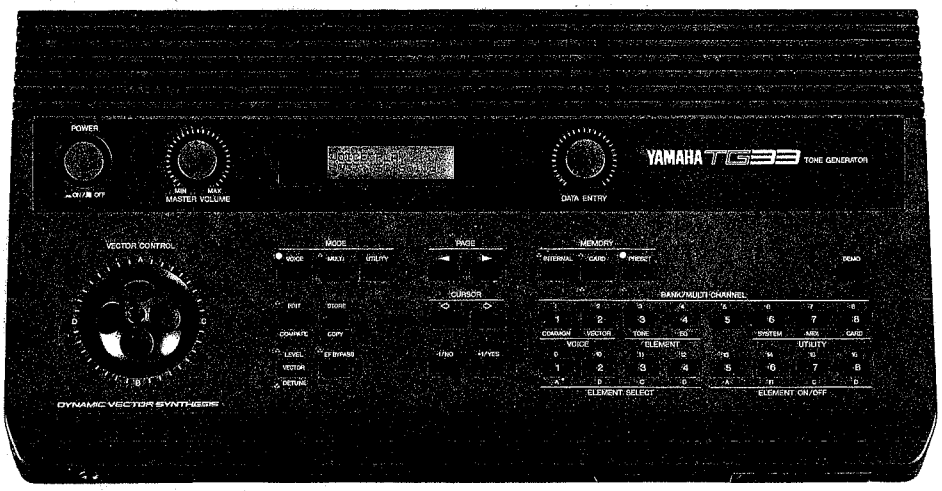
# TONE GENERATOR

# TG33

## SERVICE MANUAL

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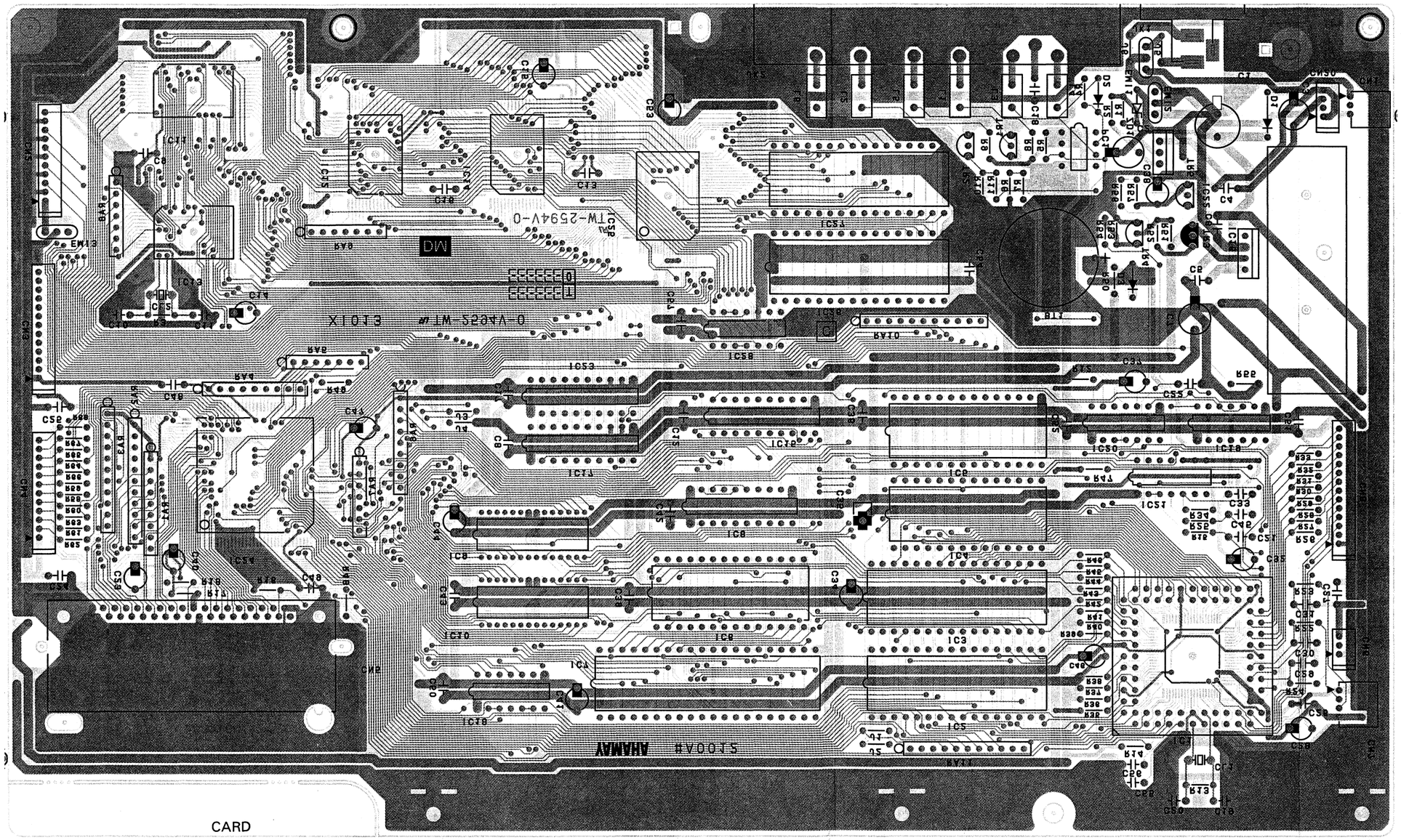
LM 011033

YAMAHA CORP.
HAMAMATSU, JAPAN
2.9K-536 Printed in Japan '90.09

## ■ CIRCUIT BOARDS（シート基板図）

### ● DM Circuit Board




Pattern side（パターン側）


3NA1-VJ78940 ⚠3





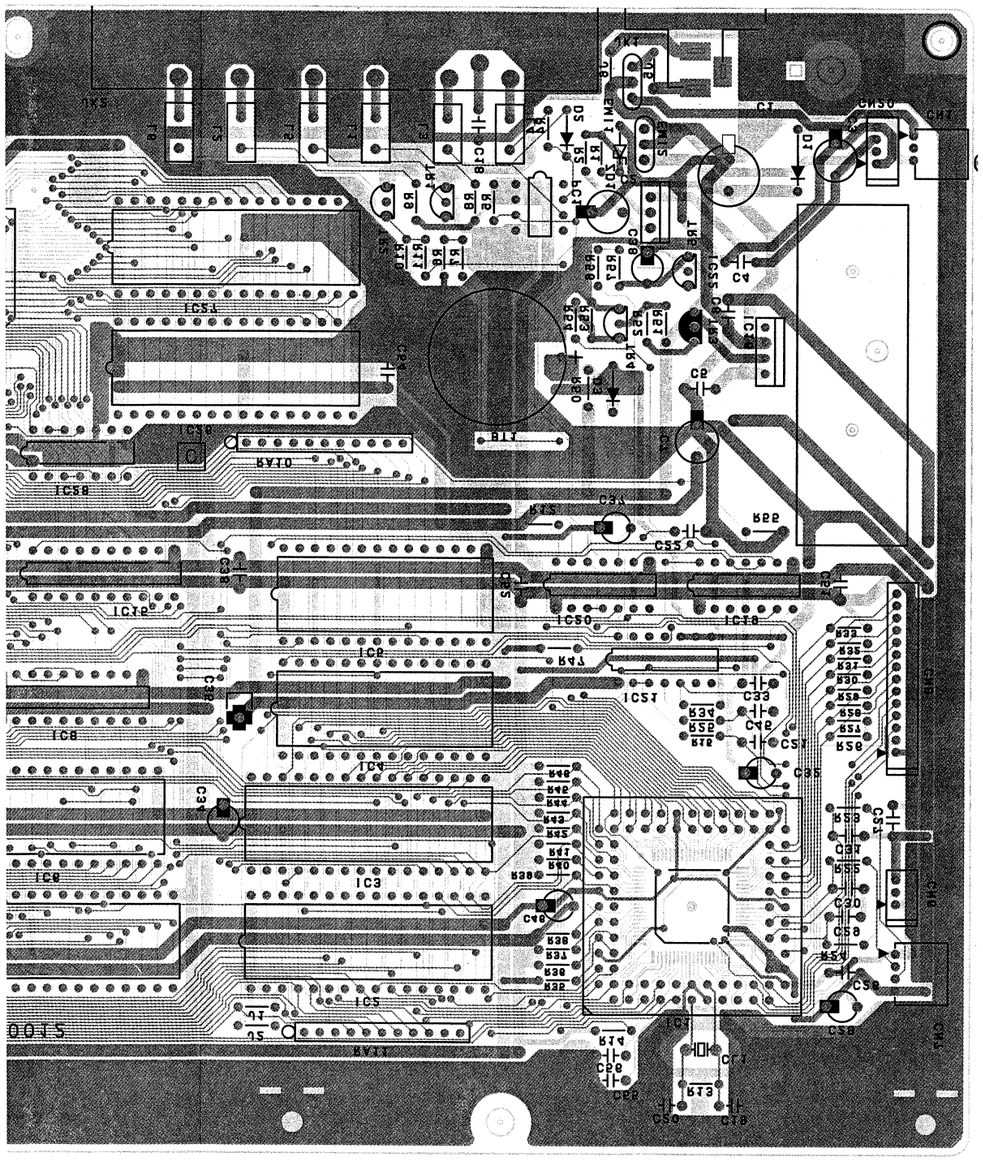
**Notes)**

Circuit Board: DM (V

1. IC
   - IC 1: HD647
   - IC 2: 012AV
   - IC 3: 012BV
   - 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: PST51
   - 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: 1ES4
   - 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: FL5R2
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



**Pattern side** (パターン側)

ピングネジ)





**Notes)**

Circuit Board: DM (VJ789400) XI013C0

1. IC
   - IC 1: HD6475328CP-10 (XI119A00) CPU <H8/532>
   - IC 2: 012AV030 (XI117A00) EPROM A 1M Ver 0.3
   - IC 3: 012BV030 (XI118A00) EPROM B 1M Ver 0.3
   - IC 4: M5M5255BP-10LL (XH080A00) SRAM 256K
   - IC 5: LC3664RL-12 (XG517A00) SRAM 64K
   - IC 6: TC51832PL-10 (XC628A00) PSRAM 256K
   - IC 7: YM3413 (XE449A00) LDSP
   - IC 8: TMC57800N (XG662A00) MIX5
   - IC 9, 10: TMC3489NL (XE755A00) SFC
   - IC11~14: TMC3493APH (XF987A00) GEW5
   - IC15: TC74AC245P (XH608A00) BUS TRANSCEIVER
   - IC16: PQ05RF1 (XI124A00) REGULATOR 5V 1A
   - IC17, 23: TC74HC245AP (IR024500) BUS BUFFER
   - IC18: TC74AC08P (XG656A00) AND
   - IC19: TC74AC04P (XG655A00) INVERTER
   - IC20: SN74HC14N (IR001450) INVERTER
   - IC21: TC74HC4066AP (IR406600) A-SWITCH
   - IC22: PST518B-2 (IG116200) SYSTEM RESET
   - IC24: LC92030C-477 (XI074A00) GATE ARRAY SP33
   - IC25: LC92018B-476 (XI045A00) GATE ARRAY RI54
   - IC26: HN62324BPC68 (XI796A00) ROM 4M VOICE
   - IC27: HN62324BPC69 (XI797A00) ROM 4M VOICE
   - IC28: TC40HC004P (IG051000) INVERTER
2. Photo Coupler
   - PC 1: 6N137 (VD473200)
3. Transistor
   - TR 1, 2: 2SC1740S R,S (IC174070)
   - TR 3: 2SA1015 O, Y (IA101570)
   - TR 4: 2SC1815 Y,GR (IC181580)
   - TR 5: 2SD880 O, Y (ID088000)
4. Diode
   - D 1: 11ES4 (VB481900)
   - D 2, 3: 1SS133 (IF003450)
5. Zener Diode
   - ZD 1: MTZ9.1A 9.1V (VA095500)
6. Resistor Array
   - RA 1, 4, 6: RGLD8X103J (VE445200) 10K × 8
   - RA 2, 3, 10, 11: RGLD10X103J (VH564300) 10K × 10
   - RA 5, 7~9: RMLS6J103 (HZ004650) 10K × 6
7. Electrolytic Cap.
   - C 1: 2200μF 16V (VH603700)
   - C 2, 3: 220μF 16V (UJ138220)
   - C 7: 470μF 10V (UJ828470)
8. Tantalum Capacitor
   - C35: 4.7μF 16V M (FP736470)
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 16V M (FZ004100)
10. Coil
    - L 1~6: FL5R200QNT 20μ (VB835000)
11. EMI Filter
    - EMI 1~3: LS MT Y223NB 0.022 (FZ006970)
12. Quartz Crystal Unit
    - CL 1: 20MHz AT-49 (VI927300)
    - CL 2: 12.8MHz AT-49 (VI460600)
13. Connector
    - JK 1: X-G9242 (VH303600) DC 10V 700mA IN
14. DIN Connector
    - JK 2: 3P YKF51-5046 (VI466400) MIDI
15. Lithium Battery
    - BT 1: CR2032 (VE338400)
16. Connector, Card
    - CN 5: 38P (VF821100) CARD





**DM CN1**

| Pin No. | Pin Name | Wire Color | Destination |
|---|---|---|---|
| 1 | PSW | RE | Power Switch |
| 2 | NC | – | – |
| 3 | PSW | WH | Power Switch |

**DM 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 | $\overline{IC}$ | BL | JKAN-CN1-11 |

**DM CN3**

| Pin No. | Pin Name | Wire Color | Destination |
|---|---|---|---|
| 1 | $V_{SS}$ | RE | LCD-CN1-1 |
| 2 | $V_{DD}$ | WH | LCD-CN1-2 |
| 3 | RS | WH | LCD-CN1-3 |
| 4 | R/$\overline{W}$ | WH | LCD-CN1-4 |
| 5 | E | WH | LCD-CN1-5 |
| 6 | $D_0$ | WH | LCD-CN1-6 |
| 7 | $D_1$ | WH | LCD-CN1-7 |
| 8 | $D_2$ | WH | LCD-CN1-8 |
| 9 | $D_3$ | WH | LCD-CN1-9 |
| 10 | $D_4$ | WH | LCD-CN1-10 |
| 11 | $D_5$ | WH | LCD-CN1-11 |
| 12 | $D_6$ | WH | LCD-CN1-12 |
| 13 | $D_7$ | WH | LCD-CN1-13 |

**DM 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 |

**DM CN20**

| Pin No. | Pin Name | Wire Color | Destination |
|---|---|---|---|
| 1 | AG2 | RE | JKAN-CN4-1 |
| 2 | $+V_A$ | WH | JKAN-CN4-2 |
| 3 | $+8_A$ | WH | JKAN-CN4-3 |
| 4 | AG1 | WH | JKAN-CN4-4 |

| IC2, IC3 | J1 | J2 | J3 | J4 |
|---|---|---|---|---|
| EP ROM | × | ○ | ○ | × |
| MASK ROM (2M) | ○ | × | × | ○ |

**DM 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 | $\overline{CE_1}$ | | CARD-9 |
| 10 | A10 | | CARD-10 |
| 11 | $\overline{OE}$ | | CARD-11 |
| 12 | A11 | | CARD-12 |
| 13 | A9 | | CARD-13 |
| 14 | A8 | | CARD-14 |
| 15 | A13 | | CARD-15 |
| 16 | A14 | | CARD-16 |
| 17 | $\overline{WE}$ | | 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 |

**DM 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 |

**DM CN7**

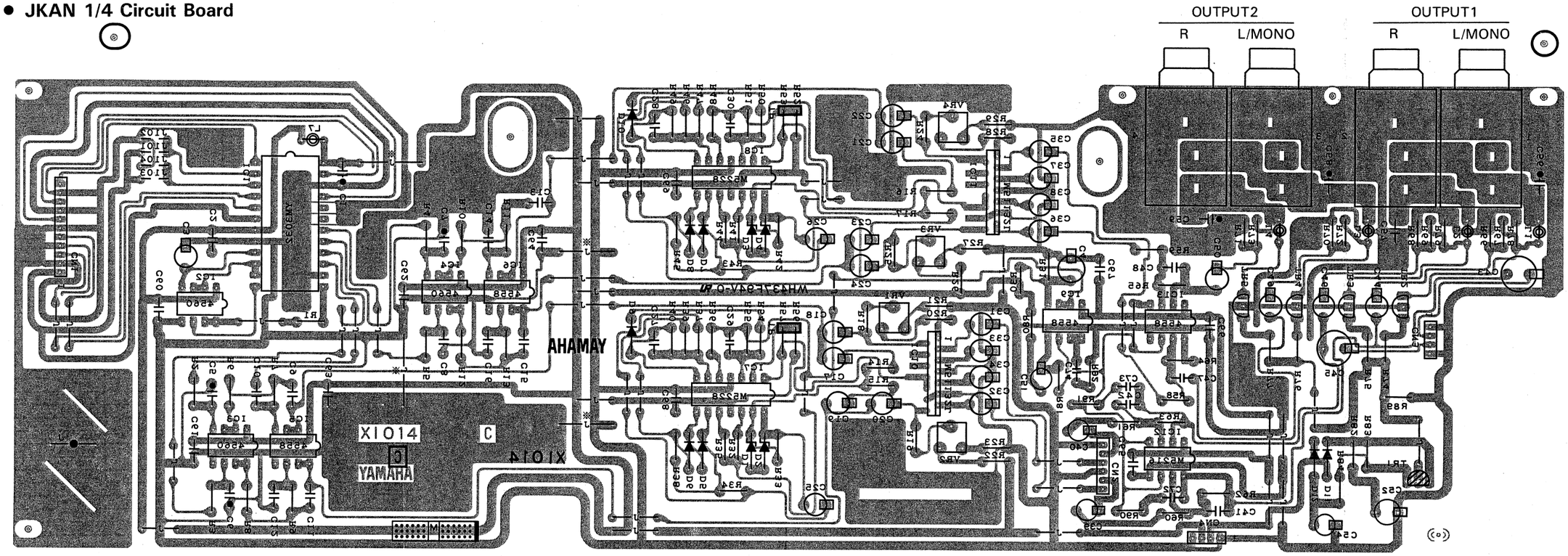
| Pin No. | Pin Name | Wire Color | Destination |
|---|---|---|---|
| 1 | +5V | RE | VECTOR control Ass'y |
| 2 | V-Y | YE | VECTOR control Ass'y |
| 3 | V-X | OR | VECTOR control Ass'y |
| 4 | GND | BL | VECTOR control Ass'y |

**DM 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 |

TG33
TG33

## ● JKAN 1/4 Circuit Board




Pattern side (パターン側)

**Notes)**

Circuit Board: JKAN1/4 (XI014C0)

1. 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
2. Transistor
   - TR 1: 2SA1015 Y (IA101520)
   - TR 2~5: 2SC2878 A, B (IC287800)
3. Diode
   - D 5~12: 1SS133 (IF003450)
4. Zener Diode
   - D 1~4: RD3.6EB1 3.6V (IF001660)
5. Trimmer Potentiometer
   - VR 1~4: B10K EVN (VA024800)
6. Electrolytic Cap.
   - C43, 52~55: 220μF 16V (FZ006950)
7. Semiconductive Cera. Cap.
   - C 1, 2, 60~69: 0.1μF 16V M (FZ004100)
8. Coil
   - L 1~4, 7: FL5R200QNT 20μH (VB835000)
9. Phone Jack
   - JK 1~4: HLJ4306 Mono (VE742000) OUTPUT
10. Jumper wire, R89

| J101 | J102 | J103 | J104 | marked * | R89 |
|---|---|---|---|---|---|
| × | ○ | ○ | × | × (4 pcs) | × |

(○: installed ×: 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 | $\overline{IC}$ | 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 |

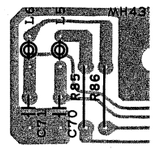
**JKAN 1/4 CN3**

| 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



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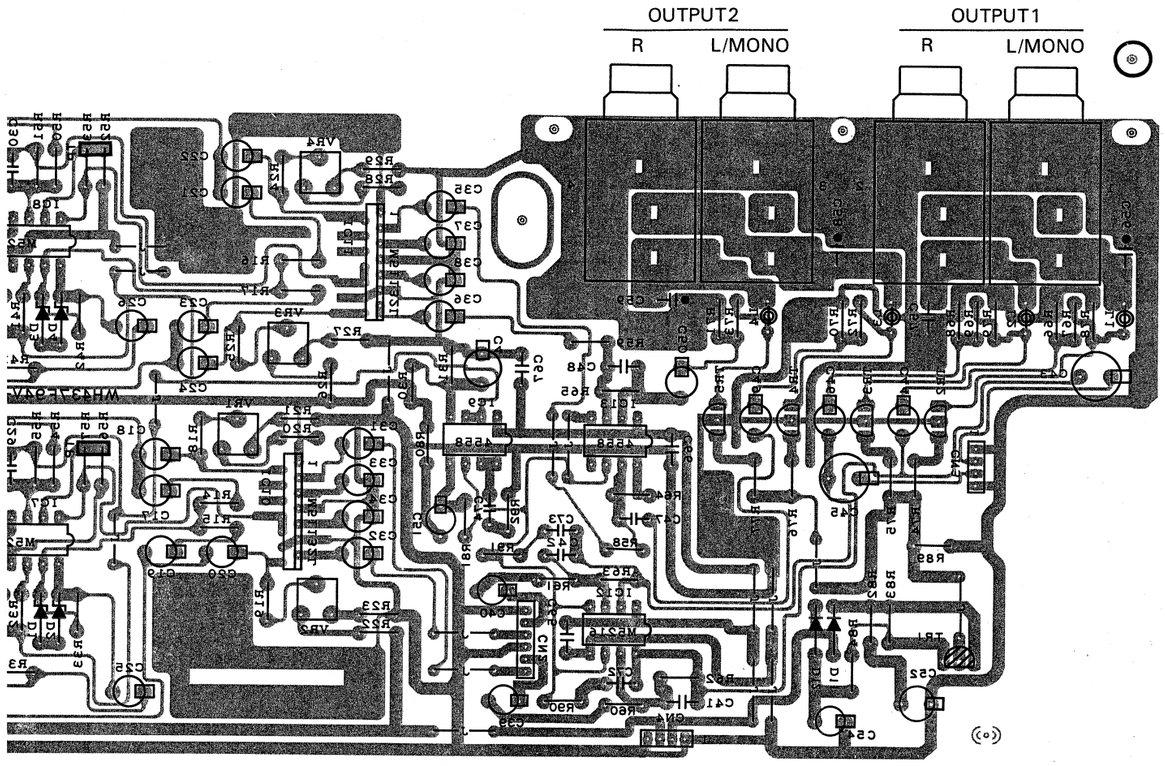
## ● JKAN 3/4

MAST

## ● JKAN 4/4

DA

Pattern




Pattern side (パターン側)

| ked * | R89 |
|---|---|
| 4 pcs) | × |

led)

**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 | $\overline{IC}$ | 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 |

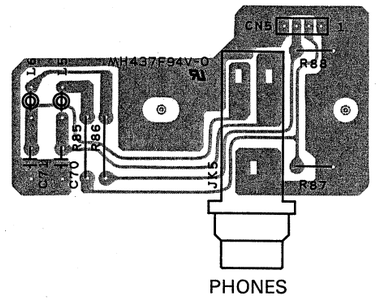
**JKAN 1/4 CN3**

| 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 |





## ● JKAN 2/4 Circuit Board




**Components side** (部品側)

**Notes)**

Circuit Board: JKAN2/4 XI014C0

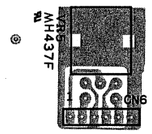
1. Coil
   L 5, 6: FL5R200QNT 20μH (VB935000)
2. Phone Jack
   JK 5: HLJ0521 Stereo (LB203090) PHONES

**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 |

## ● JKAN 3/4 Circuit Board

MASTER VOLUME




**Pattern side** (パターン側)

**Notes)**

Circuit Board: JKAN3/4 XI014C0

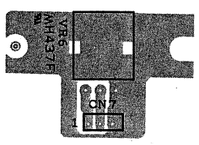
1. Variable Resistor
   VR 5: A10K × 2 (VF636100) MASTER VOLUME

**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 4/4 Circuit Board

DATA ENTRY




**Pattern side** (パターン側)

**Notes)**

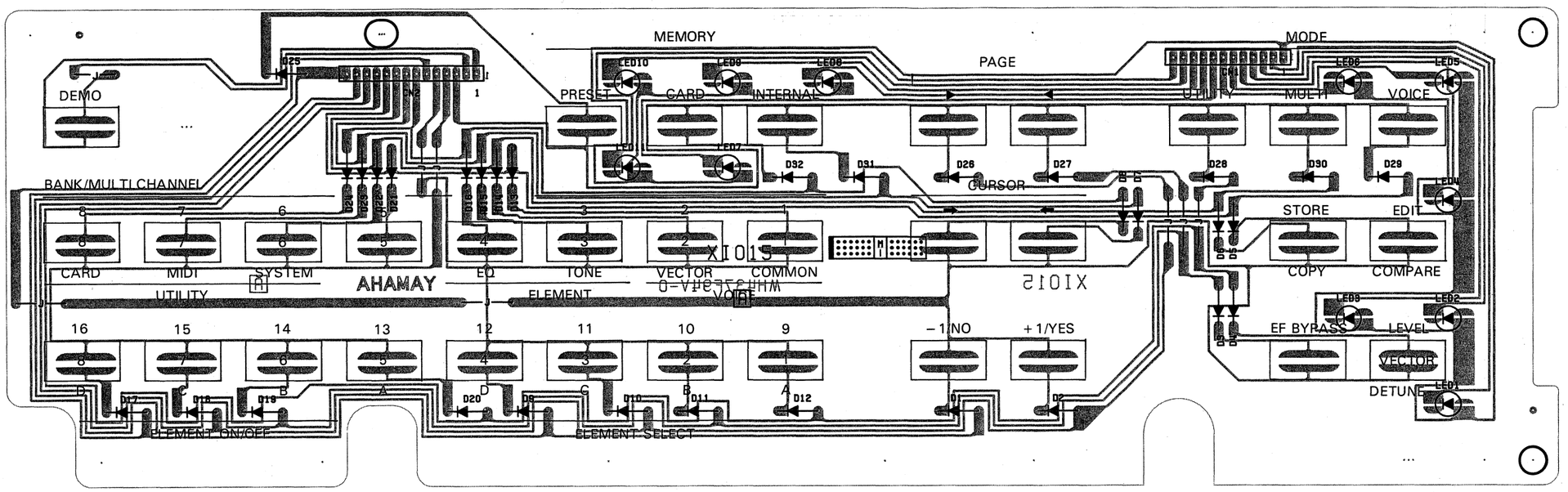
Circuit Board: JKAN4/4 XI014C0

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 |

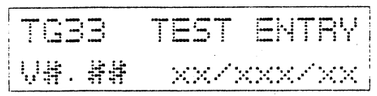
**PN CN2**

| 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.

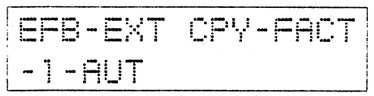



Use the [−1], [COPY], or [EF BYPASS] panel switches to select the appropriate test mode. If you press [−1], the auto test mode will be initiated. If you press [COPY], the TG33 will execute Test 18, ''18. Factory settings'', and then automatically exit the test mode and return to play mode (refer to Test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

## 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。




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

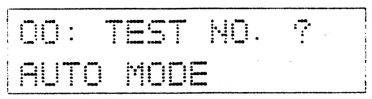
[−1]を押すと、オートモードでテストにエントリーされる。

[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. PROCEEDING THROUGH THE TESTS

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




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.

## 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).

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。

## 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

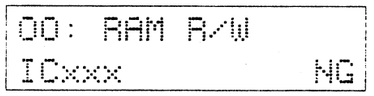
## イニシャルテスト

**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

DISPLAY OF TEST RESULTS
NG




(where xxx = IC #)

判定結果の表示
NG

(xxxx；NG となったICの番号)

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

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。

## TEST PROGRAM 1 — 19

## テストプログラム１～19

## TEST 1. RAM BACKUP BATTERY TEST

## テスト１．BATTERYテスト


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

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

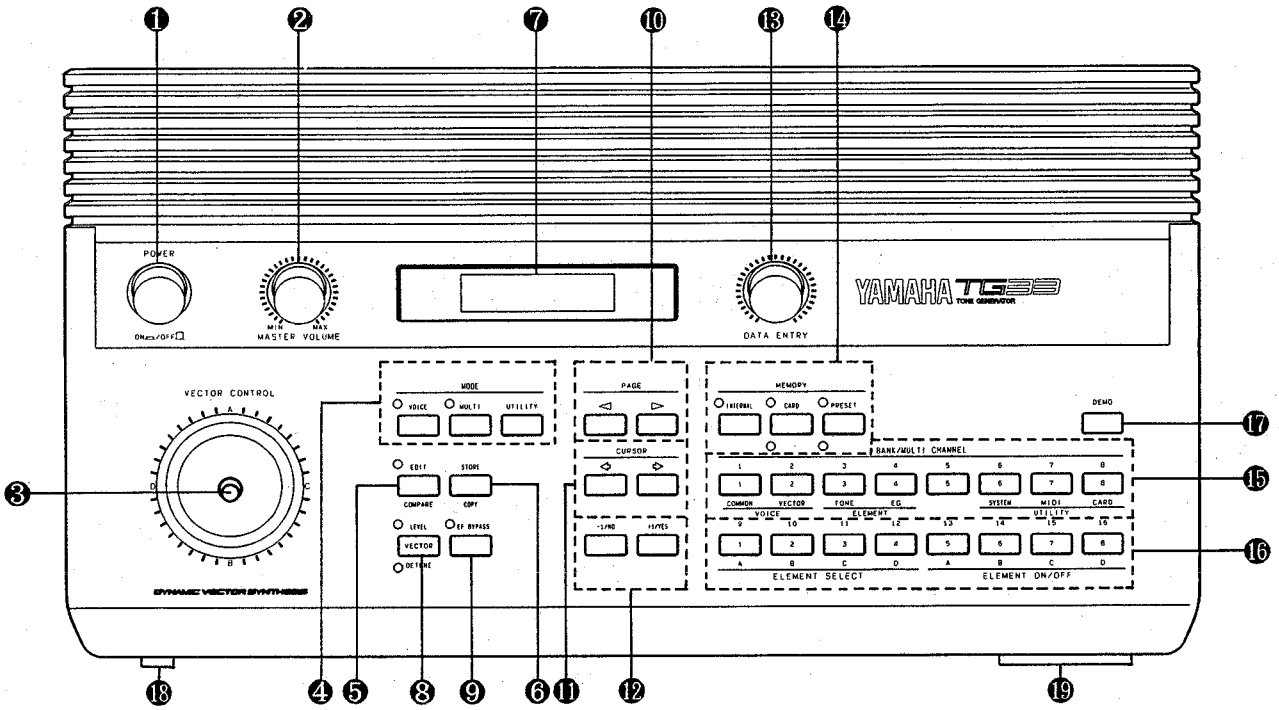
## ■ 総合仕様

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

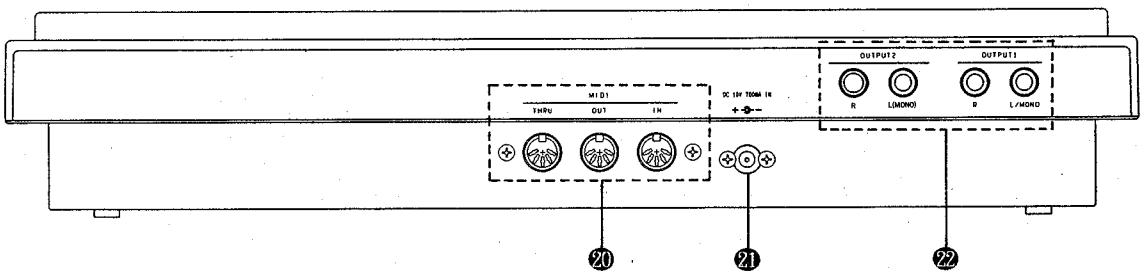
※TG33の音色データはSY22と互換性があります。エフェクトデータは異なります。なお、マルチのデーターは読み込みません。

# ■ PANEL LAYOUT（パネルレイアウト）

## ● Front Panel

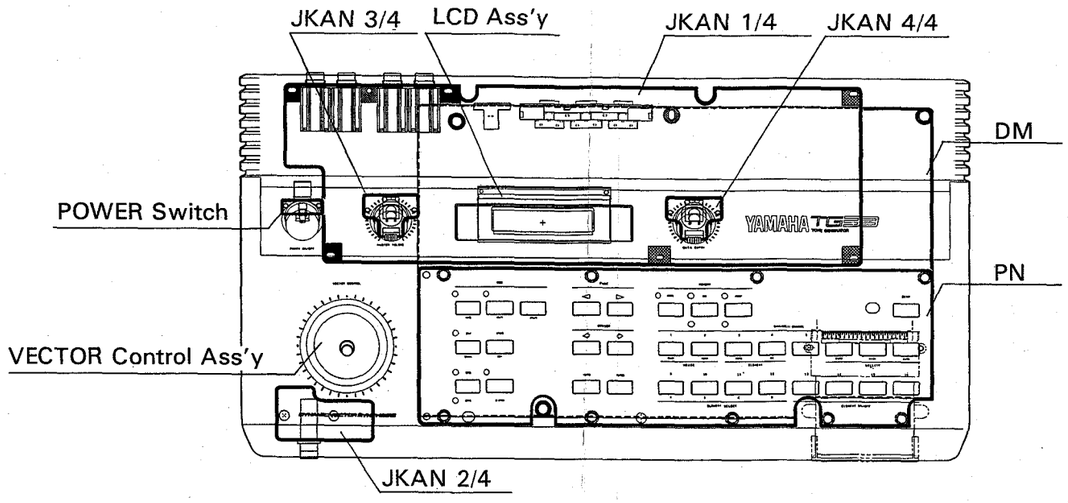


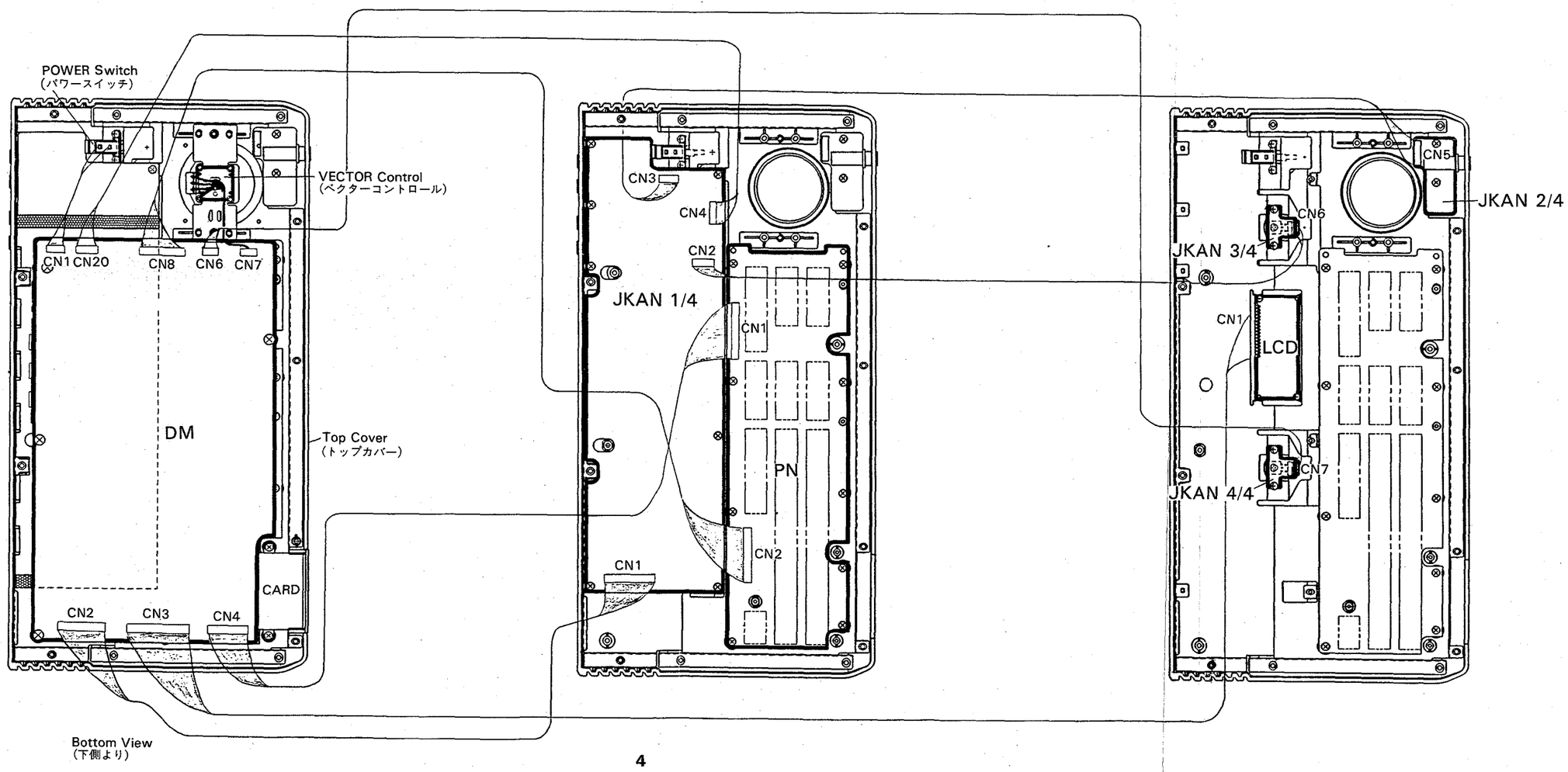

## ● Rear Panel




❶ [POWER] Switch
❷ [MASTER VOLUME] Control
❸ [VECTOR CONTROL]
❹ MODE Keys
[VOICE] Key & Indicator
[MULTI] Key & Indicator
[UTILITY] Key
❺ [EDIT/COMPARE] Key & Indicator
❻ [STORE/COPY] Key
❼ Liquid Crystal Display Panel (LCD)
❽ [VECTOR] Key & LEVEL/DETUNE Indicators
❾ [EF BYPASS] Key & Indicator
❿ PAGE [ ◁ ] and [ ▷ ] Keys
⓫ CURSOR [⇦] and [⇨] Keys
⓬ [ − 1/NO] and [ + 1/YES] Keys
⓭ [DATA ENTRY] Control
⓮ [INTERNAL], [CARD] and [PRESET] Keys & Indicatos
⓯⓰ [BANK/MULTI CHANNEL] Select, Edit/Utility Mode Access, and Element Control Keys
⓱ [DEMO] Key
⓲ PHONES Jack
⓳ Card Slot
⓴ MIDI IN, OUT and THRU Connectors
㉑ DC 10V 700mA IN Jack
㉒ OUTPUT 1 and OUTPUT 2 (R and L/MONO) Jacks

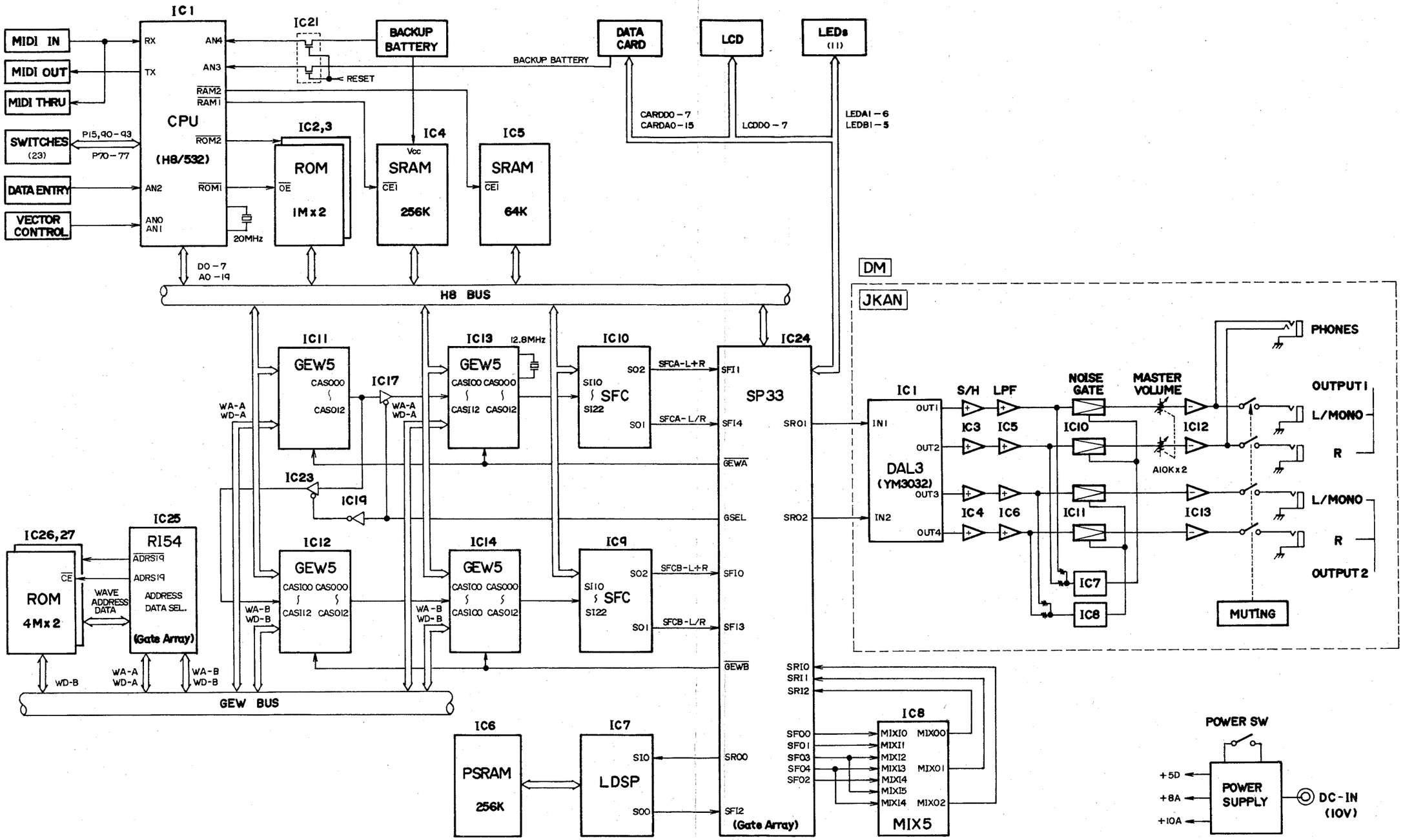
## ■CIRCUIT BOARD LAYOUT & WIRING（ユニットレイアウト＆結線図）



TG33

## ■BLOCK DIAGRAM（ブロックダイアグラム）



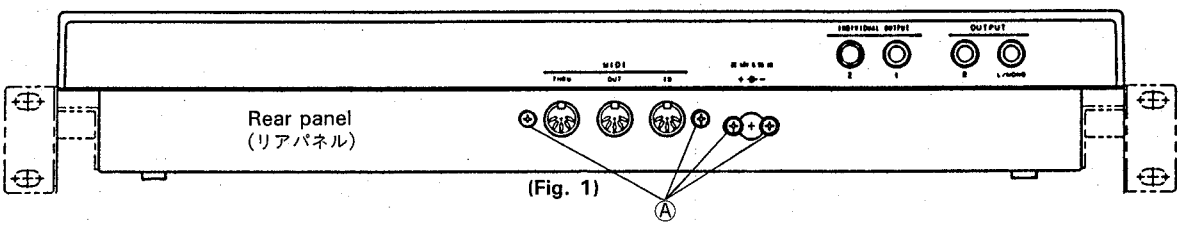
# ■ DISASSEMBLY PROCEDURE (分解手順)

### 1. Bottom Cover Removal

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

### 1．ボトムカーバーの外し方

1-1. Ⓐのネジ4本（3.0×8ナベタッピングネジ）とⒷのネジ12本（4.0×10ナベタッピングネジ）とⓁ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)




(Fig. 1)

### 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.

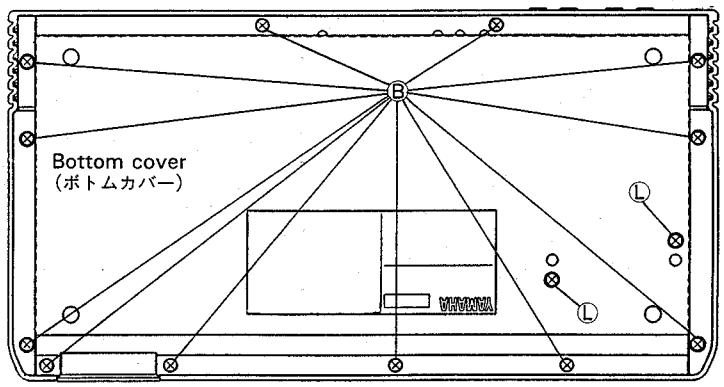
* The VECTOR control assembly is attached to the bottom cover using the two (2) screws marked Ⓛ (4.0 × 10 pan head tapping screw). (Refer to Fig. 2)

### 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Ⓛ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 Ⓒ (3.0 × 8 pan head tapping screw) and four (4) screws marked Ⓓ (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. Ⓒのネジ2本（3.0×8ナベタッピングネジ）とⒹ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**

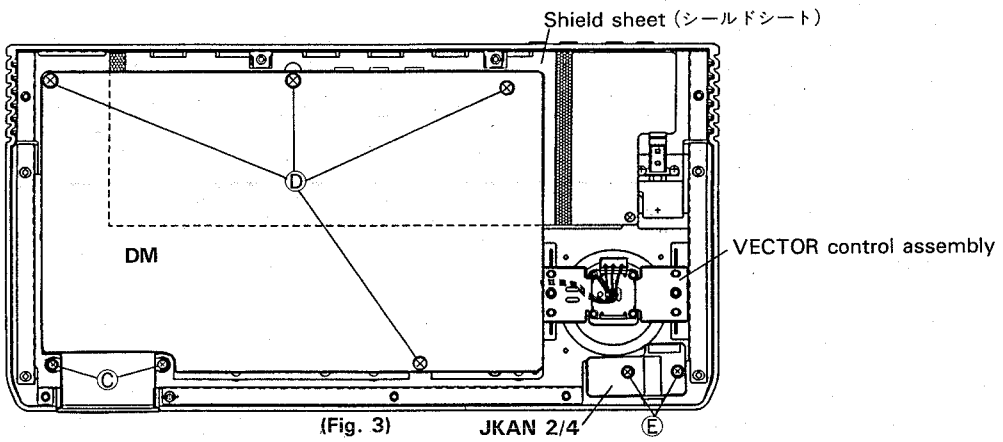
4-1. Remove the bottom cover. (see procedure 1 - Bottom Cover Removal)

4-2. Remove the two (2) screws marked Ⓔ (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. Ⓔ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)




(Fig. 3)

**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)

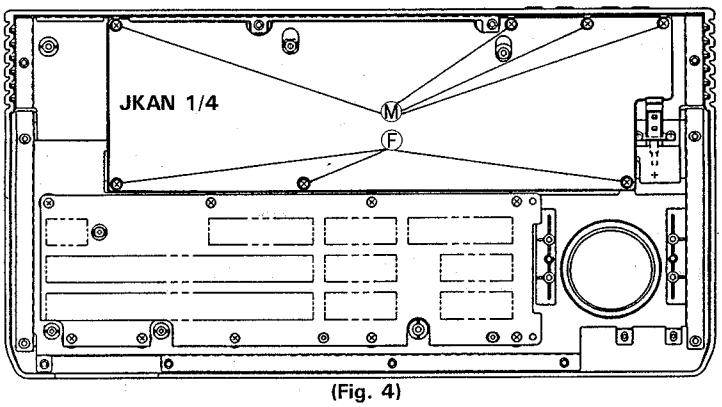
5-3. Remove the three (3) screws marked Ⓕ (3.0 × 8 bind head tapping screw) and four (4) screws marked Ⓜ (3.0 × 8 bind head screw), then the JKAN1/4 circuit board can be removed. (Refer to Fig. 4)

**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. Ⓕのネジ3本 (3.0× 8バインドタッピングネジ) とⓂ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)




(Fig. 4)

**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 Ⓖ (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)

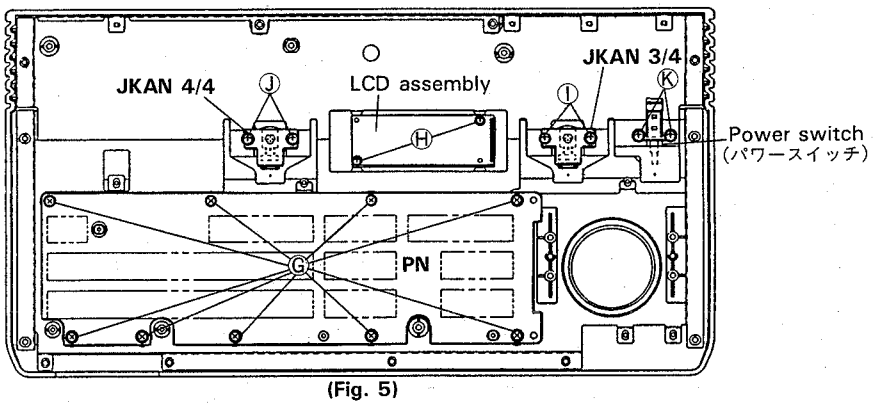
6-3. Ⓖのネジ9本 (3.0× 8バインドタッピングネジ) を外し、PNシートを外します。(図5参照)

**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 Ⓗ (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. Ⓗ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 Ⓘ (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. Ⓘ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 Ⓙ (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**

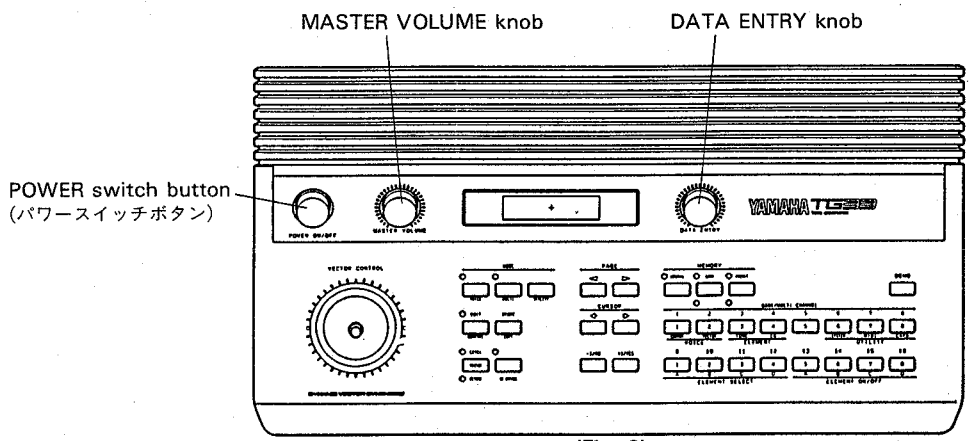
9-1. フロントパネル上のデータエントリーツマミ (DATA ENTRY) 1個を引き抜きます。(図6参照)
9-2. ボトムカバーを外します。(1項参照)
9-3. DMシートを外します。(3項参照)
9-4. JKAN1/4シートを外します。(5項参照)
9-5. Ⓙのネジ2本 (3.0× 8バインド小ネジ) を外し、JKAN4/4シートを外します。(図5参照)

## 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 Ⓚ (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. Ⓚ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> (XI119A00) 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/$\overline{BACK}$ | O | Bus acknowledge | 47 | P54/A12 | O | |
| 6 | P13/$\overline{BREQ}$ | I | Bus request | 48 | P55/A13 | O | |
| 7 | P14/$\overline{WAIT}$ | I | Wait | 49 | P56/A14 | O | |
| 8 | P15/$\overline{IRQ0}$ | I | Interrupt request 0 | 50 | P57/A15 | O | |
| 9 | P16/$\overline{IRQ1}$ | I | Interrupt request 1 | 51 | P60/A16 | O | |
| 10 | P17/$\overline{TMO}$ | O | 8-bit timer output | 52 | P61/A17 | O | |
| 11 | P20/$\overline{AS}$ | O | Address strobe | 53 | P62/A18 | O | |
| 12 | P21/R/$\overline{W}$ | O | Read/Write | 54 | P63/A19 | O | |
| 13 | P22/$\overline{DS}$ | O | Data strobe | 55 | Vcc | | Power supply |
| 14 | P23/$\overline{RD}$ | O | Read control | 56 | P70/TMCI | I | 8-bit timer clock input |
| 15 | P24/$\overline{WR}$ | O | Write control | 57 | P71/FTI1 | I | Free running timer input capture (8-bit timer counter reset input) |
| 16 | Vcc | | Power supply | 58 | P72/FTI2 | I | |
| 17 | MD0 | I | Mode control | 59 | P73/FTI3/TMRI | I | |
| 18 | MD1 | I | | 60 | P74/FTOB1/FTCI1 | O/I | Free running timer output compare B/ Free running timer counter clock |
| 19 | MD2 | I | | 61 | P75/FTOB2/FTCI2 | O/I | |
| 20 | $\overline{STBY}$ | I | Standby | 62 | P76/FTOB3/FTCI3 | O/I | |
| 21 | $\overline{RES}$ | I | Reset | 63 | P77/FTOA1 | O | Free running timer output compare A1 |
| 22 | NMI | I | Non-maskable interrupt | 64 | Vss | | Ground |
| 23 | NC | | | 65 | AVss | | Analog ground |
| 24 | Vss | | Ground | 66 | P80/AN0 | I | Port 8 |
| 25 | P30/D0 | I/O | Data bus | 67 | P81/AN1 | I | |
| 26 | P31/D1 | I/O | | 68 | P82/AN2 | I | |
| 27 | P32/D2 | I/O | | 69 | P83/AN3 | I | |
| 28 | P33/D3 | I/O | | 70 | P84/AN4 | I | |
| 29 | P34/D4 | I/O | | 71 | P85/AN5 | I | |
| 30 | P35/D5 | I/O | | 72 | P86/AN6 | I | |
| 31 | P36/D6 | I/O | | 73 | P87/AN7 | I | |
| 32 | P37/D7 | I/O | | 74 | AVcc | | Analog power supply |
| 33 | P40/A0 | O | Address bus | 75 | P90/FTOA2 | O | Free running timer output compare A2 |
| 34 | P41/A1 | O | | 76 | P91/FTOA3 | O | Free running timer output compare A3 |
| 35 | P42/A2 | O | | 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 | | Ground | 83 | Vss | | Ground |
| 42 | Vss | | | 84 | EXTAL | I | Clock |

## • YM3413 (XE449A00) LDSP (Digital Signal Processor)

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

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

| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---|---|---|---|---|---|---|---|
| 1 | CASI00 | I | Cascade in A | 41 | $\overline{MAE}$ | O | Memory address enable |
| 2 | VDD | | Power supply (+5V) | 42 | VDD | | Power supply |
| 3 | D0 | I/O | CPU data bus | 43 | $\overline{MRD}$ | O | Memory read control |
| 4 | D1 | I/O | | 44 | $\overline{MWR}$ | 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 | $\overline{CS}$ | I | Chip select | 53 | $\overline{MUTE}$ | O | Analog mute control |
| 14 | $\overline{WR}$ | I | Write control | 54 | $\overline{IC}$ | I | Initial clear |
| 15 | $\overline{RD}$ | I | Read control | 55 | SYO | O | Synch. pulse input |
| 16 | SM | I | Slave/Master select | 56 | SYI | I | Synch. pulse output |
| 17 | TEST1 | I | Test pin | 57 | XCLK | O | 3.2MHz |
| 18 | TEST2 | I | | 58 | CLC | I | MCLK in/out select |
| 19 | MA0 | O | External memory address bus | 59 | MCLK | I/O | 6.4MHz |
| 20 | MA1 | O | | 60 | VDD | | Power supply |
| 21 | MA2 | O | | 61 | XOUT | O | Clock |
| 22 | MA3 | O | | 62 | XIN | I | |
| 23 | VSS | | Ground | 63 | VSS | | Ground |
| 24 | MA4 | O | External memory address bus | 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 | | 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 | $\overline{WR}$ | I | Write control |
| 6 | SI22 | I | | 20 | $\overline{CS}$ | I | Chip select |
| 7 | VSS | | Ground | 21 | VDD | | DC supply |
| 8 | VSS | | | 22 | VDD | | |
| 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 | $\overline{IC}$ | 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 | DVDD | | Power supply | 13 | to Buff | O | Analog output to buffer amp. |
| 2 | SYW | I | Synch. pulse | 14 | MP | I | Middle point 1/2 VDD bias |
| 3 | DGND | | Digital ground | 15 | RC | O | Bias compensation |
| 4 | CLK | I | Clock | 16 | RB | O | Bias-R |
| 5 | NC | | | 17 | AGND | | Analog ground |
| 6 | NC | | | 18 | AVDD | | Analog power supply |
| 7 | OUT4 | O | Analog signal output | 19 | LMTEM | I | Limiter enable |
| 8 | OUT3 | O | | 20 | IN1 | I | Digital data input |
| 9 | OUT2 | O | | 21 | IN2 | I | |
| 10 | OUT1 | O | | 22 | SEL1 | I | Data shift |
| 11 | NS | I | Chip test | 23 | SEL2 | I | |
| 12 | COM | I | Analog input from buffer amp. | 24 | $\overline{IC}$ | I | Initial clear |

## • LC92018B-476 (X1045A00) RI54 (Gate Array)

| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---|---|---|---|---|---|---|---|
| 1 | ADRA20 | I | | 51 | ADRS15 | O | |
| 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 | Wave memory address bus |
| 10 | ADRA11 | I | | 60 | ADRS8 | O | |
| 11 | ADRA10 | I | Wave memory address bus (A) | 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 | $\overline{\text{ADRS19}}$ | O | |
| 16 | ADRA5 | I | | 66 | ADRS20 | O | |
| 17 | ADRA4 | I | | 67 | $\overline{\text{ADRS20}}$ | O | |
| 18 | ADRA3 | I | | 68 | DATB0 | I | |
| 19 | ADRA2 | I | | 69 | DATB1 | I | |
| 20 | ADRA1 | I | | 70 | DATB2 | I | |
| 21 | ADRA0 | I | | 71 | DATB3 | I | Wave memory data bus (B) |
| 22 | ADRB20 | I | | 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 | |
| 27 | ADRB15 | I | | 77 | DATA1 | O | |
| 28 | ADRB14 | I | | 78 | DATA2 | O | |
| 29 | ADRB13 | I | | 79 | DATA3 | O | Wave memory data bus (A) |
| 30 | ADRB12 | I | | 80 | DATA4 | O | |
| 31 | ADRB11 | I | Wave memory address bus (B) | 81 | DATA5 | O | |
| 32 | ADRB10 | I | | 82 | DATA6 | O | |
| 33 | ADRB9 | I | | 83 | DATA7 | O | |
| 34 | ADRB8 | I | | 84 | $\overline{\text{SYW}}$ | I | Synch. signal |
| 35 | ADRB7 | I | | 85 | MCLK | I | Master clock |
| 36 | ADRB6 | I | | 86 | A2 | I | |
| 37 | ADRB5 | I | | 87 | A3 | I | Address bus for address decode |
| 38 | ADRB4 | I | | 88 | A18 | I | |
| 39 | ADRB3 | I | | 89 | $V_{DD}$ | | Power supply |
| 40 | $V_{SS}$ | | Ground | 90 | $V_{SS}$ | | Ground |
| 41 | $V_{DD}$ | | Power supply | 91 | A19 | I | Address bus for address decode |
| 42 | ADRB2 | I | | 92 | $\overline{\text{AS}}$ | I | Address strobe |
| 43 | ADRB1 | I | Wave memory address bus (B) | 93 | $\overline{\text{SFC}}$ | O | SFC enable |
| 44 | ADRB0 | I | | 94 | $\overline{\text{GEW5C}}$ | O | GEW5-A chip enable |
| 45 | ADRS0 | O | | 95 | $\overline{\text{GEW5B}}$ | O | GEW5-B chip enable |
| 46 | ADRS1 | O | | 96 | $\overline{\text{GEW5A}}$ | O | GEW5-C chip enable |
| 47 | ADRS17 | O | | 97 | $\overline{\text{DEV}}$ | O | |
| 48 | ADRS2 | O | Wave memory address bus | 98 | $\overline{\text{RAM}}$ | O | RAM chip enable |
| 49 | ADRS16 | O | | 99 | $\overline{\text{PSRAM}}$ | O | PSRAM chip enable |
| 50 | ADRS3 | O | | 100 | $\overline{\text{ROM}}$ | O | ROM chip enable |

## • LC92030C-477 (XI074A00) SP33 (Gate Array)

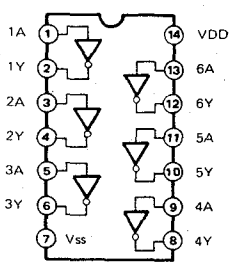
| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---|---|---|---|---|---|---|---|
| 1 | VDD | | Power supply | 65 | VDD | | Power supply |
| 2 | WAIT | O | Wait control | 66 | SF12 | I | |
| 3 | CARD-D0 | I/O | | 67 | SF13 | I | MEL formatted voice data |
| 4 | CARD-D1 | I/O | | 68 | SF14 | I | |
| 5 | CARD-D2 | I/O | | 69 | SF00 | O | |
| 6 | CARD-D3 | I/O | | 70 | SF01 | O | |
| 7 | CARD-D4 | I/O | Memory card data bus | 71 | SF02 | O | MEL formatted voice data edited at this chip. |
| 8 | CARD-D5 | I/O | | 72 | SF03 | O | |
| 9 | CARD-D6 | I/O | | 73 | SF04 | O | |
| 10 | CARD-D7 | I/O | | 74 | SRI0 | I | |
| 11 | CARD-A0 | O | | 75 | SRI1 | I | Mixed voice data edited at this chip. |
| 12 | CARD-A1 | O | | 76 | SRI2 | I | |
| 13 | CARD-A2 | O | | 77 | SRO0 | O | |
| 14 | CARD-A3 | O | Memory card address bus | 78 | SRO1 | O | Mixed voice data |
| 15 | CARD-A4 | O | | 79 | SRO2 | O | |
| 16 | CARD-A5 | O | | 80 | XCLK | I | Master clock |
| 17 | Vss | | Ground | 81 | Vss | | Ground |
| 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 | | 86 | SYWI | I | Synch signal |
| 23 | CARD-A11 | O | Memory card address bus | 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 | | 95 | A19 | I | |
| 32 | LED-A2 | O | LED drive (A) | 96 | A18 | I | Address bus |
| 33 | Vss | | Ground | 97 | Vss | | Ground |
| 34 | LED-A3 | O | | 98 | RA17 | I | |
| 35 | LED-A4 | O | | 99 | A17 | I | |
| 36 | LED-A5 | O | LED drive (A) | 100 | A16 | I | |
| 37 | LED-A6 | O | | 101 | A15 | I | |
| 38 | LED-B1 | O | | 102 | A14 | I | |
| 39 | LED-B2 | O | | 103 | A13 | I | |
| 40 | LED-B3 | O | LED drive (B) | 104 | A12 | I | |
| 41 | LED-B4 | O | | 105 | A11 | I | Address bus |
| 42 | LED-B5 | O | | 106 | A10 | I | |
| 43 | AS | I | Address strove | 107 | A9 | I | |
| 44 | LCD-D0 | I/O | | 108 | A8 | I | |
| 45 | LCD-D1 | I/O | | 109 | A7 | I | |
| 46 | LCD-D2 | I/O | Data bus for LCD driver | 110 | A6 | I | |
| 47 | LCD-D3 | I/O | | 111 | A5 | I | |
| 48 | LCD-D4 | I/O | | 112 | A4 | I | |
| 49 | VDD | | Power supply | 113 | VDD | | Power supply |
| 50 | LCD-D5 | I/O | | 114 | A3 | I | |
| 51 | LCD-D6 | I/O | Data bus for LCD driver | 115 | A2 | I | Address bus |
| 52 | LCD-D7 | I/O | | 116 | A1 | I | |
| 53 | LCD-E | I/O | | 117 | A0 | I | |
| 54 | GEWA | O | GEW5-A chip enable | 118 | D7 | I/O | |
| 55 | GEWB | O | GEW5-B chip enable | 119 | D6 | I/O | |
| 56 | SFC | O | SFC chip enable | 120 | D5 | I/O | |
| 57 | FDC | O | FDC chip enable | 121 | D4 | I/O | Data bus |
| 58 | LEDC | O | $0A000- $0AFFF 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)

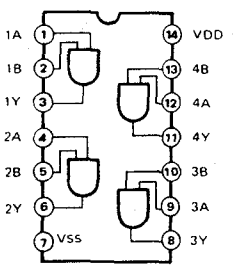
| PIN NO. | NAME | I/O | FUNCTION | PIN NO. | NAME | I/O | FUNCTION |
|---|---|---|---|---|---|---|---|
| 1 | MXI7 | I | | 11 | SYW | I | Synch. pulse |
| 2 | MXI6 | I | | 12 | CDO | O | Control data output |
| 3 | MXI5 | I | | 13 | XCLK | I | Clock |
| 4 | MXI4 | I | | 14 | CDI | I | Control data input |
| 5 | MXI3 | I | Signal data input | 15 | CRS | I | Counter reset |
| 6 | MXI2 | I | | 16 | MXO0 | O | |
| 7 | MXI1 | I | | 17 | MXO1 | O | Signal data output |
| 8 | MXI0 | I | | 18 | MXO2 | O | |
| 9 | CLK | I | Clock | 19 | MXO3 | O | |
| 10 | Vss | | Ground | 20 | VDD | | Power supply |

# ■ IC BLOCK DIAGRAM (ICブロック図)

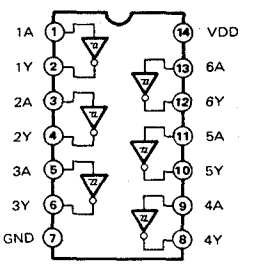
- **TC74AC04P** (XG655A00)
  **TC40H004P** (IG051000)
  Hex Inverter



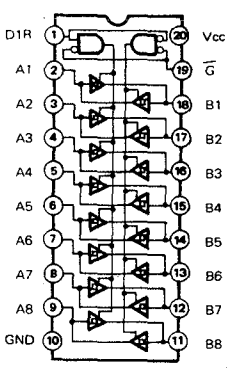

- **TC74AC08P** (IG656A00)
  Quad 2 Input AND



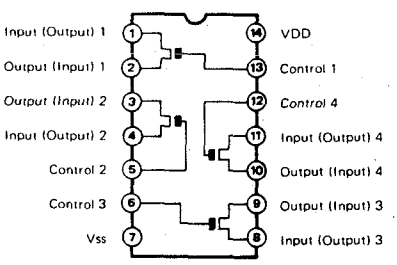

- **SN74HC14N** (IR001450)
  Hex Inverter



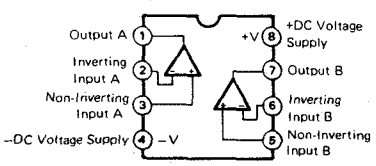

- **TC74HC245P** (IR024500)
  **TC74AC245P** (XH608A00)
  Octal 3-State Bus Transceiver



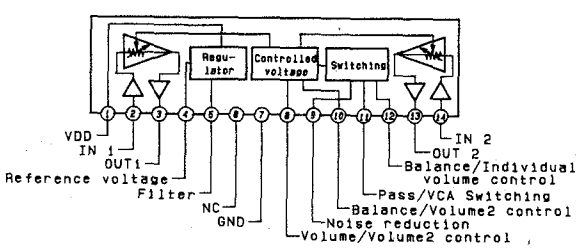

- **TC74HC4066AP** (IR406600)
  Quad Bilateral Switch




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



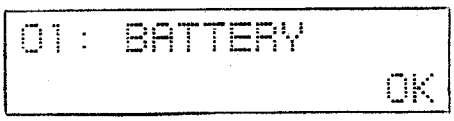

- **M51132L** (XE470001)



DISPLAY OF TEST RESULTS

判定結果の表示

OK




NG


(where xxxx = HIGH or LOW)

(xxxx ; 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.

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

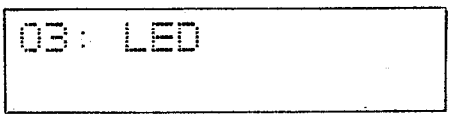
## テスト 2. LCDテスト

全ドットが黒と白にブリンクしていることを、確認する。

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。

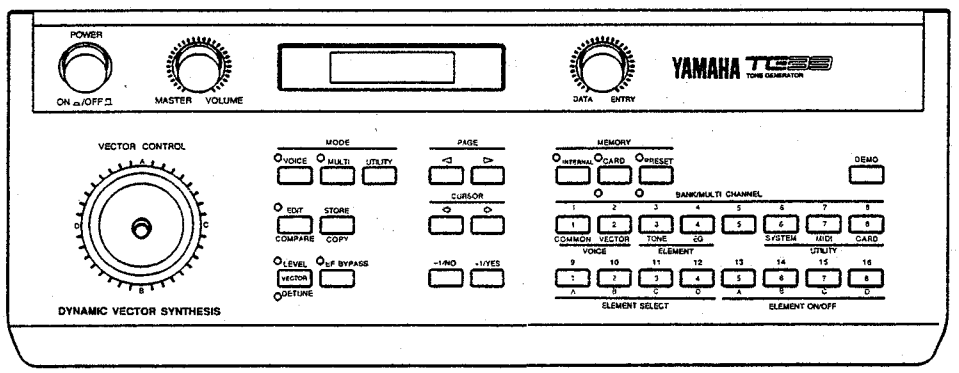
## TEST 3. LED ON/OFF TEST

## テスト 3. LED順次点燈、全点燈テスト




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が同時に点燈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。

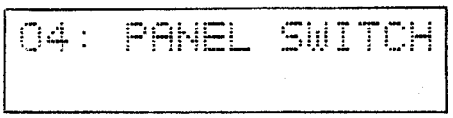



TEST END
Press [+1] to end the test and you will then be able to proceed to test the next program.

テストの終了方法
[+1]を押すと、次のテストへ進む。

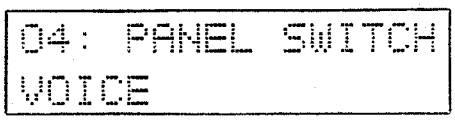
## TEST 4. PANEL SWITCH TEST

テスト４．パネルスイッチテスト




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、以下のような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。




(e.g. When checking [VOICE])

([Voice]のチェックの場合)

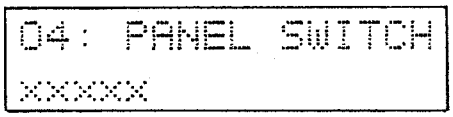
If the switch is OK, a beep will sound and you should proceed to test the next switch. If the wrong switch is pressed an unexpected code is sent, and the error message NG will be displayed and no sound will be heard. At this time, if the correct switch is pressed then the proper code is received, you 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、〝ポーッ〟と発音して、次のスイッチのテストに進む。
期待されないコードが送られると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

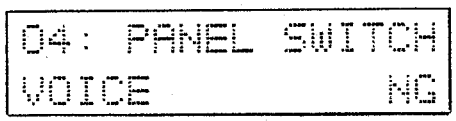
OK




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

(xxxxx；次に押されるべきスイッチ名)

NG




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

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。


(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


NG

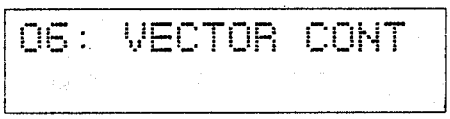
(No change in display message)
表示なし

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




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。

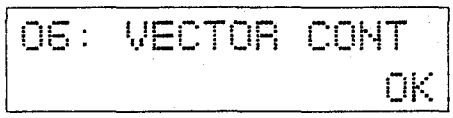

(where xx = current value, yyyy = next target direction, "RIGHT" or "LEFT" or "UP" or "DOWN")

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




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".

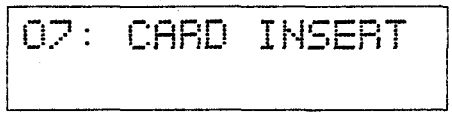
テストの終了方法

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




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.

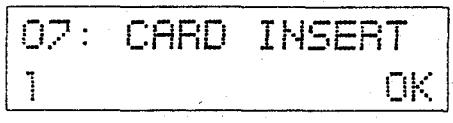
MCD64 メモリーカードを使用して、カードレディーの状態を読み込めることを確認する。

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




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".

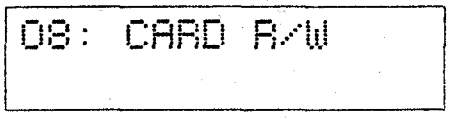
テストの終了方法

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




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)

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

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)

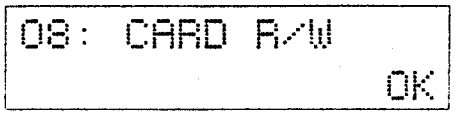
CARD 2=28000h-27FFFh (Bank 2)

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。

DISPLAY OF TEST RESULTS

判定結果の表示

OK




NG


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

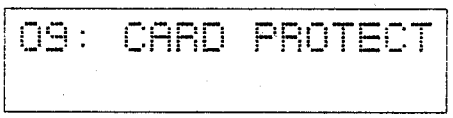
(CARD2がNGの場合)

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



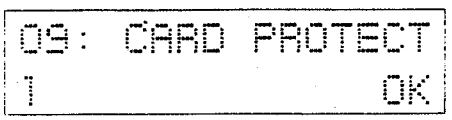

Use a RAM card to check that the card protect switch status is being read.
Check that when the switch is set from "protect off" to "protect on", the number on the display changes from 0 to 1 and that the OK result is also displayed.

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




NG

(No change in display)

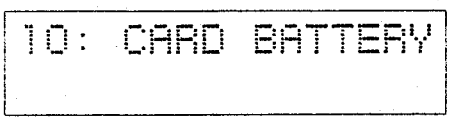
表示なし

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



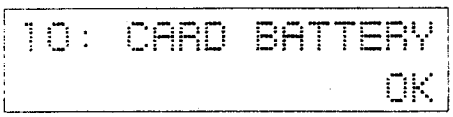

This test checks that the voltage of the card backup battery is adequate.

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。

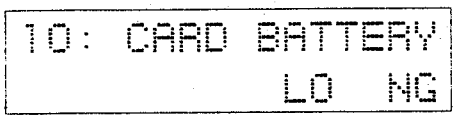
DISPLAY OF TEST RESULTS

判定結果の表示

OK

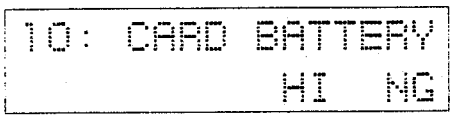



NG



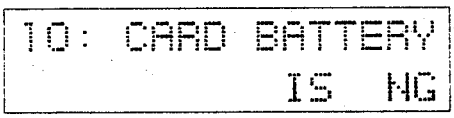

(When the voltage of card backup is too low.) .

NG




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

NG




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

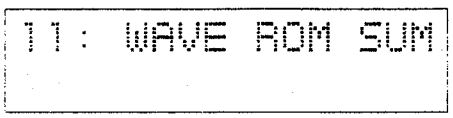
(カードが差してない場合)

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




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


NG


(where xxx = IC #)

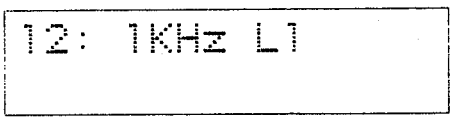
(ROM n がNG の場合、xxx ；NG となったICの番号)

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

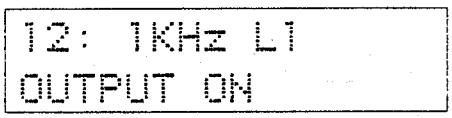
## テスト12. 1kHz OUTPUT1-L 発音 (FM)



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:

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。



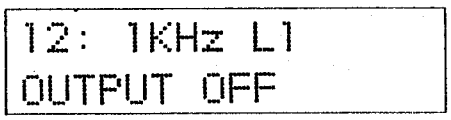

Listed below are the specifications and conditions of each output during this test.

| | |
|---|---|
| OUTPUT 1-L/MONO: | 1kHz ±1.5Hz, sine wave, distortion 0.2%, 0.0dBm ± 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 ± 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.

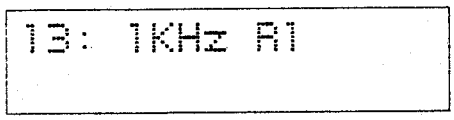
チェック項目
OUTPUT1-L；1kHz±1.5Hz、sine波、歪率 0.2%以下、+0.0 ±2dBm(負荷10kΩ)
OUTPUT2-L ；−60dBm以下
OUTPUT1-R ；−68dBm以下
OUTPUT2-R ；−60dBm以下
PHONES(L) ；1kHz、sine波、歪率 0.2%以下、+4.0±2dBm(負荷150Ω)
PHONES(R) ；−62dBm以下

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。




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

## 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:

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。

```
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 ±1.5Hz, sine wave, distortion 0.2%, 0.0dBm ± 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 ± 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 ±2.0dB.

チェック項目

OUTPUT1 - R ；1kHz、sine 波、歪 率 0.2%以下、+0.0±2dBm(負荷10kΩ)
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±2dBm(負荷150Ω)
PHONES(L) ；−62dBm以下
OUTPUT1-L ；OUTPUT1-R ジャックを抜いた時、−6.0dBm±2.0dBm

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。

```
13: 1KHz R1
OUTPUT OFF
```

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

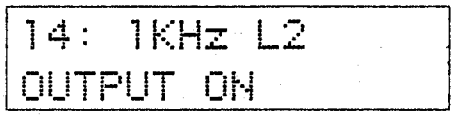
14. 1kHz OUTPUT2-L 発音 (FM)

```
14: 1KHz L2
```

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:

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表示が以下のようになる。




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

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

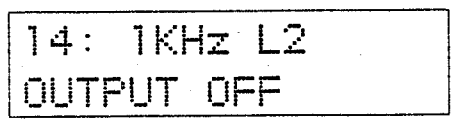
チェック項目

OUTPUT2-L ；1kHz、sine波、歪率 0.2%以下、+0.0±2dBm(負荷10kΩ)
OUTPUT1-L ；−90dBm以下
OUTPUT1-R ；−90dBm以下
OUTPUT2-R ；−68dBm以下

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.

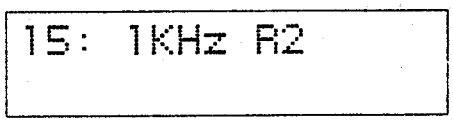
テストの終了方法

[+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。




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

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:

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。

```
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 ±1.5Hz, sine wave, distortion 0.2%, 0.0dBm ± 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 ±2.0dB.

チェック項目
OUTPUT2-R ；1kHz、sine波、歪率0.2%以下、+0.0±2dBm(負荷10kΩ)
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±2dBm

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。

```
15: 1KHz R2
OUTPUT OFF
```

## TEST 16. 1kHz FM SOUND OUTPUT (EFFECT→OUTPUT 1-L) TEST

テスト16. Effect

```
16: EFFECT
```

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:

OUTPUT1-Lより、EFFECTのかかった信号が、出力されていることを確認する。
OUTPUT1-Lにプラグを差し込み(他はオープン)、出力波形、出力レベルを、オシロスコープ、レベル計(12.47kHzフィルター付き)、歪率計で観測する。
マスターボリュームはmaxとする。発音中は、LCD表示が以下のようになる。

```
16: EFFECT
OUTPUT ON
```

The specifications for this test are as follows:
OUTPUT L1: 1kHz, sine wave, distortion 0.2% or less, −12.0dBm ±2dB (10k ohm load)

チェック項目
OUTPUT1-L ；1kHz, sine波、歪率 0.2%以下、
-12.0±2dBm (負荷10kΩ)

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.

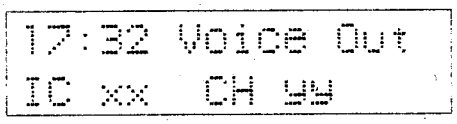
ITEMS TO CHECK
Attach an amplifier/speakers system to OUTPUT 1-L/MONO and OUTPUT 1-R outputs and monitor the sine wave signals that are output from the speaker to check by ear whether the signal is correctly output. If necessary, the frequency, output waveform, output level, and THD of this output using 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
2.IC12 1ch-8ch
} OUTPUT Lch AWM-element

3.IC13 1ch-8ch
4.IC11 1ch-8ch
} OUTPUT Rch FM-element

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。




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

xx；現在発音しているIC番号

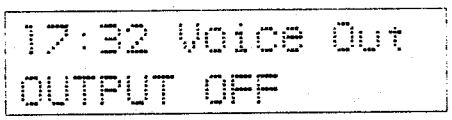
yy；現在発音しているチャンネル番号

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.

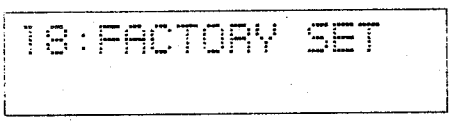
テストの終了方法

[+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。




## TEST 18. FACTORY SET TEST

## テスト18. ファクトリーセット




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

Synthesizer system data
Internal voice data
Internal multi data

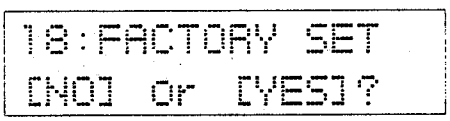
When this test is executed, the following display will appear.

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。




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

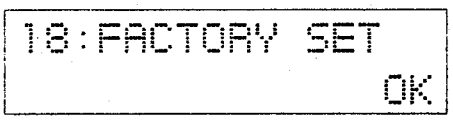
[ＹＥＳ]を押すとファクトリーセットされて
テスト19へ移行、すなわちEXITする。

[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。

DISPLAY OF TEST RESULTS
If factory settings are restored.

判定の結果

セットされた場合




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.

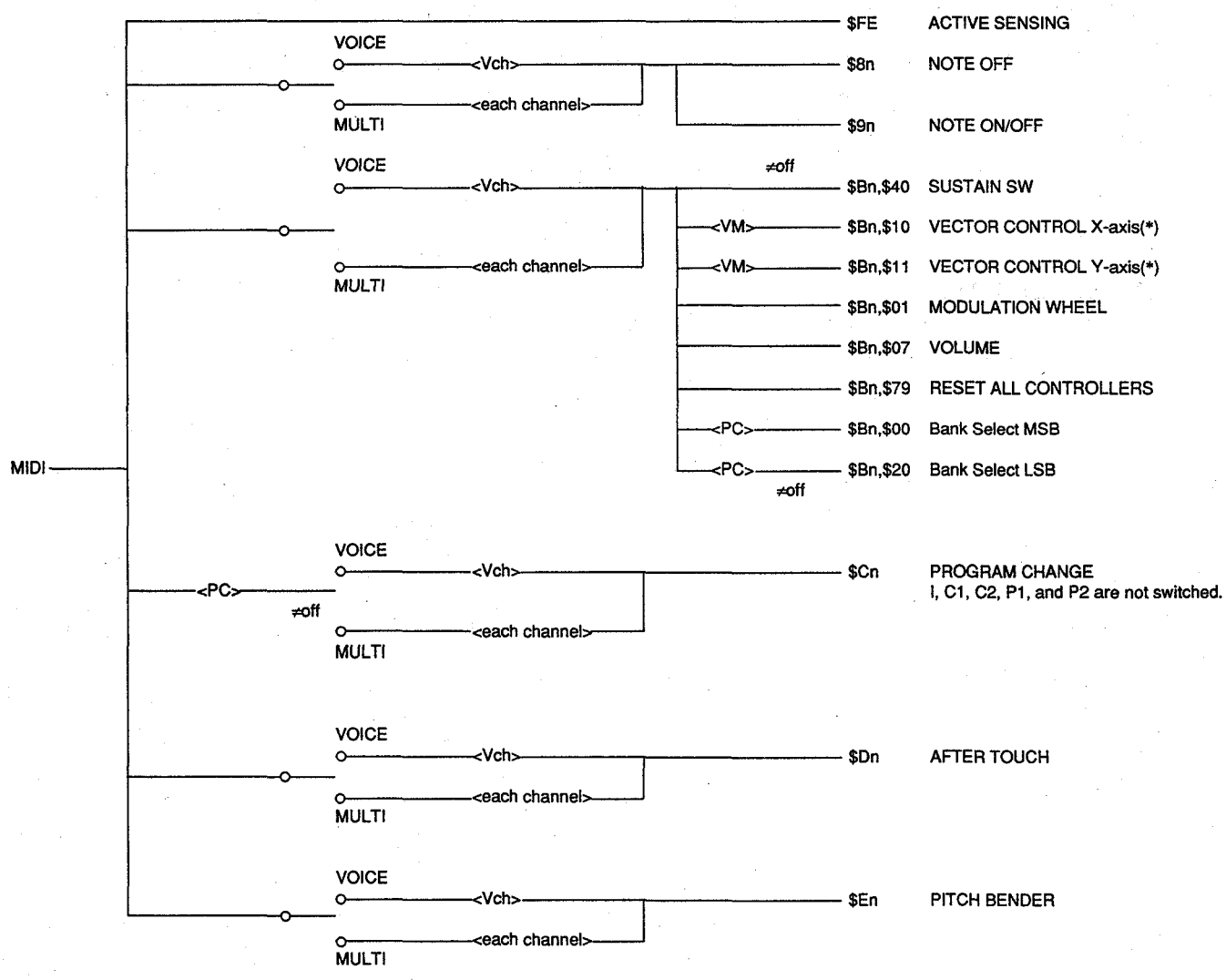
## テスト19. EXIT

テストが実行されると、テストモードから抜ける。

# ■ MIDI DATA FORMAT

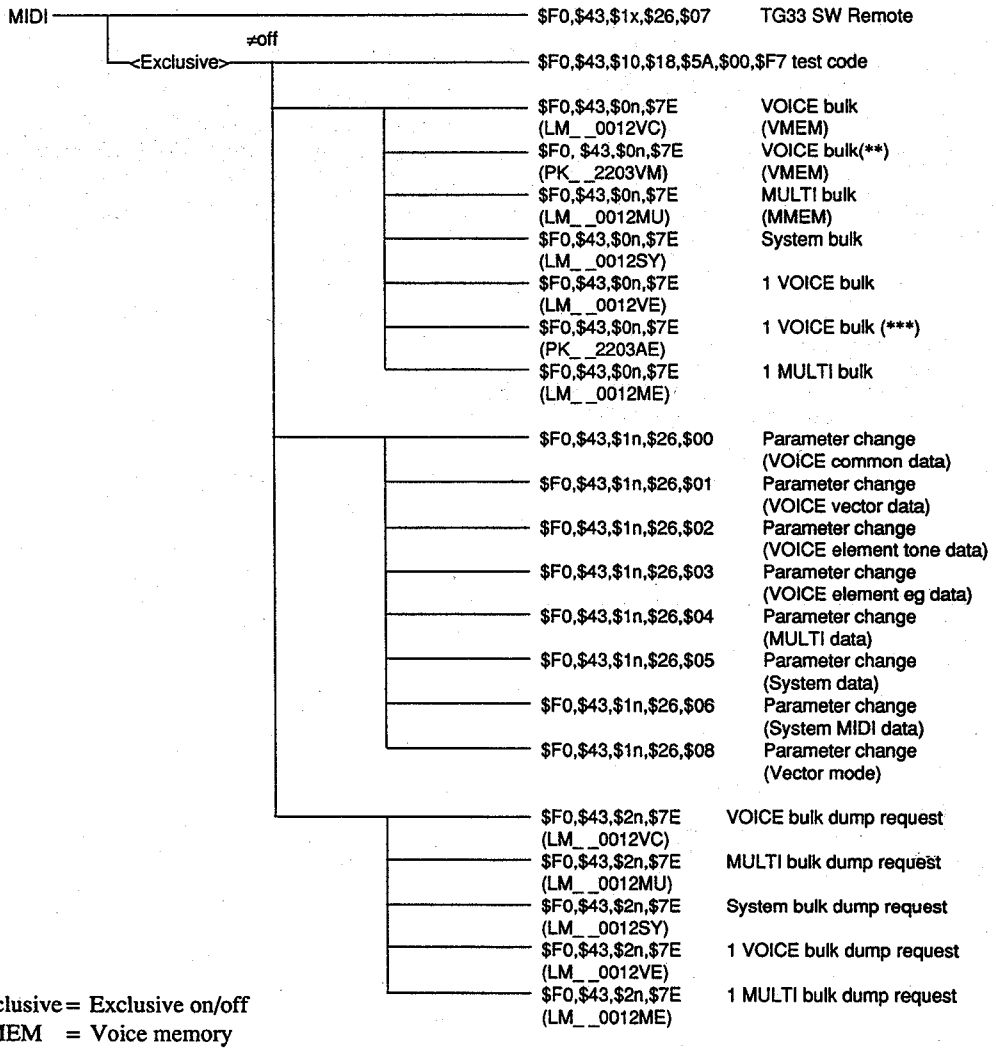
## 1. MIDI reception/transmission block diagram

<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.

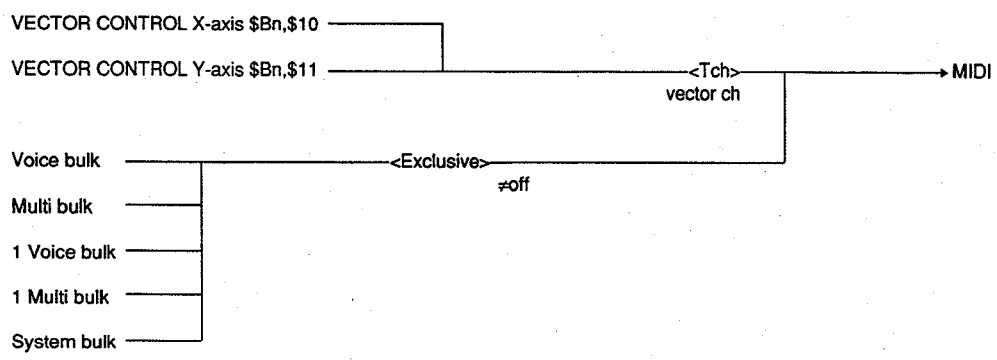
<MIDI reception conditions> 2/2




Exclusive = Exclusive on/off
VMEM = Voice memory
MMEM = Multi memory

(**) 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  aaaaaaa - ST of appended table 1-1
00000000  00
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-1
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-1
0000000d  d       - (MSB) B1 of appended table 1-1
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-1
0000000v  v       - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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  aaaaaaa - ST of appended table 1-2
00000000  00
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-2
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-2
0000000d  d       - (MSB) B1 of appended table 1-2
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-2
0000000v  v       - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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).

#### 3.1.3 Voice Element Tone Data parameter change

```
11110000  F0
01000011  43
0001nnnn  nnnn     - Device Number
00100110  26
00000010  02
0aaaaaaa  aaaaaaa - ST of appended table 1-3
000000bb  bb       - Element Number
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-3
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-3
0000000d  d       - (MSB) B1 of appended table 1-3
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-3
0000000v  v       - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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  aaaaaaa - ST of appended table 1-4
000000bb  bb       - Element Number
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-4
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-4
0000000d  d       - (MSB) B1 of appended table 1-4
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-4
0000000v  v       - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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  aaaaaaa - ST of appended table 1-5
0000bbbb  bbbb     - Channel Number
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-5
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-5
0000000d  d        - (MSB) B1 of appended table 1-5
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-5
0000000v  v        - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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  aaaaaaa - ST of appended table 1-6
00000000  00
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-6
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-6
0000000d  d        - (MSB) B1 of appended table 1-6
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-6
0000000v  v        - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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
00000110  06
0aaaaaaa  aaaaaaa - ST of appended table 1-7
00000000  00
0ccccccc  ccccccc - (MSB7bits) F1 of appended table 1-7
0ccccccc  ccccccc - (LSB7bits) F2 of appended table 1-7
0000000d  d        - (MSB) B1 of appended table 1-7
0ddddddd  ddddddd - (LSB7bits) B2 of appended table 1-7
0000000v  v        - Data Value (MSB)
0vvvvvvv  vvvvvvv - 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  sssssss - 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")                         |  Byte count shows
00100000  20(ascii" ")                         |  this area.
00100000  20(ascii" ")                         |
00110000  30(ascii"0")                         |
00110000  30(ascii"0")                         |
00110001  31(ascii"1")                         |  Check sum is 2's
00110010  32(ascii"2")                         |  compliment 7bits
01010110  56(ascii"V")                         |  sum of their
01000011  43(ascii"C")                         |  data bytes.
0ddddddd  ddddddd--+ VOICE DATA                |
↓         ↓        | (Appended table 2)       |
0ddddddd  ddddddd--+ (00~03)-------------------+
0sssssss  sssssss CHECK SUM
-------100 msec WAIT-----------------------------------------
0bbbbbbb  BYTE count(MSB)
0bbbbbbb  BYTE count(LSB)
0ddddddd  ddddddd--+ VOICE DATA
↓         ↓        | (Appended table 2)
0ddddddd  ddddddd--+ (04~07)
0sssssss  sssssss CHECK SUM
-------100 msec WAIT-----------------------------------------
```

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")                         |  Byte count
00100000  20(ascii" ")                         |  shows this area.
00100000  20(ascii" ")                         |
00110000  30(ascii"0")                         |
00110000  30(ascii"0")                         |
00110001  31(ascii"1")                         |  Check sum is
00110010  32(ascii"2")                         |  2's compliment
01010110  56(ascii"V")                         |  7bits sum of
01000101  45(ascii"E")                         |  their data bytes.
0ddddddd  ddddddd--+ VOICE DATA                |
↓         ↓        | (Appended table 2)-------+
0ddddddd  ddddddd--+
0sssssss  sssssss CHECK SUM
11110111  F7
```

- 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")                         |  Byte count shows
00100000  20(ascii" ")                         |  this area.
00100000  20(ascii" ")                         |
00110000  30(ascii"0")                         |
00110000  30(ascii"0")                         |
00110001  31(ascii"1")                         |  Check sum is
00110010  32(ascii"2")                         |  2's compliment
01001101  4D(ascii"M")                         |  7bits sum of
01010101  55(ascii"U")                         |  their data bytes.
0ddddddd  ddddddd--+ MULTI DATA                |
↓         ↓        | (Appended table 3)       |
0ddddddd  ddddddd--+ (00~15)-------------------+
0sssssss  sssssss CHECK SUM
11110111  F7
```

- 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")                         |  Byte count shows
00100000  20(ascii" ")                         |  this area.
00100000  20(ascii" ")                         |
00110000  30(ascii"0")                         |
00110000  30(ascii"0")                         |
00110001  31(ascii"1")                         |  Check sum is
00110010  32(ascii"2")                         |  2's compliment
01001101  4D(ascii"M")                         |  7bits sum of
01000101  45(ascii"E")                         |  their data bytes.
0ddddddd  ddddddd--+ MULTI DATA                |
↓         ↓        | (Appended table 3)-------+
0ddddddd  ddddddd--+
0sssssss  sssssss CHECK SUM
11110111  F7
```

- 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")                         |  Byte count shows
00100000  20(ascii" ")                         |  this area.
00100000  20(ascii" ")                         |
00110000  30(ascii"0")                         |
00110000  30(ascii"0")                         |
00110001  31(ascii"1")                         |  Check sum is
00110010  32(ascii"2")                         |  2's compliment
01010011  53(ascii"S")                         |  7bits sum of
01011001  59(ascii"Y")                         |  their data bytes.
0ddddddd  ddddddd---+  SYSTEM DATA             |
↓         ↓         |  (Appended table 4)-----+
0ddddddd  ddddddd---+
0sssssss  sssssss CHECK SUM
11110111  F7
```

- 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<br>1:Rev Room<br>2:Rev Plate<br>3:Rev Club<br>4:Rev Metal<br>5:Delay 1<br>6:Delay 2<br>7:Delay 3<br>8:Doubler<br>9:Ping_Pong<br>10:Pan Ref<br>11:Early Ref<br>12:Gate Rev<br>13:Dly&Rev 1<br>14:Dly&Rev 2<br>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<br>–99~$3F:+99 |
| 21 | $07 | $00 | $19 | $01 | $7F | EG RELEASE RATE | $C1:–99~$00:0<br>–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<br>1:10msec<br>:<br>15:150msec |
| 1 | $03 | $00 | $01 | $01 | $7F | DETUNE SPEED | 0:160msec<br>1:10msec<br>:<br>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<br>$60:–2<br>$70:–1<br>$00:+0<br>$10:+1<br>$20:+2<br>$30:+3 |
| 3 | $04 | $00 | $02 | $01 | $70 | VELOCITY SENSITIVITY | $06:–5<br>$07:–4<br>$08:–3<br>$09:–2<br>$0A:–1<br>$00:+0<br>$01:+1<br>$02:+2<br>$03:+4<br>$04:+4<br>$05:+5 |
| 4 | $07 | $00 | $03 | $00 | $1F | LFO TYPE | $00:saw down<br>$20:triangle<br>$40:square<br>$60:sample & hold<br>$80:saw up |
| 5 | $09 | $00 | $03 | $01 | $60 | LFO SPEED | $00~$1F |
| 6 | $08 | $00 | $04 | $01 | $7F | LFO DELAY | 0:0~127:99 |
| 7 | $08 | $00 | $05 | $01 | $7F | LFO RATE | 127:0~0:99 |
| 8 | $07 | $00 | $06 | $01 | $70 | LFO AM | $00~$0F |
| 9 | $07 | $00 | $07 | $01 | $60 | LFO PM | $00~$1F |
| 10 | $03 | $00 | $08 | $01 | $78 | PAN | $00:left<br>$01:left center<br>$02:center<br>$03:right center<br>$04:right |
| 11 | $02 | $00 | $09 | $01 | $7F | VOLUME | 127:0~0:99 |

(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<br>$60:–2<br>$70:–1<br>$00:+0<br>$10:+1<br>$20:+2<br>$30:+3 |
| 3 | $04 | $00 | $18 | $01 | $70 | VELOCITY SENSITIVITY | $06:–5<br>$07:–4<br>$08:–3<br>$09:–2<br>$0A:–1<br>$00:+0<br>$01:+1<br>$02:+2<br>$03:+3<br>$04:+4<br>$05:+5 |
| 4 | $07 | $00 | $19 | $00 | $1F | LFO TYPE | $00:saw down<br>$20:triangle<br>$40:square<br>$60:sample & hold<br>$80:saw up |
| 5 | $09 | $00 | $19 | $01 | $60 | LFO SPEED | $00~$1F |
| 6 | $08 | $00 | $1A | $01 | $7F | LFO DELAY | 0:0~127:99 |
| 7 | $08 | $00 | $1B | $01 | $7F | LFO RATE | 127:0~0:99 |
| 8 | $07 | $00 | $1C | $01 | $70 | LFO AM | $00~$0F |
| 9 | $07 | $00 | $1D | $01 | $60 | LFO PM | $00~$1F |
| 10 | $03 | $00 | $1E | $01 | $78 | PAN | $00:left<br>$01:left center<br>$02:center<br>$03:right center<br>$04:right |
| 11 | $06 | $00 | $1F | $01 | $78 | FEED BACK | $00~$07 |
| 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<br>$10:preset<br>$20:piano<br>$30:guitar<br>$40:pluck<br>$50:brass<br>$60:strings<br>$70:organ |
| 1 | $07 | $00 | $0B | $00 | $0F | LEVEL SCALING | $00:1~$F0:16 |
| 2 | $08 | $00 | $0B | $01 | $78 | RATE SCALING | $00:1~$07:8 |
| 3 | $01 | $00 | $0C | $00 | $7F | DELAY ON/OFF | $00:off, $80:on |
| 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<br>$10:preset<br>$20:piano<br>$30:guitar<br>$40:pluck<br>$50:brass<br>$60:strings<br>$70:organ |
| 1 | $07 | $00 | $2F | $00 | $0F | LEVEL SCALING | $00:1~$F0:16 |
| 2 | $08 | $00 | $2F | $01 | $78 | RATE SCALING | $00:1~$07:8 |
| 3 | $01 | $00 | $30 | $00 | $7F | DELAY ON/OFF | $00:off, $80:on |
| 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<br>1:Rev Room<br>2:Rev Plate<br>3:Rev Club<br>4:Rev Metal<br>5:Delay 1<br>6:Delay 2<br>7:Delay 3<br>8:Doubler<br>9:Ping_Pong<br>10:Pan Ref<br>11:Early Ref<br>12:Gate Rev<br>13:Dly&Rev 1<br>14:Dly&Rev 2<br>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 |
|---|---|---|---|---|---|---|---|
| | | | | | | <The same structure in the order of | channels 1~16 in the following> |
| 0 | $00 | $00 | $00 | $01 | $77 | 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)<br>1:Preset1<br>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<br>1:left center<br>2:center<br>3:right center<br>4:right<br>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 | DRM 2/4 | | |
| 01 | | | 0 | 0 | 0 | 0 | ---EFFECT----- | | | | |
| 02 | | | 0 | ------EFFECT BALANCE------- | | | | | | | |
| 03 | | | 0 | -------((don't care))------ | | | | | | | |
| 04 | | | 0 | -------((don't care))------ | | | | | | | |
| 05 | | | 0 | -------((don't care))------ | | | | | | | |
| 06 | | | 0 | ------EFFECT SEND---------- | | | | | | | |
| 07 | | | 0 | -------((don't care))------ | | | | | | | |
| 08 | | | 0 | -------((don't care))------ | | | | | | | |
| 09 | | | 0 | -------((don't care))------ | | | | | | | |
| 0A | | | 0 | -------((don't care))------ | | | | | | | |
| 0B | | | 0 | -------((don't care))------ | | | | | | | |
| 0C | | | 0 | ---------NAME 1----------- | | | | | | | |
| 0D | | | 0 | ---------NAME 2----------- | | | | | | | |
| 0E | | | 0 | ---------NAME 3----------- | | | | | | | |
| 0F | | | 0 | ---------NAME 4----------- | | | | | | | |
| 10 | | | 0 | ---------NAME 5----------- | | | | | | | |
| 11 | | | 0 | ---------NAME 6----------- | | | | | | | |
| 12 | | | 0 | ---------NAME 7----------- | | | | | | | |
| 13 | | | 0 | ---------NAME 8----------- | | | | | | | |
| 14 | | | 0 | 0 | 0 | 0 | -PITCH BEND R- | | | | |
| | | | 0 | -AFTER TUCH- | | | PIT -WHEEL- | | | | |
| 15 | | | 0 | LEV | PM | AM | 0 | TYP | PM | AM | |
| 16 | 17 | → | 0 | -----AFTER PITCH---------- | | | | | | | |
| 18 | | | 0 | -----EG DELAY RATE--------- | | | | | | | |
| 19 | 1A | → | 0 | --COMMON ENV. ATTACK------- | | | | | | | |
| 1B | 1C | → | 0 | --COMMON ENV. RELEASE------ | | | | | | | |
| ********** | | | | ELEMENT A ********** | | | | | | | |
| 1D | | | 0 | -------WAVE NO.----------- | | | | | | | |
| 1E | 1F | → | 0 | ----FREQUENCY SHIFT-------- | | | | | | | |
| 20 | | | 0 | -AFTER SNS- -VELOCITY TYP-- | | | | | | | |
| 21 | 22 | → | 0 | LFO TYP -----LFO SPEED----- | | | | | | | |
| 23 | 24 | → | 0 | -----LFO DELAY TIME-------- | | | | | | | |
| 25 | 26 | → | 0 | -----LFO DELAY RATE-------- | | | | | | | |
| 27 | | | 0 | 0 | 0 | AM | ---AM DEPTH---- | | | | |
| 28 | | | 0 | 0 | PM | ----- | PM DEPTH----- | | | | |
| 29 | | | 0 | --EG TYPE-- | 0 | ----PAN---- | | | | | |
| 2A | | | 0 | --------VOLUME------------ | | | | | | | |
| 2B | | | 0 | 0 | --DT2-- | ----- | DT1-------- | | | | |
| 2C | 2D | → | 0 | -L.SCALING- | --RATE SCALING- | | | | | | |
| 2E | 2F | DLAY | 0 | 0 | ------EG AR------------ | | | | | | |
| 30 | 31 | → | 0 | MAX | ------EG D1R----------- | | | | | | |
| 32 | | | 0 | 0 | ------EG D2R----------- | | | | | | |
| 33 | | | 0 | 0 | ------EG RR------------ | | | | | | |
| 34 | | | 0 | ----------EG IL------------ | | | | | | | |
| 35 | | | 0 | ----------EG AL------------ | | | | | | | |
| 36 | | | 0 | ----------EG D1L----------- | | | | | | | |
| 37 | | | 0 | ----------EG D2L----------- | | | | | | | |
| 38 | | | 0 | -------((don't care))------ | | | | | | | |
| 39 | | | 0 | -------((don't care))------ | | | | | | | |
| ********** | | | | ELEMENT B ********** | | | | | | | |
| 3A | 3B | → | 0 | -------WAVE NO.----------- | | | | | | | |
| 3C | 3D | → | 0 | ----FREQUENCY SHIFT-------- | | | | | | | |
| 3E | | | 0 | -AFTER SNS- -VELOCITY TYP-- | | | | | | | |
| 3F | 40 | → | 0 | LFO TYP -----LFO SPEED----- | | | | | | | |
| 41 | 42 | → | 0 | -----LFO DELAY TIME-------- | | | | | | | |
| 43 | 44 | → | 0 | -----LFO DELAY RATE-------- | | | | | | | |
| 45 | | | 0 | 0 | 0 | AM | ---AM DEPTH---- | | | | |
| 46 | | | 0 | 0 | PM | ----- | PM DEPTH----- | | | | |
| 47 | | | 0 | --EG TYPE-- | 0 | ----PAN---- | | | | | |
| 48 | | | 0 | --CONNECT-- | 0 | --FEEDBACK- | | | | | |
| 49 | 4A | MFX | 0 | --M WAVE--- | ----M MULTI---- | | | | | | |
| 4B | | | 0 | --------TONE LEVEL--------- | | | | | | | |
| 4C | | | 0 | 0 | -M DT2- | ----M DT1------ | | | | | |
| 4D | 4E | → | 0 | M L.SCALING | -M RATE SCALING | | | | | | |
| 4F | 50 | MDY | 0 | 0 | ------M EG AR---------- | | | | | | |
| 51 | 52 | → | 0 | MAX | ------M EG D1R--------- | | | | | | |
| 53 | | | 0 | 0 | ------M EG D2R--------- | | | | | | |
| 54 | | | 0 | 0 | ------M EG RR---------- | | | | | | |
| 55 | | | 0 | ----------M EG IL---------- | | | | | | | |
| 56 | | | 0 | ----------M EG AL---------- | | | | | | | |
| 57 | | | 0 | ----------M EG D1L--------- | | | | | | | |
| 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 | ----------C EG IL---------- | | | | | | | |
| 66 | | | 0 | ----------C EG AL---------- | | | | | | | |
| 67 | | | 0 | ----------C EG D1L--------- | | | | | | | |
| 68 | | | 0 | ----------C EG D2L--------- | | | | | | | |
| 69 | | | 0 | -------((don't care))------ | | | | | | | |
| 6A | | | 0 | -------((don't care))------ | | | | | | | |
| ********** | | | | ELEMENT C ********** | | | | | | | |
| 6B | | | 0 | -------WAVE NO.----------- | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| 85 | | | 0 | ----------EG D2L---------- | | | | | | | |
| 86 | | | 0 | -------((don't care))------ | | | | | | | |
| 87 | | | 0 | -------((don't care))------ | | | | | | | |
| ********** | | | | ELEMENT D ********** | | | | | | | |
| 88 | 89 | | 0 | -------WAVE NO.----------- | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| B6 | | | 0 | ----------C EG D2L--------- | | | | | | | |
| B7 | | | 0 | -------((don't care))------ | | | | | | | |
| B8 | | | 0 | -------((don't care))------ | | | | | | | |
| ********** | | | | VECTOR ********** | | | | | | | |
| B9 | | | 0 | 0 | 0 | 0 | --LEVEL SPEED-- | | | | |
| BA | | | 0 | 0 | 0 | 0 | --DETUNE SPEED- | | | | |
| ********** | | | | LEVEL VECTOR ********** | | | | | | | |
| BB | BC | → | 0 | --LEVEL TIME INTERVAL STEP- | | | | | | | |
| BD | | | 0 | ---------LEVEL X-axis------ | | | | | | | |
| BE | | | 0 | ---------LEVEL Y-axis------ | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| ********** | | | | DETUNE VECTOR ********** | | | | | | | |
| 183 | 184 | → | 0 | -DETUNE TIME INTERVAL STEP- | | | | | | | |
| 185 | | | 0 | --------DETUNE X-axis------ | | | | | | | |
| 186 | | | 0 | --------DETUNE Y-axis------ | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| : | | | | | | | | | | | |
| 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='0000000'

| 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----- | | | | | | | |
| | | | | | | | | GRP2 | GRP1 |
| 07 | 0 | 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 | VSW 1/2 | 0 | 0 | | |
| 21 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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  --------TRANSPOSE----------
 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

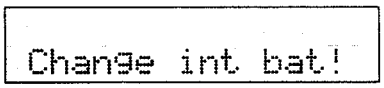
YAMAHA [ Tone Generator ] Date :13-JUL-1990
Model TG33 MIDI Implementation Chart Version : 1.00

| 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 Number | | x | 0 - 127 | |
| | True voice | ********** | 19 - 114 | |
| Velocity | Note ON | x | o v=1-127 | |
| | Note OFF | x | x | |
| After Touch | Key's | x | x | |
| | Ch's | x | o | |
| Pitch Bender | | x | o 0-12 semi | 7 bit resolution |
| Control Change | 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 |
| | 32 | x | o | Bank Select LSB |
| | 64 | x | o | Sustain |
| Reset All Cntrls | | x | o | |
| Prog Change | | x | o 0-79 | with Bank Select |
| | True # | ********** | *2 | |
| System Exclusive | | o *3 | o | *3 Voice Parameters |
| System Common | Song Pos | x | x | |
| | Song Sel | x | x | |
| | Tune | x | x | |
| System Real Time | Clock | x | x | |
| | Commands | x | x | |
| Aux Mes- sages | Local ON/OFF | x | x | |
| | All Notes OFF | x | x | |
| | Active Sense | x | o | |
| | 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.

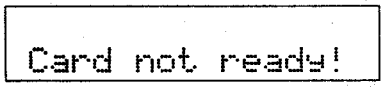
Mode 1 : OMNI ON, POLY Mode 2 : OMNI ON, MONO o : Yes
Mode 3 : OMNI OFF, POLY Mode 4 : OMNI OFF, MONO x : No

## ■ERROR MESSAGES（エラーメッセージ）



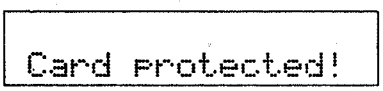

The internal memory backup battery voltage has dropped to an unsafe level.

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。



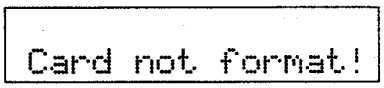

You have attempted to perform a data card operation (save, load, format, etc.) while no data card is present in the TG33 card slot.

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。




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。

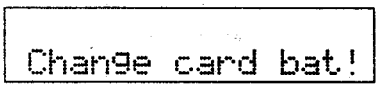



You have attempted to save or load using a card that has not been properly formatted for use with TG33.

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。

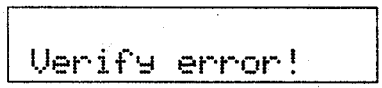

You have attempted to save to, compare or format a 32k card while card bank 2 ($C_2$) is selected.

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。




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。




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

F G H I J K L

RD

PRESET

VCC

CRH LED9 P77 D32

CRL LED7 P75 D14

P72 D11

PRH LED10 CA P70 D2S

PRL LED11

3 CC P76 D1S

11 CC P71 D10

4 CC P77 D16

12 CC P70 D9

5 CB P74 D21

13 CB P73 D20

6 CB P75 D22

14 CB P72 D19

7 CB P76 D23

15 CB P71 D18

8 CB P77 D24

16 CB P70 D17

DEMO J P15

38CC1-8810093

LCD

CN3 VSS VPP RS R/W E D0 D1 D2 D3 D4 D5 D6 D7

+5D C25 0.1(u)

CN1 CN4 +5D C24 0.1(u)

VCC DET LEV EFB EDT VOI MUL CRL INT CRH PRH PRT

LEDA5 LEDA4 LEDA6 LEDA3 LEDA1 LEDA2 LEDB3 LEDB1 LEDB2 LEDB4 LEDB5

R/W RS LCDD0 LCDD1 LCDD2 LCDD3 LCDD4 LCDD5 LCDD6 LCDD7

LEDA1 R58 470X2 LEDA2 R59

470X9 33

LEDA3 R60 LEDA4 R61 35 LEDA5 R62 LEDA6 R63 LEDB1 R64 LEDB2 R65 LEDB3 R66 40 LEDB4 R67 LEDB5 R68

RA4 10KX8

LCDD0 LCDD1 45 LCDD2 LCDD3 LCDD4 LCDD5 50 LCDD6 LCDD7

RA5 10KX6

R49 10K

GEW5A GEW5B 55

RES GSEL

SFCB

IC18

IC19

C48 0.1(u)

RES RST VBB

SRAM IC4 MSM256BP

RAM IC5 LC3664RL

C35 4.7/16 C36 0.1(u)

Analog Switch IC21 HC4066

R15 4.7K R25 4.7K R34 100K C22 0.01 C21 0.01 C45 0.01 C33 0.01

Reset IC22 C38 10/16 C37 22/16

IC20 IC19 R57 47K R56 47 R55 10K

TR3 TR4 R52 10K R51 10K R50 10K D3 R54 47K R53 15K SLIT BT1

RA7 1/2 10K R24 1K

ROM-A IC2 ROM-B IC3

J2 J1 A17 C31 47/16

Transceiver IC15 AC245 C12 0.1(u)

Vbb RAM2 ROM2 Address Bus Data Bus

RD R/W RAM1 ROM1 WR

ϕ WR DS AS CRS WAIT CST MR IC GEW5A GSEL SFC

Transceiver IC74HC245 C8 0.1(u)

CASO00 CASO01 CASO02 CASO10 CASO11 CASO12 CASI00 CASI01 CASI02 CASI10 CASI11 CASI12 S000 S001 S002 S010 S011

GEW5B RD WR GEW5A A0, A1

J K L M N O

DEMO J P15

8 P76 CB P77 D24

16 P71 CB P70 D17

38CC1-8810093

LCD

| IC2 | IC3 | J1 | J2 | J3 | J4 |
|---|---|---|---|---|---|
| 1M | 1M | × | ○ | ○ | × |
| 2M | × | ○ | × | × | ○ |

(○:installed ×:not installed)

CN3 VSS VDD RS R/W E D0 D1 D2 D3 D4 D5 D6 D7

CN1 CN4

VCC DET LEV EFB EDT VOI MUL CRL INT CRH PRH PRT

LEDA5 LEDA4 LEDA6 LEDA3 LEDA1 LEDA2 LEDB3 LEDB1 LEDB2 LEDB4 LEDB5

LCDD0 LCDD1 LCDD2 LCDD3 LCDD4 LCDD5 LCDD6 LCDD7

LEDA1 LEDA2 LEDA3 LEDA4 LEDA5 LEDA6 LEDB1 LEDB2 LEDB3 LEDB4 LEDB5 — R58 R59 R60 R61 R62 R63 R64 R65 R66 R67 R68 470X2 470X9 RA4 10KX8

LED-A3 LED-A4 LED-A5 LED-A6 LED-B1 LED-B2 LED-B3 LED-B4 LED-B5 AS LCD-D0 LCD-D1 LCD-D2 LCD-D3 LCD-D4 VDD LCD-D5 LCD-D6 LCD-D7 LCD-E GEWA GEWB SFC FDC LEDC PAGE3 PAGE7 RES GSEL SFI0 SFI1

IC18 IC18 IC18 IC19

C48 0.1(u) C24 0.1(u) C25 0.1(u) C12 0.1(u) C8 0.1(u)

R/W RS RES RST AS A0 VBB

IC21 HC4066 (Analog Switch)

1I0 10I 20I 2I0 2C 3C GND — VCC 1C 4C 4I0 40I 30I 3I0

R25 4.7K R34 100K C45 0.01 C33 0.01

IC20 IC19

R57 47K R56 47 C37 22/16 R55 10K

TR3 TR4 R52 10K R51 10K R50 10K R54 47K R53 15K D3 SLIT BT1

IC15 AC245 (Transceiver)

VCC G B1 B2 B3 B4 B5 B6 B7 B8 — D0 D1 D2 D3 D4 D5 D6 D7

Data Bus

GEWSA GEWSB GSEL

RA5 10KX6 R49 10K

*Gate Array*

IC24

SP-33

CARDA15 CARDA14 CARDA13 CARDA12 CARDA11 CARDA10 CARDA9 CARDA8 CARDA7 CARDA6 CARDA5 CARDA4 CARDA3 CARDA2 CARDA1 CARDA0 CARDD7 CARDD6 CARDD5 CARDD4 CARDD3 CARDD2 CARDD1 CARDD0

RA3 10KX10 RA2 10KX10 RA1 10KX8

LED-A2 LED-A1 CARD-CE CARD-OE CARD-WE CARD-A15 CARD-A14 CARD-A13 CARD-A12 CARD-A11 CARD-A10 CARD-A9 CARD-A8 CARD-A7 CARD-A6 VSS CARD-A5 CARD-A4 CARD-A3 CARD-A2 CARD-A1 CARD-A0 CARD-D7 CARD-D6 CARD-D5 CARD-D4 CARD-D3 CARD-D2 CARD-D1 CARD-D0 WAIT VDD

VDD SFI2 SEF3 SFI4 SF00 SF01 SF02 SF03 SF04 SRI0 SRI1 SRI2 SR00 SR01 SR02 XCLK VSS CRS CDI CDO CLK SYWI SYWO R/W RAM1 RAM2 ROM1 ROM2 ROM3 SYSCLK A19 A18

SFCB-L+R SFCA-L+R SFCB-L/R SFCA-L/R

RA6 10KX8 RA7 2/2 10KX5

SR00 REV SYW MIX02 MIX01 MIX00 CDL

J3 J4 A17

WAIT DS RD WR D0 D1 D2 D3 D4 D5 D6 D7 A0 A1 A2 A3 VDD A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14 A15 A16 A17 RA17 VSS

RAM2 ROM2 RAM1 ROM1

Address Bus

Data Bus

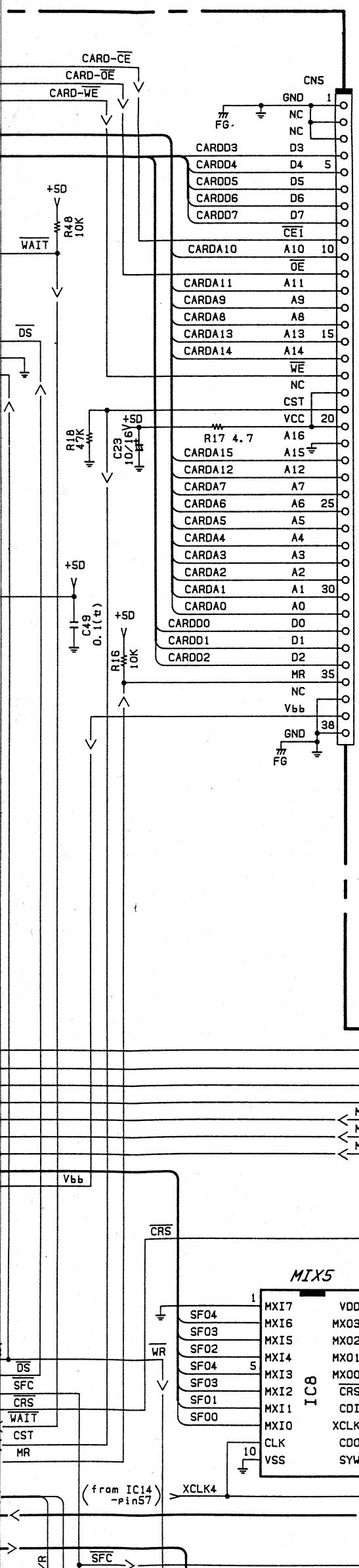
RD R/W WR DS AS CRS WAIT CST MR IC GEWSA GSEL

SFC

IC IC SFCA SFCB CASCADE OUT A CASCADE OUT B

CDS

# TG33




**Notes)**

Circuit Board: DM (VJ789400) XI013C0

1. IC
   - IC 1: HD6475328CP-10 (XI119A00) CPU <H8/532>
   - IC 2: 012AV030 (XI117A00) EPROM A 1M Ver 0.3
   - IC 3: 012BV030 (XI118A00) EPROM B 1M Ver 0.3
   - IC 4: M5M5255BP-10LL (XH080A00) SRAM 256K
   - IC 5: LC3664RL-12 (XG517A00) SRAM 64K
   - IC 6: TC51832PL-10 (XC628A00) PSRAM 256K
   - IC 7: YM3413 (XE449A00) LDSP
   - IC 8: TMC57800N (XG662A00) MIX5
   - IC 9, 10: TMC3489NL (XE755A00) SFC
   - IC11~14: TMC3493APH (XF987A00) GEW5
   - IC15: TC74AC245P (XH608A00) BUS TRANSCEIVER
   - IC16: PQ05RF1 (XI124A00) REGULATOR 5V 1A
   - IC17, 23: TC74HC245AP (IR024500) BUS BUFFER
   - IC18: TC74AC08P (XG656A00) AND
   - IC19: TC74AC04P (XG655A00) INVERTER
   - IC20: SN74HC14N (IR001450) INVERTER
   - IC21: TC74HC4066AP (IR406600) A-SWITCH
   - IC22: PST518B-2 (IG116200) SYSTEM RESET
   - IC24: LC92030C-477 (XI074A00) GATE ARRAY SP33
   - IC25: LC92018B-476 (XI045A00) GATE ARRAY RI54
   - IC26: HN62324BPC68 (XI796A00) ROM 4M VOICE
   - IC27: HN62324BPC69 (XI797A00) ROM 4M VOICE
   - IC28: TC40HC004P (IG051000) INVERTER
2. Photo Coupler
   - PC 1: 6N137 (VD473200)
3. Transistor
   - TR 1, 2: 2SC1740S R,S (IC174070)
   - TR 3: 2SA1015 O, Y (IA101570)
   - TR 4: 2SC1815 Y,GR (IC181580)
   - TR 5: 2SD880 O, Y (ID088000)
4. Diode
   - D 1: 11ES4 (VB481900)
   - D 2, 3: 1SS133 (IF003450)
5. Zener Diode
   - ZD 1: MTZ9.1A 9.1V (VA095500)
6. Resistor Array
   - RA 1, 4, 6: RGLD8X103J (VE445200) 10K × 8
   - RA 2, 3, 10, 11: RGLD10X103J (VH564300) 10K × 10
   - RA 5, 7~9: RMLS6J103 (HZ004650) 10K × 6
7. Electrolytic Cap.
   - C 1: 2200μF 16V (VH603700)
   - C 2, 3: 220μF 16V (UJ138220)
   - C 7: 470μF 10V (UJ828470)
8. Tantalum Capacitor
   - C35: 4.7μF 16V M (FP736470)
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 16V M (FZ004100)
10. Coil
    - L 1~6: FL5R200QNT 20μ (VB835000)
11. EMI Filter
    - EMI 1~3: LS MT Y223NB 0.022 (FZ006970)
12. Quartz Crystal Unit
    - CL 1: 20MHz AT-49 (VI927300)
    - CL 2: 12.8MHz AT-49 (VI460600)
13. Connector
    - JK 1: X-G9242 (VH303600) DC 10V 700mA IN
14. DIN Connector
    - JK 2: 3P YKF51-5046 (VI466400) MIDI
15. Lithium Battery
    - BT 1: CR2032 (VE338400)
16. Connector, Card
    - CN 5: 38P (VF821100) CARD

**Notes)**

Circuit Board: PN (VJ789200) XI015A0

1. Diode
   - D 1~33: 1SS133 (IF003450)
2. LED
   - LED 1~11: SLZ-181B09T6 RE (VI813100)

**Notes)**

Circuit Board: JKAN1/4 (XI014C0)

1. 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
2. Transistor
   - TR 1: 2SA1015 Y (IA101520)
   - TR 2~5: 2SC2878 A, B (IC287800)
3. Diode
   - D 5~12: 1SS133 (IF003450)
4. Zener Diode
   - D 1~4: RD3.6EB1 3.6V (IF001660)
5. Trimmer Potentiometer
   - VR 1~4: B10K EVN (VA024800)
6. Electrolytic Cap.
   - C43, 52~55: 220μF 16V (FZ006950)
7. Semiconductive Cera. Cap.
   - C 1, 2, 60~69: 0.1μF 16V M (FZ004100)
8. Coil
   - L 1~4, 7: FL5R200QNT 20μH (VB835000)
9. Phone Jack
   - JK 1~4: HLJ4306 Mono (VE742000) OUTPUT
10. Jumper wire, R89

| J101 | J102 | J103 | J104 | marked * | R89 |
|---|---|---|---|---|---|
| × | ○ | ○ | × | × (4 pcs) | × |

(○: installed ×: not installed)

**Notes)**

Circuit Board: JKAN2/4 XI014C0

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

**Notes)**

Circuit Board: JKAN3/4 XI014C0

1. Variable Resistor
   - VR 5: A10K × 2 (VF636100) MASTER VOLUME

**Notes)**

Circuit Board: JKAN4/4 XI014C0

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

38CB1-8810095

## JKAN 4/4

DATA ENTRY

CN7 CN6 +5V D.E GND VR6 B10K C26 0.1(μ) +5A

V-Y V-X D.E

Data Bus

RD R/W WR DS AS CRS WAIT CST MR

C55 C56 0.01(μ) X2

### Gate Array
IC25
RI54

+5D MCLK SYW MD7-A MD6-A MD5-A

PCM PSRAM RAM DEV GEW5A GEW5B GEW5C SFC AS A19 VSS VDD A18 A3 A2 MCLK SYW DATA7 DATA6 DATA5

ADRA20 ADRA19 ADRA18 ADRA17 ADRA16 ADRA15 ADRA14 ADRA13 ADRA12 ADRA11 ADRA10 ADRA9 ADRA8 ADRA7 ADRA6 ADRA5 ADRA4 ADRA3 ADRA2 ADRA1 ADRA0

MA19-A MA18-A MA17-A MA16-A MA15-A MA14-A MA13-A MA12-A MA11-A MA10-A MA9-A MA8-A MA7-A MA6-A MA5-A MA4-A MA3-A MA2-A MA1-A MA0-A

ADRB20 ADRB19 ADRB18 ADRB17 ADRB16 ADRB15 ADRB14 ADRB13 ADRB12 ADRB11 ADRB10 ADRB9 ADRB8 ADRB7 ADRB6 ADRB5 ADRB4 ADRB3 VSS VDD ADRB2 ADRB1 ADRB0 ADRS0 ADRS1 ADRS17 ADRS2 ADRS16 ADRS3

MA19-B MA18-B MA17-B MA16-B MA15-B MA14-B MA13-B MA12-B MA11-B MA10-B MA9-B MA8-B MA7-B MA6-B MA5-B MA4-B MA3-B C53 10/16 MA2-B MA1-B MA0-B A0 A1 A17 A2 A16 A3

DATA4 DATA3 DATA2 DATA1 DATA0 DATB7 DATB6 DATB5 DATB4 DATB3 DATB2 DATB1 DATB0 ADRS20 ADRS20 ADRS19 ADRS19 ADRS9 ADRS18 ADRS10 ADRS8 ADRS11 ADRS7 ADRS12 ADRS6 ADRS13 ADRS5 ADRS14 ADRS4 ADRS15

MD4-A MD3-A MD2-A MD1-A MD0-A MD7-B MD6-B MD5-B MD4-B MD3-B MD2-B MD1-B MD0-B WROM-2CE WROM-CE A9 A18 A10 A8 A11 A7 A12 A6 A13 A5 A14 A4 A15

### Transceiver
IC23 74HC245
DIR A1 A2 A3 A4 A5 A6 A7 A8 GND VCC G B1 B2 B3 B4 B5 B6 B7 B8
CAS000 CAS001 CAS002 CAS010 CAS011 CAS012
CASI00 CASI01 CASI02 CASI10 CASI11 CASI12
+5D C17 0.1(μ) RA9 10KX6

MA-A Bus MD-A Bus MD-B Bus MA-B Bus

IC28 MLCK SYW

IC28 +5D C57 0.1(μ)

IC8 +5D C50 0.1(μ)

IC19 +5D C51 0.1(μ)

IC20 +5D C52 0.1(μ)

### ROM
IC26 IC27
VPP A16 A15 A12 A7 A6 A5 A4 A3 A2 A1 A0 D0 D1 D2 GND VCC A18 A17 A14 A13 A8 A9 A11 OE A10 CE D7 D6 D5 D4 D3
WROM1-CE WROM2-CE C54 0.1(μ)

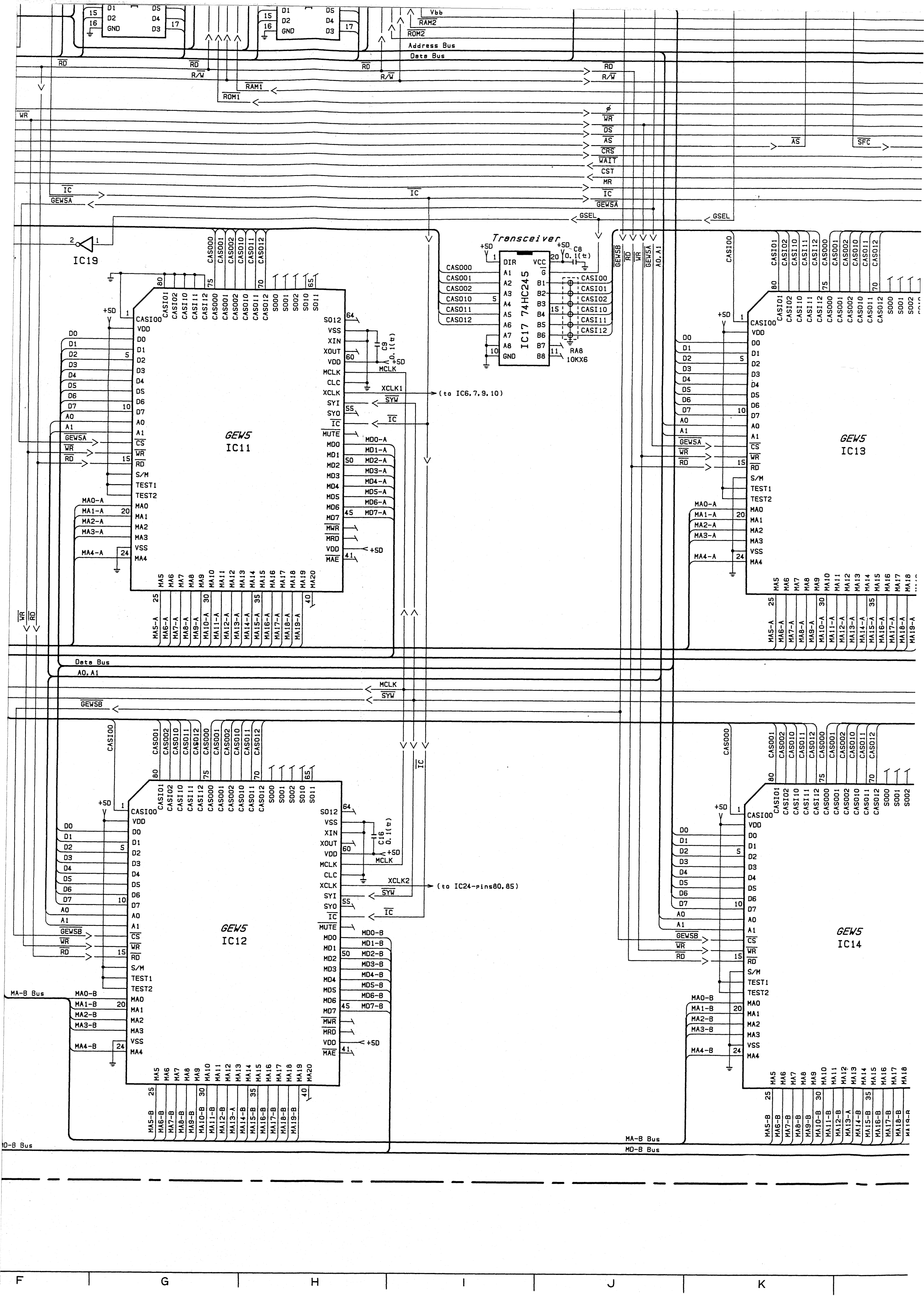
MA-B Bus MD-B Bus

POWER DC-IN 10V CN1 JK1 J5 J6 D1 EMI2 0.022 +VA (CN20-2) AG2 (CN20-1) FG

IC16 C1 2200/16 C5 0.1(μ) C6 0.1(μ) C7 470/10 R1 270 R2 100 C2 220/16 C3 220/16 C4 0.1(μ) ZD1 TR5

+5A +5D (CN2-1) (CN2-2) DG ADG +BA(CN20-3) AG1(CN20-4)

**TG33**


RD
R/W
RAM1
ROM1
WR
IC
GEWSA
Vbb
RAM2
ROM2
Address Bus
Data Bus
AS
SFC
GSEL
Transceiver
IC17 74HC245
DIR
VCC
G
A1
A2
A3
A4
A5
A6
A7
A8
GND
B1
B2
B3
B4
B5
B6
B7
B8
C8
0.1(u)
RA8
10KX6
GEWSB
IC19
CASI00
CASI01
CASI02
CASI10
CASI11
CASI12
CAS000
CAS001
CAS002
CAS010
CAS011
CAS012
S000
S001
S002
S010
S011
S012
VDD
VSS
XIN
XOUT
MCLK
CLC
XCLK
SYI
SYO
MUTE
MWR
MRD
MAE
C9
C16
XCLK1
XCLK2
(to IC6,7,9,10)
(to IC24-pins80,85)
SYW
MDO-A
MD1-A
MD2-A
MD3-A
MD4-A
MD5-A
MD6-A
MD7-A
MDO-B
MD1-B
MD2-B
MD3-B
MD4-B
MD5-B
MD6-B
MD7-B
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
CS
S/M
TEST1
TEST2
MA0
MA1
MA2
MA3
MA4
MA0-A
MA1-A
MA2-A
MA3-A
MA4-A
MA5-A
MA6-A
MA7-A
MA8-A
MA9-A
MA10-A
MA11-A
MA12-A
MA13-A
MA14-A
MA15-A
MA16-A
MA17-A
MA18-A
MA19-A
MA0-B
MA1-B
MA2-B
MA3-B
MA4-B
MA5-B
MA6-B
MA7-B
MA8-B
MA9-B
MA10-B
MA11-B
MA12-B
MA13-A
MA14-B
MA15-B
MA16-B
MA17-B
MA18-B
MA19-B
GEW5
IC11
IC12
IC13
IC14
MA-B Bus
MD-B Bus
Data Bus
AO, A1
MCLK
SYW
F
G
H
I
J
K

RAM2
ROM2
Address Bus
Data Bus
R/W
RAM1
ROM1
RD
R/W
φ
WR
DS
AS
CRS
WAIT
CST
MR
IC
GEW5A
GSEL
SFC
SFCA
SFCB
CASCADE OUT A
CASCADE OUT B
Transceiver
IC17 74HC245
DIR
A1
A2
A3
A4
A5
A6
A7
A8
GND
VCC
G
B1
B2
B3
B4
B5
B6
B7
B8
+5D
C8
0.1(t)
CASI00
CASI01
CASI02
CASI10
CASI11
CASI12
RA8
10KX6
GEW5B
RD
WR
GEW5A
A0, A1
GEW5
IC13
GEW5
IC14
VDD
D0
D1
D2
D3
D4
D5
D6
D7
A0
A1
CS
WR
RD
S/M
TEST1
TEST2
MA0
MA1
MA2
MA3
VSS
MA4
MA0-A
MA1-A
MA2-A
MA3-A
MA4-A
MA5
MA6
MA7
MA8
MA9
MA10
MA11
MA12
MA13
MA14
MA15
MA16
MA17
MA18
MA19
MA20
MA5-A
MA6-A
MA7-A
MA8-A
MA9-A
MA10-A
MA11-A
MA12-A
MA13-A
MA14-A
MA15-A
MA16-A
MA17-A
MA18-A
MA19-A
MD-A Bus
MCLK
SYW
CASO00
CASO01
CASO02
CASO10
CASO11
CASO12
SO00
SO01
SO02
SO10
SO11
SO12
VSS
XIN
XOUT
VDD
MCLK
CLC
XCLK
SYI
SYO
IC
MUTE
MD0
MD1
MD2
MD3
MD4
MD5
MD6
MD7
MWR
MRD
MAE
C10 22P
CL2 12.8M
C11 22P
R3 1M
C14 10/16
MD0-A
MD1-A
MD2-A
MD3-A
MD4-A
MD5-A
MD6-A
MD7-A
CLKMEL
SYW
(from IC12-pin57)
SRO1
SRO2
XCLK2
CDS
SFCA-L/R
SFCA-L+R
SFC-A
IC10
SI12
SI11
SI10
SI20
SI21
SI22
SO1
SO2
TST2
CS
CDO
TST1
CAS002
CAS001
CAS000
CAS010
CAS011
CAS012
(to IC8-pins9,13)
XCLK4
C13 0.1(t)
MD0-B
MD1-B
MD2-B
MD3-B
MD4-B
MD5-B
MD6-B
MD7-B
MA0-B
MA1-B
MA2-B
MA3-B
MA4-B
MD-B Bus
MA-B Bus
38CC1-8810092 1/2△2, 2/2△2
EMI3 0.002
(from IC11-pin57)
+VA
+8A
AG1
AG2
CN2
CN20
CN1
CN4
R94 10
R93 10
JKAN 1/4
DAL3
IC1 YM3032
DVDD
DGND
NC
OUT4
OUT3
OUT2
OUT1
NS
COM
IN2
IN1
LMT
AVDD
AGND
RB
RC
MP
TOBUF
SEL2
SEL1
L7
C1 0.1(t)
C2 0.1(t)
J101
J102
J103
J104
IC2
R1 120
C3 10/16
R2 470
R3 470
R4 470
R5 470
IC9 1/2
R30 10K
R31 10K
C4 47/16
R41 10K
D1
D2
D3
D4
D5
D7
R33 1M
R34 10K
C25 10/16
R35 10K
R37 10K
R38
R42 1M
R43 10K
C26 10/16
R44 10K
R45
R47 10K
J K L M N O

MIX5
IC8
LDSP
IC7 YM3413
PSRAM
IC6
SFC-B
IC9
VCA
IC10 M51132L
IC11 M51132L
JKAN 2/4
JKAN 3/4
MASTER VOLUME
PHONES
L/MONO
OUTPUT1
OUTPUT2
IC12
IC13
IC9 2/2
IC2~6
IC9, 12, 13
IC7, 8
38CC1-8810094 (5)

TG33

# TONE GENERATOR

# TG33

# 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 | ＤＭシート | (TG33) | 57 |
| * * | VJ789200 | Circuit Board | PN | ＰＮシート | | 11 |
| * * | VJ789300 | Circuit Board | JKAN | ＪＫＡＮシート | | 22 |
| | | Circuit Board | JKAN1/4 | ＪＫＡＮ１／４シート | | |
| | | Circuit Board | JKAN2/4 | ＪＫＡＮ２／４シート | | |
| | | Circuit Board | JKAN3/4 | ＪＫＡＮ３／４シート | | |
| | | Circuit Board | JKAN4/4 | ＪＫＡＮ４／４シート | | |
| * | VJ789400 | Circuit Board | DM | ＤＭシート | | 57 |
| * * | XI124A00 | IC | PQ05RF1 | ＩＣ | REGULATOR 5V 1A | 03 |
| | IG116200 | IC | PST518B-2 | ＩＣ | SYSTEM RESET | 04 |
| | IR001450 | IC | SN74HC14N | ＩＣ | INVERTER | 05 |
| | IR024500 | IC | TC74HC245AP | ＩＣ | BUS BUFFER | 07 |
| | IR406600 | IC | TC74HC4066AP | ＩＣ | A-SWITCH | 03 |
| | XG655A00 | IC | TC74AC04P | ＩＣ | INVERTER | 02 |
| | XG656A00 | IC | TC74AC08P | ＩＣ | AND | 02 |
| | XH608A00 | IC | TC74AC245P | ＩＣ | BUS TRANSCEIVER | 05 |
| * * | XG662A00 | IC | TMC57800N | ＩＣ | MIX V | 07 |
| * * | XI045A00 | IC | LC92018B-476 | ＩＣ | GATE ARRAY RI54 | 07 |
| * * | XI074A00 | IC | LC92030C-477 | ＩＣ | GATE ARRAY SP33 | 08 |
| * * | XI119B00 | IC | HD6475328CP-10 | ＩＣ | CPU <H8/532> | |
| | XG517A00 | IC | LC3664RL-12 | ＩＣ | SRAM 64K | 08 |
| * * | XI796A00 | IC | HN62324BPC68 | ＩＣ | ROM 4M | |
| * * | XI797A00 | IC | HN62324BPC69 | ＩＣ | ROM 4M | |
| * * | XI117B00 | IC | 012AV101 | ＩＣ | EPROM A | |
| * | XI118A00 | IC | 012BV101 | ＩＣ | EPROM B | |
| | XE449A00 | IC | YM3413 | ＩＣ | LDSP | 10 |
| | XE755A00 | IC | TMC3489NL | ＩＣ | SFC | 09 |
| | XF987A00 | IC | TMC3493APH | ＩＣ | GEW5 | 10 |
| | XH080A00 | IC | M5M5255BP-10LL | ＩＣ | SRAM 256K | 13 |
| | XC628A00 | IC | TC51832PL-10 | ＩＣ | PSRAM 256K | 09 |
| | IG051000 | IC | TC40H004P | ＩＣ | INVERTER | 03 |
| | VD473200 | Photo Coupler | 6N137 | フォトカプラ | | 05 |
| | IA101570 | Transistor | 2SA1015 O,Y | トランジスタ | | 01 |
| | IC174070 | Transistor | 2SC1740S R,S | トランジスタ | | 01 |
| | IC181580 | Transistor | 2SC1815 Y,GR | トランジスタ | | 01 |
| | ID088000 | Transistor | 2SD880 O,Y | トランジスタ | | 02 |
| | VB481900 | Diode | 11ES4 | ダイオード | | 01 |
| | IF003450 | Diode | 1SS133 | ダイオード | | 01 |
| | VA095500 | Zener Diode | MTZ9.1A 9.1V | ツェナーダイオード | | 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. | 470μF 10V | ケミコン | | 01 |
| | UJ138220 | Electrolytic Cap. | 220μF 16V | ケミコン | | 01 |
| | UJ838470 | Electrolytic Cap. | 470μF 16V | ケミコン | | 01 |
| | FP736470 | Tantalum Capacitor | 4.7μF 16V M | タンタルコン | | 01 |
| | FZ004100 | Semiconductive Cera. Cap. | 0.1μF 16V M | 半導体セラコン | | 01 |
| | VB835000 | Coil | FL5R2000NT 20μ | コイル | | 01 |
| | FZ006970 | EMI Filter | LS MT Y223NB | ＬＣフィルター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 | DC 10V 700mA IN | 01 |
| | VI466400 | DIN Connector | 3P YKF51-5046 | ＤＩＮジャック | MIDI | 04 |
| | VE338400 | Lithium Battery | CR2032 | リチュウム電池 | | 03 |
| | VF821100 | Connector, Card | 38P | ＩＣカード用コネクタ | CARD | 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 | ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ | | 01 |
| | EV100036 | Hexagonal Nut | φ3.0 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-181B09T6 RE | ＬＥＤ | | 01 |
| | | Circuit Board | JKAN1/4 | ＪＫＡＮ１／４シート | | |
| | IG001390 | IC | RC4558DV | ＩＣ | OP AMP. | 03 |
| | IG040000 | IC | NJM4560ED | ＩＣ | OP AMP. | 04 |
| | XE470001 | IC | M51132L | I･C | VCA | 05 |
| | XF123A00 | IC | M5228P | ＩＣ | OP AMP. 4ch | 03 |
| | IG042500 | IC | NJM4556 | ＩＣ | OP AMP. 2ch | 04 |
| | XG411A00 | IC | YM3032 | ＩＣ | DAL3 | 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 |

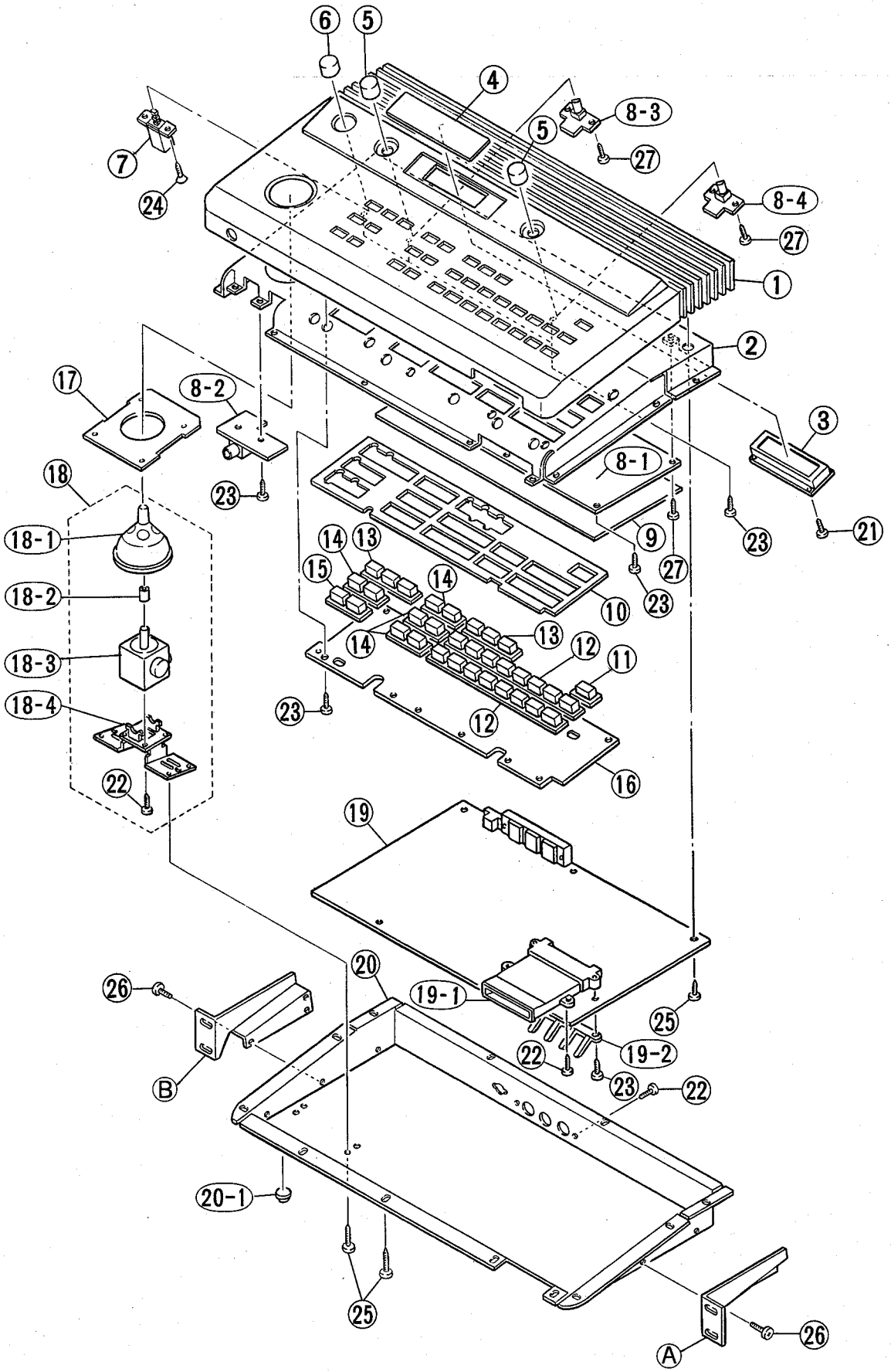


* New Parts（新規部品）

ランク：Japan only

| Ref. No. | Part No. | Description | | 部品名 | Remarks | ランク |
|---|---|---|---|---|---|---|
| | FZ006950 | Electrolytic Cap. | 220μF 16V | ケミコン | | 01 |
| | FZ004100 | Semiconductive Cera. Cap. | 0.1μF 16V M | 半導体セラコン | | 01 |
| | VB835000 | Coil | FL5R200QNT 20μ | コイル | | 01 |
| | VE742000 | Phone Jack | HLJ4306 Mono | ホーンジャック | OUTPUT | 02 |
| | | Circuit Board | JKAN2/4 | ＪＫＡＮ２／４シート | | |
| | VB835000 | Coil | FL5R200QNT 20μ | コイル | | 01 |
| | LB203090 | Phone Jack | HLJ0521 Stereo | ホーンジャック | PHONES | 02 |
| | | Circuit Board | JKAN3/4 | ＪＫＡＮ３／４シート | | |
| | VF636100 | Variable Resistor | A10K×2 | 二連ﾛｰﾀﾘｰﾎﾞﾘｭｰﾑ | MASTER VOLUME | 03 |
| | | Circuit Board | JKAN4/4 | ＪＫＡＮ４／４シート | | |
| * | VJ789500 | Variable Resistor | B10K RK09K113 | ロータリーボリューム | DATA ENTRY | 01 |
| * | VJ751800 | LCD Assembly | | ＬＣＤ Ａｓｓ'ｙ | | |
| | VF997600 | Power Switch | ESB-823V-F | パワースイッチ | POWER | 03 |

## ■ OVERALL ASSEMBLY（総組立）



| | Ref. No. | Part No. | Description | | 部品名 | Remarks | ランク |
|---|---|---|---|---|---|---|---|
| * | 1 | VJ747600 | Top Cover | | トップカバー | (TG33) | 10 |
| * * | 2 | VJ748400 | Shield Cover | | シールドカバー | | 08 |
| * * | 3 | VJ751800 | LCD Assembly | | LCD Ass'y | | |
| * | 4 | VJ752100 | Protector | | 保護板 | | 04 |
| | 5 | VF456200 | Knob | | ツマミ | DATA ENTRY/M.V. | 01 |
| | 6 | VF456100 | Push Button | | プッシュボタン | POWER | 01 |
| | 7 | VF997600 | Power Switch | ESB-823V-F | パワースイッチ | POWER | 03 |
| * | 8 | VJ789300 | Circuit Board | JKAN | JKANシート | | 22 |
| | 8-1 | | Circuit Board | JKAN1/4 | JKAN1/4シート | | |
| | 8-2 | | Circuit Board | JKAN2/4 | JKAN2/4シート | | |
| | 8-3 | | Circuit Board | JKAN3/4 | JKAN3/4シート | | |
| | 8-4 | | Circuit Board | JKAN4/4 | JKAN4/4シート | | |
| * | 9 | VJ799200 | Sheild Sheet, JKAN | | シールドシート | | 04 |
| * * | 10 | VK240300 | Sheild Sheet, PN | | PN絶縁シート | | |
| | 11 | VI848400 | Key Top Rubber | ×1 | キートップラバー | DEMO | 01 |
| * * | 12 | VJ794500 | Key Top Rubber | ×8 1-8 ELEMENT | キートップラバー | BANK/MULTI CH. | 04 |
| * * | 13 | VK304800 | Key Top Rubber | ×3 | キートップラバー | MODE,MEMORY | 03 |
| | 14 | VI848300 | Key Top Rubber | ×2 | キートップラバー | PAGE,CURSOR | 01 |
| * * | 15 | VJ794400 | Key Top Rubber | ×2 VECTOR | キートップラバー | LEVEL,DETUNE | 03 |
| * * | 16 | VJ789200 | Circuit Board | PN | PNシート | | 11 |
| * * | 17 | VJ800900 | Felt | | フェルト | | 01 |
| * * | 18 | VJ749100 | Vector Control Assembly | | ﾍﾞｸﾀｰｺﾝﾄﾛｰﾙ Ass'y | VECTOR CONTROL | 09 |
| | 18-1 | VI847700 | Knob, JOY | | JOYツマミ | | 02 |
| | 18-2 | VJ086000 | Tube | 8X8 T=1.0 | チューブ | | 01 |
| | 18-3 | VI864200 | JOY Stick | RKJXB 100KB×2 | ジョイスティック | | 06 |
| | 18-4 | VI848600 | Angle Bracket, JOY Stick | | JOYスティック金具 | | 03 |
| * * | 19 | VJ789400 | Circuit Board | DM | DMシート | | 57 |
| * * | 19-1 | VK304900 | Card Guide | 33 | カードガイド33 | | 04 |
| * * | 19-2 | VK545200 | Earth Leaf | | 静電リーフ | | |
| | 20 | VJ752600 | Bottom Cover Assembly | | ボトムカバー Ass'y | | |
| | 20-1 | CB037120 | Foot | BL | スベリ座 | | 01 |
| | 21 | EI023066 | Bind Head Tapping Screw | 2.3X6 ZMC2Y | ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ | | |
| | 22 | EJ330086 | Pan Head Tapping Screw | 3.0X8 ZMC2BL | ナベタッピングネジ | | 01 |
| | 23 | EI330086 | Bind Head Tapping Screw | 3.0X8 FCM3BL | ﾊﾞｲﾝﾄﾞﾀｯﾋﾟﾝｸﾞﾈｼﾞ | | 01 |
| | 24 | EB330086 | Flat Tapping Screw | 3.0X8 ZMC2BL | 皿小ネジ | | 01 |
| | 25 | EJ340106 | Pan Head Tapping Screw | 4.0X10 FCM3BL | ナベタッピングネジ | | 01 |
| | 26 | ED340066 | Bind Head Screw | 4.0X6 ZMC2BL | バインド小ネジ | | 01 |
| | 27 | ED030086 | Bind Head Screw | 3.0X8 ZMC2Y | バインド小ネジ | | 01 |
| | | | Accessories | | 付属品 | | |
| | | | AC Adaptor | PA-3 | ACアダプター | J | |
| | | | AC Adaptor | PA-3 | ACアダプター | U,C | |
| | | | AC Adaptor | PA-3 | ACアダプター | H,D,S | |
| * | A | VJ807800 | Rack Angle | Right | ラックアングル(右) | | 04 |
| * | B | VJ807700 | Rack Angle | Left | ラックアングル(左) | | 04 |

* New Parts (新規部品)

ランク：Japan only