disklavier

SERVICE MANUAL

MX-100A

SM8549

YAMAHA CORPORATION OF AMERICA

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

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

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CONTENTS

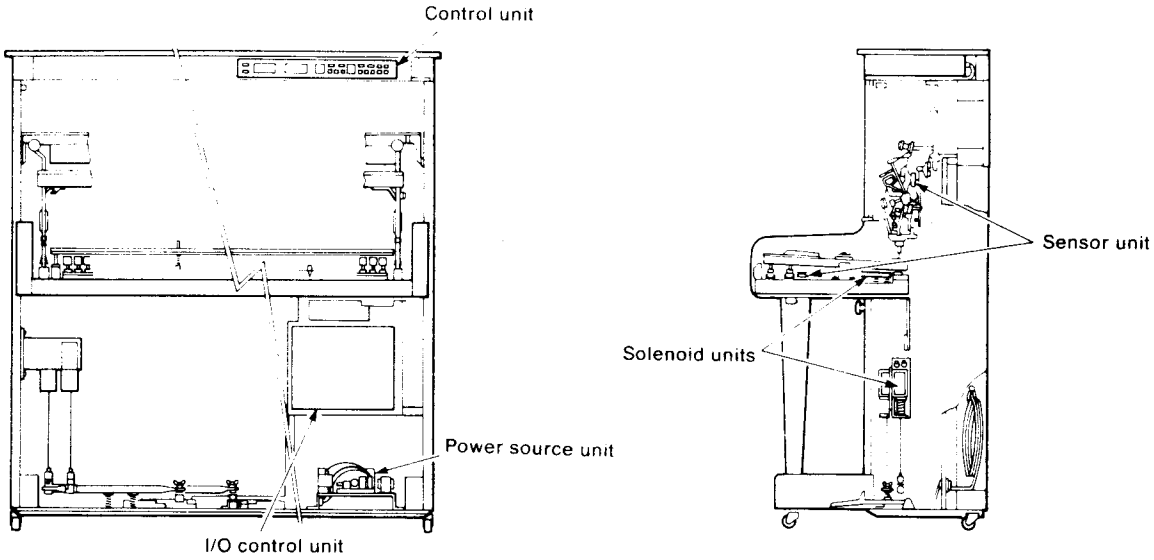
The Disklavier Design 1
Specifications 1
Names and Functions
- Front Panel 2
- Remorte Control Unit 5
- Connectors 6

How to Format Disks 7
MIDI Data Format 8
MIDI Implementation Chart 11
MIDI Troubleshooting and know-how 12
Warning Displays and error messages 14
Error number meaning 15
Block Diagram 16
Disassembly Procedure 17
Adjustment Procedure
- Key Drive Unit 21
- Key Stop Rail Unit 21
- Pedal Drive Unit 22
- Pedal Cushion Unit 23
- Sensor Units 24

Operation Test of Each Unit Using The Test Disk 26
Error Display LEDs on the I/O Board 31
Adjusting the Trimmer 32
Test Program 33
Program Flow-chart and Memory Map of Disklavier 38
Explanation of Sensor System 39
LSI Data Table 41
CPU Circuit Board 57
I/O Circuit Board 59
Sensor, Hammer, Key, M1, K, M2 Circuit Board 61
Drive Unit, MIDI, Power Supply Circuit Board 63
Part List

The Disklavier Design

The Disklavier consists of a control unit and a drive unit comprising of a sensor unit, solenoid units, power source unit and I/O control unit.



Specifications

Design

Control unit	• Key switches	18
	• LCD	Dot matrix (16 characters x 2 lines)
	• LED indicators	Power, Record, Volume, Tempo, Transposition, Metronome, MIDI.
	• LED display	7 segments x 2 digits
	• Disk drive	3.5 inch micro-floppy disk drive
	• Jacks	MIDI IN/OUT, foot switch phone jack
	• Media	Double sided, double density, double track 3.5 inch microfloppy disks Memory capacity: 628 kbytes Number of pieces: 60 Music titles: 32 characters Disk titles: 64 characters
Solenoid unit	• Polyphonic voices	16
Sensor unit	• Polyphonic voices	16

Power supply

• U.S. & Canadian Models:	120V - 60 Hz
• General Model:	220V - 50Hz
• Power consumption	250 W
• Environmental temperature:	4°C ~ 40°C

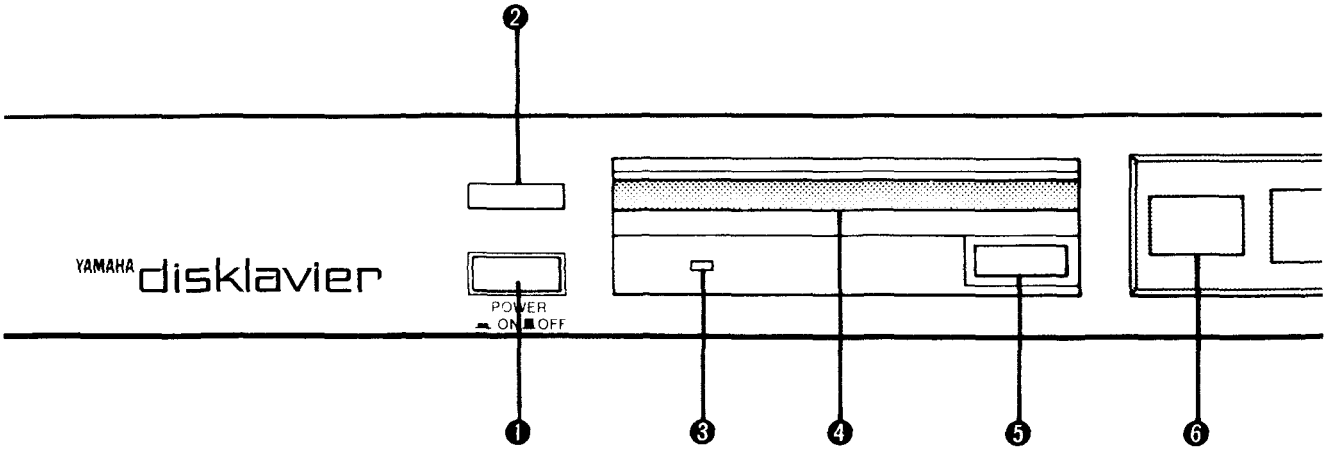
Standard equipment

Wireless remote control unit, prerecorded floppy disk

* Specifications and exterior design are subject to change without notice.

■Names and Functions

●Front Panel



①Power Switch

Pressing this switch turns power on, shown by the power indicator ③ and the Volume button indicator ⑬ lighting up. At the same time, the LCD will display the message "DISK NOT READY!".

②Remote control signal window

The infrared signals from the remote control unit are received at this window. Be sure to leave it uncovered so the signals from the remote control unit can be received properly.

③Power indicator

Lights up when power is turned on.

④Disk slot

Floppy disks are inserted here.

⑤Disk Eject button

Press this button when you wish to remove an inserted disk.

* Please do not remove the disk during playback or recording as this will damage the disk drive head and the disk itself.

⑥Music number indication

Displays the number of the selected piece of music. Confirm this display before you play back or record.

⑦Liquid Crystal Display (LCD)

The LCD displays a variety of information such as the music title, adjustment values, the time that has elapsed since the beginning of the piece of music, playback and recording levels, and so on.

⑧Start Pause button

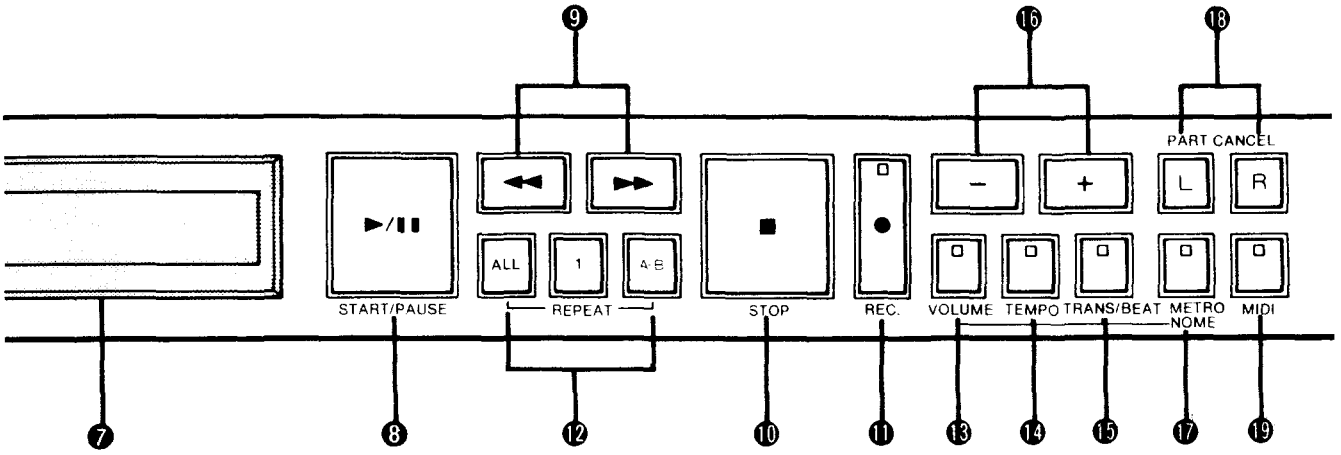
Press this button when you want to start playback or recording. Also use it when you wish to temporarily stop (pause) or restart a piece of music during playback or recording. (If this button is pressed during fast forward or rewind, playback will recommence from there.)

⑨Tune Select Return-FF buttons

In stop or record stand-by mode, the function of these buttons is to select the music number, while they function as Fast Forward or Return buttons during playback. To stop fast forward or rewind operation, press the respective button again. This will restart playback from the point where the button was pressed. If the button is not pressed again, fast forward or Return will stop at the beginning of the next piece of music or the present one respectively.

⑩Stop button

This button stops all operations such as playback and recording, fast forward or rewind.



⑪Rec. button

Pressing this button causes its indicator to light up, entering record stand-by mode. Recording can now be started by pressing the Start/Pause button.

If you would like to delete part of a recorded piece of music and rerecord something else in its place, first enter record stand-by mode by pressing this button. Then display the number of the respective piece of music with the Music Selection/Return-FF buttons⑨and use the Start/Pause button ⑧in order to commence rerecording.

★The number of pieces of music that can be recorded on a single floppy disk is 60 for a total recording time of about 90 minutes. However, this is only an approximation and the actual number of pieces and length of recording time depends on the kind of music recorded.

★If this button is pressed once again during record stand-by mode, the mode will change to "music/disk title entry mode", which is used to input the names of single pieces of music or entire disks.

★If this button is pressed again twice during record stand-by mode, the mode will change to "split point setting for separate left-and right-hand parts".

⑫Repeat buttons

Operate these buttons when you desire repeated playback of certain pieces of music or sections within them.

⑬Volume button

In order to adjust the playback volume, press this button in stop mode, during playback or playback pause, making sure that the button's indicator lights up. You can then adjust the volume with the + / - buttons ⑯. The adjustment range is from -03 to +02. It is usually set to 00.

In addition, this button can be used to turn the metronome sound on or off when the Metronome button ⑰ has been pressed to select the metronome function.

⑭Tempo button

When you want to adjust the tempo (speed) of a piece of music for playback, press this button in stop mode, during playback or playback pause, making sure that the button's indicator lights up. You can then adjust the tempo with the + / - buttons ⑯. The adjustment range is from -50% to +20%. It is usually set to 00.

Besides, this button can be used to enable metronome tempo adjustment when the metronome function is on.

⑮Trans/Beat

When you want to transpose (change) the key of a piece of music for playback, press this button in stop mode, during playback or playback pause, making sure that the button's indicator lights up. You can then transpose the music with the + / - buttons ⑯. The transposition range is from two octaves down to two octaves up. It is usually set to "normal".

In addition, this button can be used to set the metronome time when the metronome function is on.

⑯- / + buttons

These are used for various adjustments and settings such as volume, tempo or transposition. Pressing the " - " button decreases the respective value, pressing "+" increases it. With both buttons, keeping them depressed changes the value continuously while pressing them shortly changes the value in single steps.

⑰Metronome button

The Disklavier has a metronome function which allows you to record music while listening to a metronome beat. It is also possible to use the metronome function when not recording. (However, the metronome cannot be used during playback.)

When you wish to use the metronome function, press this button.

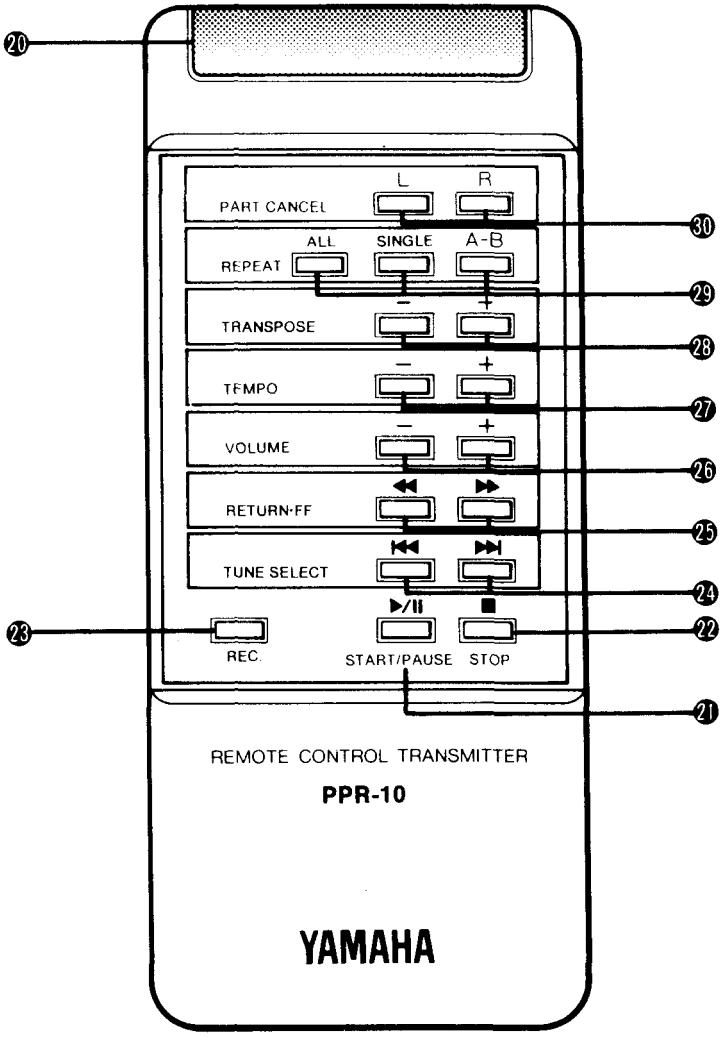
⑱Part Cancel buttons

It is possible to cancel either the left-hand or right-hand part by pressing the corresponding Part Cancel button when playing back music recorded separately for the left and right hand. In other words, pressing the button "L" causes only the sound of the keys played by the right hand to be heard, while pressing "R" means that you will hear only the part for the left hand.

⑲MIDI button

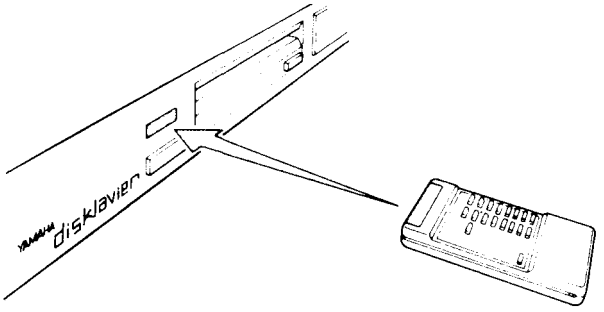
This button is only needed when MIDI signals are being exchanged with other connected MIDI equipment. Pressing this button enters MIDI set-up mode in which the conditions for MIDI communication are established.

●Remote Control Unit



⑳Remote control signal window

Please operate the remote control while making sure that this infrared signal transmission window is aimed at the corresponding reception window ② on the front panel. The control signals from the remote control unit are transmitted from here.



㉑ Start/Pause button

Has the same functions as the Start/Pause button ⑧ on the front panel.

㉒ Stop button

Has the same functions as the Stop button ⑩ on the front panel.

㉓ Rec. button

Has the same functions as the Rec. button ⑪ on the front panel.

㉔ Tune Select buttons

The function of these buttons is to select the music number in stop mode, during playback or in record stand-by mode.

㉕ **Return-FF buttons**

These buttons are for fast forward and rewind. They can be operated in stop mode or during playback. Fast forward or rewind continues until the respective button is pressed again.

㉖ **Volume buttons**

These buttons adjust playback volume level. They can be operated in stop mode, during playback or playback pause.

㉗ **Tempo buttons**

When you want to adjust the tempo of a piece of music for playback, use these buttons in stop mode, during playback or playback pause.

㉘ **Transpose buttons**

When you want to transpose (change the key of) a piece of music for playback, press these buttons in stop mode, during playback or playback pause.

㉙ **Repeat buttons**

Operate these buttons when you desire repeated playback.

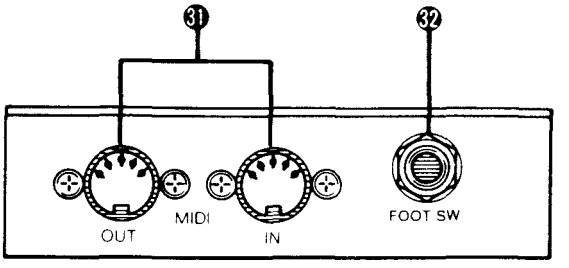
㉚ **Part Cancel buttons**

These allow you to cancel either the left-hand or right-hand part for playback of music with separate parts for the left and right hand.

★Operations that cannot be carried out with the remote control unit:

- Operations with the metronome function on
- Operations in MIDI set-up mode
- Disk formatting, registration

●Connectors



㉛ **MIDI jacks**

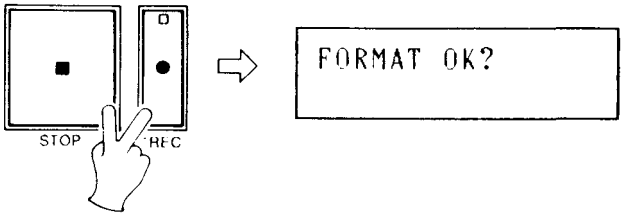
These jacks are used for MIDI connections. When you want to control other MIDI equipment from the Disklavier or control this unit via other MIDI equipment, these jacks enable MIDI signal communication.

㉜ **Foot switch jack**

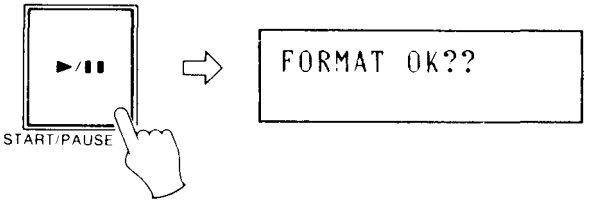
If an optional FC-5 foot switch has been connected to this jack, you can start, stop and restart playback or recording with your foot. (The foot switch then has the same functions as the Start/Pause button ⑧ on the front panel.)

■How to Format Disks

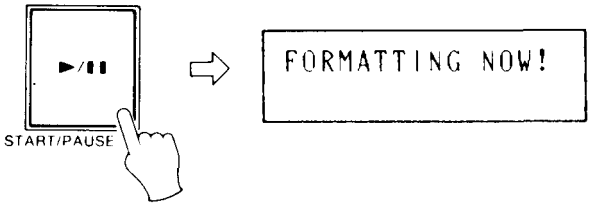
① After inserting a disk, press the Rec. button while keeping the Stop button depressed. You can release these buttons when the display reads "FORMAT OK?".



② In answer to the above message, press the Start/Pause button. (If you should decide not to proceed with formatting, remove the disk instead.)



③ Reconfirm the above question by again pressing the Start/Pause button. (If you decide not to proceed with formatting, remove the disk instead.)



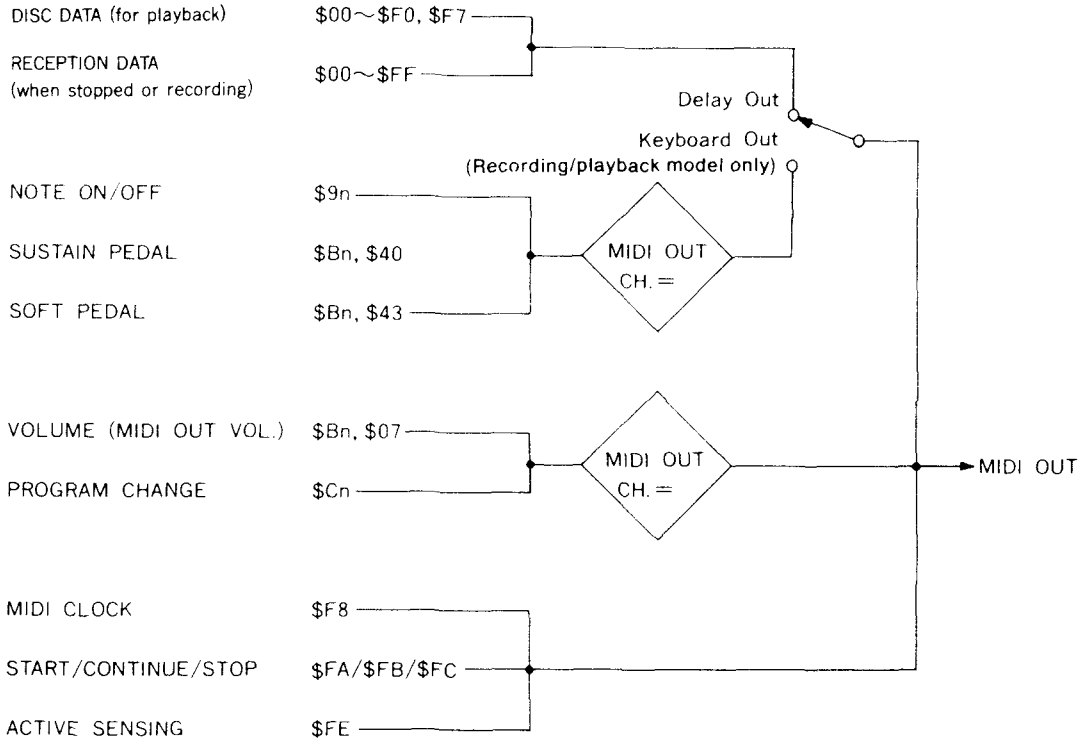
④ After a few minutes, formatting is completed and the display will change as follows.

● **Erasing recordings**

Should you wish to delete all recordings on a disk at once, you can format that disk as described.

MIDI Data Format

Transmission Conditions



Transmission Data

- **CHANNEL INFORMATION**

1) CHANNEL VOICE MESSAGES

① Key On/Off

Status	1 0 0 1 n n n n (9n)	n = channel number (0~15)
Note No.	0 k k k k k k k	k = 21 (A_{-1}) ~108 (C_7): Note 1
Velocity	0 v v v v v v v	v = 0: key off
		v = 1 ~127: key on

Note 1: Transposition is also limited to this range.

② Control Change

Status	1 0 1 1 n n n n (Bn)	n = channel number (0 ~15)
Control No.	0 c c c c c c c	
Control value	0 v v v v v v v	

Control No.	Control value
c = 7 volume (MIDI OUT VOL.)	v = 0 ~127
c = 64 Sustain pedal	v = 0: off, 31: on
c = 67 Soft pedal	v = 0: off, 31: on

③ Program Change

Status	1 1 0 0 n n n n (Cn)	n = channel number (0 ~ 15)
Program No.	0 p p p p p p p	p = 0 ~ 127

• SYSTEM INFORMATION

1) SYSTEM REALTIME MESSAGES

①Timing clock

Status 1 1 1 1 1 0 0 0 (F8): Note 2

Note 2: The clock tempo can be changed within a variable range of ♩ = 40~230.

②Start

Status 1 1 1 1 1 0 1 0 (FA)

③Continue

Status 1 1 1 1 1 0 1 1 (FB)

④Stop

Status 1 1 1 1 1 1 0 0 (FC)

⑤Active sensing

Status 1 1 1 1 1 1 1 0 (FE): Note 3

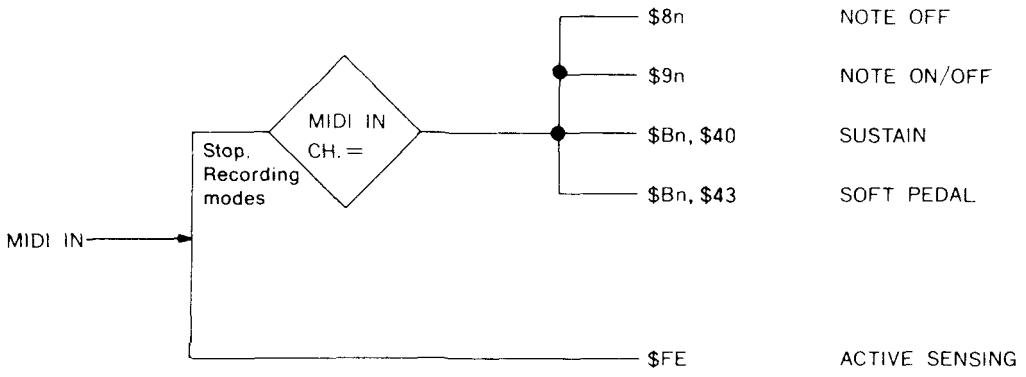
Note 3: When the preferred data, including active sensing, has been transmitted, if data is not transmitted within an interval of approximately 80 milli seconds, the main clock is transmitted.

* The system realtime messages Timing Clock, Start, Continue, and Stop can be transmitted only when the metronome function is ON.

* When playing back *a* disk recorded on another system (E-seq), all system information as well as system exclusive messages can be transmitted.

* In MIDI OUT = DELAY OUT conditions, and also in Stop or Recording mode, delay the data received through MIDI IN by 500msec, and merge it with MIDI OUT without any changes.

Reception Conditions



Reception Data

- **CHANNEL INFORMATION**

1) CHANNEL VOICE MESSAGES

① Key Off

Status	1 0 0 0 n n n n (8n)	n = channel number (0~15)
Note No.	0 k k k k k k k	k = 21 (A_{-1})~108 (C_7)
Velocity	0 v v v v v v v	v = ignored

② Key On/Off

Status	1 0 0 1 n n n n (9n)	n = channel number
Note No.	0 k k k k k k k	k = 21 (A_{-1})~108 (C_7)
Velocity	0 v v v v v v v	v = 0: key off
		v = 1~127: key on

③ Control Change

Status	1 0 1 1 n n n n (Bn)	n = channel number (0~15)
Control No.	0 c c c c c c c	
Control Value	0 v v v v v v v	

Control No.	Control Value
c = 64 Sustain pedal	v = 0: off, 31: on
c = 67 Soft pedal	v = 0: off, 31: on

- **SYSTEM INFORMATION**

1) SYSTEM REALTIME MESSAGES

① Active Sensing

Status 1 1 1 1 1 1 1 0 (FE): Note 4

Note 4: When this code is received, sensing begins. If there is neither status nor data for an interval of 300msec, the piano keyboard and pedals become OFF, as do the Note ON of MIDI OUT and the Sustain Pedal ON.

■ MIDI Implementation Chart

(DISKLAVIER) Date : 2/4, 1986
Model MX100A MIDI Implementation Chart Version : 1.0

Function ...		Transmitted	Recognized	Remarks
Basic Channel	Default	1	1	
	Changed	1 - 16	1 - 16	
Mode	Default	3	3	
	Messages	x	x	
	Altered	**********	x	
Note Number		21 - 108 *1	21 - 108	
	True voice	**********	21 - 108	
Velocity	Note ON	o 9nH,v=1-127	o v=1-127	
	Note OFF	x 9nH,v=0 *1	x	
After Touch	Key's	x	x	
	Ch's	x *1	x	
Pitch Bender		x *1	x	
Control Change	7	o	x	
	64	o	o	
	67	o	o	
		*1		
Prog Change		o 0 - 127 *1	x	
	True #	**********		
System Exclusive		x *1	x	
System Common	Song Pos	x	x	
	Song Sel	x	x	
	Tune	x	x	
System Real Time	Clock	o	x	if Metronome is used
	Commands	o	x	
Aux Mes-sages	Local ON/OFF	x	x	
	All Notes OFF	x	x	
	Active Sense	o	o	
	Reset	x	x	

Notes: All recognized data are transmitted 500msec later if controler mode is STOP or RECORD and DELAYOUT mode is on.

*1 = All data are enabled to transmitted as record data if other E_seq disk is used and DELAYOUT mode is on.

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

MIDI Troubleshooting and Know-how

When MIDI Is connected, there are a few mistakes and problems that occur frequently.

① A sound source instrument has been connected to the MIDI OUT terminal, but no sound is produced by the external instrument.

- Are you sure the MIDI cable is firmly connected between the MIDI OUT terminal of the Disklavier and the MIDI IN of the external instrument?
- Does the reception channel of the external instrument match the transmission channel of the Disklavier?
- If you are performing, is the MIDI OUT switched to KEYBOARD OUT?
- During playback, is the MIDI OUT switched to DELAY OUT? (In this case, the transmission channel of the Disklavier cannot be changed.) Or, if it is KEYBOARD OUT, is the volume setting of the MIDI OUT VOL. or the piano volume too low?

② A keyboard or sequencer is connected to the MIDI IN terminal, and performance took place on the external instrument, but the piano keys were not struck.

- Is the MIDI cable firmly connected between the MIDI OUT terminal of the external instrument and the MIDI IN of the Disklavier?
- Is the power on, and has a floppy disk been inserted?
- Does the reception channel of the Disklavier match the transmission channel of the external instrument?
- Is the volume setting of the piano (MIDI IN VOL.) too low?

③ A keyboard or sequencer is connected to the MIDI IN terminal of the Disklavier, and performance took place on the external instrument, but the piano keys were struck with delay.

- It takes about 0.5 seconds from the time the information is received until the time the piano keys are struck.

④ There is a difference in pitch between the piano and the external instrument.

- Is the transposition function on?
- Is the TRANS/BEAT set to something other than "normal"?

⑤ The voicing of the external instrument can not be changed.

- Does the transmission channel of the Disklavier match the reception signal of the external instrument? (If they do not match, the voicing cannot be changed.)

⑥ The MIDI OUT VOL. function does not operate for the external instrument.

- Does the transmission channel of the Disklavier match the reception channel of the external instrument? (If they do not match, switching is not possible.)

⑦ During performance or playback on the piano, there is no problem with the piano, but the upper or lower tones are not produced on another keyboard.

- Are you playing music separated for left and right hand?
- Is the split function on?

⑧ Split, transposition functions do not work on the external instrument.

- Is the MIDI OUT set to DELAY OUT? (If it is not set to KEYBOARD OUT, these functions will not operate.)
- Does the transmission channel of the Disklavier match the reception channel of the external instrument?

⑨ When playing ensemble music, the external instrument receives all parts.

- Is the reception channel of the external instrument set to OMNI ON?

⑩ The MIDI OUT CH. was specified, but information is not output through the specified channel.

- Is the MIDI OUT set to DELAY OUT? (If the performance information transmission channel was set to KEYBOARD OUT only, you can change to the original channel and transmit.)

⑪ Voicing data was dumped from the keyboard or other instrument connected to the MIDI IN terminal of the Disklavier to the keyboard or instrument connected to the MIDI OUT terminal of the Disklavier, but on the Disklavier, "MIDI DATA ERROR" is displayed and the command is not implemented.

- If a large volume of data is transmitted, dump without sending the data via the Disklavier.

⑫ You recorded ensemble music yourself, but when you play it back, the rhythm goes haywire.

- Sometimes if the amount of data is too large, the rhythm goes haywire.
  To protect the piano, avoid sending overly large amounts of data. Also, avoid entering quick repeated not or successive or long scores as much as possible.

⑬ The piano repeats the same note over and over.

- Is there a loop in the wiring of the MIDI cable?

⑭ Playback is started on the Disklavier, and you wanted to start the rhythm machine and sequencer simultaneously by using system realtime messages, but cannot start them.

- Timing Clock, Start, Continue, and Stop can be transmitted only in Stop or Recording mode, when the metronome function is ON.

■Warning Displays and Error Messages

This Disklavier will display warnings and error messages on its LCD when operation has been incorrect or other problems have arisen. Should this happen, please take the appropriate measures after having found out what the trouble is by referring to the table below. Please note that some of these problems are easy to mistake for malfunctions though they are actually very easy to solve by yourself.

Display	Cause	What to do...
DISK NOT READY!	Always displayed when power turned on.	
DISK WRITE PROTECTED!	Floppy disk contents are protected.	When recording or entering a music or disk title, cancel the disk's memory protect function by sliding back the erasure protection tab.
UNFORMATTED DISK	Unformatted disk has been inserted.	When you want to record on a new disk, you must first format it.
CONVERT DISK!	Disk that has been used with other system has been inserted.	In order to use a disk that was previously used with another system, it must be converted.
ERROR OCCURRED!! (PUSH STOP KEY)	Disk defective.	Replace the disk.
	Hardware problem.	Press the Stop key to cancel the error message.
MIDI DATA ERROR! (PUSH STOP KEY!)	MIDI data faulty.	Press the Stop key.
	Too large a volume of MIDI data received at once.	Press the Stop key.
	MIDI connections faulty.	After turning off the power for both pieces of equipment, check the connections.
FILE NOT FOUND! RE-CONVERT DISK!	Error occurred during playback or recording.	Reconvert, then rerecord.
	During rerecording, the disk's memory capacity has been exceeded.	Reconvert and record on a different disk.
CANNOT FORMAT!	Disk defective.	Replace the disk.
DISK FULL!	Disk full to capacity.	Record on a different disk.
CANNOT CONVERT!	Disk defective.	Replace the disk.
THIS FILE IS PROTECTED!	A purchased disk contains a piece of music which cannot be rerecorded.	
EXECUTING!	This message appears whenever internal processes take some time during which external operation is not possible. Please do not remove the disk as long as this message is displayed.	
CANNOT RECORD MORE SONGS	Attempt was made to record a 61st piece of music on a disk.	The maximum number of pieces that can be recorded on a single disk is 60.

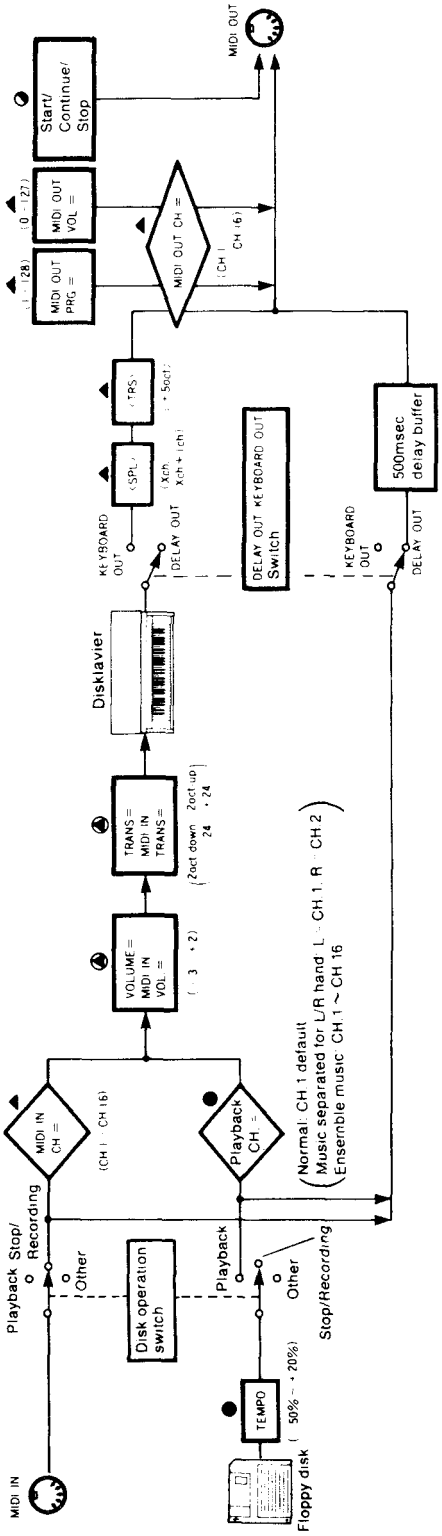
■ Error Number and Description in Details

When error occurred, the error number will be indicated on the 7 segment LED with pushing the L and R buttons at a time.

Error No.	Error message on LCD	Description
99	DISK NOT READY!	Disk not ready
98	ERROR OCCURRED!! (PUSH STOP KEY!)	Disk read and write retry over
97	ERROR OCCURRED!! (PUSH STOP KEY!)	Buffer write overrun
96	ERROR OCCURRED!! (PUSH STOP KEY!)	Buffer read overrun
94	DISK FULL!	Disk track full
93	ERROR OCCURRED!! (PUSH STOP KEY!)	Disk seek retry over
92	ERROR OCCURRED!! (PUSH STOP KEY!)	Write error
91	DISK WRITE PROTECTED!	Write into protected disk
90	CONVERT DISK!	Unsuitable disk format("PIANODIR.FTL" not found)
88	ERROR OCCURRED!! (PUSH STOP KEY!)	Byte counter miss matching
87	ERROR OCCURRED!! (PUSH STOP KEY!)	Event frame buffer overflow(Greater than 38)
81	REPEAT 255 TIMES ALREADY	Repeat 255 times already
80	CANNOT PAUSE IN THIS MODE!	Use REC.PAUSE in MDR mode.
79	UNFORMATTED DISK	Un-formatted disk(Directory read DMA error)
78	ERROR OCCURRED!! (PUSH STOP KEY!)	Directory write DMA error(Write or seek error)
76	ERROR OCCURRED!! (PUSH STOP KEY!)	FDD restore error
74	THIS FILE IS PROTECTED!	This music file is protected
73	PUSH STOP KEY!	Drive power off
70	FILE NOT FOUND! RE-CONVERT DISK!	File not exist though exist in DIR. FIL
69	ERROR OCCURRED!! (PUSH STOP KEY!)	Invalid get data
68	ERROR OCCURRED!! (PUSH STOP KEY!)	Get circuite error(Parity/Framing error)
67	ERROR OCCURRED!! (PUSH STOP KEY!)	Get key over
66	ERROR OCCURRED!! (PUSH STOP KEY!)	Get circuite error(Receive overrun)
65	MIDI DATA ERROR! (PUSH STOP KEY!)	MIDI data error
64	ERROR OCCURRED!! (PUSH STOP KEY!)	DOS error
63	CANNOT FORMAT!	Format error
62	CANNOT CONVERT!	Convert error

Error number 95, 89, 86, 85, 84, 83, 82, 77, 75, 72 and 71:NUL

Block Diagram



* This block diagram shows the MIDI functions in block form.

◕ : Can be set in normal mode or MIDI Setup Mode.
● : Can be set in normal mode.
◀ : Can be set in MIDI Setup Mode.
◔ : Produced during metronome operation.

■ Disassembly Procedure

1. Removing the Case Parts and Action

★When tuning:

1) Open and lock the Top Board.
2) Loosen the screws and securing fasteners on the inside of the left Side Board. (See Figure 1.)
3) Remove the Upper Front Board.
4) Remove the Fall Board.
5) Remove the Muffler Assembly.

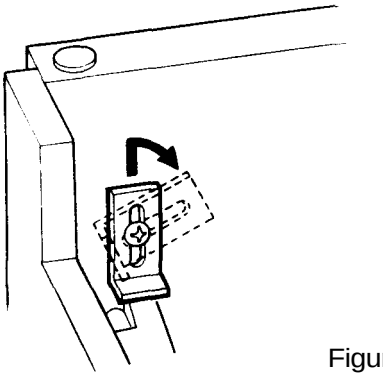


Figure 1.

★When regulating:

6) Remove the Key Stop Rail.
7) Remove the three screws shown at (A) in Figure 2, and the bolt shown at (B). Remove the Key Stopper Assembly.

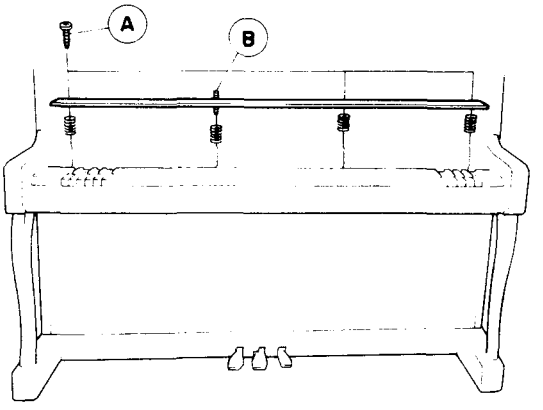


Figure 2.

8) Remove the stopper screw from the Lower Front Board Spring.
9) While pressing on the spring, pull the knob towards you, and remove the Lower Front Board. (See Figure 3.)

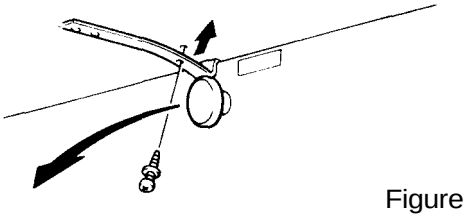


Figure 3.

★Removing the piano action:

10) Disconnect the four connectors from both sides of the action bracket.
11) Take off the knob bolt, and remove the action unit. (See Figure 4.)

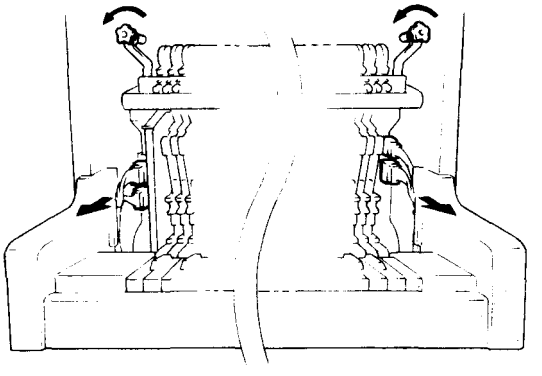


Figure 4.

2. Removing the Electrical Unit:

*If necessary, cut the binding tie.

* For connector numbers, refer to the circuit diagram.

* Before removing each unit, be sure to disconnect the AC plig.

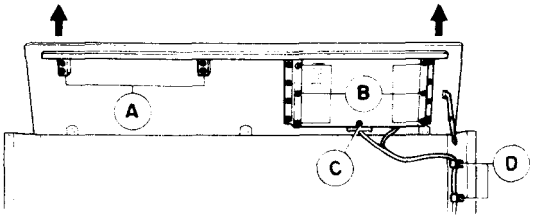


Figure 5.

★Removing the Control Unit:

12) Remove the following screws shown in Figure 5: the four at (A), the six at (B), the one at (C) and the two at (D).

13) Shift the unit to the top and remove it.

★Removing the CPU Circuit Board and FDD Unit:

14) Disconnect all the Connectors from the CPU circuit board, remove the six screws, and take out the unit.

1 5) Disconnect the two connectors of the FDD unit, remove the four screws shown in Figure 6, and remove the unit.

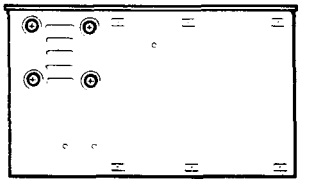


Figure 6.

★Removing the Hammer Sensor Unit:

16) Remove the Action Unit (See steps 10 and 11).

17) loosen the two attachment screws on the right and left of the action bracket (see (A) on Figure 7), and remove the two center screws attaching the Hammer Sensor Unit (see (B) on Figure 7).

8) Pull up on the unit in the direction of the arrow, and remove it.

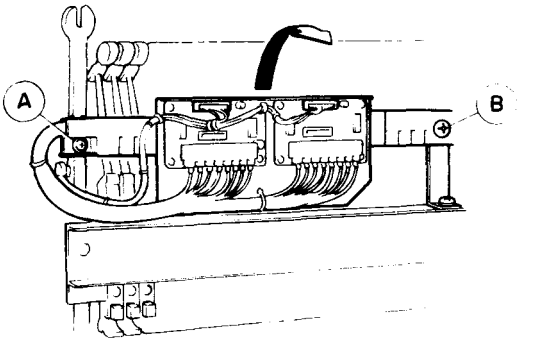


Figure 7.

★Removing the Key Sensor Unit:

19) Remove the Keyboard.
20) Disconnect the three connectors to the unit (CN8, 9, 4).
21) Remove the six screws shown at (A) on Figure 8, and remove the unit.

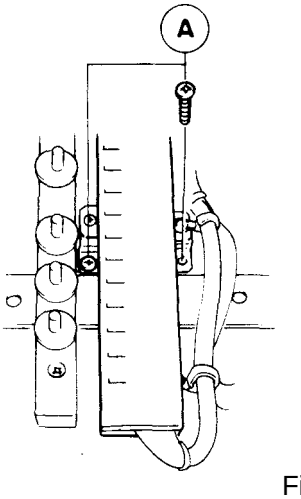


Figure 8.

★Removing the Key Drive Unit:

22) Remove the fourteen connectors of the I/O Circuit Board (CN8, CN10~22) and the connector of the power source unit (CN8).
23) Remove the six attachment screws from the drive unit (see (A) of Figure 9.) and take put the unit.

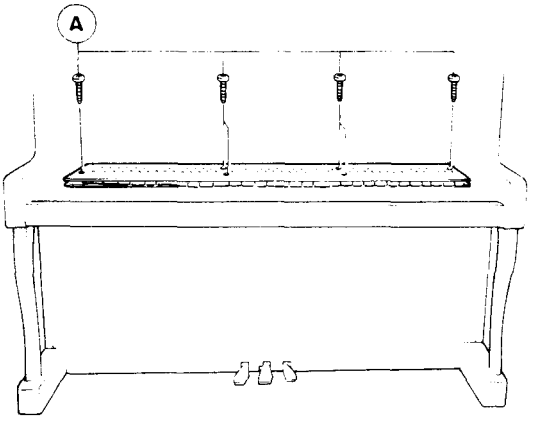


Figure 9.

★Removing the Pedal Drive Unit:

24) Remove the two connectors at (A).
25) Loosen the hex nut at (B) on Figure 10 and then remove the hex nut at (C).
26) Loosen the four screws of the Side Board (D).
27) Shift the unit to the top and remove it.

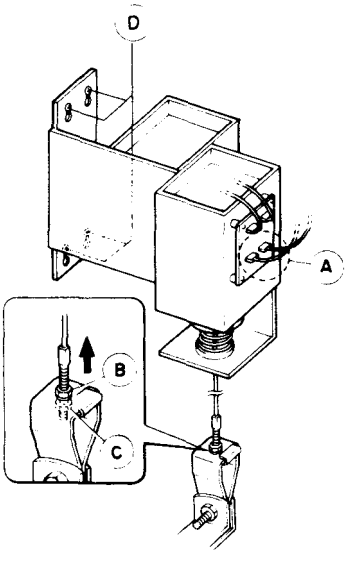


Figure 10.

★ **Removing the Pedal Sensor Unit:**

28) Remove the connector of the Sensor Circuit Board (CN3).
29) Remove the screws shown in Figure 11, and take out the unit.

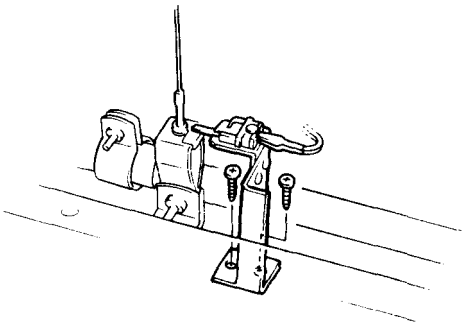


Figure 11 .

★ **Removing the I/O and Sensor Circuit Boards:**

30) Remove all of the connectors.
31) Remove the six screws of the Sensor circuit board and the seven screws of the I/O circuit board., and take out the two units. (See Figure 12.)

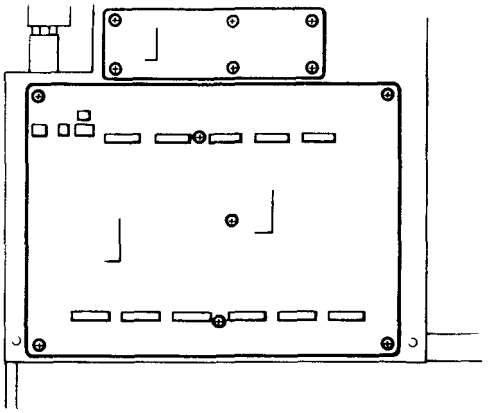


Figure 12.

★ **Removing the Power Source Unit:**

* Disconnect the AC plug.

32) Disconnect the three connectors at (A). (See Figure 13.)

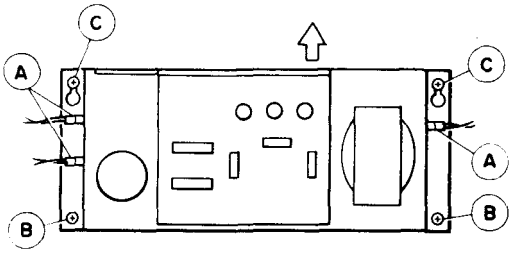


Figure 13.

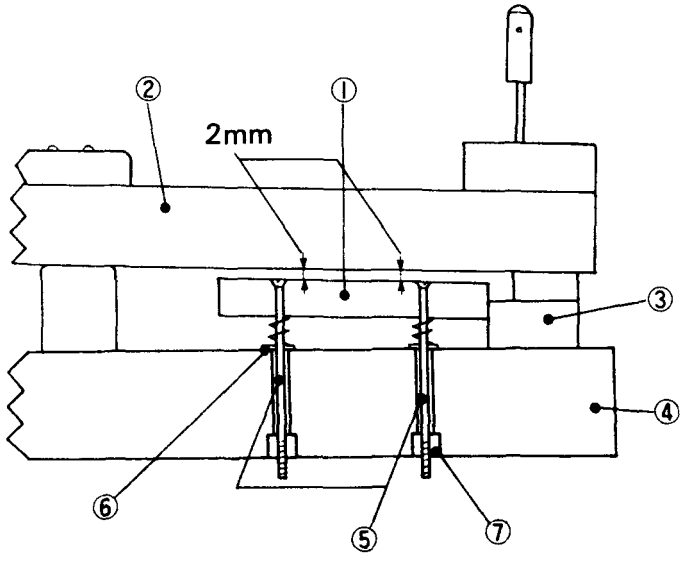
* The figure shows the power source unit as viewed from directly above.

33) Remove the two screws at (B) and loosen the two screws at (C).
34) Shift the unit in the direction of the arrow and take it out.

■Adjustment Procedure

1-1. Adjustment of the Key Drive Unit

The key drive unit is mounted as shown in the figure below.



①Key drive unit
②Keyboard
③Key back rail
④Key bed
⑤Adjustment screw 4×75
⑥Spacer
⑦Nut

- **Adjustment-Front and Back**

Fit the unit against the front surface of the key back rail.

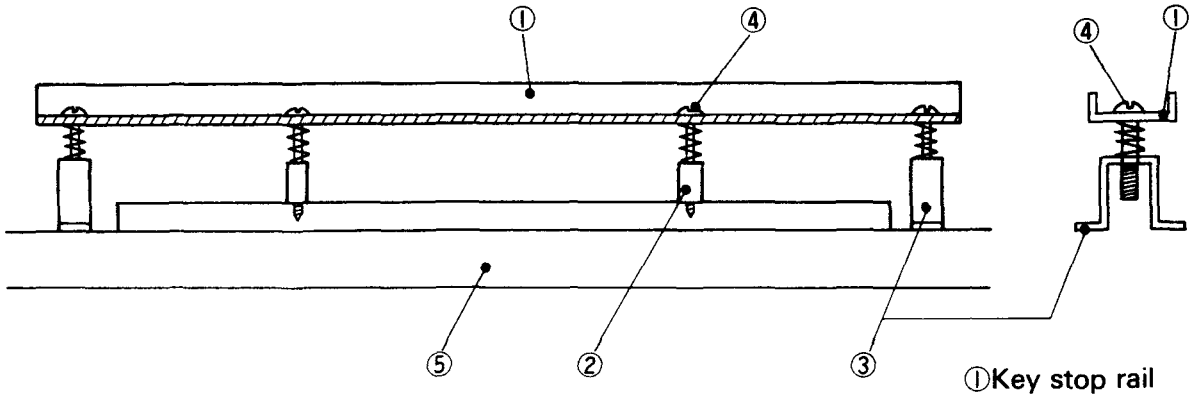
- **Adjustment-Right and Left**

Instal Keys 2, 50, and 87 (black keys), then align the key drive unit so that each solenoid is at the center of its corresponding key.

- **Adjustment-Up and Down**

Install the remaining Keys except those at the position of the ⑤adjustment screws. Use the adjustment screws to adjust the gap between the key drive unit's top surface and the keyboard's bottom surface to 2mm.

1-2. Adjustment of the Key Stop Rail Unit



①Key stop rail
②Shaft
③Key stop rail angle
④Mounting screw
⑤Key bed

• **Height Adjustment**

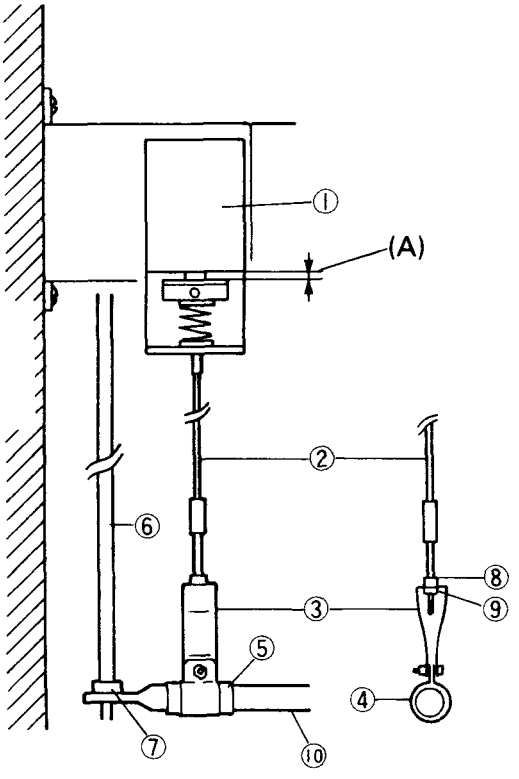
Use the ④ mounting screws to adjust the gap between the top of the black keys and the bottom surface of the key stop rail to 0 (visually).

* If the screws are excessively tightened:
Key touch becomes heavy.

* If the screws are insufficiently tightened:
The keys may fly up during playback

→ Faulty sound generation

1-3. Adjustment of the Pedal Drive Unit



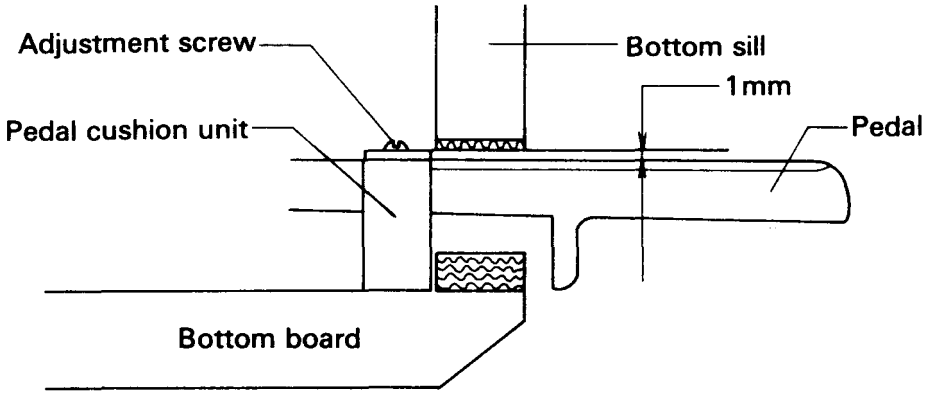
①Pedal solenoid
②Wire
③Pedal lever hook
④Pedal lever clamp
⑤Rubber plate
⑥Pedal rod
⑦Pedal rod dowel
⑧Hex nut M4
⑨Hex nut M4
⑩Pedal lever

Adjust the wire length so that the gap at section (A) is:
5mm: For the soft pedal
3mm: For the loud pedal

After performing adjustment using the © nut, tighten the ® nut.
*Set the wire so that it is positioned vertically, both front/back and side directions.
If the wire is slanted, it deviates from the center of the solenoid axis which will cause mechanical noise.

1-4. Adjustment of the Pedal Cushion Unit

Adjustment of the pedal cushion unit is as folows.

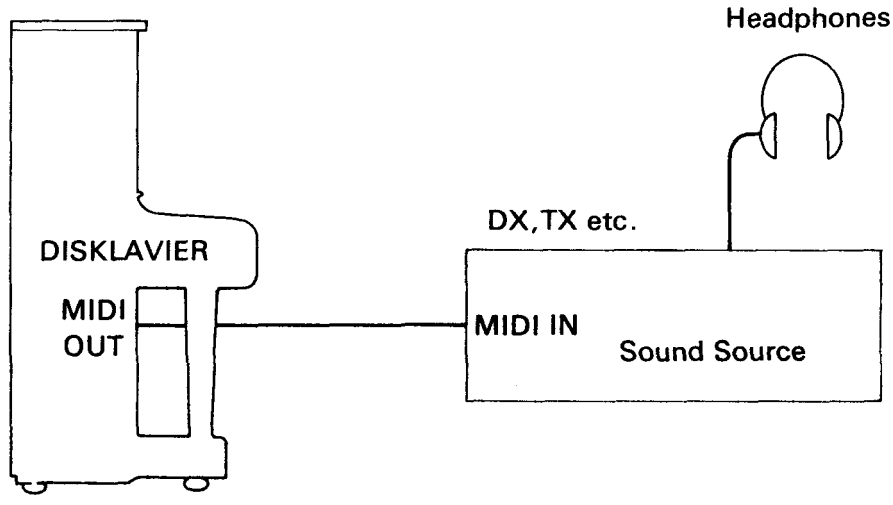


Cushion unit is too high···Pedal rebound noise can occur.

Cushion unit is too low···Pedal may not disengage.

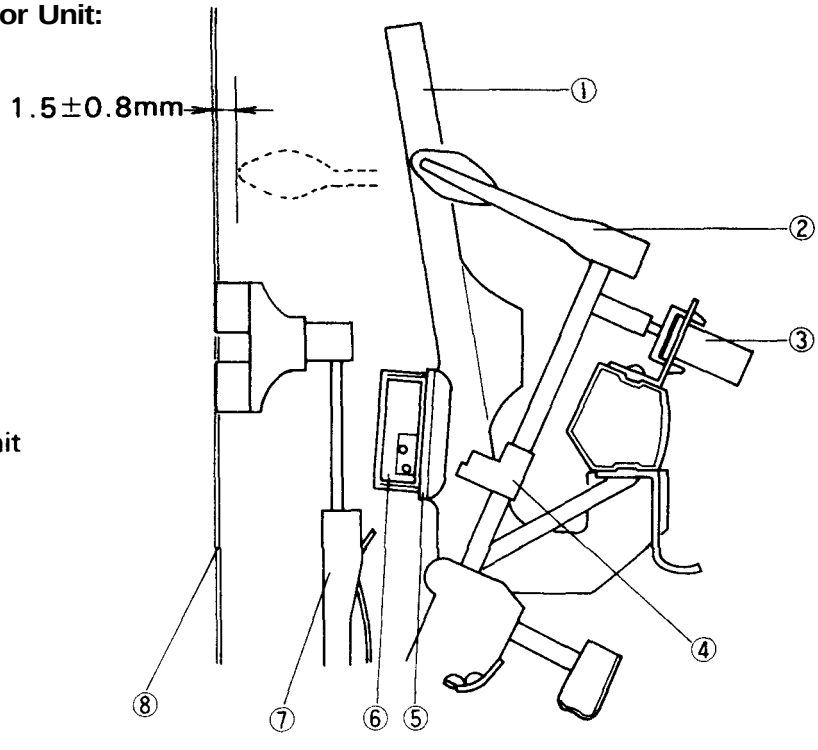
1-5. Adjustment Procedure for the Sensor Units

1) Settings When Adjusting the Sensors:



- Connect MIDI OUT on the DISKLAVIER to MIDI IN on the external sound source and set individual each unit so that transmission and reception of signals is possible.
- To adjust, select a sustaining sound such as an organ voice from the sound source.
- Adjust the sensors while monitoring the sound source with headphones.

2)Adjusting the Hammer Sensor Unit:



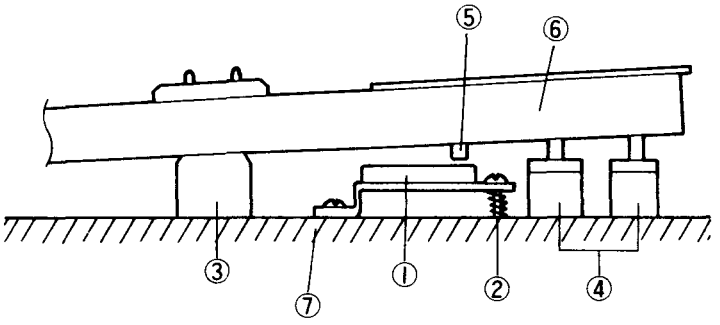
①Action Bracket
②Hammer
③Air Damper
④Hammer Shutter
⑤Spacer
⑥Hammer Sensor Unit
⑦Damper
⑧String

Increase or decrease the spacer (3 locations, number ⑤ in Fig.) to adjust.

Slowly push the hammer forward without playing the keys. Sound from the sound source is produced when the distance between the hammer tip and surface of the string is 1.5±0.8mm.

Measure the bass, middle and treble sections and adjust to the mean of 2 ~ 3 keys.

3) Adjusting the Key Sensor Unit:



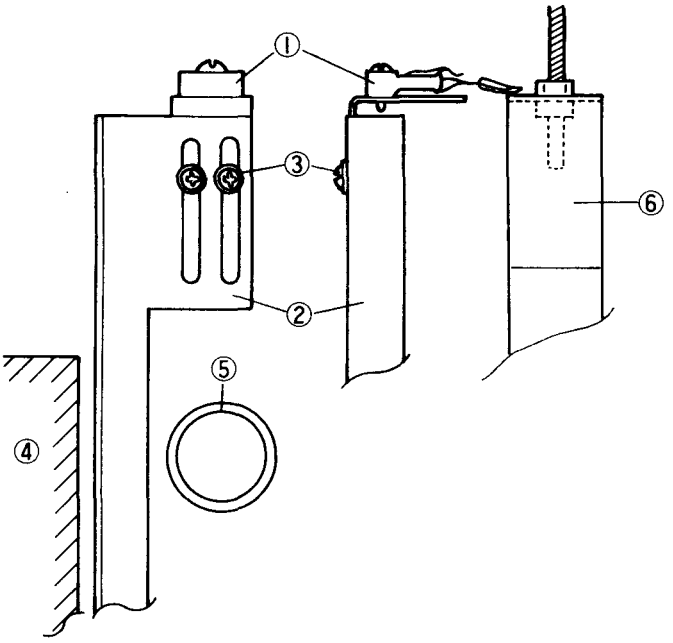
①Key Sensor Unit
②Height Adjustment Screw
③Balance Rail
④Front Rail
⑤Key Shutter
⑥Keyboard
⑦Key Bed

Depress a white key making sure sound is being produced on the tone generation system.
Slowly release the white key and adjust the height adjustment screws (4 locations).
The sound source should stop at a height of 4.5±0.5mm (half of key depth) from normal key level.

Sound stop timing is too fast···Loosen the screw (counterclockwise)
Sound stop timing is too slow···Tighten the screw (clockwise)

4) Adjusting the Pedal Sensor Unit:

①Pedal Sensor
②Sensor Bracket
③Adjustment Screw
④Bottom Sill
⑤Pedal Lever
⑥Pedal Lever Hook



4)-1. Adjusting the Damper Pedal Sensor Unit:

Play the 49th key while holding down the damper pedal and confirm that the sound from the tone generator continues with the pedal depressed. Slowly return the pedal and adjust the screws (③) so that sound stops when the damper felt (in the vicinity of the 49th key) is approximately 1 mm removed from the string.

4)-2. Adjusting the Soft Pedal Sensor Unit:

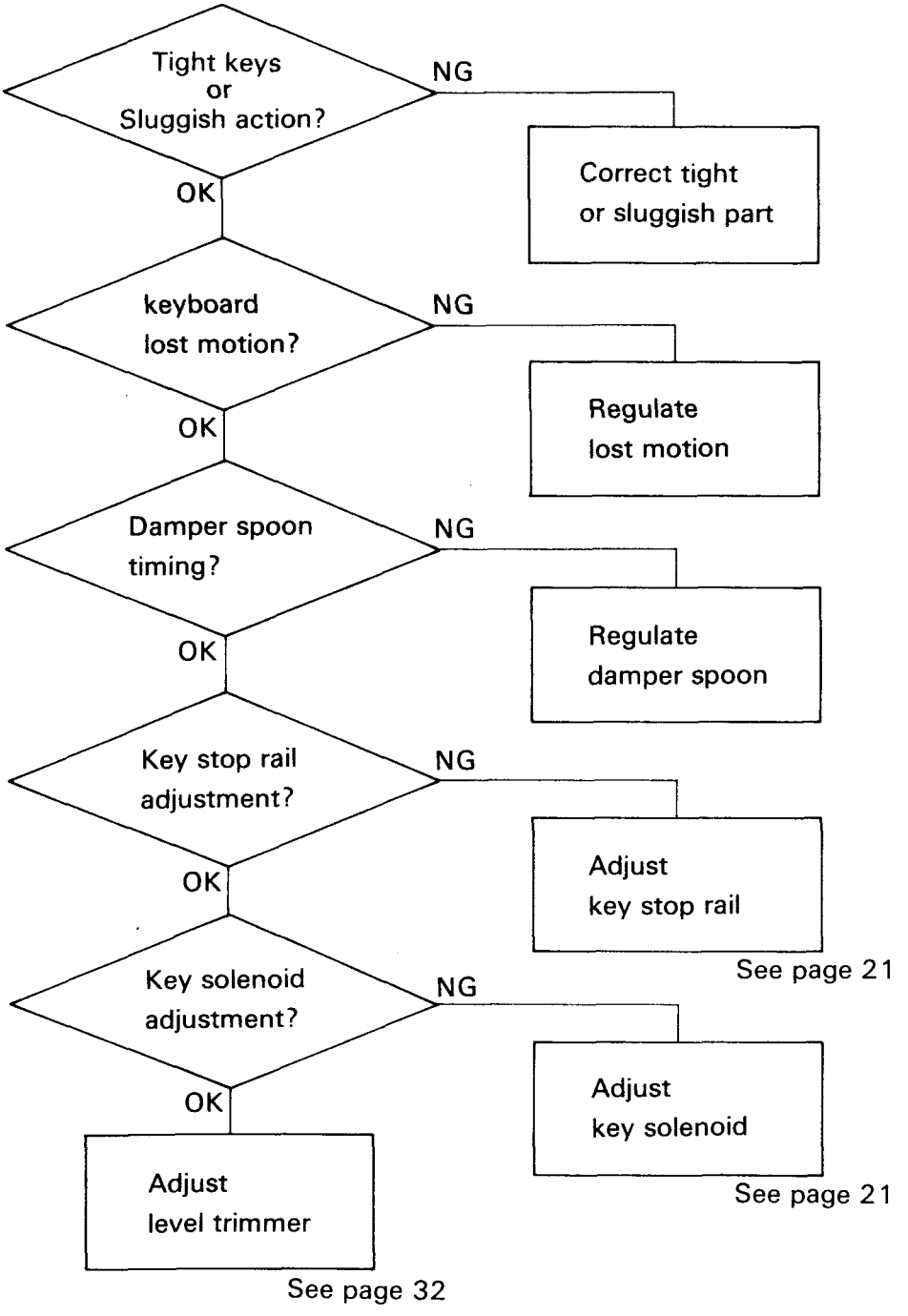
Adjust the screw (③) so that the soft pedal sensor is ON when the hammer rail is off blocking felt approximately 2 ~ 3mm. (eye measurement)

Operation Test of Each Unit Using The Test Disk

[TEST 1]

Minimum-pressure single-note scale of 1 to 88 keys. Tests whether the keys are played back when the minimum touch pressure is applied.

If a note is not sounded (although the keyboard operates normally):



See page 21

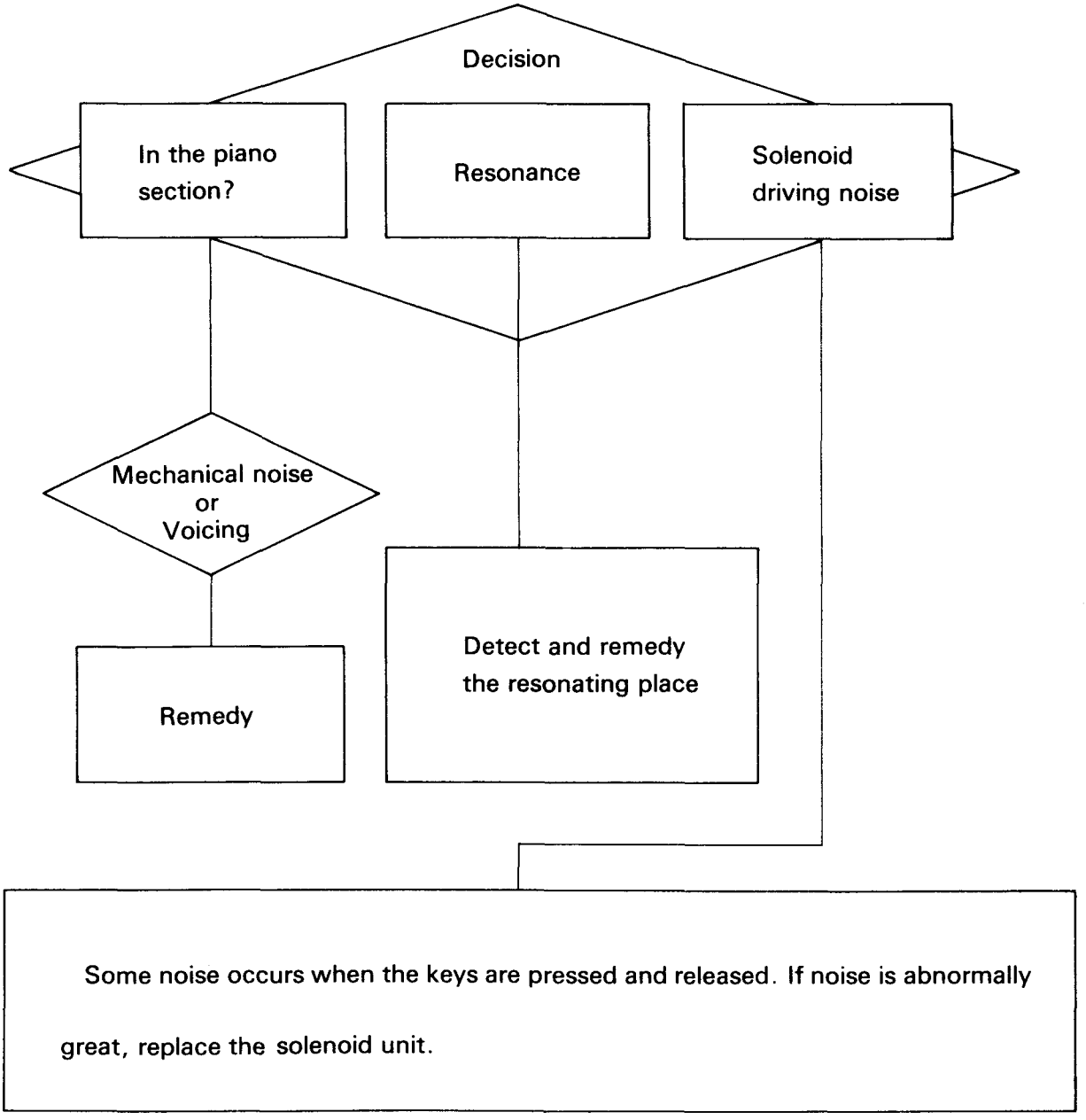
See page 21

See page 32

[TEST 2]

Standard-pressure single-note scale of 1 to 88 keys. Tests the operation of the key solenoid unit (for noise, etc.).

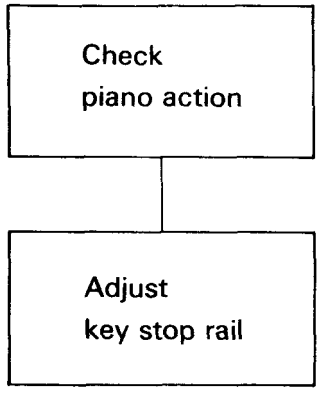
If noise is generated:



[TEST 3]

Applies pressure onto 5 consecutive keys. Tests the sound generation while playing trills (check for noise, etc.)

If sound generation is faulty:



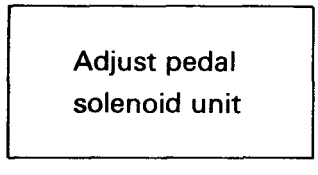
See page 21

If noise is generated: See [TEST 2]

[TEST 4]

Turns ON the Damper Pedal/Soft Pedal five times for one second each time. Tests the efficacy of the Damper Pedal and Soft Pedal.

If a pedal malfunctions:

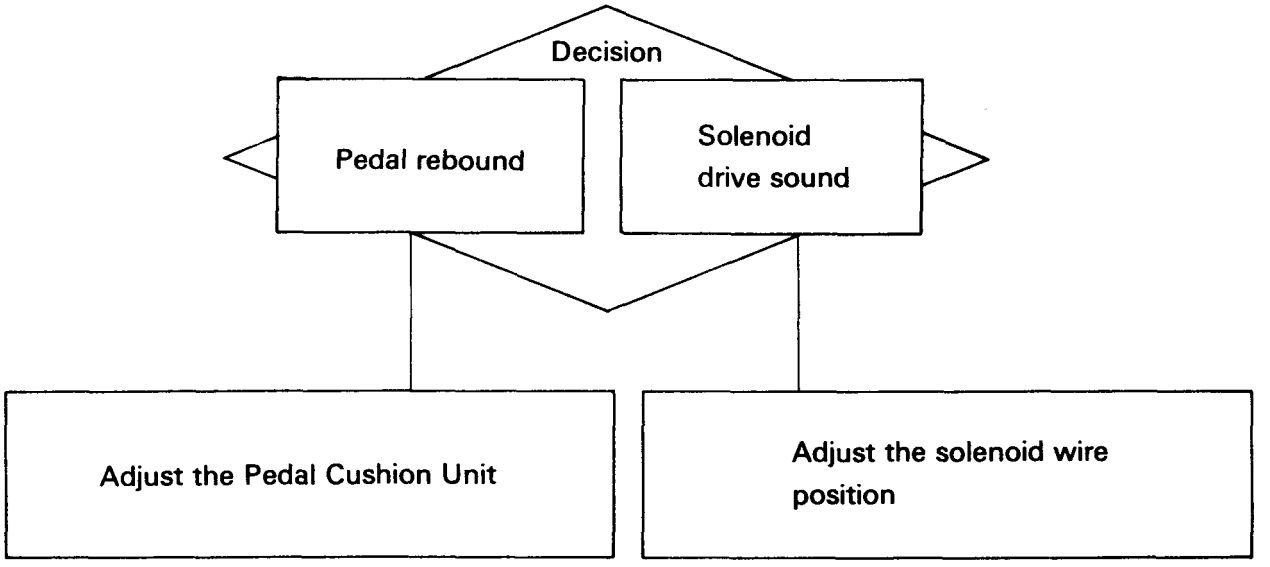


See page 22

[TEST 5]

Turns ON the Damper Pedal ten times for one second each time. Tests the operation of the Damper Pedal (for noise, etc.)

If noise is generated:



See page 23
See page 22

[TEST 6]

Demonstration performance. Comprehensively tests all units in the playback system.
Re-confirms [TEST 1] through [TEST 5] .

[TEST 7]

Recording and playback test. Tests the operation of the units in the recording system (using a disk for recording).

Records then plays back the scale of Keys 1 to 88, pedal ON/OFF, and so on.

The location of the defect can be determined by the error symptom that occurs, as listed below.

• Hammer/Key Sensor Units

Recording conditions: Key 1-88 scale, normal volume

Symptom							Faulty Section
Abnormal Key		Playback Volume			Key Return		
1 Octave	Same note in each oct.	Highest	Lowest	Normal	Return	Doesn't Return	
	○	○			○		LED drive circuit of Hammer Sensor Unit
○			○			○	M1 detect circuit of Hammer Sensor Unit
○		○			○		M2 detect circuit of Hammer Sensor Unit
	○			○		○	LED drive circuit of Key Sensor Unit
○				○		○	Key detect circuit of Key Sensor Unit

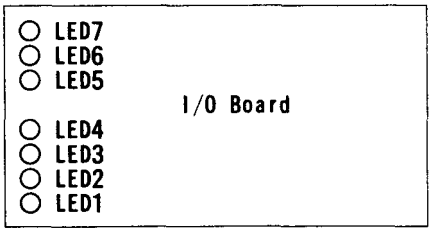
• Pedal Sensor Unit

Symptom	Faulty Section
Pedal doesn't work	Pedal Sensor Unit is positioned too high.
Pedal remains depressed and doesn't return.	Pedal Sensor Unit is positioned too low.

* Attention must also be given to the connector of the action brackets (right and left).

■Error Display LEDs on the I/O Board

As shown in the figure below, the I/O board is mounted with LEDs that indicate abnormal operation in the driving system. If an error occurs, the pertinent LED lights up next, after the solenoid power supply is turned OFF, the other LEDs also gradually light up.



	Error Circuit
LED1	Key Solenoid Unit-Keys 25-48: Short-circuited diode or overcurrent to the drive transistor.
LED2	Key Solenoid Unit-Keys 1-24: Short-circuited diode or overcurrent to the drive transistor.
LED3	Key Solenoid Unit-Keys 49-72: Short-circuited diode or overcurrent to the drive transistor.
LED4	Key Solenoid Unit-Keys 73-88: Short-circuited diode or overcurrent to the drive transistor.
LED5	Soft Pedal: Short-circuited diode or overcurrent to the drive transistor.
LED6	Damper Pedal: Short-circuited diode or overcurrent to the drive transistor.
LED7	Activation of the thermostat within the Key Solenoid Unit

* Please note that the same display occurs if the 1 -MΩresistance for 100VDC voltage division is OPEN, or if the soldering between the error display comparator and the 10μF/16V tantalic capacitor is faulty.
* When the error display circuit is activated, the 100V power supply for driving the solenoids is automatically switched OFF.

■Adjusting the Trimmer

The operating efficiency of the piano action and keyboard will vary slightly according to the piano model. Even if two pianos have the same model number, minute differences may occur due to humidity, adjustment procedures, and other factors. When a person plays the piano, she/he listens to the sound and feels the key touch, then plays while making the necessary compensations. In case of a DISKLAVIER, however, the setting of the trimmer value must be regulated to the optimum status.

• Adjustment Procedure

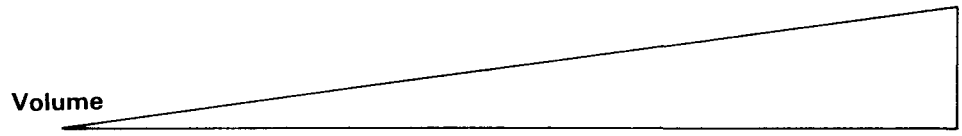
Conduct "TEST 1. Sound Generation Test under Minimum Pressure" on the floppy disk.

Contents: Minimum-pressure single-note scale of 1 to 88 keys.

→Set the trimmer value so that all keys are sounded at the minimum touch pressure.

The better the regulation and action conditions, the more the sounding of notes under low touch pressure is improved. Therefore, make sure to check the adjustment then perform re-adjustment if necessary.

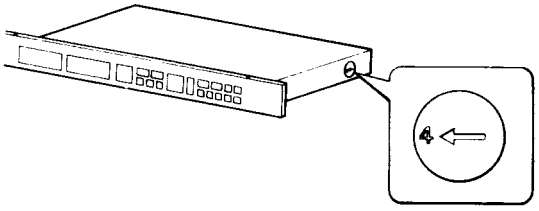
• The Trimmer Value and the Volume



Trimmer Value	F	0	1	2	* 3	* 4		5	6		7	8
Normal Mode	-5	-4	-3	-2	-1	0		+1	+2		+3	+4
* Low-Pressure Compensation Mode				Trimmer Value		A	B		D	E		
						+1	+2		+1	+2		
				Trimmer Value		9			C			
						-1			-1			

* The recommended trimmer values are the circled values of "3" and "4".

* Low-Pressure Compensation Mode: When the volume data of a piano note indicates low volume, only that volume of that note is raised in this mode (9 and C are lowered).

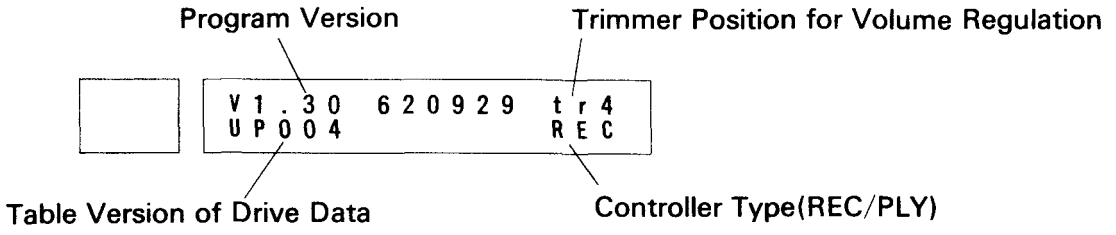


■Test Program

1. STARTING/ENDING THE TEST PROGRAM

Among the two ROMs used for piano player control, ROM B contains the test program. When you simultaneously hold down the L and R buttons while you turn ON the power, TEST mode is entered.

Upon entering TEST mode, the ROM Version, Table Version, Trimmer Value, and Controller Type are displayed as shown below.

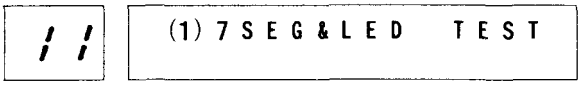


After the above display appears, use the "+" button to increase the value of the Test No. so that each test can be executed. (Press the " - " button to return to the previous Test No.) To terminate TEST mode, turn OFF the power to the controller.

2. DESCRIPTION OF EACH TEST

1) 7-Segment LED Test

The two 7-segment digits change from "0" to "9", the six LEDs light up successively from left to right next, all LEDs light up then go out. This entire process is repeated.



2) LCD Test

The characters which have been preset at the lower row of the LCD are displayed as flashing characters.

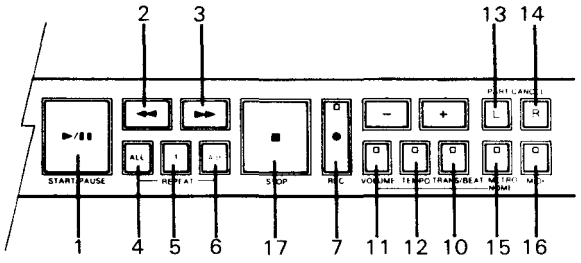
3) Buzzer Test

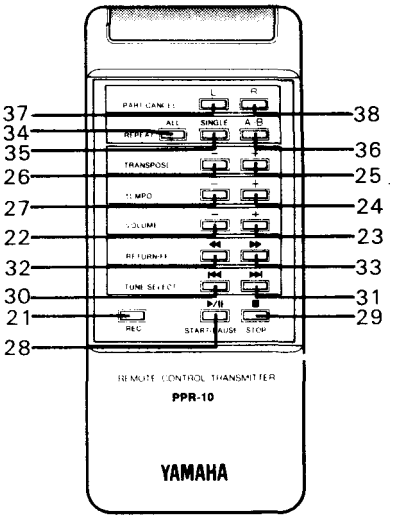
Along with the flashing display of "EXECUTING!" at the lower row of the LCD, the buzzer is sounded in alternately long and short intervals.

4) Switch Test

The 7-segment LEDs display the number corresponding to each switch.

Foot Switch=40





5) RAM Test

Write, Read, and Verify operations are conducted, then the result is displayed. (OK!!/NG!!)

6) ROM Test

The checksum of ROM B is calculated, and the result is displayed. (OK!!/NG!!)

7) MIDI Test

The MIDI IN and MIDI OUT terminals of the controller are directly connected, and the result is displayed. (OK!!/NG!!)

8) PIANO Test

For the playback system, single keys are successively pressed during approximately 0.5 seconds from Key 1. After Key 88 is pressed, the Loud Pedal and Soft Pedal are operated, then the sequence returns to Key 1 and is repeated.

During playback, the START/PAUSE, Fast Forward (1-Key Skip), and Fast Reverse can be used.

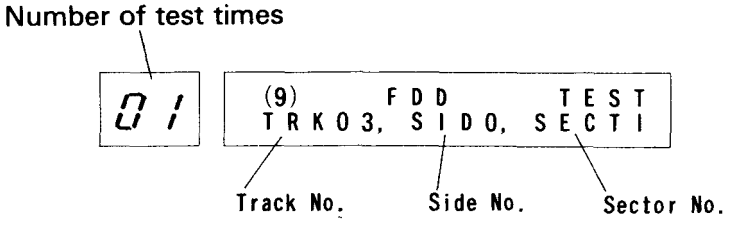
For the recording system, the Key No. of the pressed key is displayed at the seven-segment LEDs (Loud Pedal=90 Soft Pedal=91), and GET-DATA is displayed at the lower row of the LCD.

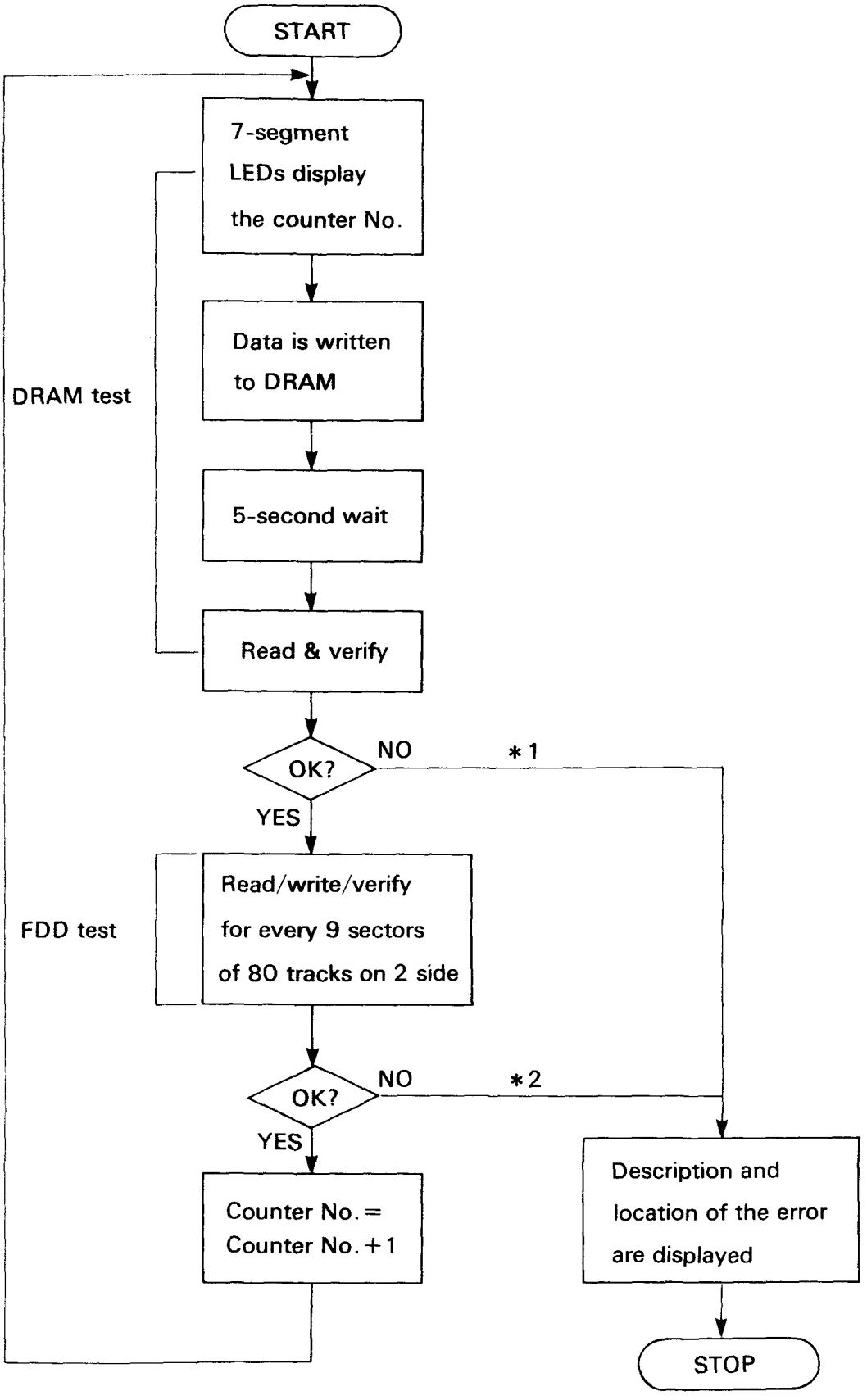
If an error occurs, "NG!!" is displayed at the lower row of the LCD and the Error No. is displayed at the 7-segment LEDs.

Error No.	MEANING
69	INVALID GET DATA
68	GET CIRCUITE ERROR(PARITY/FRAMING ERROR)
67	GET KEYOVER
66	GET CIRCUITE ERROR(RECEIVE OVER-RUN)

9) DRAM FDD Test

This test checks the refresh operation of the PMAC's DRAM, and performs Read, Write, and Verify operations on the floppy disk drive.




START
7-segment
LEDs display
the counter No.
Data is written
to DRAM
5-second wait
Read & verify
DRAM test
OK?
NO
*1
YES
Read/write/verify
for every 9 sectors
of 80 tracks on 2 side
FDD test
OK?
NO
*2
YES
Counter No. =
Counter No. + 1
Description and
location of the error
are displayed
STOP

* Example 1: "AA" was written to Address $1234, but "00" was read back.

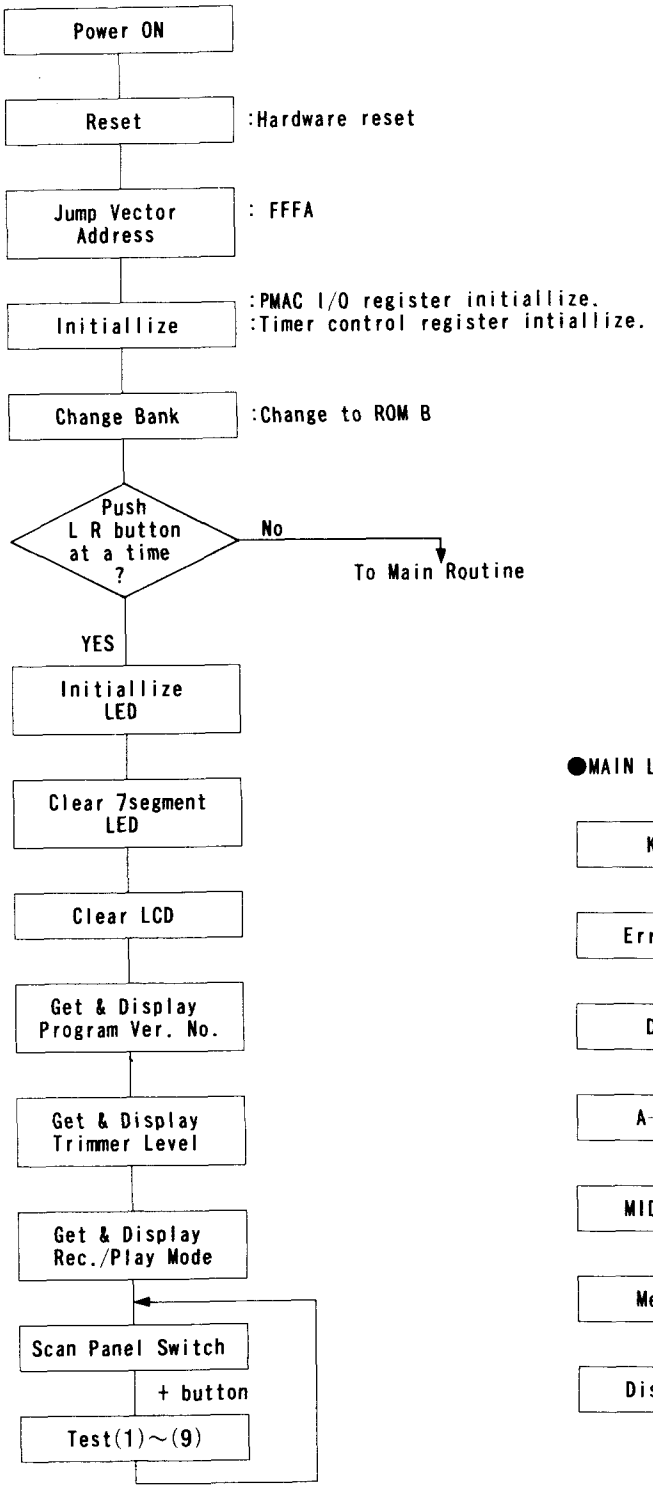
* Example 2: During the test, the Track No., Side, and Sector No. being tested are displayed at the lower row of the LCD.

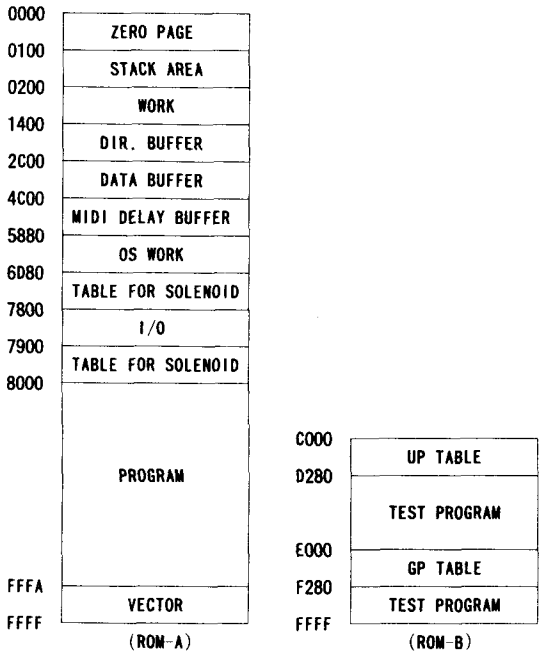
• If an error occurs, its description and location are alternately displayed.

Error Description

Display	
DISK NOT READY	Disk is not installed.
SEEK ERROR	
READ ERROR	
WRITE ERROR	This is also displayed if the disk is write protected.
VERIFY ERROR	

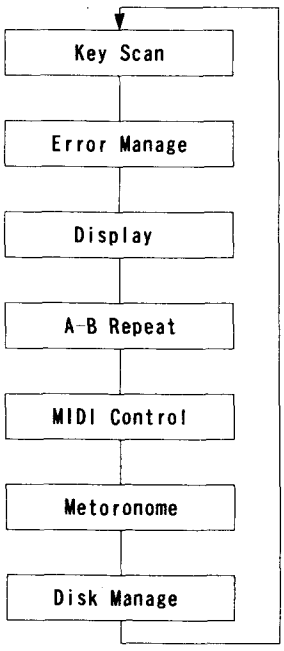
■ Program Flow-chart & Memory Map of Disklavier



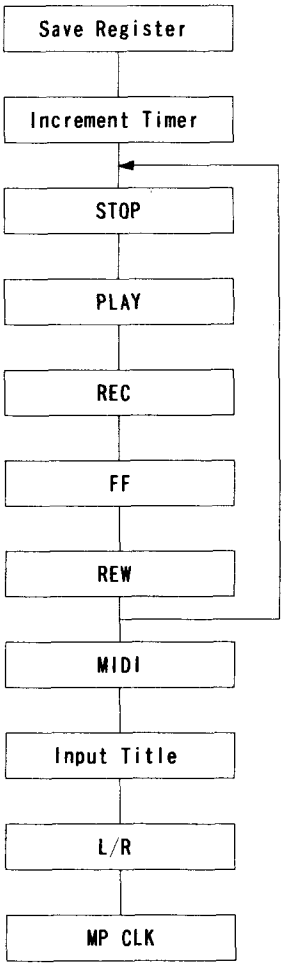


*UP or GP table in ROM-B is selected with dip switch condition, and transferred to the address of table for solenoid.

●MAIN LOOP



●IRQ(4msec.)

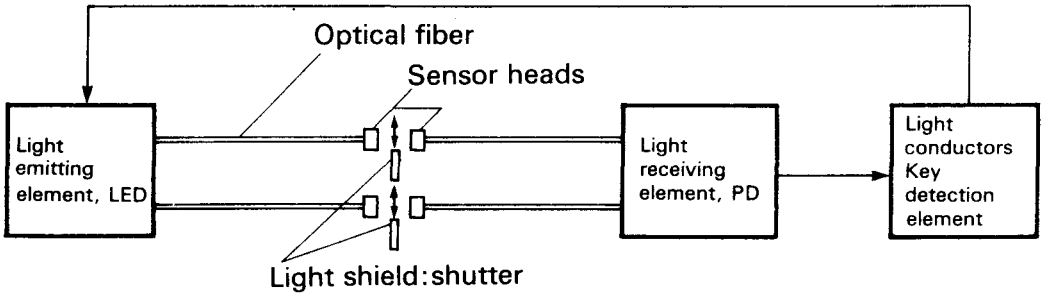


■ Explanation of Sensor System

The sensors on the DISKLAVIER are as follows:

- Key Sensor Unit···Optical Sensor···Detects key information.
- Hammer Sensor Unit···Optical sensor···Detects key information.
- Pedal Sensor Unit···Mechanical sensor···Detects pedal information.

1. Key Sensor Unit, Hammer Sensor Unit:

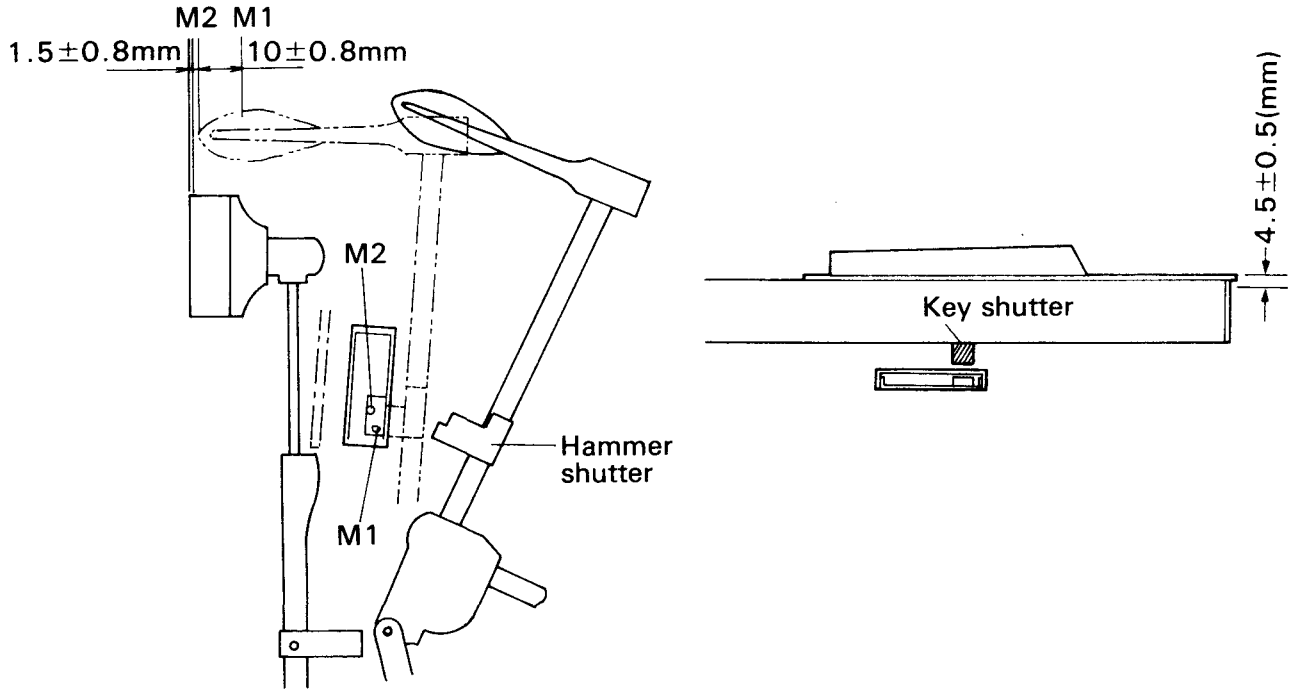


The Key Sensor, Hammer Sensor Units include the following equipment:

- Light emitting element···LED
- Light receiving element···Photo-diode (PD)
- Key detection element···LSI KAPP (YM2019)
- Conductor···Optical fiber, sensor head
- Shield···Shutter

Information is obtained by using a shutter to "Cut Off" the path of conduction for the light.

For each key there are three sensor heads, one on the keyboard (K) and two on the hammer (M1, M2). The unit is constructed in such a way that the light will be blocked when (K) is located 4.5mm from the start of keyboard depression, when the distance from the hammer tip to the string is 10mm for (M1), and 1.5mm for (M2).



This sensor system is used to obtain the key information listed below:

Detection contents	Detection method
Which key is (Key Assign)?	OR of K and M1 (see Note 1)
When is (Note On Timing)?	M2
How strong is (Touch Data)?	Time from M1 to M2 (see Note 2)
How long is (Note Off Timing)?	AND for K and M1 (see Note 3)

Note 1: OR···Time during which either key sensor K or hammer sensor M1 has its light blocked by the shutter.

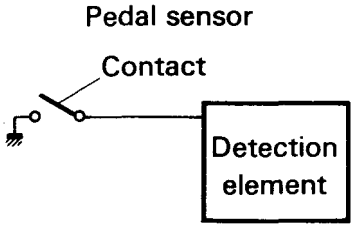
Note 2: When the time from M1 to M2 is:

Long···Hammer has passed slowly = Low sound volume

Short···Hammer has passed quickly=High sound volume

Note 3: AND···Time when the light for both K and M1 has been transmitted (shutter has returned).

2. Pedal Sensor Unit:



The damper and soft pedal sensor unit is constructed from the following equipment:

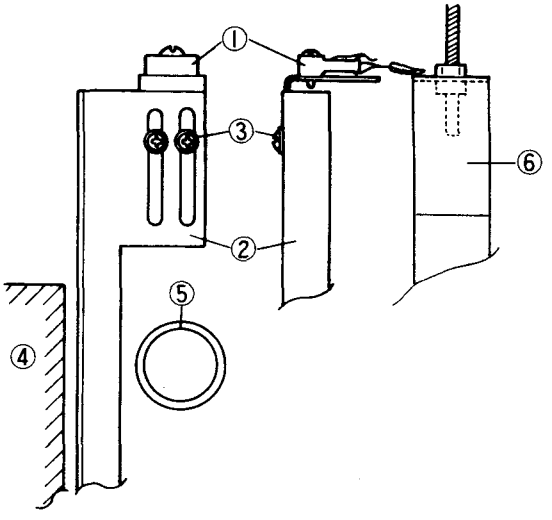
Contact···Leaf switch

Detection element···LSI KAPP (YM2019)

These components are used to detect the ON-OFF timing for each pedal.

The pedal sensor detects the ups and downs of the pedal lever hook and is set so that the switch goes on when the damper is 1 mm from the string.

Pedal Sensor Unit:



①Pedal Sensor
②Sensor Bracket
③Adjustment Screw
④Bottom Sill
⑤Pedal Lever
⑥Pedal Lever Hook

■LSI Data Table

●YM5205 (PMAC: Memory Access Controller)

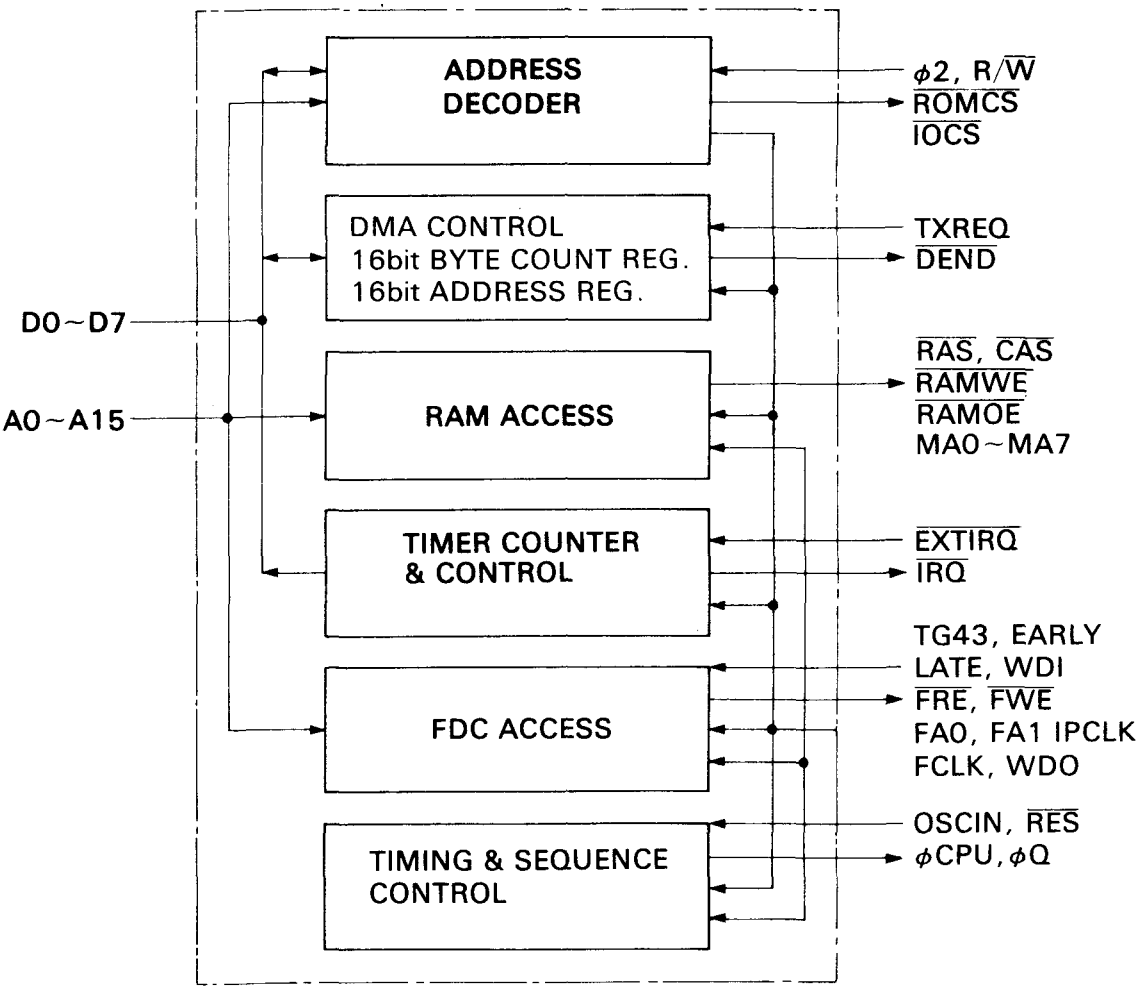
1. OVERVIEW

The PMAC contains the CPU peripheral circuit in a 64-pin OIL LSI. It selects addresses in and refreshes the dynamic RAM and also makes communication between the dynamic RAM and the FDC possible in the DMA mode. The other functions of PMAC include interrupt generation using an internal timer, decoding addresses for ROM I/O operations and FDC, CPU clock extension for low speed I/O access, generation of FDC, and write precompensation for the floppy disks.

To use the PMAC, the system must include a 2MHz YM2002CPU, the MB8877 FDC, MB8116Hx 8 (16KBytes) RAMs, and 2732-35x2 (8KBytes) ROMs. For future extensions, however, one can use 16KByte ROMs and 64KByte RAMs.

Use of PMAC assures the following:

①Almost total elimination of the random logic involving DMAC (LSI) and CPU.
②Reduction in the overheads caused due to DMA and memory refreshings because PMAC supervises the CPU operation clock.



YM5205 Block Diagram

2. CONSTITUENT PARTS

The internal circuit in PMAC consists roughly of six parts:

①DRAM controller···Controls address switching, $\overline{RAS}$ and $\overline{CAS}$ timing, and memory refreshing

②DMA controller···Controls DMA transfers between FDC and DRAM

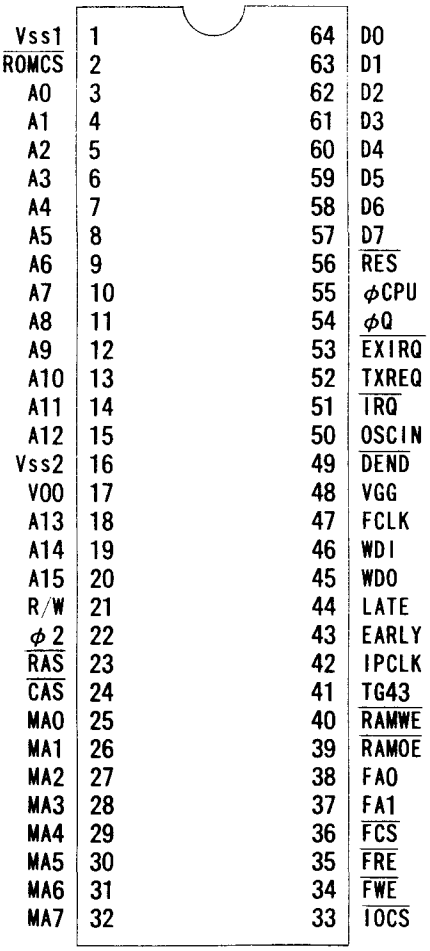
③Timer control···Controls interrupts generated by the internal timer and external triggers

④Address decoder···Decodes the addresses from the CPU and generates the address decode signals for $\overline{ROMCS}$ and $\overline{IOCS}$

⑤FDC support circuit···Generates clock signals for FDC and carries out write data precompensation for the disks

⑥Timing controller···Uses microprograms to sequence the PMAC

PMAC operations are sequentially guided by the 8MHz clock.



YM5205 Pin Assignment

3. LIST OF PMAC TERMINALS

Area	Pin Name	Pin No	I/O	Function details
Power source	Vss1 Vss2 Vcc Vdd	1 16 17 48		0V(Ground) 0V(Ground) +5V(±5%) Power is supplied via the +2V (across the 15Ω/5W resistance from Vcc)
Reset	$\overline{RES}$	56	IN	Master reset. Is received if the low level continues for 8μ sec or more. Resetting resisters and flip-flops(TMRH,TMRL,TMRC,DMCR,IRQF/F, and DRQF/F) to 00H and the I/O page register(IOPR) to C0H. Accordingly, $\overline{IRQ}$ and $\overline{DENO}$ go high. During the resetting period, output of a 2MHz clock occurs in φCPU, but access is disable to RAM, FDC, PMAC and the I/O units.
Clock	OCSIN	50	IN	Takes the 8MHz master clock as an input. All PMAC operations depend on this upper limit of the master clock frequency is determined by the CPU, ROM, and RAM operating speeds and the lower limit by RAM refreshing sequence. This calls for an accuracy of 8MHz ±5%.
	φCPU	55	OUT	This outputs a clock for CPU operations and is connected to the pin φ0 of the YM2002. φCPU goes high or low according to the system operations(I/O access, refresh period, DMA operations, etc.). During ROM/RAM access or CPU internal cycle···Low period: 250nsec High period: 250nsec During accesses to FDC, PMAC, or other I/O···Low period: 500nsec High period: 500nsec During refreshing period···Low period is extended by 500nsec DMA period···Low period is extended by 1μ sec
	FCLK	47	OUT	Outputs a 1MHz 1/2 duty cycle clock as the FDC operation clock.
	IPCLK	42	OUT	Outputs a 15.625KHz 1/2 duty cycle pulse as the dummy index pulse for floppy disk control.
CPU interface	φ2	22	IN	The φ2 clock is issued only as φCPU is delayed. However, it is used for correct access to PMAC by the CPU.
	A0~A15	3~15 18~20		Connected to CPU address bus.
	R/$\overline{W}$	21	IN	Connected to CPU R/$\overline{W}$.
	D0~D7	57~64	IN/OUT	Bidirectional(three state) terminal for connection to the data bus.
	$\overline{IRQ}$	51	OUT	Output terminal for generation of interrupt requests (open drain negative logic output). The source generating IRQ is either the internal timer in PMAC or an external trigger($\overline{EXTIRQ}$).

Area	Pin Name	Pin No	I/O	Function details
Address decoder output	$\overline{ROMCS}$	2	OUT	The address decoder output. A low logic if the addresses is given output by the CPU for those area in ROM. The range of the ROM area can be selected by bit 1 of the I/O page register. If the bit is '0', the area extends from (E000H) to (FFFFH) and if the bit is '1', from (C000H) to (FFFFH). If the area assigned to the I/O pages overlaps this area, the 256 overlapping bytes are given priority for I/O accesses. $\overline{ROMCS}$ does not go low now.
	$\overline{IOCS}$	33	OUT	If the address output by CPU refers to an area other than the PMAC or FDC, the $\overline{IOCS}$ goes low. By specifying the high order 6bits of the address using bits 2-7 of the I/O page register(IOPR), the I/O area may be assigned to any optional address location(1Kbyte steps). The I/O page contains 256bytes. However as high order 16bytes(A07~04=F) are assigned to PMAC and the following 16bytes(A07~00=E) to FDC, only 224bytes(A07~00=00~DF) on the low order side are available for external I/O. Therefore the $\overline{IOCS}$ goes low only if an address in this address range is accessed for the CPU.
RAM interface	$\overline{RAS}$	23	OUT	Connection of $\overline{RAS}$ to DRAM.
	$\overline{CAS}$	24	OUT	Connection of $\overline{CAS}$ to DRAM.
	$\overline{RAMWE}$	40	OUT	Connection of $\overline{WE}$ to DRAM.
	$\overline{RAMOE}$	39	OUT	Connected to the enable terminal of the DRAM output buffer (e.g.LS244)
	MA0~MA7	25~32	OUT	Connected to DRAM address terminal. MA7 is provided if the 64K DRAM is used. Bit 0 of the I/O page register must be set to '1' now. In this way, all the area within the address space except the ROM area and the I/O pages is treated as the RAM area. If used with the 16K DRAM, bit0 of the I/O page register must be set to '0', and no connection must be made to MA7.
FDC interface	FA1	37	OUT	Connected to A1 on the FDC(MB8877). Selects FDC internal register.
	FA0	38	OUT	Connected to A0 on the FDC. Selects FDC internal register.
	$\overline{FRE}$	35	OUT	Connected to $\overline{RD}$ on the FDC. This is FDC read strobe.
	$\overline{FWE}$	34	OUT	Connected to $\overline{WT}$ on the FDC. This is FDC write strobe.
	$\overline{FCS}$	36	OUT	Connected to $\overline{CS}$ on the FDC. This is FDC chip select.
	TXREQ	52	IN	Connected to DRQ on the FDC. The DMA transfer request input signal.
	$\overline{DEND}$	49	OUT	DMA end. Indicates end of DMA. Active low.
	TG43	41	IN	Connected to TG43 of FDC — This is write precompensation signal.
	EARLY	43	IN	EARLY
	LATE	44	IN	LATE
	WDI	46	IN	WD
	WDO	45	OUT	Write data output to the floppy disk.
IRQ outside	EXIRQ	53	IN	Interrupt request from outside. Interrupt requests to the CPU are controlled by the timer interrupt control register(TMRC) written PMAC. Either the internal timer or the $\overline{EXTRQ}$ signal may be selected as the source of request.

●MB8877 (FDC: Floppy Disk Controller)

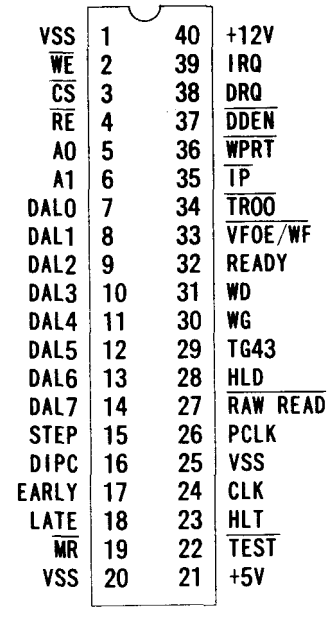
To enter data on a floppy disk, 8 bits of serial data that is sent from the computer, must be converted into the corresponding parallel data. To this, again, the clock pulses must be applied. When reading data from a disk, the same procedure must be repeated, but the reverse order. Floppy disk controller FDC is, more than anything else, an LSI controlling these operations and also the floopy disk drive.

MB8877 has five internal registers that may be selected by using address lines A0 and A1. Internal commands may be written on the data I/O terminal to read in data from a diskette or write data on it. Each time a 1-byte data is read out from a diskette or written on it, the data request (DRQ) line issues a signal. A signal is issued at the IRQ terminal as soon as the execution of the command ends.

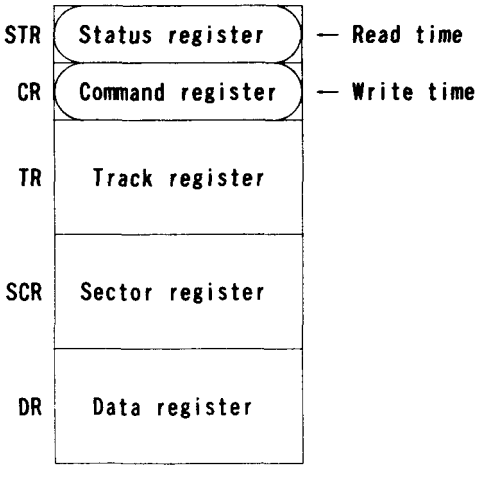
The data to be written on the diskette appears as the output at terminal WD (pin 30). $\overline{\text{RAW READ}}$ (pin 27 PRD) is the input terminal for data read from the diskette. This data includes clock pulses, though, only the data read out because of the window pulse entered through the RCLK terminal (pin 26). EARLY and LATE are the write compensation pulse output terminals indicating whether the write data must be accelerated or delayed. Terminal TG43 (pin 41) issues signals to indicate whether the head occurs ahead of or before track 43. The floppy disk drive uses this signal to change the strength of the write current. Recording density on the outer side of the disks is not the same as that on the inner side, so the write current must be adjusted to attain a uniform recording characteristic.

Terminal $\overline{\text{DDEN}}$ (pin37) is intended to change the format in MB8877 to double density. Pulse output terminal STEP (pin 1 5) moves the head through a track at a time in the direction determined by the output at DIRC (pin 46). $\overline{\text{TROO}}$ (pin 34) is an input terminal informing the FDC head is at track 0. $\overline{\text{IP}}$ (pin 35) is an input terminal for notifying detection of an index hole.

Signal HLD (pin 28) is meant to press the head on the diskette while terminal HLT (pin 23) indicates that the head is pressed on the diskette as it should be. Terminal READY (pin 32) indicates that the floppy disk controller is ready for normal operation.



MB8877 Pin Assignment



Internal address

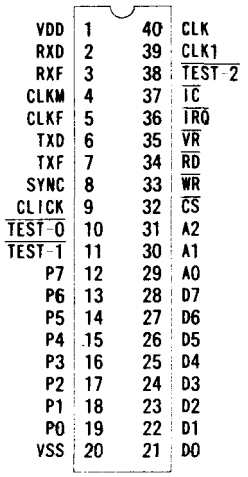
LIST OF MB8877 TERMINALS

Pin No.	Pin Name	I/O	Functions
1	VSS		VSS
2	$\overline{WE}$	IN	Internal register write
3	$\overline{CS}$	IN	Chip selection terminal
4	$\overline{RE}$	IN	Internal register read
5	A0	IN	Internal register selection terminal
6	A1	IN	Internal register selection terminal
7	DAL0	I/O	Data IN/OUT terminal
8	DAL1	I/O	
9	DAL2	I/O	
10	DAL3	I/O	
11	DAL4	I/O	
12	DAL5	I/O	
13	DAL6	I/O	
14	DAL7	I/O	
15	STEP	OUT	Head movement pulse output terminal
16	DIPC	OUT	Head movement direction indication
17	EARLY	OUT	Shift write data to the faster side — Compensation terminal
18	LATE	OUT	Shift write data to the delay side — Compensation terminal
19	$\overline{MR}$	IN	Chip reset terminal
20	VSS		VSS
21	VCC		+5V
22	$\overline{TEST}$	IN	Chip test terminal (delay in internal timer is ignored)
23	HLT	IN	Head has been pressed
24	CLK	IN	Clock pulse input terminal
25	VSS		VSS
26	$\overline{PCLK}$	IN	Read data window pulse input terminal
27	$\overline{RAW\ READ}$	IN	Input terminal for the raw data directly obtained from the disk
28	HLD	OUT	Press the head on the diskette
29	TG43	OUT	Head occur at a larger track than 44
30	WG	OUT	Data is being written on the disk
31	WD	OUT	Write data output terminal for the disks
32	$\overline{READY}$	IN	Disk is set
33	$\overline{VFOE}/\overline{WF}$	IN	Write data error generated in disk
34	$\overline{TR00}$	IN	Head occurs on track 0
35	$\overline{IP}$	IN	Index hole detection
36	$\overline{WPRT}$	IN	Diskette write disabled
37	$\overline{DDEN}$	IN	Access a double dencity disk
38	DRQ	OUT	Indicates that a byte of data has been read/written (Reset on DR access)
39	IRQ	OUT	Indicates that execution of a command has ended (Reset on writing of the STR read command)
40	VDD		+12V

●YM3802 MCS (MIDI Communication & Service Controller)

LIST OF YM3802 TERMINAL

Pin No.	Pin Name	I/O	Functions
1	VDD		VDD
2	RXD	IN	Serial data input terminal
3	RXF	IN	Audio signal input terminal from the magnetic tape such as a cassette tape. FSK modulated serial data are input to this terminal at the TTL level.
4	CLKM	IN	Input terminal for a clock that generates an MIDI communication rate of 31.25K bps(baud). Usually 1MHz or 0.5MHz is input, and 1/16 or 1/32 of this can be used as the communication rate. This clock signal is divided to obtain a count clock for the general purpose timer and the MIDI clock timer and also for the output pulse width at the SYNC and CLICK terminals. A divide by two circuit is included so that the same setting time can be obtained, irrespective of the input signal to the CLKM terminal(1MHz or 0.5MHz).
5	CLKF	IN	Input terminal for a clock that generates a communication rate of 75×2n series. Usually 614.4KHz is input and communication rates from 1/8192nd of this frequency(75 bps) to 1/32nd of the same frequency(19200 bps) can be used. Can be used also for counting in the MIDI active sense function.
6	TXD	OUT	Serial data output terminal
7	TXF	OUT	Audio signal output terminal to the magnetic tape such as a cassette tape. FSK modulated serial data are output from this terminal at the TTL level.
8	SYNC	OUT	A 2msec width pulse is output from this terminal in synchronization with the MIDI clock. Used as a SYNC signal for other hardware.
9	CLICK	OUT	A 2msec width pulse is output from this terminal in synchronization with the MIDI clock divided. Used when a metronome, etc., which is synchronized with the MIDI, is configured.
10	$\overline{\text{TEST 0}}$	IN	Terminals used for testing the LSI. Thus, no connections are generally made.
11	$\overline{\text{TEST 1}}$	IN	
12	P7	I/O	General purpose I/O port with which the input/output direction of each bit can be separately set.
13	P6	I/O	
14	P5	I/O	
15	P4	I/O	
16	P3	I/O	
17	P2	I/O	
18	P1	I/O	
19	P0	I/O	
20	VSS		VSS
21	D0	I/O	These terminals are used to provide interface to the host CPU.
22	D1	I/O	
23	D2	I/O	
24	D3	I/O	
25	D4	I/O	
26	D5	I/O	
27	D6	I/O	
28	D7	I/O	
29	A0	IN	
30	A1	IN	
31	A2	IN	
32	$\overline{\text{CS}}$	IN	
33	$\overline{\text{WR}}$	IN	
34	$\overline{\text{RD}}$	IN	
35	$\overline{\text{VR}}$	IN	
36	$\overline{\text{IRQ}}$	IN	
37	$\overline{\text{IC}}$	IN	The YM3802 is reset by the L level input signal to this terminal. The reset pulse width must be more than 32 clocks of the system clock to the CLK terminal (32 TCLK). The same reset operation can be made by the host CPU operation on the internal registers of YM3802.
38	$\overline{\text{TEST 2}}$	IN	Terminal used for testing the LSI. Thus, no connections are generally made.
39	CLK1	OUT	Internal timing clock output terminal.
40	CLK	IN	System clock input terminal. The internal operation of the YM3802, input signal sampling and output signal changing are all performed in synchronization with the internal timing clock made by this system clock. The clock rate must be more than 32 times the communication rate used. In the case of an MIDI communication rate of 31.25K bps at least a 1MHz clock rate is necessary. The maximum rate is 4MHz.



YM3802 Pin assignment

●YM2019 KAPP (Key Assigner for Piano Player)

1. OVERVIEW

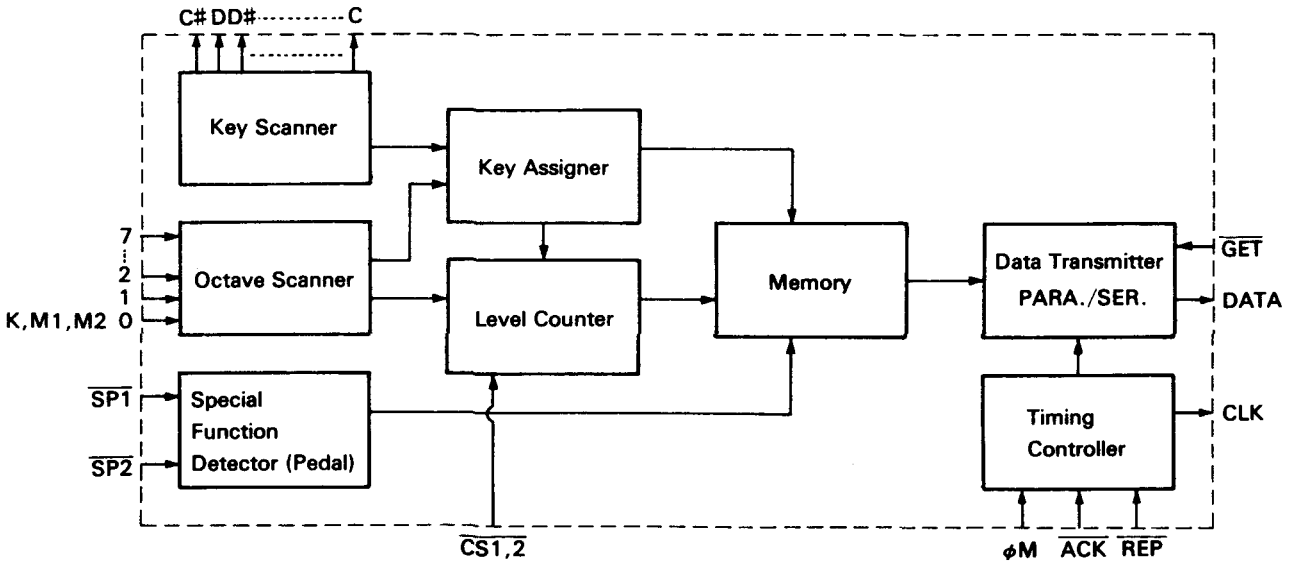
This LSI detects the operation being executed (keys, hammers and pedals) while a piano is being played. Its offers the features listed below:

1) Detects the ON/OFF timing of keys in eight octaves (96keys) and the hammer speed. (For up to 16 concurrently sounded notes.)
2) Detects the ON/OFF status of the damper and shift pedals.
3) The above performance events are output as serial data each time a GET pulse is input.

2. LIST OF YM2019 TERMINALS

Pin Name	Pin No.	I/O	Function
VDD	63		Power supply +5V.
VSS	1,17		GND
φM	64	IN	Inputs the master clock(4 MHz)
C#～C	31～20	OUT	Output the note scan pulses.
$\overline{SP1}$	16	IN	Detects the ON/OFF status of the damper pedal.
$\overline{SP2}$	15	IN	Detects the ON/OFF status of the shift pedal.
K0～K7	32,35,38 41,44,47 50,53	IN	Detect the key Assign and Key Off timing.
M10～M17	33,36,39 42,45,48 51,54	IN	Detect the Start timing of the level counter.
$\overline{M20}$～$\overline{M27}$	34,37,40 43,46,49 52,55	IN	Detect the level counter's Stop timing and the Note ON timing.
$\overline{CS1}$,$\overline{CS2}$	58,57	IN	Selects the conversion curve for touch(speed) data.
$\overline{CP}$	56	IN	Selects the method for detecting touch(speed).
$\overline{IC}$	2	IN	Initial Clear terminal.
$\overline{GET}$	6	IN	Inputs pulses for reading data.
DATA	4	OUT	Outputs serial data(events).
CLK	9	OUT	Outputs sync. clocks for data transmission.
$\overline{ACK}$	7	IN	Inputs Wait Request signals.
$\overline{REP}$	8	IN	Inputs Resend Data Request signals.

3. Block Diagram

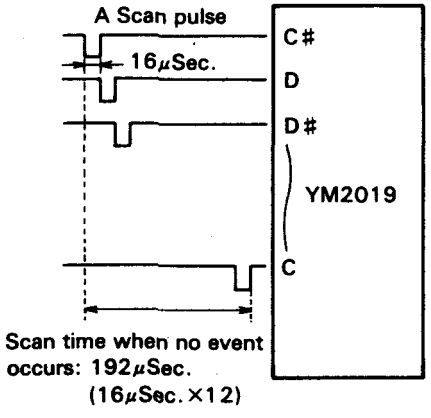


3-1. Key Scanner

Scanning is beginning from the C # note of Octave 0 to detect the status of the hammers within the octave for witch Pin K is "1" (the octave in which a key is being pressed).

Key scanning is then stopped for 16µSec. while that hammer status is sent to the key Assignor. During the next 16µSec. interval, the next higher octave is scanned if the Pin K has not become "1" during that interval, scanning shifts to the next note (D). Consequently, if "N" is the number of keys being pressed, the scanning time for all keys (T) conforms to the equation below:

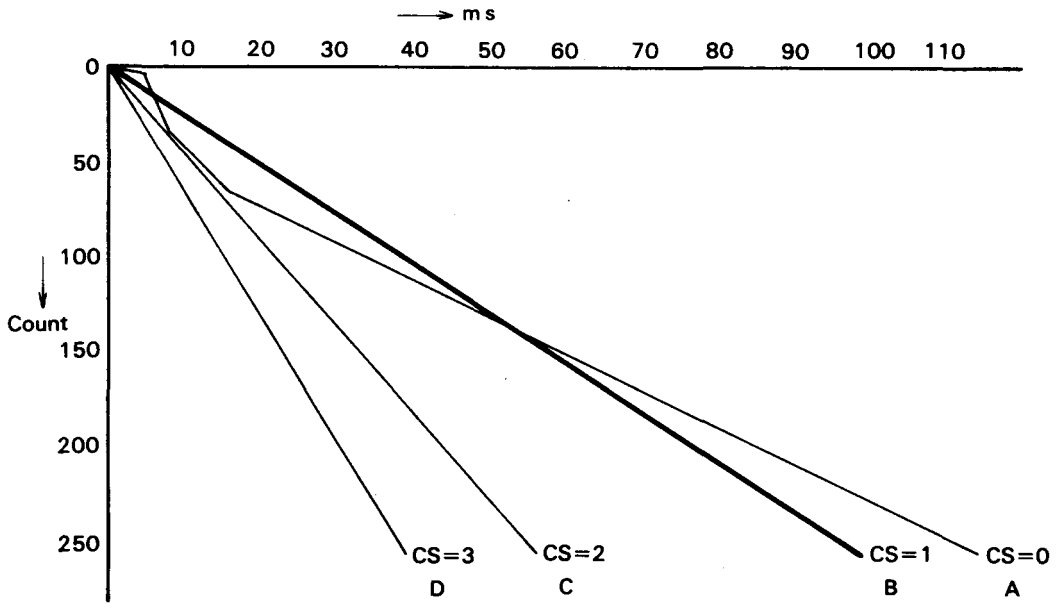
$T = 16x(12 + N)\mu Sec.$



3-2. Key Assignor and Level Counter

The data from the Key Scanner is assigned to an empty channel among the 16 channels.
The operation conforms to the table as shown below, depending to the status of Pins K, M1, and M2.
Based on the conversion curve selected by Pins $\overline{CS1}$ and $\overline{CS2}$, the Level Counter accumulates in 48µSec. interval until the Count STOP timing.
This counter value is the attenuation level.

Assign	Pin K "0"→"1"
Count START	Pin M1 "0"→"1"
Count STOP/ON-Event	Pin $\overline{M2}$ "1"→"0"
OFF-Event	Pin K "1"→"0"



• A Level Rate Selected by $\overline{CS1}$ and $\overline{CS=2}$: B is used in DISKLAVIER.

3-3. Special Function Detector

The special Function Detector detects the status of the damper pedal and shift pedal (ON/OFF switch status) at each GET pulse.

3-4. Memory

The Memory records the data listed below:

①The key address (note and octave) and Level Counter value of a Key-On event.

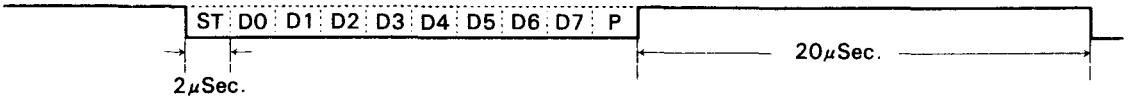
②The Key address of a Key-Off event.

③The number (SP1 or SP2) of a special function (pedal).

3-5. Data Transmitter

When a $\overline{GET}$ pulse is received, control by the Timing Controller causes the data to be transmitted in the format shown below.

①Data Format for One Byte (40μSec.).

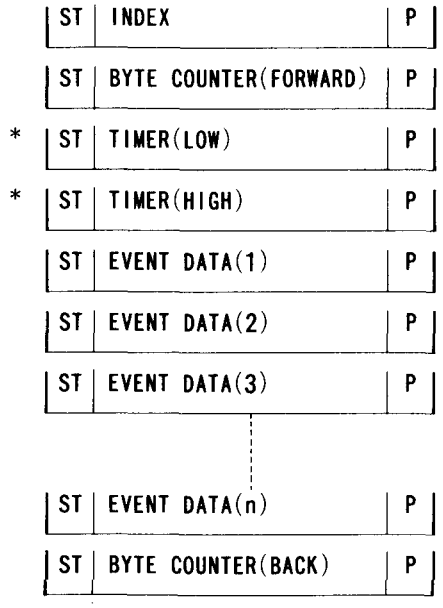


ST: Start bit, always "0".

P: Parity bit

The bit prior to ST and after P is always "1".

②Sequence of Data Transmission



· When no event has occurred, only the INDEX is transmitted.

*: Not used with the DISKLAVIER.

③ Description of the Data

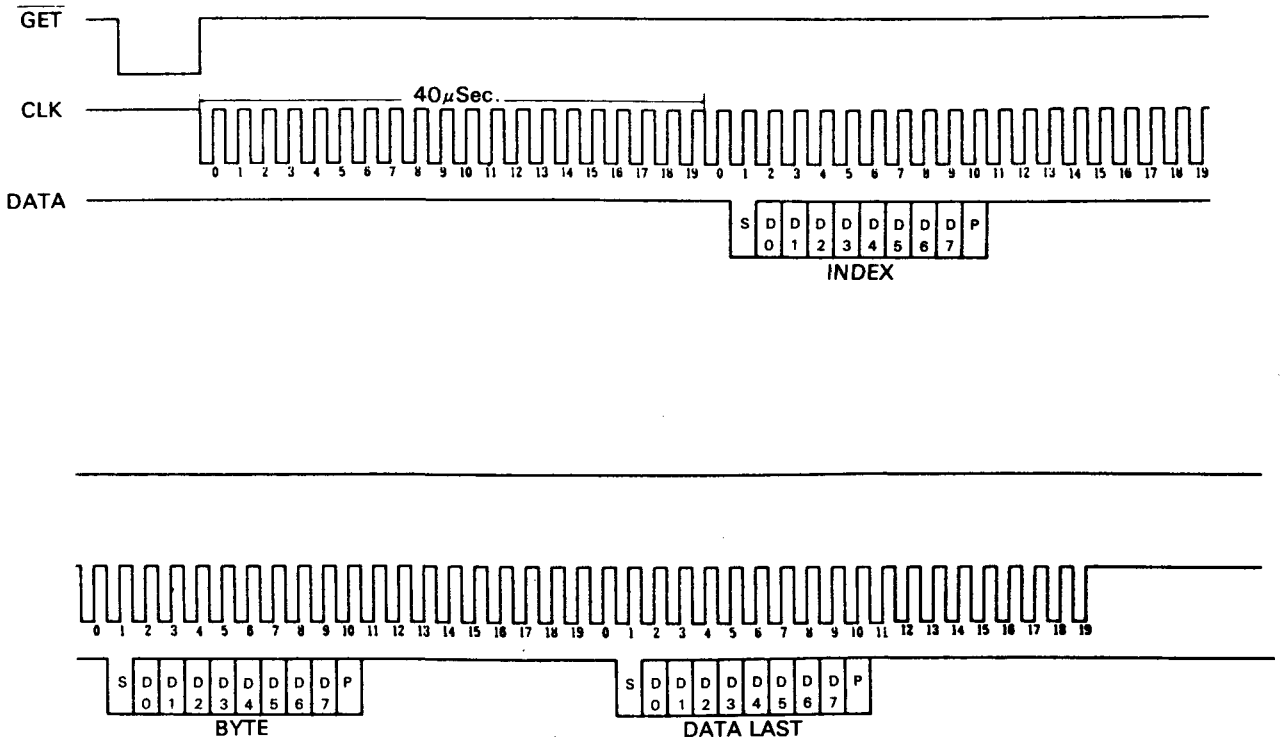
Data Name	D0 D1 D2 D3 D4 D5 D6 D7	
INDEX	——INDEX———0 1 EV	EV="1" when an event has occurred. EV="0" when no event has occurred.
Key-On Event 1/2	—NOTE———BLOCK——1	When a Key ON event occurs, key data and level data are sent as a pair.
Key-On Event 2/2	————LEVEL————	NOTE(0,1,2,4,5,6,8,9,10,12,13,14) BLOCK(0~7)
Key-OFF Event	——NOTE———BLOCK——0	
Special-ON Event	–Special– 0 0 0 0 1	Special No.(1~7)
Special-OFF Event	–Special– 0 0 0 0 0	

3-6. Timing Controller

When an $\overline{IC}$ pulse (minimum pulse width of 8mSec.) is received, the internal registers and timer are all cleared and the internal clock is woke up.

When a $\overline{GET}$ pulse (minimum pulse width of 8mSec.) is received, changes in the Special Function switches are detected, and event data transmission is controlled.

3-7. Timing Chart of $\overline{\text{GET}}$, CLK, and DATA



●YM2020 PKD2

1. OVERVIEW

This LSI is an addressable PWM which uses 8-bit data to output pulses having the duty ratio set by data to the specified output pin. This PWM output permits the current flowing to the solenoids to be controlled, thereby allowing control of the piano's key touch.

2. FUNCTIONAL DESCRIPTION

• IC (Initial Clear)

This signal clears the internal circuitry when the power is turned ON. When IC is "0", the output (C0 to C4) all becomes "1".

• CE (Chip Enable)

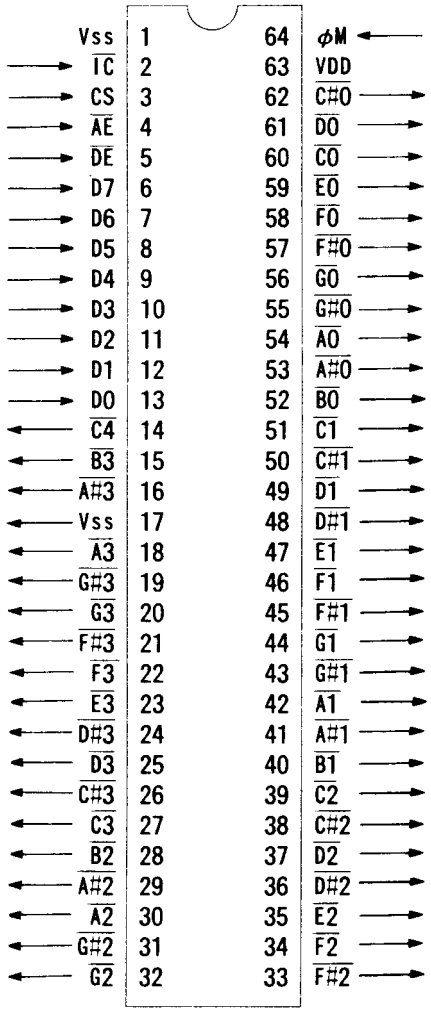
This signal is used to switch between C0~C4 and C4~C8.When CE is "0", C0~C4 (Address data 00~3E) are selected when CE is "1", C4~C8 (Address data 40~7E) are selected. During normal use, this terminal is connected to GND (for C0~C4) or Vdd (for C4~C8).

• AE (Address Enable)

This signal latches the key information (C#0~C4) within the data. It enables the output pins (C#0~C4) in accordance with the data (00~7E) during AE="0" status.

ADDRESS DATA								
	D6	D5	D4	D3	D2	D1	D0	OUTPUT
0 0	0	0	0	0	0	0	0	$\overline{C\#0}$
0 1	0	0	0	0	0	0	1	$\overline{D0}$
0 2	0	0	0	0	0	1	0	$\overline{D\#0}$
0 4	0	0	0	0	1	0	0	$\overline{E0}$
0 5	0	0	0	0	1	0	1	$\overline{F0}$
0 6	0	0	0	0	1	1	0	$\overline{F\#0}$
0 8	0	0	0	1	0	0	0	$\overline{G0}$
0 9	0	0	0	1	0	0	1	$\overline{G\#0}$
0 A	0	0	0	1	0	1	0	$\overline{A0}$
0 C	0	0	0	1	1	0	0	$\overline{A\#0}$
0 D	0	0	0	1	1	0	1	$\overline{B0}$
0 E	0	0	0	1	1	1	0	$\overline{C1}$
1 0	0	0	1	0	0	0	0	$\overline{C\#1}$
1 1	0	0	1	0	0	0	1	$\overline{D1}$
1 2	0	0	1	0	0	1	0	$\overline{D\#1}$
1 4	0	0	1	0	1	0	0	$\overline{E1}$
1 5	0	0	1	0	1	0	1	$\overline{F1}$
1 6	0	0	1	0	1	1	0	$\overline{F\#1}$
1 8	0	0	1	1	0	0	0	$\overline{G1}$
1 9	0	0	1	1	0	0	1	$\overline{G\#1}$
1 A	0	0	1	1	0	1	0	$\overline{A1}$
1 C	0	0	1	1	1	0	0	$\overline{A\#1}$
1 D	0	0	1	1	1	0	1	$\overline{B1}$
1 E	0	0	1	1	1	1	0	$\overline{C2}$
2 0	0	1	0	0	0	0	0	$\overline{C\#2}$
2 1	0	1	0	0	0	0	1	$\overline{D2}$
2 2	0	1	0	0	0	1	0	$\overline{D\#2}$
2 4	0	1	0	0	1	0	0	$\overline{E2}$
2 5	0	1	0	0	1	0	1	$\overline{F2}$
2 6	0	1	0	0	1	1	0	$\overline{F\#2}$
2 8	0	1	0	1	0	0	0	$\overline{G2}$
2 9	0	1	0	1	0	0	1	$\overline{G\#2}$
2 A	0	1	0	1	0	1	0	$\overline{A2}$
2 C	0	1	0	1	1	0	0	$\overline{A\#2}$
2 D	0	1	0	1	1	0	1	$\overline{B2}$
2 E	0	1	0	1	1	1	0	$\overline{C3}$
3 0	0	1	1	0	0	0	0	$\overline{C\#3}$
3 1	0	1	1	0	0	0	1	$\overline{D3}$
3 2	0	1	1	0	0	1	0	$\overline{D\#3}$
3 4	0	1	1	0	1	0	0	$\overline{E3}$
3 5	0	1	1	0	1	0	1	$\overline{F3}$
3 6	0	1	1	0	1	1	0	$\overline{F\#3}$
3 8	0	1	1	1	0	0	0	$\overline{G3}$
3 9	0	1	1	1	0	0	1	$\overline{G\#3}$
3 A	0	1	1	1	0	1	0	$\overline{A3}$
3 C	0	1	1	1	1	0	0	$\overline{A\#3}$
3 D	0	1	1	1	1	0	1	$\overline{B3}$
3 E	0	1	1	1	1	1	0	$\overline{C4}$

ADDRESS DATA TABLE



YM2020 Pin assignment

When CE is "0", output is enabled when D6 is "0".
When CE is "1", output is enabled when D6 is "1".

• DE (Touch Data Enable)

This signal latches the latch information within the data.

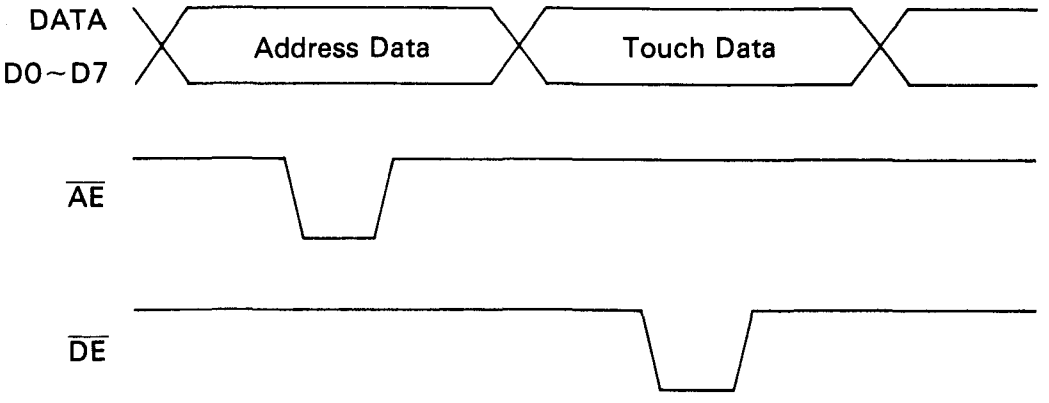
It modulates the pulse width of the output according to the data (00~7E) during DE = "0" status. D7 represents the Key ON/OFF data.

ADDRESS DATA TABLE

TOUCH DATA		PULSE WIDTH		
	D D D D D D D D 7 6 5 4 3 2 1 0	"1"	"0"	KEY TOUCH
8 0 F F	1 * * * * * * *	1 2 8	0	Key OFF
7 F	0 1 1 1 1 1 1 1	1 2 7	1	Min. pressure
7 E	0 1 1 1 1 1 1 0	1 2 6	2	↑
7 D	0 1 1 1 1 1 0 1	1 2 5	3	|
7 B	0 1 1 1 1 0 1 1	1 2 3	5	126 levels
7 7	0 1 1 1 0 1 1 1	1 1 9	9	| in between
6 F	0 1 1 0 1 1 1 1	1 0 1	1 7	|
5 F	0 1 0 1 1 1 1 1	9 5	3 3	|
3 F	0 0 1 1 1 1 1 1	6 3	6 5	↓
0 0	0 0 0 0 0 0 0 0	0	1 2 8	Max. pressure

• D0~D7

These signals are latched by the previously-mentioned AE and DE signals, and used as Key data and Touch data. The relationship of D0~D7 with AE and DE is shown in Fig. 2 below.



CPU Circuit Board

CN16

Pin No00	Pin Name
7	LED6
6	LED5
5	LED4
4	LED3
3	LED2
2	LED1
1	+5V

CN4

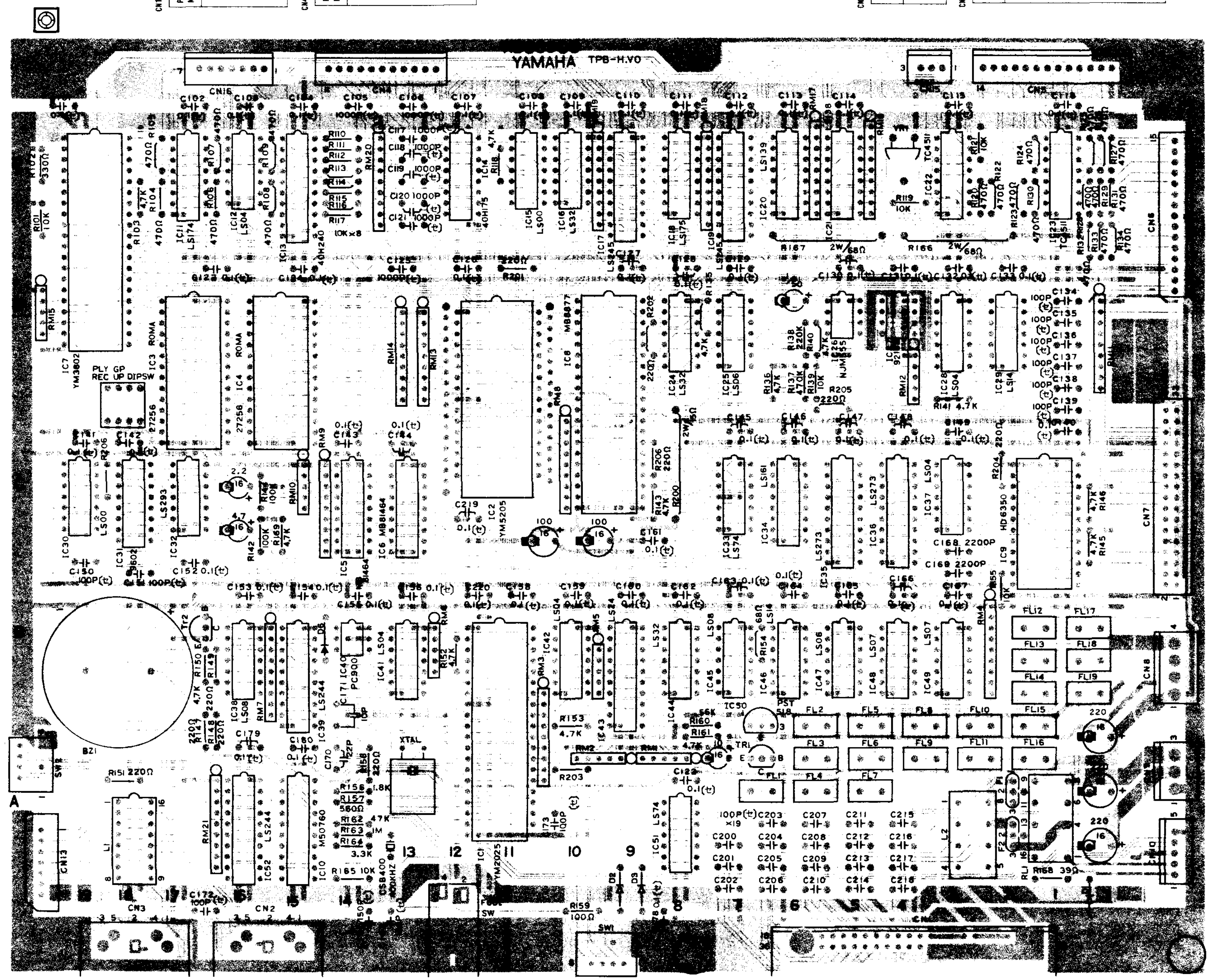
Pin No.	Pin Name
11	SW10/SW18/SW8
10	SW9/SW17
9	SW7/SW13
8	SW6/SW12
7	SW5/SW15
6	SW4/SW14
5	SW3/SW16
4	SW2/SW11
3	Q1
2	Q2
1	Q3

CN15

Pin No.	Pin Name
3	GND
2	GND
1	+12V

CN5

Pin No.	Pin Name
14	D7
13	D6
12	D5
11	D4
10	D3
9	D2
8	D1
7	D0
6	E
5	R/W
4	RS
3	CSS
2	VCC
1	GND



CN6

Pin No.	Pin Name
15	A2
14	B2
13	C2
12	D2
11	E2
10	F2
9	G2
8	COM
7	A1
6	B1
5	C1
4	D1
3	E1
2	F1
1	G1

CN7

Pin No.	Pin Name	Pin No.	Pin Name
34	READY	17	GND
33	GND	16	MOTOR
32	SIDSEL	15	GND
31	GND	14	—
30	RD	13	GND
29	GND	12	—
28	WPRT	11	GND
27	GND	10	DRIVESEL0
26	TR00	9	GND
25	GND	8	INDEX
24	WTGAT	7	GND
23	GND	6	GND
22	WTDAT	5	—
21	GND	4	—
20	STEP	3	GND
19	GND	2	DISKIN
18	DIRC	1	—

CN8

Pin No.	Pin Name
4	+5V
3	GND
2	GND
1	+12V

CN9

Pin No.	Pin Name
3	+5V
2	+5V
1	GND

CN10

Pin No.	Pin Name
5	GND
4	SI
3	+5V
2	P2
1	P1

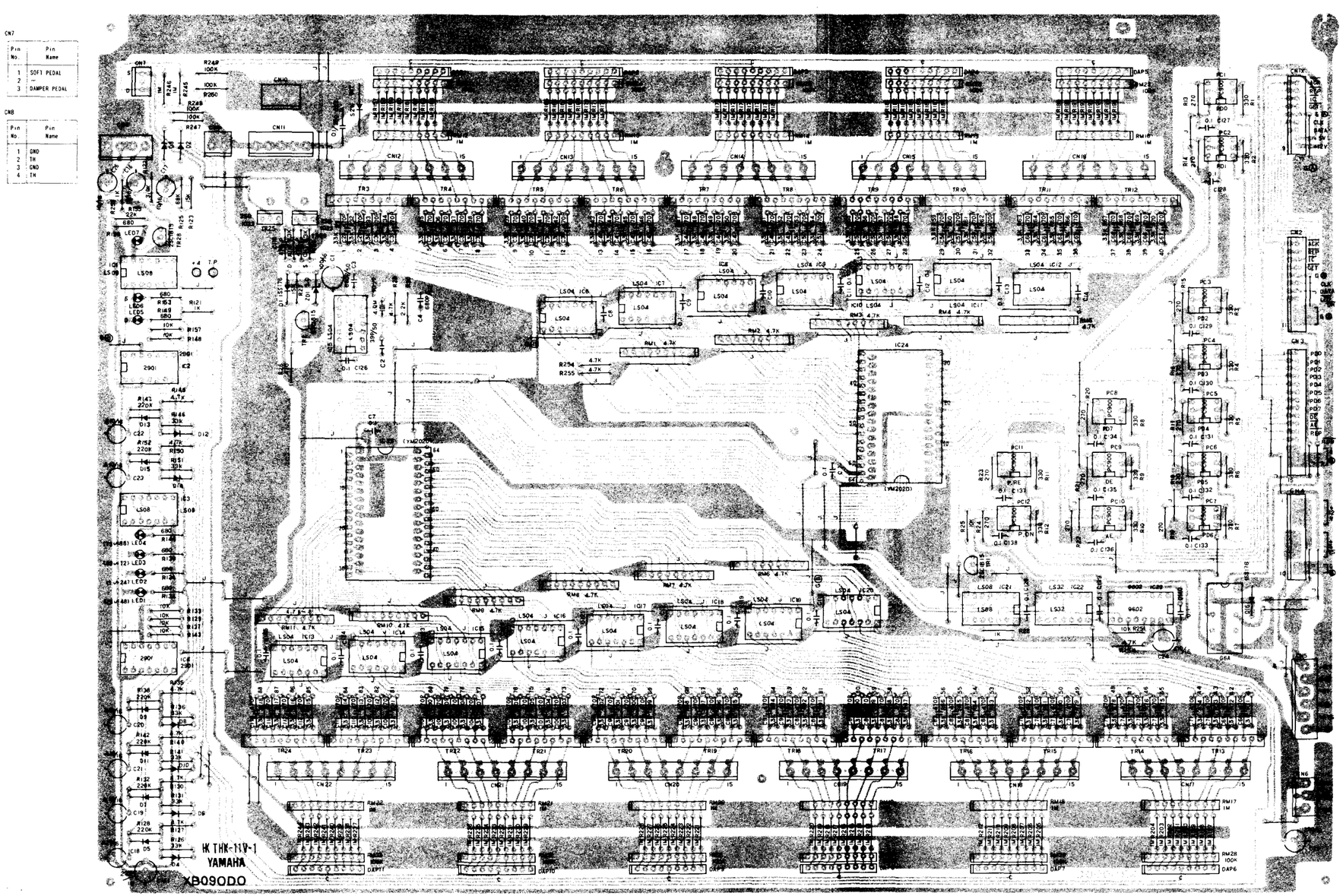
CN13

Pin No.	Pin Name
7	—
6	Foot SW
5	MIDI Pin 5
4	MIDI Pin 4
3	GND
2	MIDI Pin 5
1	MIDI Pin 4

CN1

Pin No.	Pin Name	Pin No.	Pin Name
34	PD7	17	AE
33	PD6	16	DE
32	PD5	15	LEDON
31	PD4	14	DATA
30	PD3	13	CLK
29	PD2	12	GND
28	PD1	11	GET
27	PD0	10	IC
26	PRES	9	REP
25	P_ON	8	ACK
24	GND	7	+12V
23	GND	6	+12V
22	GND	5	+12V
21	GND	4	+12V
20	GND	3	+5V
19	GND	2	+5V
18	GND	1	+5V

■I/O Circuit Board



CN7

Pin No.	Pin Name
1	SOFT PEDAL
2	—
3	DAMPER PEDAL

CN8

Pin No.	Pin Name
1	GND
2	TH
3	GND
4	TH

CN9

Pin No.	Pin Name
1	+10V
2	+10V

CN10

Pin No.	Pin Name
1	GND
2	GND
3	GND

CN11

Pin No.	Pin Name
1	+10V
2	+10V
3	+10V
4	+10V
5	+10V

CN12

Pin No.	Pin Name
1	Key 21(A)
2	Key 22(A#)
3	Key 23(B)
4	Key 24(C)
5	Key 25(C#)
6	Key 26(D)
7	Key 27(D#)
8	Key 28(E)
9	Key 29(F)
10	Key 210(F#)
11	Key 211(G)
12	Key 212(G#)
13	Key 213(A)
14	Key 214(A#)
15	Key 215(B)
16	Key 216(C)

CN13

Pin No.	Pin Name
1	Key 217(C#)
2	Key 218(D)
3	Key 219(D#)
4	Key 220(E)
5	Key 221(F)
6	Key 222(F#)
7	Key 223(G)
8	Key 224(G#)
9	Key 225(A)
10	Key 226(A#)
11	Key 227(B)
12	Key 228(C)
13	Key 229(C#)
14	Key 230(D)
15	Key 231(D#)
16	Key 232(E)

CN14

Pin No.	Pin Name
1	Key 233(F)
2	Key 234(F#)
3	Key 235(G)
4	Key 236(G#)
5	Key 237(A)
6	Key 238(A#)
7	Key 239(B)
8	Key 240(C)
9	Key 241(C#)
10	Key 242(D)
11	Key 243(D#)
12	Key 244(E)
13	Key 245(F)
14	Key 246(F#)
15	Key 247(G)
16	Key 248(G#)

CN15

Pin No.	Pin Name
1	Key 249(A)
2	Key 250(A#)
3	Key 251(B)
4	Key 252(C)
5	Key 253(C#)
6	Key 254(D)
7	Key 255(D#)
8	Key 256(E)
9	Key 257(F)
10	Key 258(F#)
11	Key 259(G)
12	Key 260(G#)
13	Key 261(A)
14	Key 262(A#)
15	Key 263(B)
16	Key 264(C)

CN16

Pin No.	Pin Name
1	Key 265(C#)
2	Key 266(D)
3	Key 267(D#)
4	Key 268(E)
5	Key 269(F)
6	Key 270(F#)
7	Key 271(G)
8	Key 272(G#)
9	Key 273(A)
10	Key 274(A#)
11	Key 275(B)
12	Key 276(C)
13	Key 277(C#)
14	Key 278(D)
15	Key 279(D#)
16	Key 280(E)

CN17

Pin No.	Pin Name
1	Key 281(F)
2	Key 282(F#)
3	Key 283(G)
4	Key 284(G#)
5	Key 285(A)
6	Key 286(A#)
7	Key 287(B)
8	Key 288(C)
9	Key 289(C#)
10	Key 290(D)
11	Key 291(D#)
12	Key 292(E)
13	Key 293(F)
14	Key 294(F#)
15	Key 295(G)
16	Key 296(G#)

CN18

Pin No.	Pin Name
1	Key 297(A)
2	Key 298(A#)
3	Key 299(B)
4	Key 300(C)
5	Key 301(C#)
6	Key 302(D)
7	Key 303(D#)
8	Key 304(E)
9	Key 305(F)
10	Key 306(F#)
11	Key 307(G)
12	Key 308(G#)
13	Key 309(A)
14	Key 310(A#)
15	Key 311(B)
16	Key 312(C)

CN19

Pin No.	Pin Name
1	Key 313(C#)
2	Key 314(D)
3	Key 315(D#)
4	Key 316(E)
5	Key 317(F)
6	Key 318(F#)
7	Key 319(G)
8	Key 320(G#)
9	Key 321(A)
10	Key 322(A#)
11	Key 323(B)
12	Key 324(C)
13	Key 325(C#)
14	Key 326(D)
15	Key 327(D#)
16	Key 328(E)

CN20

Pin No.	Pin Name
1	Key 329(F)
2	Key 330(F#)
3	Key 331(G)
4	Key 332(G#)
5	Key 333(A)
6	Key 334(A#)
7	Key 335(B)
8	Key 336(C)
9	Key 337(C#)
10	Key 338(D)
11	Key 339(D#)
12	Key 340(E)
13	Key 341(F)
14	Key 342(F#)
15	Key 343(G)
16	Key 344(G#)

CN21

Pin No.	Pin Name
1	Key 345(A)
2	Key 346(A#)
3	Key 347(B)
4	Key 348(C)
5	Key 349(C#)
6	Key 350(D)
7	Key 351(D#)
8	Key 352(E)
9	Key 353(F)
10	Key 354(F#)
11	Key 355(G)
12	Key 356(G#)
13	Key 357(A)
14	Key 358(A#)
15	Key 359(B)
16	Key 360(C)

CN22

Pin No.	Pin Name
1	Key 361(C#)
2	Key 362(D)
3	Key 363(D#)
4	Key 364(E)
5	Key 365(F)
6	Key 366(F#)
7	Key 367(G)
8	Key 368(G#)
9	Key 369(A)
10	Key 370(A#)
11	Key 371(B)
12	Key 372(C)
13	Key 373(C#)
14	Key 374(D)
15	Key 375(D#)
16	Key 376(E)

CN1

Pin No.	Pin Name
1	ACK
2	REP
3	TC
4	GET
5	GND
6	CLK
7	DATA
8	+5V
9	+12V

CN2

Pin No.	Pin Name
1	ACK
2	REP
3	TC
4	GET
5	GND
6	CLK
7	DATA
8	LEDON
9	GND
10	GND
11	GND

CN3

Pin No.	Pin Name
1	PD0
2	PD1
3	PD2
4	PD3
5	PD4
6	PD5
7	PD6
8	PD7
9	RE
10	XT
11	P.RE
12	P.ON
13	GND
14	GND
15	GND

CN4

Pin No.	Pin Name
1	+12V
2	+12V
3	+12V
4	-12V
5	+5VS
6	+5VS
7	-5VS
8	+5VS
9	GND
10	GND

CN5

Pin No.	Pin Name
1	GND
2	+5VS
3	GND
4	+5V
5	GND
6	+12V

CN6

Pin No.	Pin Name
1	P.ON
2	GND
3	+5V

■Sensor,Hammer,Key,M1,K and M2 Circuit Board

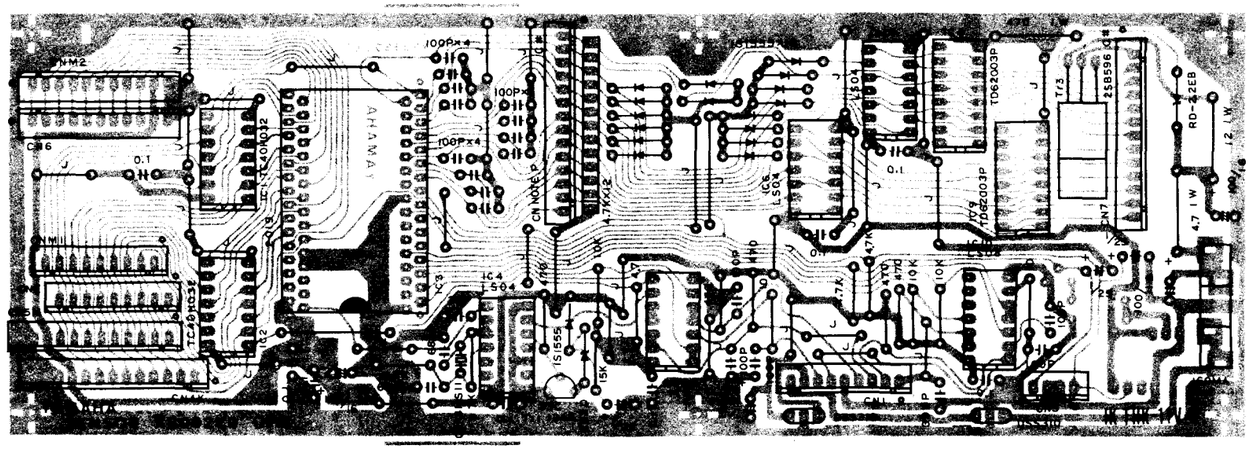
●Sensor Circuit Board

CN6

Pin No.	Pin Name
1	
2	0 Oct
3	1 Oct
4	2 Oct
5	3 Oct
6	4 Oct
7	5 Oct
8	6 Oct
9	7 Oct
10	+5V
11	GND

CN5M

Pin No.	Pin Name
1	
2	0 Oct
3	1 Oct
4	2 Oct
5	3 Oct
6	4 Oct
7	5 Oct
8	6 Oct
9	7 Oct
10	+5V
11	GND
12	GND



CN7

Pin No.	Pin Name
1	VCC
2	C#
3	D
4	D#
5	E
6	F
7	F#
8	G
9	G#
10	A
11	A#
12	B
13	C

CN4k

Pin No.	Pin Name
1	0 Oct
2	1 Oct
3	2 Oct
4	3 Oct
5	4 Oct
6	5 Oct
7	6 Oct
8	7 Oct
9	+5V
10	GND
11	GND
12	GND
13	

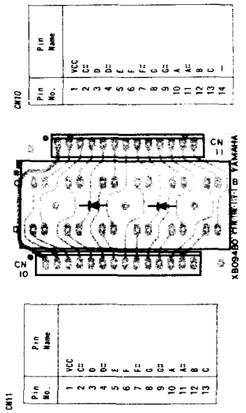
CN1

Pin No.	Pin Name
1	REF
2	REF
3	TI
4	TEST
5	GND
6	CLK
7	DATA
8	+5V
9	+12V

CN3

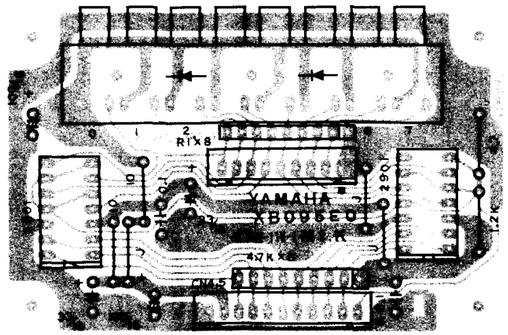
Pin No.	Pin Name
1	SP1
2	GND
3	GND
4	SP2

●Hammer LED Drive Circuit Board



●Key LED Drive Circuit Board

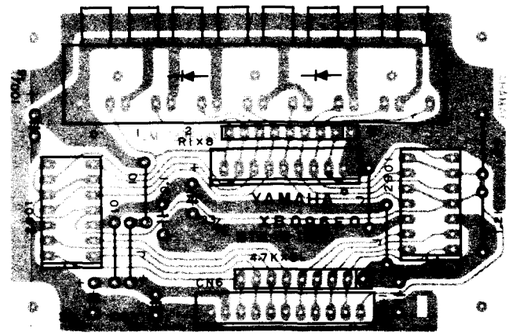
●M1, K Detect Circuit Board



CN5

Pin No.	Pin Name
1	0 Oct
2	1 Oct
3	2 Oct
4	3 Oct
5	4 Oct
6	5 Oct
7	6 Oct
8	7 Oct
9	+5V
10	GND
11	

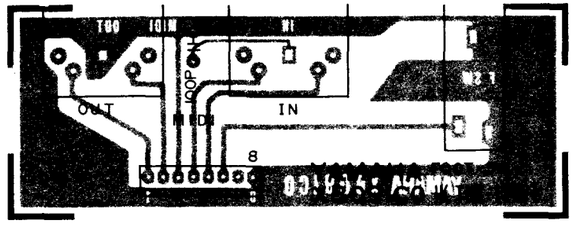
●M2 Detect Circuit Board



CN6

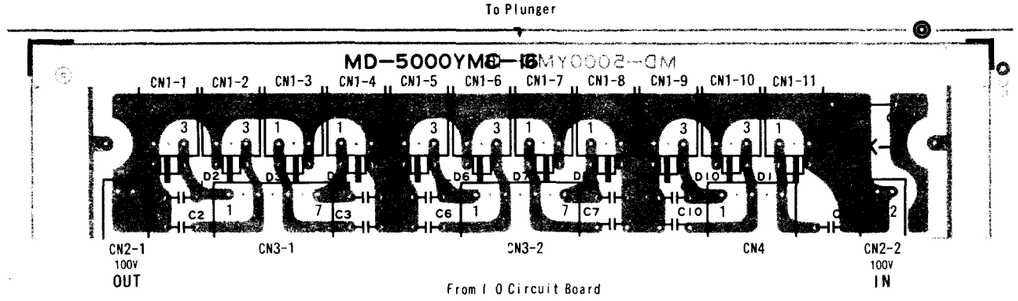
Pin No.	Pin Name
1	0 Oct
2	1 Oct
3	2 Oct
4	3 Oct
5	4 Oct
6	5 Oct
7	6 Oct
8	7 Oct
9	+5V
10	GND
11	

●MIDI External Circuit Board



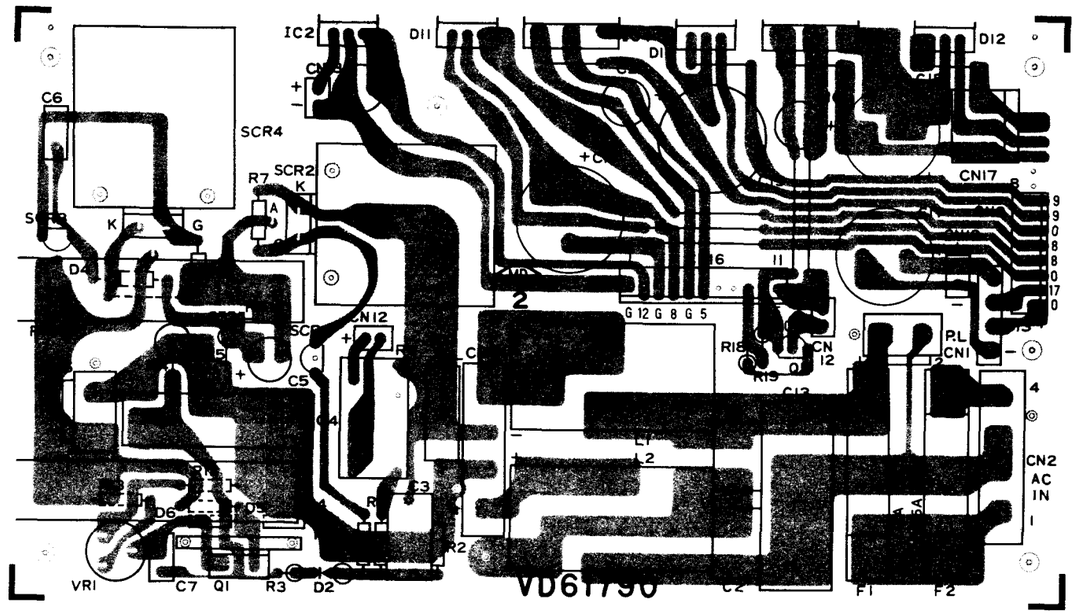
Pin No.	Pin Name
1	MIDI OUT Pin =4
2	MIDI OUT Pin =5
3	GND
4	MIDI IN Pin =4
5	MIDI IN Pin =5
6	FOOT SW Pin =2
7	—
8	GND

●Drive Circuit Board



■Drive Unit,MIDI and Power Supply Circuit Board

●Power Supply Circuit Board



CN3

Pin No.	Pin Name
8	Transformer
7	Transformer
6	Transformer
5	Transformer
4	Transformer
3	Transformer
2	Transformer
1	Transformer

CN2

Pin No.	Pin Name
4	Transformer
3	Transformer
2	AC IN
1	AC IN

CN1

Pin No.	Pin Name
1	P.L +
2	P.L —

YAMAHA

disklavier

PARTS LIST

CONTENTS

1. Electrical Parts ····· 1
2. Control Unit ····· 6
3. Key Stop Rail Assembly····· 9
4. Key Drive Unit····· 10
5. Key Sensor Unit ····· 11
6. Hammer Sensor Unit, Air Damper Unit ·····12
7. Pedal Drive Unit, Pedal Sensor Unit, Pedal Cushion Unit ····· 14
8. I/O Unit, Power Supply Unit, MIDI Unit ····· 16

1.ElectricalParts

	Ref. No.	Part No.	Description		部品名	Remarks
			Control Unit			
		IG136200	IC	SI-3052V	IC	2A 5V Regulator
		IF000040	Diode	1S1555	ダイオード	
		IF008730	LED	SLR-34URC3H3	LED	Red
		IF008740	LED	SLR-34MC3H3	LED	Green
※		VB352400	LCD		LCD	
※		JX550050	LED 7Seg. Indicator	GL-6P206U	7セグメント表示器	
※		KX550100	Power Switch		パワースイッチ	
※		KX550640	Micro Switch		MTスイッチ	
※		JX550060	Sensor, Remote Controller		リモコン受光器	
			CPU Circuit Board			
※		VE470300	CPU Circuit Board		CPUシート	
		iT200200	IC	YM2025	IC	CPU
		iT520520	IC	YM5205	IC	PMAC
		XA591001	IC	YM3802	IC	MCS
※		XA457001	IC	MB81464-12	IC	RAM (64k×4bit)
		iG132700	IC	HD6350	IC	ACIA
		IG057300	IC	MB8877	IC	FDC
		iG137800	IC	FDC9216B	IC	FD DATA SEPARATER
		XA513002	IC	M50760-463	IC	REMOTE CONT. DECODER
		iG067210	IC	TC4511BP	IC	BCD to 7 LATCH
		iG068100	IC	TC40H240	IC	OCT. BUFF. INVERTER
		iG096700	IC	TC40H175	IC	QUAD D-F.F.
		iG057400	IC	F9602	IC	MULTI VIBRATOR
		iG044200	IC	LS138	IC	3 to 8 DECODER
		iG049900	IC	LS139	IC	DUAL 2 to 4 DECODER
		iG060000	IC	LS244	IC	OCT. BUS DRIVER
		iG044600	IC	LS245	IC	OCT. TRANS
		iG050100	IC	LS175	IC	QUAD D-F.F.
		iG044000	IC	LS74	IC	EDGE TRIGGER
		iG060200	IC	LS273	IC	OCT D-F.F.
		iG050300	IC	LS293	IC	4 BIT COUNT.
		iG044400	IC	LS161	IC	4 BIT COUNT.
		iG049600	IC	LS14	IC	HEX SCHMITT TRIGG.
		iG049800	IC	LS32	IC	QUAD 2 INPUT NOR
		iG043700	IC	LS08	IC	QUAD 2 INPUT AND
		iG027010	IC	LS04	IC	HEX INVERTER
		iG026910	IC	LS00	IC	QUAD 2 INPUT NAND
		iG050000	IC	LS174	IC	HEX D-F.F.
		iG059100	IC	SN74LS06N	IC	HEX INV/BUFF
		iG152700	IC	MB74LS07P	IC	HEX BUFFER
		iG044500	IC	LS240	IC	OCT. BUFFER
		iG116200	IC	PST518	IC	Power Amp.
		iG063500	IC	NJM555	IC	TIMER
※		XD775000	IC	HN27256G-25	IC	ROMA
※		XD776000	IC	MB27128-25G	IC	ROMB
		iK000420	Photo coupller	PC900	フォトカプラー	
		HF859100	Carbon resistor	1M 1 6W	カーボン抵抗	
		HL324150	Metal Oxide Resistor	15Ω2W	酸金抵抗	
		HL324680	Metal Oxide Resistor	65Ω2W	酸金抵抗	
※		VB350500	Resistor Array	RM8-470Ω	抵抗モジュール	
※		VB350600	Resistor Array	RM8-1kΩ	抵抗モジュール	

※ : New Parts (新規部品)

1. Electrical Parts

	Ref. No.	Part No.	Description		部品名	Remarks
		HZ003350	Resistor Array	RM4-4.7kΩ	抵抗モジュール	
		HZ002940	Resistor Array	RM8-4.7kΩ	抵抗モジュール	
		HZ003370	Resistor Array	RM4-10kΩ	抵抗モジュール	
		HZ003380	Resistor Array	RM8-10kΩ	抵抗モジュール	
		FZ004100	Semi-Conductive Cera. Cap.	0.1 16V	半導体セラコン	
		FP336220	Tamtalum Cap.	2.2μ16V	タンタルコン	
		FP336470	Tamtalum Cap.	4.7μ16V	タンタルコン	
		iC181520	Transistor	2SC1815Y	トランジスタ	
		VA106500	Diode	1SS176	ダイオード	
		HT370010	Semi-Variable Resistor	B1K	半固定ボリューム	
		KA000240	Switch, DIP	KTD04	DIPスイッチ	
		QU001400	Quartz Crystal	8MHz	水晶発振子	
※		QU003500	Ceramic Resonator	CSB400MT	セラロック	
		FZ006970	EMI Filter	0.022μF	エミフィル	
※		VB353000	Buzzer	PKB9-2A0	圧電ブザー	
		VB835000	Coil	5P200	FLコイル	
※		VB293400	Relay	G6A-274	リレー	
		KA501760	Rotary Switch		ロータリースイッチ	
		LB604730	Socket	IC30-2806G4	ICソケット	
		LB021030	Connector	3P	コネクタ	
		LB021050	Connector	5P	コネクタ	
		LB021070	Connector	7P	コネクタ	
		LB916070	Connector	7P	コネクタ	
		LB021110	Connector	11P	コネクタ	
		LB021140	Connector	14P	コネクタ	
		LB021150	Connector	15P	コネクタ	
		LB604400	Connector	34P	コネクタ	
		VB316200	Connector	34P	PSコネクタ	
		LB932030	Connector	B3P-VH	VHコネクタ	
		LB932040	Connector	B4P-VH	VHコネクタ	
			MIDI External Circuit Board			
		LB202930	Phone Jack		ホーンジャック	
		LB500520	DIN Connector	5P	DINコネクタ	
		LB917080	Connector	8P	コネクタ	
			I/O Circuit Board			
※		VE470200	I/O Board		I/Oシート	
※		iT202000	IC	YM2020	IC	DIGITAL PWM
		iG027010	IC	HD74LS04P	IC	Hex Inverter
		iG043700	IC	HD74LS08P	IC	Quad 2 Input AND
		iG049800	IC	HD74LS32	IC	Quad 2 Input NOR
		iG036100	IC	NJM2901	IC	Quad Comparator
		iG057400	IC	F9602	IC	Multi VIBRATOR
		iC181520	Transistor	2SC1815	トランジスタ	
		iD102300	Transistor	2SD1023	トランジスタ	
※		VB293700	Transistor Array	TH3L20	トランジスタアレイ	
		HZ002940	Resistor Array	RM8-472	抵抗アレイ	
※		VB307500	Resistor Array	RM8-104	抵抗アレイ	
※		VB307600	Resistor Array	RM8-105	抵抗アレイ	
		VA106500	Diode	1SS176	ダイオード	
※		VB295700	Diode Array	DAP-801	ダイオードアレイ	

※ : New Parts (新規部品)

1.ElectricalParts

	Ref. No.	Part No.	Description		部品名	Remarks
		iF001840	Zener Diode	RD3.0EB	ツェナーダイオード	
※		iF001220	First Recovery Diode	S2K20	ダイオード	
		FZ004100	Semi-Conductive Cera. Cap.	0.1μF 16V	半導体セラコン	
		FP337100	Tantalum Cera. Cap.	10μF 16V	タンタルコン	
		FZ000680	MM Cap.	0.1μF 250V	MM コン	
		iF003940	LED	GL-5PR2	LED	
※		VB293300	Ceramic Resonator	CSA4.0MG11	セラロック	
※		VB293400	Relay	G6A-274P DC5V	リレー	
		iK000420	Photo Coupller	PC900	フォトカプラ	
		LB932020	Connector	B2P-VH	コネクタ	
		LB932030	Connector	B3P-VH	コネクタ	
		LB932040	Connector	B4P-VH	コネクタ	
		LB932050	Connector	B5P-VH	コネクタ	
		LB932060	Connector	B6P-VH	コネクタ	
		LB916030	Connector	3P	コネクタ	
		LB916090	Connector	9P	コネクタ	
		LB916100	Connector	10P	コネクタ	
		LB916110	Conncetor	11P	コネクタ	
		LB916150	Connector	15P	コネクタ	
※		VE470400	Sensor Circuit Board (A)		センサーシート(A)	
		iT201900	IC	YM2019	IC	KAPP
		iG027010	IC	HD74LS04	IC	HEX INVERTER
		iG043700	IC	HD74LS08	IC	QUAD 2IN AND
		iG052800	IC	TC40H032	IC	QUAD 2IN OR
		HZ004700	Resistor Array	RM12-4.7kΩ	抵抗アレイ	
		HL313470	Metal Oxide Resistor	4.7Ω1/2W	酸金抵抗	
		HL314120	Metal Oxide Resistor	12Ω1W	酸金抵抗	
		HL315470	Metal Oxide Resistor	470Ω1W	酸金抵抗	
		FZ413680	Ceramic Cap.	6800PF 50V	セラコン	
		FZ005030	Semi-conductive Cera. Cap.	0.1μF 25V	半導体セラコン	
		iC134540	Transistor	2SC1345(D,E)	トランジスタ	
		iB059630	Transistor	2SB596(O,Y)	トランジスタ	
		iG127300	Transistor Array	TD62003P	トランジスタアレイ	
		iF000040	Diode	1S1555	ダイオード	
		iF001840	Zener Diode	RD-3.0EB	ツェナーダイオード	
		VB434900	Zener Diode	RD-2.2EB1	ツェナーダイオード	
		FZ006970	EMI Filter	DSS310 0.022μF	エミフィル	
		VB293300	Ceramic Resonator	CSA4.0MG11	セラロック	
		VB835000	Coil	5R200	FL コイル	
		VE472300	Fuse	160mA UL	ヒューズ	
		LB918040	Connector	B4B-XH-A	コネクタ	
		L18918090	Connector	B9B-XH-A	コネクタ	
		LB918110	Connector	B11B-XH-A	コネクタ	
		LB918120	Connector	B12B-XH-A	コネクタ	
		LB918130	Connector	B13B-XH-A	コネクタ	
		LB918140	Connector	B14B-XH-A	コネクタ	
※		VE470900	Hammer LED Drive Board		ハンマー発光シート	
		VB434100	LED	H-1000	発光ダイオード	
		CB502580	Socket		発光ブロック	

※ : New Parts (新規部品)

1. Electrical Parts

Ref. No.	Part No.	Description		部品名	Remarks
	LB918130	Connector	B13B-XH-A	コネクタ	
	LB918140	Connector	B14B-XH-A	コネクタ	
※	VE471200	M1,K Detect Board		M1,K 受光シート	
	iG036100	IC	NJM2901	IC	QUAD COMPARATOR
	VB434400	Photo Diode	S2506-02	フォトダイオード	
	VB433900	Resistor Array	RM8-333	抵抗アレイ	
	H2003190	Resistor Array	RM8-472	抵抗アレイ	
	HV753470	Frame Proof Carbon Resistor	4.7Ω1 4W	不燃化カーボン抵抗	
	FZ005030	Semi-Conductive Cera. Cap.	0.1μF 25V	半導体セラコン	
	CB502590	Socket		受光ブロック	
	LB918090	Connector	B9B-XH-A	コネクタ	
	LB918110	Connector	B11B-XH-A	コネクタ	
※	VE471300	M2 Detect Board		M2 受光シート	
	iG036100	IC	NJM2901	IC	QUAD COMPARATOR
	VB434400	Photo Diode	S2506-02	フォトダイオード	
	VB433900	Resistor Array	RM8-333	抵抗アレイ	
	HZ003190	Resistor Array	RM8-472	抵抗アレイ	
	HV753470	Flame Proof Carbon Resistor	4.7Ω1 4W	不燃化カーボン抵抗	
	FZ005030	Semi-Conductive Cera. Cap.	0.1μF 25V	半導体セラコン	
※	CB502590	Socket		受光ブロック	
	LB918090	Connector	B9B-XH-A	コネクタ	
	LB918110	Connector	B11B-XH-A	コネクタ	
	VE471400	Key LED Drive Board		キー発光シート	
	VB434100	LED	H-1000	LED	
	CB502580	Socket		発光ブロック	
	LB918060	Connector	B6B-XH-A	コネクタ	
	LB918070	Connector	B7B-XH-A	コネクタ	
		Pedal Sensor Unit		ペダルセンサーユニット	
	NB137040	PK Switch	(1T)	PK スイッチ	
		Power Supply Unit			
※	VD617900	Power Supply Unit		電源ユニット	
	IG083400	IC	AN7812	IC	Regulator
	IG094300	IC	SI3052V	IC	Regulator
	IC181520	Transistor	2SC1815	トランジスタ	
	IC223840	Transistor	2SC2238B	トランジスタ	
	1X603810	Diode	10E-4	ダイオード	
※	IX554290	Diode	1S1585	ダイオード	
	IF000040	Diode	1S1555	ダイオード	
※	IX554300	Diode	C10P10F	ダイオード	
※	IX800830	Diode	S1VB20	ダイオード	
※	IX554310	Diode	BS08A	ダイオード	
※	IH001050	Diode	AC16DGM	サイリスタ	
※	IH000420	Diode	CR02AM4	サイリスタ	
※	IX554440	Diode Bridge	KBPC2504	ダイオードブリッジ	

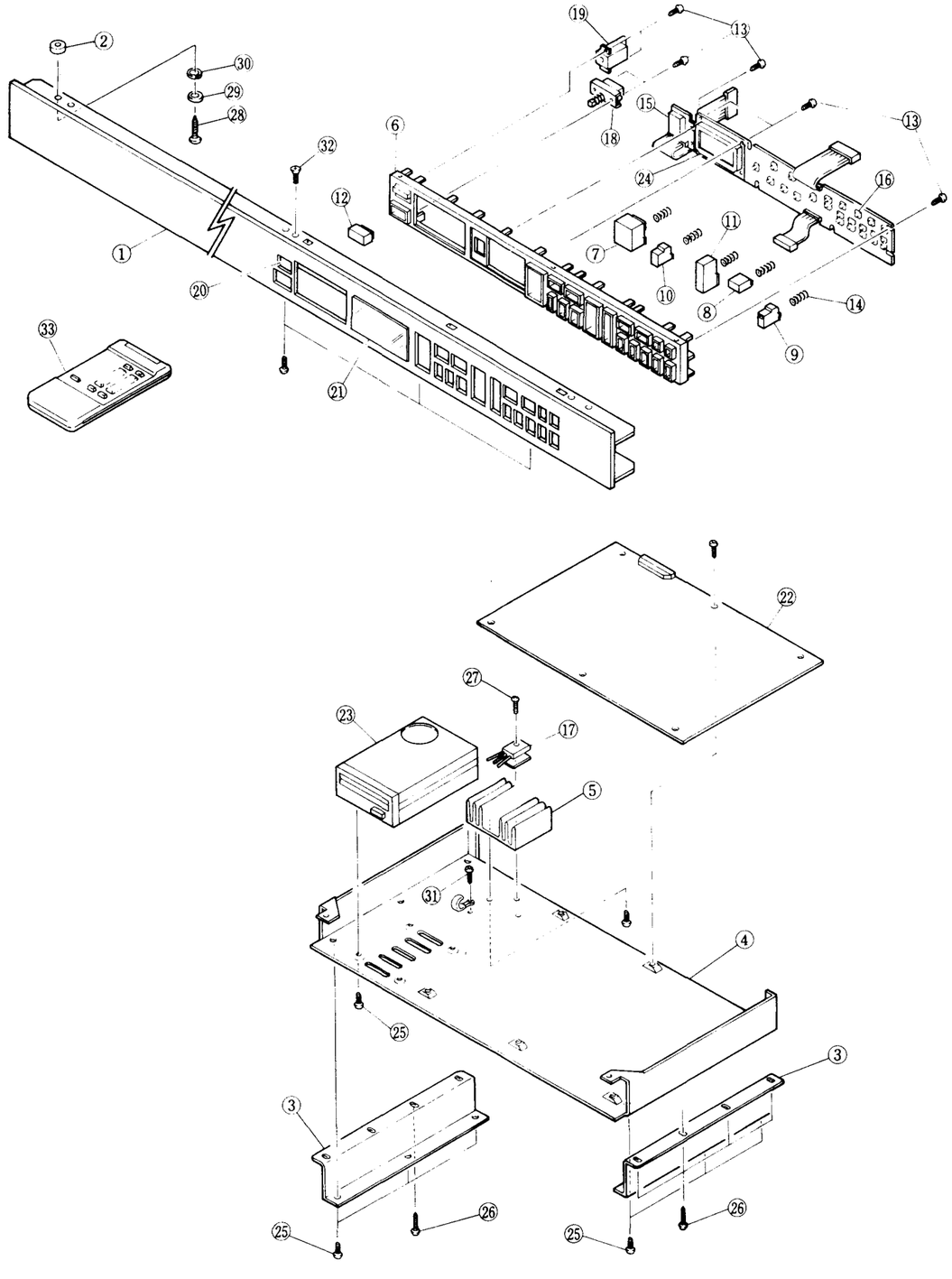
※ : New Parts (新規部品)

1. Electrical Parts

Ref. No.	Part No.	Description		部品名	Remarks
	IF001470	Zener Diode	RD6.2EB2	ツェナーダイオード	
※	FX551060	Ceramic Cap.	2200PF 250V	セラコン	
※	FX800230	Ceramic Cap.	100PF 1KV	セラコン	
※	FX551560	MM Cap.	0.15μF 250V	MMコン	
	FZ005250	MM Cap.	0.22μF 125V	MMコン	
※	FX551570	MM Cap.	2.7μF 250V	MMコン	
	FC244100	MM Cap.	0.01μF 125V	MMコン	
	HL327220	Metal Oxide Resistor	22KΩ2W	酸金抵抗	
	HL327100	Metal Oxide Resistor	10KΩ2W	酸金抵抗	
	HM574120	Cement Mold Resistor	12Ω10W	セメント抵抗	
※	HX551720	Cement Mold Resistor	4.7KΩ10W	セメント抵抗	
※	KX550680	Relay	AW62199	リレー	
※	HX551730	Semi-Variable Resistor	B-10K	半固定ボリューム	
※	KX550630	Switch	SDA3S-A-1	シーソースイッチ	
※	KX550690	Fuse	7A 250V	ヒューズ	
	KB002740	Fuse	1.5A 250V	ヒューズ	
※	JX550080	Pilot Lamp	108-RN 120V	パイロットランプ	
※	GX550630	Coil		チョークコイル	
※	GX550670	Transformer	N36-506	トランス	
	MG000820	AC Cable		電源コード	
		Key Drive Unit			
※	BX550110	Plunger Ass'y (A)		プランジャー Ass'y(A)	Front
※	BX550120	Plunger Ass'y (B)		プランジャー Ass'y(B)	Rear
※	IX554330	Thermostat	UP62 100°C	サーモスタット	
※	IX554340	Diode	DIK20	ダイオード	

※ : New Parts (新規部品)

2. Control Unit



2. Control Unit

	Ref. No.	Part No.	Description		部品名	Remarks
※	1	VE513200	Front Panel		フロントパネル	BL
※	1	VF593400	Front Panel		フロントパネル	WH
※	1	VF610900	Front Panel		フロントパネル	WN
※	2	VF156400	Spacer		コントローラー取付スペーサ	
※	3	AA503110	Holder, Controller		コントロール取付金具	
※	4	VE513700	Bottom Cover		コントロールボトム	
※	5	VB496400	Heat Sink		放熱板	
※	6	CX558110	Sub-panel		ハウジング	BL,WN
※	6	CX558120	Sub-panel		ハウジング	WH
※	7	CX557810	Button, Switch	BL,WN	キートップ (A)	START/PAUSE
※	7	CX557820	Button, Switch	WH	キートップ (A)	START/PAUSE
※	7	CX557830	Button, Switch	BL,WN	キートップ (A)	STOP
※	7	CX557840	Button, Switch	WH	キートップ (A)	STOP
※	8	CX557850	Button, Switch	BL,WN	キートップ (C)	REW
※	8	CX557860	Button, Switch	WH	キートップ (C)	REW
※	8	CX557870	Button, Switch	BL,WN	キートップ (C)	FF
※	8	CX557880	Button, Switch	WH	キートップ (C)	FF
※	8	CX557890	Button, Switch	BL,WN	キートップ (C)	−
※	8	CX557900	Button, Switch	WH	キートップ (C)	−
※	8	CX557910	Button, Switch	BL,WN	キートップ (C)	+
※	8	CX557920	Button, Switch	WH	キートップ (C)	+
※	9	CX557930	Button, Switch	BL,WN	キートップ (F)	Vol, Tempo
※	9	CX557940	Button, Switch	WH	キートップ (F)	Vol, Tempo
※	10	CX558420	Button, Switch	BL,WN	キートップ (D)	All Repeat
※	10	CX558450	Button, Switch	WH	キートップ (D)	All Repeat
※	10	CX558430	Button, Switch	BL,WN	キートップ (D)	1 Repeat
※	10	CX558460	Button, Switch	WH	キートップ (D)	1 Repeat
※	10	CX558440	Button, Switch	BL,WN	キートップ (D)	A•B Repeat
※	10	CX558470	Button, Switch	WH	キートップ (D)	A•B Repeat
※	10	CX558010	Button, Switch	BL,WN	キートップ (D)	L
※	10	CX558020	Button, Switch	WH	キートップ (D)	L
※	10	CX558030	Button, Switch	BL,WN	キートップ (D)	R
※	10	CX558040	Button, Switch	WH	キートップ (D)	R
※	11	CX558050	Button, Switch	BL,WN	キートップ (B)	REC.
※	11	CX558060	Button, Switch	WH	キートップ (B)	REC.
※	12	CX558070	Button, Switch	BL,WN	キートップ (E)	Power
※	12	CX558080	Button, Switch	WH	キートップ (E)	Power
	13	EI320066	Bind Head Tapping Screw	2×6 ZMC2-BL	バインドタッピングネジ	
※	14	AX550300	Spring		コイルスプリング	
※	15	JX550050	LED 7Seg. Indicator		7セグメント表示器	
※	16	KX550640	Micro Switch		MT スイッチ	
	17	IG136200	IC	SI-3052V	IC	2A5V Regulator
※	18	KX550100	Power Switch		パワースイッチ	
※	19	JX550060	Sensor, Remote Controller		リモコン受光器	
※	20	CX558150	Window		フィルター (A)	
※	21	CX558160	LCD Panel		表示板	
※	22	VE470300	CPU Circuit Board		CPU シート	
※	23	VF035500	FDD		FDD	VB072400
※	24	VB352400	LCD		LCD	
	25	EI330066	Bind Head Tapping Screw	3×6 ZMC2-BL	バインドタッピングネジ	
	26	EH340120	Truss Head Tapping Screw	4×12 ZMC2-BL	トラスタッピングネジ	
	27	ED330086	Bind Head Screw	3×8 ZMC2-BL	バインド小ネジ	
	28	EH340120	Truss Head Tapping Screw	4×12 ZMC2-BL	トラスタッピングネジ	
	29	EV203046	Flat Washer	φ4 ZMC2-BL	平座金	

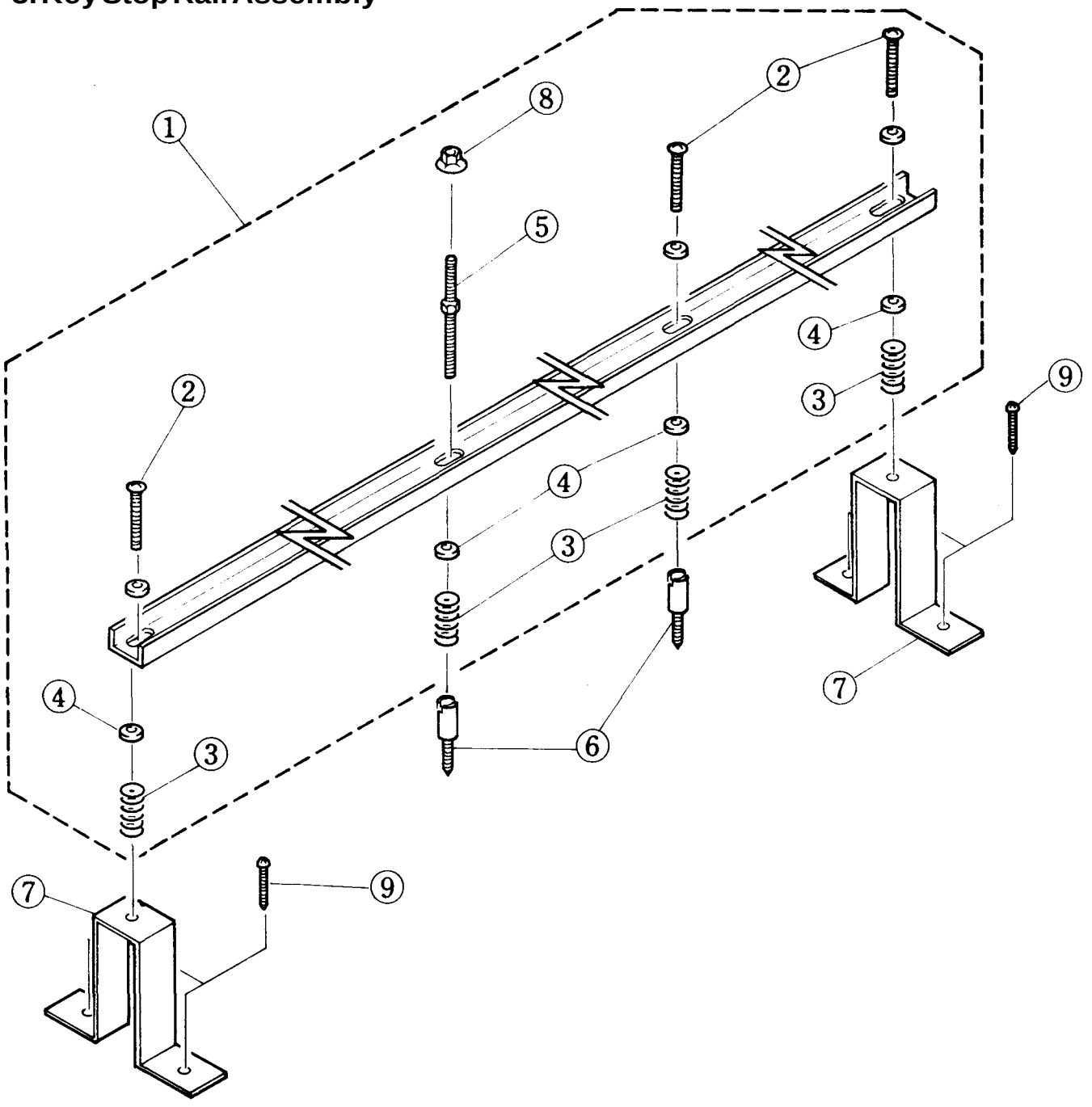
※ : New Parts （新規部品）

2. Control Unit

Ref. No.	Part No.	Description		部品名	Remarks
30	EV303046	Spring Washer	φ4 ZMC2-BL	バネ座金	
31	EI330056	Bind Head Tapping Screw	3×5 ZMC2-BL	バインドタッピングネジ	
32	EA026056	Pan Head Screw	2.6×5 ZMC2-Y	ナベ小ネジ	
※ 33	VE514700	Remote Control Unit		リモコンユニット	REC PB
※	MZ501260	Cable, CPU-FDD		CPU-FDD ケーブル	
※	VE479800	Cable, CPU-I O	34P	34芯接続ケーブル	

※ : New Parts (新規部品)

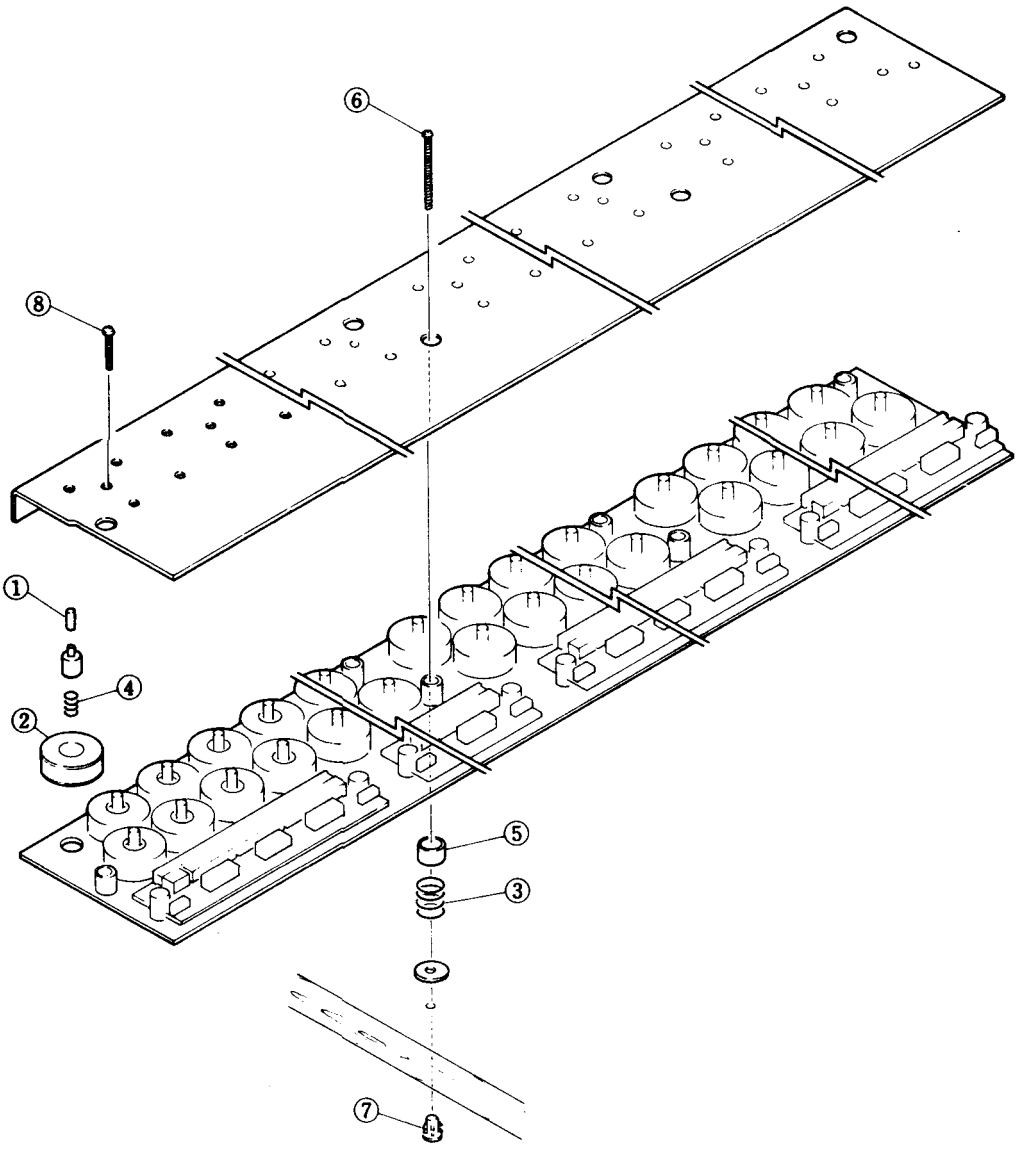
3. Key Stop Rail Assembly



	Ref. No.	Part No.	Description		部品名	Remarks
※	1	NB513830	Key Stop Rail Ass'y		鍵盤押え Ass'y	
	2	EC050300	Truss Head Screw	5×30 ZMC2-Y	トラス小ネジ	
※	3	AA504060	Spring		鍵盤押え調整バネ	
	4	EV200066	Flat Washer	φ6 ZMC2-Y	平座金	
※	5	AA504050	Bolt		鍵盤押えスクリューボルト	
※	6	AA504040	Shaft		鍵盤押え固定シャフト	
※	7	AA504130	Angle		鍵盤押え支持台	
	8	EX600170	Hexagonal Nut	M5	フランジ六角ナット	
	9	EH034020	Truss Head Tapping Screw	4×12 ZMC2-Y	トラスタッピングネジ	

※ : New Parts (新規部品)

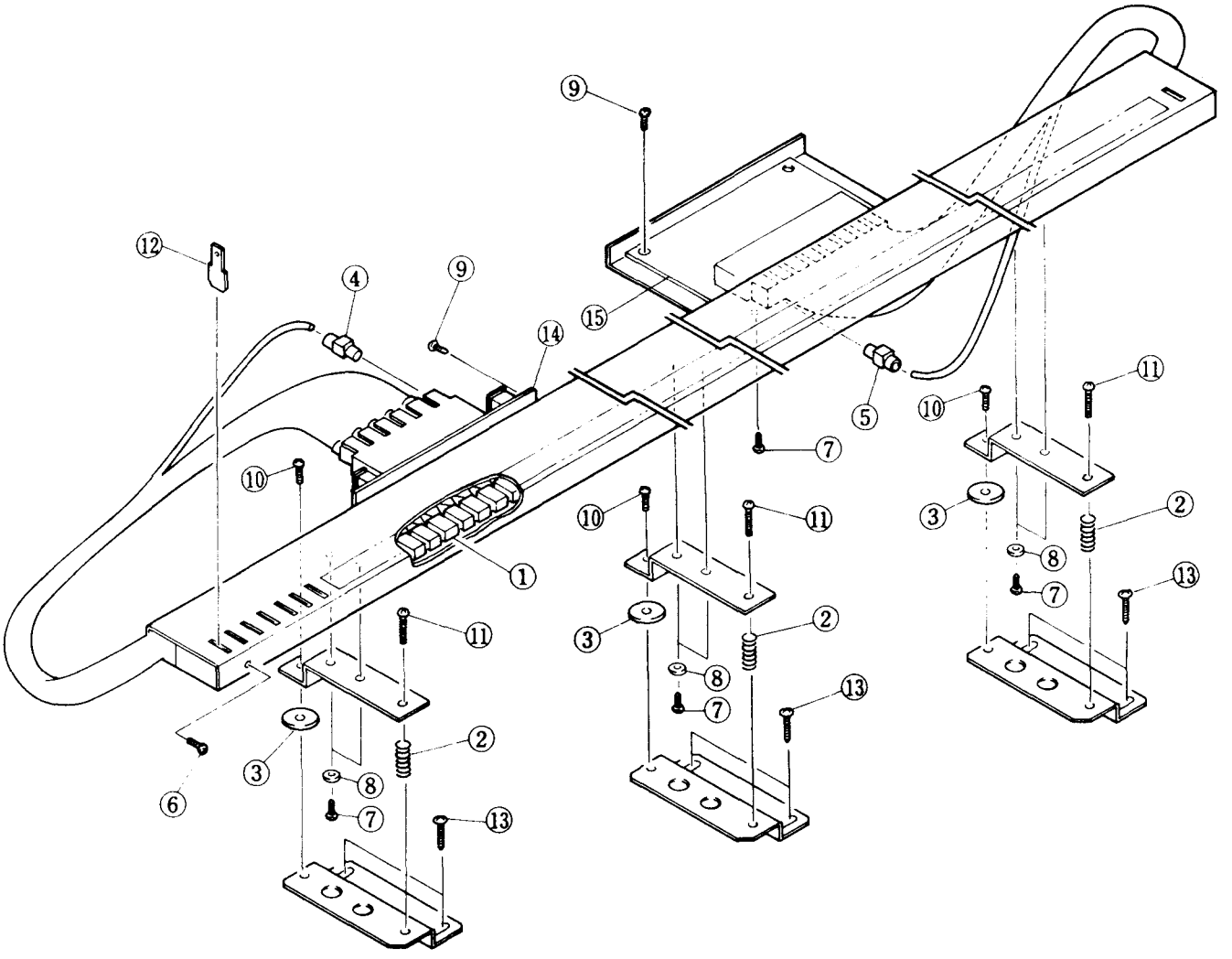
4. Key Drive Unit



	Ref. No.	Part No.	Description		部品名	Remarks
※		VE479600	Key Drive Unit		キードライブユニット	
※	1	CX558200	Damper(A)	BL	ゴムダンパー (A)	
※	1	CX558210	Damper(B)	WH	ゴムダンパー (B)	
※	2	BX550110	Plunger Ass'y(A)		プランジャー Ass'y(A)	
※	2	BX550120	Plunger Ass'y(B)	Front	プランジャー Ass'y(B)	
※	3	AX550340	Spring	Rear	クッションスプリング(A)	
※	4	AX550350	Spring		コイルスプリング	
※	5	CX558220	Bushing, Spring		スプリング固定ブッシュ	
	6	EA040550	Pan Head Screw	4×55 ZMC2-Y	ナベ小ネジ	
	7		Nut	B4×9.5 ZMC2-Y	ツバ付鬼目ナット	
	8	EX550050	Screw	M4	共通ヨーク固定ネジ	

※ : New Parts (新規部品)

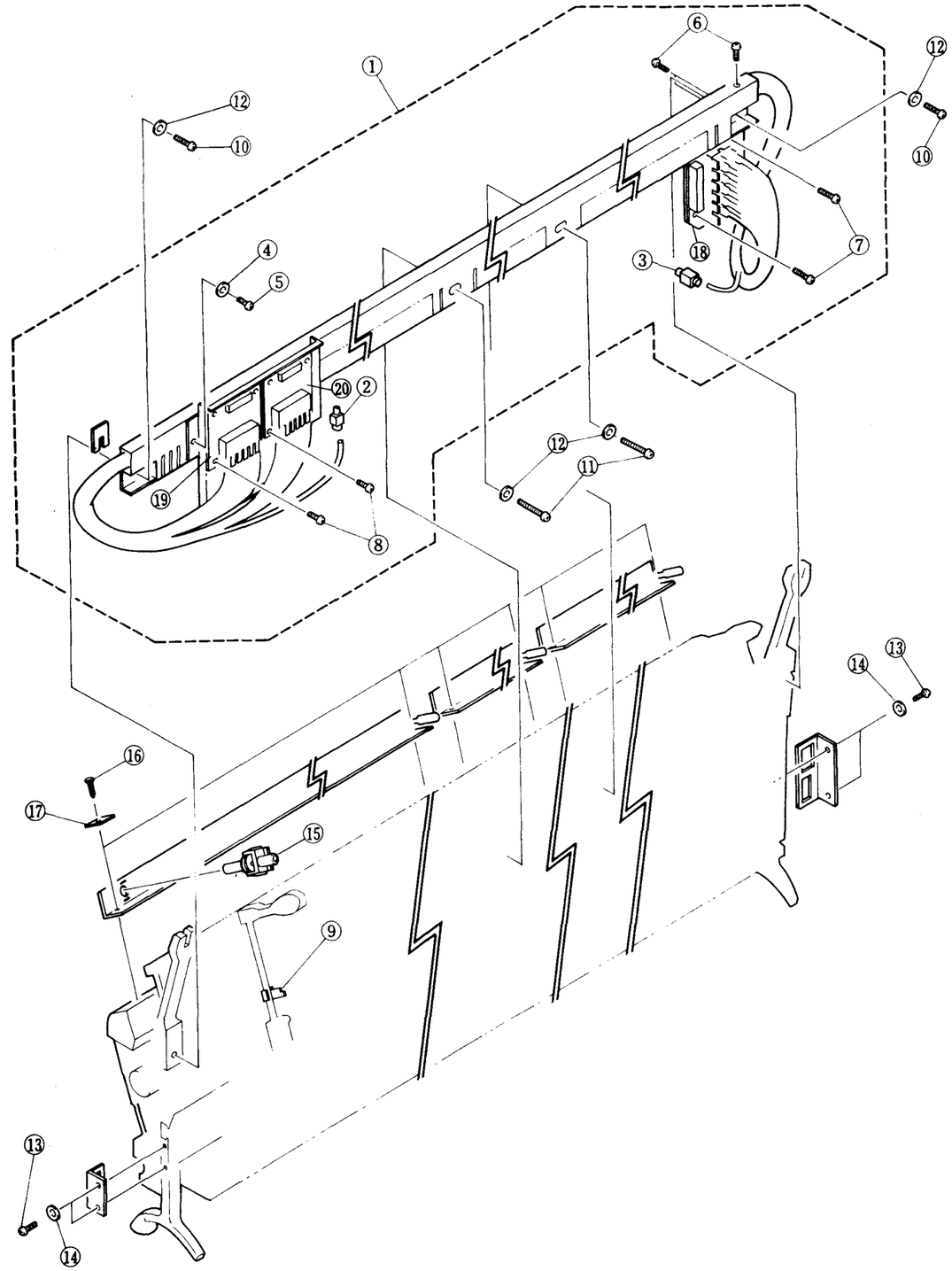
5.KeySensorUnit



	Ref. No.	Part No.	Description		部品名	Remarks
※		VE479300	Key Sensor Unit		キーセンサーユニット	
	1	CB502790	Sensor Head B		センサーヘッドB	
※	2	AA503970	Spring A	ZMC2-BL	高さ調整バネA	
※	3	CB502800	Spacer A		ゴムスペーサーA	
	4	CB502650	Plug	Emitter	発光プラグ	
	5	CB502700	Plug	Receiver	受光プラグ	
	6	EA330046	Pan Head Screw	3×4 ZMC2-BL	ナベ小ネジ	
	7	ED330306	Bind Head Screw	3×3 ZMC2-BL	バインド小ネジ	
	8	EV203036	Flat Washer	φ3	平座金	
	9	ED330056	Bind Head Screw	3×5 ZMC2-BL	バインド小ネジ	
	10	ED330086	Bind Head Screw	3×8 ZMC2-BL	バインド小ネジ	
	11	ED330166	Bind Head Screw	3×16 ZMC2-BL	バインド小ネジ	
	11	ED330186	Bind Head Screw	3×18 ZMC2-BL	バインド小ネジ	
	12	BB500690	Key Shutter	ZMC2-BL	キーシャッター	
	13	EH340120	Truss Head Tapping Screw	4×12 ZMC2-BL	トラスタッピングネジ	
※	14	VE471400	LED Drive Board		キー発光シート	
※	15	VE471200	M1 K Detect Board		M1 K受光シート	

※ : New Parts (新規部品)

6. Hammer Sensor Unit, Air Damper Unit

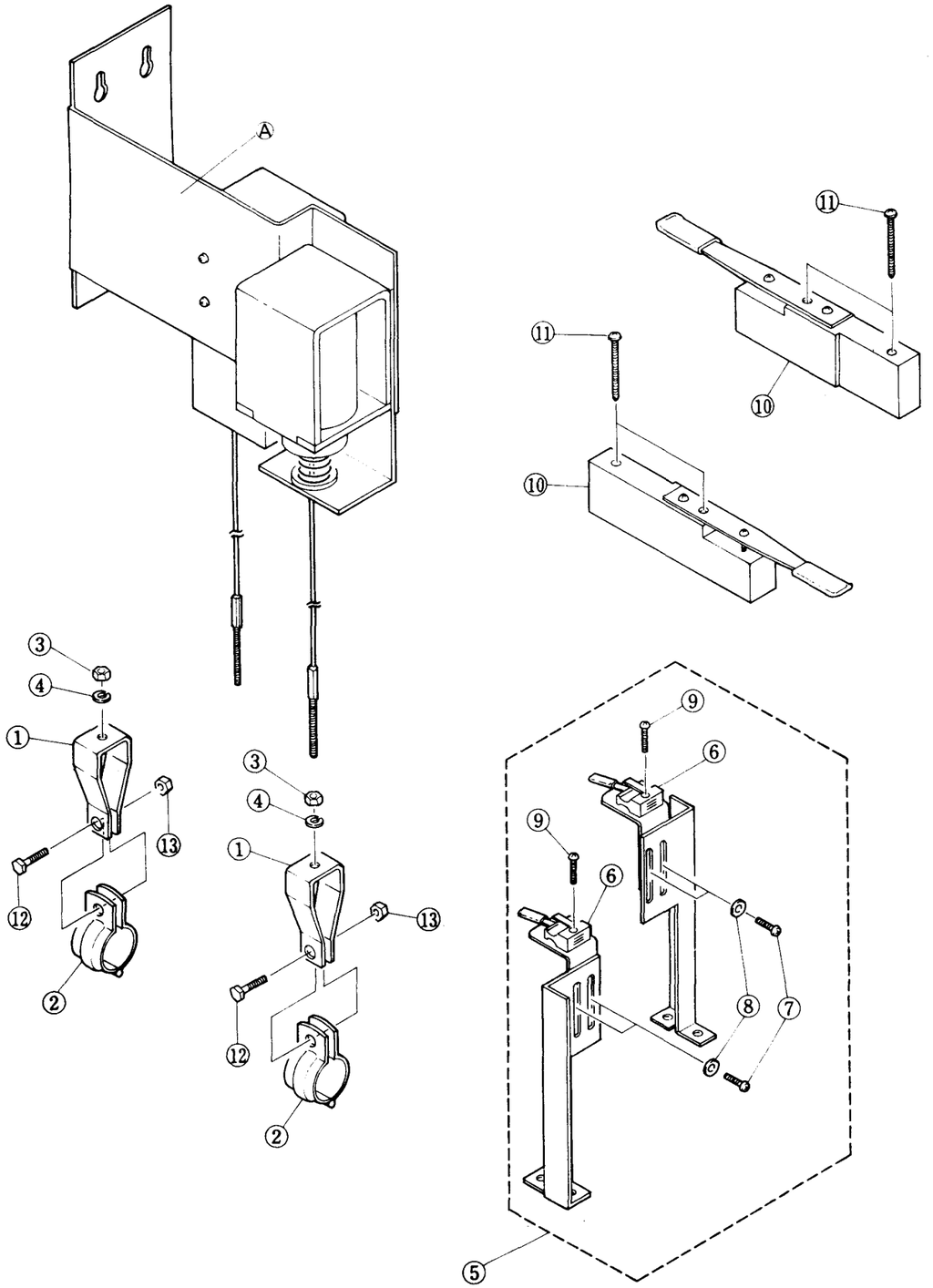


6. Hammer Sensor Unit, Air Damper Unit

	Ref. No.	Part No.	Description	M2	部品名	Remarks
※	1	VE479200	Hammer Sensor Unit		ハンマーセンサーユニット	
		CB502790	Sensor Head B		センサーヘッドB	
	2	CB502700	Plug	Receiver	受光プラグ	
	3	CB502600	Plug	Emitter	発光プラグ	
	4	EA030036	Pan Head Screw	3×3 ZMC2-Y	ナベ小ネジ	
	5	EV200036	Flat Washer	φ3	平座金	
	6	ED030046	Bind Head Screw	3×4 ZMC2-Y	バインド小ネジ	
	7	EA030086	Pan Head Screw	3×8 ZMC2-Y	ナベ小ネジ	
	8	ED030056	Bind Head Screw	3×5 ZMC2-Y	バインド小ネジ	
※	9	BB500670	Hammer Shutter A		ハンマーシャッターA	
	10	EA040106	Pan Head Screw	4×10 ZMC2-Y	ナベ小ネジ	
	11	EA040206	Pan Head Screw	4×20 ZMC2-Y	ナベ小ネジ	
	12	EV200046	Flat Washer	φ4	平座金	
	13	EA030046	Pan Head Screw	3×4 ZMC2-Y	ナベ小ネジ	
	14	EV200036	Flat Washer	φ3 ZMC2-Y	平座金	
※	15	NX509820	Air Dumper		エアーダンパー	
	16	EH040100	Truss Head Tapping Screw	4×10 ZMC2-Y	トラスタッピングネジ	
	17		Square Spring Washer	φ4	バネ座金(角)	
※	18	VE470900	LED Drive Board		ハンマー発光シート	
※	19	VE471200	M1 K Detect Board		M1 K受光シート	
※	20	VE471300	M2 Detect Board		M2 受光シート	

※ : New Parts （新規部品）

7. Pedal Drive Unit, Pedal Sensor Unit, Pedal Cushion Unit

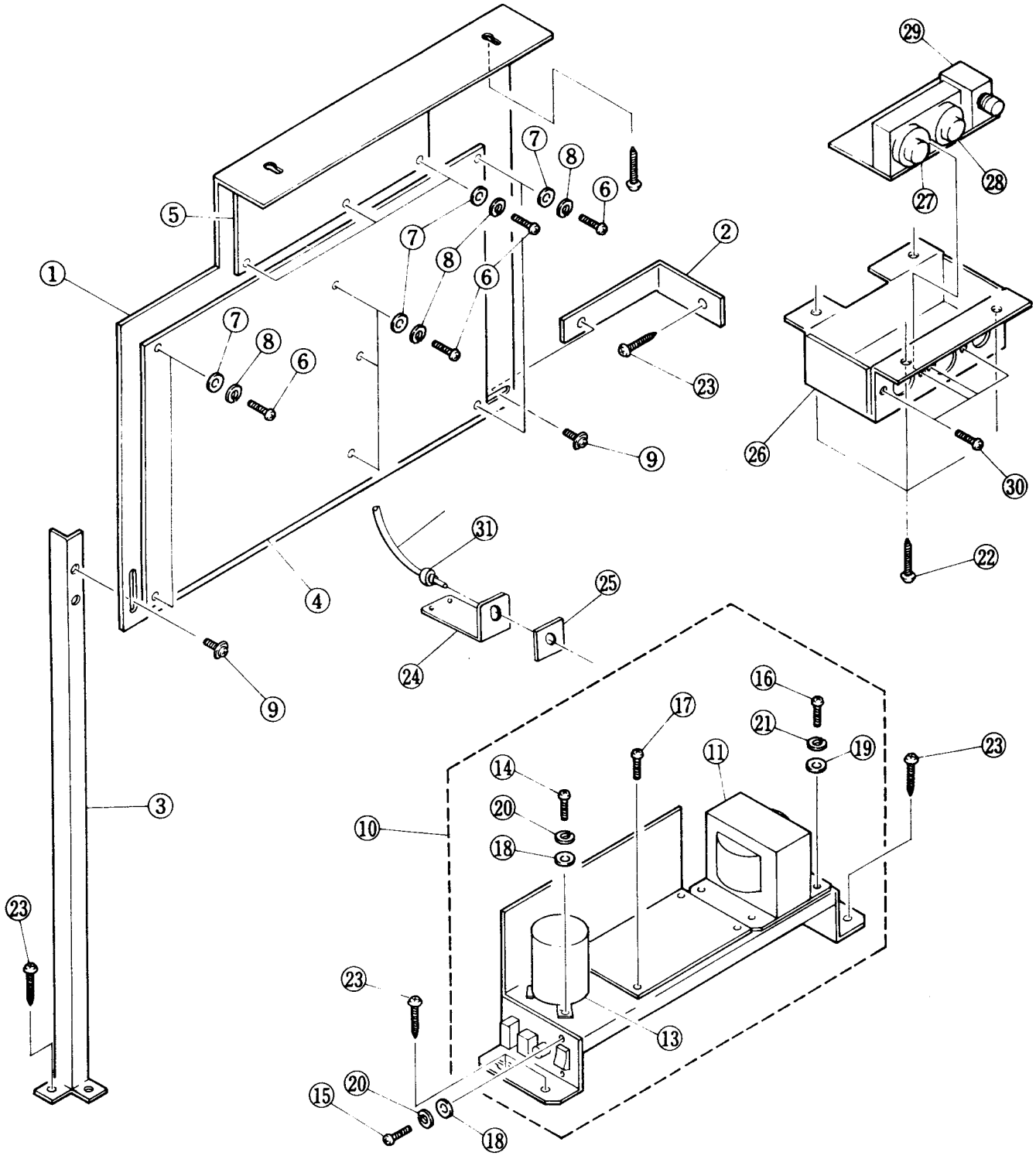


7. Pedal Drive Unit, Pedal Sensor Unit, Pedal Cushion Unit

	Ref. No.	Part No.	Description		部品名	Remarks
※	A	VE479700	Pedal Drive Unit		ペダルドライブユニット	
※	1	AA504080	Pedal Lever Hook		天秤止め金具	
※	2	AA504590	Pedal Lever Clamp		天秤吊りバンド	
	3	EV100046	Hexagonal Nut	M4 ZMC2-Y	六角ナット	
	4	EV300046	Spring Washer	φ4 ZMC2-Y	バネ座金	
※	5	NB513260	Pedal Sensor Unit A		ペダルセンサーユニットA	
	6	NB137040	PK Switch	(1T)	PKスイッチ	
	7	EA030046	Pan Head Screw	3×4 ZMC2-Y	ナベ小ネジ	
	8	EV200036	Flat Washer	φ4 ZMC2-Y	平座金	
	9	ED030126	Bind Head Screw	3×12 ZMC2-Y	バインド小ネジ	
※	10	NB513620	Pedal Cushion Ass'y		ペダルクッションAss'y	
	11	EK940406	Truss Head Tapping Screw	4×40 ZMC2-Y	トラスタッピングネジ	
※	12	EX801360	Hexagonal Bolt	M5×15 ZMC2-Y	六角ボルト	
※	13	EX600170	Hexagonal Nut	M5	フランジ六角ナット	

※ : New Parts （新規部品）

8. I/O Unit, Power Supply Unit, MIDI Unit



8. I/O Unit, Power Supply Unit, MIDI Unit

	Ref. No.	Part No.	Description		部品名	Remarks
	1		Bracket, I O Circuit Board		I Oシートブラケット	
	2		Angle		I Oシートブラケット支柱(右)	
	3		Angle		I Oシートブラケット(左)	
※	4	VE470200	I O Circuit Board		I O シート	
※	5	VE470400	Sensor (A) Board		センサーシート	
	6	EA030066	Pan Head Screw	3×6 ZMC2-Y	ナベ小ネジ	
	7	EV200036	Flat Washer	φ3 ZMC2-Y	平座金	
	8	EV300036	Spring Washer	φ3 ZMC2-Y	バネ座金	
	9	EK365020	BW Head Screw	4×6	BWH 小ネジ	
※	10	VD617900	Power Supply Unit		電源ユニット	
※	11	GX550670	Transformer	N36-506	電源トランス	
※	12	MG000820	AC Cable		電源コード	
	13	FX551610	Electrolytic Cap.	4700μF 160V	ケミコン	
	14	EA040066	Pan Head Screw	4×6 ZMC2-Y	ナベ小ネジ	
	15	EA030066	Pan Head Screw	3×6 ZMC2-Y	ナベ小ネジ	
		EA030186	Pan Head Screw	3×18 ZMC2-Y	ナベ小ネジ	Bridge Diode
		EA030106	Pan Head Screw	3×10 ZMC2-Y	ナベ小ネジ	Transistor
	16	EA050066	Pan Head Screw	5×6 ZMC2-Y	ナベ小ネジ	
	17	ED030046	Bind Head Screw	3×4 ZMC2-Y	バインド小ネジ	
	18	EV200036	Flat Washer	φ3 ZMC2-Y	平座金	
	19	EV200056	Flat Washer	φ5 ZMC2-Y	平座金	
	20	EV300036	Spring Washer	φ3 ZMC2-Y	バネ座金	
	21	EV300056	Spring Washer	φ5 ZMC2-Y	バネ座金	
		EV100036	Hexagonal Nut	M3 ZMC2-Y	六角ナット	Bridge Diode
	22	EH040168	Truss Tapping Screw	4×16 ZMC2-Y	トラスタッピングネジ	
	23	EH040126	Truss Tapping Screw	4×12 ZMC2-Y	トラスタッピングネジ	
※	24	VE545200	Cord Stopper		電源コード止め金具	
※	25	VE545100	Spacer Rubber		止め金具防振板	
※	26	VE512700	Panel, MIDI Socket		MIDI外部ユニットパネル	
	27	AA831250	Holder, DIN Socket		DIN ソケットホルダー	
	28	LB500520	DIN Socket	5P	DIN ソケット	
	29	LB202930	Phone Jack		フォンジャック	
	30	EA330066	Pan Head Screw	3×6 ZMC2-BL	ナベ小ネジ	
※		VE555800	Noise Filter		ノイズフィルター	
※	31	VE545300	Cord Bushing		コードブッシュ	

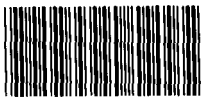
※ : New Parts (新規部品)

disklavier

YAMAHA CORPORATION

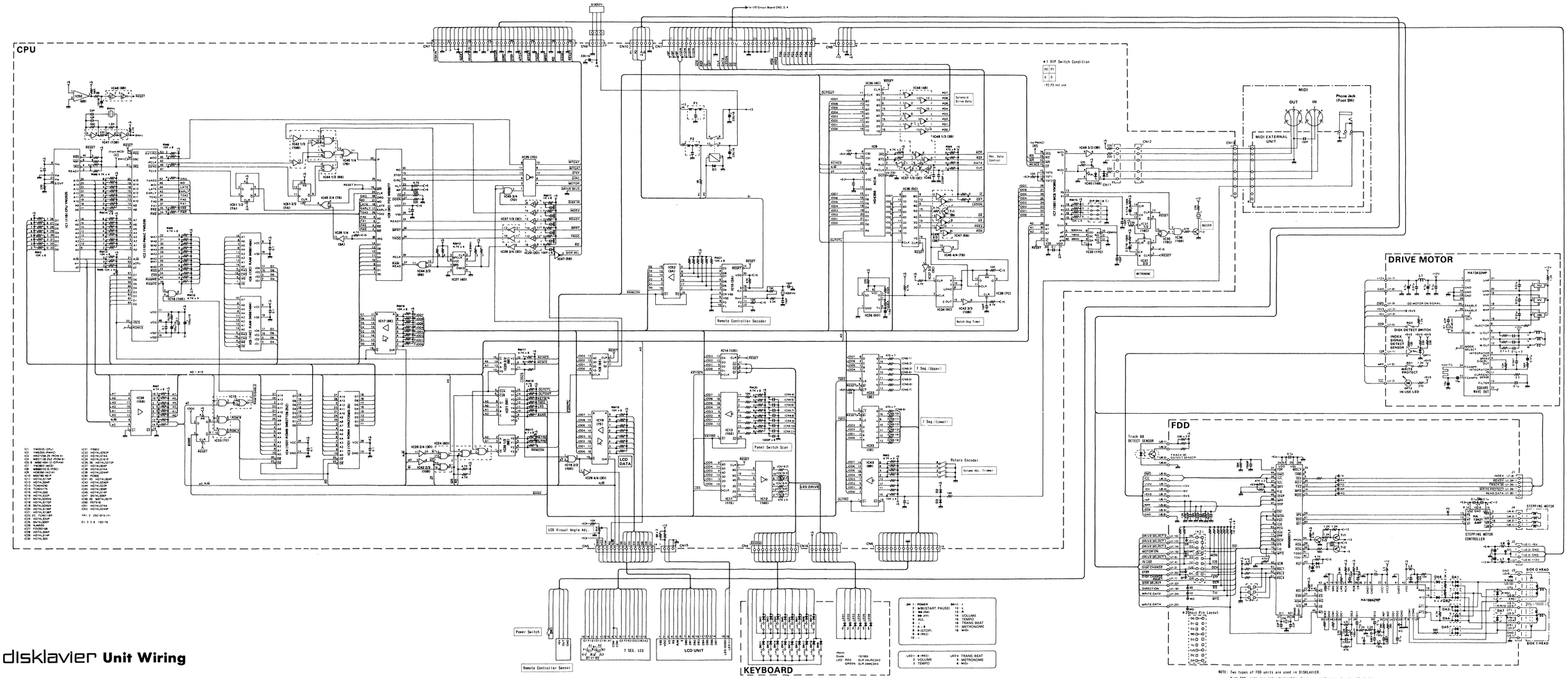
YAMAHA PARTS

MX100A SERVICE MANUAL



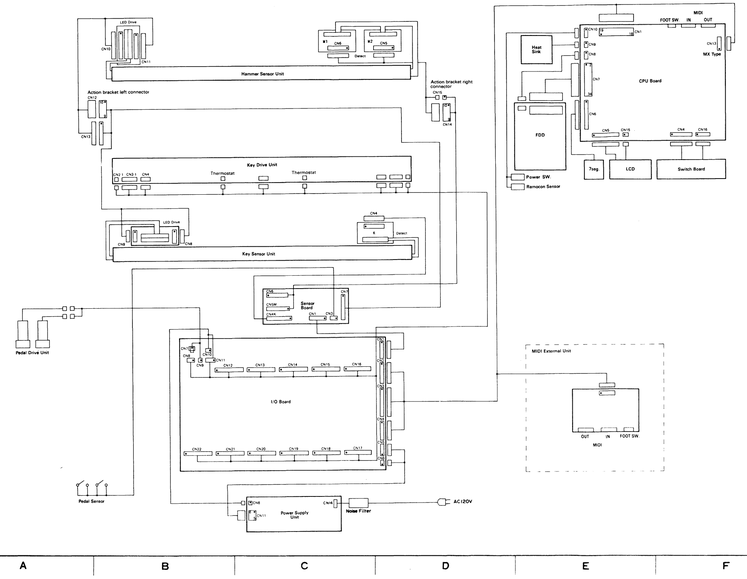
SM8549

disklavier Overall Circuit Diagram (CPU Section)



- IC1 YM3225 (CPU)
- IC2 YM2154B-E (MAC)
- IC3 HN27256-25 (ROM A)
- IC4 M5M11B-256 (ROM B)
- IC5-8 M5M51464E-12 (RAM)
- IC9 HD6303RP (CPU)
- IC10 M5M82C51P (PDC)
- IC11 HD6340-14 (S/A)
- IC12 M5M82-461P
- IC13 HD74LS32P
- IC14 HD74LS04P
- IC15 TC4040-40
- IC16 HD74LS00P
- IC17 SN74LS05
- IC18 HD74LS32P
- IC19 SN74LS245N
- IC20 HD74LS175P
- IC21 HD74LS138P
- IC22 HD74LS139P
- IC23 23 TC4011BP
- IC24 HD74LS10P
- IC25 SN74LS00P
- IC26 NJM555
- IC27 PQ012B1
- IC28 HD74LS14P
- IC29 HD74LS74P
- IC30 HD74L300
- IC31 PM01
- IC32 HD74LS123P
- IC33 HD74LS14
- IC34 HD74LS161P
- IC35 M5M82C51P
- IC36 HD74LS08P
- IC37 HD74LS74A
- IC38 HD74LS244P
- IC39 PQ08U5
- IC40 HD74LS04P
- IC41 HD74LS244P
- IC42 HD74LS32P
- IC43 HD74LS08P
- IC44 HD74LS10P
- IC45 SN74LS00P
- IC46 RE M5M74L5019P
- IC50 PST518
- IC51 HD74LS74A
- IC52 HD74LS244P
- TR1, 2 2SC1815 (Y)
- D1, 2, 3, 6 1SS176

disklavier Unit Wiring



CPU Board

CN1 (36P), (36P – MIX)

Pin #	Name	Pin #	Name
1	+5	19	GND
2	+5	20	GND
3	+12	21	GND
4	+12	22	GND
5	+12	23	GND
6	+12	24	GND
7	+12	25	PD0
8	DATA	26	PD1
9	CLK	27	PD2
10	SYNC	28	PD3
11	RST	29	PD4
12	DATA	30	PD5
13	CLK	31	PD6
14	SYNC	32	PD7
15	(M1/2)SW11	33	PD8
16	SW(3)SW16	34	PD9
17	SW(4)SW14	35	PD10
18	SW(5)SW12	36	PD11
19	SW(6)SW13		
20	SW(7)SW15		
21	SW(8)SW18(SHIFT)		

CN2 (11P)

Pin #	Name
1	PD0
2	PD1
3	PD2
4	PD3
5	PD4
6	PD5
7	PD6
8	PD7
9	PD8
10	PD9
11	PD10
12	PD11
13	GND
14	GND
15	GND

CN3 (15P)

Pin #	Name
1	+12V
2	+12V
3	+12V
4	+5VS
5	+5VS
6	+5VS
7	+5V3
8	GND A
9	GND A
10	+12V

CN4 (10P)

Pin #	Name
1	+12V
2	+12V
3	+12V
4	+5VS
5	+5VS
6	+5VS
7	+5V3
8	GND A
9	GND A
10	+12V

CN5 (6P)

Pin #	Name
1	GND A
2	+5VS
3	GND A
4	+5VS
5	GND A
6	+12V

CN6 (3P)

Pin #	Name
1	P.ON
2	GND
3	+5V

CN7 (3P)

Pin #	Name
1	SOFT PEDAL
2	GND
3	DAMPER PEDAL

CN8 (4P)

Pin #	Name
1	GND
2	GND
3	Tx
4	Rx

CN9 (2P)

Pin #	Name
1	+100V
2	+100V

CN10 (3P)

Pin #	Name
1	+100V
2	GND
3	GND

CN11 (5P)

Pin #	Name
1	+100V
2	+100V
3	+100V
4	+100V
5	+100V

CN12 (15P)

Pin #	Name
1	Key #1 (A)
2	Key #2 (A#)
3	Key #3 (B)
4	Key #4 (C)
5	Key #5 (C#)
6	Key #6 (D)
7	Key #7 (D#)
8	Key #8 (E)
9	Key #9 (F)
10	Key #10 (F#)
11	Key #11 (G)
12	Key #12 (G#)
13	Key #13 (A)
14	Key #14 (A#)
15	Key #15 (B)
16	Key #16 (C)

CN13 (15P)

Pin #	Name
1	Key #9 (F)
2	Key #10 (F#)
3	Key #11 (G)
4	Key #12 (G#)
5	Key #13 (A)
6	Key #14 (A#)
7	Key #15 (B)
8	Key #16 (C)
9	Key #17 (C)
10	Key #18 (D)
11	Key #19 (D#)
12	Key #20 (E)
13	Key #21 (F)
14	Key #22 (F#)
15	Key #23 (G)
16	Key #24 (G#)

CN14 (15P)

Pin #	Name
1	Key #25 (A)
2	Key #26 (A#)
3	Key #27 (B)
4	Key #28 (C)
5	Key #29 (C#)
6	Key #30 (D)
7	Key #31 (D#)
8	Key #32 (E)
9	Key #33 (F)
10	Key #34 (F#)
11	Key #35 (G)
12	Key #36 (G#)
13	Key #37 (A)
14	Key #38 (A#)
15	Key #39 (B)
16	Key #40 (C)

CN15 (15P)

Pin #	Name
1	Key #41 (C#)
2	Key #42 (D)
3	Key #43 (D#)
4	Key #44 (E)
5	Key #45 (F)
6	Key #46 (F#)
7	Key #47 (G)
8	Key #48 (G#)
9	Key #49 (A)
10	Key #50 (A#)
11	Key #51 (B)
12	Key #52 (C)
13	Key #53 (C#)
14	Key #54 (D)
15	Key #55 (D#)
16	Key #56 (E)
17	Key #57 (F)
18	Key #58 (F#)
19	Key #59 (G)
20	Key #60 (G#)
21	Key #61 (A)
22	Key #62 (A#)
23	Key #63 (B)
24	Key #64 (C)

CN16 (15P)

Pin #	Name
1	Key #65 (C)
2	Key #66 (C#)
3	Key #67 (D)
4	Key #68 (D#)
5	Key #69 (E)
6	Key #70 (F)
7	Key #71 (F#)
8	Key #72 (G)
9	Key #73 (G#)
10	Key #74 (A)
11	Key #75 (A#)
12	Key #76 (B)
13	Key #77 (C)
14	Key #78 (C#)
15	Key #79 (D)
16	Key #80 (D#)

CN17 (15P)

Pin #	Name
1	Key #81 (E)
2	Key #82 (F)
3	Key #83 (F#)
4	Key #84 (G)
5	Key #85 (G#)
6	Key #86 (A)
7	Key #87 (A#)
8	Key #88 (B)
9	Key #89 (C)
10	Key #90 (C#)
11	Key #91 (D)
12	Key #92 (D#)
13	Key #93 (E)
14	Key #94 (F)
15	Key #95 (F#)
16	Key #96 (G)
17	Key #97 (G#)
18	Key #98 (A)
19	Key #99 (A#)
20	Key #100 (B)
21	Key #101 (C)
22	Key #102 (C#)
23	Key #103 (D)
24	Key #104 (D#)
25	Key #105 (E)
26	Key #106 (F)
27	Key #107 (F#)
28	Key #108 (G)

CN18 (15P)

Pin #	Name
1	Key #109 (G#)
2	Key #110 (A)
3	Key #111 (A#)
4	Key #112 (B)
5	Key #113 (C)
6	Key #114 (C#)
7	Key #115 (D)
8	Key #116 (D#)
9	Key #117 (E)
10	Key #118 (F)
11	Key #119 (F#)
12	Key #120 (G)
13	Key #121 (G#)
14	Key #122 (A)
15	Key #123 (A#)
16	Key #124 (B)
17	Key #125 (C)
18	Key #126 (C#)
19	Key #127 (D)
20	Key #128 (D#)

CN19 (15P)

Pin #	Name
1	Key #129 (E)
2	Key #130 (F)
3	Key #131 (F#)
4	Key #132 (G)
5	Key #133 (G#)
6	Key #134 (A)
7	Key #135 (A#)
8	Key #136 (B)
9	Key #137 (C)
10	Key #138 (C#)
11	Key #139 (D)
12	Key #140 (D#)
13	Key #141 (E)
14	Key #142 (F)
15	Key #143 (F#)
16	Key #144 (G)
17	Key #145 (G#)
18	Key #146 (A)
19	Key #147 (A#)
20	Key #148 (B)
21	Key #149 (C)
22	Key #150 (C#)
23	Key #151 (D)
24	Key #152 (D#)
25	Key #153 (E)
26	Key #154 (F)
27	Key #155 (F#)
28	Key #156 (G)

CN20 (15P)

Pin #	Name
1	Key #157 (G#)
2	Key #158 (A)
3	Key #159 (A#)
4	Key #160 (B)
5	Key #161 (C)
6	Key #162 (C#)
7	Key #163 (D)
8	Key #164 (D#)
9	Key #165 (E)
10	Key #166 (F)
11	Key #167 (F#)
12	Key #168 (G)
13	Key #169 (G#)
14	Key #170 (A)
15	Key #171 (A#)
16	Key #172 (B)
17	Key #173 (C)
18	Key #174 (C#)
19	Key #175 (D)
20	Key #176 (D#)
21	Key #177 (E)
22	Key #178 (F)
23	Key #179 (F#)
24	Key #180 (G)
25	Key #181 (G#)
26	Key #182 (A)
27	Key #183 (A#)
28	Key #184 (B)

CN21 (15P)

Pin #	Name
1	Key #185 (C)
2	Key #186 (C#)
3	Key #187 (D)
4	Key #188 (D#)
5	Key #189 (E)
6	Key #190 (F)
7	Key #191 (F#)
8	Key #192 (G)
9	Key #193 (G#)
10	Key #194 (A)
11	Key #195 (A#)
12	Key #196 (B)
13	Key #197 (C)
14	Key #198 (C#)
15	Key #199 (D)
16	Key #200 (D#)
17	Key #201 (E)
18	Key #202 (F)
19	Key #203 (F#)
20	Key #204 (G)
21	Key #205 (G#)
22	Key #206 (A)
23	Key #207 (A#)
24	Key #208 (B)
25	Key #209 (C)
26	Key #210 (C#)
27	Key #211 (D)
28	Key #212 (D#)

CN22 (15P)

Pin #	Name
1	Key #213 (E)
2	Key #214 (F)
3	Key #215 (F#)
4	Key #216 (G)
5	Key #217 (G#)
6	Key #218 (A)
7	Key #219 (A#)
8	Key #220 (B)
9	Key #221 (C)
10	Key #222 (C#)
11	Key #223 (D)
12	Key #224 (D#)
13	Key #225 (E)
14	Key #226 (F)
15	Key #227 (F#)
16	Key #228 (G)
17	Key #229 (G#)
18	Key #230 (A)
19	Key #231 (A#)
20	Key #232 (B)
21	Key #233 (C)
22	Key #234 (C#)
23	Key #235 (D)
24	Key #236 (D#)
25	Key #237 (E)
26	Key #238 (F)
27	Key #239 (F#)
28	Key #240 (G)

I/O Board

CN1 (8P)

Pin #	Name
1	ADR
2	ADR
3	DEV
4	DEV
5	CLK
6	DATA
7	DATA
8	GND

CN2 (11P)

Pin #	Name
1	ADR
2	ADR
3	DEV
4	DEV
5	CLK
6	DATA
7	DATA
8	GND A
9	GND A
10	GND A
11	GND

CN3 (15P)

Pin #	Name
1	PD0
2	PD1
3	PD2
4	PD3
5	PD4
6	PD5
7	PD6
8	PD7
9	PD8
10	PD9
11	PD10
12	PD11
13	GND
14	GND
15	GND

CN4 (10P)

Pin #	Name
1	+12V
2	+12V
3	+12V
4	+5VS
5	+5VS
6	+5VS
7	+5V3
8	GND A
9	GND A
10	+12V

CN5 (6P)

Pin #	Name
1	GND A
2	+5VS
3	GND A
4	+5VS
5	GND A
6	+12V

CN6 (3P)

Pin #	Name
1	P.ON
2	GND
3	+5V

CN7 (3P)

Pin #	Name
1	SOFT PEDAL
2	GND
3	DAMPER PEDAL

CN8 (4P)

Pin #	Name
1	GND
2	GND
3	Tx
4	Rx

CN9 (2P)

Pin #	Name
1	+100V
2	+100V

CN10 (3P)

Pin #	Name
1	+100V
2	GND
3	GND

CN11 (5P)

Pin #	Name
1	+100V
2	+100V
3	+100V
4	+100V
5	+100V

CN12 (15P)

Pin #	Name
1	Key #1 (A)
2	Key #2 (A#)
3	Key #3 (B)
4	Key #4 (C)
5	Key #5 (C#)
6	Key #6 (D)
7	Key #7 (D#)
8	Key #8 (E)
9	Key #9 (F)
10	Key #10 (F#)
11	Key #11 (G)
12	Key #12 (G#)
13	Key #13 (A)
14	Key #14 (A#)
15	Key #15 (B)
16	Key #16 (C)

CN13 (15P)

Pin #	Name
1	Key #17 (C#)
2	Key #18 (D)
3	Key #19 (D#)
4	Key #20 (E)
5	Key #21 (F)
6	Key #22 (F#)
7	Key #23 (G)
8	Key #24 (G#)
9	Key #25 (A)
10	Key #26 (A#)
11	Key #27 (B)
12	Key #28 (C)
13	Key #29 (C#)
14	Key #30 (D)
15	Key #31 (D#)
16	Key #32 (E)

CN14 (15P)

Pin #	Name
1	Key #33 (F)
2	Key #34 (F#)
3	Key #35 (G)
4	Key #36 (G#)
5	Key #37 (A)
6	Key #38 (A#)
7	Key #39 (B)
8	Key #40 (C)
9	Key #41 (C#)
10	Key #42 (D)
11	Key #43 (D#)
12	Key #44 (E)
13	Key #45 (F)
14	Key #46 (F#)
15	Key #47 (G)
16	Key #48 (G#)

CN15 (15P)

Pin #	Name
1	Key #49 (A)
2	Key #50 (A#)
3	Key #51 (B)
4	Key #52 (C)
5	Key #53 (C#)
6	Key #54 (D)
7	Key #55 (D#)
8	Key #56 (E)
9	Key #57 (F)
10	Key #58 (F#)
11	Key #59 (G)
12	Key #60 (G#)
13	Key #61 (A)
14	Key #62 (A#)
15	Key #63 (B)
16	Key #64 (C)

CN16 (15P)

Pin #	Name
1	Key #65 (C)
2	Key #66 (C#)
3	Key #67 (D)
4	Key #68 (D#)
5	Key #69 (E)
6	Key #70 (F)
7	Key #71 (F#)
8	Key #72 (G)
9	Key #73 (G#)
10	Key #74 (A)
11	Key #75 (A#)
12	Key #76 (B)
13	Key #77 (C)
14	Key #78 (C#)
15	Key #79 (D)
16	Key #80 (D#)

CN17 (15P)

Pin #	Name
1	Key #81 (E)
2	Key #82 (F)
3	Key #83 (F#)
4	Key #84 (G)
5	Key #85 (G#)
6	Key #86 (A)
7	Key #87 (A#)
8	Key #88 (B)
9	Key #89 (C)
10	Key #90 (C#)
11	Key #91 (D)
12	Key #92 (D#)
13	Key #93 (E)
14	Key #94 (F)
15	Key #95 (F#)
16	Key #96 (G)

CN18 (15P)

Pin #	Name
1	Key #97 (G#)
2	Key #98 (A)
3	Key #99 (A#)
4	Key #100 (B)
5	Key #101 (C)
6	Key #102 (C#)
7	Key #103 (D)
8	Key #104 (D#)
9	Key #105 (E)
10	Key #106 (F)
11	Key #107 (F#)
12	Key #108 (G)
13	Key #109 (G#)
14	Key #110 (A)
15	Key #111 (A#)
16	Key #112 (B)
17	Key #113 (C)
18	Key #114 (C#)
19	Key #115 (D)
20	Key #116 (D#)

CN19 (15P)

Pin #	Name
1	Key #117 (E)
2	Key #118 (F)
3	Key #119 (F#)
4	Key #120 (G)
5	Key #121 (G#)
6	Key #122 (A)
7	Key #123 (A#)
8	Key #124 (B)
9	Key #125 (C)
10	Key #126 (C#)
11	Key #127 (D)
12	Key #128 (D#)
13	Key #129 (E)
14	Key #130 (F)
15	Key #131 (F#)
16	Key #132 (G)
17	Key #133 (G#)
18	Key #134 (A)
19	Key #135 (A#)
20	Key #136 (B)
21	Key #137 (C)
22	Key #138 (C#)
23	Key #139 (D)
24	Key #140 (D#)
25	Key #141 (E)
26	Key #142 (F)
27	Key #143 (F#)
28	Key #144 (G)

CN20 (15P)

Pin #	Name
1	Key #145 (G#)
2	Key #146 (A)
3	Key #147 (A#)
4	Key #148 (B)
5	Key #149 (C)
6	Key #150 (C#)
7	Key #151 (D)
8	Key #152 (D#)
9	Key #153 (E)
10	Key #154 (F)
11	Key #155 (F#)
12	Key #156 (G)
13	Key #157 (G#)
14	Key #158 (A)
15	Key #159 (A#)
16	Key #160 (B)
17	Key #161 (C)
18	Key #162 (C#)
19	Key #163 (D)
20	Key #164 (D#)
21	Key #165 (E)
22	Key #166 (F)
23	Key #167 (F#)
24	Key #168 (G)
25	Key #169 (G#)
26	Key #170 (A)
27	Key #171 (A#)
28	Key #172 (B)

CN21 (15P)

Pin #	Name
1	Key #173 (C)
2	Key #174 (C#)
3	Key #175 (D)
4	Key #176 (D#)
5	Key #177 (E)
6	Key #178 (F)
7	Key #179 (F#)
8	Key #180 (G)
9	Key #181 (G#)
10	Key #182 (A)
11	Key #183 (A#)
12	Key #184 (B)
13	Key #185 (C)
14	Key #186 (C#)
15	Key #187 (D)
16	Key #188 (D#)
17	Key #189 (E)
18	Key #190 (F)
19	Key #191 (F#)
20	Key #192 (G)
21	Key #193 (G#)
22	Key #194 (A)
23	Key #195 (A#)
24	Key #196 (B)
25	Key #197 (C)
26	Key #198 (C#)
27	Key #199 (D)
28	Key #200 (D#)

CN22 (15P)

Pin #	Name
1	Key #201 (E)
2	Key #202 (F)
3	Key #203 (F#)
4	Key #204 (G)
5	Key #205 (G#)
6	Key #206 (A)
7	Key #207 (A#)
8	Key #208 (B)
9	Key #209 (C)
10	Key #210 (C#)
11	Key #211 (D)
12	Key #212 (D#)
13	Key #213 (E)
14	Key #214 (F)
15	Key #215 (F#)
16	Key #216 (G)
17	Key #217 (G#)
18	Key #218 (A)
19	Key #219 (A#)
20	Key #220 (B)
21	Key #221 (C)
22	Key #222 (C#)
23	Key #223 (D)
24	Key #224 (D#)
25	Key #225 (E)
26	Key #226 (F)
27	Key #227 (F#)
28	Key #228 (G)

Sensor Board

CN1 (3P)

Pin #	Name
1	SW
2	SW
3	GND

CN2 (6P)

Pin #	Name
1	SW
2	SW
3	GND
4	GND
5	DATA
6	+5V

CN3 (6P)

Pin #	Name
1	SW
2	SW
3	GND
4	GND
5	DATA
6	+5V

CN4K (13P)

Pin #	Name
1	0.Out
2	1.Out
3	2.Out
4	3.Out
5	4.Out
6	5.Out
7	6.Out
8	7.Out
9	+5V
10	GND
11	GND
12	GND

CN5M (12P)

Pin #	Name
1	8.Out
2	9.Out
3	A.Out
4	B.Out
5	C.Out
6	D.Out
7	E.Out
8	F.Out
9	+5V
10	GND
11	GND
12	GND

CN6 (11P)

Pin #	Name
1	0.Out
2	1.Out
3	2.Out
4	3.Out
5	4.Out
6	5.Out
7	6.Out
8	7.Out
9	+5V
10	GND
11	GND

CN7 (13P)

Pin #	Name
1	+5V
2	D
3	GND
4	GND
5	F
6	E
7	+5V
8	D
9	C
10	B
11	A
12	9
13	8

Key Sensor Unit

Key Emitter Board

CN8 (7P)

Pin #	Name
1	+5
2	5
3	4
4	3
5	2
6	1
7	GP

CN9 (6P)

Pin #	Name
1	6
2	5
3	4
4	3
5	2
6	1

Key Receiver Board

CN10 (11P)

Pin #	Name
1	0.Out
2	1.Out
3	2.Out
4	3.Out
5	4.Out
6	5.Out
7	6.Out
8	7.Out
9	GND
10	GND
11	GND

Hammer Sensor Unit

Hammer Emitter Board

CN10 (16P)

Pin #	Name
1	5V
2	GP
3	6
4	5
5	4
6	3
7	2
8	1
9	GP
10	6
11	5
12	4
13	3
14	2
15	1
16	GP

CN11 (13P)

Pin #	Name
1	GP
2	6
3	5
4	4
5	3
6	2
7	1
8	GP
9	6
10	5
11	4
12	3
13	2

M1 Detect Circuit Board

CN5 (11P)

Pin #	Name
1	0.Out
2	1.Out
3	2.Out
4	3.Out
5	4.Out
6	5.Out
7	+5V
8	GND
9	GND
10	GND
11	GND

M2 Detect Circuit Board

CN6 (11P)

Pin #	Name
1	0.Out
2	1.Out
3	2.Out
4	3.Out
5	4.Out
6	5.Out
7	+5V
8	GND
9	GND
10	GND
11	GND

Key Solenoid Unit

CN2-1 (2P)

Pin #	Name
1	+100V
2	+100V

CN3-1 (7P)

Pin #	Name
1	Key #1 (A)
2	Key #2 (A#)
3	Key #3 (B)
4	Key #4 (C)

CN4 (5P)

Pin #	Name
1	Key #5 (C#)
2	Key #6 (D)
3	Key #7 (D#)

Power Supply Unit

CN8 (2P)

Pin #	Name
1	AC120V
2	AC120V

CN11 (10P)

Pin #	Name
1	+5V
2	+5VS
3	+12V
4	+5V
5	GND
6	GND A
7	+5V
8	+5VS
9	+12V
10	GND A

MIDI External Unit

(8P)

Pin #	Name
1	MIDI OUT Pin #4
2	MIDI OUT Pin #5
3	GND
4	MIDI IN Pin #4
5	MIDI IN Pin #5
6	FOOT SW Pin #2
7	GND
8	GND

NOTE: Two types of FDD units are used in DISKLAVIER.
Both FDD units are interchangeable, however, each connector is attached in reverse.

disklavier Overall Circuit Diagram (I/O,Sensor Section)

KEY SOLENOID UNIT

I/O

PEDAL SOLENOID UNIT

SENSOR

POWER SUPPLY UNIT