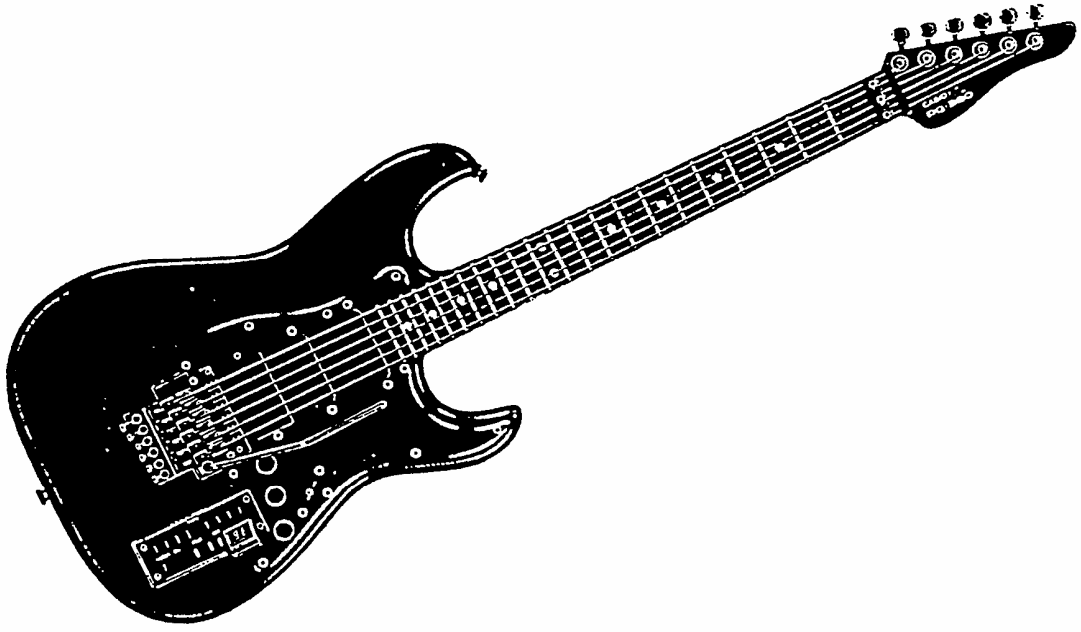
# SERVICE MANUAL & PARTS LIST

(without price)

## *GUITAR SYNTH*

# PG-380

**FEB. 1988**



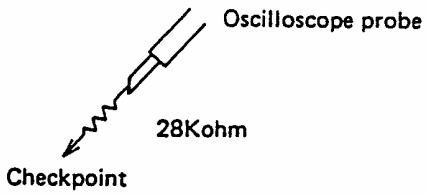
PG-380

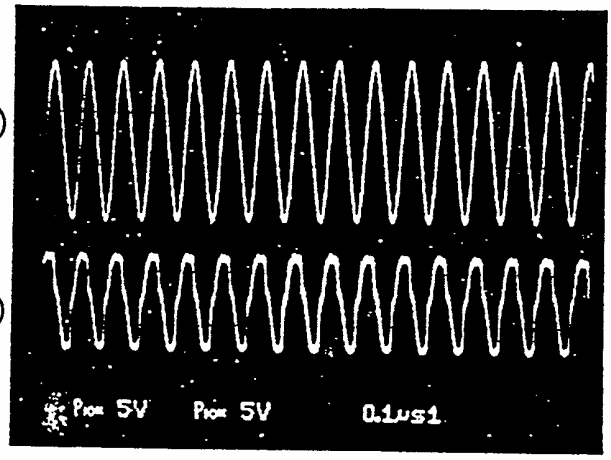
**CASIO**

CONTENTS

## 2-2. Major Waveforms

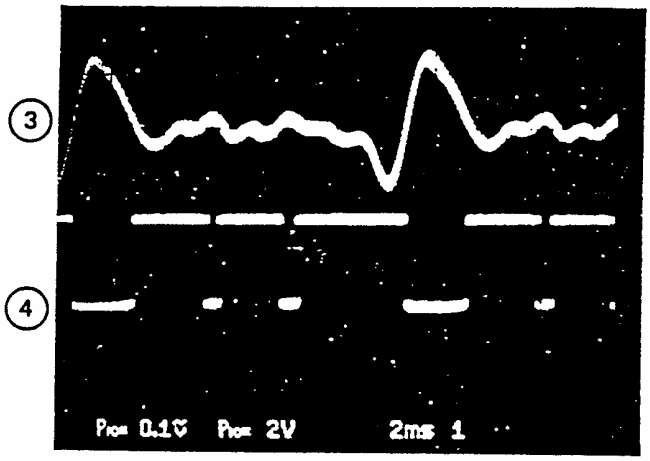
Note: The analog waveforms were observed via 28Kohm resistor.
Probe reduction: 10:1



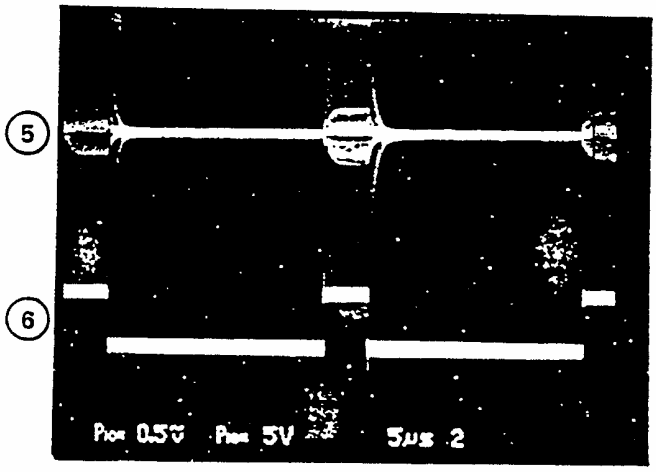

(1) Clock pulse source
GAO μPD65070 pin 3

(2) Main CPU clock pulse
Main CPU μPD78C10G pin 25



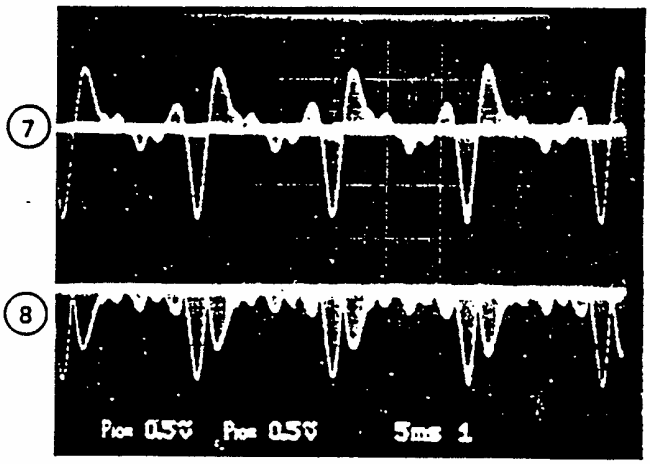

(3) String input
Opamp NJM062-2 pin 7

(4) Zero cross signal
Opamp NJM2068-1 pin 7




(5) Multiplexer output
IC μPD4066-2 pin 10

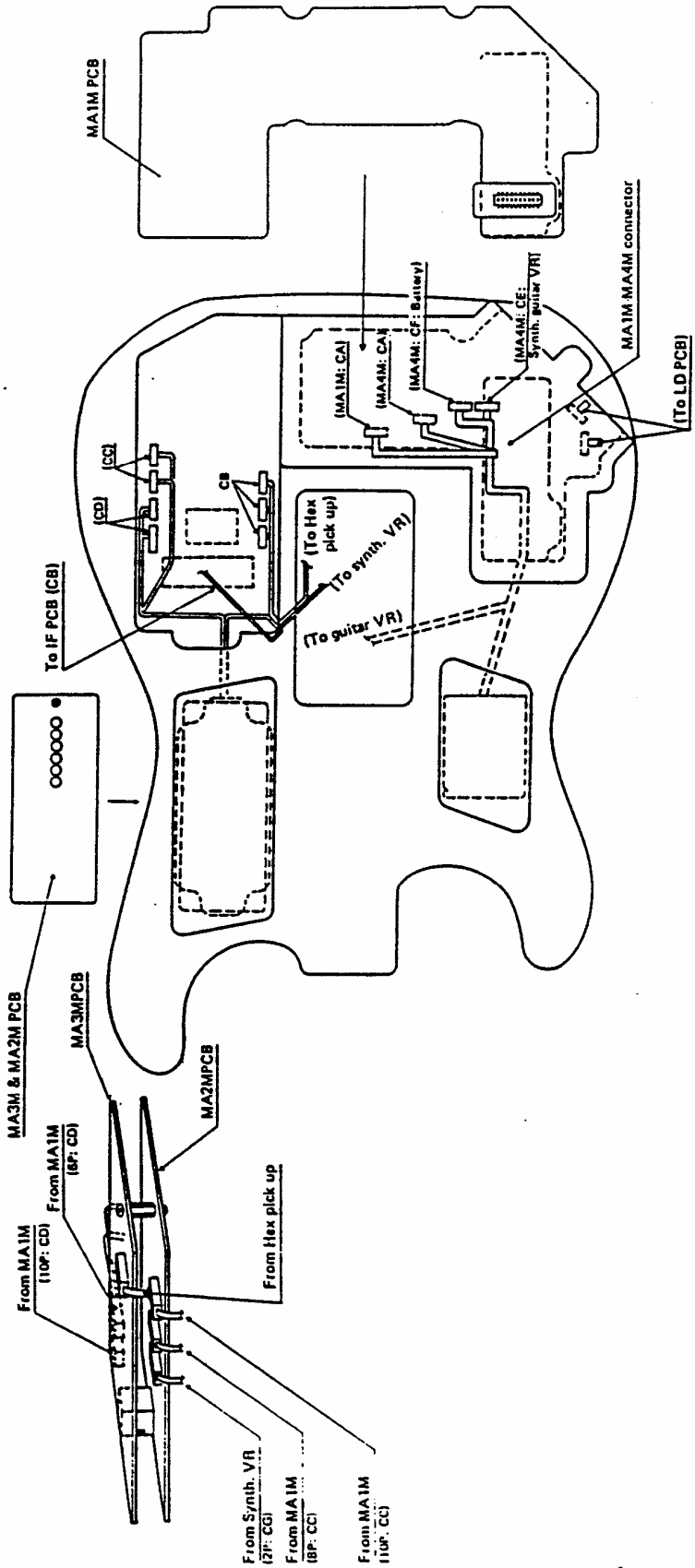
(6) Multiplexer clock signal
IC μPD4066-2 pin 12



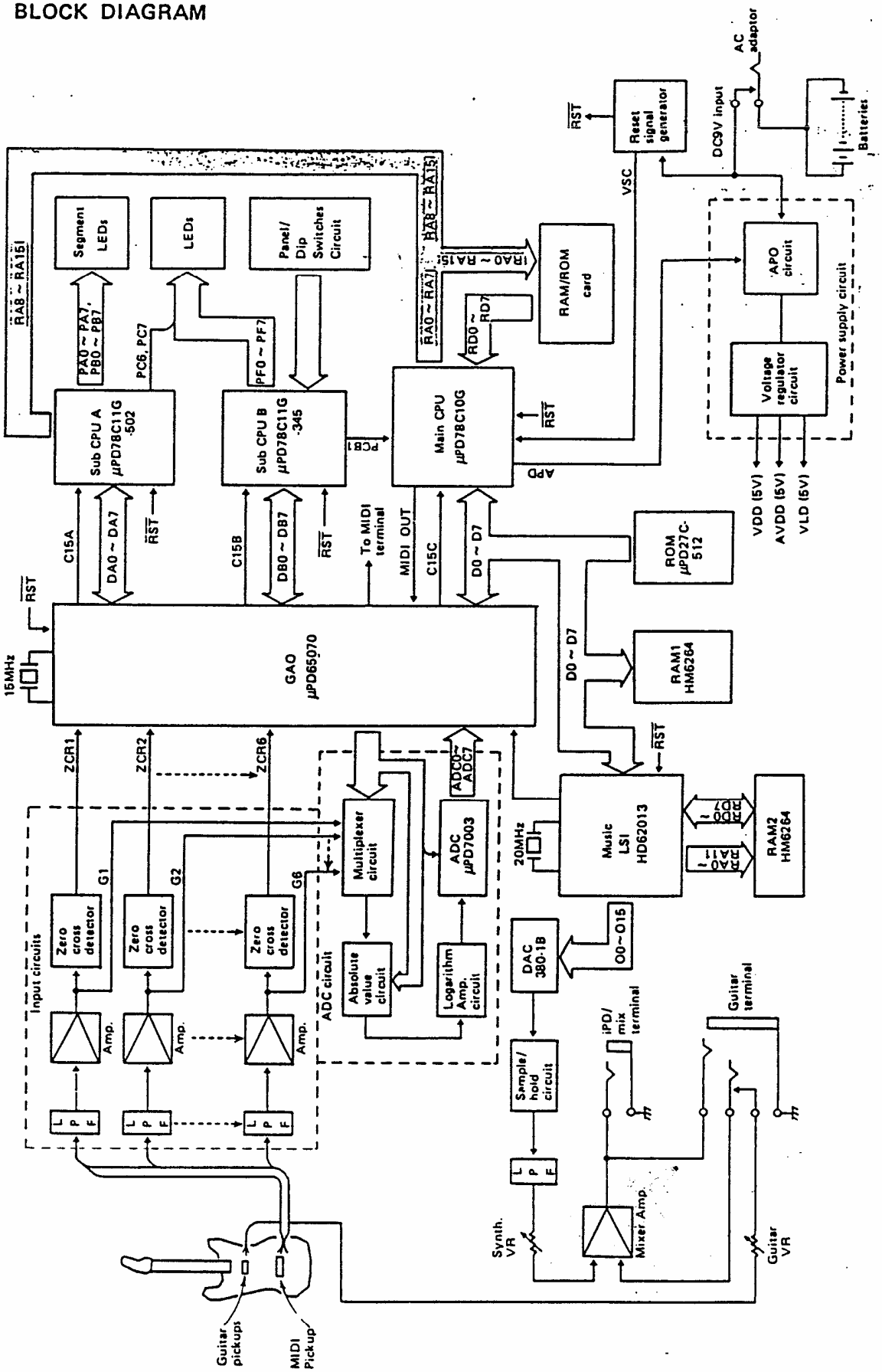

(7) Absolute value input
Opamp NJM2068-2 pin 7

(8) Absolute value output
Opamp NJM2068-5 pin 7

## 3. WIRING DIAGRAM



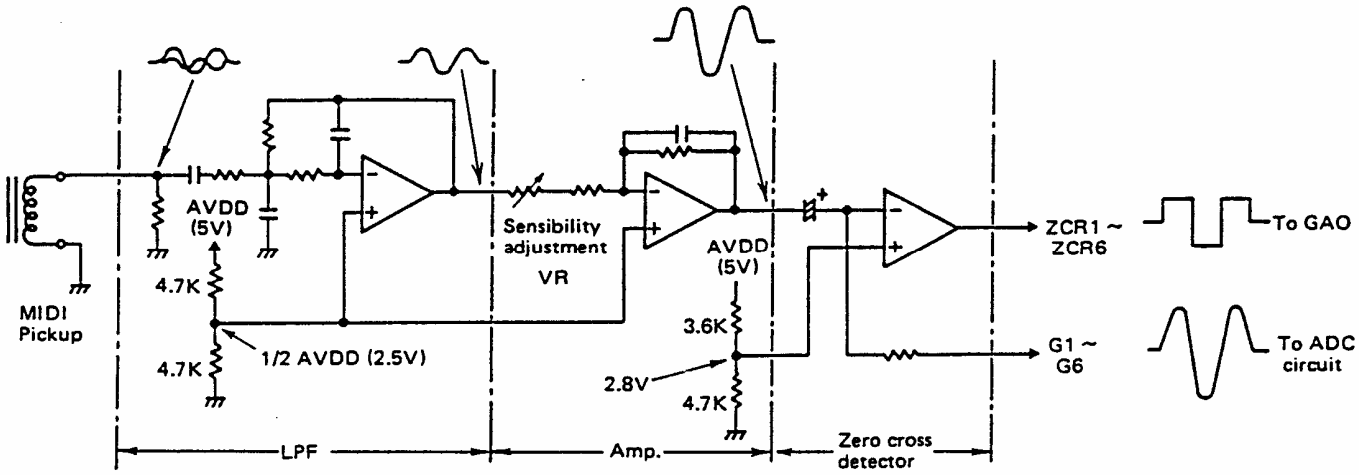
## 4. BLOCK DIAGRAM



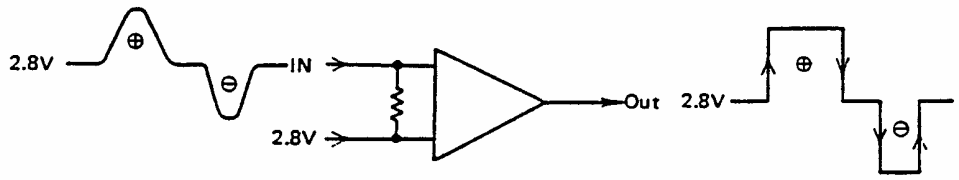
## 5. INPUT CIRCUIT

MIDI pickup converts the vibration of strings into an electrical signal and the signal from the pickup enters Input Circuit.

The PG-380 is equipped with six Input Circuits and, one Input Circuit consists of LPF, Amp, and Zero Cross Detector.




The LPF cuts unnecessary harmonic signals and noises. The Amp. adjusts the input sensibility of the string. The Zero Cross Detector transfers the input signal into square waveform as shown below.

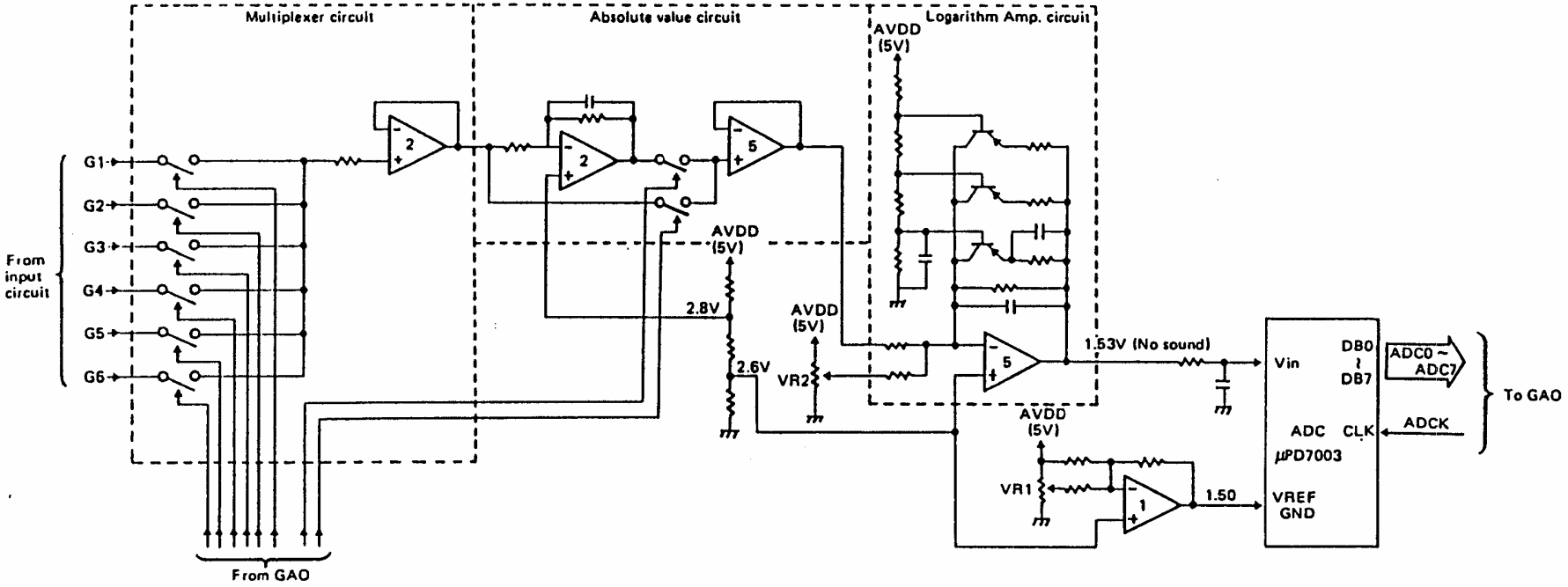



When the input level is more than 2.8V, the output rises to High whereas the output voltage falls if the input is less than 2.8V.

The square waveform is used for determination of the pitch in the Sub CPUs.

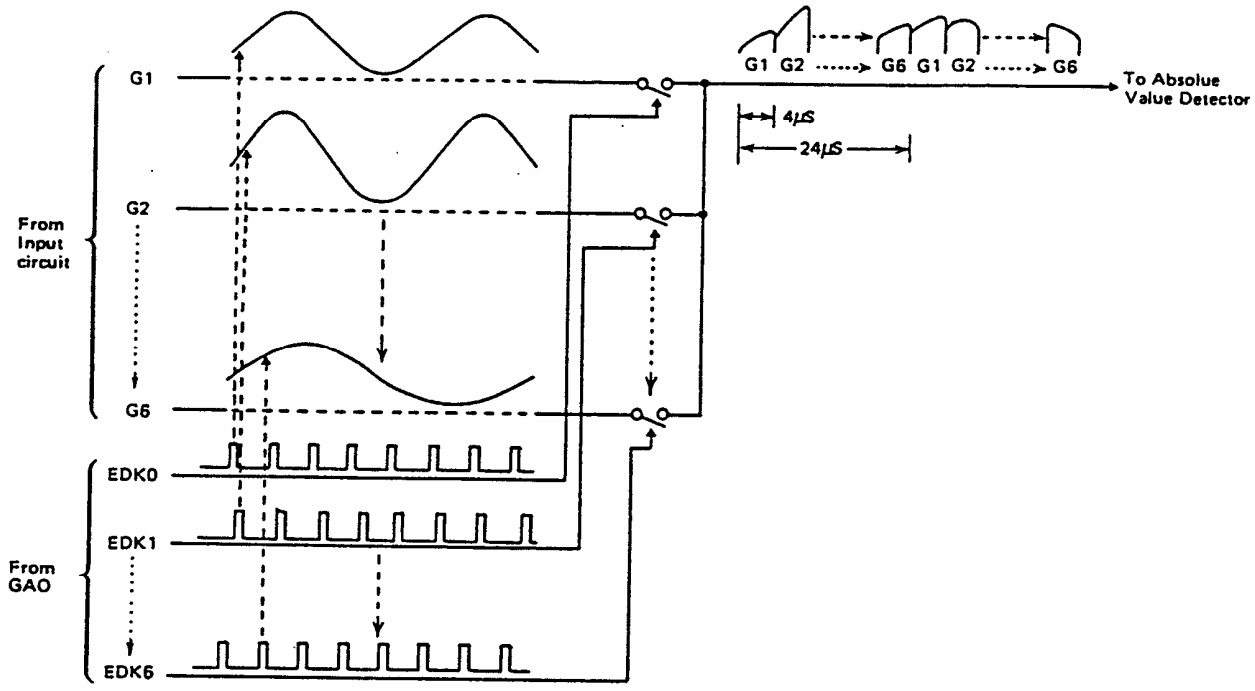
## 6. ADC CIRCUIT

This circuit consists of four blocks, Multiplexer Circuit, Absolute Value Circuit, Logarithm Amp. and ADC (Analog to Digital Converter).
The circuit transfers data of the velocity, note ON/OFF and string No. of the picked strings to LSI GAO. ADC converts the analog signals from the strings into 8-bit digital signals.



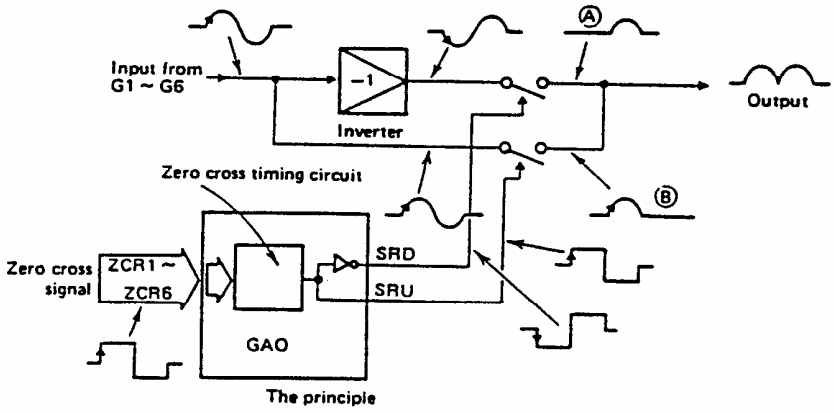
## 6-1. Multiplexer Circuit

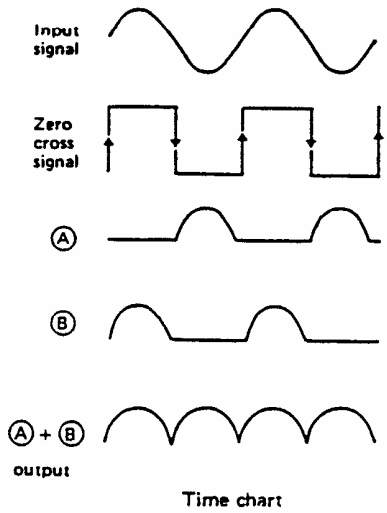
The circuit converts parallel signals of six strings into a serial signal with time-sharing as shown below.




## 6-2. Absolute Value Circuit

This circuit rectifies alternate waveform to obtain velocity value of the strings as shown below.



## 6-3. Logarithm Amp. Circuit

The circuit is an amplifier whose amplitude varies in accordance with the input voltage level in order to obtain wide dynamic range. The circuit also works as gain controller to prevent saturation in the ADC when the input is too large.

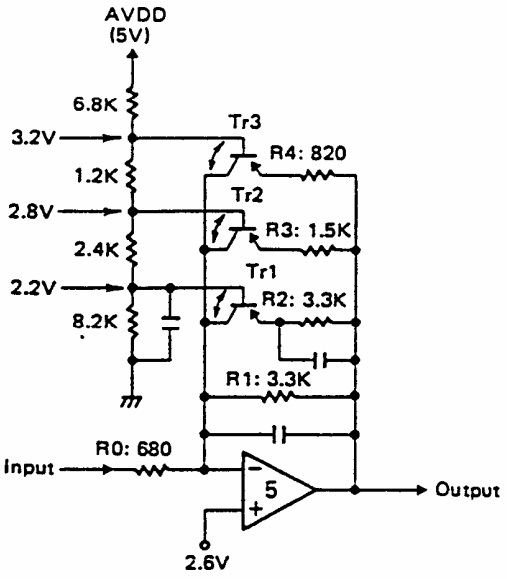



Fig. 1

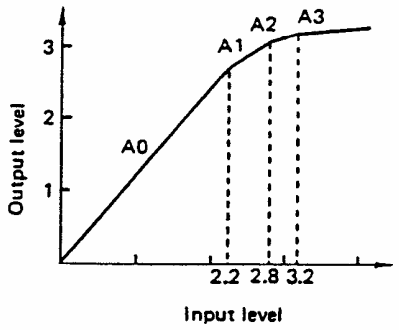



Fig. 2

For example, when the input voltage is less than 2.2V, the amplitude A0 is as shown below.

$$A_0 = \frac{R_1}{R_0} = \frac{3.3K}{680} = 4.85 \div 4.8$$

When the voltage becomes between 2.2V and 2.8V, the transistor Tr1 turns ON, so that $A_1$ is as shown below.

$$A_1 = \frac{\frac{1}{\frac{1}{R_1}+\frac{1}{R_2}}}{R_0} = \frac{1.65K}{680} = 2.43 \div 2.4$$

Also, the amplitudes $A_2$ and $A_3$ are as follows:

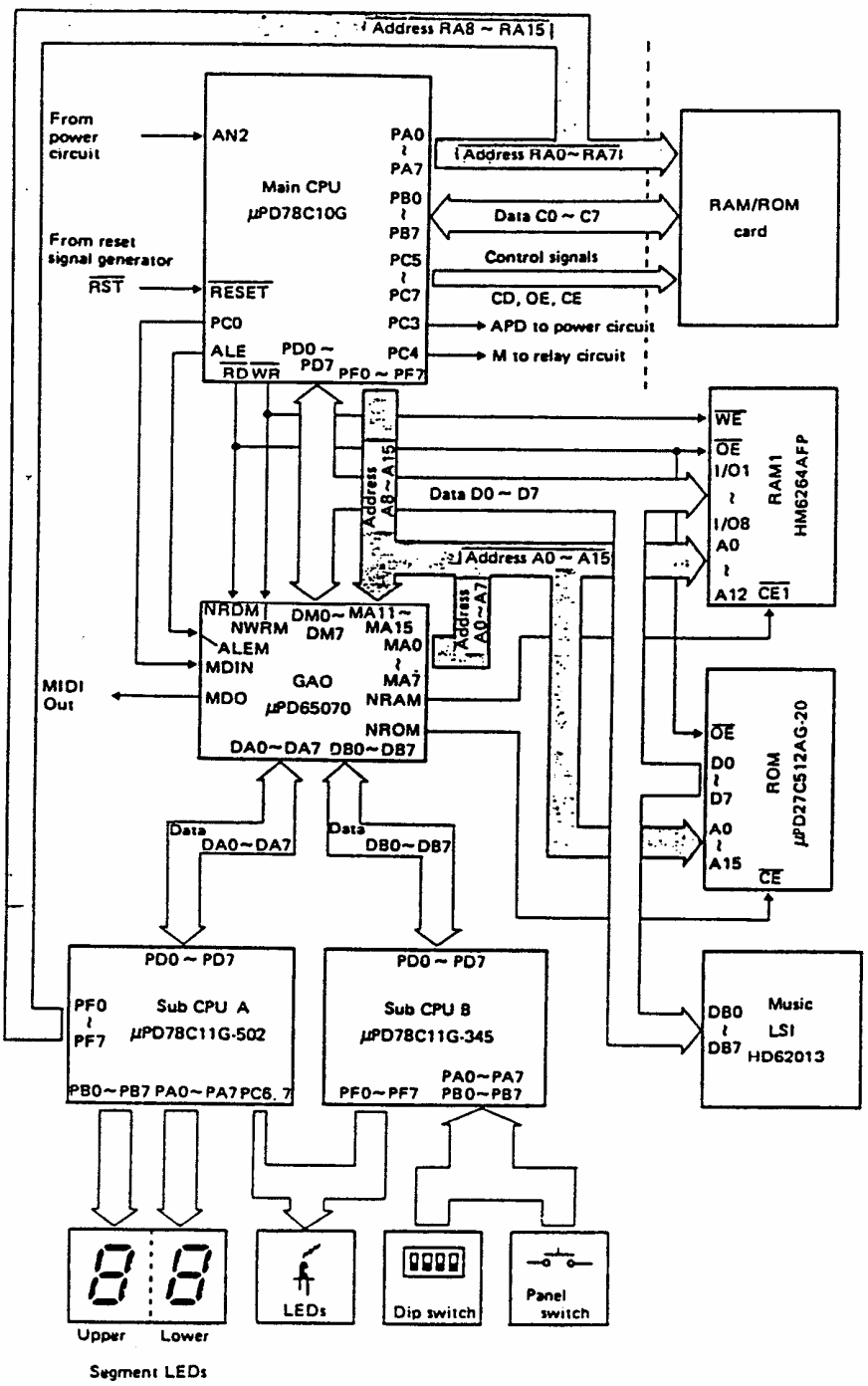
$$A_2 = \frac{\frac{1}{\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}}}{R_0} = \frac{786}{680} = 1.15 \div 1.2$$

$$A_3 = \frac{\frac{1}{\frac{1}{R_1}+\frac{1}{R_2}+\frac{1}{R_3}+\frac{1}{R_4}}}{R_0} = \frac{401}{680} = 0.59 \div 0.6$$

Thus, higher the input voltage, the lower the amplitude.

# 7. DIGITAL CIRCUIT BLOCK

## 7-1. Block Diagarm




Each block has the following functions.

(1) Main CPU

a. Control of Music LSI, ROM RAM1 and GAO.

b. Outputs MIDI, APD and relay drive signal.

c. Data communication between RAM/ROM cards.

(2) Sub CPU A

a. Pitch, string number, and note ON/OFF detections of the 1st, the 4th, and the 6th strings.

b. Segment LEDs and switch LEDs driving.

c. Outputs upper address signals for RAM/ROM card.

(3) Sub CPU B

a. Pitch, string number, and note ON/OFF detection of the 2nd, 3rd, and 5th strings.

b. Switch LEDs driving.

c. DIP and panel switches scanning.

(4) GAO (Refer to page 14)

a. Detection of zero cross timing and peak points of string signal.

b. Interface between Main and Sub CPUs.

(5) RAM1

Work area for Main CPU.

(6) ROM

Stores preset sound data and execution program.

## 7-2. Pin Function of Major LSIs

### (1) Main CPU (μPD78C10)

| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 1, 2 | PA6, PA7 | RA6, RA7 | Out | Address bus for RAM/ROM card |
| 3 ~ 10 | PB0~PB7 | C0 ~ C7 | In/Out | Data bus for RAM/ROM card |
| 11 | PC0 | | Out | MIDI (Musical Instruments Digital Interface) signal output. |
| 12 | PC1 | PCB1 | In | Switch scanning data input from Sub CPU B. |
| 13 | PC2 | PCB2 | In | MIDI clock (2MHz) signal input. |
| 14 | PC3 | APD | Out | APD (Auto Power Down) signal output. Normally High level. When the battery voltage becomes less than 6V, the CPU falls this terminal to the Low level after 15 minutes. |
| 15 | PC4 | $\overline{M}$ | Out | Relay drive signal. The CPU keeps this terminal High level for a while to prevent shock noise when the unit is turned power switch ON. |
| 16 | PC5 | $\overline{C15}$ | In | RAM/ROM card detection signal.<br>CPU discriminates that a RAM/ROM card is inserted when it receives Low level from RAM/ROM card. |
| 17 | PC6 | $\overline{C13}$ | Out | Output enable signal for RAM/ROM card.<br>When Low, data can be output for RAM/ROM card. |
| 18 | PC7 | $\overline{CE}$ | Out | Chip enable signal for RAM/ROM card.<br>When High, data can be transferred between RAM/ROM card and Main CPU. |
| 19 | | | | Not used. |
| 20 | INT1 | | In | Interrupt signal input from LSI GAO.<br>The data are transferred from LSI GAO when this terminal receives High level signal. |
| 21 | | | | Not used. |
| 22 | $\overline{RESET}$ | $\overline{RST}$ | In | Reset signal input. When the power switch is turned on, the terminal receives Low level signal for approximately 100mS during which the internal circuits of the LSI is initialized. |
| 23, 24 | | | | Not used. |
| 25 | X1 | | In | Clock pulse (15 MHz) signal input. |
| 26 | VSS | | | Ground (0V) source. |
| 27 | AVSS | | | Ground (0V) source for built-in ADCs (Analog to Digital Converter) |
| 28, 29 | | | | Not used. |
| 30 | AN2 | | In | Voltage down detection signal input. When the power voltage is Low, the terminal detects it and the CPU flashes the power LED. |
| 31~35 | | | | Not used. |

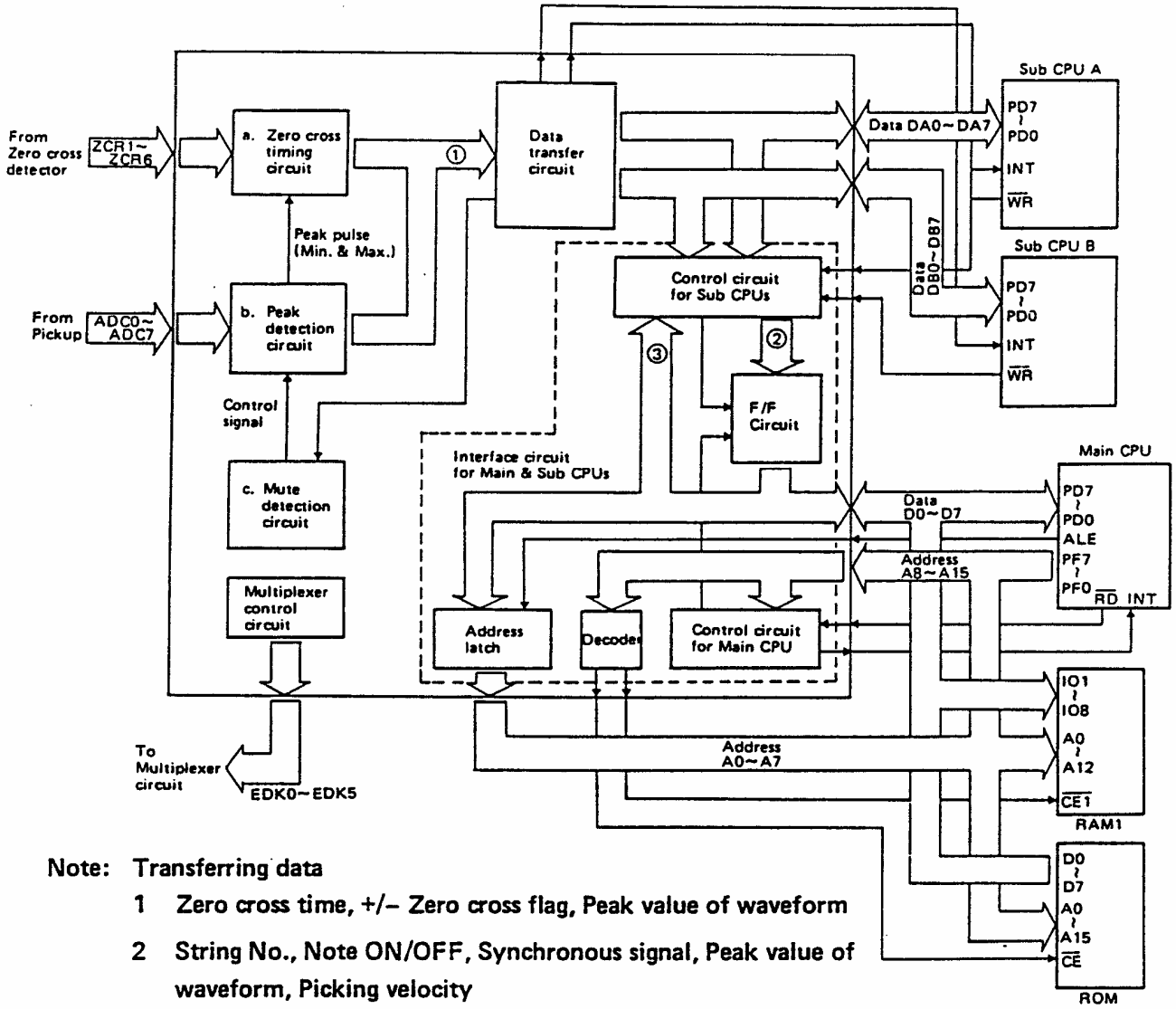
| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 36 | VREF | | | Reference voltage for built-in ADCs. |
| 37 | AVDD | | | +5V source for built-in ADCs. |
| 38 | $\overline{RD}$ | | Out | Read signal output.<br>CPU falls this terminal when it reads data from peripheral devices. |
| 39 | $\overline{WR}$ | | Out | Write signal output.<br>CPU falls this terminal when it writes data in peripheral devices. |
| 40 | ALE | | Out | ALE (Address Latch Enable) signal output.<br>At the rising edge of this signal, the data bus (D0 ~ D7) become the lower address bus (A0 ~ A7). |
| 41~48 | PF0~PF7 | A8~A15 | Out | Upper address bus for peripheral devices. |
| 49~56 | PD0~PD7 | D0~D7 | In/Out | Data bus for peripheral devices. |
| 57 | | | | Not used. |
| 58 | VDD | | | +5V source. |
| 59~64 | PA0~PA5 | RA0~RA5 | Out | Address bus for RAM/ROM card. |

(2) GAO (μPD65070)

| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 1 | GND | | | Ground (0V) source |
| 2 | VDD | | | +5V source |
| 3, 4 | CKI2/CKO2 | | In/Out | Clock pulse (15 MHz) input/output for Main and Sub CPUs |
| 5, 6 | C15A, C15B | | Out | Clock pulse (15 MHz) output for Sub CPU A and B |
| 7 | GND | | | Ground (0V) source |
| 8 ~ 15 | DA7~DA0 | DA7~DA0 | In/Out | Data bus for Sub CPU A. |
| 16 | ALEA | ALEA | In | ALE (Address Latch Enable) signal input from Sub CPU A |
| 17 | NWRA | NWRA | In | Write signal input from Sub CPU A.<br>When this terminal receives Low level signal, GAO takes the data from Sub CPU A. |
| 18 | NRDA | NRDA | In | Read signal input from Sub CPU A.<br>When this terminal receives Low level signal, GAO output the data to Sub CPU A. |
| 19 | INTA | INTA | Out | INT (Interrupt) signal output for Sub CPU A.<br>When GAO outputs the data to Sub CPU A, it outputs the Low level signal to Sub CPU A. |
| 20~27 | DB7~DB0 | DB7~DB0 | In/Out | Data bus for Sub CPU B. |
| 28 | GND | | | Ground (0V) source |
| 29 | VDD | | | +5V source |
| 30 | ALEB | ALEB | In | ALE signal input from Sub CPU B |
| 31 | NWRB | NWRB | In | Write signal input from Sub CPU B |
| 32 | NRDB | NRDB | In | Read signal input from Sub CPU B |
| 33 | INTB | INTB | Out | INT signal output for Sub CPU B |
| 34~39 | ZCR1 ~ ZCR6 | ZCR1 ~ ZCR6 | In | Pitch signals iput from Zero Cross Detection Circuits |
| 40 | GND | | | Ground (0V) source |
| 41, 42 | SRU, SRD | SRU, SRD | Out | Control signals for Absolute Value Circuit |
| 43~48 | EDK0 ~ EDK5 | EDK0 ~ EDK5 | Out | Control signals for Multiplexer Circuit |
| 49~51 | ADC0 ~ ADC2 | ADC0 ~ ADC2 | In | Digital signals input from ADC (Analog to Digital Converter) |
| 52 | VDD | | | +5V source |
| 53 | GND | | | Ground (0V) source |
| 54 | | | | Not used |
| 55 | CKI | CK | In | Clock pulse (10 MHz) input from Music LSI |
| 56 | GND | | | Ground (0V) source |

| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 57~61 | ADC3~ ADC7 | ADC3~ ADC7 | In | Digital signals input from ADC |
| 62 | ADCK | ADCK | Out | Clock pulse (250KHz) output for ADC |
| 63, 64 | | | | Not used |
| 65 | MD0 | MIDI | Out | MIDI (Musical Instruments Digital Interface) signal output |
| 66 | NRAM | | Out | Chip enable signal for RAM 1 |
| 67 | NROM | | Out | Chip enable signal for ROM |
| 68~75 | MA0~ MA7 | A0~A7 | Out | Lower address bus output for RAM and ROM |
| 76, 77 | | | | Not used |
| 78 | DM7 | D7 | In/Out | Data bus for peripheral devices |
| 79 | VDD | | | +5V source |
| 80 | GND | | | Ground (0V) source |
| 81~84 | DM6~DM3 | D6~D3 | In/Out | Data bus for peripheral devices |
| 85 | MDIN | | In | MIDI signal input from Main CPU |
| 86~88 | DM2~DM0 | D2~D0 | In/Out | Data bus for peripheral devices |
| 89~93 | MA15~ MA11 | A15~ A11 | In | Upper address bus from Main CPU |
| 94 | ALEM | | In | ALE signal input from Main CPU |
| 95 | NWRM | $\overline{WR}$ | In | Write signal input from Main CPU |
| 96 | NRDM | $\overline{OE}$ | In | Read signal input from Main CPU |
| 97 | MM2 | PCB2 | Out | MIDI clock pulse (2MHz) output to Main CPU and Sub CPU B |
| 98 | INTM | | Out | Interrupt signal output for Main CPU |
| 99 | GND | | | Ground (0V) source |
| 100 | C15C | | Out | Clock pulse (15 MHz) output for Main CPU |

(3) Block Diagram of GAO

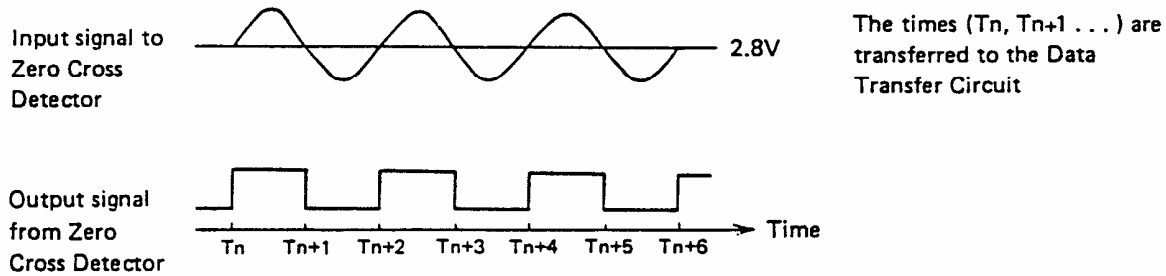



**Note: Transferring data**

1. **Zero cross time, +/– Zero cross flag, Peak value of waveform**
2. **String No., Note ON/OFF, Synchronous signal, Peak value of waveform, Picking velocity**
3. **Initial data at power ON**

a. Zero Cross Timing Circuit

This circuit detects the times for zero cross points (or pitch) as shown below by using internal counters.



b. Peak Detection Circuit

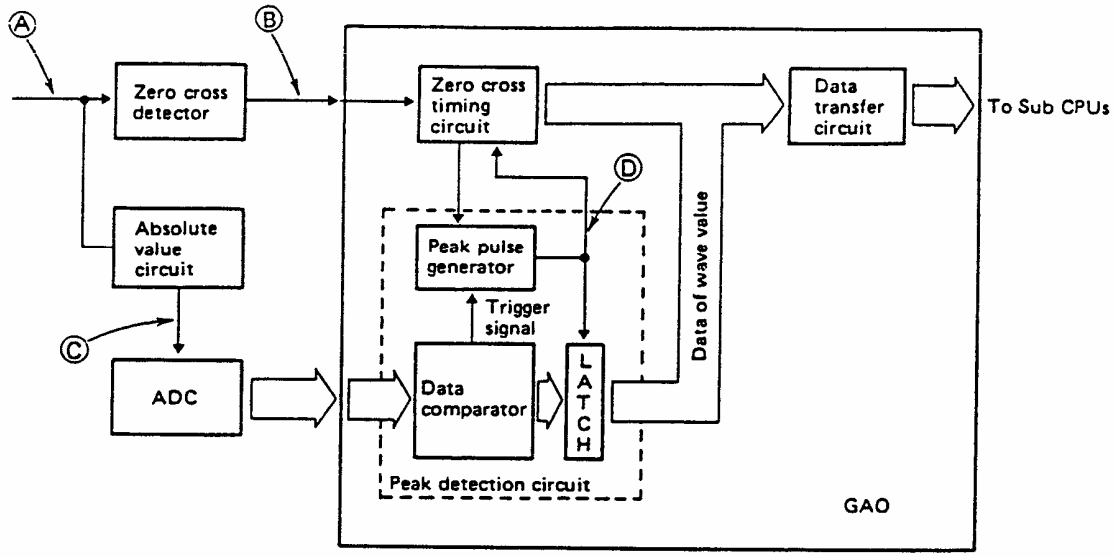



Fig. 1

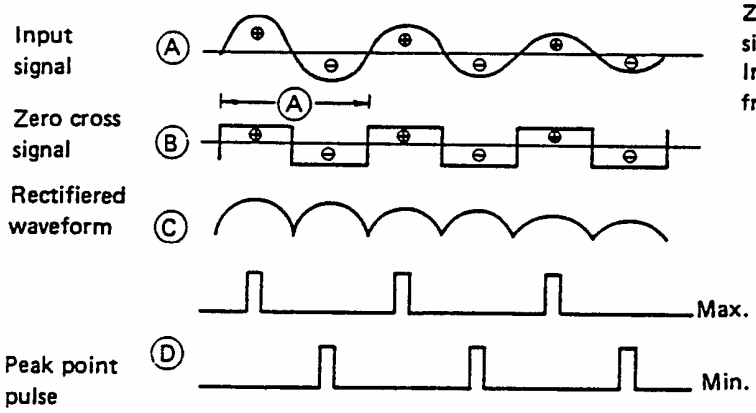



Fig. 2 Time Chart

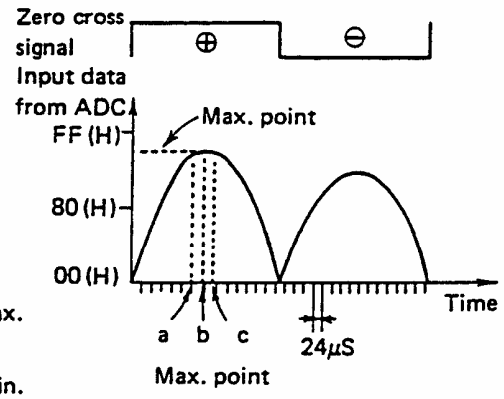


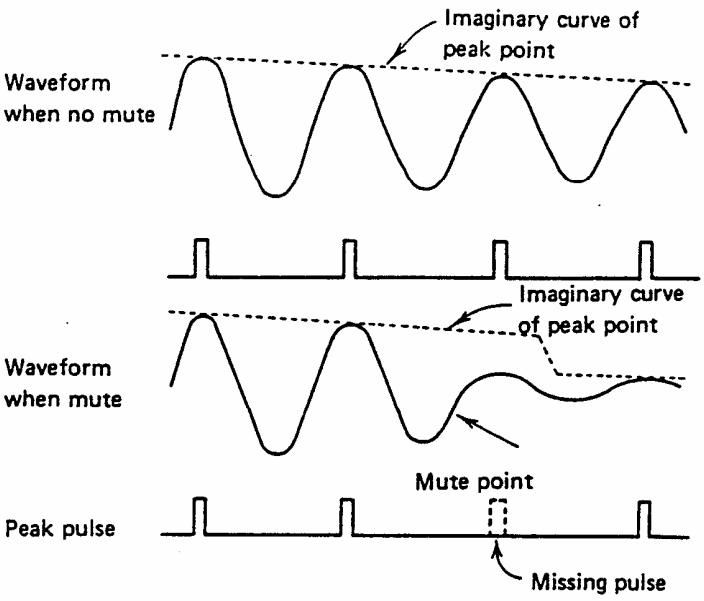

Fig. 3 Detail of Period A

The circuit provides peak pulses at the timings that the voltage of input waveform is maximum and minimum levels and sends digitized peak and lowest level data to the data transfer circuit. The peak pulses are provided to the zero cross timing circuit and used for eliminating unnecessary signals.

The data comparator examines digitized voltage levels of each peak of the waveform in every 24μS. When the levels of wave a, b, c are a<b>c, it determines wave b as the peak and provides a trigger pulse to the peak pulse generator. At the same time, the block sends digital value of the peak level to the data transfer circuit.

c. Mute Detection Circuit

This circuit detects muting (touching strings) and outputs a control signal to peak detection circuit in order to reduce sounds.




Comparing the voltage levels of each peak of waveform, peak detection circuit conjectures the voltage level of the next waveform. When the actual voltage level of input waveform is much smaller than the conjectured level, peak detection circuit omitts one pulse of peak point signal. Detecting the missing pulse, mute detection circuit determines that a string is muted and output a change-over signal to lower the conjecturing voltage level for next waveforms.

(4) Sub CPU A ($\mu$PD78C11G-502

| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 1~10 | PA6, PA7<br>PB0~PB7 | | Out | Segment LED driving signals |
| 11~16 | | | | Not used |
| 17, 18 | PC6, PC7 | | Out | Drive signal for switch LED |
| 19 | | | | Not used |
| 20 | INT1 | INTA | In | Interrupt signal from LSI GAO |
| 21 | | | | Not used |
| 22 | $\overline{\text{RESET}}$ | $\overline{\text{RST}}$ | In | Reset signal input. Low active. |
| 23, 24 | | | | Not used |
| 25 | X1 | C15A | In | Clock pulse (15 MHz) input |
| 26~37 | | | | Not used |
| 38 | $\overline{\text{RD}}$ | NRDA | Out | Read signal output.<br>When Low, this LSI takes the data from LSI GAO. |
| 39 | $\overline{\text{WR}}$ | NWRA | Out | Write signal output.<br>When Low, this LSI writes data in LSI GAO. |
| 40 | ALE | ALEA | Out | ALE (Address Latch Enable) signal output. |
| 41~48 | PF0~PF7 | | Out | Upper address bus for RAM/ROM card. |
| 49~56 | PD0~PD7 | DA0~DA7 | In/Out | Data bus between LSI GAO. |
| 57 | | | | Not used |
| 58 | VDD | | | +5V source |
| 59~64 | PA0~PA5 | | | Segment LED driving signals. |

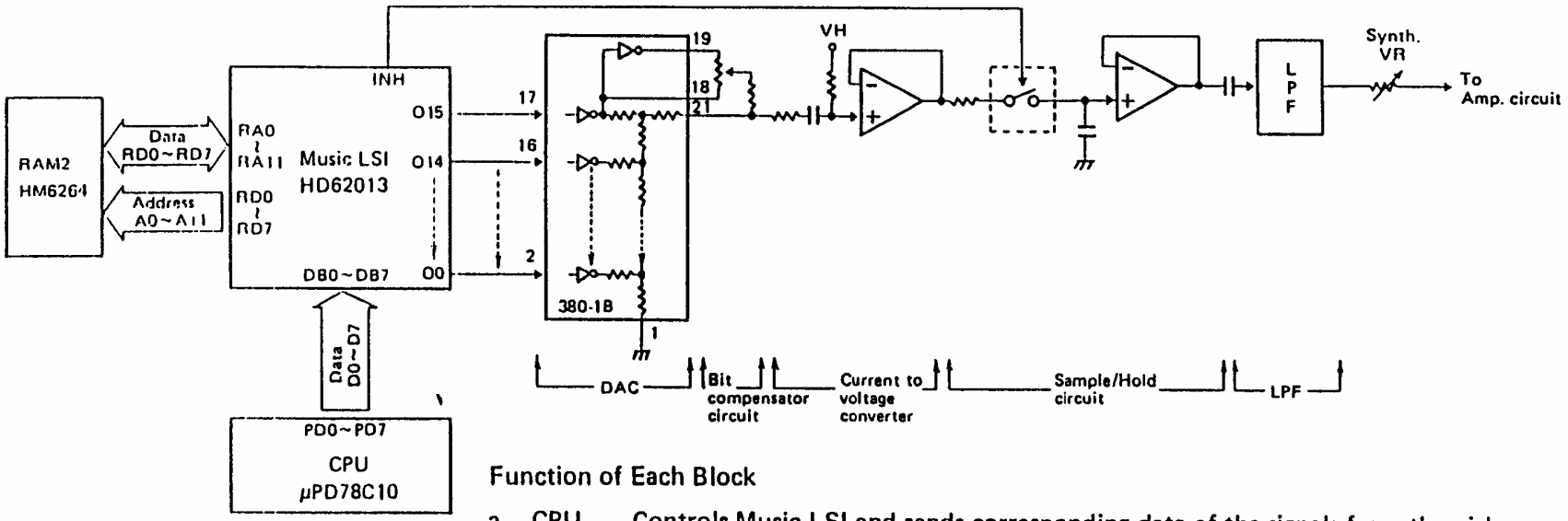
(5) Sub CPU B ($\mu$PD78C11G-345)

| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 1, 2 | PA6, PA7 | | In | DIP switch input signals |
| 3~10 | PB0~PB7 | | In | Panel switch input signals |
| 11 | PC0 | PCB1 | Out | Switch scanning data output to Main CPU. |
| 12 | PC1 | | In | Panel switch input signal |
| 13 | PC2 | PCB2 | In | Clock signal (2MHz) input for terminal PC0 of pin 11. |
| 14, 15 | PC3, PC4 | | In | Panel switch input signals |
| 16, 17 | PC5, PC6 | | In | DIP switch input signal |
| 18 | PC7 | | In | Panel switch input signal |
| 19 | | | | Not used |
| 20 | INT1 | INTB | In | Interrupt signal from LSI GAO |
| 21 | | | | Not used |
| 22 | $\overline{\text{RESET}}$ | $\overline{\text{RST}}$ | In | Reset signal input. Low active. |
| 23, 24 | | | | Not used |
| 25 | X1 | C15B | In | Clock pulse (15MHz) input |
| 26~37 | | | | Nut used |
| 38 | $\overline{\text{RD}}$ | NRDB | Out | Read signal output.<br>When Low, this LSI takes the data from LSI GAO. |
| 39 | $\overline{\text{WR}}$ | NWRB | Out | Write signal output.<br>When Low, this LSI writes the data into LSI GAO. |
| 40 | ALE | ALEB | Out | ALE (Address Latch Enable) signal output. |
| 41~48 | PF0~PF7 | | Out | Drive signals for switch LEDs |
| 49~56 | PD0~PD7 | DB0~DB7 | In/Out | Data bus bewteen LSI GAO |
| 57 | | | | Not used |
| 58 | VDD | | | +5V source |
| 59~64 | PA0~PA5 | | | DIP switch input signals |

## 8. ANALOG CIRCUIT BLOCK

### 8-1. Block Diagram

This block generates synthesized sound signals.




Function of Each Block

a. CPU . . . Controls Music LSI and sends corresponding data of the signals from the pickups.

b. Music LSI . . . Provides 16-bit digital sound signals for synthesized sounds.

c. RAM 2 . . . Work area of Music LSI.

d. DAC (Digital to Analog Converter) . . . Converts digital sound signals into a stepped waveform.

e. Bit compensator circuit . . . (Refer to page 25) Compensates the reducing curve of envelope for synthesized sounds.

f. Current to voltage converter . . . Converts a current level signal into a voltage level signal.

g. Sample/Hold circuit . . . Removes a high frequency noise called glitch contained in the DAC output waveforms.

h. LPF . . . Cuts unnecessary high frequency signals and smoothes the stepped waveform of DAC output.

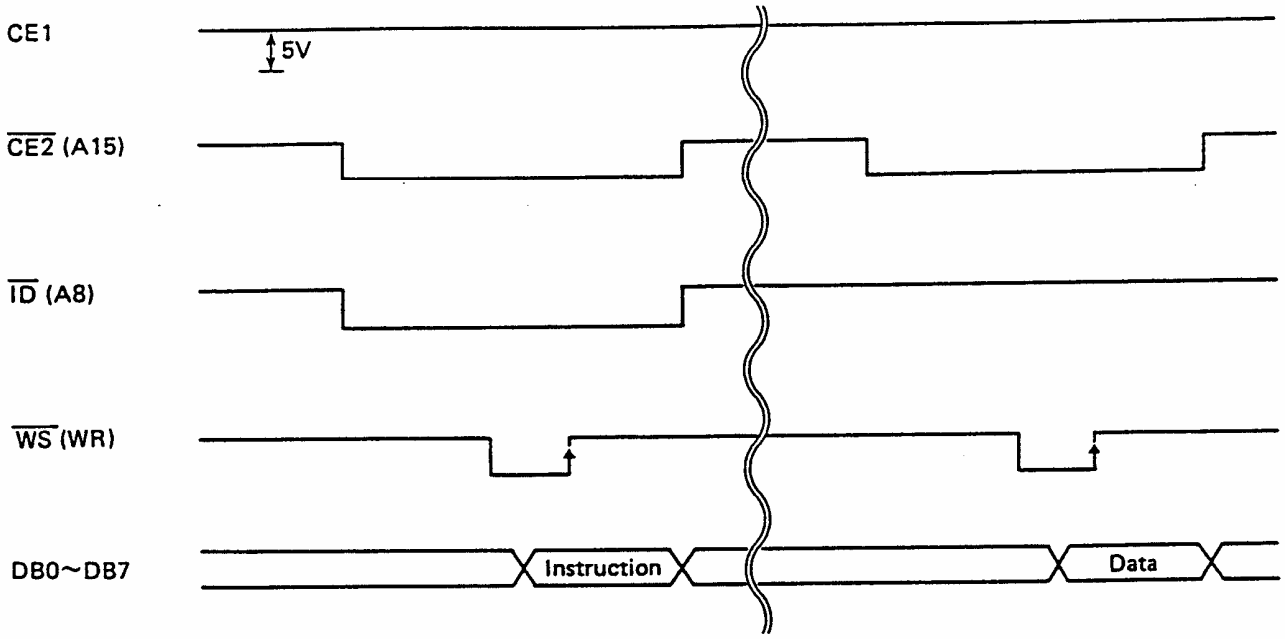
## 8-2. Music LSI (HD62013)

- Generates 16-bit digital sound signals in accordance with set voice and picked stirngs.
- Has 8-modules which are constructed by DCO (Digital Controlled Oscillator) and DCA (Digital Controlled Amplifier).
- Functions with external work area of 64-Kbit capacity.

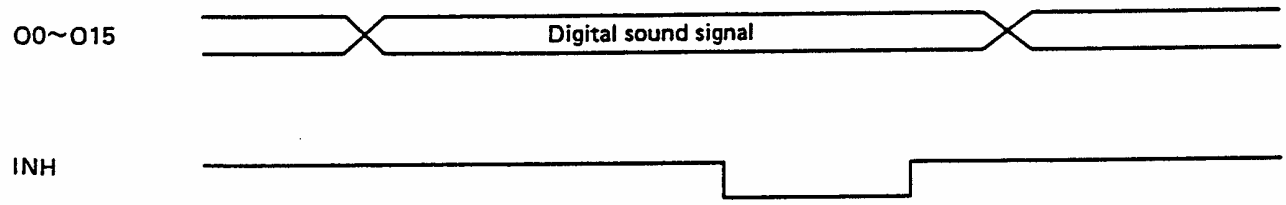
| Pin No. | Terminal | Signal | In/Out | Function |
|---|---|---|---|---|
| 1 | GND3 | | | Ground (0V) source |
| 2~9 | RD0~RD7 | RD0 ~ RD7 | In/Out | Data bus for work RAM |
| 10~13 | RA11~RA8 | RA11~RA8 | Out | Address bus for work RAM |
| 14 | $\overline{ROE}$ | | Out | Output enable signal for RAM. Low active. |
| 15~22 | RA7~RA0 | RA7 ~ RA0 | Out | Address bus for work RAM |
| 23 | $\overline{RWE}$ | | Out | Write enable signal for work RAM. Low active. |
| 24 | $\overline{RST}$ | $\overline{RST}$ | In | When power switch is turned on, the terminal receives Low level signal for approximatley 100mS during which the LSI internal circuits are reset. |
| 25 | VDD3 | | | +5V source |
| 26 | | | | Not used |
| 27 | VDD1 | | | +5V source |
| 28, 29 | OSC1, OSC2 | | In | Clock pulse signal (20 MHz) input |
| 30 | GND1 | | | Ground (0V) source |
| 31~43 | | | | Not used |
| 44 | INH | INH | Out | 40 KHz sampling signal for Sample/Hold circuit |
| 45, 46 | | | | Not used |
| 47 | VDD2 | | | +5V source |
| 48~63 | O15~O4 | O15~O0 | Out | Digital sound data for synthesized sound |
| 64 | GND | | | Ground (0V) source |
| 65 | $\overline{I}$/D | A8 | In | The LSI reads the data as an instruction or data according to the voltage level of this terminal.<br>Low ..... Instruction<br>High ..... Data |
| 66 | $\overline{WS}$ | $\overline{WR}$ | In | Write signal for data bus. Low active. |
| 67, 68 | | | | Not used |
| 69~74 | DB0~DB5 | D0~D5 | In | Data bus from CPU |
| 75 | CKOUT | CK | Out | Clock pulse signal (10 MHz) output |
| 76 | | | | Not used |
| 77, 78 | DB6, DB7 | D6, D7 | In | Data bus from CPU |
| 79, 80 | $\overline{CE2}$, CE1 | A15 | In | Chip select signal. The LSI is able to communicate with CPU when it receives the signal.<br>$\overline{CE2}$.... Low active<br>CE1.... Fixed at High level |

Time Chart of Music LSI

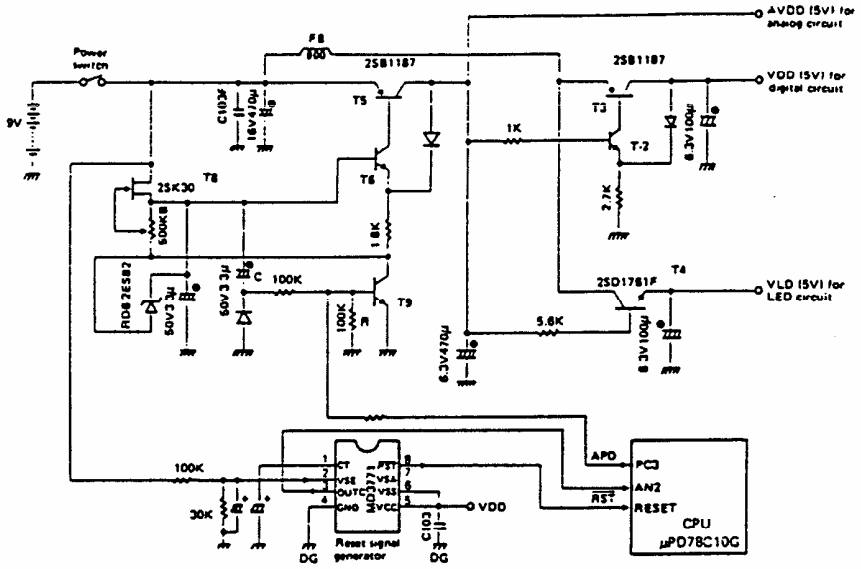
a. CPU → Music LSI

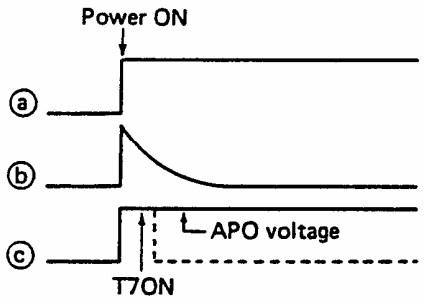



b. Music LSI → DAC



## 9. POWER CIRCUIT



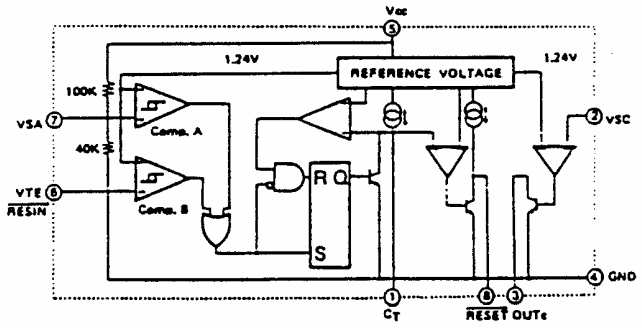




Normally signal APD from the CPU stays High level turning transistors T2 ~ T6 and T9 on so that the circuit provides the voltages VDD, AVDD and VLD to each circuit.

Forming a differential circuit, capacitor C and resistor R turns transistor T9 on for a moment compulsorily at the first stage of the Power ON.

IC MB3771 generates RESET signal and observes the voltage level of the power source. When the power switch is turned on, MB3771 outputs a L level signal from pin 8 to initialize the LSIs' internal circuits.

Containing a comparator, MB3771 also observes the battery voltage from pin 2 and if the battery voltage becomes less than six volts, the IC falls pin 3 L informing the CPU of the power down. Receiving power down signal from pin 3 of the IC, CPU then flashes the pilot lamp and outputs signal APD 15 minutes after then to shut the voltages down.

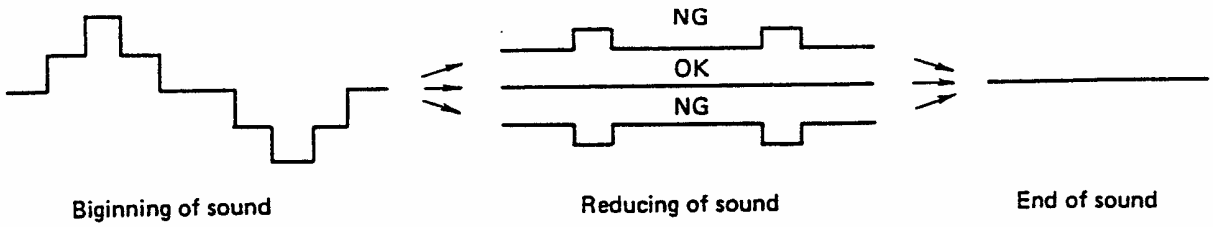



MB3771 Block Diagram

## 10. ADJUSTMENT

### 10-1. Bit Compensation

1. Set an oscilloscope to checkpoint Ⓐ on page 3.
2. Set preset tone 6.6 (HORN/STRINGS) and pick the 5th string.
3. Adjust the VR9 on PCB MA2M so that positive and negative portion of the waveform reduces simultaneously.




### 10-2. Voltage Vin

1. Set a voltmeter to checkpoint Ⓑ on page 3.
2. While no sound is produced, adjust VR8 on PCB MA3M so that the voltmeter reading is 1.53 ± 0.005V.

### 10-3. Voltage VRG

1. Set a voltmeter to checkpoint Ⓒ on page 3.
2. While no sound is produced, adjust VR7 on PCB MA3M so that the voltmeter reading is 1.50 ± 0.005V.

### 10-4. Voltage AVDD

1. Set a voltmeter to checkpoint Ⓓ on page 2.
2. When there is no sound, adjust VR1 on PCB MA4M so that the voltmeter reading is 5.0 ± 0.1V.

Refer to the next chapter for guitar adjustments.

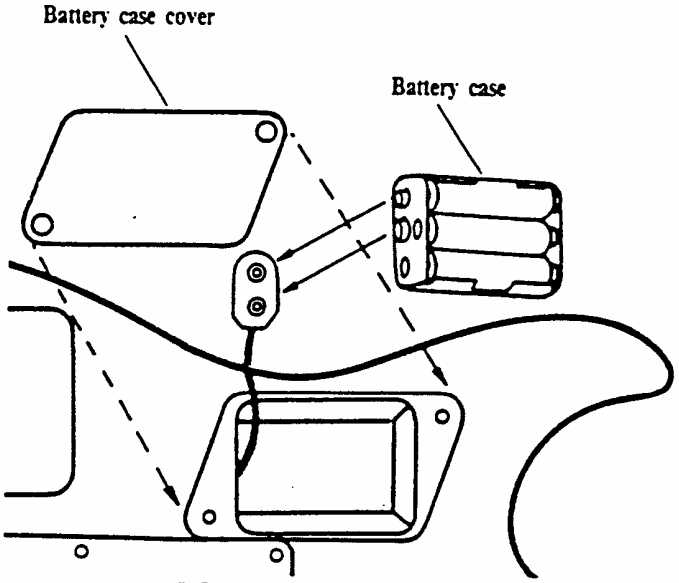
## Supplying Power to Your Guitar

In addition to being a "normal" electric guitar, your PG guitar features a built-in sound source which produces 64 preset tones as well as MIDI circuitry. Because of this, the PG Guitar requires electricity for operation.

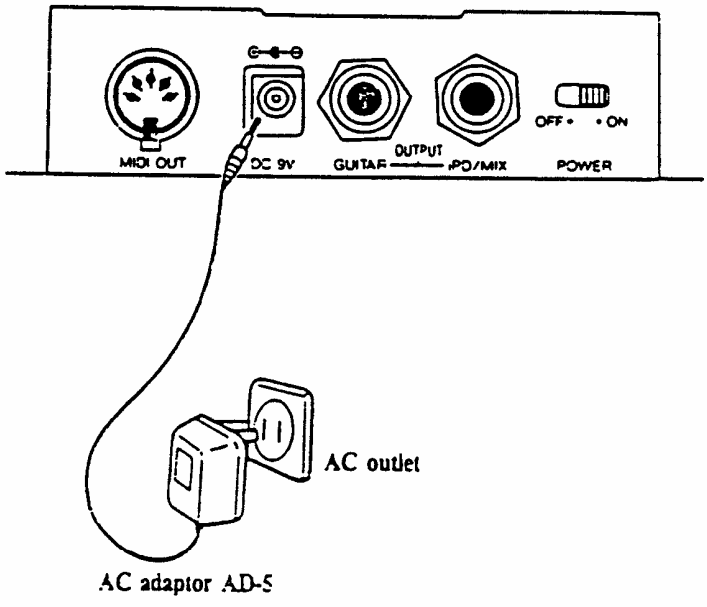
To power the PG guitar, you can connect an optional AC adaptor (AD-5), or use 6 AA (R6P/SUM-3) batteries. When you're not using the preset tones, or your guitar as a MIDI controller, batteries or AC power are not necessary.

When changing batteries, be sure to replace all 6 at the same time. If battery power is too weak, your guitar's functions may operate abnormally.

When battery power weakens, the LED display starts flashing. Within approximately 15 minutes, the power is automatically cut off to prevent malfunction caused by weakened batteries.




(PG guitar back panel)

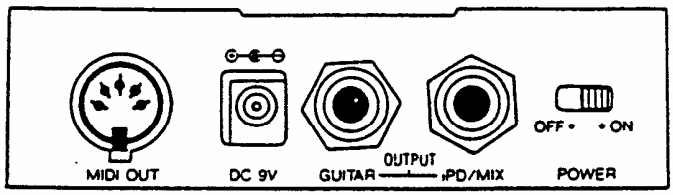



AC adaptor AD-5

## Connecting Your Guitar to Amplifiers

Since your PG guitar is an electric guitar, you'll have to connect it to an amplifier. There are two output jacks on the tail of your PG guitar and sound output differs with each jack.

### To connect the PG guitar




- Connection using only the iPD/Mix output jack

Use this output jack for mixed output of preset sound and electric guitar sound.

- Connection using only the guitar output jack

Use this output jack for monophonic output of only the electric guitar sound.

- Connection using both the iPD/Mix and guitar output jacks

Use both jacks for monophonic output of preset sounds through the iPD/Mix jack and monophonic output of electric guitar sounds through the guitar jack.

- Connection using only guitar output jack with stereo cord

Connect a stereo guitar cord to the guitar output jack for stereo output of both the preset sound and electric guitar sound.

## Changing Strings

Changing strings whenever they become worn or lose their brilliance (hopefully before they become corroded or rusty!). You'll find that fresh strings not only sound better, they're easier to keep in tune as well (once they've gotten past the initial "stretching" stage). They're also easier to play than old ones.

When you've finished playing, be sure to wipe the strings and frets with a dry cloth to prevent prematrue corrosion caused by hand perspiration.

### To change strings

①Loosen the top locks, tail end locks using the custom wrench and remove all old strings.

②Cut off the ball end of the new strings.

③Place the string in between the bridge and string stopper and tighten tail end lock.

④With the string in proper position over the nut, insert the tip of the string through top lock and through the hole in the machine head post.

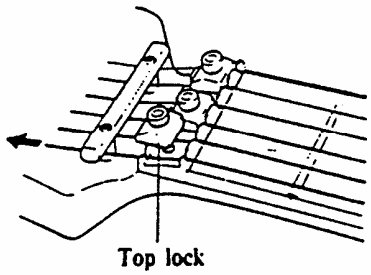
⑤"Tie" the string off firmly.

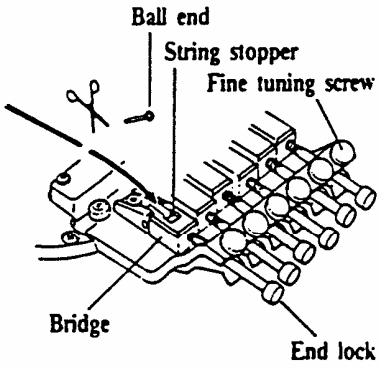
⑥Holding the string fairly taut with your right hand, wind up the excess sting by turning the corresponding tuning knob with the other hand (or try using a tuning crank).

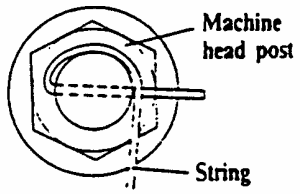
⑦Once all strings are in place, tune using tuning knobs while checking with the built-in electronic tuner. (See page 6 for tuning.)

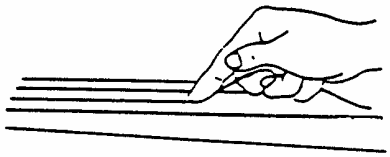
⑧Screw lock all strings using the top locks.

⑨Retune all strings using the fine tuning screws.



## Tuning the PG Guitar

Your CASIO PG Guitar features built-in electronic tuning circuitry which makes it easy to stay in tune without the aid of pitch pipes, external strobe tuners or other instruments.

Also, you may need to make fine octave tuning adjustments at the bridge assembly if certain strings seem difficult to tune. These adjustments are made individually for each string.

### To tune your guitar

①Select the frequency of the standard pitch (A4).

Before actually tuning your guitar strings, you can use microswitches number 9 and 10 on the back of the guitar to select the frequency of the standard pitch you will tune to.

This is simply a basis to work from when you tune your guitar — if one note is in tune you can tune the others to it.

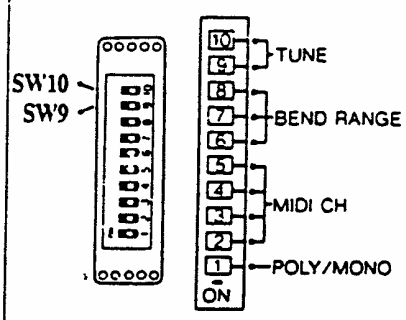
As with other instruments, the PG guitar uses A4 as the standard pitch. You can specify the frequency of A4 by turning the microswitches ON or OFF according to the chart shown on the right.

②Tune each string by using the tuning indicators.

Notice that there are two arrows which light up when you play an open string on the guitar. These are the tuning indicators.

One is marked "♯" indicating that the open string being played is sharp, and the other is marked "♭" indicating that the open string being played is flat.

When these indicators light simultaneously, the string is in tune (within ± 3 cents).




Microswitches

| SW9 | SW10 | Freq. |
|---|---|---|
| Off | Off | 440 Hz |
| Off | On | 441 Hz |
| On | Off | 442 Hz |
| On | On | 443 Hz |

*The microswitches and trigger pickup sensitivity controls on the back of the guitar are protected by black rubber covers. These controls are made up of precision electronic components which may be damaged if exposed to static electricity or foreign elements, so be sure to replace the rubber covers after making any adjustments.*

♯ ▲ *Lights to indicate that the string is sharp*

♭ ▼ *Lights to indicate that the string is flat*

*If two or more strings are played simultaneously, both the "♯" and "♭" indicators will not light.*

You can tune each string by playing it open or at the octave (12th fret). For increased accuracy, you might find it best to tune each string open first, then check the tuning at the 12th fret and make any necessary fine adjustment.

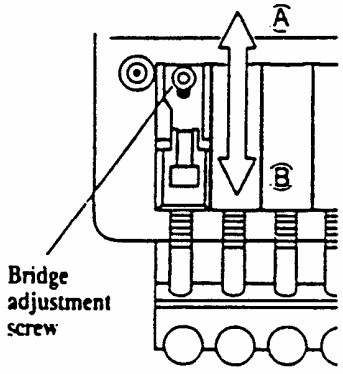
*It's important to note that each time a string's pitch is raised 550 cents over its standard tuning, the tuner automatically "shifts" into the next octave.*

*Because of this, if a string is already sharp (when the "♯" indicator is lit) and you continue to raise its tuning, the "♭" indicator will light and the "♯" indicator will go out. This is because you have exceeded the 550 cent limit and the tuner is indicating tuning for the next octave up.*

*When you are using your PG guitar as a MIDI controller (see page 13, it is important to tune the MIDI sound source to your PG guitar in order to play totally "in tune". You might also try to detune one or the other for some interesting effects.*

### To adjust octave tuning

- Play the string open and then at the octave (12 fret).
- If the pitch is slightly sharp at the 12th fret, loosen the string and unscrew the corresponding bridge adjustment screw. Slightly move the bridge towards the pickup (direction A) and check open/octave tuning again.
- If the pitch is slightly flat at the 12th fret, loosen the string and unscrew the corresponding bridge adjustment screw. Slightly move the bridge towards the tail (direction B) and check open/octave tuning again.



## Setting Bend Range

By setting note bend range, you can establish how far up you can bend a preset/MIDI note when the chromatic key is switched OFF (normal status). Eight different settings are possible, using microswitches 6, 7 and 8.

< Bend range setting > ○ = OFF ● = ON

| SW6 | SW7 | SW8 | BEND RANGE |
|---|---|---|---|
| ○ | ○ | ○ | 2* |
| ○ | ○ | ● | 3 |
| ○ | ● | ○ | 5 |
| ○ | ● | ● | 7 |
| ● | ○ | ○ | 12 |
| ● | ○ | ● | 24 |
| ● | ● | ○ | 32 |
| ● | ● | ● | 48 |

(* Units: half-tones)

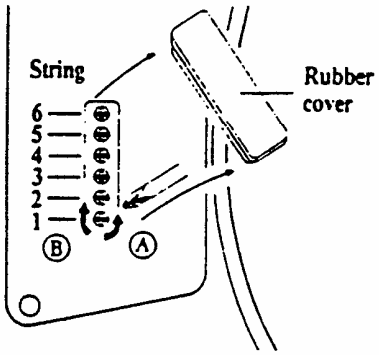
In the POLY mode (see page 13), normal MIDI bend is only possible on one string at a time. If you attempt to bend two or more strings at once, MIDI sounds bend only chromatically.

## Trigger Pickup Sensitivity

In some cases, you'll want to adjust the sensitivity of the trigger pickup (pickup that triggers the output of preset sounds or MIDI sounds), for individual strings. When this sensitivity is increased, NOTE ON (trigger output) messages are sent with only a light touch, as are maximum velocity messages. When decreased, the opposite is true.

### To adjust trigger pickup sensitivity

①Remove the rubber cover protecting the sensitivity controls on the back of the guitar.

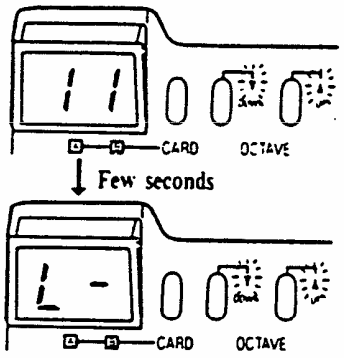


This adjustment can be used in a variety of ways. For example, differences in string gauge or string height may cause an imbalance in preset/MIDI sound characteristics. Or a certain string or strings may stand out, while others seem too weak or don't sound at the same time. These problems can be solved by increasing or decreasing trigger pickup sensitivity.

Your PG guitar features Sensitivity Check function using the LED display. The display will show the trigger pickup sensitivity of each string in numerals ("0"—"99"), and also indicates if the setting is too high ("OL" = Over Level).

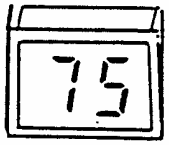
In cases where you are using sound sources which feature MIDI Touch Sensitivity when utilizing the PG guitar as a MIDI controller, you may need to decrease trigger pickup sensitivity for best results.

②To shift to Sensitivity Check mode, switch the main power switch ON while depressing both octave UP and DOWN keys simultaneously. The display will show "L-", indicating the Sensitivity Check standby status.

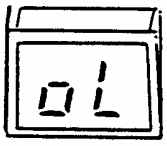



③To check the sensitivity level of a certain string, pluck the string strongly.

④If the display shows a number below 85, the trigger pickup sensitivity for that string needs to be increased by turning the corresponding sensitivity control to the left. Ⓐ

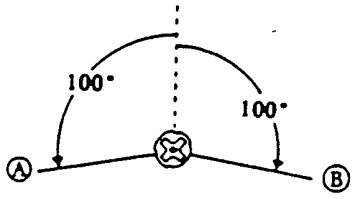


If the display shows "OL" (over level) the trigger pickup sensitivity for that string needs to be decreased by turning the corresponding sensitivity control to the right. Ⓑ



Over level display

⑤Switch the main power switch OFF and then ON again to return to the normal playing condition.




*Note: These adjustments are delicate. Do not turn the controls more than 100° (about a quarter turn) in each direction.*

*Do not use excessive force when making trigger pickup sensitivity adjustment.*

## Performance Using MIDI (POLY/MONO Performance Modes)

By connecting your PG guitar to other MIDI devices, your PG guitar can be used as a MIDI controller. You can perform in either MONO or POLY MIDI performance modes. In the POLY mode, all six strings can be used to control the same MIDI timbre. In the MONO mode, it is possible to assign each string a different sound source.

### To select the performance mode

Turn microswitch number 1 ON or OFF, according to the chart shown to the right. (A)

A

| SW1 | MODE |
|---|---|
| OFF | POLY (MODE 3*) |
| ON | MONO (MODE 4) |

* See MIDI Implementation Chart.

### To perform in the POLY mode

In the POLY mode, all 6 strings control the same MIDI timbre.

①Set the guitar to the POLY mode (see figure A).

②Make sure that the MIDI sound source is set to the same MIDI receive channel of the guitar (see figure B).

③Match MIDI bend range of guitar and sound source (see page 22).

B (MIDI guitar MIDI Transmission channel) ○ = OFF, ● = ON

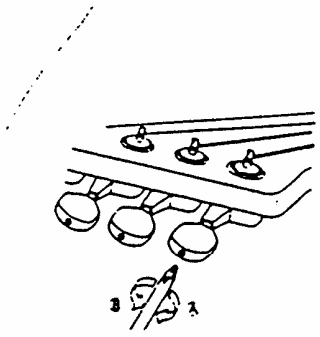
| Transmission Channel | | SW2 | SW3 | SW4 | SW5 |
|---|---|---|---|---|---|
| POLY mode SW1 = OFF | MONO mode SW1 = ON | | | | |
| 1 | 1-6 | ○ | ○ | ○ | ○ |
| 2 | 2-7 | ○ | ○ | ○ | ● |
| 3 | 3-8 | ○ | ○ | ● | ○ |
| 4 | 4-9 | ○ | ○ | ● | ● |
| 5 | 5-10 | ○ | ● | ○ | ○ |
| 6 | 6-11 | ○ | ● | ○ | ● |
| 7 | 7-12 | ○ | ● | ● | ○ |
| 8 | 8-13 | ○ | ● | ● | ● |
| 9 | 9-14 | ● | ○ | ○ | ○ |
| 10 | 10-15 | ● | ○ | ○ | ● |
| 11 | 11-16 | ● | ○ | ● | ○ |
| 12 | 11-16 | ● | ○ | ● | ● |
| 13 | 11-16 | ● | ● | ○ | ○ |
| 14 | 11-16 | ● | ● | ○ | ● |
| 15 | 11-16 | ● | ● | ● | ○ |
| 16 | 11-16 | ● | ● | ● | ● |

## Machine Head Torque

By adjusting the torque of the machine head, you can prevent strings from becoming detuned (to some extent).

### To adjust machine head torque

• Using a Philips screwdriver, tighten or loosen the screw holding each tuning knob. Turn to the left Ⓔ to loosen torque and to the right Ⓐ to tighten torque.



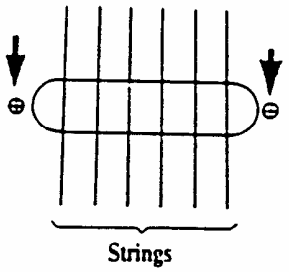
## Adjusting Guitar Pickup Height

By adjusting pickup height, you can make delicate adjustments in sound characteristics. When the pickup is brought closer to the strings (raised), the sound becomes fuller, while when the pickup is lowered the sound becomes thinner and sharper.

### To adjust pickup height

• Turn the screws at both sides of the pickup(s) to lower or raise the pickup.

As a basic rule, the surface of the pickups should be between 2 and 3mm from the strings when the strings are held down at the 22nd (top) fret.

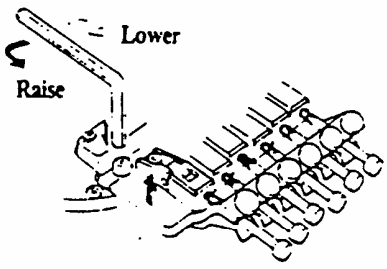



## Adjusting Bridge Height

Depending on the gauge of strings you will be using, the style of music and the type of sound you want to obtain, you'll probably want to adjust string height (distance from the fretboard and pickups), by raising or lowering the bridge for each string. A special wrench (small) is provided for this purpose.

### To adjust bridge height

• Using the small wrench which come with your guitar, raise or lower bridge height as shown in the diagram on the right.



## Taking Care of Your PG Guitar

- Avoid extremes of temperature, excessive humidity and direct sunlight.

- Your guitar features precision electronic components. Any modification of, or tampering with internal components can be the cause of malfunctions or damage.

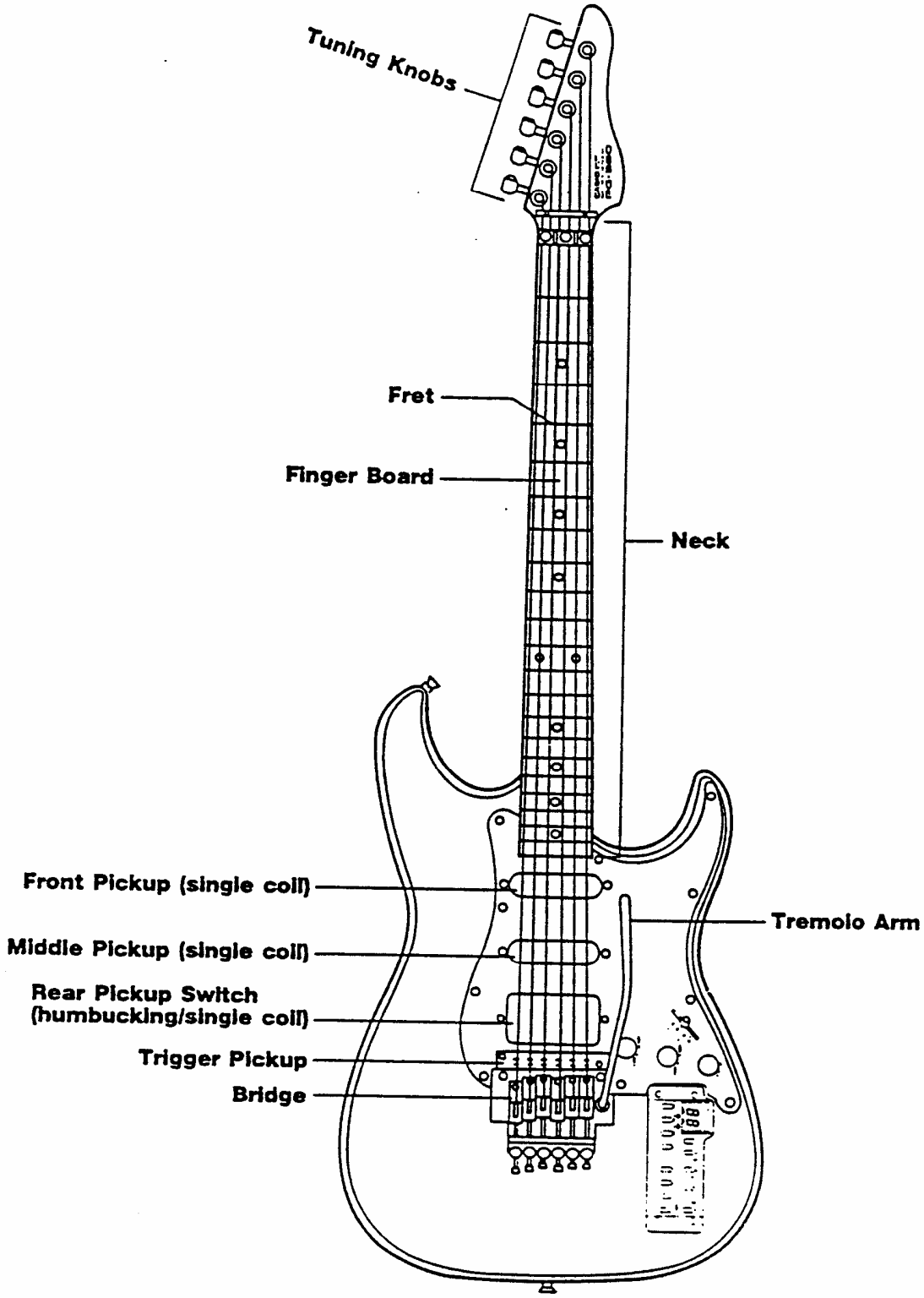
- Do not use alcohol, thinner or similar chemicals for cleaning.

- To preserve the life of strings and frets, always wipe your guitar with a clean, dry cloth after each use.

- When transporting your PG guitar, always put it in a hard or soft case for protection. It's also a good idea to remove the tremolo arm and loosen strings when transporting your instrument for long distances.

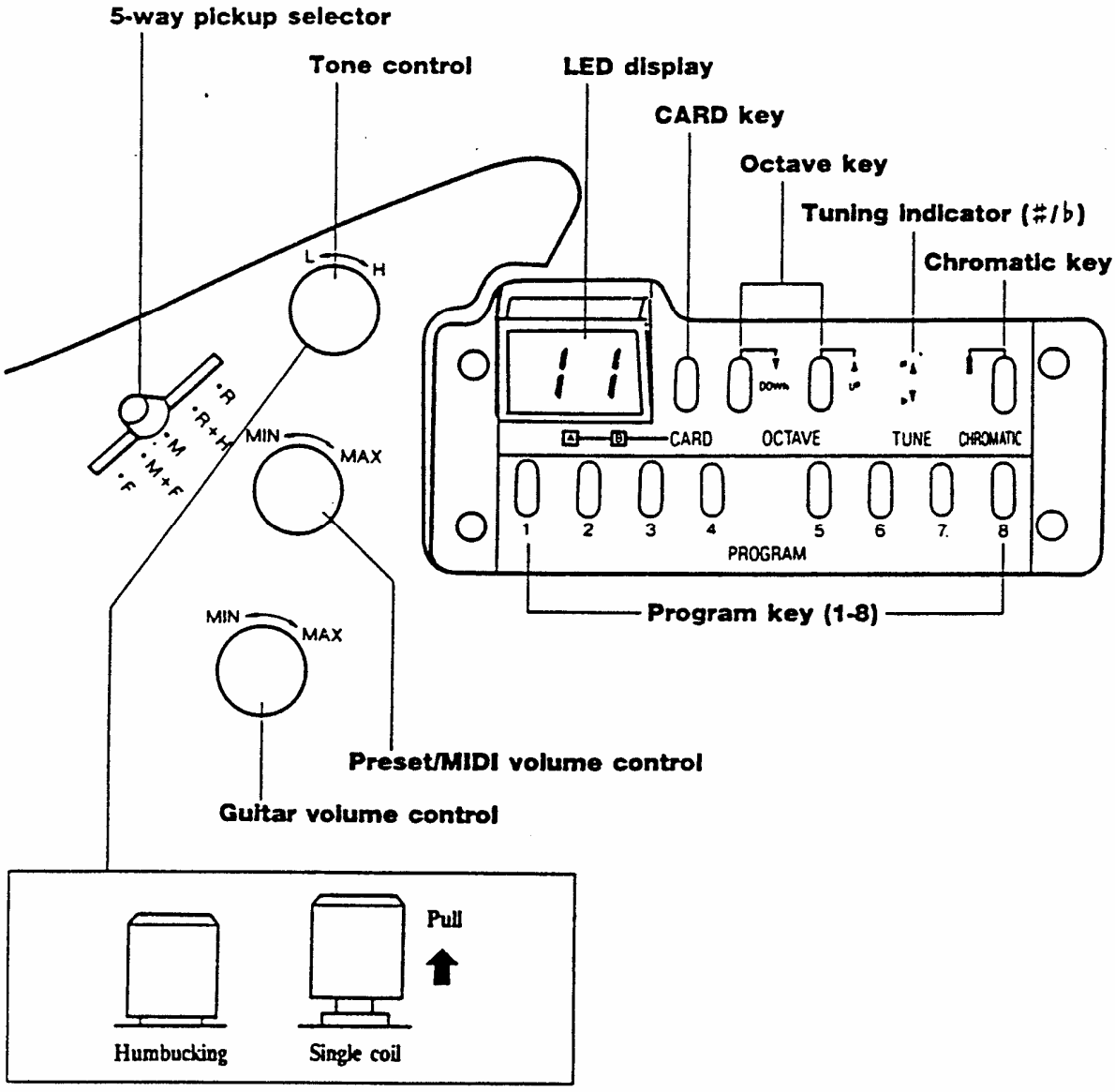
- Always replace the rubber covers on the rear of your guitar after making sensitivity or microswitch adjustments.

## General Guide—An Overall View of the PG Guitar




General Guide — An Overall View of the PG Guitar

## ■ Control Section



## Specifications

| | |
|---|---|
| **Body** | Alder |
| **Neck** | Maple |
| **Fingerboard** | Ebony, 22 frets |
| **Pickups** | Single coil (PS-581A) × 2<br>Humbucking (PH-641A) × 1 |
| **Tremolo unit** | Precision tremolo unit |
| **Guitar controls** | Volume, tone (rear pickup switch), 5-position pickup selector |
| **Preset tone/MIDI controls** | Preset tone volume, card key, octave up key, octave down key, chromatic key, program keys (1 - 8), microswitches (1 - 10) |
| **MIDI out message** | Program change (0 - 63, 0 - 126 when using ROM card), basic channel (1 - 16), mode 3 (poly), mode 4 (poly), velocity, pitch bend |
| **Electronic tuner** | Tuning indicators (♯/♭), standard pitch (440/441/442/443 Hz) |
| **Inputs/outputs** | Guitar out, preset tone out, MIDI out, DC 9V |
| **Power** | 6 AA (R6P/SUM-3) batteries or AC adaptor (AD-5, optional)<br>Comsumption: 2 W |
| **Dimensions/Weight** | 1000 × 322 × 71 mm / 4.5 kg<br>($39^{3}/_{8}$" × $12^{11}/_{16}$" × $2^{13}/_{16}$") / 9.9 lbs |
| **Standard accessories** | Batteries, guitar cord × 2, tremolo arm, wrench × 4 |
| **Optional accessories** | Soft case (SC-75G), Hard case (HC-51G), RAM card (RA-500), AC adaptor (AD-5) |

**Design and specifications are subject to change without notice.*

| Display | Preset tone | Display | Preset tone |
|---|---|---|---|
| 11 | VZ BASS | 51 | AVANALOCH |
| 12 | PIANO BASS | 52 | MELLOW BRASS |
| 13 | SEQ BASS | 53 | AFRO BRASS |
| 14 | PAST BASS | 54 | THE SAX |
| 15 | SYNTH BASS | 55 | VZ TRUMPET |
| 16 | 60's BASS | 56 | R&B BRASS |
| 17 | HARP | 57 | BRASTRINGS |
| 18 | KOTO | 58 | OVER BRASS X |
| 21 | STEEL STRING | 61 | SPACE ORCH |
| 22 | GITIANO | 62 | FANTASIA |
| 23 | BACKING GUITAR | 63 | PG CINEMA |
| 24 | CLAVICHORD | 64 | WINDINGS |
| 25 | MUTE CLAVI | 65 | VELO ORCH |
| 26 | SYN CLAVI | 66 | HORN/STRINGS |
| 27 | DIST GUITAR | 67 | LIGHT STRINGS |
| 28 | DISTORTAR | 68 | VZ STRINGS |
| 31 | SERENE VIBES | 71 | CELLO |
| 32 | VZ VIBES | 72 | WOOD WINDS |
| 33 | VIBRAPHONE | 73 | HARMO LEAD |
| 34 | VZ PIANO | 74 | WILD SYN LEAD |
| 35 | MELLOW PIANO | 75 | FUSION LEAD |
| 36 | VZ EP | 76 | JAZZ FLUTE |
| 37 | DYN VZ PIANO | 77 | PRIMAL SCREAM |
| 38 | CLAVI PIANO | 78 | VZ-MONICA |
| 41 | EMERALD BLUE | 81 | AMBULANCE |
| 42 | TEAR DROPS | 82 | EXPLOSION A |
| 43 | TOI PERCUSSION | 83 | SYNTH TOM |
| 44 | VZ MARIMBA | 84 | FESTIVAL |
| 45 | BELLS | 85 | MAZE |
| 46 | CHURCH BELL | 86 | CHURCH ORGAN |
| 47 | STEEL DRUM | 87 | WARM ORGAN |
| 48 | COWBELL | 88 | COOL ORGAN |

# PARTS LIST

PG-380

NOTES:
1. Prices and specifications are subject to change without prior notice.
2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare Parts Supply", published separately.
3. The numbers in item column correspond to the same numbers in drawing.

# CASIO GUITAR SYNTH

## Model PG-380 MIDI Implementation Chart Version : 1.0

| Function ... | | Transmitted | Recognized | Remarks |
|---|---|---|---|---|
| Basic Channel | Default | 1 through 16 CH | × | Set using microswitches. |
| | Changed | 1 through 16 CH | × | |
| Mode | Default | Mode 3, 4 (M = 6) | × | Set using microswitches. |
| | Messages | × | × | |
| | Altered | ********** | × | |
| Note Number: | True voice | 24—79(DOWN), 36—91 (NORMAL),48—103(UP) | × | Octaved can be raised or lowered. |
| Velocity | Note ON | ○ 9n v = 1—127 | × | |
| | Note OFF | × 9n v = 0 | × | |
| After Touch | Key's | × | × | |
| | Ch's | × | × | |
| Pitch Bender | | ○ | × | 14 bits effective. |
| Control Change | 6, 38 | ○* | × | Data Entry (MSB, LSB) |
| | 100, 101 | ○(0)* | × | RPC (LSB, MSB) |
| Prog Change: | True # | ○ 0—127 | × | When using ROM card. |
| | | ********** | | |
| System Exclusive | | ○ | × | Bend range. |
| System Common | : Song Pos | × | × | |
| | : Song Sel | × | × | |
| | : Tune | × | × | |
| System Real Time | : Clock | × | × | |
| | : Commands | × | × | |
| Aux Mes-sages | : Local ON/OFF | × | × | |
| | : All Notes OFF | × | × | |
| | : Active Sense | × | × | |
| | : Reset | × | × | |
| Remarks | | *RPC = Registered parameter control number<br>RPC # 0: Pitch bend sensitivity | | |

Mode 1 : OMNI ON, POLY
Mode 2 : OMNI ON, MONO
Mode 3 : OMNI OFF, POLY
Mode 4 : OMNI OFF, MONO

○ : Yes
× : No

| Item | Code No. | Part Name | Specification | Q'ty | • | Unit Price N.R. Yen (¥) (FOB. JAPAN) | Rank |
|---|---|---|---|---|---|---|---|
| | 1) M0380 MA1M PCB ASS'Y | | | | | | |
| | 2010 3409 | LSI (Main CPU) | μPD78C10G-1B-X | 1 | | | B |
| ☆ | 2010 4823 | LSI (GAO) | μPD65070GF-161 | 1 | | | B |
| ☆ | 2010 4830 | LSI (ADC) | μPD7003C | 1 | | | B |
| ☆ | 2010 4837 | LSI (Sub CPU B) | μPD78C11G-345-1B | 1 | | | B |
| ☆ | 2010 5138 | LSI (RAM 1) | HM6264ALFP-12 | 1 | | | B |
| ☆ | 2010 5145 | LSI (ROM) | μPD27C512G-15-M380 | 1 | | | B |
| ☆ | 2010 5152 | LSI (Sub CPU A) | μPD78C11G-502-1B | 1 | | | B |
| ☆ | 2114 1148 | IC (Reset signal generator) | MB3771PF (TF) | 1 | | | B |
| TR2 ☆ | 2201 0069 | Chip transistor | 2SA1037KT-96R | 1 | 10 | | C |
| TR1 ☆ | 2252 0315 | Chip transistor | 2SC2412KT-96R | 1 | 10 | | C |
| DT1 ☆ | 2259 0490 | Chip digital transistor | DTC114EKT96 | 1 | 10 | | C |
| | 2370 0035 | LED | LN851RPP.WE | 5 | 20 | | C |
| ☆ | 2590 0441 | Crystal oscillator | AT-49, 15.000MHZ | 1 | | | C |
| R130 | 2792 0209 | Chip resistor | MCR10EZHJ104 | 1 | 20 | | X |
| R91~110 R129, 132 | 2792 0462 | Chip resistor | MCR10EZHJ473 | 23 | 20 | | X |
| R82 | 2792 0799 | Chip resistor | MCR10EZHJ472 | 1 | 20 | | X |
| R138 | 2792 0815 | Chip resistor | MCR10EZHJ221 | 1 | 20 | | X |
| R133~137 | 2792 0831 | Chip resistor | MCR10EZHJ103 | 6 | 20 | | X |
| FB1, 2 ☆ R81, 139 | 2792 0926 | Chip resistor | MCR10EZHJ100 | 4 | 20 | | X |
| FB3, ☆ R140 | 2795 0056 | Chip resistor | MCREZHJ000 | 2 | 20 | | X |
| R141 ☆ | 2795 0273 | Chip resistor | MCR10EZHJ823 | 1 | 20 | | X |
| R83~90☆ R111~128 | 2795 1169 | Chip resistor | MCR10EZHJ821 | 26 | 20 | | X |
| R131 ☆ | 2795 1295 | Chip resistor | MCR10EZHJ303 | 1 | 20 | | X |
| C71, 74, 75 C84, 90~92 | 2807 6063 | Chip electrolytic capacitor | ECE-V1CV100R | 7 | 20 | | X |
| C76, 77 ☆ C81 | 2807 6084 | Chip electrolytic capacitor | ECE-V1HV010R | 3 | 20 | | X |
| C78 ☆ | 2807 6119 | Chip electrolytic capacitor | ECE-V1AV330UR | 1 | 20 | | X |
| C64, 65, 67 72, 82, 88, 89 | 2845 0308 | Chip capacitor | T1-21N1EF103Z-T | 7 | 20 | | X |
| C79 ☆ | 2845 0322 | Chip capacitor | T1-21N1HR103K-T | 1 | 20 | | X |
| C85, 86 | 2845 0476 | Chip capacitor | T1-21N1HCG150J-T | 2 | 20 | | X |
| C63, 73 ☆ 80, 89 | 2845 0742 | Chip capacitor | T1-21N1HLS101K-T | 4 | 20 | | X |
| C61 ☆ | 2845 0749 | Chip capacitor | T1-21N1HLS102K-T | 1 | 20 | | X |

Note: ☆ – New parts
Q'ty– Quantity used per unit
• – Minimum order and supply quantity

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

| Item | Code No. | Part Name | Specification | Q'ty | • | Unit Price N.R. Yen (¥) (FOB: JAPAN) | Rank |
|---|---|---|---|---|---|---|---|
| C66, 70 ☆ | 2845 0756 | Chip capacitor | T1-21N1HSL220J-T | 2 | 20 | | X |
| C83 ☆ | 2845 0819 | Chip capacitor | T1-21N1HSL331J-T | 1 | 20 | | X |
| C62 ☆ | 2895 0196 | Chip tantalum capacitor | ECST1AY225R | 1 | 10 | | X |
| | 3410 1728 | Tact switch | EVQ-QS205K | 1 | 10 | | C |
| ☆ | 3501 2758 | Connector | S11B-ZR | 1 | | | X |
| ☆ | 3501 2765 | Connector | S12B-ZR | 1 | | | X |
| ☆ | 3501 2772 | Connector | S7B-ZR | 1 | | | X |
| ☆ | 3501 2779 | Connector | S10B-DR | 1 | | | X |
| ☆ | 3501 2786 | Connector | S10B-ZR | 1 | | | X |
| ☆ | 3501 2793 | Connector | S11B-PH-K-S | 1 | | | X |
| ☆ | 3501 2800 | Connector | S6B-ZR | 1 | | | X |
| ☆ | 3501 2807 | Connector | S8B-PH-K-S | 1 | | | X |
| ☆ | 3501 2814 | Connector | S9B-PH-K-S | 1 | | | X |
| ☆ | 3501 2821 | Connector | S08B-DR | 1 | | | X |
| ☆ | 3501 2870 | Post | B5P-MQ | 1 | | | X |
| ☆ | 3501 2877 | Post | B6P-MQ | 1 | | | X |
| ☆ | 4307 8761 | Blank PCB M0380-MA1M | M110212A-1 | 1 | | | X |
| | 2) M0380-MA2M PCB ASS'Y | | | | | | |
| ☆ | 2010 4949 | LSI | HD62013 | 1 | | | B |
| ☆ | 2010 5138 | LSI | HM6264ALFP-12 | 1 | | | B |
| ☆ | 2105 0784 | CMOS IC | μPD4066BG-T1 | 1 | | | B |
| ☆ | 2114 1120 | Hibrid IC | 380-B1 | 1 | | | B |
| ☆ | 2114 1218 | Monolithic IC | NJM2068MD-T1 | 1 | | | B |
| ☆ | 2590 0448 | Crystal oscillator | AT-49, 20.000MHZ | 1 | | | C |
| VR9 | 2771 0310 | Chip semi-fixed resistor | EVM-07SW00B23 | 1 | 10 | | C |
| R146 | 2792 0209 | Chip resistor | MCR10EZHJ104 | 1 | 20 | | X |
| R145, 157 | 2792 0462 | Chip resistor | MCR10EZHJ473 | 2 | 20 | | X |
| R150, 151 | 2792 0799 | Chip resistor | MCR10EZHJ472 | 2 | 20 | | X |
| R154, 158 | 2792 0831 | Chip resistor | MCR10EZHJ103 | 2 | 20 | | X |
| R152 ☆ | 2792 0845 | Chip resistor | MCR10EZHJ153 | 1 | 20 | | X |
| R148, 159 | 2792 0942 | Chip resistor | MCR10EZHJ332 | 2 | 20 | | X |
| R156 | 2792 1051 | Chip resistor | MCR10EZHJ222 | 1 | 20 | | X |
| R147, ☆ R160, 161, FB5 | 2795 0056 | Chip resistor | MCR10EZHJ000 | 4 | 20 | | X |
| FB4 ☆ | 2795 0077 | Chip resistor | MCR10EZHJ2R2 | 1 | 20 | | X |
| R149 ☆ | 2795 1813 | Chip resistor | MCR10EZHJ680 | 1 | 20 | | X |

Note: ☆ – New parts
Q'ty – Quantity used per unit
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Rank A: Essential
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| Item | Code No. | Part Name | Specification | Q'ty | • | Unit Price N.R. Yen (¥) (FOB: JAPAN) | Rank |
|---|---|---|---|---|---|---|---|
| C100~102 104, 106, 107 | 2807 6063 | Chip electrolytic capacitor | ECE-V1CV100R | 6 | 20 | | X |
| C103 ☆ | 2807 6224 | Chip electrolytic capacitor | ECE-V0GA101P | 1 | 20 | | X |
| C95~98 ☆ 109, 110, 109 | 2845 0763 | Chip capacitor | T1-21N1ER103K-T | 6 | 20 | | X |
| C108 ☆ | 2845 0791 | Chip capacitor | T1-21N1ER222K-T | 1 | 20 | | X |
| C111, ☆ 112 | 2845 0987 | Chip capacitor | T1-21N1HCG100J-T | 2 | 20 | | X |
| ☆ | 3501 2779 | Connector | S10B-DR | 1 | | | X |
| ☆ | 3501 2821 | Connector | S08B-DR | 1 | | | X |
| ☆ | 3501 2828 | Connector | S2B-PH-K-S | 1 | | | X |
| ☆ | 3613 0476 | Socket | 03JQ-BT | 1 | | | X |
| | 3841 0661 | Low pass filter | LPF-M152-17K | 1 | | | C |
| ☆ | 4307 8771 | Blank PCB M0380-MA2M | M110212A-2 | 1 | | | X |
| | 3) M0380-MA3M PCB ASS'Y | | | | | | |
| ☆ | 2105 0784 | CMOS IC | μPD4066BG-T1 | 2 | | | B |
| ☆ | 2114 0511 | Monolithic IC | BA4558F-DX-T1 | 3 | | | B |
| ☆ | 2114 1162 | Monolithic IC | NJM062M-T1 | 3 | | | B |
| ☆ | 2114 1218 | Monolithic IC | NJM2068MD-T1 | 6 | | | B |
| TR3~5 ☆ | 2201 0069 | Chip transistor | 2SA1037KT-96R | 3 | 10 | | B |
| R71 | 2792 0209 | Chip resistor | MCR10EZHJ104 | 1 | 20 | | X |
| VR7, 8 | 2771 0212 | Chip semi-fixed resistor | EVM-07SW00B54 | 2 | 10 | | C |
| R73 | 2792 0217 | Chip resistor | MCR10EZHJ101 | 1 | 20 | | X |
| R16, 18, 26, 34, 41, 49, 56 | 2792 0470 | Chip resistor | MCR10EZHJ102 | 7 | 20 | | X |
| R52 ☆ | 2792 0756 | Chip resistor | MCR10EZHJ563 | 1 | 20 | | X |
| R64 ☆ | 2792 0823 | Chip resistor | MCR10EZHJ152 | 1 | 20 | | X |
| R6, 12, 22, 30, 37, 45 | 2792 0831 | Chip resistor | MCR10EZHJ103 | 6 | 20 | | X |
| R61 ☆ | 2792 0853 | Chip resistor | MCR10EZHJ333 | 1 | 20 | | X |
| R76 ☆ | 2792 0926 | Chip resistor | MCR10EZHJ100 | 1 | 20 | | X |
| R54 ☆ | 2792 0934 | Chip resistor | MCR10EZHJ391 | 1 | 20 | | X |
| R58, 59, 63 | 2792 0942 | Chip resistor | MCR10EZHJ332 | 3 | 20 | | X |
| R51 ☆ | 2792 0950 | Chip resistor | MCR10EZHJ392 | 1 | 20 | | X |
| R57, 66 ☆ | 2792 0960 | Chip resistor | MCR10EZHJ822 | 2 | 20 | | X |

Note: ☆ — New parts
Q'ty — Quantity used per unit
• — Minimum order and supply quantity

Rank A: Essential
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C: Others
X: No stock recommended

| Item | Code No. | Part Name | Specification | Q'ty | • | Unit Price N.R. Yen (¥) (FOB: JAPAN) | Rank |
|---|---|---|---|---|---|---|---|
| R15, 17 ☆ 25,33,40 48 | 2792 0993 | Chip resistor | MCR10EZHJ123 | 6 | 20 | | X |
| R68 ☆ | 2792 1000 | Chip resistor | MCR10EZHJ122 | 1 | 20 | | X |
| R1, 2 | 2792 1043 | Chip resistor | MCR10EZHJ223 | 2 | 20 | | X |
| R50 ☆ | 2792 1094 | Chip resistor | MCR10EZHJ120 | 1 | 20 | | X |
| R3, 7, 9 ☆ 13, 19, 23 27, 31, 35 38, 42, 46 | 2792 1108 | Chip resistor | MCR10EZHJ562 | 12 | 20 | | X |
| R5, 11 ☆ 21, 69 | 2792 1140 | Chip resistor | MCR10EZHJ682 | 4 | 20 | | X |
| R28, 29 ☆ 44 | 2792 1205 | Chip resistor | MCR10EZHJ273 | 3 | 20 | | X |
| R53 ☆ | 2795 0056 | Chip resistor | MCR10EZHJ000 | 1 | 20 | | X |
| R8, 14, 24☆ 33, 39, 47 | 2795 0273 | Chip resistor | MCR10EZHJ823 | 6 | 20 | | X |
| R4, 10 ☆ 20, 28, 36 43 | 2795 0742 | Chip resistor | MCR10EZHJ683 | 6 | 20 | | X |
| R65 ☆ | 2795 0896 | Chip resistor | MCR10EZHJ242 | 1 | 20 | | X |
| R67 ☆ | 2795 1169 | Chip resistor | MCR10EZHJ821 | 1 | 20 | | X |
| R70 ☆ | 2795 1190 | Chip resistor | MCR10EZHF1002 | 1 | 20 | | X |
| R72 ☆ | 2795 1274 | Chip resistor | MCR10EZHF2202 | 1 | 20 | | X |
| R62 ☆ | 2795 1288 | Chip resistor | MCR10EZHF3301 | 1 | 20 | | X |
| R55 ☆ | 2795 1344 | Chip resistor | MCR10EZHJ432 | 1 | 20 | | X |
| R60 ☆ | 2795 1498 | Chip resistor | MCR10EZHF6800 | 1 | 20 | | X |
| C17, 22 24, 29 34, 50 | 2807 6063 | Chip electrolytic capacitor | ECE-V1CV100R | 6 | 20 | | X |
| C6, 12 | 2807 6084 | Chip electrolytic capacitor | ECE-V1HV010R | 2 | 20 | | X |
| C3, 4, 27 | 2845 0413 | Chip capacitor | T1-21NER473K-T | 3 | 20 | | X |
| C41, 42 ☆ | 2845 0756 | Chip capacitor | T1-21N1HSL220J-T | 2 | 20 | | X |
| C8, 45 ☆ 46, 48, 51~54, 56 | 2845 0763 | Chip capacitor | T1-21N1ER103K-T | 8 | 20 | | X |
| C14, 15 ☆ | 2845 0770 | Chip capacitor | T1-21N1EF823Z-T | 2 | 20 | | X |
| C13 ☆ | 2845 0777 | Chip capacitor | T1-21N1ER123K-T | 1 | 20 | | X |
| C5 ☆ | 2845 0784 | Chip capacitor | T1-21N1ER182K-T | 1 | 20 | | X |
| C21 ☆ | 2845 0798 | Chip capacitor | T1-21N1ER393K-T | 1 | 20 | | X |
| C7, 18, 19☆ 25, 26, 30 31, 37 | 2845 0805 | Chip capacitor | T1-21N1ER472K-T | 8 | 20 | | X |

Note: ☆ — New parts
Q'ty — Quantity used per unit
• — Minimum order and supply quantity

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

| Item | | Code No. | Part Name | Specification | Q'ty | * | Unit Price N.R. Yen (¥) (FOB: JAPAN) | Rank |
|---|---|---|---|---|---|---|---|---|
| C2, 32 35 | ☆ | 2845 0812 | Chip capacitor | T1-21N1ER682K-T | 3 | 20 | | X |
| C43 | ☆ | 2845 0819 | Chip capacitor | T1-21N1HSK331J-T | 1 | 20 | | X |
| C20, 59 | ☆ | 2845 0826 | Chip capacitor | T1-21N1ER392K-T | 2 | 20 | | X |
| C9, 10 | ☆ | 2845 0833 | Chip capacitor | T1-21N1ER683K-T | 2 | 20 | | X |
| C44 | ☆ | 2845 0840 | Chip capacitor | T1-21N1HSL151J-T | 1 | 20 | | X |
| C16 | ☆ | 2845 0966 | Chip capacitor | T1-21N1ER332K-T | 1 | 20 | | X |
| | ☆ | 2765 0672 | Semi-fixed resistor | RH0411C-47KB | 6 | 10 | | C |
| | | 2804 5808 | Electrolytic capacitor | 6.3RE2-330 | 1 | 10 | | X |
| | | 3501 1358 | Connector | IL-S-7P-S2L2-EF | 1 | 20 | | X |
| | ☆ | 3501 2786 | Connector | S10B-ZR | 1 | | | X |
| | ☆ | 3501 2800 | Connector | S6B-ZR | 1 | | | X |
| | | 3540 3523 | Connector | B3B-XH-A | 1 | 20 | | X |
| | ☆ | 4307 8781 | Blank PCB M0380-MA3M | M110212A-3 | 1 | | | X |
| | | | **4) M0380 MA4M PCB ASS'Y** | | | | | |
| | | 2114 0021 | Monolithic IC | LA6462D | 1 | 5 | | B |
| | | 2200 4409 | Transistor | 2SA933-SQ-TP-T | 2 | 10 | | B |
| | | 2220 1387 | Transistor | 2SC1740SQ-TP-T | 3 | 10 | | B |
| | ☆ | 2230 4143 | Transistor | 2DS1761-F | 1 | | | B |
| | ☆ | 2240 1076 | FET | 2SK30ATMY, TPE2-T | 1 | 10 | | B |
| | ☆ | 2251 0238 | Transistor | 2SB1187F | 2 | 10 | | B |
| | | 2301 0241 | Diode | 1SS254T-77-T | 8 | 20 | | B |
| | ☆ | 2360 0035 | Zener diode | RD6.2ESB2-T1-T | 1 | 10 | | C |
| | | 2390 0371 | Diode | DSK10B-BT-T | 2 | 20 | | X |
| | ☆ | 2607 5077 | Carbon film resistor | ELR50X10-J-T34V-T | 1 | 20 | | X |
| | | 2617 0036 | Carbon film resistor | R-20-220-J-T24-T | 1 | 20 | | X |
| | | 2617 0052 | Carbon film resistor | R-20-1K-J-T24-T | 1 | 20 | | X |
| | | 2617 0061 | Carbon film resistor | R-20-2.2K-J-T24-T | 2 | 20 | | X |
| | | 2617 0079 | Carbon film resistor | R-20-3.3K-J-T24-T | 2 | 20 | | X |
| | | 2617 0087 | Carbon film resistor | R-20-4.7K-J-T24-T | 1 | 20 | | X |
| | | 2617 0095 | Carbon film resistor | R-20-10K-J-T24-T | 3 | 20 | | X |
| | | 2617 0109 | Carbon film resistor | R-20-33K-J-T24-T | 1 | 20 | | X |
| | | 2617 0141 | Carbon film resistor | R-20-100K-J-T24-T | 3 | 20 | | X |
| | ☆ | 2617 0192 | Carbon film resistor | R-20-1.8K-J-T24-T | 1 | 20 | | X |
| | | 2617 0203 | Carbon film resistor | R-20-470K-J-T24-T | 2 | 20 | | X |
| | | 2617 0214 | Carbon film resistor | R-20-2.7K-J-T24-T | 1 | 20 | | X |
| | | 2617 0271 | Carbon film resistor | R-20-5.6K-J-T24-T | 1 | 20 | | X |

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* — Minimum order and supply quantity

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| Item | Code No. | Part Name | Specification | Q'ty | • | Unit Price N.R. Yen (¥) (FOB: JAPAN) | Rank |
|---|---|---|---|---|---|---|---|
| | 2617 0297 | Carbon film resistor | R-20-22K-J-T24-T | 2 | 20 | | X |
| | 2617 0327 | Carbon film resistor | R-20-2.2M-J-T24-T | 1 | 20 | | X |
| ☆ | 2760 2134 | Semi-fixed resistor | V8K4-11B500K | 1 | 20 | | C |
| | 2800 9063 | Electrolytic capacitor | 50RE2-3R3-T2-T | 2 | 20 | | X |
| ☆ | 2801 7994 | Electrolytic capacitor | 16RE3-470-T14-T | 1 | 20 | | X |
| | 2804 6002 | Electrolytic capacitor | 6.3RE2-470-T14-T | 3 | 10 | | X |
| | 2805 3142 | Electrolytic capacitor | 16RE2-10-T2-T | 1 | 20 | | X |
| | 2807 1023 | Electrolytic capacitor | 50RE2-1-T2-T | 1 | 10 | | X |
| | 2807 1104 | Electrolytic capacitor | 6.3RE2-100-T14-T | 3 | 20 | | X |
| | 2818 2082 | Ceramic capacitor | RT-HE70TKYF103Z-T | 3 | 10 | | X |
| | 2819 0557 | Ceramic capacitor | RT-HE50TKSL101K-T | 1 | 10 | | X |
| | 2830 6229 | Mylar capacitor | AMZV-104K50-T | 1 | 10 | | X |
| | 3020 2147 | Ferrite beads | BL02RN2-R62 | 5 | 10 | | C |
| | 3025 0042 | EMI filter | DST306-51B222M | 4 | 10 | | C |
| ☆ | 3121 6056 | Relay | ATQ229 | 1 | | | C |
| | 3412 0238 | Slide switch | SSD-22DP | 1 | | | C |
| | 3501 0070 | DC jack | HEC2305-01-030 | 1 | | | C |
| ☆ | 3501 2674 | Connector 2P | IL-S-2P-S2L2-EF | 1 | | | X |
| ☆ | 3501 2793 | Connector | S11B-PH-K-S | 1 | | | X |
| ☆ | 3501 2835 | Connector | S4B-PH-K-S | 1 | | | X |
| ☆ | 3501 2996 | Connector | S3B-PH-K-S | 1 | | | X |
| | 3612 0665 | Phone jack | YKB21-5006 | 1 | | | C |
| | 3612 0789 | Jack | YKB21-5010 | 1 | | | C |
| | 3501 0196 | DIN jack | TCS5350-01-1211 | 1 | 5 | | C |
| ☆ | 3501 3101 | 3P connector M380A | PRH-3P-8-M380 | 1 | | | X |
| ☆ | 4307 8731 | Blank PCB M0380-MA4M | M210197A-1 | 1 | | | X |
| ☆ | 4307 8741 | Blank PCB M0380-MA4M (SUB) | M210197A-2 | 1 | | | X |
| | **5) M0380-MA5M PCB ASS'Y** | | | | | | |
| ☆ | 3412 0427 | DIP switch | A6D-0103 | 1 | | | C |
| ☆ | 3613 0462 | Socket | 05MQ-BT | 1 | | | X |
| ☆ | 3613 0469 | Socket | 06MQ-BT | 1 | | | X |
| ☆ | 4307 8721 | Blank PCB M0380-MA5M | M110212A-5 | 1 | | | X |
| | **6) M0380-LD-PCB ASS'Y** | | | | | | |
| ☆ | 2370 0287 | LED | LA301RB | 2 | | | C |
| ☆ | 3501 3108 | 8P connector M380A | PHR-8P-13-M380A | 1 | | | X |

Note: ☆ — New parts
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| Item | Code No. | Part Name | Specification | Q'ty | • | Unit Price N.R. Yen (¥) (FOB: JAPAN) | Rank |
|---|---|---|---|---|---|---|---|
| ☆ | 3501 3115 | 9P connector M380A | PHR-9P-12-M380A | 1 | | | X |
| ☆ | 4307 9361 | Blank PCB M0380-LDM | M110212A-4 | 1 | | | X |
| | | **7) M0380-IF PCB ASS'Y** | | | | | |
| ☆ | 3501 0896 | Card connector | JC20-C45PA-LT2-A2 | 1 | | | C |
| ☆ | 3501 2758 | Connector | S11B-ZR | 1 | | | X |
| ☆ | 3501 2765 | Connector | S12B-ZR | 1 | | | X |
| ☆ | 3501 2772 | Connector | S7B-ZR | 1 | | | X |
| ☆ | 3501 2968 | 11P connector M380B | ZR-11P-17-M380A | 1 | | | X |
| ☆ | 3501 2975 | 12P connector M380A | ZR-12P-17-M380A | 1 | | | X |
| ☆ | 3501 2982 | 7P connector M380A | ZR-7P-17-M380A | 1 | | | X |
| ☆ | 4307 8710 | Blank PCB M0380-IF | M310339-1 | 1 | | | X |
| | | **8) HOLDER ASS'Y** | | | | | |
| 50☆ | 6914 1800 | Holder | M210083-1 | 1 | | | X |
| 53☆ | 6914 1870 | Button 380 | M310178-1 | 9 | 10 | | C |
| 54☆ | 6914 1880 | Button 380 | M310178-2 | 2 | 10 | | C |
| 55☆ | 6914 1890 | Button 380 | M310178-3 | 1 | 10 | | C |
| | | **9) CASE BLOCK** | | | | | |
| ☆ | 3501 2709 | 10P connector M380A | DR-10P-26-M380 | 1 | | | X |
| ☆ | 3501 2716 | 8P connector M380B | DR-8P-28-M380 | 1 | | | X |
| ☆ | 3501 2730 | 11P connector M380A | KR-11P-13-M380 | 1 | | | X |
| ☆ | 3501 2954 | 10P connector M380B | ZR-10P-26-M380A | 1 | | | X |
| ☆ | 3501 2961 | 6P connector M380A | ZR-6P-23-M380A | 1 | | | X |
| 56☆ | 6914 1750 | Top panel | M310271-1 | 1 | | | C |
| 57☆ | 6914 1760 | Lower panel B | M310179-1 | 1 | | | C |
| 58☆ | 6914 6061 | Knob 380 sub ass'y | M410407A*1 | 3 | | | C |
| 59☆ | 6914 1791 | Lower panel sub ass'y | M310326A*1 | 1 | | | C |
| 60☆ | 6914 1770 | Upper case 380 | M110130-1 | 1 | | | C |
| 61☆ | 6914 4411 | Card guide | M410333A-1 | 1 | | | C |
| 62☆ | 6914 1780 | Lower case 380 | M110126-1 | 1 | | | C |
| 63 | 3501 1477 | Battery snap | PLGW-8533-01A | 1 | | | C |
| 64 | 3901 0712 | Battery case | S6-3 | 1 | | | C |
| 65 | 6913 3350 | Battery cover sub ass'y | M410077*1 | 1 | | | C |

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|---|---|---|---|---|---|---|---|
| 1 | 0007 8720 | Panel | MX-380 t=2.3 | 1 | | | B |
| 2 | 0007 7034 | Pick up F.M (Front/Middle) | MX-S | 2 | | | B |
| 3 | 0007 7036 | Pick up (Rear) | MX-H | 1 | | | B |
| 4 | 0007 8721 | Pick up (MIDI) | FEX. PU (Mx-380) | 1 | | | B |
| 5 | 0007 7040 | Control VR (Guitar) | VOL 500K | 1 | | | C |
| 6 | 0007 8722 | Control VR (Tone) | TONE 500K | 1 | | | C |
| 7 | 0007 8723 | Control VR (Synth.) | TONE 10K | 1 | | | C |
| 8 | 0007 7043 | Select SW (with Knob) | YM-50 | 1 | | | C |
| | 0007 8724 | Mylar capacitor | 0.022μF | 1 | 20 | | X |
| | 0007 8725 | Ceramic capacitor | 47pF | 1 | 20 | | X |
| | 0007 8726 | Connector CE | 4 Pin | 1 | | | X |
| | 0007 8727 | Connector CG | 2 Pin | 1 | | | X |
| 9 | 0007 7047 | Tuning knob set | SG38-07 | 1 | | | C |
| 9-1 | 0007 7049 | Tuning knob | SG38-07/L | 6 | | | C |
| 9-2 | 0007 7050 | Nut (Black) | | 6 | | | X |
| 9-3 | 0007 7051 | Washer | | 6 | 10 | | X |
| 10 | 0007 7052 | Neck joint plate | NPF/No mark, Blank | 1 | | | X |
| 11 | 0007 7053 | Joint plate cushion | | 1 | 10 | | X |
| 14 | 0007 8732 | Top lock | GHL-2 | 1 | | | X |
| 15 | 0007 8714 | Spring holder | | 1 | | | X |
| 16 | 0007 8733 | Back plate A | FLT | 1 | | | C |
| 23 | 0007 8740 | Tremolo unit (including 23-1, 15, 25) | GE-1988 T | 1 | | | X |
| 23-1 | 0007 8741 | Tremolo arm | | 1 | | | C |
| 27 | 0007 8744 | Rubber cover | 1MG-2010 | 2 | | | C |
| | 0007 8746 | String | ELF | 1 | | | C |
| | 0007 8748 | Wrench bar | 5 x 12mm | 1 | 10 | | C |
| | 0007 8749 | Wrench bar | 2.5 x 12mm | 1 | | | C |
| | 0007 7063 | Wrench bar | 1.5 x 12mm | 1 | 20 | | C |
| | 0007 8750 | Wrench bar | 3.0 x 12mm | 1 | | | C |
| 17 | 0007 8751 | Felt W (black) | | 2 | 20 | | C |
| | 0007 8752 | Plug cord (3m) | | 2 | | | C |
| 24 | 0007 8753 | Strap pin | | 2 | 10 | | C |
| | 0007 8754 | Rod bar | G5 x 438 | 1 | | | X |
| | 0007 8755 | Round nut 9 x 25S | | 1 | 5 | | X |
| | 0007 8756 | Rag nut | 5 x 10 | 2 | 20 | | X |
| | 0007 8757 | Rag nut | 3 x 8.5 | 2 | 20 | | X |
| | 0007 8758 | Fret bar (1 set) | SBB-213 | 1 | | | X |
| 25 | 0007 8715 | Spring (Tremolo) | 8.1¢ | 5 | 5 | | X |

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|---|---|---|---|---|---|---|---|
| 26 | 0007 7083 | Spring | Semi conical 8mm, Nickel | 2 | 20 | | C |
| 27 | 0007 7081 | MX-H fixing spring | NP, Nickel | 2 | 20 | | C |
| 28 | 0007 7080 | MX-S fixing spring | BL-300, Nickel | 4 | 20 | | C |
| 29 | 0007 8716 | Body | PG-380 Black | 1 | | | C |
| | 0007 8717 | Body | PG-380 White | 1 | | | C |
| 30 | 0007 8718 | Neck | PG-380 | 1 | | | C |
| 101 | 0007 7078 | Round flush tapping screw | 3 x 10mm, Black | 2 | 20 | | C |
| 102 | 0007 7079 | Pan-head tapping screw | 3 x 25mm, Black | 2 | 20 | | C |
| 103 | 0007 7082 | Pan-head tapping screw | 3 x 20mm, Black | 2 | 20 | | C |
| 104 | 0007 7088 | Round-head wood screw | 2.4 x 10mm, Black | 6 | 20 | | C |
| 105 | 0007 7089 | Round flush tapping screw | 4.5 x 45mm, Black | 4 | 20 | | C |
| 106 | 0007 8763 | Round flush tapping screw | 3 x 12mm, Black | 16 | 20 | | C |
| 107 | 0007 7091 | Round flush tapping screw | 3.5 x 25mm, Black | 2 | 20 | | C |
| 110 | 0007 7098 | Round flush wood screw | 4.1 x 45mm, Nickel | 2 | 20 | | C |
| 111 | 0007 8766 | Round flush tapping screw | 3 x 10mm, Black | 10 | 20 | | C |
| 112 | 0007 8767 | Bind tapping screw | 3 x 16mm, Nickel | 1 | 20 | | C |
| 113 | 0007 8768 | Flush tapping screw | 2.6 x 8mm, Black | 4 | 20 | | C |
| 114 | 0007 8770 | Pan-head tapping screw | 3 x 10mm, Nickel | 11 | 20 | | C |
| 115 | 0007 7086 | Round flush tapping screw | 3 x 8mm, Black | 2 | 20 | | C |

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