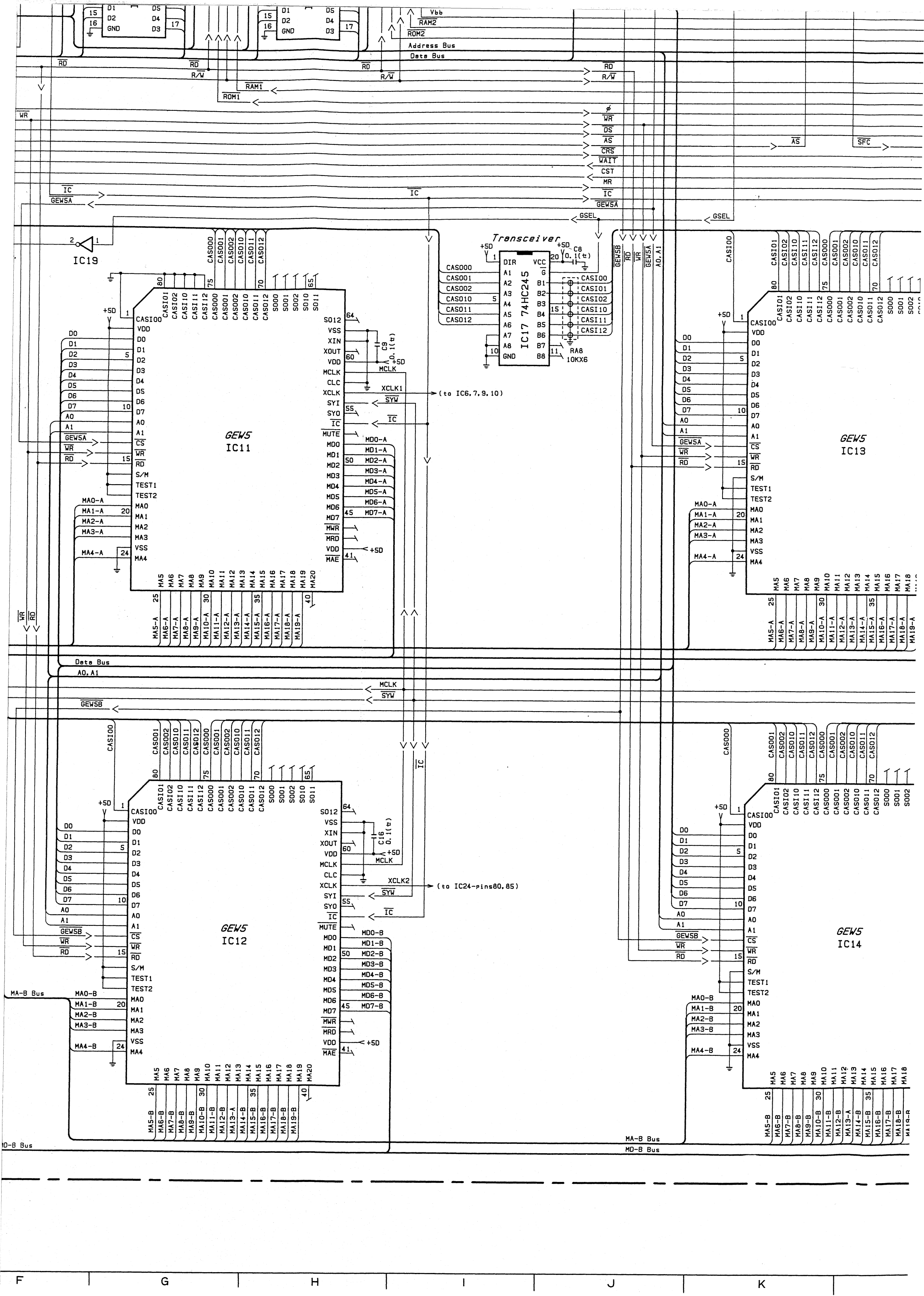
TG33 OVERALL CIRCUIT DIAGRAM

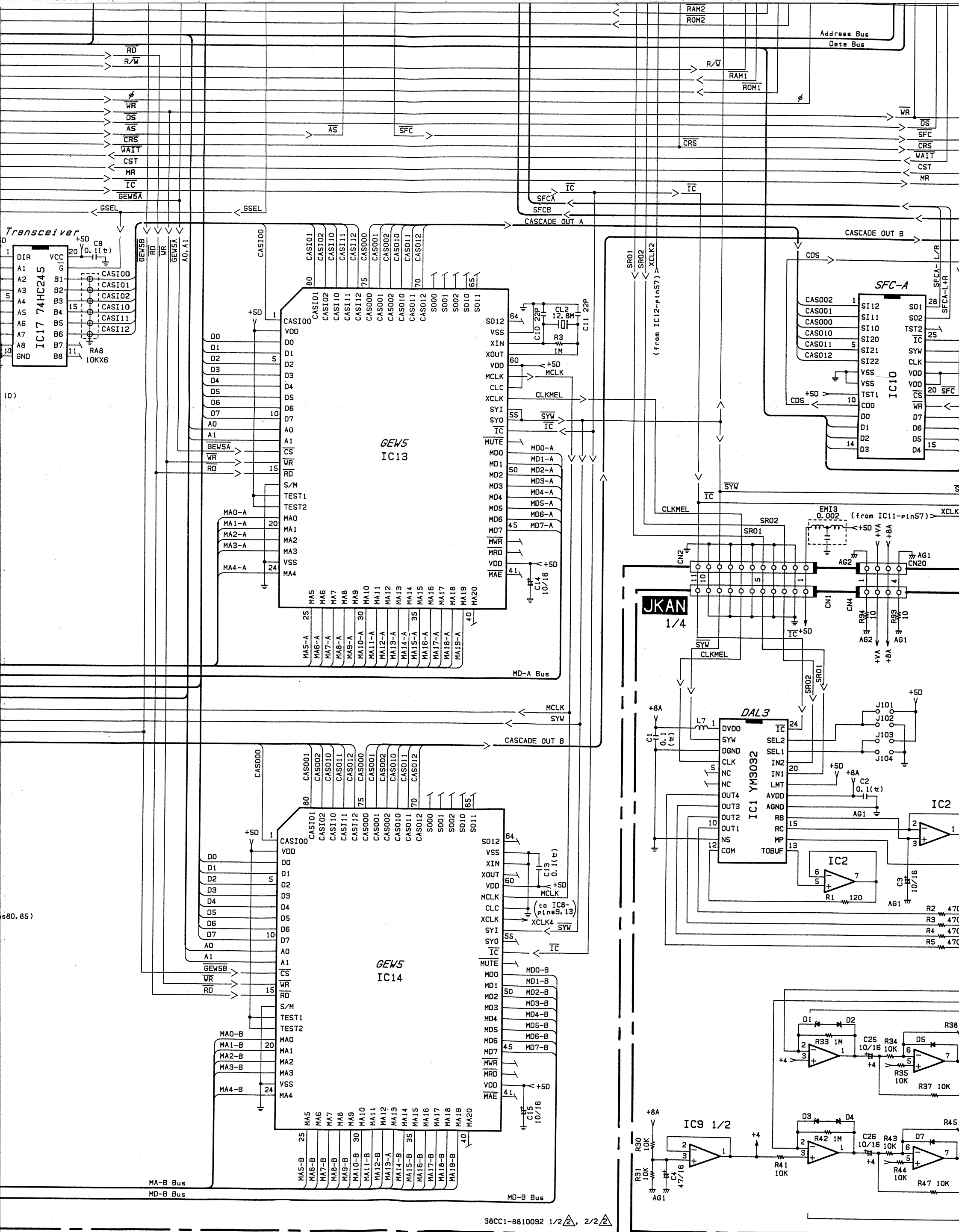


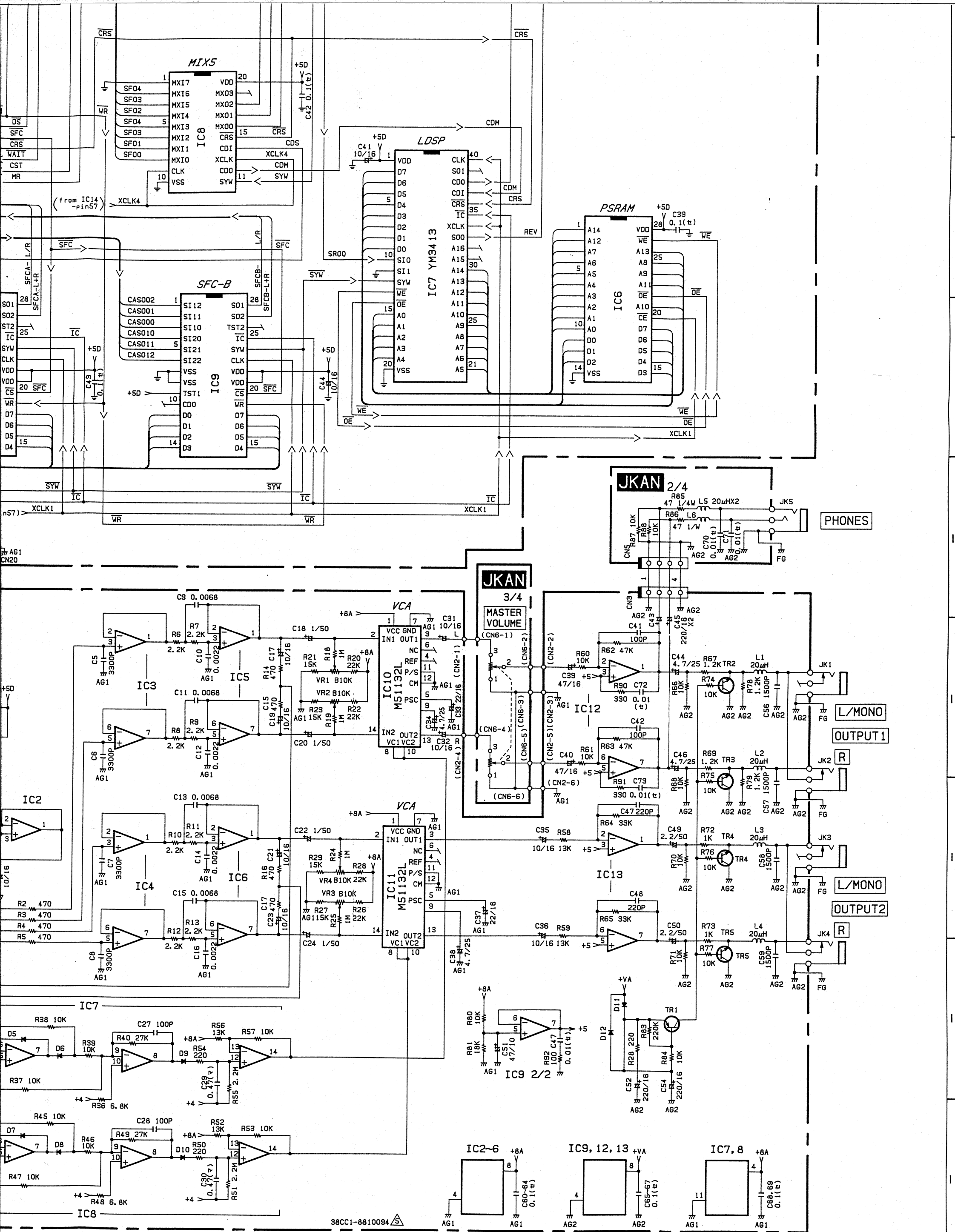












tone GENERATOR



PARTS LIST

Note) 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	

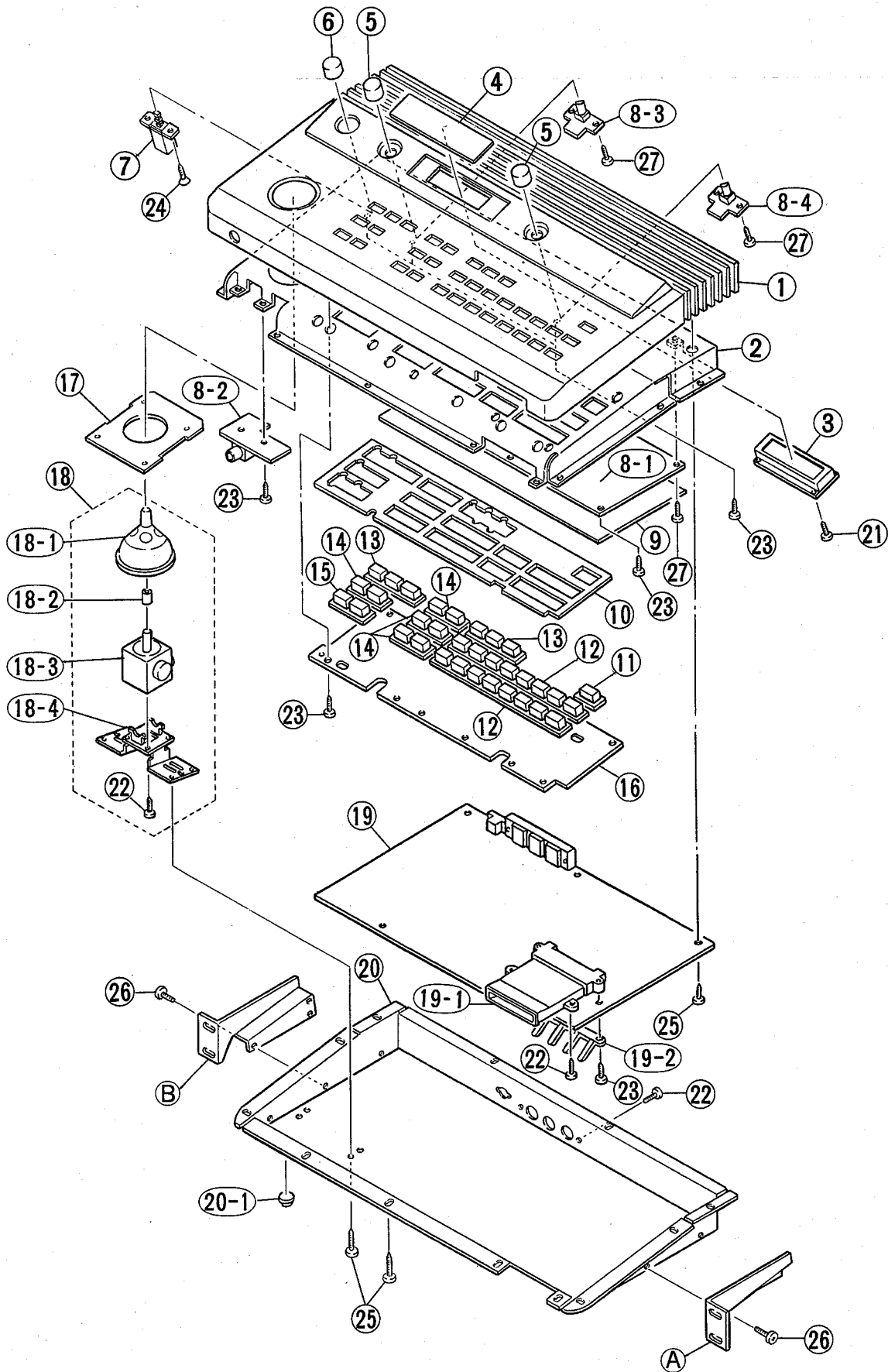
ELECTRICAL PARTS (電気部品)

Ref. No.	Part No.	Description	部 品 名	Remarks	ランク
	VJ789400	Circuit Board	DM シート	(TG33)	57
	VJ789200	Circuit Board	PN シート		11
	VJ789300	Circuit Board	JKAN シート		22
		Circuit Board	JKAN1/4		
		Circuit Board	JKAN2/4		
		Circuit Board	JKAN3/4		
		Circuit Board	JKAN4/4		
	VJ789400	Circuit Board	DM シート		57
	XI124A00	IC	PQ05RF1	REGULATOR 5V 1A	03
	IG116200	IC	PST518B-2	SYSTEM RESET	04
	IR001450	IC	SN74HC14N	INVERTER	05
	IR024500	IC	TC74HC245AP	BUS BUFFER	07
	IR406600	IC	TC74HC4066AP	A-SWITCH	03
	XG655A00	IC	TC74AC04P	INVERTER	02
	XG656A00	IC	TC74AC08P	AND	02
	XN608A00	IC	TC74AC245P	BUS TRANSCEIVER	05
	XG662A00	IC	TMC57800N	MIX V	07
	XI045A00	IC	LC92018B-476	GATE ARRAY RI54	07
	XI074A00	IC	LC92030C-477	GATE ARRAY SP33	08
	XI119B00	IC	HD6475328CP-10	CPU <H8/532>	
	XG517A00	IC	LC3664RL-12	SRAM 64K	08
	XI796A00	IC	HN62324BPC68	ROM 4M	
	XI797A00	IC	HN62324BPC69	ROM 4M	
	XI117B00	IC	012AV101	EPROM A	
	XI118A00	IC	012BV101	EPROM B	
	XE449A00	IC	YM3413	LDSP	10
	XE755A00	IC	TMC3489NL	SFC	09
	XF987A00	IC	TMC3493APH	GEW5	10
	XH080A00	IC	M5M5255BP-10LL	SRAM 256K	13
	XC628A00	IC	TC51832PL-10	PSRAM 256K	09
	IG051000	IC	TC40H004P	INVERTER	03
	VD473200	Photo Coupler	6N137		05
	IA101570	Transistor	2SA1015 0.Y		01
	IC174070	Transistor	2SC1740S R,S		01
	IC181580	Transistor	2SC1815 Y,GR		01
	ID088000	Transistor	2SD880 0.Y		02
	VB481900	Diode	11ES4		01
	IF003450	Diode	1SS133		01
	VA095500	Zener Diode	MTZ9.1A 9.1V		01
	HZ004650	Resistor Array	RMLS6J103	抵抗アレイ	02
	VE445200	Resistor Array	RGLD8X103J	抵抗アレイ	01
	VH564300	Resistor Array	RGLD10X103J	抵抗アレイ	01
	UJ828470	Electrolytic Cap.	470 μ F 10V	ケミコン	01
	UJ138220	Electrolytic Cap.	220 μ F 16V	ケミコン	01
	UJ838470	Electrolytic Cap.	470 μ F 16V	ケミコン	01
	FP736470	Tantalum Capacitor	4.7 μ F 16V M	タンタルコン	01
	FZ004100	Semiconductive Cera. Cap.	0.1 μ F 16V M	半導体セラコン	01
	VB835000	Coil	FL5R200QNT 20 μ	コイル	01
	FZ006970	EMI Filter	LS MT Y223NB	LCフィルタ EMI	02
	VI460600	Quartz Crystal Unit	12.8MHz AT-49	水晶振動子	03
	VI927300	Quartz Crystal Unit	20MHz AT-49	水晶振動子	03
	VH303600	Connector	X-G9242	電源コネクタ	01
	VI466400	DIN Connector	3P YKF51-5046	DINジャック	04
	VE338400	Lithium Battery	CR2032	リチウム電池	03
	VF821100	Connector, Card	38P	ICカード用コネクタ	06
	VK304900	Card Guide	33	カードガイド 33	04
	VF020600	Heat Sink		放熱板	07
	EA030106	Pan Head Screw	3.0X10 ZMC2Y	ナベ小ネジ	01
	EI330086	Bind Head Tapping Screw	3.0X8 FCM3BL	ハインドタッピングネジ	01
	EV100036	Hexagonal Nut	ϕ 3.0 ZMC2Y	六角ナット	01
	VK545200	Earth Leaf		静電リーフ	
	VJ789200	Circuit Board	PN	PN シート	11
	IF003450	Diode	1SS133	ダイオード	01
	VI813100	LED	SLZ-181B09TG RE	LED	01
		Circuit Board	JKAN1/4	JKAN1/4 シート	
	IG001390	IC	RC4558DV	IC	03
	IG040000	IC	NJM4560ED	IC	04
	XE470001	IC	M51132L	IC	05
	XF123A00	IC	M5228P	IC	03
	IG042500	IC	NJM4556	IC	04
	XG411A00	IC	YM3032	IC	10
	IA101520	Transistor	2SA1015 Y	トランジスタ	01
	IC287800	Transistor	2SC2878 A,B	トランジスタ	01
	IF003450	Diode	1SS133	ダイオード	01
	IF001660	Zener Diode	RD3.6EB1 3.6V	ツェナーダイオード	01
	VA024800	Trimmer Potentiometer	B10K EVN	半固定ボリューム	02

* New Parts (新規部品)

ランク : Japan only

OVERALL ASSEMBLY (総組立)



[illegible]