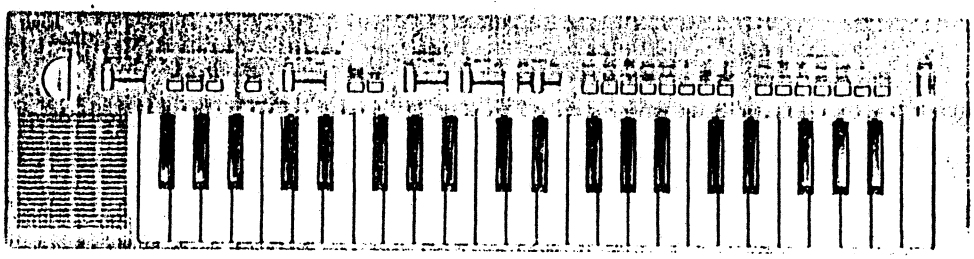
PortaSound

# PS-400

## SERVICE MANUAL



CONTENTS



001158

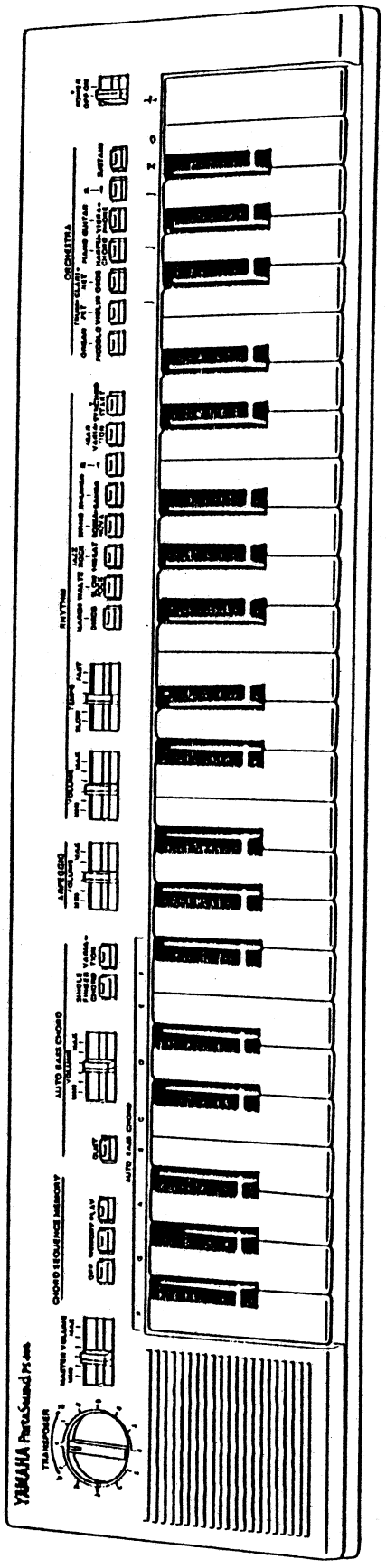
SINCE 1887 YAMAHA
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

'83.1 2.15K ↔ Printed in Japan

## SPECIFICATIONS

| | |
|---|---|
| KEYBOARD | 44 keys (F1 – C5) |
| ORCHESTRA SECTION | Organ – Piccolo<br>Trumpet – Violin<br>Clarinet – Oboe<br>Piano – Harpsichord<br>Guitar – Vibraphone<br>Upper/Lower selector |
| EFECT SECTION | Sustain (except vibraphone) |
| RHYTHM SECTION | March – Disco<br>Waltz – Slow Rock<br>Jazz Rock – 16 Beat<br>Swing – Bossanova<br>Rhumba – Samba<br>Upper/Lower selector<br>[Control]<br>Synchro Start Switch<br>4 BAR Switch<br>Tempo Control Volume<br>Rhythm Volume<br>Tempo Lamp |
| AUTO BASS CHORD SECTION | Single Finger Chord Switch<br>(with memory)<br>[Control]<br>Auto Bass Chord Volume |
| ARPEGGIO | Arpeggio Volume |
| DUET | Duet |
| PLAY MEMORY SYSTEM | Chord Memory<br>Chord Play<br>Chord Cancel |
| OTHER CONTROLS and INDICATORS | Power Switch<br>Pilot Lamp<br>Master Volume Lever<br>Transposer<br>(1/2 octave high and low)<br>Pitch Control |
| AUXILIARY JACKS | Headphones<br>Aux – out<br>Expression Pedal<br>DC9 – 12V Input |
| AMPLIFIER | 1.4W |
| SPEAKER | 7.7 cm (6Ω impedance) |
| RATED VOLTAGE | DC9V using 1.5V SUM-2, "C" size R-14 or equivalent batteries, AC power adaptor, or car battery adaptor. |
| DIMENSIONS AND CASE (W x D x H) | 621 x 151.5 x 43 mm |
| WEIGHT: | 1.6 kg (excluding batteries) |
| MATERIAL: | MIPS |
| SEMICONDUCTORS | LSI : 4 pcs.<br>IC : 14 pcs.<br>TR : 8 pcs.<br>FET : 2 pcs.<br>Diode : 62 pcs.<br>LED : 2 pcs. |

## PANEL LAYOUT

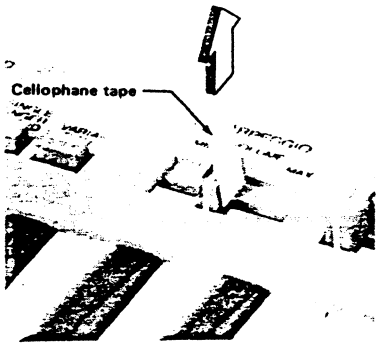


## DISASSEMBLY PROCEDURE

* When disassembling the unit, place it on a soft cloth and be careful to avoid scratching it.

### 1. Removing volume buttons

Remove the slide volume buttons by attaching a piece of cellophane tape to both sides of the buttons, grasping the tape with fingers, and pulling slowly upwards.




### 2. Removing the lower case

Turn the unit upside down and remove six batteries.

Remove the 11 screws and placing your hands on both sides of the lower case, remove it by lifting slowly upward.

### 3. Removing the M circuit board

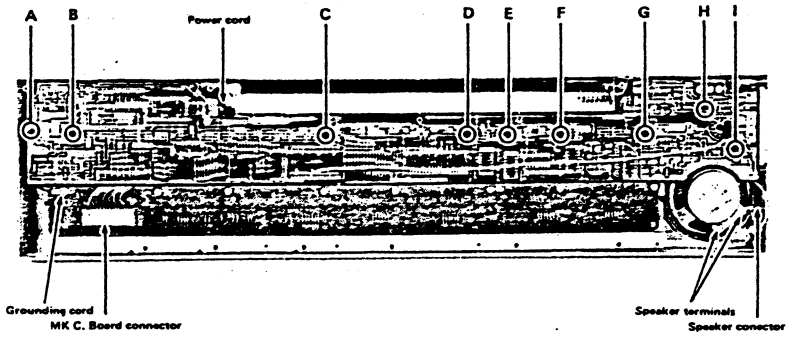
When removing the M circuit board, be sure to remove all the switch buttons first.

Remove the 9 screws marked (A) – (I).

Remove the M circuit board connector.

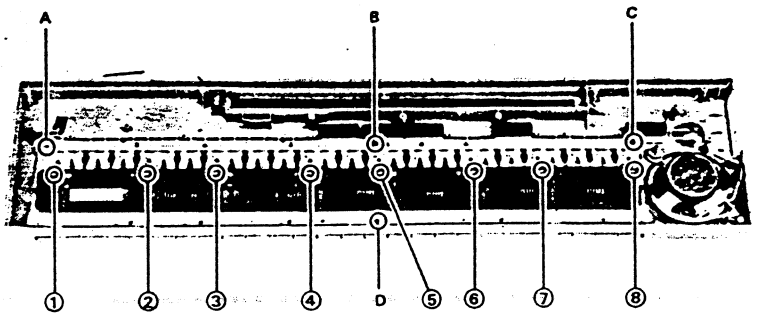
By slightly lifting the MK circuit board, remove the speaker connector and grounding cord to the body.

Grasp the MK circuit board with both hands and lift slowly upward to remove it. At this time, disconnect the power cord from both of the battery terminals on the battery case.

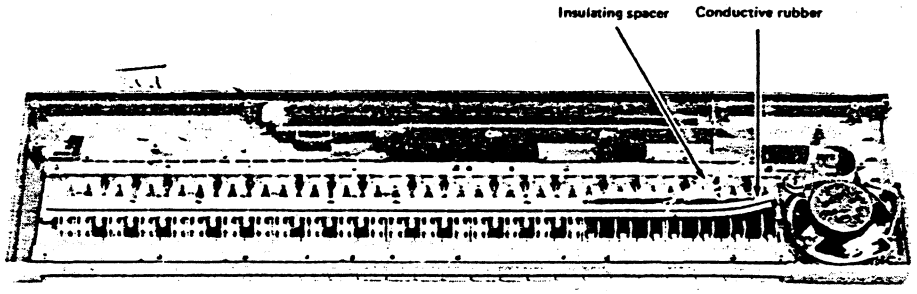



### 4. Removing the keyboard unit

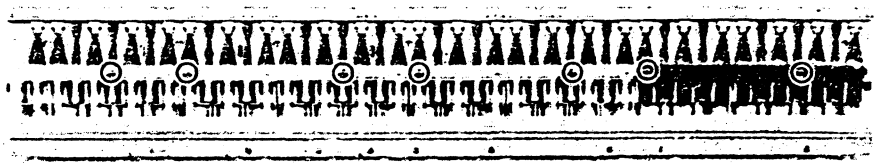
(1) Remove the 4 screws marked (A) – (D) and grasp the keyboard unit with both hands to remove it.
Remove the 8 screws marked (1) – (8) and remove the MK circuit board.



(2) A spacer and rubber contact are attached to the keyboard guide; grasp them with fingers and slowly pull them out, exercising enough care not to damage them.




(3) The keyboard guide and key springs are divided into four sections; remove them by removing screws from applicable locations.

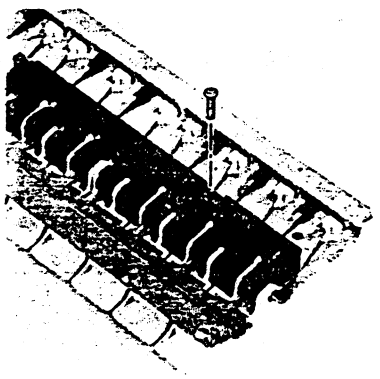


## 5. Removing the keys

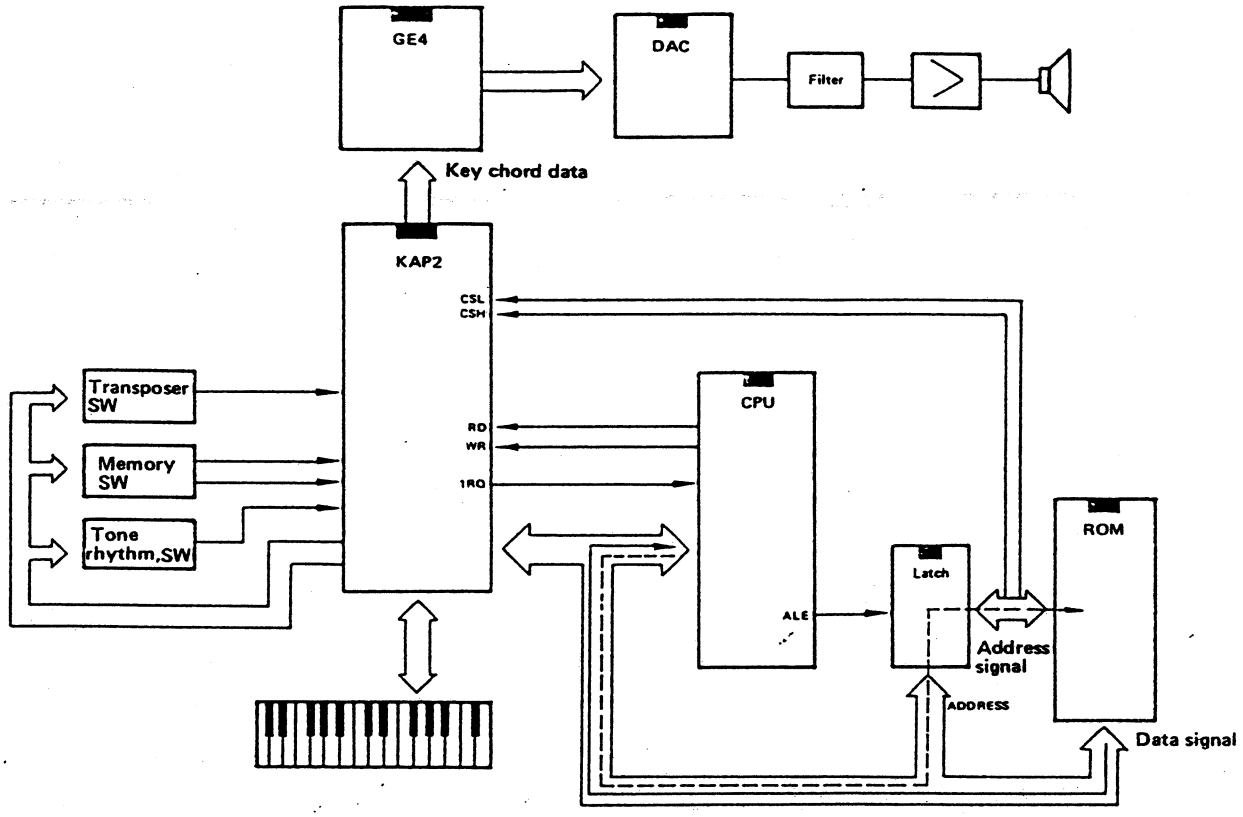
Remove the white keys and black keys by pulling them outward with hand.
When reinstalling the keys, be sure to reinstall the black keys, then the white keys.

## 6. Installing the key springs and keys

Install the key springs and keyboard guide in the keyboard frame and finger tighten roughly the screws.
Tighten the screws completely after confirming that the tips of the key springs are properly fitted to the actuators of the white and black keys.
Press all of the keys to confirm that they return properly with same tension.



## CIRCUITRY OUTLINE



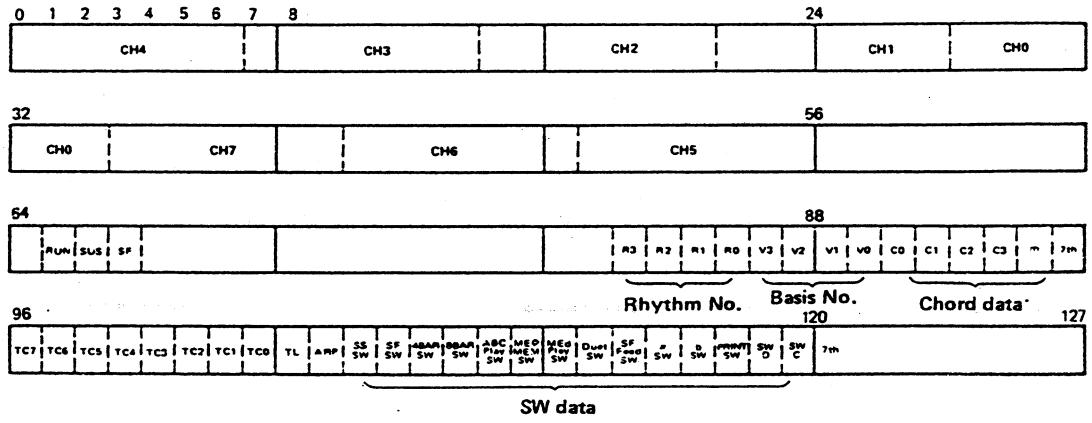

## [OUTLINE OF OPERATION]

### RECORD MODE

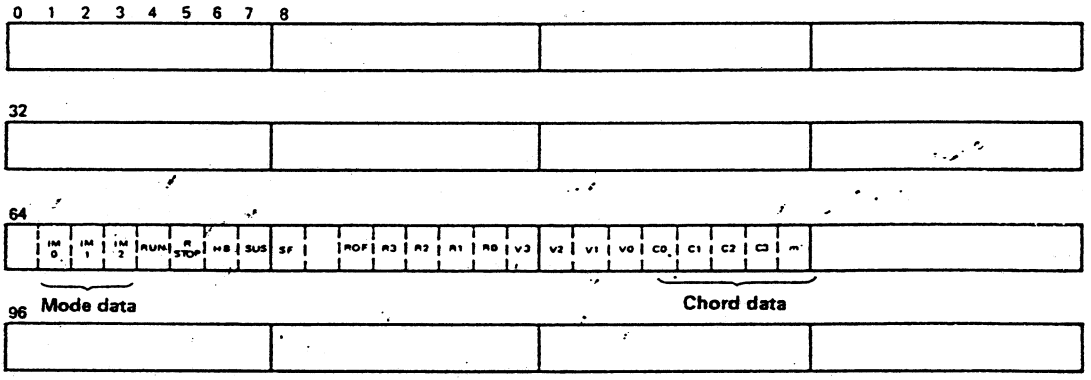
When the MEMORY switch is pressed, an IRQ (Interrupt Request) signal is sent from KAP2 to CPU, and this signal switches CPU to the CHORD SEQUENCE MEMORY mode. Then, CPU sends an address signal to ROM to load the CHORD SEQUENCE MEMORY program. CPU is switched to the READ mode, and gives to KAP2 an RD signal which requests output of chord data.

Now KAP2 sends to CPU the chord data of pressed keys one after another, which are recorded in the CPU memory.

## READ DATA




## WRITE DATA

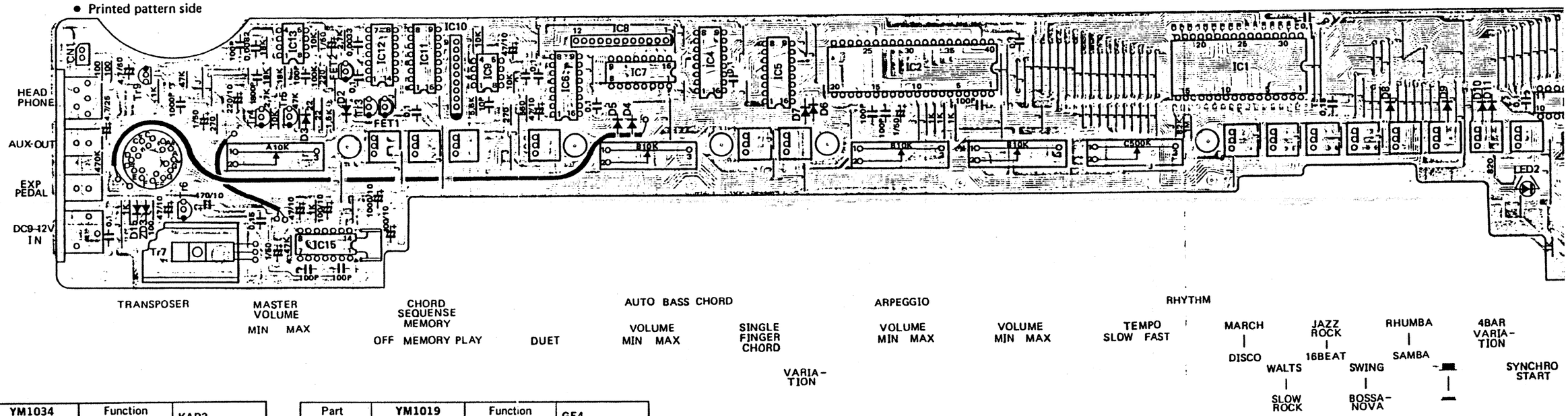



## PLAY MODE

KAP2 checks at all times what key is pressed and which switch is pressed, and sends those data to CPU as read data. When the PLAY switch is pressed, CPU detects the PLAY mode from the read data sent from KAP2. Then, CPU sends to KAP2 a WR signal and KAP2's chip signals of CSL and CSH to demand KAP2 to send write data. And CPU sends to KAP2 the write data – C0 to C3, m, 7th. On the basis of those data, KAP2 sends the key chord data to GE-4IC so that the data are generated as sound.

## ■M CIRCUIT BOARD AND WIRING AND IC DATA TABLE

● Printed pattern side




| Part Name | YM1034 (iT103400) | Function Name | KAP2 |
|---|---|---|---|

| PIN No. | PIN Name | I/O | Description |
|---|---|---|---|
| 1 | $V_{SS}$ | | Power Supply (+9V) |
| 2 | RD | I | READ Control Input from CPU |
| 3 | WR | | WRITE control input from CPU |
| 4 | $\overline{TEST8}$ | | TEST PIN |
| 5 | IRQ | O | Interrupt Request output |
| 6 | NC | | No Connection |
| 7 | CSL | I | Chip select control input (LOW) |
| 8 | CSH | I | Chip select control input (HIGH) |
| 9 | IO/M | O | Interrupt Request output |
| 10 | −5V | | Power Supply input (−5V) |
| 11 | $\overline{SY}$ | O | Synchro pulse to GE4 |
| 12 | $\overline{TRCH}$ | I | Signal from GE4 |
| 13 | $\overline{IC}$ | O | Initial Clear In |
| 14 | NC | | No Connection |
| 15 | NC | | No Connection |
| 16 | $\overline{TL}$ | O | Tempo Lamp driving pulse |
| 17 | $V_{SS}$ | | Power Supply (+9V) |
| 18 | $\overline{KON}$ | O | Key ON Signal |
| 19 | $\overline{N1}$ | O | NOTE KEY Code |
| 20 | $\overline{N2}$ | O | |
| 21 | $\overline{N3}$ | O | |
| 22 | $\overline{N4}$ | O | |
| 23 | $\overline{B1}$ | O | BLOCK KEY Code |
| 24 | $\overline{B2}$ | O | |
| 25 | $\overline{B3}$ | O | |
| 26 | TCL | I | Rhythm Tempo control Voltage |
| 27 | $\overline{SO2}$ | O | Serial data to GE4 |
| 28 | $\overline{KC1}$ | I | Key Code output from external IC |
| 29 | $\overline{TEST\ A}$ | | TEST PIN |
| 30 | $\overline{KC\phi}$ | O | Key Code output to external IC |
| 31 | C | O | Key Note Scanning Terminals |
| 32 | B | O | |

| Pin No. | Pin Name | I/O | Description |
|---|---|---|---|
| 64 | φM | I | System clock (445 kHz) |
| 63 | VDD | | Power Supply (0V) |
| 62 | DB7 | I/O | Bi-directional data bus |
| 61 | DB6 | I/O | |
| 60 | DB5 | I/O | |
| 59 | DB4 | I/O | |
| 58 | DB3 | I/O | |
| 57 | DB2 | I/O | |
| 56 | DB1 | I/O | |
| 55 | DB0 | I/O | |
| 54 | $\overline{SI1}$ | I | Serial data input from GE4 |
| 53 | $\overline{SO1}$ | O | Serial data output from GE4 |
| 52 | $\overline{F4}$ | I | Panel SW data input |
| 51 | $\overline{F3}$ | I | Panel SW data input (for transposer) |
| 50 | $\overline{F2}$ | I | Panel SW data input (for ARC RHYTHM START SUSTAIN SW) |
| 49 | $\overline{F1}$ | I | Panel SW data input (for Tone, Rhythm SW) |
| 48 | NC | | No Connection |
| 47 | BL0 | I | Key Block Scanning Terminals ($F_1^*$~$C_2$) |
| 46 | BL1 | I | ($C_2$~$C_3$) |
| 45 | BL2 | I | ($C_3^*$~$C_4$) |
| 44 | BL3 | I | ($C_4^*$~$C_3$) |
| 43 | C | O | Key Note Scanning Terminals |
| 42 | D | O | |
| 41 | D | O | |
| 40 | E | O | |
| 39 | F | O | |
| 38 | F | O | |
| 37 | G | O | |
| 36 | G | O | |
| 35 | A | O | |
| 34 | A | O | |
| 33 | NC | | No Connection |

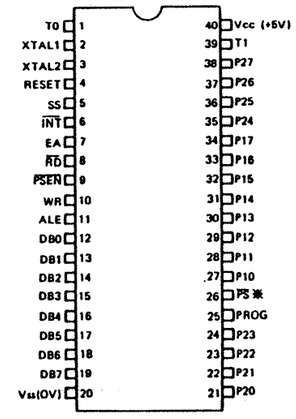
| Part Name | YM1019 (iT101900) | Function Name | GE4 |
|---|---|---|---|

| Pin No. | Pin Name | I/O | Description |
|---|---|---|---|
| 1 | $V_{SS}$ | | Power Supply (+9V) |
| 2 | $\overline{SY}$ | I | Synchro Pulse (64 clock cycle) |
| 3 | $\overline{SI1}$ | I | Serial data 1 from KAP |
| 4 | $\overline{SI2}$ | I | Serial data 2 from KAP |
| 5 | $\overline{SO2}$ | O | Serial data to IE |
| 6 | RHV | I | Control Voltage for Rhythm Volume |
| 7 | ARV | I | Control Voltage for Arpeggio Volume |
| 8 | ABV | I | Control Voltage for ABC Volume |
| 9 | Vrsf | | A/D Fundamental Voltage (+2.5V) |
| 10 | AGND | | Analog Ground (+9V) |
| 11 | ICin | I | Initial Clar Production |
| 12 | $\overline{ICout}$ | O | Initial Clear Signal |
| 13 | NC | | No Connection |
| 14 | S3 | O | Wave form data for DAC |
| 15 | S2 | O | |
| 16 | S1 | O | |
| 17 | M9 | O | |
| 18 | M8 | O | |
| 19 | M7 | O | |
| 20 | M6 | O | |

| Pin No. | Pin Name | I/O | Description |
|---|---|---|---|
| 40 | M | I | System Clock (445 kHz) |
| 39 | VDD | | Power Supply (0V) |
| 38 | NC | | No Connection |
| 37 | NC | | No Connection |
| 36 | NC | | No Connection |
| 35 | $\overline{THCH}$ | O | Trancate Signal (to KAP) |
| 34 | $\overline{KON}$ | I | Note Key Code from KAP |
| 33 | $\overline{N1}$ | I | |
| 32 | $\overline{N2}$ | I | |
| 31 | $\overline{N3}$ | I | |
| 30 | $\overline{N4}$ | I | |
| 29 | $\overline{B1}$ | I | Block Key Code From KAP |
| 28 | $\overline{B2}$ | I | |
| 27 | $\overline{B3}$ | I | |
| 26 | Mφ | O | Weveform data for DAC |
| 25 | M1 | O | |
| 24 | M2 | O | |
| 23 | M3 | O | |
| 22 | M4 | O | |
| 21 | M5 | O | |

TMP80C39P-6 : iG08480

### Pin Connection Diagram (Top View)

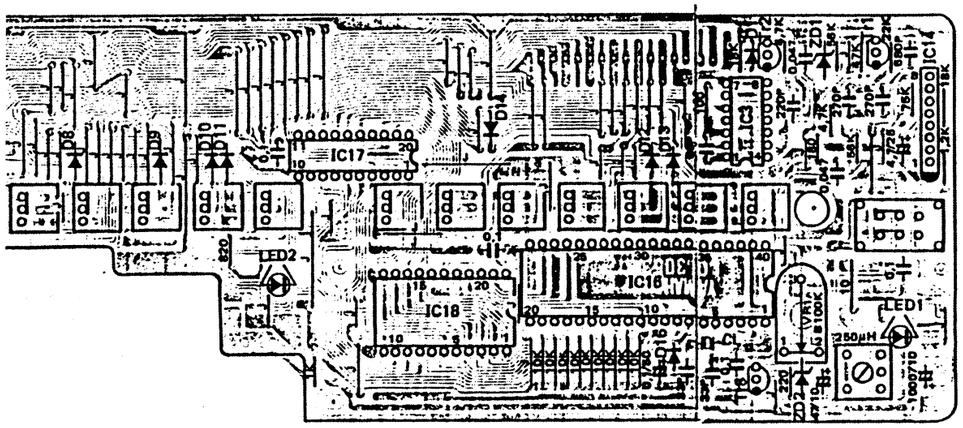


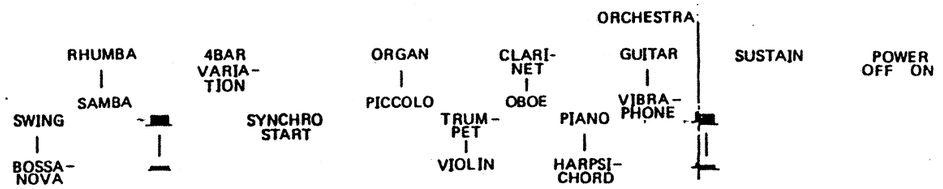

* Different in function from Pin 26-power save pin (TMP8049).

### PIN NAMES AND FUNCTIONS

| Pin Name | No. of Pins | I/O/3-State | Function |
|---|---|---|---|
| XTAL1 XTAL2 | 2 | Input | Used as oscillator connection terminal or external clock input terminal. |
| RESET | 1 | Input | Reset input<br>Initializes chip at low active. Then, when high level is applied, program starts from address 0. |
| EA | 1 | Input | External address designation input<br>When +5V is applied, stored program is separated and external program is accessed from address 0.<br>By applying +12V, this pin is also used to designate the verify mode of stored program. |
| ALE * | 1 | Output | Address latch enable signal<br>When accessing external memory area, trailing of this signal gives timing to latch address on DB0 ~ DB7. |
| PSEN | 1 | Output | Program strobe enable signal<br>strobe signal when accessing external program area. |
| RD ~ WR | 2 | Output | Write, read strobe signals when accessing external data area. |
| PROG | 1 | Output | Control signal output for I/O expander 8243. |
| SS | 1 | Input | When single step input (low active) 0V is applied, CPU is brought into wait state after completion of executing the currently executing instruction.<br>In this case, ALE is maintained at high level, and when accessing external program area, the next address to be excuted is kept output to DB0 ~ DB7, P20 ~ P23. |
| INT | 1 | Input | External Interrupt input<br>Since this is level interrupt, it is necessary to hold at low level until interrupt is accepted. This is also used as test flag input for conditional jump. |
| T0 | 1 | Input/Output | Test flag input for conditional jump.<br>This is also used as clock (oscillation frequency x 1/3) output terminal by ENTO CLK instruction. |
| T1 | 1 | Input | Test flag input for conditional jump.<br>This is also used as external clock input terminal to timer counter at event counter mode. |
| DB0 ~ DB7 | 8 | Input/Output/3-State | Used as bi-directional port when stored program is executed, and as address bus, data bus when external program is excecuted. |

| Pin Name | No. of Pi |
|---|---|
| P10 ~ P17 | 8 |
| P20 ~ P27 | 8 |
| PS | 1 |
| Vcc | 1 |
| Vss | 1 |




| | |
|---|---|
| | rminal or external clock |
| | Then, when high level is lress 0. |
| | ut rogram is separated and m address 0. lso used to designate the |
| | ry area, trailing of this ldress on DB0 ~ DB7. |
| | external program area. |
| | accessing external data |
| | pander B243. |
| | ve) 0V is applied, CPU is completion of executing on. at high level, and when , the next address to be 0 ~ DB7, P20 ~ P23. |
| | necessary to hold at low . This is also used as test |
| | mp. llation frequency x 1/3) instruction. |
| | mp. clock input terminal to node. |
| | hen stored program is data bus when external |

| Pin Name | No. of Pins | I/O/3-State | Function |
|---|---|---|---|
| P10 ~ P17 | 8 | Input/Output | Pseudo-bi-directional 8-bit port. |
| P20 ~ P27 | 8 | Input/Output | Pseudo-bi-directional 8-bit port. Lower order 4-bits, P20 ~ P23, are used as address output when external program is executed, and also as connection line with 4-bit I/O expander B243. |
| PS | 1 | Input | Signal which controls start and stop of oscillation circuit operation because power is reduced at battery back-up. By inputting low level, oscillation circuit is brought to a stop. |
| Vcc | 1 | Power Supply | +5V |
| Vss | 1 | Power Supply | 0V |

Note)

Integrated Circuit

| | |
|---|---|
| IC1 | : YM1034 (KAP2) |
| IC2 | : YM1019 (GE4) |
| IC3 | : TC40H074P |
| IC4, 5 | : TC40H174P |
| IC6, 7 | : 60H000 |
| IC8 | : HZ00236 |
| IC9 | : NJM4560 |
| IC10 | : HZ00237 |
| IC11 | : TC4051 |
| IC12 | : TC4066 |
| IC13 | : NJM4558 |
| IC14 | : iG05380 (Supply voltage reduction flash IC) |
| IC15 | : LA4138 (Power AMP) |
| IC16 | : TMP80C39P-6 (CPU) |
| IC17 | : TC40H373P |
| IC18 | : TMM2332P (ROM) |

Transistor

| | |
|---|---|
| Tr1, 3 | : 2SC752 (O)(Y) |
| Tr2, 5, 6, 9 | : 2SC1815 (O)(Y) |
| Tr4 | : 2SA733 (P)(Q) |
| Tr7 | : 2SD880 (O)(Y) |
| Tr8 | : 2SA1015 (O)(Y) |

Field Effect Transistor

| | |
|---|---|
| FET1, 2 | : 2SK105 (E)(F) |

Diode

| | |
|---|---|
| D1 ~ 16 | : 1SS133 |
| ZD1 | : WZ061 |
| ZD2 | : RD5.6 EB3 |
| ZD3 | : WZ090 |

LED

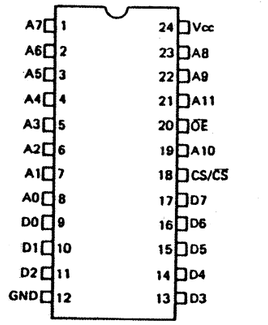
| | |
|---|---|
| LED1, 2 | : IF00377 |

Ceramic Vibrator

| | |
|---|---|
| CL | : CUS 600MT |

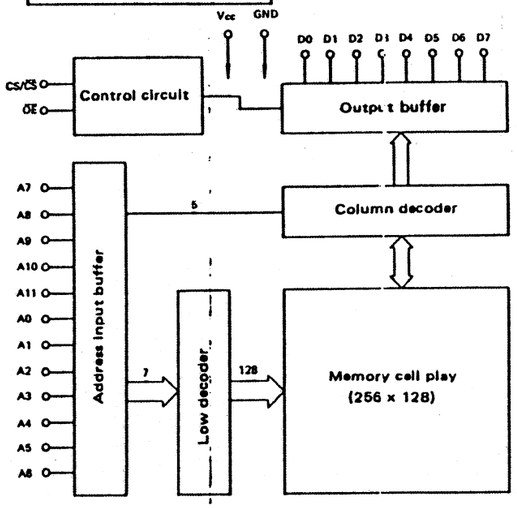
## TMM2332P : iG083800

(TOP VIEW)



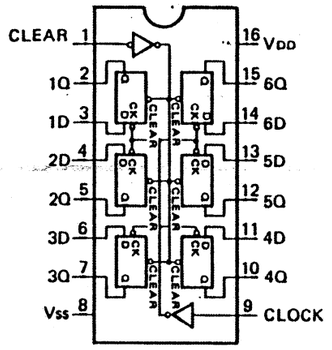

| | |
|---|---|
| A0 ~ A11 | Address input |
| D0 ~ D7 | Data output |
| CS/$\overline{CS}$ | Chip select input |
| $\overline{OE}$ | Output enable input |
| Vcc | Power supply (+5V) |
| GND | Ground |

## ROM BLOCK DIAGRAM

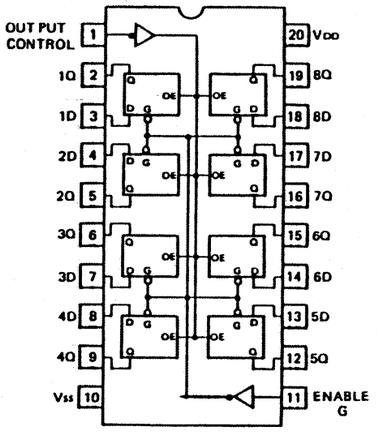



## TC40H174P : iG064100

Hex D-Type Flip-Flop

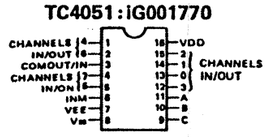


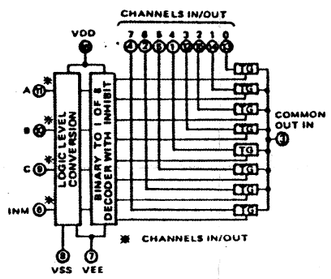

## TC40H373P : iG078500




## 8-Channel Multiplexer/Demulfiplexe

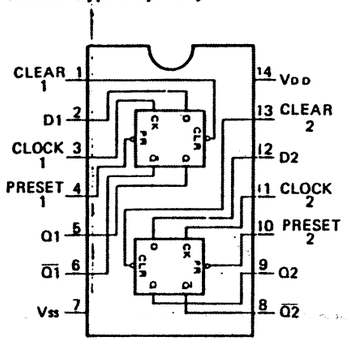
## TC4051 : iG001770



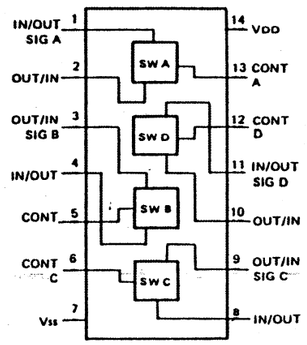

## TC40H074P : iG051100

Dual D-Type Flip-Flop



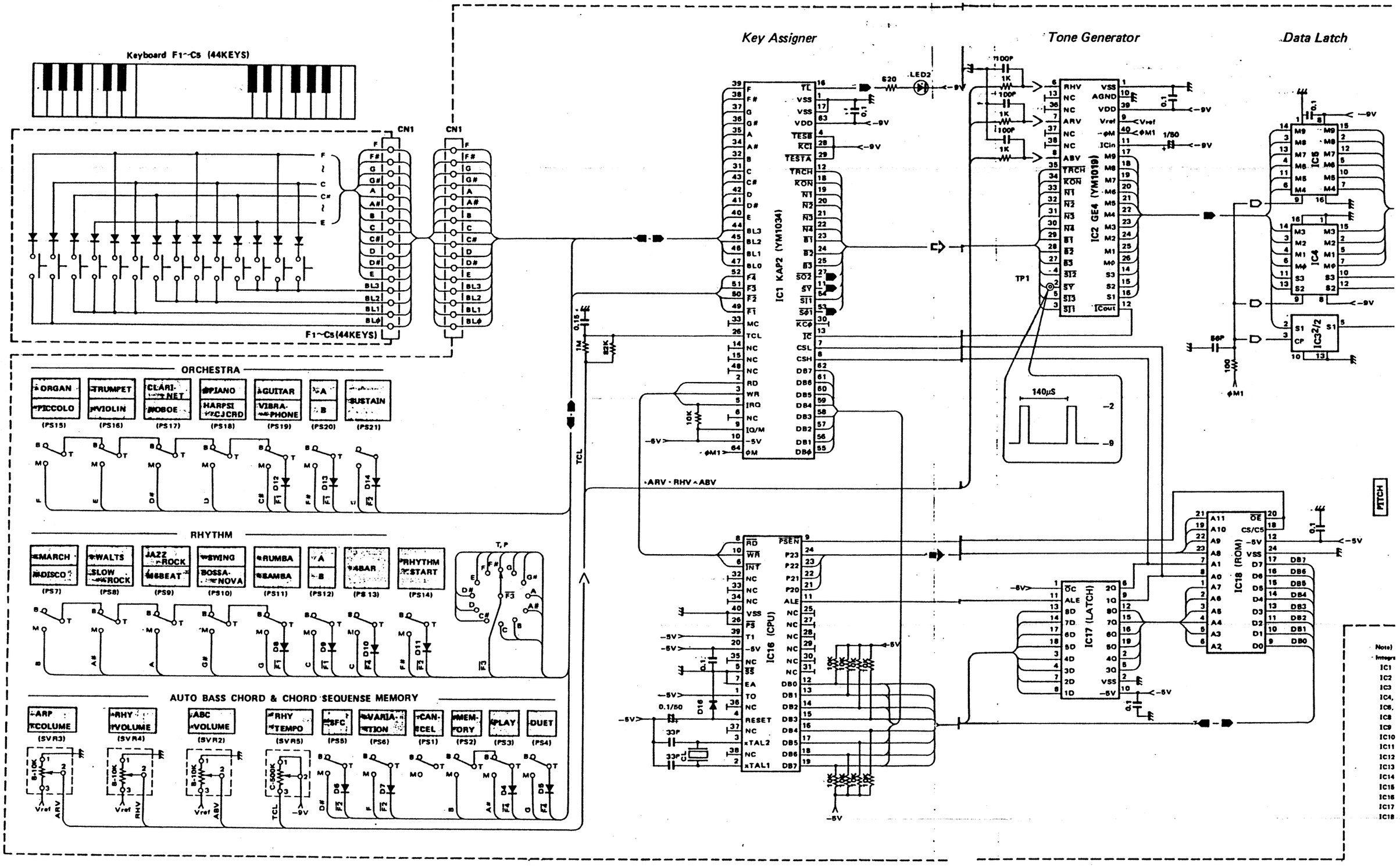

## TC4066 : iG001270

Quad Bilateral sw



# PS-400 OVERALL CIRCUIT DIAGRAM

002675



Data Latch

Voltage Ladder Driver

Multiplexer

Buffer

1/2 Generator

Pilot Lamp Driver

Power Amp

Regulator

PITCH

f=892.1KHZ

| | | | |
|---|---|---|---|
| Note) | | | |
| Integrated Circuit | | Transistor | |
| IC1 | : YM1034 (KAP2) | Tr1, 3 | : 2SC762 (O)(Y) |
| IC2 | : YM1019 (GE4) | Tr2, 5, 6, 9 | : 2SC1815 (O)(Y) |
| IC3 | : TC40H074P | Tr4 | : 2SA733 (P)(Q) |
| IC4, 5 | : TC40H174P | Tr7 | : 2SD880 (O)(Y) |
| IC6, 7 | : 80H000 | Tr8 | : 2SA1015 (O)(Y) |
| IC8 | : HZ00236 | | |
| IC9 | : NJM4560 | Field Effect Transistor | |
| IC10 | : HZ00237 | FET1, 2 | : 2SK105 (E)(F) |
| IC11 | : TC4051 | | |
| IC12 | : TC4066 | Diode | |
| IC13 | : NJM4558 | D1 ~ 16 | : 1SS133 |
| IC14 | : IG06380 (Supply voltage reduction flash IC) | ZD1 | : WZ061 |
| IC15 | : LA4138 (Power AMP) | ZD2 | : RD6.8 EB3 |
| IC16 | : TMP80C39P-6 (CPU) | ZD3 | : WZ090 |
| IC17 | : TC40H373P | | |
| IC18 | : TMM2332P (ROM) | LED | |
| | | LED1, 2 | : IF00377 |
| | | Ceramic Vibrator | |
| | | CL | : CUS 600MT |

Key code data (possible to measure with an oscilloscope)
Clock pulse ( — do. — )
Pulse form signal ( — do. — )
Audio signal (possible to measure with signal tracer)
DC control signal (possible to measure with VOM)

PortaSound

# PS-400

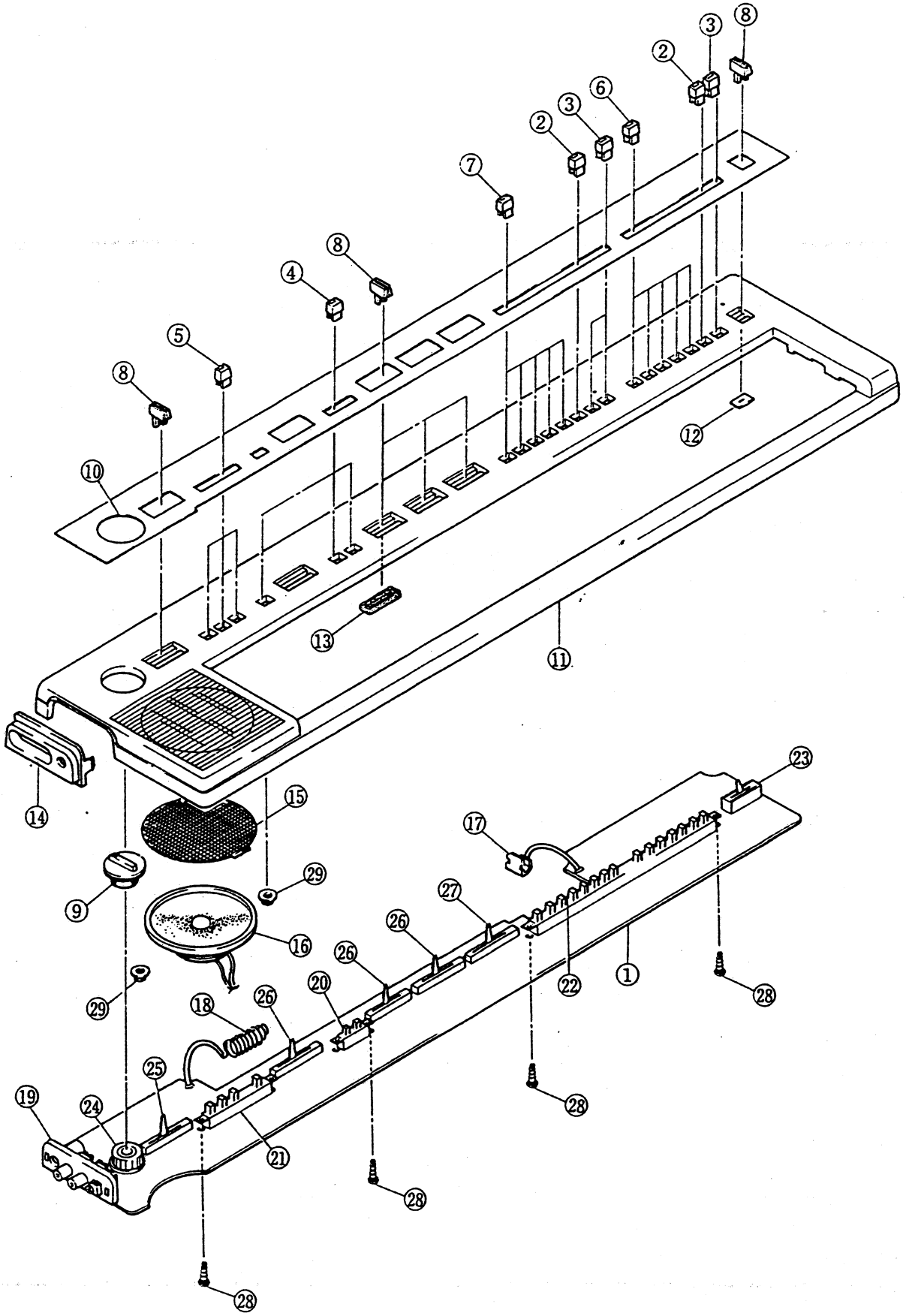
# PARTS LIST

CONTENTS



001158

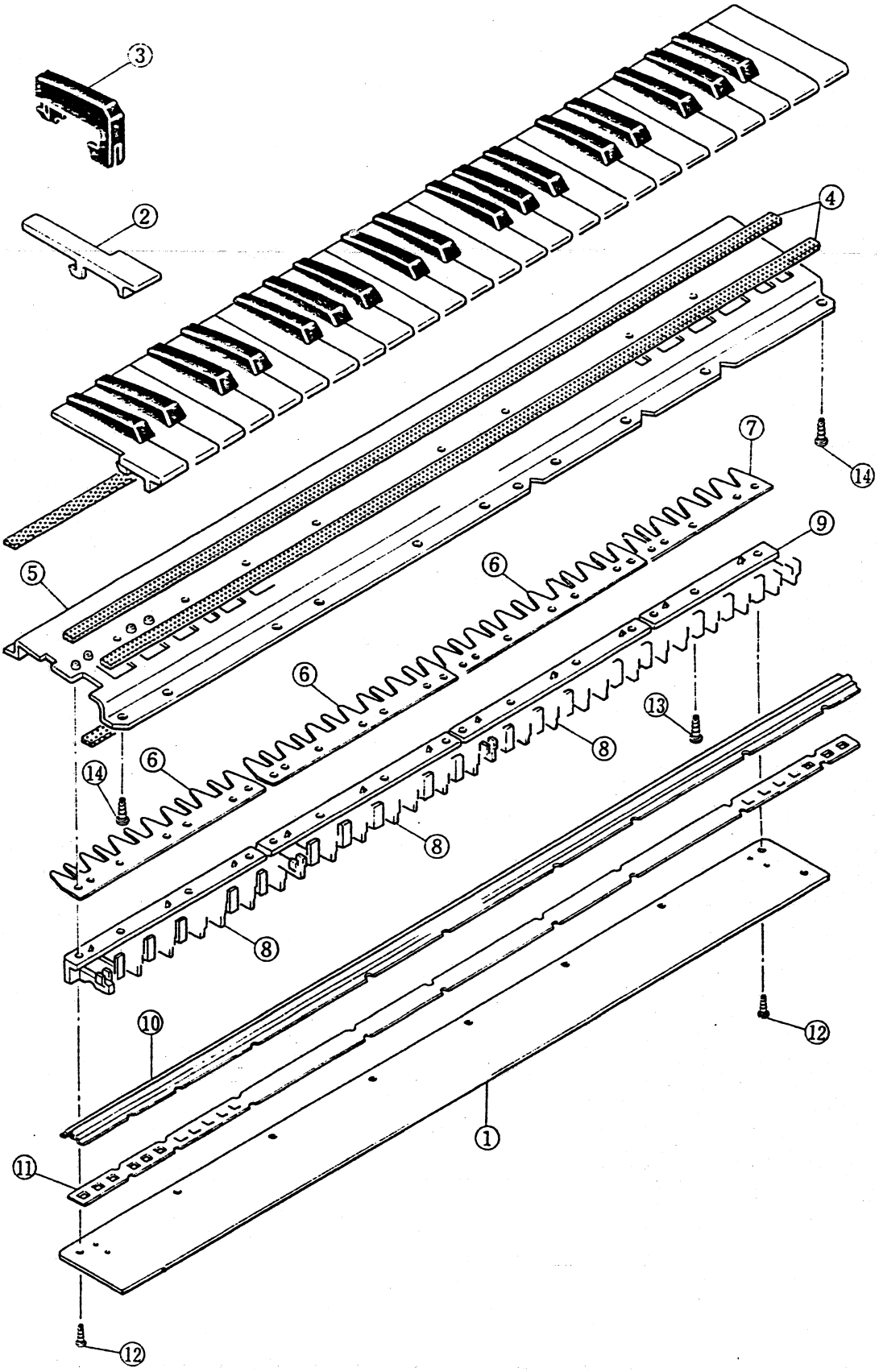
A. Upper Case Assembly



| | Ref. No. | Part No. | Description | | 部品名 | Remarks | Common Model | Markets |
|---|---|---|---|---|---|---|---|---|
| ※ | 1 | NB:10:70:00 | M Circuit Board Assembly | | M シート Ass'y | | | |
| | 2 | CB:04:34:90 | Knob, Push Switch | Red | プッシュツマミ | RHYTHM ORCHESTRA | | |
| | 3 | CB:04:38:00 | – do. – | White | 〃 | SUSTAIN 4 BAR VARIATION SYNCHRO START | | |
| | 4 | CB:04:38:10 | – do. – | Blue | 〃 | VARIATION DUET SINGLE FINGER CHORD | | |
| | 5 | CB:04:38:20 | – do. – | Orange | 〃 | OFF MEMORY PLAY | | |
| | 6 | CB:04:38:30 | – do. – | Green | 〃 | ORCHESTRA | | |
| | 7 | CB:04:38:50 | – do. – | Yellow | 〃 | RHYTHM | | |
| | 8 | CB:04:35:00 | Knob, Slide Switch | White | スライドツマミ | MASTER VOLUME VOLUME, TEMPO, POWER | | |
| | 9 | CB:04:48:70 | Knob, Rotary Switch | Red | ロータリーツマミ | Trans Poser | | |
| | | CB:04:48:80 | – do. – | Blue | 〃 | – do. – | | |
| | | CB:04:49:90 | – do. – | Beige | 〃 | – do. – | | |
| ※ | 10 | CB:04:37:70 | Panel Template, Japanese Description | Beige | 和文シート | | | Japan |
| ※ | | CB:04:48:20 | – do. – | Red | 〃 | | | – do. – |
| ※ | | CB:04:48:30 | – do. – | Blue | 〃 | | | – do. – |
| ※ | 11 | NK:00:80:60 | Upper Case | Blue | 上ケース | | | |
| ※ | | NK:00:80:50 | – do. – | Red | 〃 | | | |
| ※ | | NK:00:77:50 | – do. – | Beige | 〃 | | | |
| | 12 | CB:04:34:20 | Dust Protection Film, Slide Switch | | 防塵フィルムB | | | |
| | 13 | CB:04:37:30 | Dust Protection Rubber | | 防塵ラバー | | | |
| ※ | 14 | CB:04:46:20 | Accessory Panel | Red | アクセサリーパネル | | | |
| ※ | | CB:04:46:30 | – do. – | Blue | 〃 | | | |
| ※ | | CB:04:46:40 | – do. – | Beige | 〃 | | | |
| | 15 | CE:02:04:30 | Screen, Speaker | | スピーカクロス | | | |
| | 16 | JA:07:51:10 | Speaker | JA0751 | スピーカリード付 | | | |
| | 17 | BB:00:54:90 | Contact Leaf, Battery | | 電池端子(+) | | | |
| | 18 | AA:05:44:50 | Contact Spring (Spiral), Battery | | 〃 (−) | | | |
| | 19 | LB:10:10:70 | Accessory Plate | | ジャック板 | EXP IN, AUX OUT, HP, SP, DC JACK | | |
| | 20 | KA:80:32:40 | Push Switch | | プッシュスイッチ | VARIATION DUET SINGLE FINGER CHORD | | |
| | 21 | KA:80:34:40 | – do. – | | 〃 | CHORD SEQUENCE MEMORY | | |
| | 22 | KA:80:34:70 | – do. – | | 〃 | RHYTHM & ORCHESTRA | | |
| | 23 | KA:40:10:40 | Slide Switch | | スライドスイッチ | POWER ON/OFF | | |
| ※ | 24 | KA:50:18:30 | Rotar Type Switch | | ロータリースイッチ | Trans Poser | | |
| | 25 | HQ:46:00:10 | Slide Volume | A-10K | スライドボリューム | MASTER VOLUME | | |
| | 26 | HQ:46:00:20 | – do. – | B-10K | 〃 | A,B,C VOLUME RHYTHM VOLUME ARPEGGIO VOLUME | | |
| | 27 | HQ:46:01:00 | – do. – | C-500K | 〃 | RHYTHM TEMPO | | |
| | 28 | EJ:33:00:80 | Pan Head Tapping Screw | 3 x 8 BL | バインドタッピングネジ | | | |
| | 29 | EK:00:36:50 | Self Threading Nut | | セルフスレディングナット | | | |

※ New Parts (新規部品)

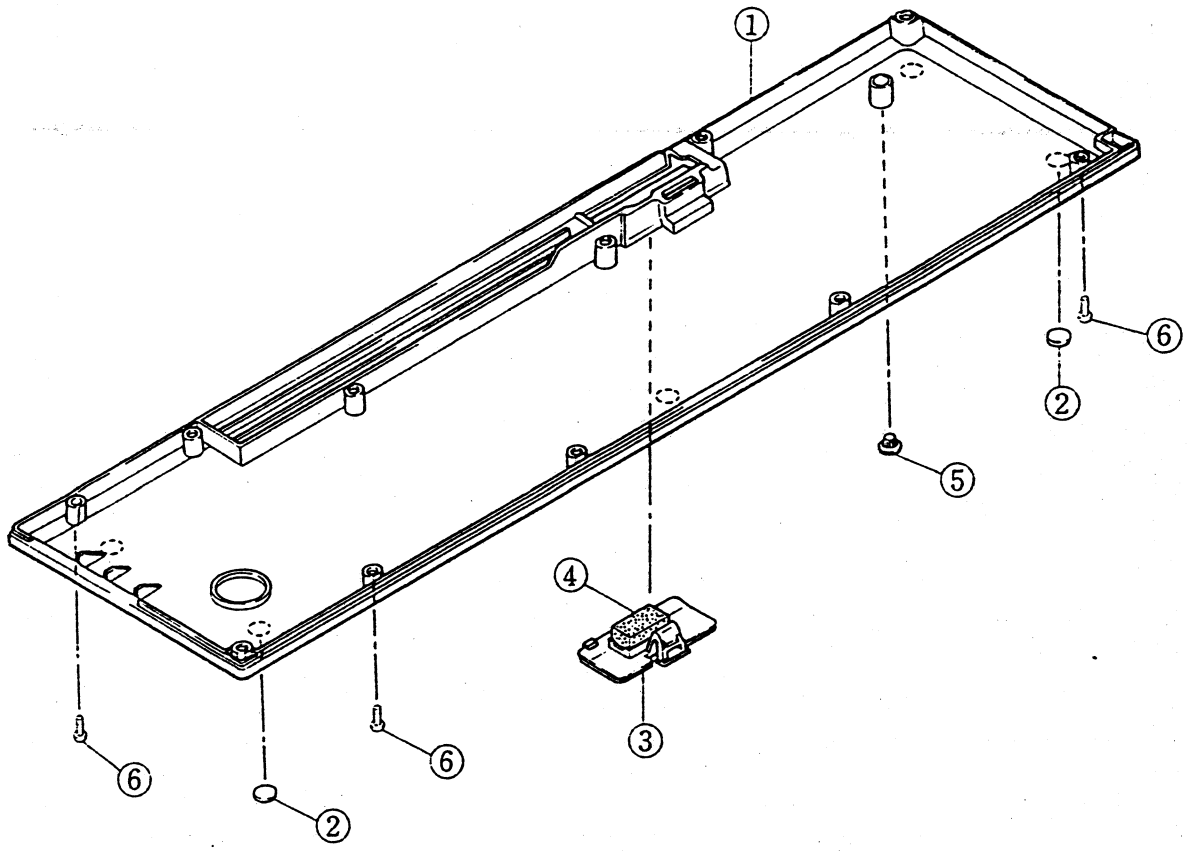
B. Keyboard Assembly



| Ref. No. | Part No. | Description | | 部品名 | Remarks | Common Model | Markets |
|---|---|---|---|---|---|---|---|
| | | Keyboard Assembly | | | | | |
| 1 | NA 10 83 90 | MK Circuit Board | | M K シート | | | |
| | | | | | | | |
| 2 | CB 04 03 70 | White Key | F | 白鍵 | | | |
| | CB 04 03 80 | — do. — | G | 〃 | | | |
| | CB 04 03 90 | — do. — | A | 〃 | | | |
| | CB 04 04 00 | — do. — | B | 〃 | | | |
| | CB 04 04 10 | — do. — | C | 〃 | | | |
| | CB 04 04 20 | — do. — | D | 〃 | | | |
| | CB 04 04 30 | — do. — | E | 〃 | | | |
| | CB 04 04 40 | — do. — | C' | 〃 | | | |
| 3 | CB 04 04 50 | Black Key | | 黒鍵 | | | |
| | | | | | | | |
| 4 | CC 01 54 90 | Felt, Keyboard Frame | | 鍵盤フェルト | | | |
| 5 | AA 05 30 20 | Keyboard Frame | | 鍵盤フレーム | | | |
| 6 | AA 05 30 70 | Key Spring | F12 | 鍵バネ | | | |
| 7 | AA 05 30 80 | — do. — | F8 | 〃 | | | |
| 8 | CB 04 04 70 | Key Guide | F12 | 鍵盤ガイド | | | |
| 9 | CB 04 04 80 | — do. — | F8 | 〃 | | | |
| 10 | CB 04 27 00 | Rubber Contact | | 可動導電ゴム | | | |
| 11 | CB 04 15 80 | Isolation Spacer | | 絶縁スペーサ | | | |
| | | | | | | | |
| 12 | Ei 03 01 40 | Bind Head Tapping Screw | 3 x 14 YE | バインドタッピングネジ | | | |
| 13 | Ei 03 01 80 | — do. — | 3 x 18 YE | 〃 | | | |
| 14 | EJ 33 00 80 | Pan Head Tapping Screw | 3 x 8 BL | ナベタッピングネジ | | | |

※ New Parts (新規部品)

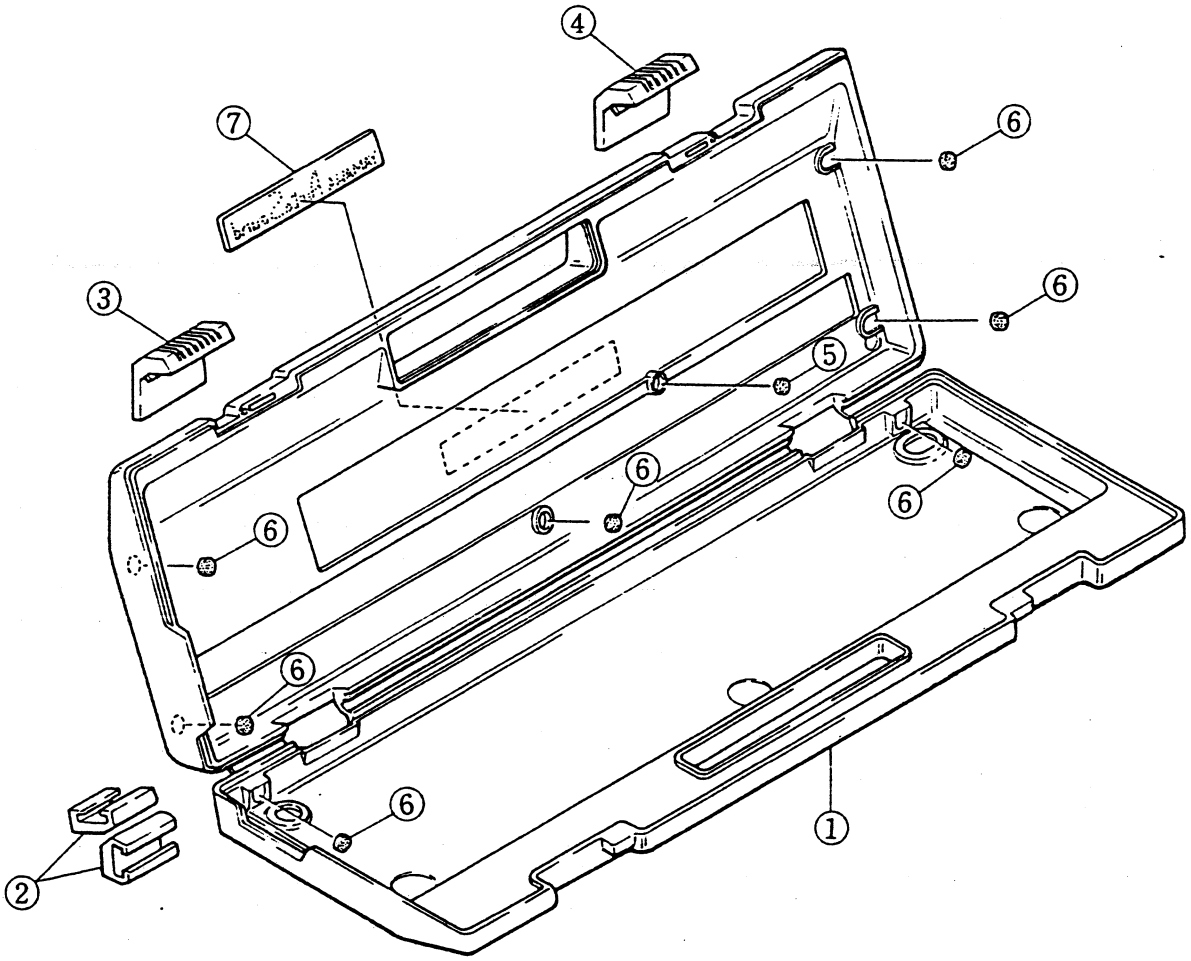
C. Lower Case Assembly




| | Ref. No. | Part No. | Description | | 部品名 | Remarks | Common Model | Markets | |
|---|---|---|---|---|---|---|---|---|---|
| ※ | 1 | CB:04:37:20 | Lower Case | | 下ケース | | | | |
| | 2 | CB:04:37:50 | Rubber Insulator | | ゴム脚 | | | | |
| ※ | 3 | CB:04:46:50 | Battery Cover | | バッテリーカバー | | | | |
| | 4 | CB:04:20:70 | Sponge Cushion, Battery Cover | | バッテリークッション | | | | |
| ※ | 5 | CB:04:24:50 | Button Tuning | | ゴムボタン | | | | |
| | 6 | EJ:33:00:80 | Pan Head Tapping Screw | 3 x 8 BL | ナベタッピングネジ | | | | |

※ New Parts (新規部品)

D. Carrying Case Assembly




| | Ref. No. | Part No. | Description | | 部品名 | Remarks | Common Model | Markets | |
|---|---|---|---|---|---|---|---|---|---|
| ※ | 1 | NB10 68 20 | Carring Case Assembly | Beige | キャリングケースAss'y | | | | |
| ※ | | NB10 70 70 | – do. – | Red | 〃 | | | | |
| ※ | | NB10 70 80 | – do. – | Blue | 〃 | | | | |
| ※ | 2 | CB04 46 80 | Leg | Beige | 脚 | | | | |
| ※ | | CB04 47 20 | – do. – | Red | 〃 | | | | |
| ※ | | CB04 47 60 | – do. – | Blue | 〃 | | | | |
| ※ | 3 | CB04 46 90 | Latch | Left Beige | ラッチ(左) | | | | |
| ※ | | CB04 47 30 | – do. – | 〃 Red | 〃 | | | | |
| ※ | | CB04 47 70 | – do. – | 〃 Blue | 〃 | | | | |
| ※ | 4 | CB04 47 00 | – do. – | Right Beige | ラッチ(右) | | | | |
| ※ | | CB04 47 40 | – do. – | 〃 Red | 〃 | | | | |
| ※ | | CB04 47 80 | – do. – | 〃 Blue | 〃 | | | | |
| | 5 | CE13 60 10 | Cushion | | クッション皮 | | | | |
| | 6 | CE17 10 40 | – do. – | | 〃 C | | | | |
| ※ | 7 | CB04 47 10 | Plate | Beige | ネームプレート | | | | |
| ※ | | CB04 47 50 | – do. – | Red | 〃 | | | | |
| ※ | | CB04 47 90 | – do. – | Blue | 〃 | | | | |

※ New Parts (新規部品)

## E. Electronic Components

| | Ref. No. | Part No. | Description | | 部品名 | Remarks | Common Model | Markets | |
|---|---|---|---|---|---|---|---|---|---|
| ※ | | NB 10 70 00 | M Circuit Board Assembly | | M シート Ass'y | | | | |
| | | HZ 00 23 60 | IC | 10 bit Ladder | I C | 10 bits Resistor Ladder Network | | | |
| | | HZ 00 23 70 | — do. — | 8 bit Latter | 〃 | 8 bits Resistor Ladder Network | | | |
| | | iG 00 12 70 | — do. — | TC4066 | 〃 | Quad. Bilateral SW. | | | |
| | | iG 00 13 90 | — do. — | NJM4558 | 〃 | OP AMP | | | |
| | | iG 00 17 70 | — do. — | TC4051 | 〃 | Multiplexer | | | |
| | | iG 04 00 00 | — do. — | NJM4560 | 〃 | OP Amp | | | |
| | | iG 04 58 00 | — do. — | LA4138 | 〃 | Power Amp | | | |
| | | iG 05 11 00 | — do. — | TC40H074P | 〃 | D Flip-Flop | | | |
| | | iG 05 38 00 | — do. — | M5232L | 〃 | Auto Power OFF | | | |
| | | iG 06 10 00 | — do. — | TC50H000 | 〃 | Hex Buffer | | | |
| | | iG 06 41 00 | — do. — | TC40H174P | 〃 | Hex D Flip-Flon | | | |
| | | iG 07 85 00 | — do. — | TC40H373P | 〃 | | | | |
| ※ | | iG 08 38 00 | — do. — | TMM2332P | 〃 | ROM | | | |
| ※ | | iG 08 48 00 | — do. — | TMP80C39P-6 | 〃 | CPU | | | |
| | | iT 10 19 00 | — do. — | YM1019 | 〃 | GE4 | | | |
| | | iT 10 34 00 | — do. — | YM1034 | 〃 | KAP2 | | | |
| | | iA 07 33 40 | Transistor | 2SA733 (P,Q) | トランジスタ | | | | |
| | | iA 10 15 70 | — do. — | 2SA1015 (O,Y) | 〃 | | | | |
| | | iC 07 52 30 | — do. — | 2SC752 (O,Y) | 〃 | | | | |
| | | iC 18 15 70 | — do. — | 2SC1815 (O,Y) | 〃 | | | | |
| | | iD 08 80 00 | — do. — | ZSD880 (O,Y) | 〃 | | | | |
| | | iE 10 12 30 | FET | 2SK105 (E,F) | F E T | | | | |
| | | iF 00 01 90 | Diode | WZ090 | ダイオード | | | | |
| | | iF 00 03 20 | — do. — | WZ061 | 〃 | | | | |
| | | iF 00 16 90 | — do. — | RD5.6EB3 | 〃 | | | | |
| | | iF 00 34 50 | — do. — | 1SS133 | 〃 | | | | |
| | | FS 68 33 30 | Semi-Conductive Ceramic Capacitor | 0.0033μF | 半導体セラミックコンデンサ | | | | |
| | | FS 68 44 70 | — do. — | 0.047μF | 〃 | | | | |
| | | FS 54 51 00 | — do. — | 0.1μF | 〃 | | | | |
| | | UA 25 51 50 | Mylar Capacitor | 0.15μF | 小型マイラーコンデンサ | | | | |
| | | UW 82 81 00 | Electrolytic Capacitor | 100μF/10V | 電解コンデンサ | | | | |
| | | UW 82 82 20 | Electrolytic Capacitor | 220μF/10V | 小型電解コンデンサ | | | | |
| | | UW 82 84 70 | — do. — | 470μF/10V | 〃 | | | | |
| | | FZ 00 34 40 | Electrolytic Capacitor | 1000μF/10V | 小型電解コンデンサ | | | | |
| | | UW 94 64 70 | Miniature Electrolytic Capacitor | 4.7μF/25V | 小型電解コンデンサ | | | | |
| | | UW 82 74 70 | — do. — | 47μF/10V | 〃 | | | | |
| | | UW 56 51 00 | — do. — | 0.1μF/50V | 〃 | | | | |
| | | UW 96 61 00 | — do. — | 1μF/50V | 〃 | | | | |
| | | GE 90 01 80 | OSC Coil | 250μH | OSCコイル | | | | |
| | | QU 00 34 00 | Ceramic Vibrator | CUS 600MT | セラミック振動子 | | | | |
| | | iF 00 37 70 | LED | SLP-14-4B-40 | L E D | | | | |
| | | CB 04 20 80 | LED Holder | | LEDホルダー | | | | |

※ New Parts (新規部品)