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Internal use only

SC03-9B002(Rev.2)

Applicable lots:
0312001lot ~

Revision Date: Nov. 2013

Terumo Sterile Tubing Welder

TSCD-II

Code No : ME*SC203A

Service Manual

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Revision History (TSCD-II)

Revision	Page	Contents	How to treat each of page revised (*)	ME Center Manager
0	All pages	Establishment by the documents (product standard documents, documents concerned) maintenance of TSCD-II (export). (No.5882)	-	Iizuka 01.27.2011
1	Front cover	Cover substitution by the revision.	Change	Inaba 12.03.2012
	Revision History	Revision history addition by the service manual revision.	Addition	
	All pages	It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.)	Change	
	8-1(1)	Operation flowchart, review	Change	
	8-1-5(1)	Screw name, review	Change	
	8-1-7(1) to 8-1-7(4)	<ul style="list-style-type: none"> • Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) • It's reviewed a page number to a chapter number by consecutive number. • Screw name, review (The underlined parts are revised.) 	Change	
	8-1-8(1)	<ul style="list-style-type: none"> • It's reviewed a page number to a chapter number by consecutive number. • Screw name, review (The underlined parts are revised.) 	Change	
	8-1-9(1)	<ul style="list-style-type: none"> • Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) • It's reviewed a page number to a chapter number by consecutive number. • Screw name, review (The underlined parts are revised.) 	Change	
	8-1-9(2)	<ul style="list-style-type: none"> • For TSCDs manufactured in Jan. '08 and later, add a screw during securing the base cover unit. • It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	
	8-1-10(1), 8-1-12(2) to 8-1-14(2)	<ul style="list-style-type: none"> • It's reviewed a page number to a chapter number by consecutive number. • Screw name, review (The underlined parts are revised.) 	Change	
	8-1-15(1) to 8-1-15(3)	<ul style="list-style-type: none"> • Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) • It's reviewed a page number to a chapter number by consecutive number. • Screw name, review (The underlined parts are revised.) 	Change	

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Revision	Page	Contents	How to treat each of page revised (*)	ME Center Manager
1	8-1-15(4)	<ul style="list-style-type: none"> For TSCDs with lot '1203 and later, add a procedure to remove the reinforcement before removing the wafer feed unit. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Addition	Inaba 12.03.2012
	8-1-16(1) to 8-1-17(3)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-1-17(4)	<ul style="list-style-type: none"> Due to the addition of reinforcement to the chassis unit, add a new page. (No.6260) It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	
	8-1-18(1) to 8-1-18(3)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-1-18(4) to 8-1-18(5)	<ul style="list-style-type: none"> Due to the addition of reinforcement to the chassis unit, add a new page. (No.6260) It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	
	8-2(1)	Operation flowchart, review (The underlined parts are revised.)	Change	
	8-2-1(1) to 8-2-1(3)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-1(4) to 8-2-1(5)	<ul style="list-style-type: none"> Due to the addition of reinforcement to the chassis unit, add a new page. (No.6260) It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	
	8-2-1(1) to 8-2-1(2)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	

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Revision	Page	Contents	How to treat each of page revised (*)	ME Center Manager
1	8-2-2(3) to 8-2-2(5)	<ul style="list-style-type: none"> Due to the addition of reinforcement to the chassis unit, add a new page. Clearance confirmation procedure addition with the ferrite core addition to rear panel unit. (No.6260) It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	Inaba 12.03.2012
	8-2-3(1)	<ul style="list-style-type: none"> For TSCDs with lot '1203 and later, add a procedure to attach the reinforcement together with the wafer feed unit. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-3(2) to 8-2-3(3)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-3(4) to 8-2-3(5)	<ul style="list-style-type: none"> Due to the addition of reinforcement to the chassis unit, add a new page. (No.6260) It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	
	8-2-5(1) to 8-2-6(1)	<ul style="list-style-type: none"> Move "8.2.10 Attach right clamp unit" and "8.2.11 Attach left clamp unit." (Renumber the sections from "8.2.5 Attach main CPU board" to "8.2.9 Attach top main cover" accordingly.) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-7(1) to 8-2-8(1)	<ul style="list-style-type: none"> It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-9(1)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) Add a procedure to also screw GID-WAF-EXIT-B (installed between frame unit and base cover unit) for TSCDs manufactured in January'08 and after. It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	

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1	8-2-9(2)	<ul style="list-style-type: none"> Due to the addition of reinforcement to the chassis unit, add a new page. (No.6260) It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Addition	Inaba 12.03.2012
	8-2-10(1) to 8-2-11(3)	<ul style="list-style-type: none"> It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-12(1)	<ul style="list-style-type: none"> Include pictures showing before and after addition of the reinforcement to the chassis. (No.6260) It's reviewed a page number to a chapter number by consecutive number. Screw name, review (The underlined parts are revised.) 	Change	
	8-2-13(1) to 13-3	<ul style="list-style-type: none"> It's reviewed a page number to a chapter number by consecutive number. (The underlined parts are revised.) 	Change	
2	7-1 to 7-2	Correct errors.(Code number ⇒ Parts Code)	Change	Toshiaki 11.14.2013
	7-1 to 7-12	Discontinue some of the current parts and replace with a new one. Prepare new service parts. (No.6456)	Change	
	8-2-2(5)	Correct the contents of the check point 2 to 4.	Change	
3				
4				
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Table of Contents

1. Summary	Page 3~4
2. Specifications	
2.1 Main unit	Page 5
2.2 Accessories	Page 6
3. Required tools and measuring instruments	Page 7~8
4. Principle	
4.1 Purpose of operation	Page 9
4.2 How to use and operation procedures	Page 9
4.3 Precautions for use	Page 9~10
5. Device exterior	
5.1 Configuration	Page 11
5.2 Description of parts	Page 12~14
6. Operation mode	
6.1 Operating mode	Page 15~16
6.2 Test mode specs	Page 17~29
6.3 Buzzer pattern specs	Page 30
7. Service parts list	
7.1 List of service parts	Page 31~32
7.2 Description of service parts	Page 33~42
8. Disassembling / assembling / adjustment procedures	
8.1 Disassembling procedures	Page 43~75
8.2 Assembling procedures	Page 76~104
8.3 Adjusting procedures	Page 105~109
9. Troubleshooting	Page 110
10. LCD display	
10.1 Types of errors	Page 111
10.2 Normal operation / normal error screen	Page 112~115
10.3 Recoverable error screen	Page 116~118
10.4 Communication error screen	Page 119
10.5 Irrecoverable error screen (Peripheral)	Page 120~122
10.6 Irrecoverable error screen (System)	Page 123
10.7 Irrecoverable error screen (Coding)	Page 124~125
11. Circuit diagram	
11.1 Parts	Page 126
11.2 CPU circuit diagram	Page 127

11.3	Main CPU board	Page 128
11.4	Clock circuit	Page 129
11.5	Reset circuit	Page 130
11.6	Memory circuit	Page 131
11.7	RS232C and RS485 circuit	Page 132
11.8	Reference voltage circuit	Page 133
11.9	5V power generating circuit	Page 134
11.10	Sensor input circuit	Page 135
11.11	Button press SW circuit and room temperature sensor circuit	Page 136
11.12	DIP SW circuit	Page 137
11.13	Cam motor control circuit	Page 138
11.14	Wafer feeding motor control circuit	Page 139
11.15	Cooling fan circuit and exhaust fan circuit	Page 140
11.16	Buzzer circuit	Page 141
11.17	Holder heater temperature control circuit and Clamp lock solenoid output circuit	Page 142~143
11.18	Wafer temperature control circuit	Page 144
11.19	RTC circuit	Page 145
11.20	Wafer full sensor circuit	Page 146~147
11.21	LCD display circuit	Page 148~149
11.22	Power circuit	Page 150~151
11.23	TSCD— II wiring system diagram	Page 152
11.24	TSCD— II main circuit diagram	Page 153
12.	Inspection procedures	
12.01	Exterior	Page 154~159
12.02	Setup	Page 160~165
12.03	Operation check	Page 166~170
12.04	Weld condition	Page 171~173
12.05	Exchanging the battery	Page 174
13.	Inspection sheet	Page 175~177
14.	Document revision history	Page 178

1. Summary

This service manual is for the Terumo Sterile Tubing Welder TSCD-II maintenance service field. The following procedures must be followed if there are any complaints from the customer regarding malfunction.

- (1) Read the instruction manual and service manual before conducting maintenance work.
- (2) Check that the customer usage conditions of the device are correct and in accordance with the instruction manual.
- (3) If the malfunction occurred due to incorrect use of the device, remove the cause of the malfunction and re-educate the customer on the proper use of the device.
- (4) Check the malfunction reported by the customer before starting the service.
- (5) Identify the cause of the malfunction using the procedures outlined in the manual if the device malfunctions even when using correct procedures.
- (6) If the device cannot be repaired by the methods stated in this manual, note the details of the malfunction and send the device back to the factory.
- (7) Disinfect parts that are contaminated with the bodily fluids of patients as much as possible when sending back broken replacement parts to the factory. If they have not been disinfected, place in a sealed bag and attach a warning label before sending back.

(General warning)

- (1) Be careful of contamination. The device must be disinfected or sterilized before inspection and servicing.
- (2) Do not disconnect the connectors or CPU board while the power is on.
- (3) First, visually check for broken or shorted wires, disconnected connectors, damaged parts, and irregular noises and smells (i.e. burnt resistors).
- (4) Report the results to the contact person after cleaning the device and its surroundings, and returning the switches to the default position after conducting the inspection/ repair.
- (5) Be careful of static damage when dealing with semiconductors and MOS IC.
- (6) If the error is resolved after replacing the CPU board, install the original CPU board again to check if the same error occurs. If the same error does not occur, the error may have been caused by a loose connection, so investigate further.

※ This service manual uses the following SI units [International system of units SI] (System International d'Unites in French)

Quantity	SI Units		
	Name	Symbol	Reference
Force	Newton	N	1kgf = 9.80665N
Pressure	Pascal	Pa	1kgf/ cm ² = 9.8066.5Pa

2. Specifications

2.1 Main unit

Product Name: Terumo Sterile Tubing Welder TSCD-II

Code No.: ME*SC203A

Welding: Heat fusion method

Compatible tubes: Specified tubes

Compatible wafers: Specified wafers

- Safety features:
- ① Pin to restrict clamp from opening during welding
 - ② Replace wafer cassette buzzer
 - ③ Device malfunction buzzer
 - ④ Clamp malfunction notification
 - ⑤ Defective wafer notification
 - ⑥ Room temperature notification
 - ⑦ Wafer jam notification

Additional functions: LCD display operation and recovery guidance

(Communication with TSCD-IS: Support for overseas)

Operating conditions: Room temp. 10～40°C Relative temp. 10～85%Rh (without condensation)

Storage conditions: Room temp. -10～50°C Relative temp. 10～95%Rh (without condensation)

Power rating: Power supply AC100V～AC240V ±10% 50/60Hz

Power supply current Maximum 3.0A

NEC rating: Class 1 device

Dimensions: 224 (W) × 177 (H) × 342 (D) mm

Weight: Approximately 6.5kg

2.2 Accessories

- | | | |
|---|----------------------------------|--------------|
| ① | Bag support table | (2 sets) |
| ② | Power cable | (1) |
| ③ | TSCD wafer | (1 cassette) |
| ④ | Air filter | (1) |
| ⑤ | Instruction manual | (1) |
| ⑥ | Wafer jam recovery tool | (2) |
| ⑦ | Surface fastener (set-in) | (2) |
| ⑧ | Surface fastener (adhesive tape) | (2) |
| ⑨ | Spare fuse | (2) |

3 Required tools and measuring instruments

3.1 List of required tools and measuring instruments

No.	Name of required tools and measuring instruments
1.	Digital multimeter
2.	Tension tester (Reference fig. 1 below)
3.	Pin gauge set (0.50—1.00mm 0.01mm units)
4.	Dummy wafers [created by Terumo] (Reference fig. 3 below)
5.	Special pin gauge [created by Terumo] (Reference fig. 2 below)
6.	Torque screwdriver (one each of ~60N·cm, ~260N·cm)
7.	+ bit (#1, #2)
8.	Hex bit (2.5mm)
9.	Pin set, long nose pliers
10.	Grease (MOLYKOTE EM-50L, THK AFB-LF grease)

(Fig. 1 tension tester)



◊Required capacity

- Load capacity approximately 500N
- Test speed 500mm/min
- Valid test distance above 300mm

◊Required accessories

- Pneumatic grip
- Air compressor
- Data processing software

(Fig. 2 special pin gauge)



A ϕ 3.80mm center D cut special pin gauge for the TSCD. Attached to the clamp to adjust the position.

(Fig. 3 dummy wafer)



A t=0.35mm special thickness gauge for the TSCD. Attached to the wafer holder unit to adjust the position.

4. Principle

4.1 Purpose of operation

This device is designed to automatically weld blood bag tubing (also compatible with solution filled tubes) in a sterile manner.

4.2 How to use and operation procedures

- ① Connect the power cable and set a full wafer cassette into the cassette compartment.
- ② The device will indicate the status of the device on the LCD display after the power switch has been turned on (switched to 1) and the system check and the LCD backlight turn on.
- ③ Open the clamp cover and press the reset button to align the clamp units.
- ④ Automatic wafer replacement will occur once the clamps are aligned.
- ⑤ Set the two tubes for welding in the slot and close the clamp cover.
- ⑥ Check that the LCD displays "WELDING PRESS START" and press the start switch. The display will change to "HEATING WAFER" and start the welding process.
- ⑦ The device will automatically start the welding process. The LCD will indicate each step of the welding process.
- ⑧ Once the weld process is complete, the LCD will display "WELD COMPLETE OPEN CLAMP". Open the clamp cover and remove the welded tubes.
- ⑨ Separate the two welded tubes by pressing on the flattened weld section.
- ⑩ Return to step 3 if more tubes will be welded.

4.3 Precautions for use

- ① Do not use this device to weld tubes that are connected to a human body.
- ② Do not use any tubes that are not compatible with the device.
- ③ Do not use in flammable environments.
- ④ Do not use mobile phones and wireless devices that emit high frequencies near this device. This can cause the device to malfunction.
- ⑤ Do not use this device in direct sunlight or in dusty areas.
- ⑥ Only use the specified wafers when using this device. Use of other wafers will not guarantee a sterile weld and may cause medical incidents.
- ⑦ Do not reuse wafers. This could cause the device to malfunction.
- ⑧ If the tube already has a weld, do not weld again. This can cause the weld to become defective.
- ⑨ Secure both tubes entirely into the slot before welding.
- ⑩ Leave some slack on the tubes. Pulling the tube during a weld may cause a defective weld.
- ⑪ Dispose the used wafers as infectious waste.

- ⑫ If foreign objects or liquids enter the device, turn the power off, remove the power cable from the device and call the factory for repair services.
- ⑬ Do not touch the device during the weld operation (when the weld light is on). The device may be permanently damaged if the clamp cover is forced open during the weld operation.
- ⑭ The sterility cannot be guaranteed if holes or leaks are found on the weld upon visual inspection.
- ⑮ Do not modify the device. Terumo is not responsible for any damage from any unauthorized disassembly, alterations, or misuse of the product.
- ⑯ Any knocks or impacts may cause the device to malfunction. Immediately cease use of the device even if visual signs of damage are not present.

About the battery installed on the main CPU board:

A coin cell battery (CR2032) is installed as backup for the calendar functionally on the main CPU board.

Please refer to the “Exchanging the battery” section in chapter 12.5 to change the battery.

5. Device exterior

5.1 Configuration

TSCD-II device exterior diagram

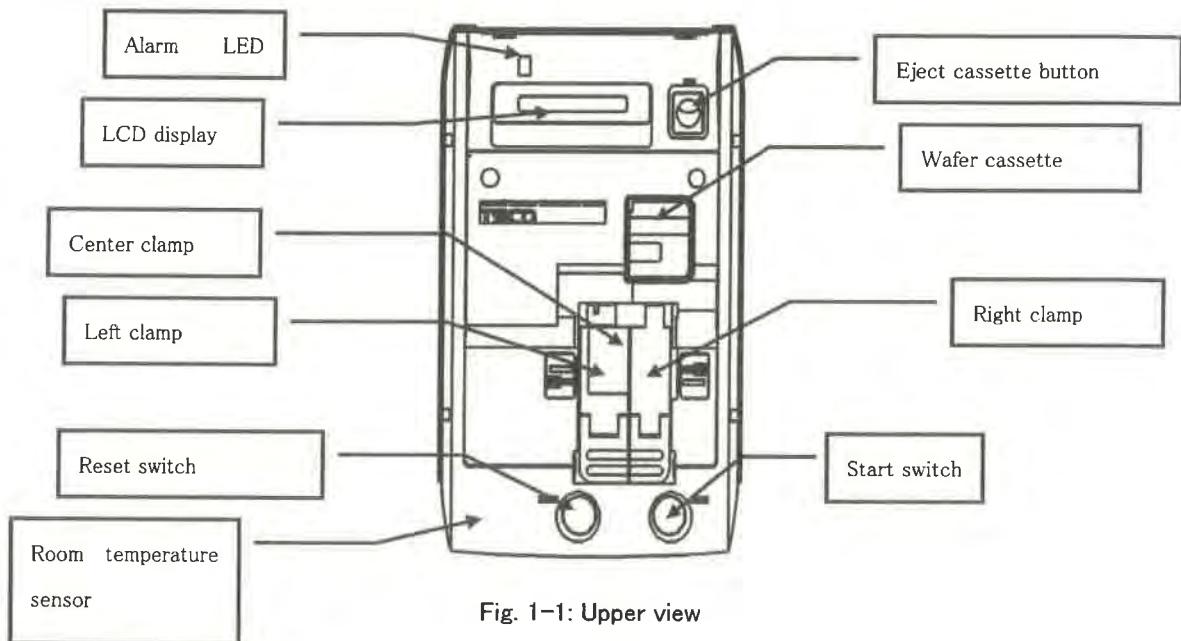


Fig. 1-1: Upper view

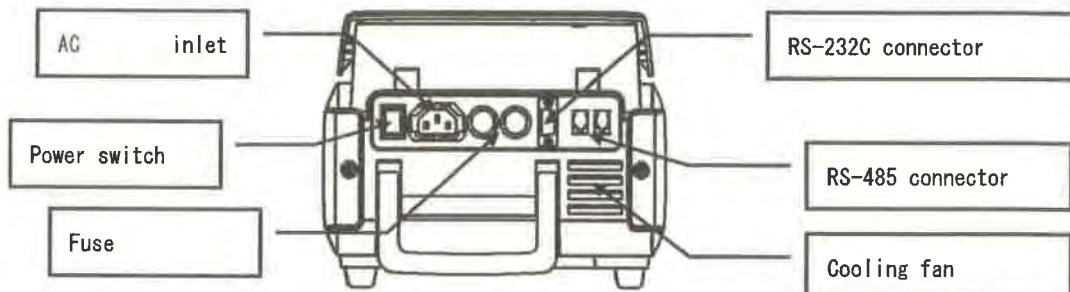


Fig. 1-2 Rear view

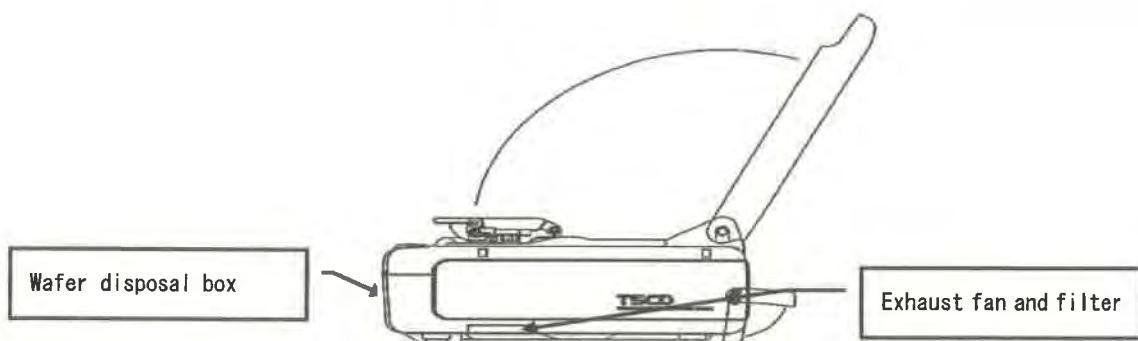


Fig. 1-3 Side view

5.2 Description of parts

◇Clamps

Holds and flattens the tubes. The center clamp reduces loss of solution from the welding portion. The clamp units consist of the clamp-closed sensor, clamp lock solenoid, and clamp lock sensors. The internal cam motor moves the left clamp forward and back, the right clamp left and right, and the center clamp up and down.

◇LCD display

Indicates the status, warnings, errors, and maintenance information of the TSCD-II. The LCD displays two lines of 20 alphanumeric characters in full dot matrix with backlight. The display can show up to 2 lines and 40 characters during shift display.

◇Wafer cassette compartment

Holds the wafer cassette. The wafer cassette consists of the wafer sensor (wafer detection) and determines if there is a wafer inserted into the device.

◇Wafer disposal box

Stores the used wafers. The wafer disposal box consists of the disposal box and the box full sensor and determines if the disposal box is full.

◇Operation switches

Consists of the reset switch and start switch. The reset switch replaces the wafers and adjusts the position of the clamps. The start switch initiates the welding procedure.

◇Room temperature sensor

The room temperature sensor installed on the CPU board detects the room temperature.

◇LED display

Consists of the orange-red warning LED. It displays the correct LED corresponding to the status of the device.

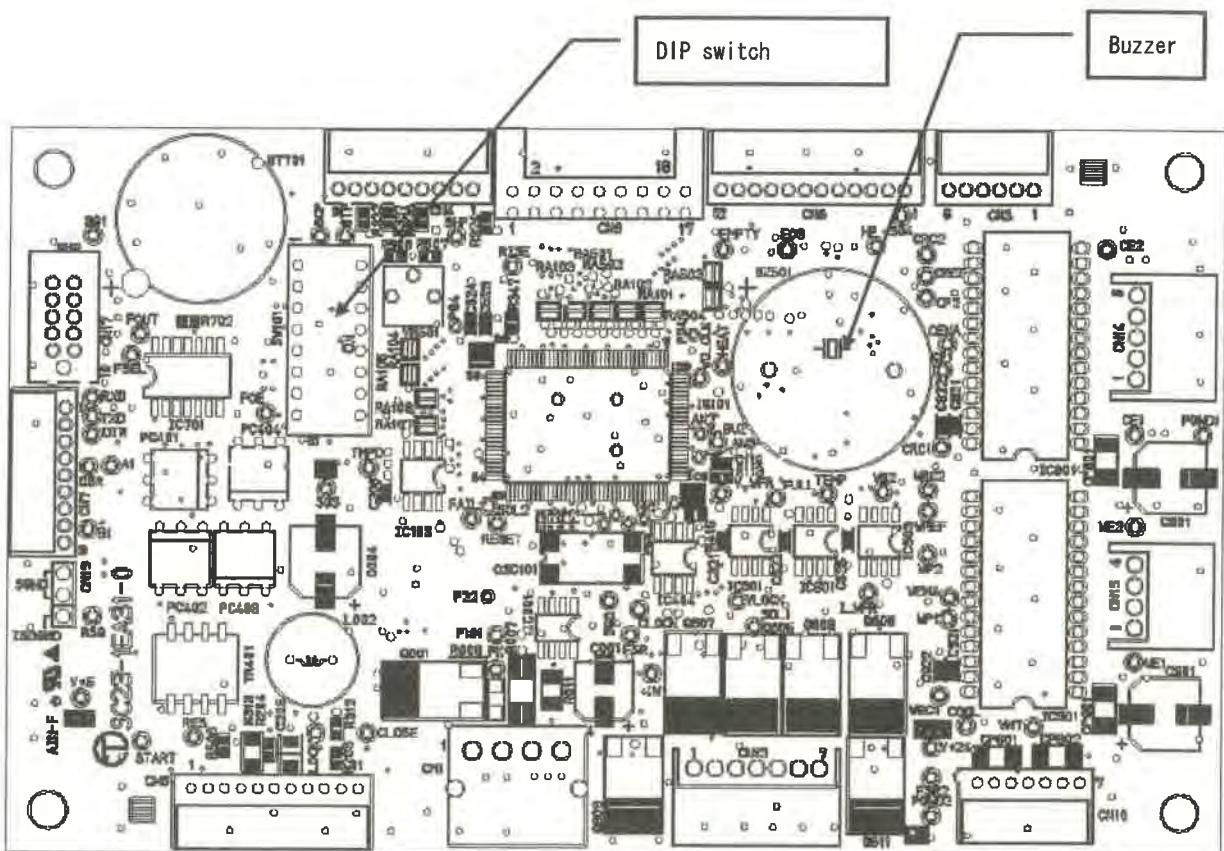
◇Communication ports (support for overseas)

Connects the 9-pin RS-232C cable. Conducts communication with the TSCD IS system and barcode reader. The RS-485 connector is for expansion purposes. This currently does not function.

◇Wafer holder

The wafer holder consists of the electrodes and thermostat that measures the holder temperature. This unit moves up and down along with the motion of the cam. The wafer feeding motor automates the feeding and disposal to and from the wafer holder.

Fig. 2 shows the diagram of the CPU board located inside the left-side cover of the device.



(Fig. 2 CPU board diagram)

◇Buzzer

Outputs sound at 8 levels depending on the volume value assigned (can be set in setting mode.)

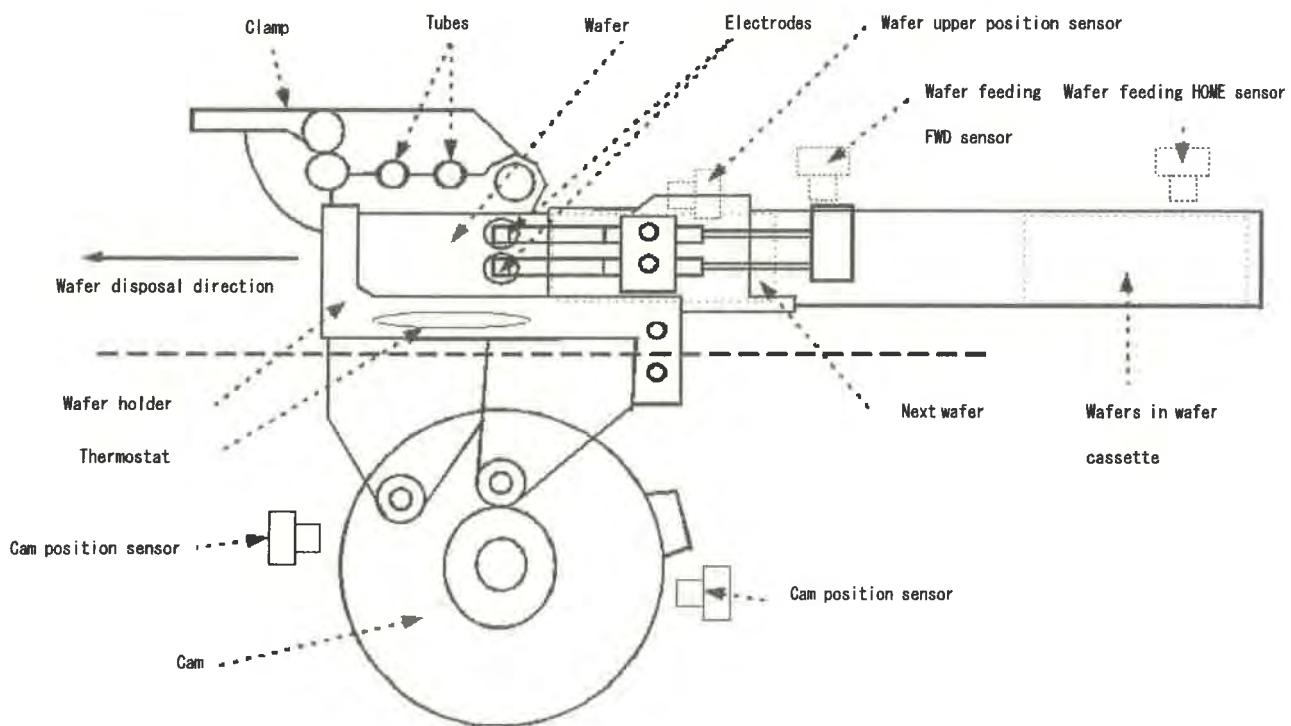
◇DIP switch

Located inside the device. The DIP switch is usually not used and only during specific operations during test mode and evaluation.

◇Wafer holder

The wafer holder consists of the electrodes and thermostat that measures the holder temperature. This unit moves up and down along with the motion of the cam. The wafer feeding motor automates the feeding and disposal to and from the wafer holder.

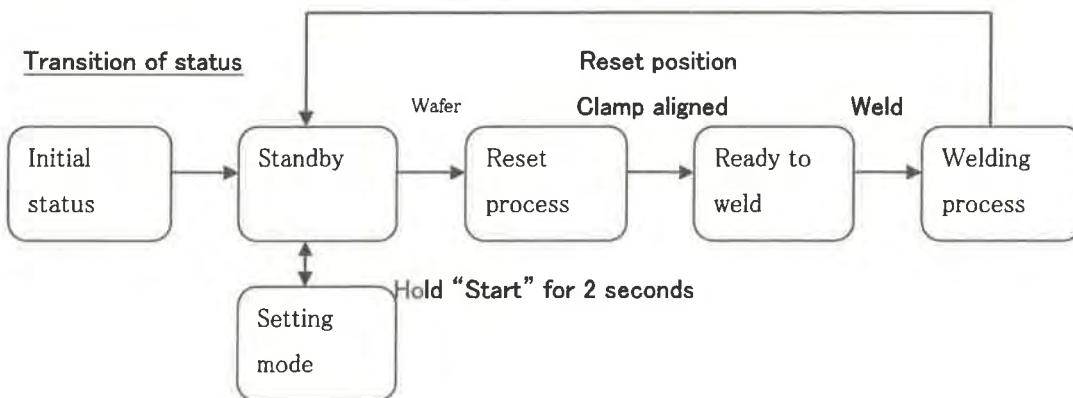
Fig. 3 below shows the schematic diagram of the wafer holder and clamp units



(Fig. 3 Schematic diagram of the wafer holder and clamp units [side view])

6.Operation mode

6.1 Operation mode



6.1.1 Initial status

- ① Checks the status of every sensor and detects errors.
- ② Reads, verifies, and recovers the data from the E2PROM and starts communication with the LCD.
- ③ Initiates communication with the TSCD IS system.
(Note: Disconnects communication and proceeds to normal operation if a communication error or time out occurs.)
- ④ Activates the cooling fan.
- ⑤ Activates the POWER ON buzzer.

6.1.2 Standby

- ① All sensors and analog input errors are monitored at all times after standby.
- ② Starts to heat the wafer holder. This turns the heater on and maintains the wafer holder at a constant temperature. The screen remains on the temperature adjustment screen and does not proceed to the next reset operation until the wafer holder reaches the specified temperature.
- ③ When “S” is displayed on the top right of the LCD, hold the start button for 2 seconds to enter the setting mode.

Please refer to the “setting mode specification” in “LCD display specifications” for more details on the setting mode.

- ④ If the device detects an emergency shutdown (power is turned off during welding) it will go to standby after a message is displayed on the LCD display.

The emergency shutdown recovery conducts the same procedure as the normal weld process and indicates when the weld is complete signifying recovery. The user is notified by an alarm 1 buzzer (recoverable error) and a message display on the screen.

- ⑤ The device aligns the clamp by pressing the reset switch.

6.1.3 Reset process

- ① If the wafer feeding shuttle home position sensor is turned off, the wafer shuttle will advance to the FWD limit then return to home position.
If cam is not in home position, cam will move to home position before executing the above process.
- ② Checks that the clamp is open and moves the cam to align the clamp to the tube set position when the clamp unit is not aligned.
- ③ Checks that the wafer and wafer cassette is not empty and that the disposal box is not full. Following this, it activates the wafer feeding motor, moves the wafer shuttle from the home position to the FWD limit, replaces the wafer, and returns to the home position. To reduce the duration of the process, the device goes to standby and allows the user to start welding by pressing the start switch before the wafer shuttle returns to the home position.

Note: The wafer shuttle will stop in the case of a wafer jam. (The wafer shuttle returns to the home position if the shuttle stops in a position from which it is possible to replace the wafer cassette.) The wafer shuttle then goes back automatically, the clamp moves in reverse to the jam recovery position, the error message on the LCD is displayed, and it goes to standby. The clamps will stop in a position from which the user can move the right clamp outwards with their hands.

Note: The error message differs depending on whether the shuttle stops at a position from which it is possible to replace the wafer cassette or not.

- ④ Transfer current to the electrodes to measure the resistance of the wafer after wafer replacement. If the resistance is not up to standard, an error message will be displayed when the wafer is heated during the welding process.

Note: The temperature difference between the wafer and the wafer holder is small directly after wafer replacement. In this instance, the resistance is measured under the assumption that the holder thermostat temperature is the same as the wafer temperature. The resistance is recorded once it has converted to its 25°C equivalent. (The wafer is inspected before delivery at 25°C and the resistance standards are recorded at 25°C.) If the resistance is not up to standard, an error message will be displayed when the wafer is heated during the weld process.

6.2 Test mode specs.

6.2.1 Summary of test mode

The following message will be displayed when the DIP switches are set to the test mode settings and the power is turned on.

SC-203 TEST MODE

PUSH START SW

Press the Start switch to enter the test mode.

The corresponding test operation displays below are displayed upon pressing the reset switch once in the test mode.

No.	Description	Application
0	Display program version	Confirmation after update
1	Read real time clock	Check current date and time
2	Clear welding count	Manage maintenance info.
3	Write service date	
4	Write weld count until next service	
5	Check error history	Check error history
6	Check jam history	
7	Check sensor position	Check status of each hardware
8	Check AD input	
9	Check LED	
10	Check buzzer output	
11	Check solenoid operation	
12	Check fan motor	
13	Check holder heating control	
14	Check inching	
15	Check wafer feeding motor	Tests
16	Check cam motor	
17	Check wafer resistance	
18	Check wafer heating	
19	Check wafer aging (cool)	
20	Check wafer aging (with heat)	
21	Test LCD display	Check LCD display
22	Check LCD characters	

23	Write to real time clock	Setup before shipping
24	Write serial number	
25	Clear total weld count	
26	Read E2PROM data	Check memory data
27	Write to E2PROM	
28	Clear E2PROM data	Initialize data at the time of manufacture
29	Display selection	Setup before shipping

6.2.2 Test description and how to operate each test

0. ROM VERSION

Description: Displays program version

Application: Confirmation after firmware update

- ① Press the start switch to indicate the current firmware version on the 2nd line.
- ② Press the start switch again to indicate the check sum on the 2nd line after calculating the values in the memory.
- ③ Press the start switch to go back to select another test.

Note: All other processes are paused when calculating the check sum. A long buzzer (about 2 seconds) sounds if an attempt is made to repeat the operation multiple times.

1. RTC READ

Description: Read Real Time Clock

Application: Check current date and time

- ① Press the start switch to display the current date and time.
- ② Press the start switch to go back to select another test.

Note: if the current date and time in the memory is not feasible, the message "RTC ERROR!" will be displayed on the right side of the 2nd line. Please reset the date and time as indicated in "23. RTC SET" if this occurs or if the time is incorrect.

2. Maintenance Clear

Description: Clear maintenance count

Application: Clear the weld count from the previous maintenance service

- ① Press the start switch to display the weld count from the previous maintenance service.
- ② Press the start switch for 2 seconds and clear the counter.
- ③ Press the start switch to go back to select another test.

3. Maintenance Day

Description: Write service date

Application: Set next service date

- ① Press the start switch to display the next service date on the 2nd line. (displayed in YYYY/MM/DD)
- ② Change the characters that are blinking by pressing start.
- ③ Press the reset button to change the value of blinking characters.
- ④ The data is updated and the test select screen is returned to by pressing down the start switch when the date (DD) is blinking.

4. Maintenance Count**Description:** Write weld count until next service**Application:** Set the weld count until next service

- ① Press the start switch to display the current weld count until the next service date on the 2nd line.
- ② Change the characters that are blinking by pressing start.
- ③ Press the reset button to change the value of blinking characters.
- ④ The data is updated and the test select screen is returned to by pressing down the start switch when the 1st line is blinking.

5. Error history**Description:** Check error history**Application:** Check the type of error and the date it occurred

- ① Press the start switch to display the order that the error occurred on the top right and the error code and the date it occurred on the 2nd line of the LCD display.
- ② Press the reset switch to display the next error history. A total of 30 errors can be saved with the newest error saved as "00" and the oldest saved as "29".

(Please refer to the LCD display section for more details on the error codes.)

- ③ Press the start switch to return and select another test.

Note: The oldest data saved in "29" may be inaccurate, so please ignore (the CPU can sometimes detect AD input or other various errors during the shutdown process when the voltage is low. This inaccurate data is sometimes saved to "29").

6. Wafer jam history**Description:** Check wafer jam history**Application:** Check the location the wafer jam occurred

- ① Press the start switch to display the wafer jam history on the 2nd line.

The last 5 jams will be displayed on the 3rd line from the left in the order that the jam occurred (the right side is the newest).

"1" indicates that a wafer jam has occurred and "0" indicates that a jam has not occurred. The 100th digit indicates a "desynchronization of the wafer feeding motor returning to home position"; the 10th digit indicates it was a "heavy wafer jam (manual recovery)"; and the 1st digit indicates it was a "light wafer jam (recover by pressing reset)".

For example, if a heavy wafer jam occurs during the wafer feeding and desynchronization occurs while the wafer feeding motor returns to the home position, this jam will be displayed as "110".

- ② Press the start switch to return and select another test.

7. SENSOR CHECK**Description:** Check sensor position**Application:** Check ON/OFF status of each sensor

- ① Press the start switch to display each sensor and its ON/OFF status.
- ② Press the reset switch to scroll through the sensors.
- ③ Press the start switch to return and select another test.

Below are the types of sensors and the description of their status.

0. WAFER	Wafer sensor. ON when both wafer and cassette are detected.
1. CLAMPCLOSE	Clamp close sensor. ON when clamp is closed.
2. WAFER FULL	Disposal box full sensor. ON when disposal box is full.
3. SOLENOID	Clamp lock solenoid sensor. ON when clamp is locked.
4. CAM HOME	Cam position (home) sensor. ON when in home position.
5. CAM JOINT	Cam welding position sensor. ON when in welding complete position.
6. WAF FRONT	Wafer FWD limit sensor. ON when wafer feeding shuttle is at FWD limit.
7. WAF BACK	Wafer home sensor. ON when wafer feeding shuttle is in home position.
8. HOLDER UP	Wafer holder up sensor. ON when wafer holder unit is raised.
9. LED OFF FULL	Receiving status when the LED beam for disposal box full sensor is OFF. ON when light is detected. OFF normally.

8. AD INPUT**Description:** Check AD input**Application:** Check AD input status

- ① Press the start switch to display each AD input name, analog port input status (10-bit hexadecimal AD value), and conversion value on the 2nd line.
- ② Press the reset switch to scroll through the AD inputs.
- ③ Press the start switch to return and select another test.

The following are the types of AD input

24V	24V source voltage monitor for wafer heating (upstream) Conversion value: Value is corrected with 2.5V reference voltage in mV.
WAF	Wafer current and 24V source voltage monitor (downstream) Conversion value: Value is corrected with 2.5V reference voltage in mA.
2.5V	2.5V reference voltage monitor Conversion value: 2.5V reference voltage in mV.
HOLD	Wafer holder thermostat monitor Conversion value: Holder temperature in °C.
ROOM	Room temperature monitor Conversion value: Holder temperature in °C.

9. LED**Description:** Check LED**Application:** Checks that LED turns ON and OFF

- ① Press the start switch to display the LED name and its ON/OFF status on the 2nd line.
- ② Press the reset switch to scroll through the LED status and turn the LED ON/OFF.
- ③ Press the start switch to return and select another test.

The following are the LED ON/OFF status

ALL	LED OFF	Warning LED and backlight is off
ALL	LED ON	Warning LED and backlight is on
POWER	LED ON	Only the backlight is on
WARNING	LED ON	Only the warning LED is on

10. BUZZER**Description:** Check buzzer output**Application:** Checks the buzzer patterns and output sound volume

- ① Press the start switch to show the buzzer output pattern on the 2nd line.
- ② Press the reset switch to scroll through the different patterns.
- ③ Press the start switch to output the selected buzzer pattern and return to select another test.

The following are the buzzer output patterns

0. POWER ON	POWER ON sound
1. START SW	Start switch input sound
2. RESET SW	Reset switch input sound
3. ALARM 1 ERROR	Recoverable error alarm 1
4. ALARM 2 ERROR	Irrecoverable error alarm 2
5. WELD COMPLETE	Weld complete sound
6. INITIAL CHECK OK	Initial check passed at boot up
7. NOT USED	—
8. DA VOLUME CHECK	Set the DA value to test the sounds (used for testing buzzer sound volume). Press the reset switch to adjust the DA output value when the buzzer is continuously ON.

Note: The buzzer sound volume in test mode can be set to the following 8 levels.

34h, 51h, 6Eh, 8Bh, A8h, C5h, E2h, FFh

11. SOLENOID

Description: Check the clamp lock solenoid operation

Application: Checks the motion of the clamp lock solenoid

- ① Press the start switch to display "CLAMP LOCK" on the 2nd line.
- ② Press the reset switch to select the operation. Pressing the start switch initiates the clamp lock solenoid to move to the lock position.

Pressing the start switch when "CLAMP LOCK" is displayed moves the clamp lock solenoid to the lock position.

The test selection screen can be returned to by pressing the start switch when "EXIT" is displayed.

- ③ Press the start switch to move the clamp lock solenoid to the unlock position and return to select another test.

CLAMP LOCK Start the lock motion of the clamp lock solenoid

EXIT Exit (Exit without testing)

12. FAN MOTOR

Description: Check fan motor

Application: Checks fan operation. Possible to run other tests while running this function.

- ① Press the start switch to display the fan motors and their ON/OFF status on the 2nd line.
- ② Press the reset switch to scroll through the different fan motors and turn them ON/OFF.
- ③ Press the start switch to return and select another test.

The following are the fan motor types and its ON/OFF status

0. SMOKE FAN ON	Exhaust fan ON
1. SMOKE FAN OFF	Exhaust fan OFF
2. COOL FAN ON	Cooling fan ON
3. COOL FAN OFF	Cooling fan OFF
4. EXIT	Exit (Exit without testing)

Note: This mode is used to keep the fan running or turned off during other tests so the fan motor maintains its status until it is changed in this mode again.

13. HOLDER HEAT

Description: Check holder heating control

Application: Checks holder heating control. Possible to run other tests while running this function.

- ① Press the start switch to display holder temperature settings on the 2nd line.
- ② Press the reset switch to change the temperature setting.
- ③ Press the start switch to set the desired temperature. "Continue" and "Exit" should now be displayed on the screen. Selecting exit stops heat output and return to the test selection screen. Continue will initiate the heating process and will display the target temperature and current thermostat temperature.

Note: This mode is used to control the temperature during other tests. Run step ③ indicated above to stop heat output.

14. Inching Mode**Description:** Check inching**Application:** Checks the inching movement and sensors of the cam / wafer feeding motor.

- ① Press the start switch to display the inching and sensor information.
- ② Press the reset switch to select the inching motion.
- ③ Holding down the start switch maintains the inching movement. The inching movement stops once the start switch is released. The wafer feeding motor cannot go past the FWD limit or the home position.
- ④ "S" on the 2nd line means the sensor is ON and “-“ on the 2nd line means the sensor is OFF. From the left, each of these signify "cam home position sensor", "cam weld position sensor", "wafer holder up sensor", "wafer FWD position sensor", and "wafer home position sensor".
- ⑤ Press the reset switch to return and select another test.

The following are the types of inching movement

CAM	Cam motor inching
WAFER FORWARD	Wafer feeding motor FWD
WAFER BACKED	Wafer feeding motor return to home
EXIT	Exit (Exit without testing)

Note: The wafer position may become misaligned after moving the wafer feeding (shuttle) motor. In this case, realign the wafer by running the wafer feeding motor test.

15. WAFER MOTOR**Description: Wafer feeding motor test****Application: Checks the wafer feeding motor movement and aging**

- ① Press the start switch to display the movement patterns of the wafer feeding motor on the 2nd line.
- ② Press the reset switch to scroll through the different movement patterns.
- ③ Press the start switch to initiate the selected movement.
- ④ The device returns to the test select screen after the selected operation is completed.

The following are the types of wafer feeding motor movements

0. AGING

Aging movement (continuous movement).

Pressing the start switch stops the movement at the FWD position when moving forward and at the home position when moving backward.

The operation stops when the wafer cassette is empty.

1. FORWARD

Moves forward to FWD limit.

2. BACKWARD

Moves back to home position.

3. CW LOW SPEED

Motor moves forward 1000 pulses at a low speed then stops.

4. CCW LOW SPEED

Motor moves backward 1000 pulses at a low speed then stops.

5. CW MAX SPEED

Motor moves forward 1000 pulses at a normal speed then stops.

6. CCW MAX SPEED

Motor moves backward 1000 pulses at a normal speed then stops.

7. EXIT

Exit (Exit without testing)

Note: Return the wafer feeding motor to home position after running this test.

Note: Tests 3–6 are for testing the motor only. Please do not use these tests.

16. CAM MOTOR**Description:** Cam motor test**Application:** Checks cam motor movement and aging

- ① Press the start switch to display the movement patterns of the cam motor on the 2nd line.
- ② Press the reset switch to scroll through the different movement patterns.
- ③ Press the start switch to initiate the selected movement.
- ④ The device returns to the test select screen after the selected operation is completed.

The following are the types of cam motor movements

0. AGING	Aging movement (continuous movement). Continues to repeat welding and resetting. The movement will stop at the weld position or the reset position, depending on which is closer, when the start switch is pressed.
1. INITIAL	Return to home position (detect reset position)
2. RESET	Reset movement (align clamps)
3. JOINT	Welding
4. JAM	Moves to wafer jam recovery position
5. ORIGIN	Searches the home position (Can still detect when reset position sensor is ON)
6. CW LOW SPEED	Motor moves clockwise 1000 pulses at a low speed then stops.
7. CCW LOW SPEED	Motor moves counterclockwise 1000 pulses at a low speed then stops.
8. CW MAX SPEED	Motor moves clockwise 1000 pulses at a normal speed then stops.
9. CCW MAX SPEED	Motor moves counterclockwise 1000 pulses at a normal speed then stops.
10. EXIT	Exit (Exit without testing)

Note: Tests 6–9 are for testing the motor only. Please do not use these tests.

Note: Moving to the jam recovery position can only be performed from the reset position (home position), since it requires the cam to move in reverse.

17. Wafer resistance**Description:** Wafer resistance test**Application:** Measures the wafer resistance

- ① Pressing the start switch displays a prompt to replace the wafer. Press the start switch to replace the wafer and press the reset switch to keep the wafer.
- ② The action/ cancel screen will be displayed on the screen. Press the start switch to execute the action or press the reset switch to cancel.

The device will return to the test select screen if cancel is selected.

If action is selected, the wafer's resistance will be measured and displayed on screen.

- ④ Press the start switch to return and select another test.

The following is how the measured wafer resistance is displayed

Measured resistance [mΩ] (resistance before temperature conversion[mΩ])		
Wafer holder temp. °C	Current mA	Voltage mV

18. WAFER HEAT**Description:** Wafer heating test**Application:** Check wafer heating and constant power output

- ① Press the start switch to display the wafer constant power output and the power setting (W) on the 2nd line.
- ② Press the reset switch to scroll through the power settings (W) and select the power setting by pressing the start switch.
- ③ A prompt to replace the wafer will be displayed on screen. Press the relevant switch to replace or keep the wafer.
- ④ A prompt to heat the wafer will be displayed on screen. Select action to heat and cancel to return and select another test. If action is selected, the constant power output to the wafer will be initiated and the current set power and measured current output will be displayed on screen.
- ⑤ Press the start switch to stop output and return to the test select screen.

Note: As a safety feature, the test stops automatically after 12 seconds and returns to the test select screen after cooling down.

Note: To check with defective wafer detection off, turn the defective wafer detection off at the DIP switch and reboot the device.

19. COOL AGING**Description:** Aging without wafer heating**Application:** Endurance test and overall operation check.

- ① Press the start switch to start aging without wafer heating.
- ② Press start again to stop and exit to the test select screen.

20. HEAT AGING**Description:** Aging with wafer heating**Application:** Endurance test and overall operation check.

- ① Press the start switch to start aging with wafer heating.
- ② Press start again to stop and exit to the test select screen.

21. LCD**Description:** Check LCD display**Application:** Checks that the messages display on screen.

- ① Press the start switch to display the LCD screen explained in "LCD display specifications".
- ② Press the start switch to scroll the display from setting mode to irrecoverable system error and return to the test select screen.

Press the reset switch to scroll through each of the table numbers in each screen.

Note: The display language can be changed in setting mode during operation mode (currently supports English only).

22. LCD CHARACTER

Description: Check LCD characters

Application: Checks LCD type and character code.

- ① Press the start switch to display the character code and compatible character codes on the 2nd line.
- ② Press the reset switch to scroll through the different codes.
- ③ Press the start switch to return and select another test.

23. RTC SET

Description: Write to Real Time Clock

Application: Sets current date and time.

- ① Press the start switch to display the current year, month, date, day of the week, hour, minute, and second.
 - ② Press the reset switch to return and select another test.
- Scroll through the blinking characters from year, month, date, day of the week, hour, minute, and second by pressing start.
- ③ Press the reset button to change the value of blinking characters.
 - ④ The data is updated when the start switch is pressed and the seconds are set. The screen then returns to the test select screen.

24. Serial No.

Description: Writes the serial number

Application: Sets the device serial number

- ① Press the start switch to display the current serial number on the 2nd line.
- ② Press the start switch to scroll through the blinking digits sequentially.
- ③ Press the reset button to change the value of blinking characters.
- ④ Press the start switch after the last blinking number to save the data and return to the test select screen.

Note: Only used during manufacturing or shipping.

25. Total Count Clear

Description: Clear total weld count

Application: Clears total weld count (weld count from time of manufacture)

- ① Press the start switch to display the weld count from the last time the weld count was cleared).
- ② Press the start switch for 5 seconds to clear the total weld count.
- ③ Press the reset switch to return and select another test.

Note: Only used during manufacturing or shipping.

26. E2PROM READ**Description:** Read the data from E2PROM.**Application:** Checks data in flash memory.

- ① Press the start switch to display the address and value of the E2PROM on the 2nd line.
- ② Press the reset switch to scroll through addresses and display the assigned values.
- ③ Press the start switch to return and select another test.

27. E2PROM WRITE**Description:** Write data to the E2PROM**Application:** Checks E2PROM.

- ① Press the start switch to display the E2PROM address on the 2nd line.
- ② Press the reset switch to select the address.
- ③ Press the start switch to define the address and display the data entry select screen.
- ④ Select the value to enter with the select switch and press the start switch to set the data.
Each address is 16 bit and holds four 4-bit characters (0~F).
- ⑤ After all four characters are set, the data is entered in the E2PROM and the screen returns to the test select screen.

Note: Only used to test during manufacturing or debugging. Do not use during normal operation.

28. E2PROM CLEAR**Description:** Erase E2PROM data**Application:** Format memory at time of manufacture

- ① Press the start switch to display the erase and cancel prompt.
- ② Press the reset switch to go back to select another test.

Press the start switch to clear all data in the E2PROM to 0 and return to the test select screen.

Note: For use only at time of manufacture. Do not use during normal operation.

29. Display Selection**Description:** Change LCD display settings**Application:** Set LCD display settings based on ship location

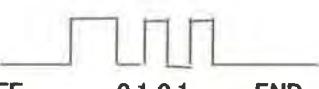
- ① Press the start switch to display the display settings on the 2nd line.
- ② Press the reset switch to select the display setting.
- ③ Press the start switch to save the display setting and return to the test select screen.

The following are the two display settings. → 0. NORMAL 1. USA (1 is the display setting made for use in the U.S.)

Note: Changing the display settings changes the communication settings to 0. NORMAL and 1. USA.
(For software ver. S00017 or later)

6.3 Buzzer pattern specifications

The numerical values in the table below are units of seconds

Power on and finished system check sound	ON 0.2 0.1 0.1  OFF 0.1 0.1 END
Weld complete	ON 0.5  OFF END
Alarm 2 Recoverable error	ON 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1  OFF 0.1 0.1 0.5 0.1 0.1 0.5 0.1 0.1 END
Alarm 2 Irrecoverable error	ON  OFF Push reset switch to turn OFF
Switch input sound Reset switch Start switch	ON 0.05  OFF END
(Not used) TSCD IS connection Power on and system check passed	ON 0.2 0.2 0.2 0.2  OFF 0.1 0.1 0.1 END

7. Service parts list

7.1 List of service parts

NO.	Parts name	Parts Code
1	Cam frame unit	06BE201
2	Wafer holder plate	06BE203
3	Contact unit	06BE204
4	Clamp lock unit	06BE206
5	Lock solenoid unit	06BE207
6	Wafer outlet guide unit	06BE208
7	Main frame unit (*)	06BE209
8	Wafer feeding unit	06BE210
9	Rear panel unit (*)	06BE211
10	Main CPU board (*)	06BE212
11	Rear cover unit	06BE213
12	Base cover unit	06BE214
13	Wafer outlet guide cover unit	06BE215
14	Left clamp unit	06BE216
15	Right clamp unit	06BE217
16	Clamp latch	06BE218
17	Heater cable holder	06BE219
18	Top main cover unit	06BE220
19	LCD panel unit	06BE221
20	LCD panel cover	06BE222
21	Left side cover	06BE223
22	Right side cover	06BE224
23	Air filter holder	06BE225
24	Wafer disposal box	06BE226
25	Upper plate set with screws	06BE227
26	Upper plate	06BE228
27	Screw set for upper plate	06BE229
28	Lid	06BE230
29	Fuse	06BE235
30	Wafer holder	06BE236
31	Heater bracket	06BE237
32	Heater spacer	06BE238
33	Heater 2	06BE239
34	Wafer holder unit 2	06BE240

NO.	Parts name	Parts Code
35	Wafer jam repair tool set	06BE242
36	Bag support table set	06BE243
37	Thermistor cable	06BE244
38	Exhaust fan	06BE249
39	Motor stay (*)	06BE250
40	Air filter	XX*SC203F

* For applicable lot numbers: 0312 to 1202.

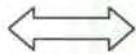
When any of the following three parts are to be replaced, all of them must be replaced together to maintain compatibility:

- ①Main Frame unit
- ②Rear Panel unit
- ③Main CPU board
- ④Motor stay

For applicable lot number 1203 and later, and the ones above for which all three parts have been replaced, individual parts can be replaced separately because they are compatible each other.



①[06BE209: Main Frame unit]



②[06BE211: Rear Panel unit]

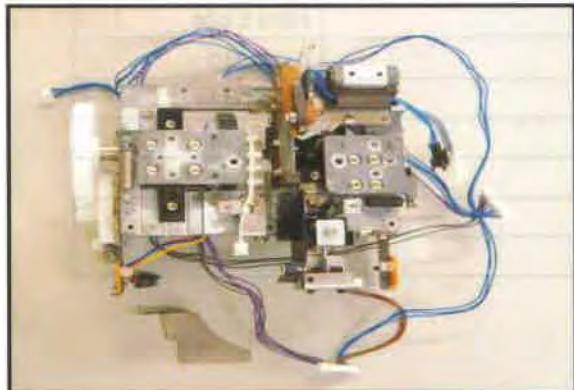


③[06BE212: Main CPU board]



④[06BE250: Motor stay]

7.2 Description of service parts



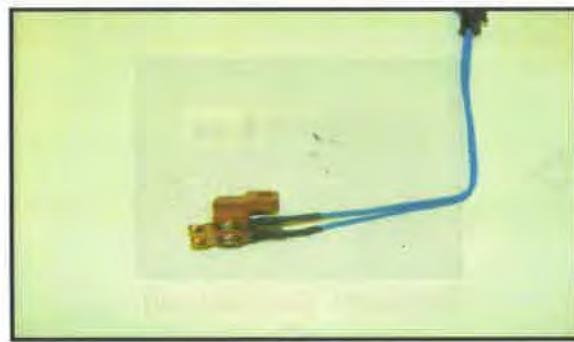
1. Cam frame unit

Parts Code: 06BE201



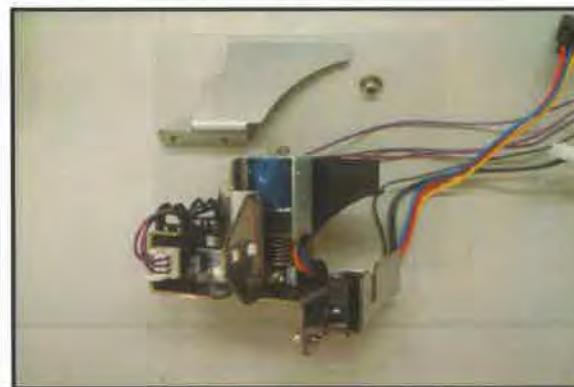
2. Wafer holder plate

Parts Code: 06BE203



3. Contact unit

Parts Code: 06BE204



4. Clamp lock unit

Parts Code: 06BE206



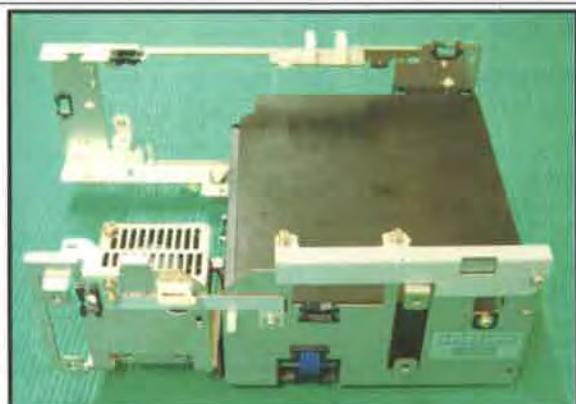
5. Lock solenoid unit

Parts Code: 06BE207



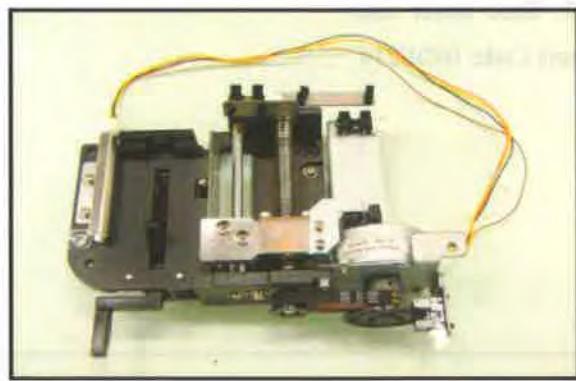
6. Wafer outlet guide unit

Parts Code: 06BE208



7. Main frame unit

Parts Code: 06BE209



8. Wafer feeding unit

Parts Code: 06BE210



9. Rear panel unit

Parts Code: 06BE211



10. Main cpu board

Parts Code: 06BE212



11. Rear cover unit

Parts Code: 06BE213



12. Base cover unit

Parts Code: 06BE214



13. Wafer outlet guide cover unit
Parts Code: 06BE215



14. Left clamp unit
Parts Code: 06BE216



15. Right clamp unit
Parts Code: 06BE217



16. Clamp latch
Parts Code: 06BE218



17. Heater cable holder

Parts Code: 06BE219



18. Top main cover unit

Parts Code: 06BE220



19. Lcd panel unit

Parts Code: 06BE221



20. Lcd panel cover

Parts Code: 06BE222



21. Left side cover

Parts Code: 06BE223



22. Right side cover

Parts Code: 06BE224



23. Air filter holder

Parts Code: 06BE225



24. Wafer disposal box

Parts Code: 06BE226



25. Upper plate set with screw

Parts Code: 06BE227



26. Upper plate

Parts Code: 06BE228



27. Screw set for upper plate

Parts Code: 06BE229



28. Lid

Parts Code: 06BE230



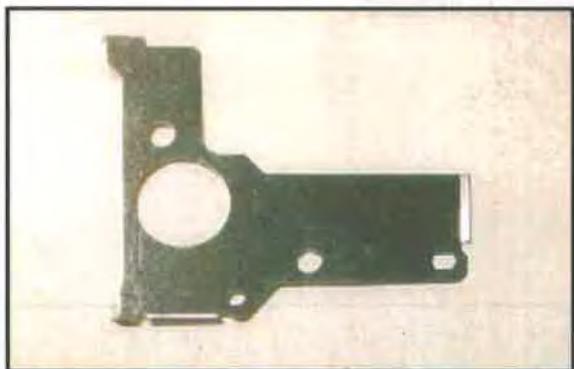
29. Fuse

Parts Code: 06BE235



30. Wafer holder

Parts Code: 06BE236



31. Heater bracket

Parts Code: 06BE237



32. Heater spacer

Parts Code: 06BE238



33. Heater 2
Parts Code: 06BE239



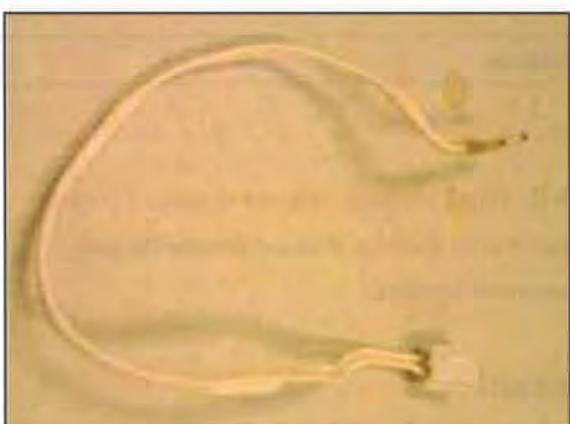
34. Wafer holder unit 2
Parts Code: 06BE240



35. Wafer jam repair tool set
Parts Code: 06BE242



36. Bag support table set
Parts Code: 06BE243



37. Thermistor cable

Parts Code: 06BE244



38. Exhaust fan

Parts Code: 06BE249



39. Motor stay

Parts Code: 06BE250



40. Air filter

Parts Code: XX * SC203F

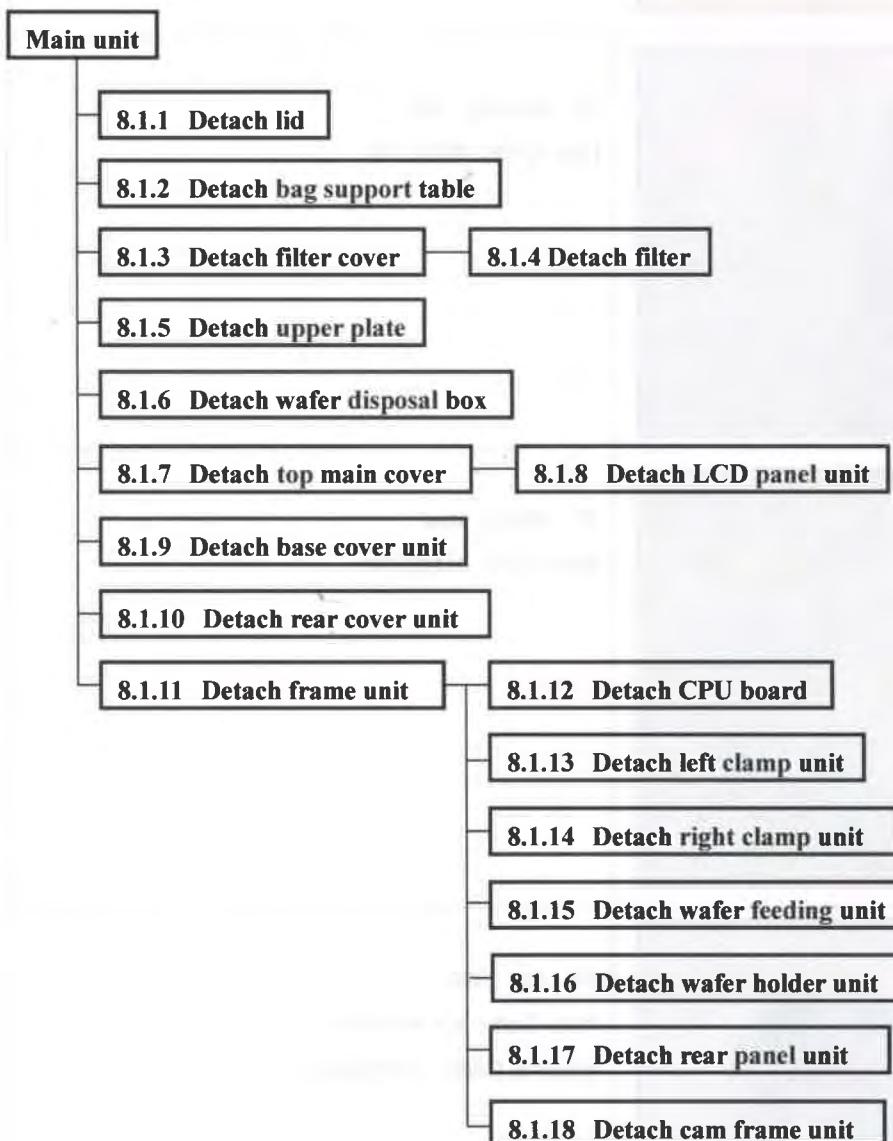
Material Code: SD09X620

8. Disassembling / assembling / adjustment procedures

8.1 Disassembling procedures

The following are the disassembling procedures of the TSCD-II. **When working with the chassis or frame unit, lay down a soft cloth on the workspace to prevent scratches or damage.** Please reference the parts diagram and configuration diagram for the part names and attachment location.

【Operation flowchart】





◇ **Basic rules for disassembly / assembly / adjustment**

- ① The tightening torque for screws should follow the following standards.

M3: $80\text{N}\cdot\text{cm} \pm 20\%$

M4: $100\text{N}\cdot\text{cm} \pm 20\%$

- ② In case there are both location holes and slotted holes for attaching a certain part,
always **tighten the location hole first before tightening the slotted hole.**

◇ 8.1.1 Detach lid

- ① Flip the lid in the direction of the red arrow and detach the lid from the main unit.
(See fig 8.1.1.(2))

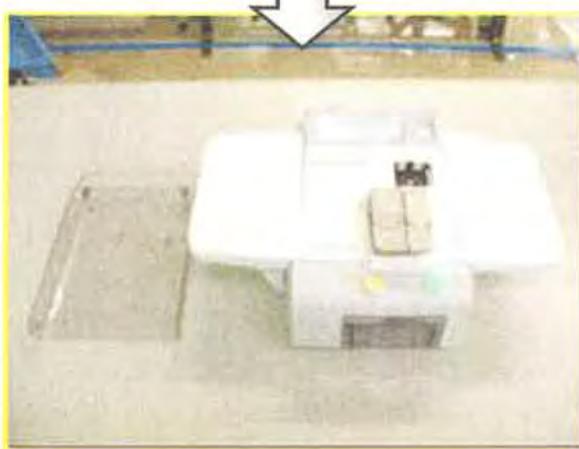


【Fig. 8.1.1.(1)】

【Fig. 8.1.1.(2)】



【Fig. 8.1.1.(3)】



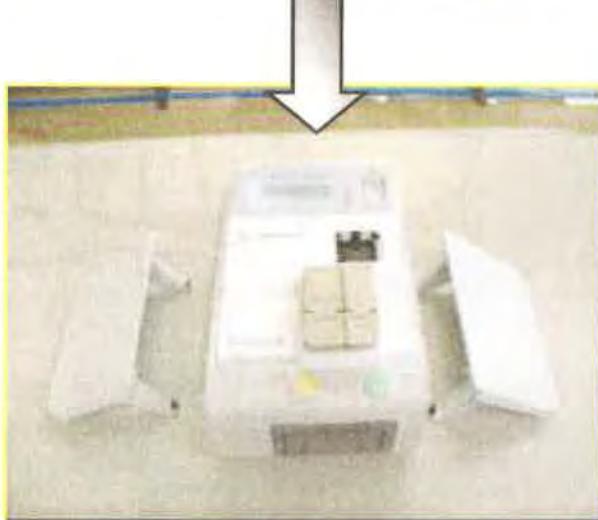
【Fig. 8.1.1.(4)】

◇ 8.1.2 Detach bag support table

- ① Pull the bag support table in the direction of the red arrows (to the side) and detach from the main unit. (See fig. 8.1.2.(1))



[Fig. 8.1.2.(1)]

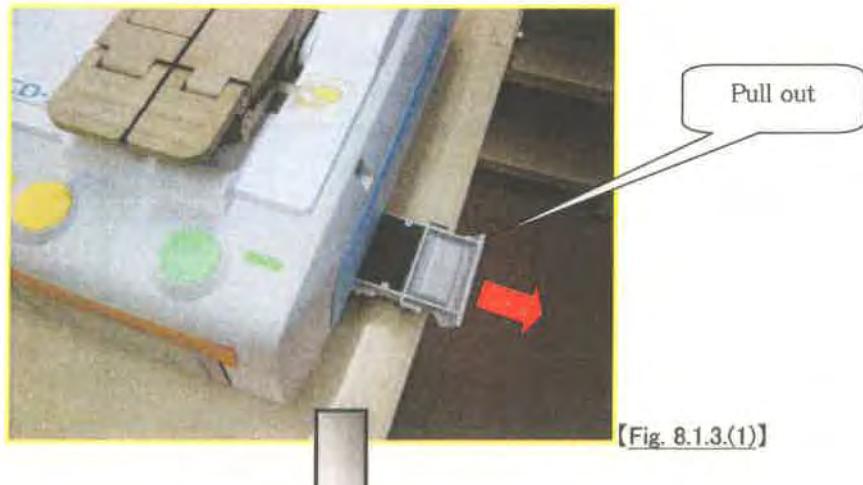


[Fig. 8.1.2.(2)]

◇ 8.1.3 Detach filter cover

- ① Pull the filter cover in the direction of the red arrow and detach from the main unit.

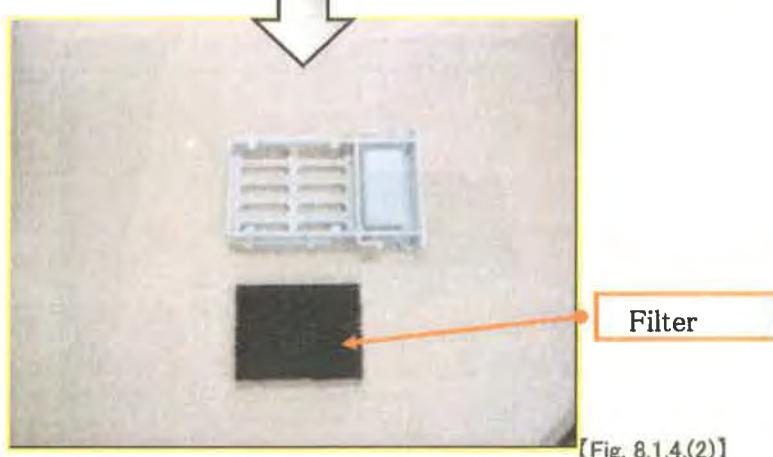
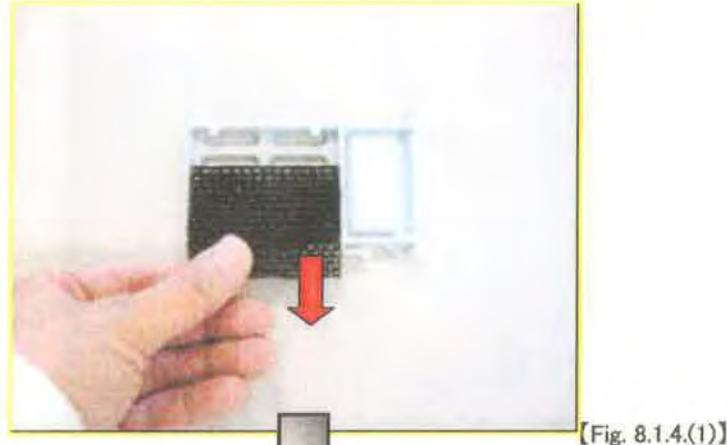
(See fig. 8.1.3.(1))



◆ 8.1.4 Detach filter

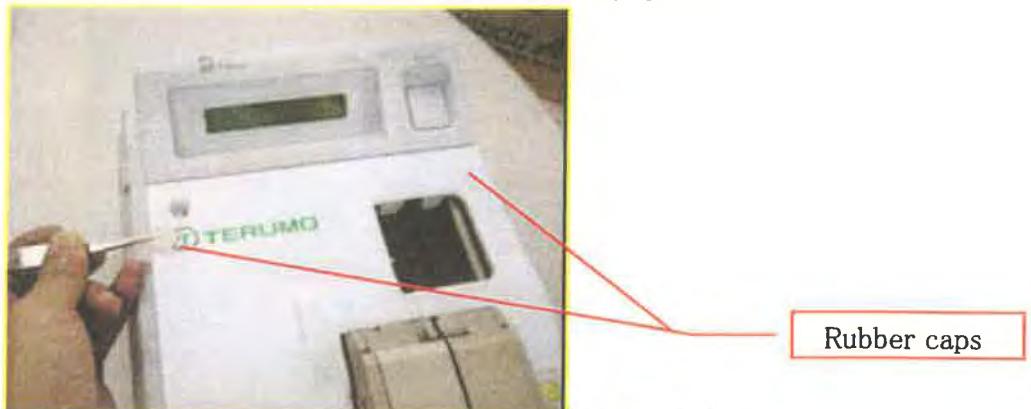
- ③ Pull the filter cover in the direction of the red arrow to detach the filter cover.

(See fig. 8.1.4.(1))



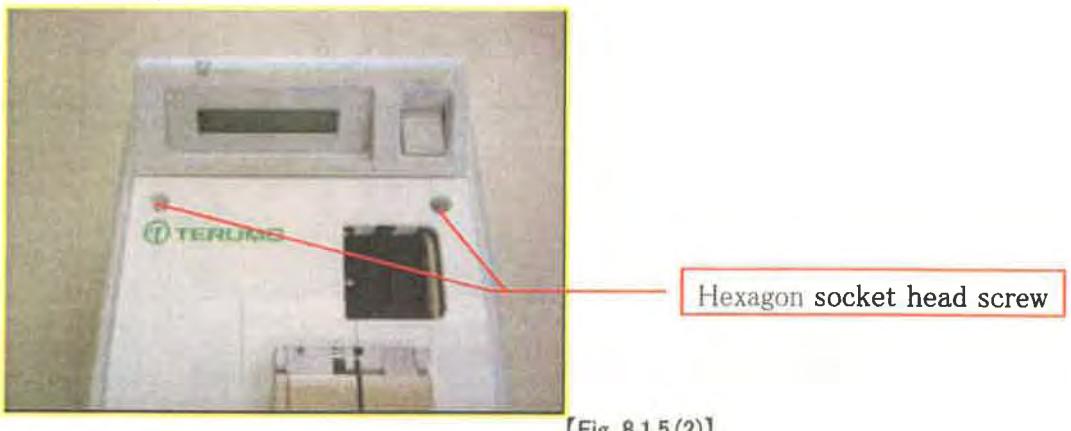
◇ 8.1.5 Detach upper plate

- ① Using tweezers, remove the rubber caps from the two locations displayed below.



【Fig. 8.1.5.(1)】

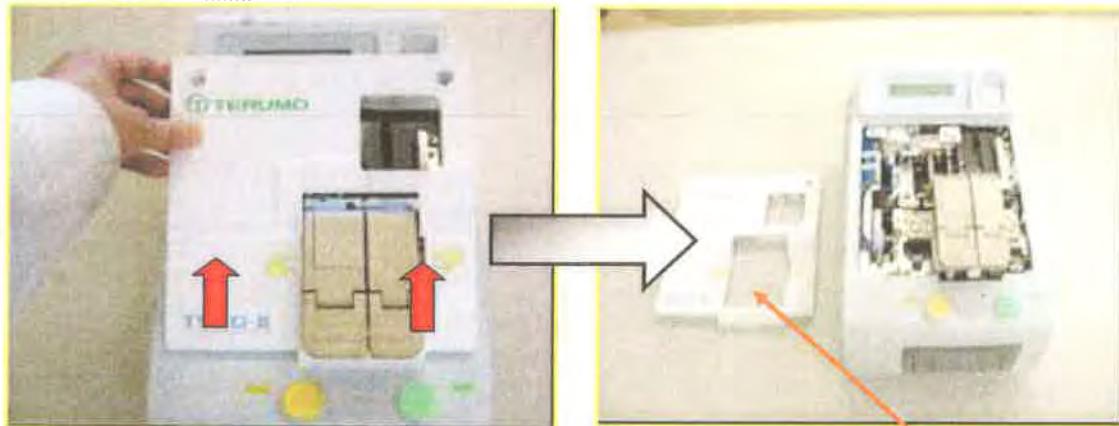
- ② Detach two screws (hexagon socket head screws).



【Fig. 8.1.5.(2)】

- ③ Pull the upper plate in the direction of the red arrow to detach from the main unit.

(See fig. 8.1.5.(3))

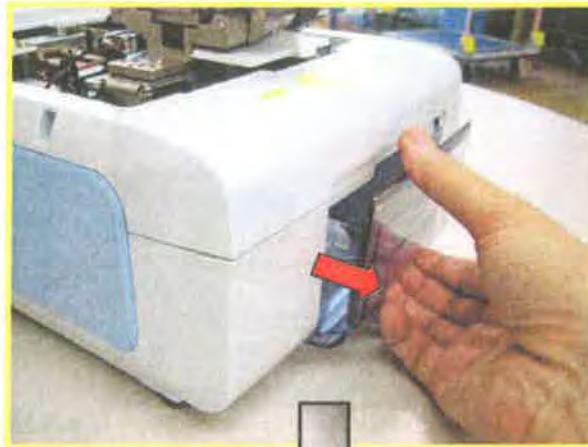


【Fig. 8.1.5.(3)】

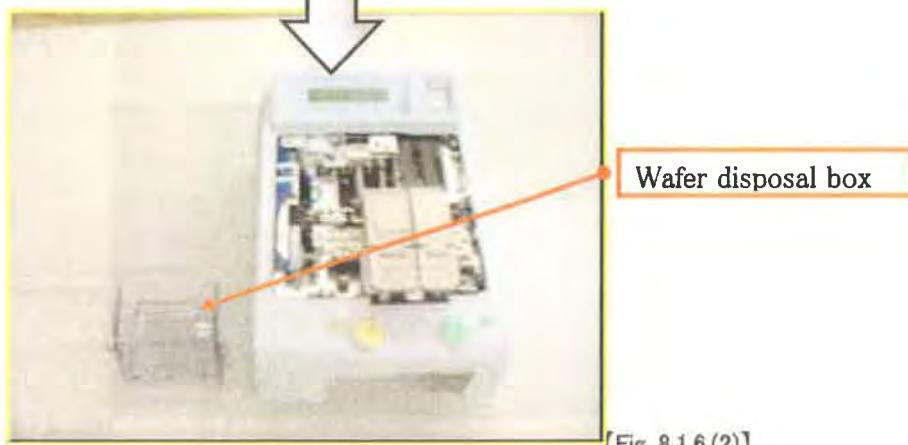
【Fig. 8.1.5.(4)】

◇ 8.1.6 Detach wafer disposal box

- ① Pull the wafer disposal box in the direction of the red arrow to detach. (See Fig. 8.1.6.(1))



【Fig. 8.1.6.(1)】

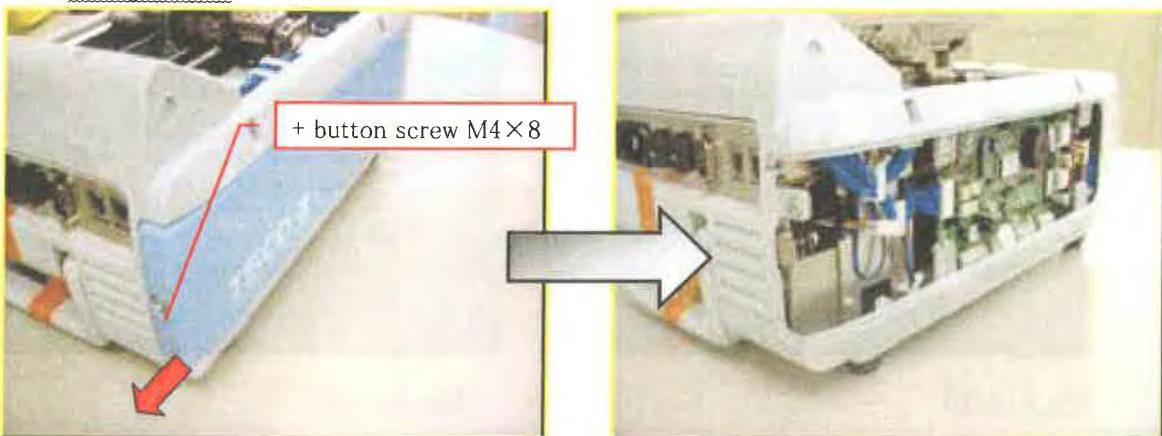


【Fig. 8.1.6.(2)】

◇ 8.1.7 Detach top main cover

- ① Detach the screws (+ button screws M4 x 8) and slide the left-side cover in the direction of the red arrows to detach.

(See fig. 8.1.7.(1))

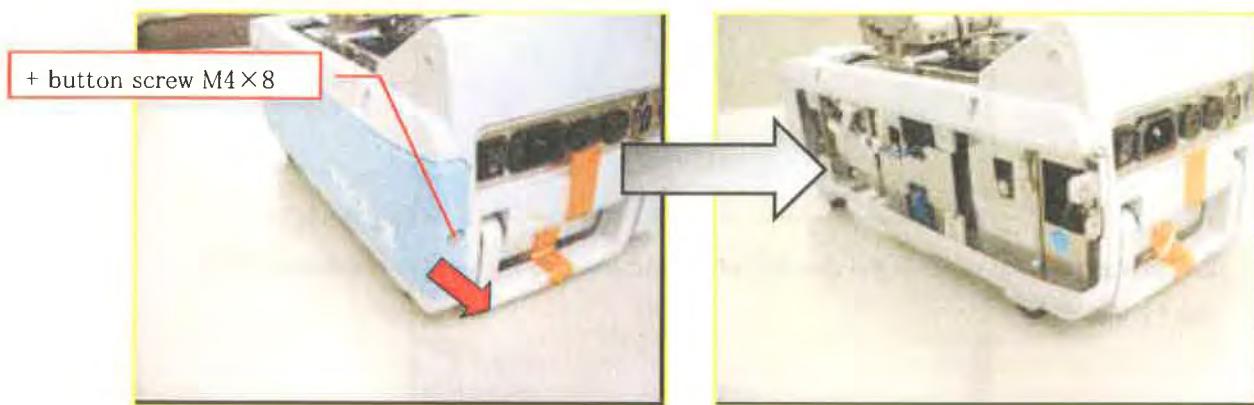


【Fig. 8.1.7.(1)】

【Fig. 8.1.7.(2)】

- ② Detach the screws (+ button screws M4 x 8) and slide the right-side cover in the direction of the red arrows to detach.

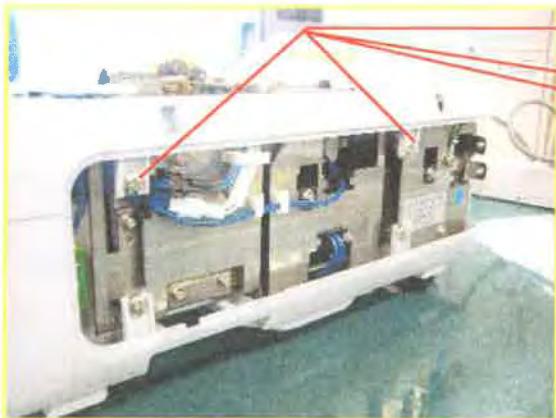
(See fig. 8.1.7.(3))



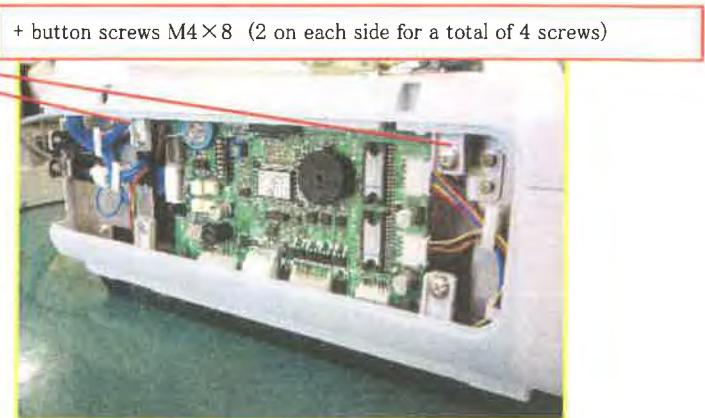
【Fig. 8.1.7.(3)】

【Fig. 8.1.7.(4)】

- ③ Detach the two screws (+ button screw M4 × 8) displayed below from each side, removing a total of four screws on both sides.

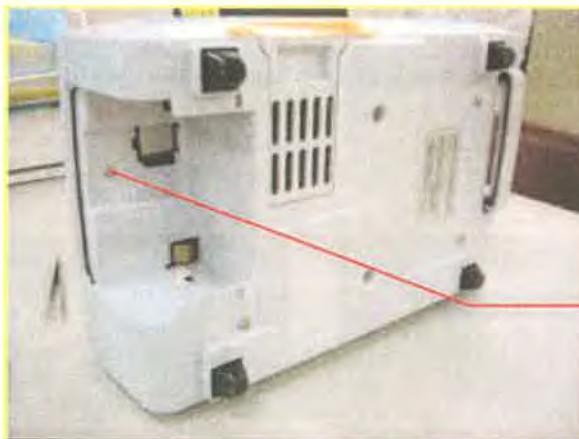


【Fig. 8.1.7.(5)】



【Fig. 8.1.7.(6)】

- ④ Detach the screw (+ sems screw M3 × 6) located on the bottom of the unit.



【Fig. 8.1.7.(7)】

- ⑤ Lift the top main cover in the direction of the red arrow to the position displayed below .
(See fig. 8.1.7.(8))



【Fig. 8.1.7.(8)】

⑥ Detach the LCD panel connector cable.



Be sure to hold the cable housing when taking the connectors off. Pulling on the cables to detach could cause damage to the device.

LCD panel connector cable

【Fig. 8.1.7.(9)】

⑦ Detach the keyboard connector cable



Keyboard connector cable



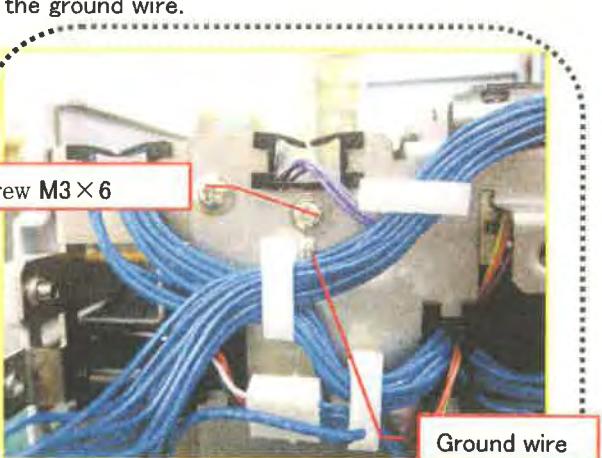
Be sure to hold the cable housing when taking the connectors off. Pulling on the cables to detach could cause damage to the device.

【Fig. 8.1.7.(10)】

⑧ Detach the screw (+ sems screw M3 × 6) and detach the ground wire.



+ sems screw M3 × 6



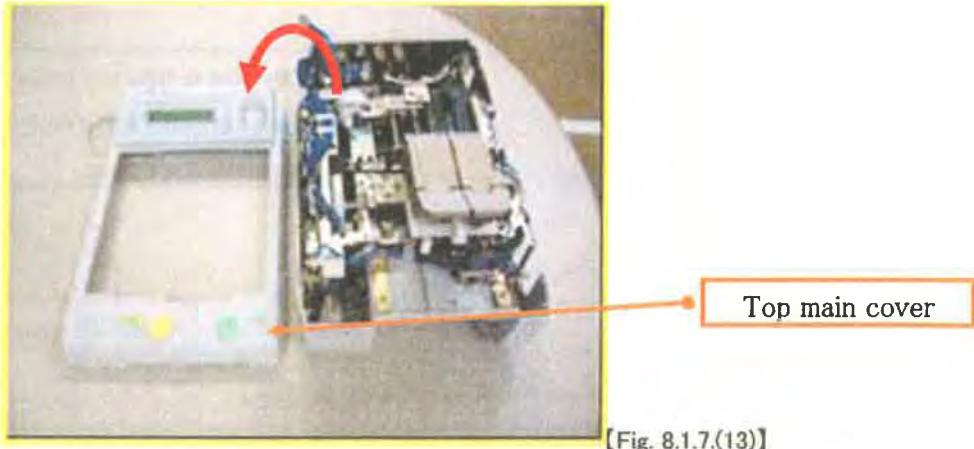
Ground wire

【Fig. 8.1.7.(11)】

【Fig. 8.1.7.(12)】

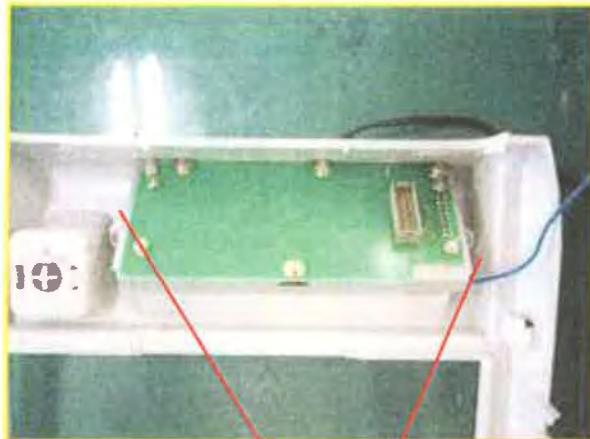
※Magnified

- ⑨ Pull the top main cover in the direction of the red arrow to detach from the main unit.
(See fig. 8.1.7.(13))



◇ 8.1.8 Detach LCD panel unit

- ① Detach the two screws (tap tight screws M3 × 10) displayed below.



【Fig. 8.1.8.(1)】

tap tight screws M3 × 10 (2 screws)

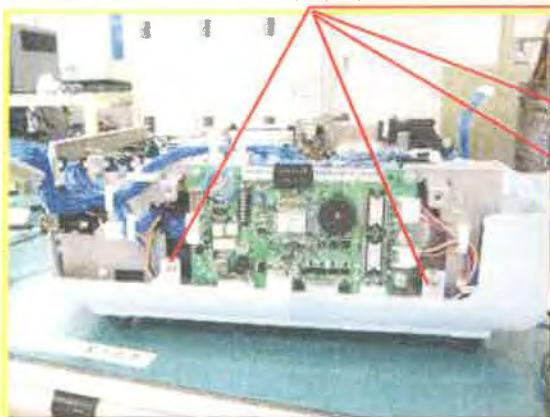
- ② Detach the LCD panel unit from the top main cover unit.



【Fig. 8.1.8.(2)】

◇ 8.1.9 Detach base cover unit

- ① Detach the two screws (+ button screw M4×8) displayed below from each side, removing a total of four screws on both sides.



+ button screws M4×8 (2 on each side for a total of 4 screws)



【Fig. 8.1.9.(1)】

【Fig. 8.1.9.(2)】

- ② Detach the five screws (+ button screw M4×8) located on the bottom of the unit.



+ button screw M4×8 (5 screws)

【Fig. 8.1.9.(3)】

- ③ Pull the main frame unit in the direction of the red arrow to detach from the base cover unit. (See fig. 8.1.9.(4))

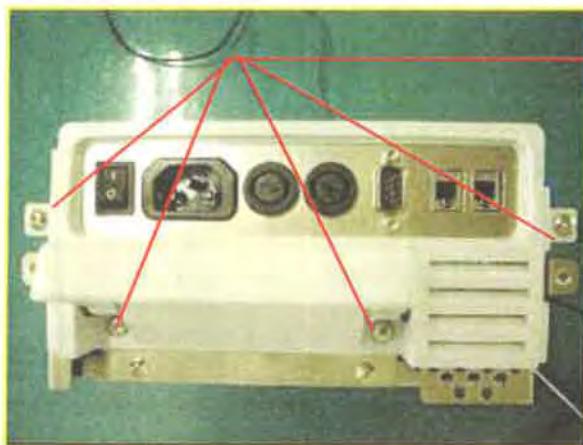


Base cover unit

【Fig. 8.1.9.(4)】

◇ 8.1.10 Detach rear cover unit

- ① Detach the four screws displayed below (+ button screw M4 × 8)



【Fig. 8.1.10.(1)】

- ② Lift the rear panel cover up and detach from the main unit. (See fig. 8.1.10.(2))

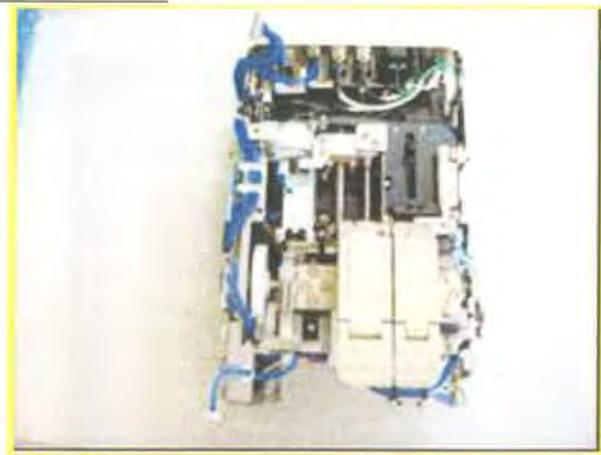


【Fig. 8.1.10.(2)】



【Fig. 8.1.10.(3)】

◇ 8.1.11 Detach frame unit

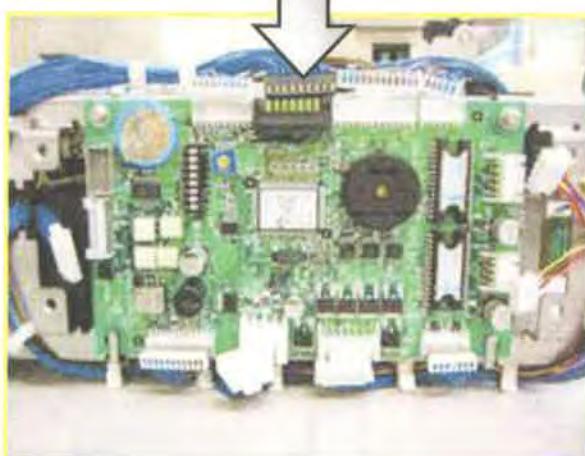
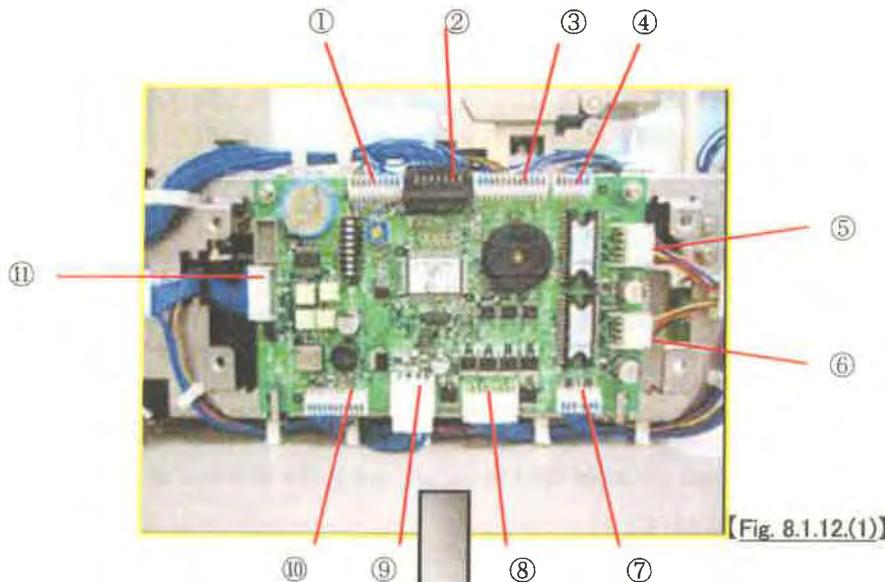


【Fig. 8.1.11.(1)】

Detached main frame unit

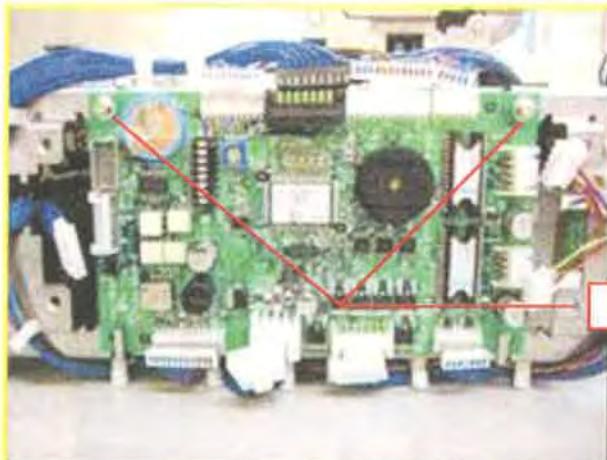
◇ 8.1.12 Detach main CPU board

- ① Detach the 11 connectors displayed below.



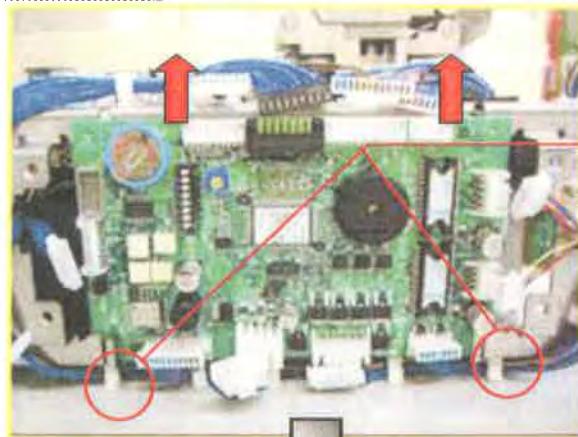
Be sure to hold the cable housing when taking the connectors off. Pulling on the cables to detach could cause damage to the device.

- ② Detach the screws (+ sems screw M3 × 6) from the two locations displayed below.

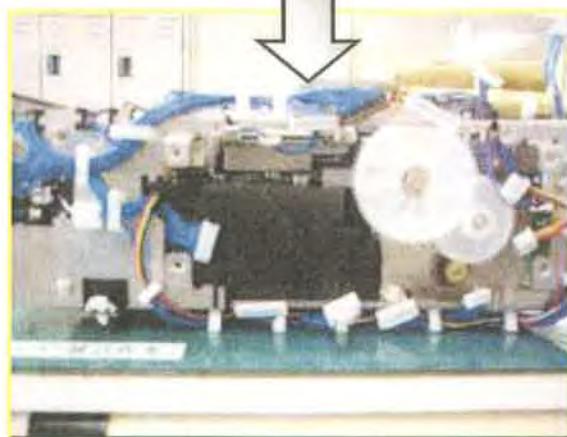


【Fig. 8.1.12.(3)】

- ③ Detach the hook from the main CPU board and pull in the direction of the red arrow to detach. (See fig. 8.1.12.(4))



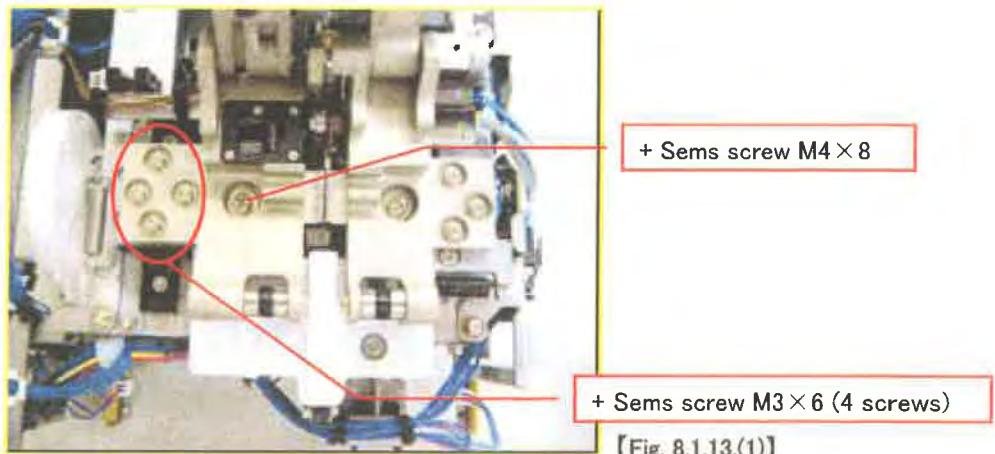
【Fig. 8.1.12.(4)】



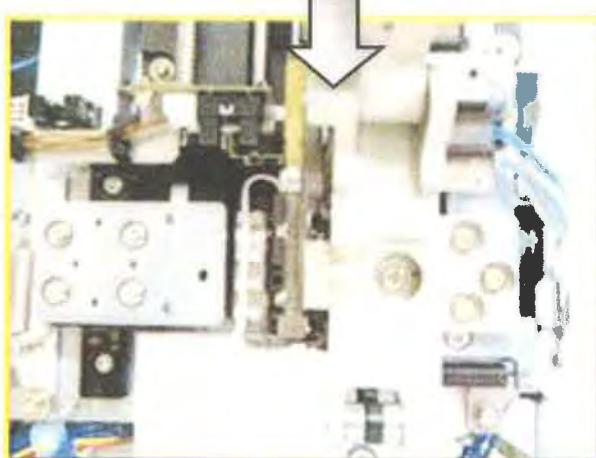
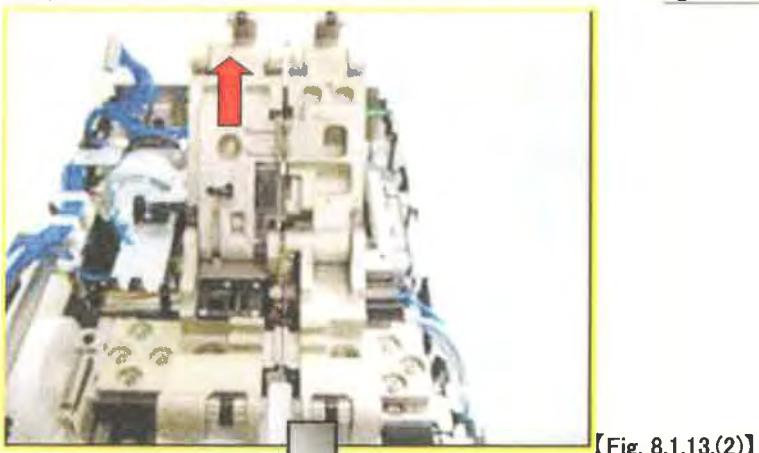
【Fig. 8.1.12.(5)】

◇ 8.1.13 Detach left clamp unit

- ① Detach the five screws (four + sems screw M3 × 6 and one + sems screw M4 × 8).

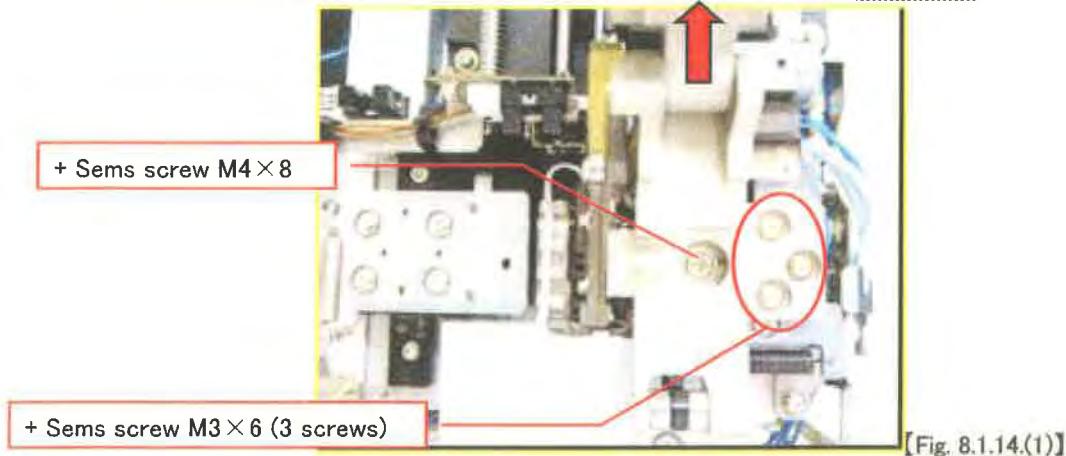


- ② Lift the left clamp unit in the direction of the red arrow to detach. (See fig. 8.1.13.(2))

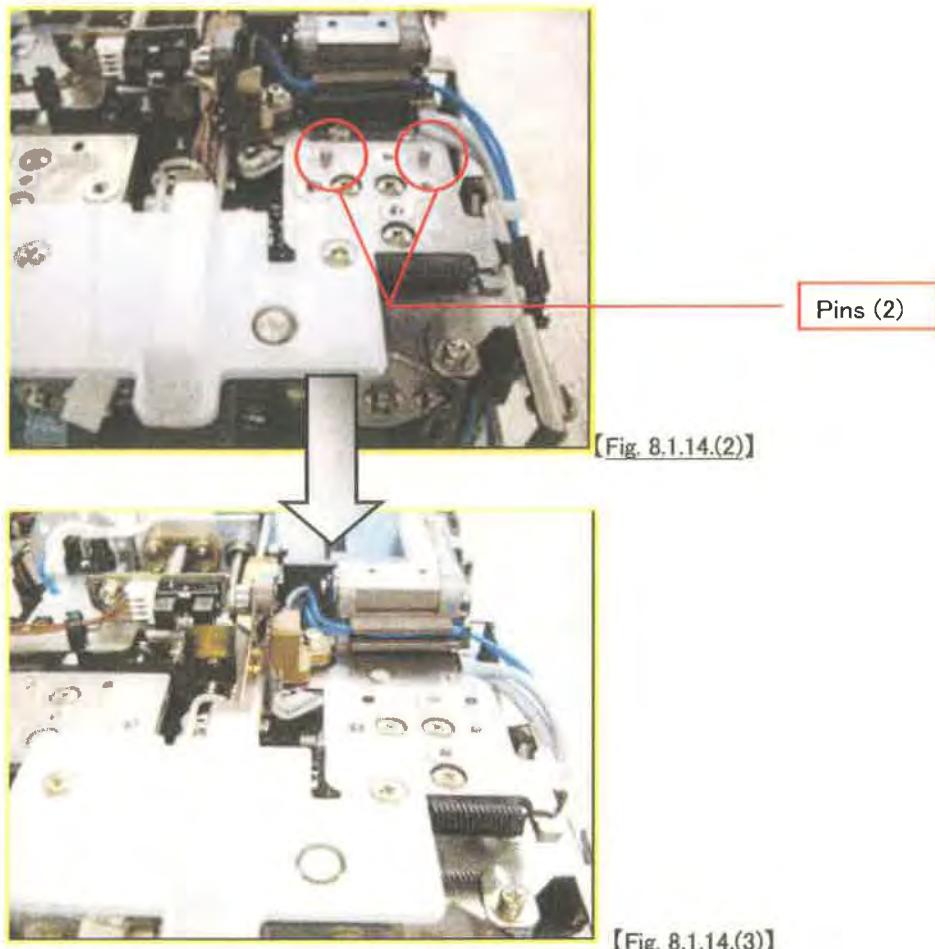


◇ 8.1.14 Detach right clamp unit

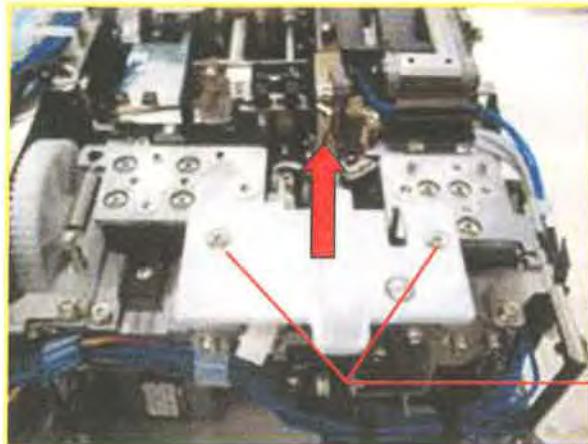
Detach the four screws (three + sems screw M3×6 and one + sems screw M4×8) and lift the right clamp unit in the direction of the red arrow to detach. (See fig. 8.1.14.(1))



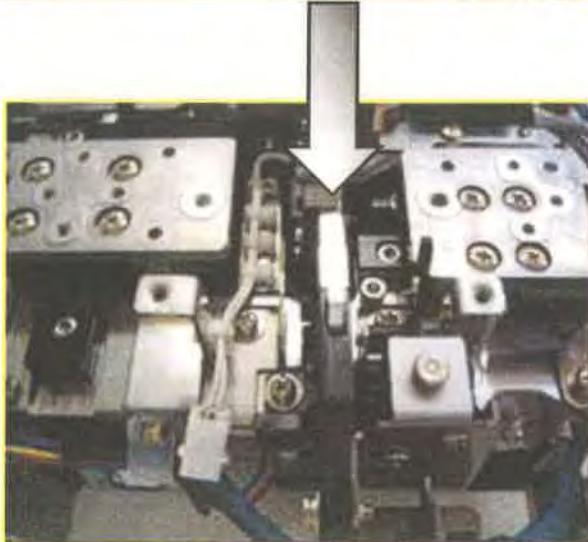
② Detach the two pins.



- ③ Detach the two bolts (pan bolt M3×6) displayed below and lift the wafer outlet guide cover unit in the direction of the red arrow to detach. (See fig. 8.1.14.(4))



【Fig. 8.1.14.(4)】

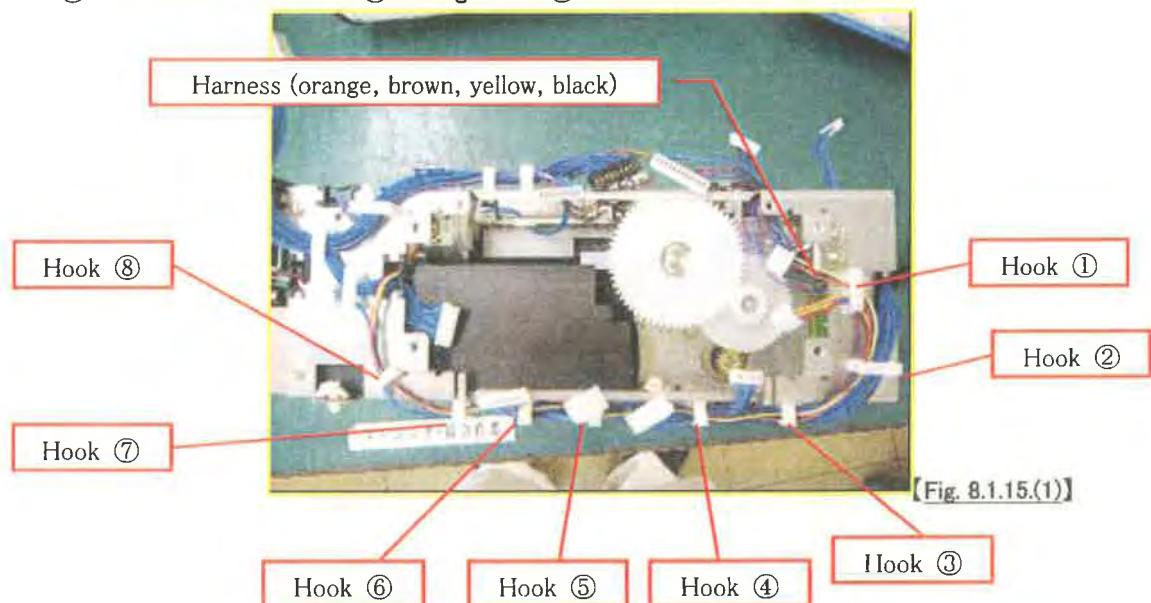


【Fig. 8.1.14.(5)】

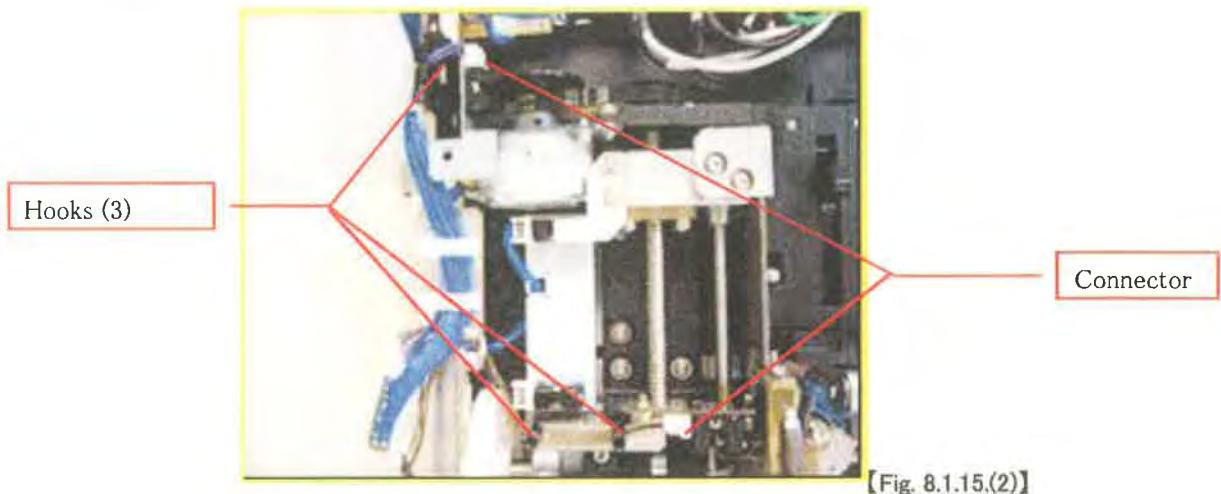
◇ 8.1.15 Detach wafer feeding unit

① Open hook ① and detach the motor harness and close hook ① again.

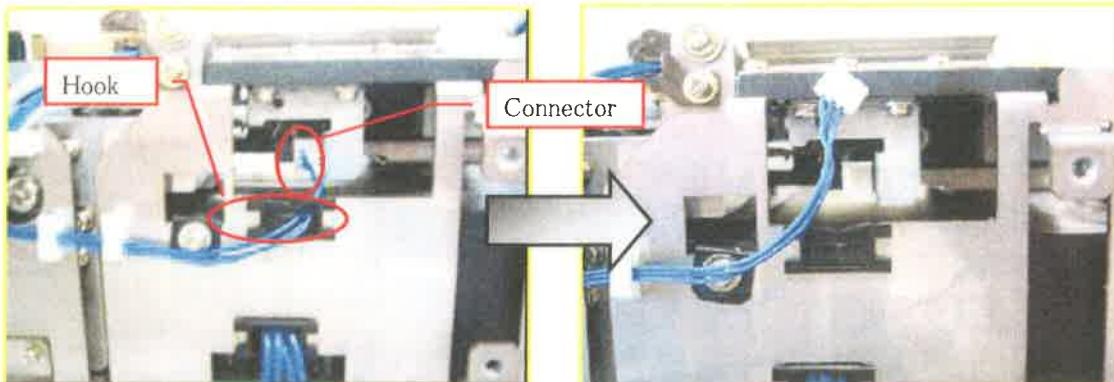
② Do the same for hook ② through hook ⑧ and detach the motor harness.



③ Attach the two connectors of the wafer feeding unit and attach the three hooks displayed below.



- ④ Detach the hooks and connectors on the right side.

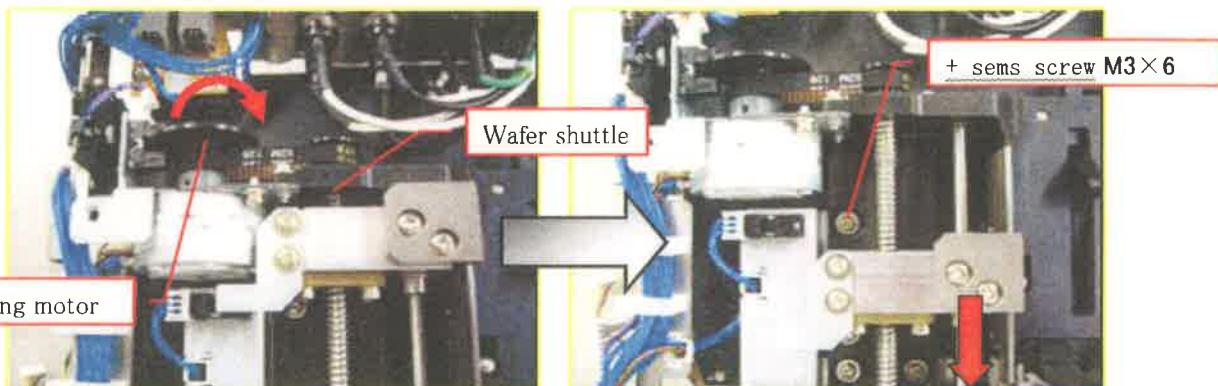


【Fig. 8.1.15.(3)】

【Fig. 8.1.15.(4)】

- ⑤ Manually turn the wafer feeding motor in the direction of the red arrow (see fig. 8.1.15.(5)).

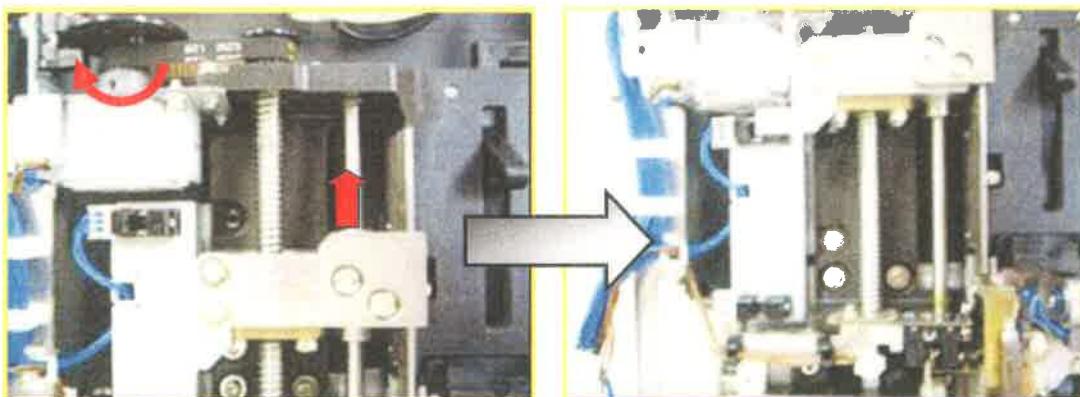
Lower the wafer shuttle until you see the screw (+ sems screw M3 × 6) and detach the screw (+ sems screw M3 × 6). (See fig. 8.1.15.(6))



【Fig. 8.1.15.(5)】

【Fig. 8.1.15.(6)】

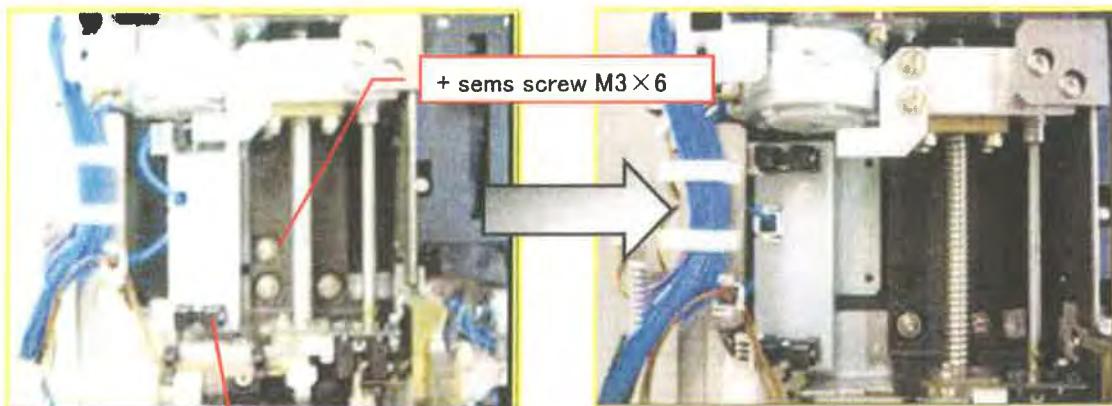
- ⑥ Detach the screw (+ sems screw M3 × 6) and turn the wafer feeding motor in the direction of the red arrow to move the shuttle to its original position. (See fig. 8.1.15.(7))



【Fig. 8.1.15.(7)】

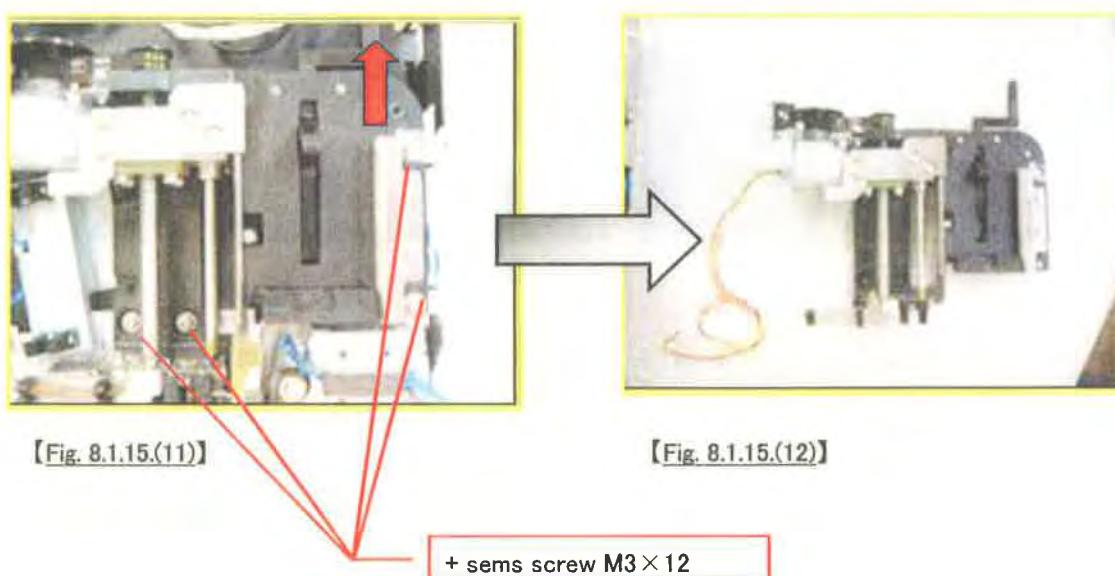
【Fig. 8.1.15.(8)】

- ⑦ Detach the screw (+ sems screw M3 × 6) and detach the sensor bracket by sliding it to the side.



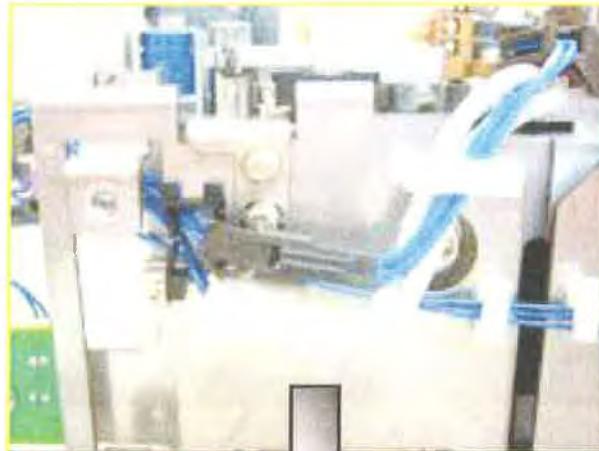
Sensor bracket

- ⑧ Detach the four screws (+ sems screw M3 × 12) and pull the wafer feeding unit in the direction of the red arrow to detach. (See fig. 8.1.15.(11))

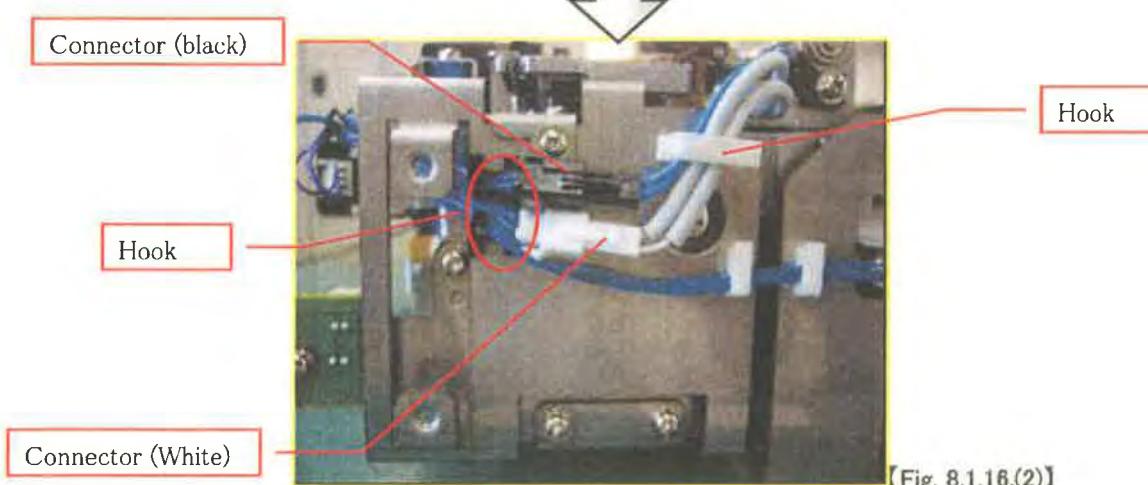


◇ 8.1.16 Detach wafer holder

- ① Detach the white and black connectors and hooks.

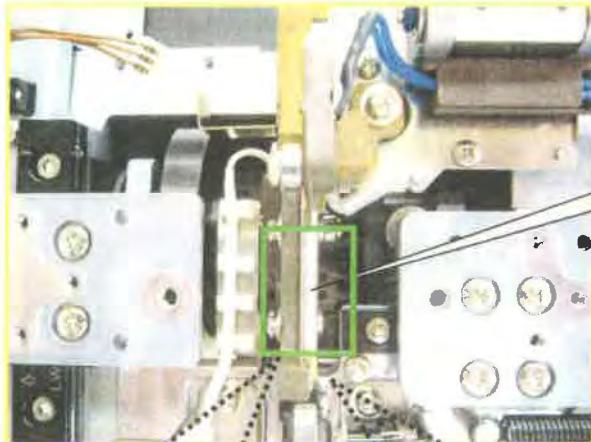


【Fig. 8.1.16.(1)】



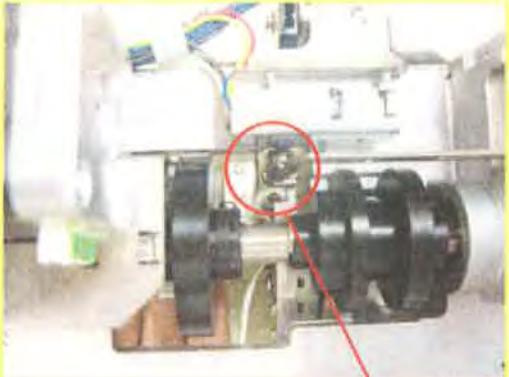
【Fig. 8.1.16.(2)】

- ② Using tweezers, detach the springs connecting the connectors to the main unit.



【Fig. 8.1.16.(3)】

※Picture from the back side

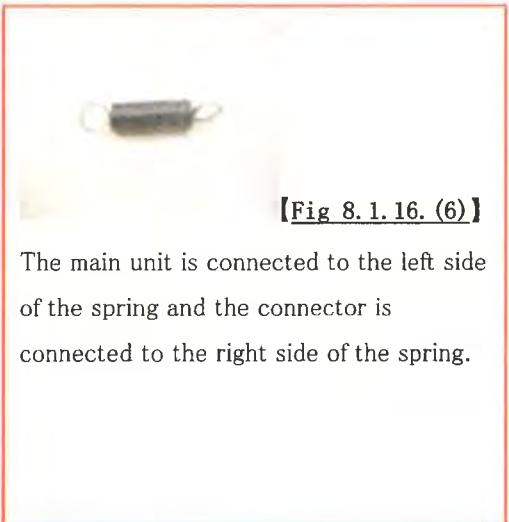


【Fig. 8.1.16.(4)】

※Picture from the side



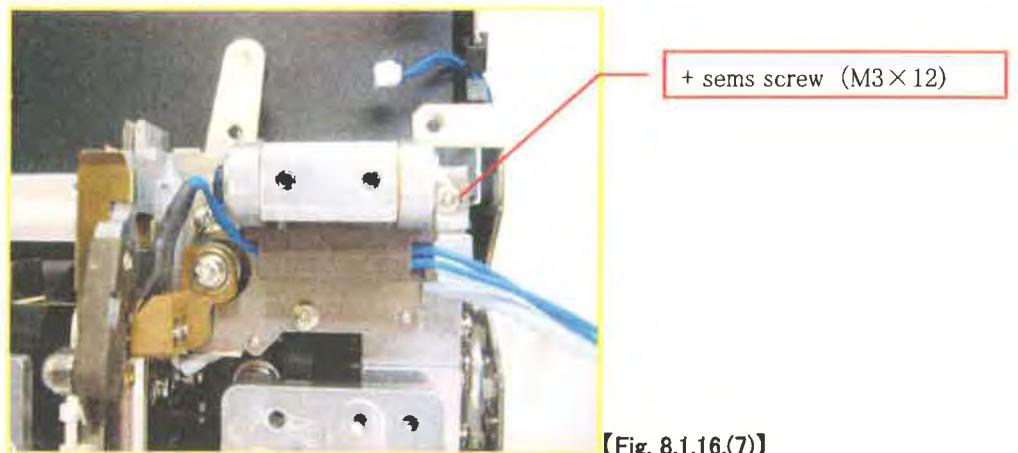
【Fig. 8.1.16.(5)】



【Fig. 8.1.16. (6)】

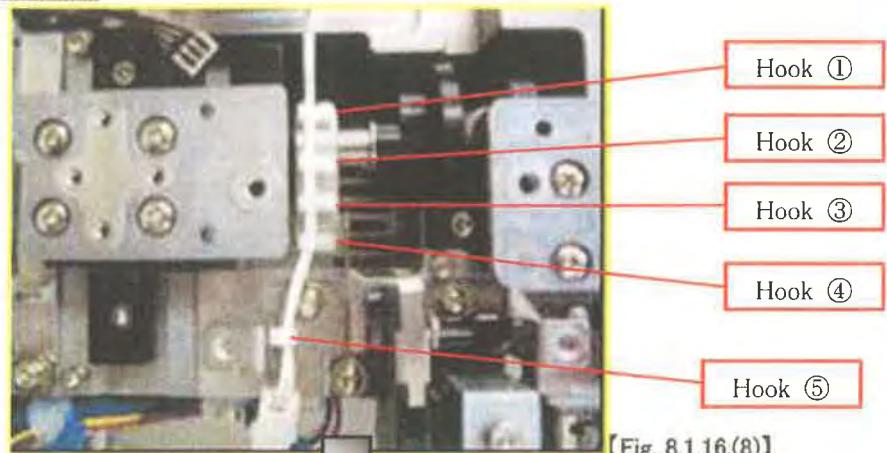
The main unit is connected to the left side of the spring and the connector is connected to the right side of the spring.

- ③ Detach the screw (+ sems screw M3 × 12) displayed below.

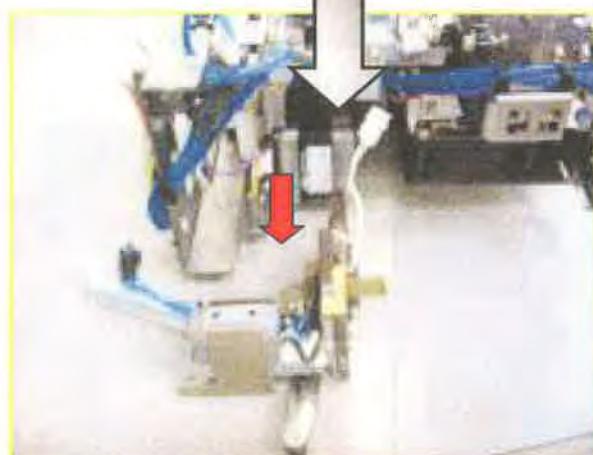


【Fig. 8.1.16.(7)】

- ④ Detach the five hooks in order and pull the wafer holder unit in the direction of the arrow to detach. (See Fig. 8.1.16(8))



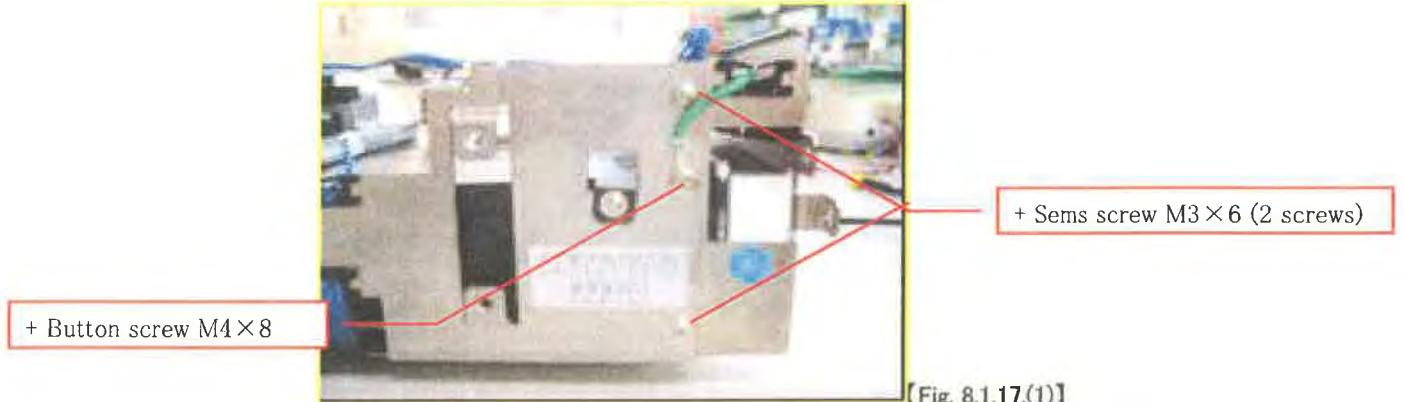
【Fig. 8.1.16.(8)】



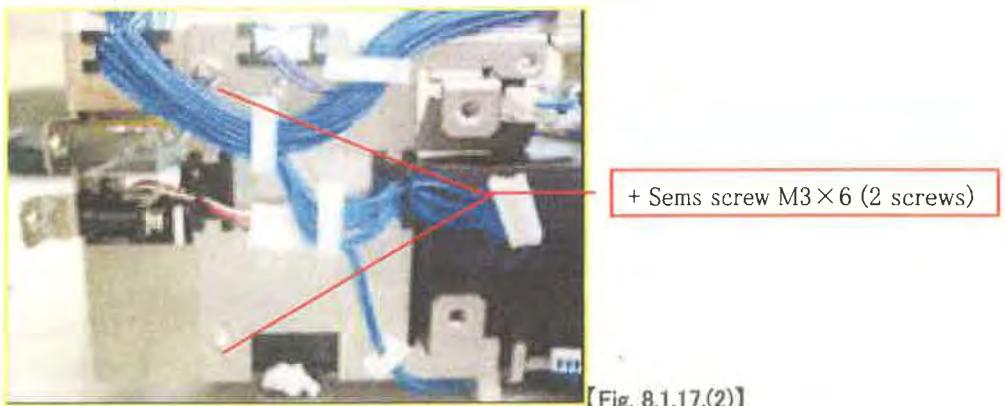
【Fig. 8.1.16.(9)】

◇ 8.1.17 Detach rear panel unit

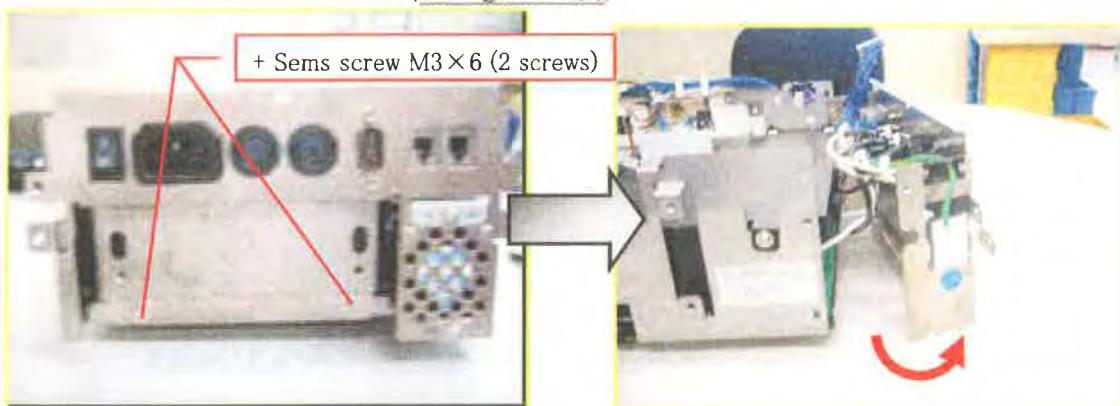
- ① Detach the three screws (two + sems screw M3×6 and one + button screw M4×8) located on the right side.



- ② Detach the two screws (+ sems screw M3×6) located on the left side.



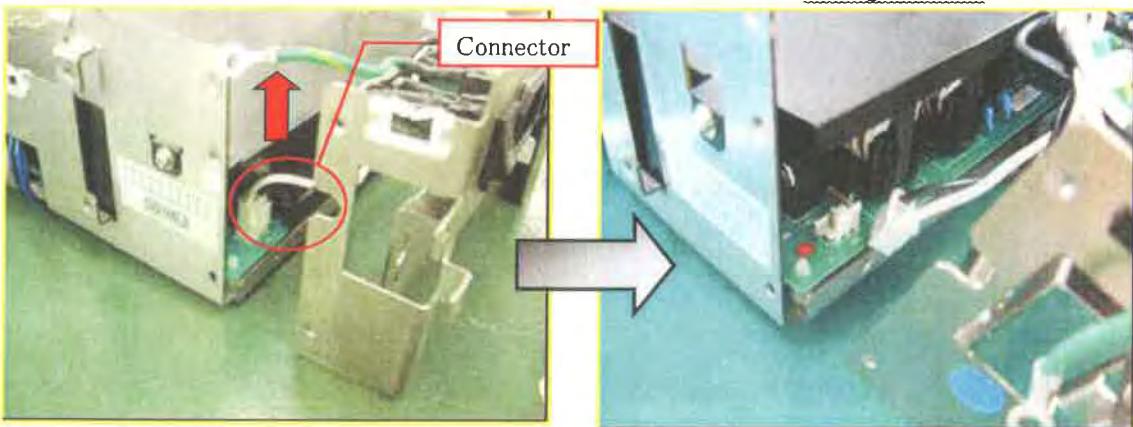
- ③ Detach the 2 screws (+ sems screw M3×6) on the rear panel unit and pull the rear panel unit in the direction of the red arrow. (See fig. 8.1.17.(4))



【Fig. 8.1.17.(3)】

【Fig. 8.1.17.(4)】

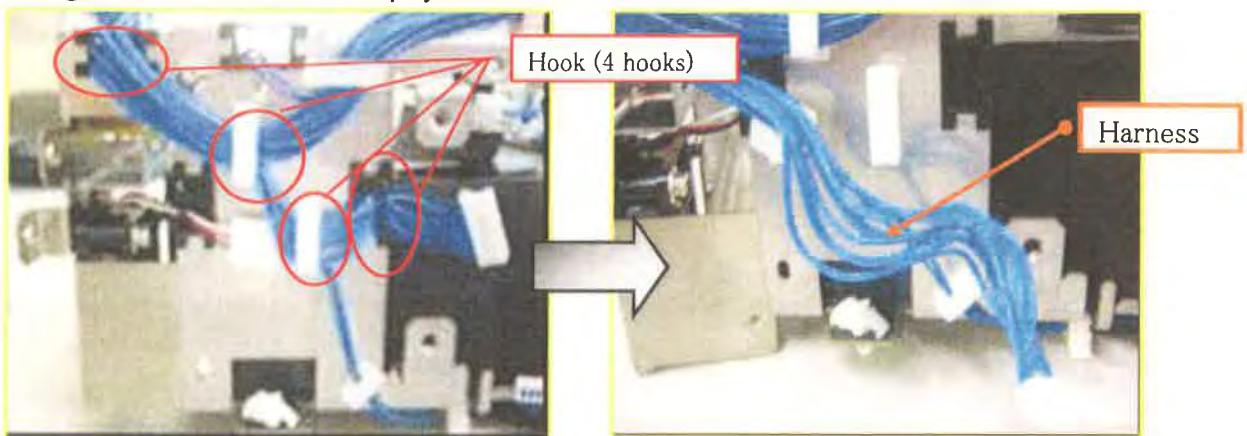
- ④ Pull the connector in the direction of the red arrow to detach. (See fig. 8.1.17.(5))



【Fig. 8.1.17.(5)】

【Fig. 8.1.17.(6)】

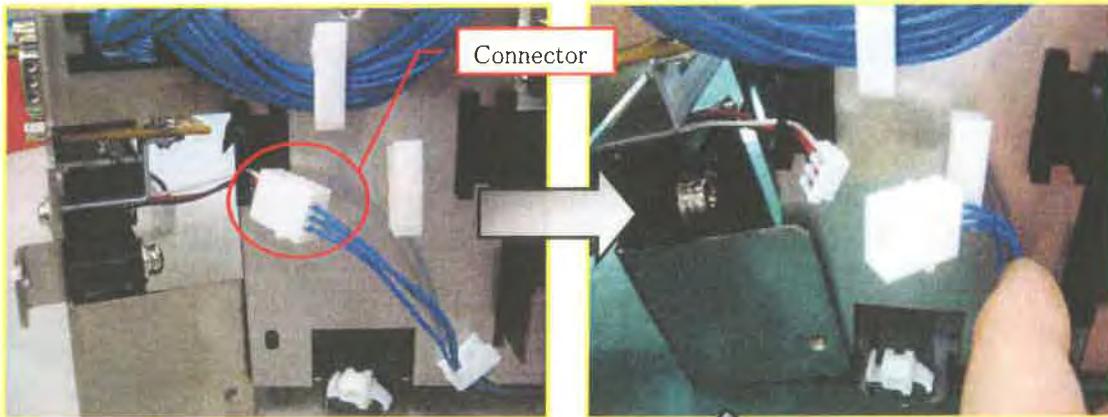
- ⑤ Detach the four hooks displayed below and detach the harness from the main unit.



【Fig. 8.1.17.(7)】

【Fig. 8.1.17.(8)】

- ⑥ Detach the connector and detach the rear panel unit.



【Fig. 8.1.17.(9)】

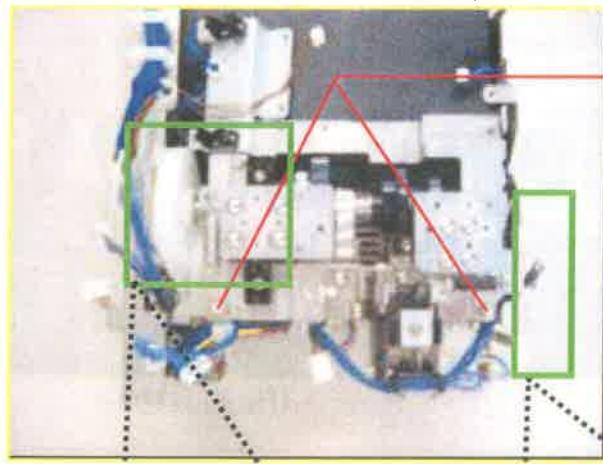
【Fig. 8.1.17.(10)】



【Fig. 8.1.17.(11)】

◇ 8.1.18 Detach cam frame unit

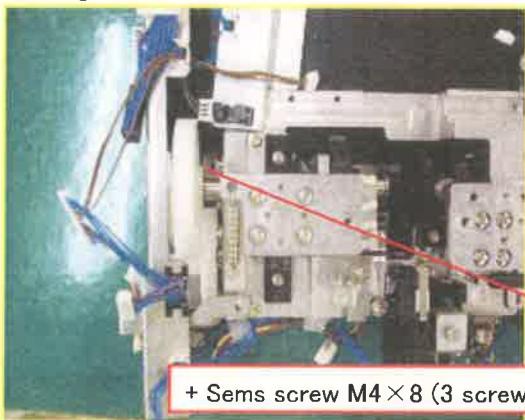
- ① Detach the five screws (+ sems screw M4 × 8) displayed below.



+ Sems screw M4 × 8 (2 screws)

【Fig. 8.1.18.(1)】

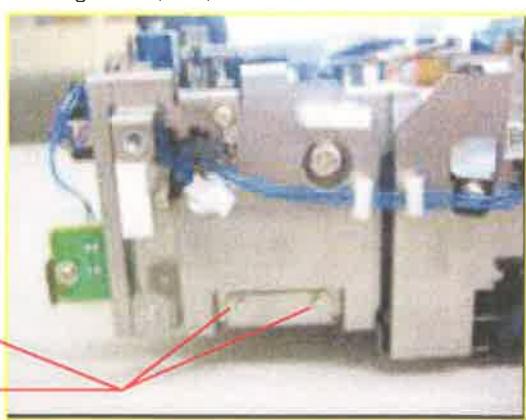
※Magnified



+ Sems screw M4 × 8 (3 screws)

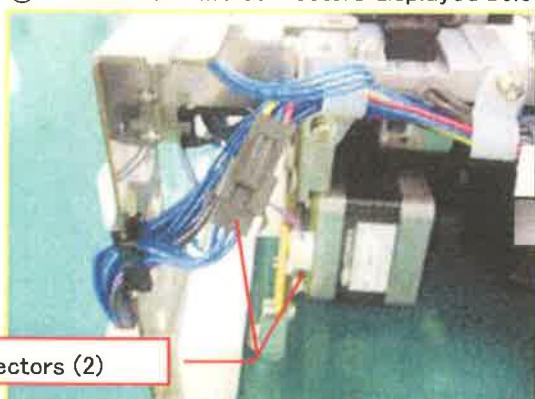
【Fig. 8.1.18.(2)】

※Magnified (side)



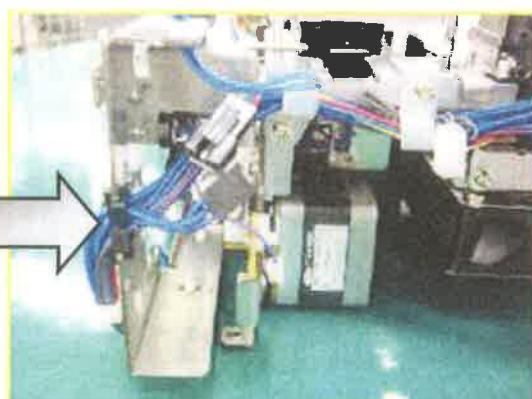
【Fig. 8.1.18.(3)】

- ② Detach the two connectors displayed below.



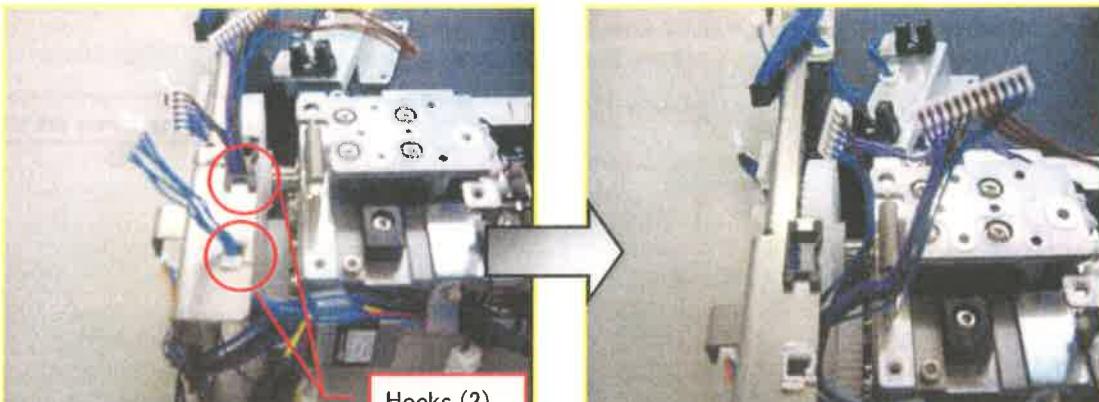
Connectors (2)

【Fig. 8.1.18.(4)】



【Fig. 8.1.18.(5)】

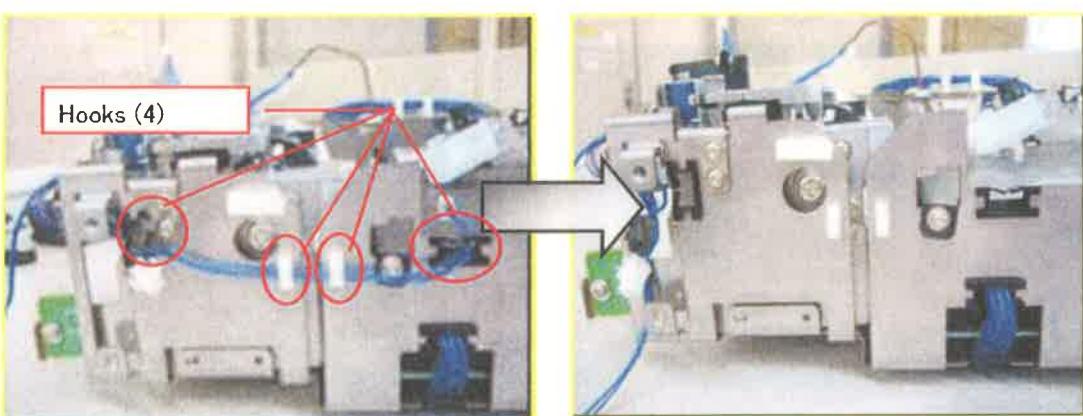
- ③ Detach the two hooks and detach the harness.



【Fig. 8.1.18.(6)】

【Fig. 8.1.18.(7)】

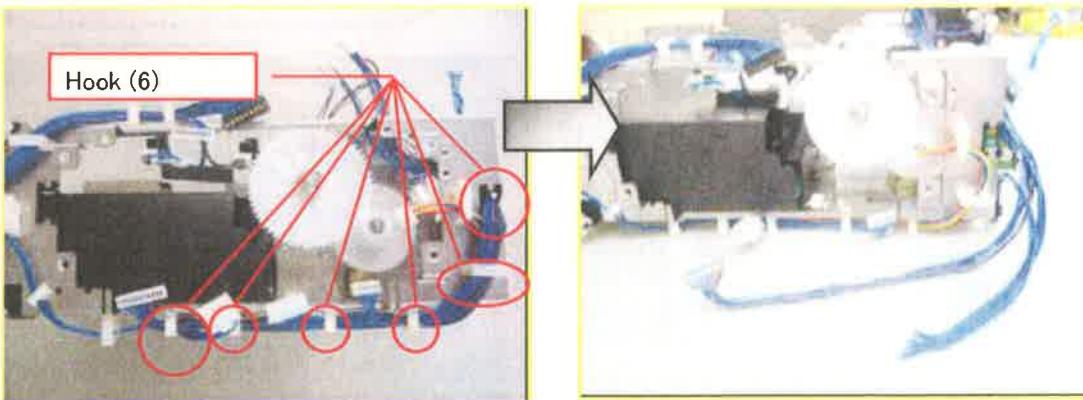
- ④ Detach the four hooks and detach the harness on the right side.



【Fig. 8.1.18.(8)】

【Fig. 8.1.18.(9)】

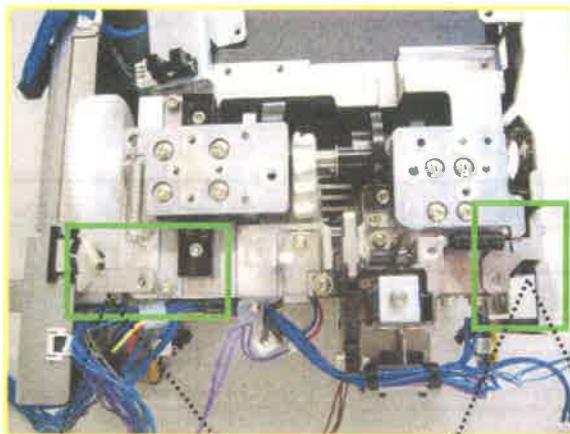
- ⑤ Detach the six hooks on the left side and detach the harness.



【Fig. 8.1.18.(10)】

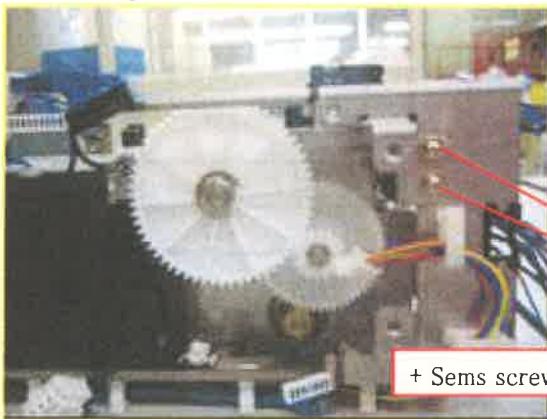
【Fig. 8.1.18.(11)】

- ⑥ Detach the four screws (+ sems screw M3 × 6) and pull the bracket in the direction of the red arrow to detach. (see fig. 8.1.18.(15) and fig. 8.1.18.(16))



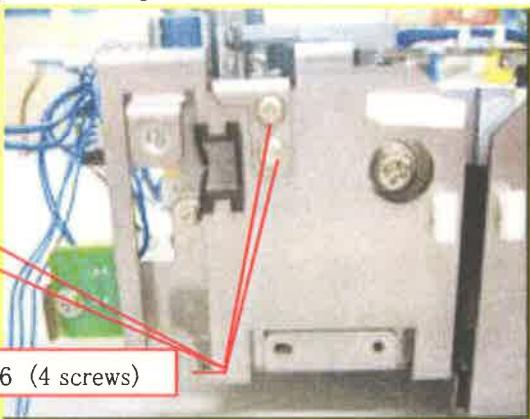
【Fig. 8.1.18.(12)】

※Magnified (side)



【Fig. 8.1.18.(13)】

※Magnified (side)



【Fig. 8.1.18.(14)】



【Fig. 8.1.18.(15)】

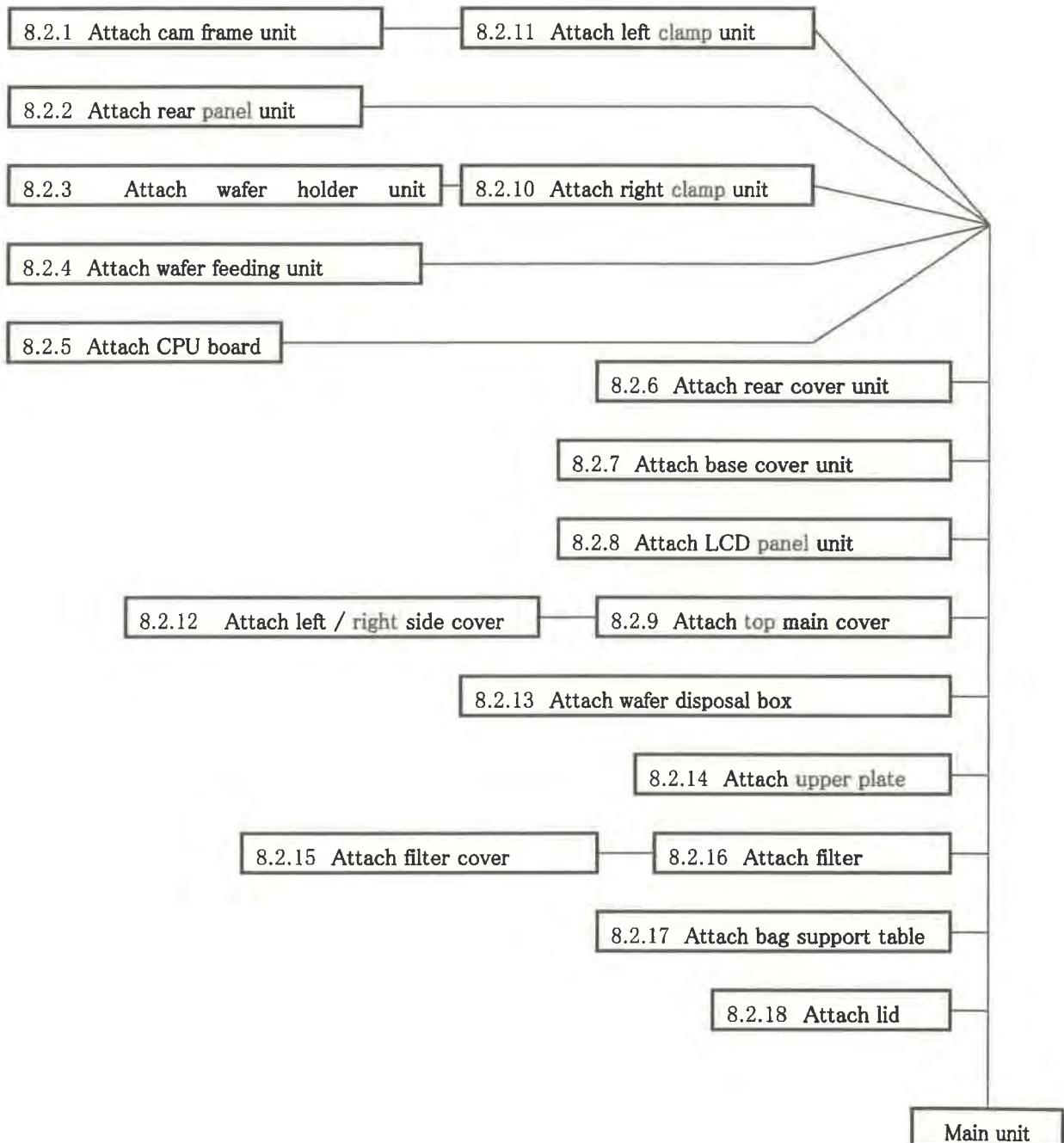


【Fig. 8.1.18.(16)】

8.2 Assembling procedure

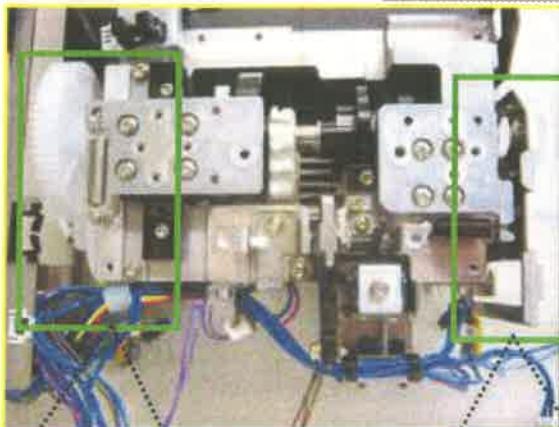
The following is the assembling procedure for the TSCD-II. When working with the chassis or frame unit, lay a soft cloth on the workspace to prevent scratches or damage. Please reference the parts diagram and configuration diagram for the part names and attachment location.

【Operation flow chart】



◇ 8.2.1 Attach cam frame unit

- ① Attach the brackets on both sides in the direction of the red arrow and attach the four screws (+ sems screw M3×6) to the main unit. (See fig. 8.2.1.(2) and fig. 8.2.1.(3))



【Fig. 8.2.1.(1)】

※Magnified (side)

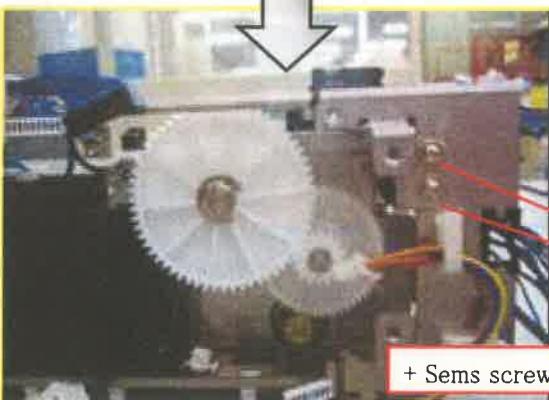


【Fig. 8.2.1. (2)】

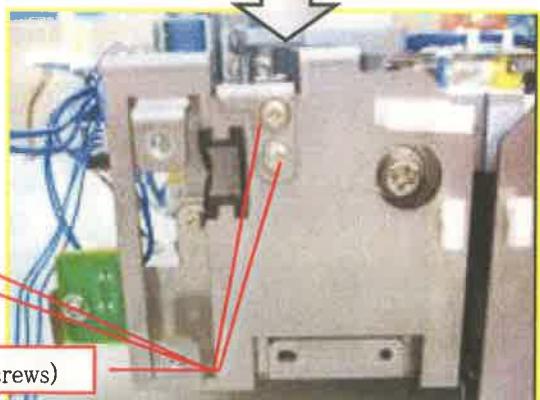
※Magnified (side)



【Fig. 8.2.1. (3)】



【Fig. 8.2.1. (4)】

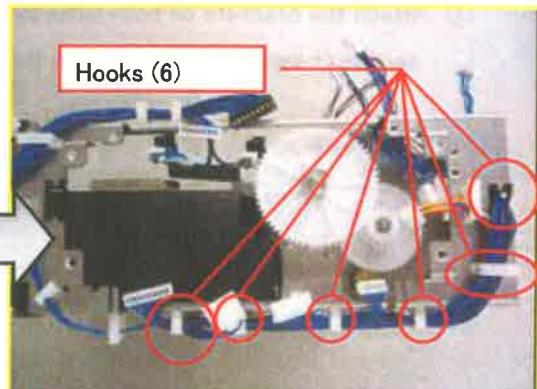


【Fig. 8.2.1. (5)】

- ② Attach the six hooks on the left side and attach the harness to the main unit.



【Fig. 8.2.1.(6)】

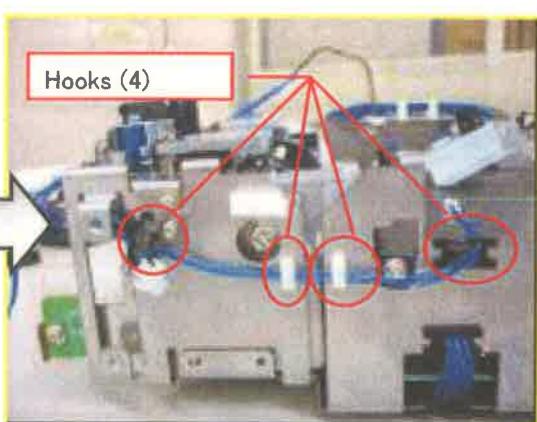


【Fig. 8.2.1.(7)】

- ③ Attach the four hooks on the right side and attach the harness to the main unit.

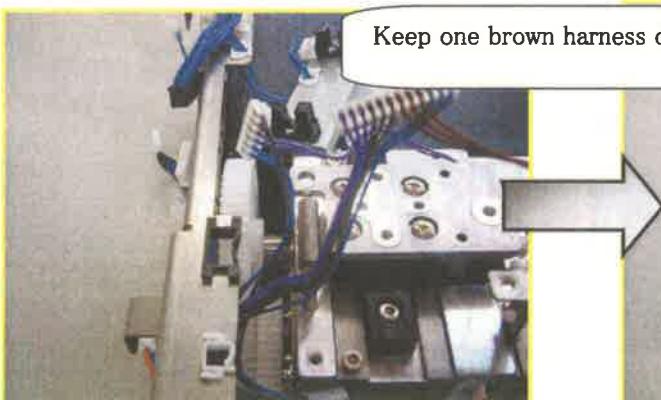


【Fig. 8.2.1.(8)】

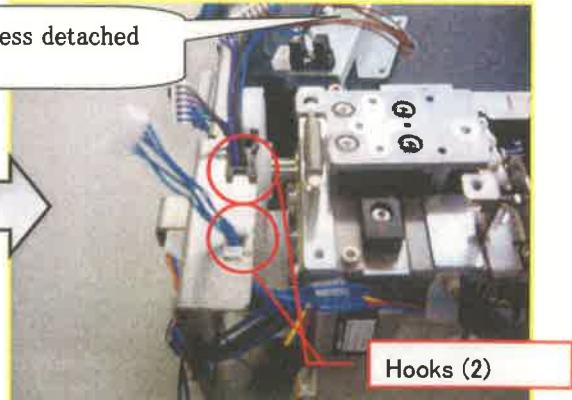


【Fig. 8.2.1.(9)】

- ④ Attach the two hooks on the top and attach the harness to the main unit.

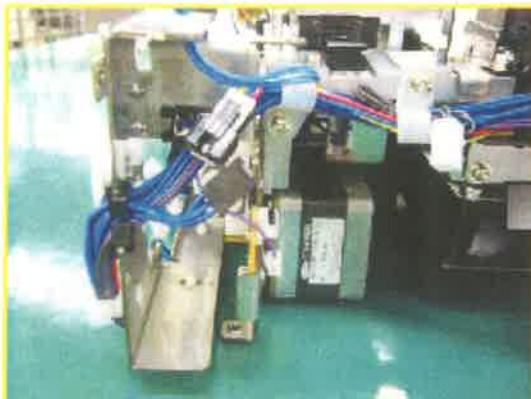


【Fig. 8.2.1.(10)】

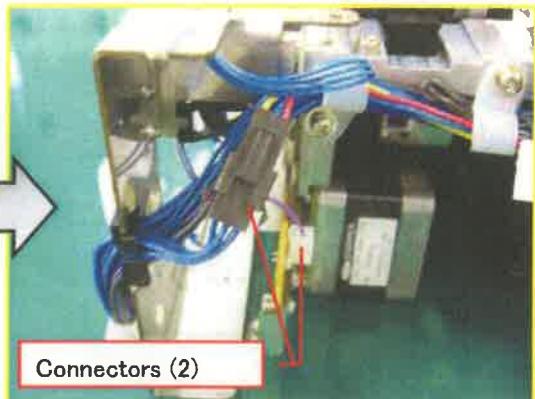


【Fig. 8.2.1.(11)】

- ⑤ Attach the two connectors on the left side.



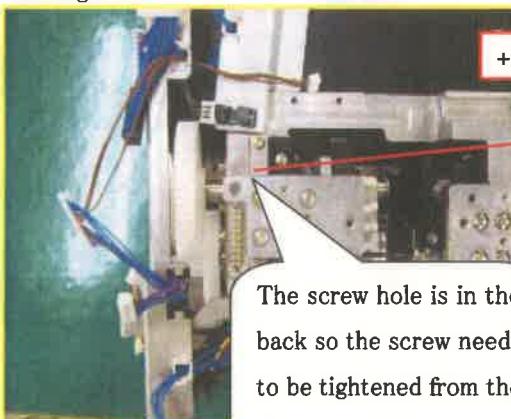
【Fig. 8.2.1.(12)】



【Fig. 8.2.1.(13)】

- ⑥ Attach the three screws (+ sems screw M3 × 6) and two screws (+ sems screw M4 × 8) displayed below.

※Magnified



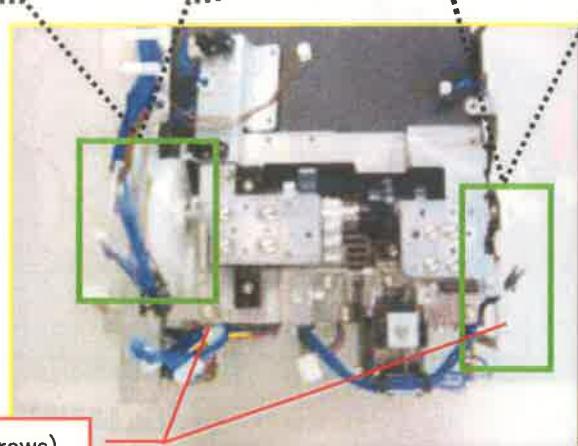
【Fig. 8.2.1.(14)】

※Magnified (side)



【Fig. 8.2.1.(15)】

+ Sems screw M4 × 8 (2 screws)



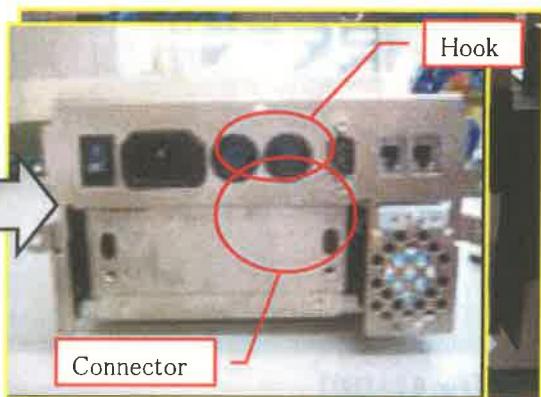
【Fig. 8.2.1.(16)】

◇ 8.2.2 Attach rear panel unit

- ① Attach the harness to the hook and connect the connector.



【Fig. 8.2.2.(1)】

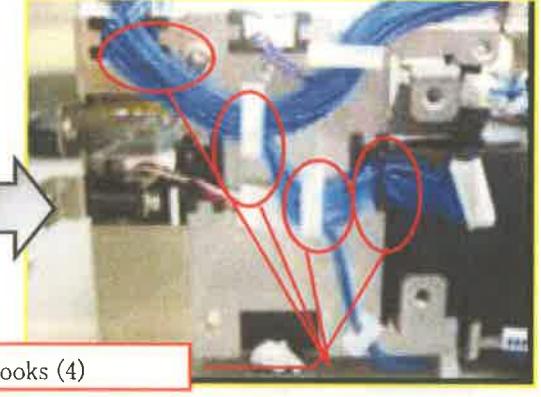


【Fig. 8.2.2.(2)】

- ② Attach the four hooks and attach the harness to the main unit.



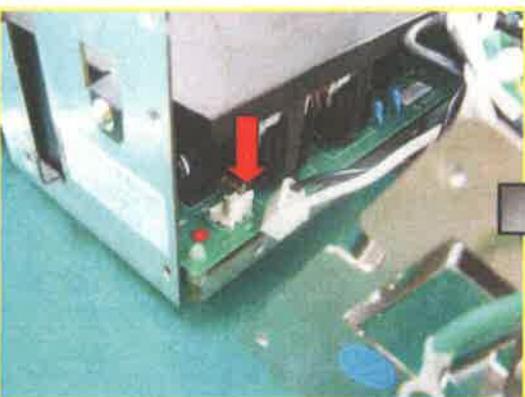
【Fig. 8.2.2.(3)】



【Fig. 8.2.2.(4)】

- ③ Push the connector in the direction of the red arrow to attach to the main unit.

(See fig. 8.2.2.(5))



【Fig. 8.2.2.(5)】



【Fig. 8.2.2.(6)】

- ④ Close the rear panel unit in the direction of the red arrow and attach the two screws

(+ sems screw M3 × 6). (See fig. 8.2.2.(7))

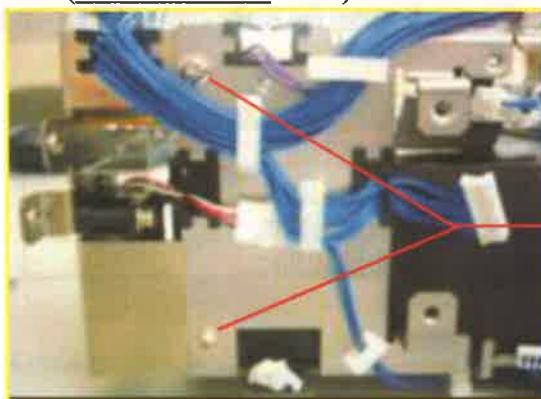


【Fig. 8.2.2.(7)】



【Fig. 8.2.2.(8)】

⑤ Attach the two screws (TP machine screw M3x6) on the left side.



TP machine screw M3x6 (2 screws)

【Fig. 8.2.2.(12)】

⑥ Attach the screws (TP machine screw M3x6 and one binding head screw M4x8 + polished circular washer) on the right side. The binding head screw M4x8 should be attached in the following order from the near side (away from the main unit): screw, ground wire, polished circular washer.

Applicable lots:0312001 lot ~ 1202 lot



TP machine screw M3x6 (2 screws)

【Fig. 8.2.2.(10)】

Ground wire

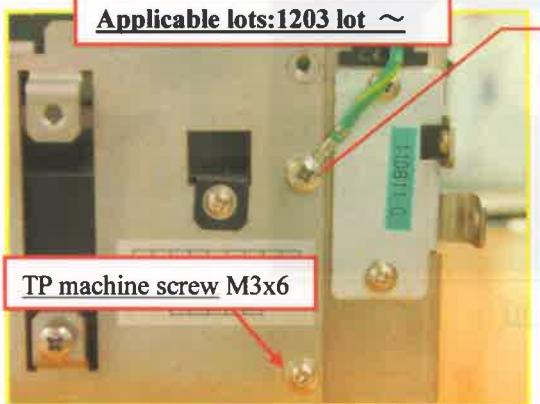
Polished circular washer

Binding head screw M4x8

【Fig 8.2.2.(11)】

※Magnified

Applicable lots:1203 lot ~



TP machine screw M3x6

【Fig. 8.2.2.(12)】

Ground wire

Polished circular washer

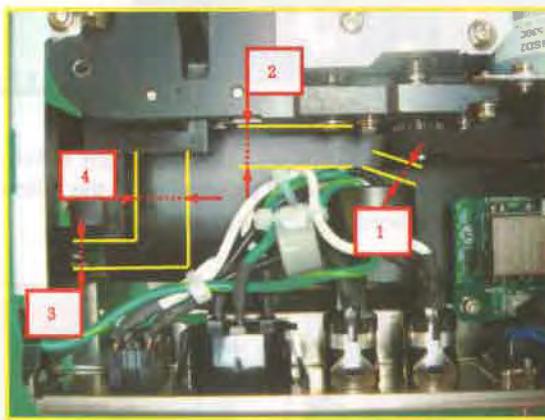
Binding head screw M4x8

【Fig 8.2.2.(13)】

※Magnified

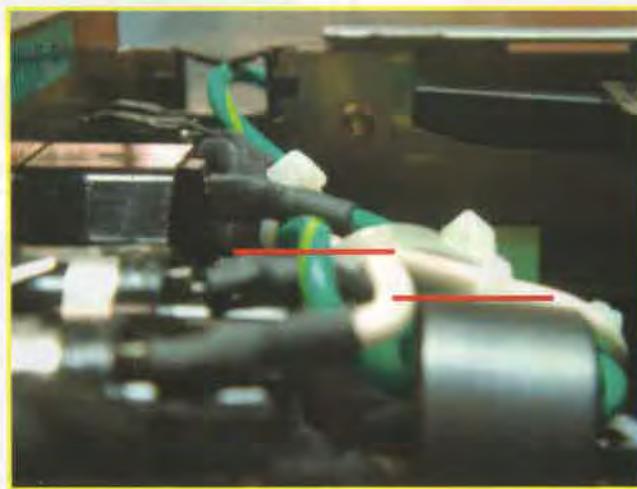
⑦After attaching the rear panel, check the clearance between the ferrite core and the main body, and between the main body and the harness.

Check point	Confirmation contents
<u>1</u>	<u>Distance more than 3.0mm.</u>
<u>2</u>	<u>Distance more than 2.0mm.</u>
<u>3</u>	<u>Distance more than 5.0mm.</u>
<u>4</u>	<u>Distance more than 10.0mm.</u>



【Fig. 8.2.2.(14)】

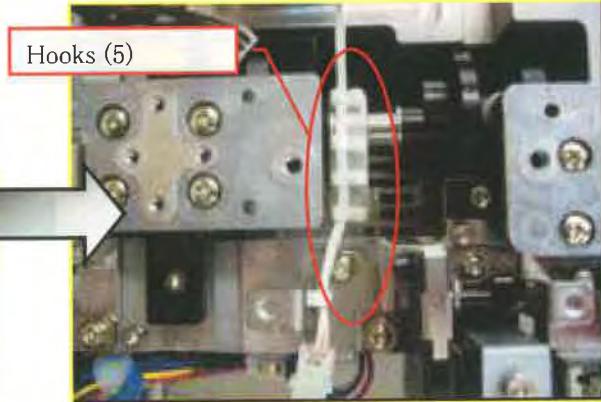
Also check that the attachment position (height) of the (white) ferrite core is lower than the harness of the fuse holder (AC inlet side).



【Fig. 8.2.2.(15)】

◇ 8.2.3 Attach wafer holder unit

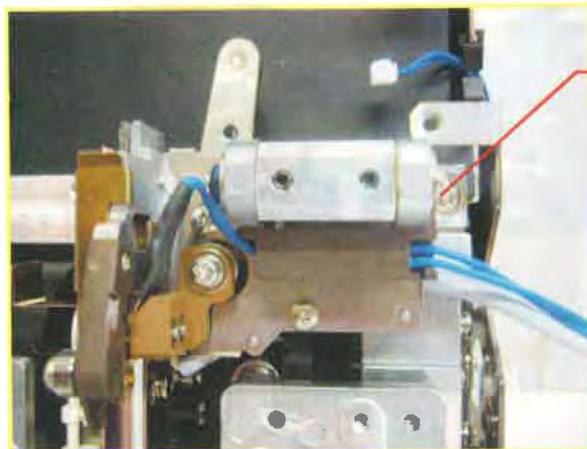
- ① Attach the five hooks (See fig. 8.2.3(2))



【Fig. 8.2.3.(1)】

【Fig. 8.2.3.(2)】

- ② Hold the unit to the cam frame and attach the screw (+ sems screw M3 × 12)



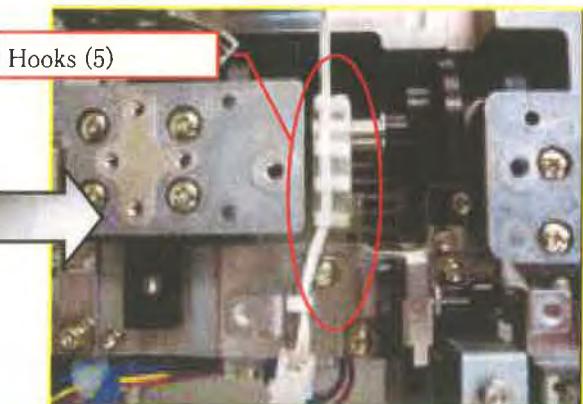
【Fig. 8.2.3.(3)】

◇ 8.2.3 Attach wafer holder unit

- ① Attach the five hooks (See fig. 8.2.3(2))

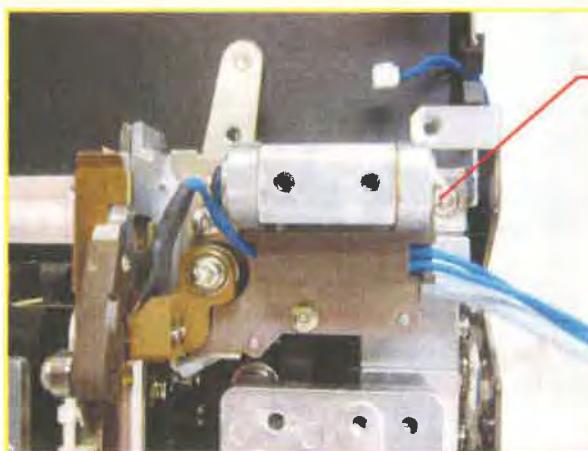


【Fig. 8.2.3.(1)】



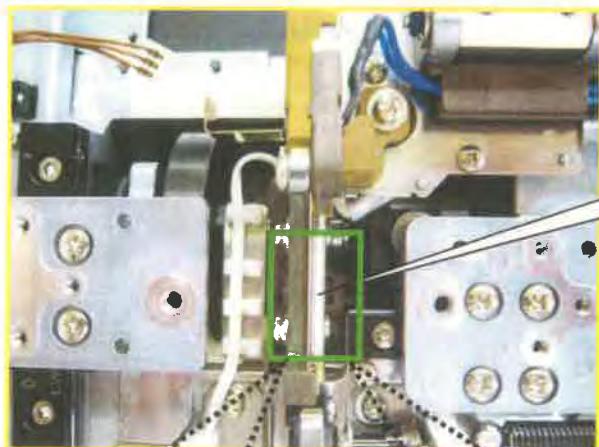
【Fig. 8.2.3.(2)】

- ② Hold the unit to the cam frame and attach the screw (+ sems screw M3 × 12)

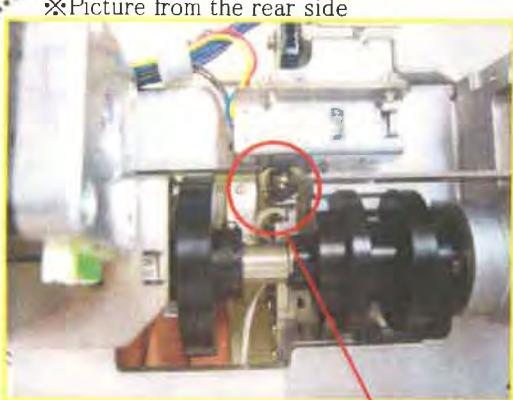


【Fig. 8.2.3.(3)】

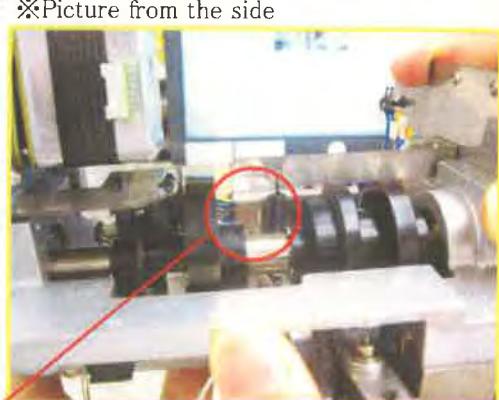
- ③ Using tweezers, attach the spring that connects the connectors to the main unit.



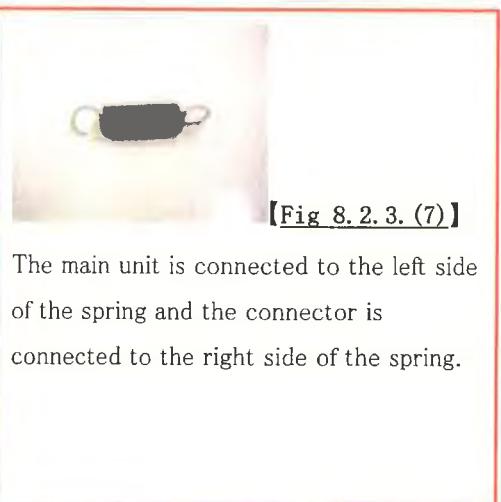
【Fig. 8.2.3.(4)】



【Fig. 8.2.3.(5)】



【Fig. 8.2.3.(6)】



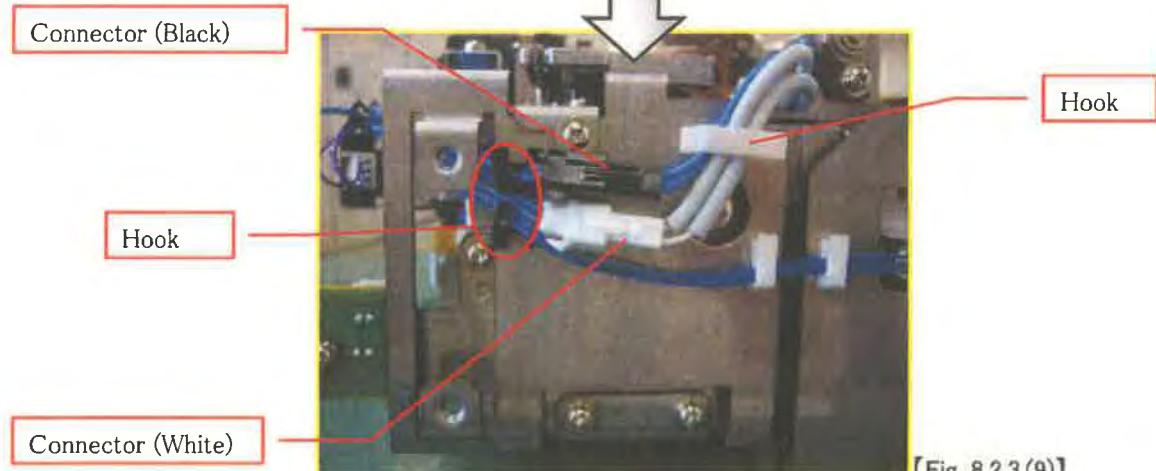
【Fig. 8.2.3. (7)】

The main unit is connected to the left side of the spring and the connector is connected to the right side of the spring.

- ④ Connect the black and white connectors and attach the two hooks on the right side.



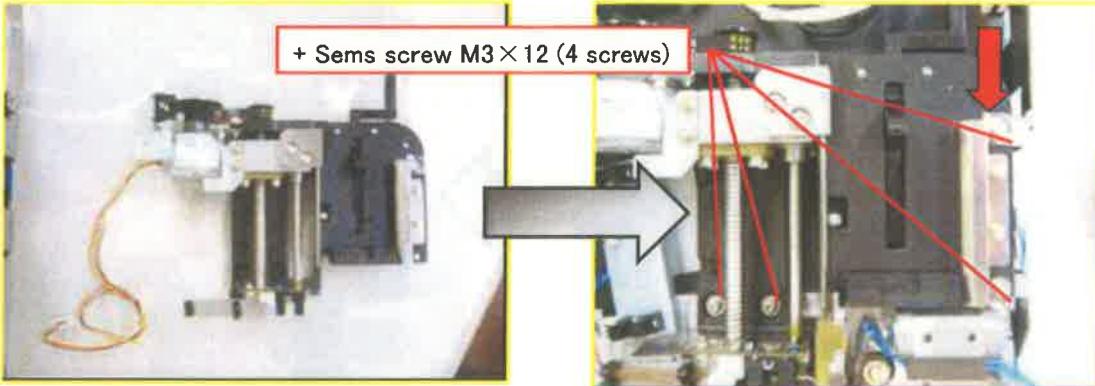
【Fig. 8.2.3.(8)】



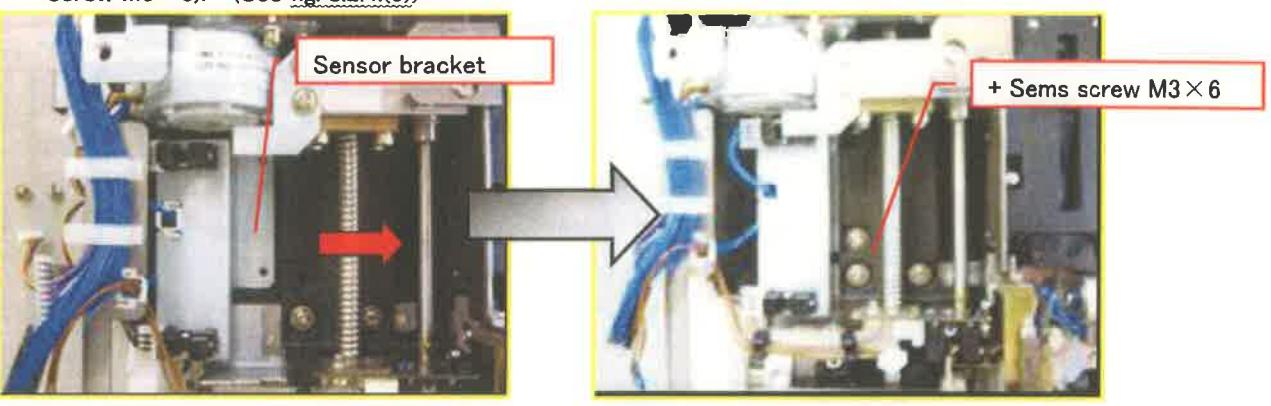
【Fig. 8.2.3.(9)】

◇ 8.2.4 Attach wafer feeding unit

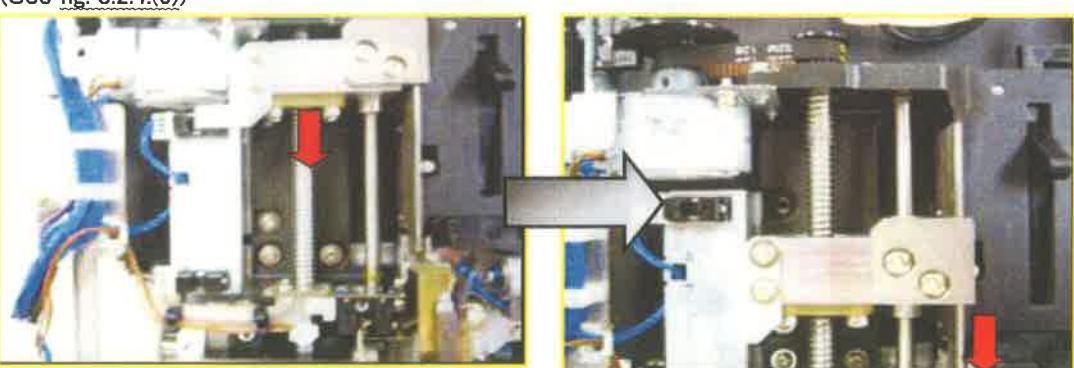
- ① Attach the wafer feeding unit in the direction of the red arrow and attach the four screws (+ sems screw M3 × 12). (See fig. 8.2.4.(2))



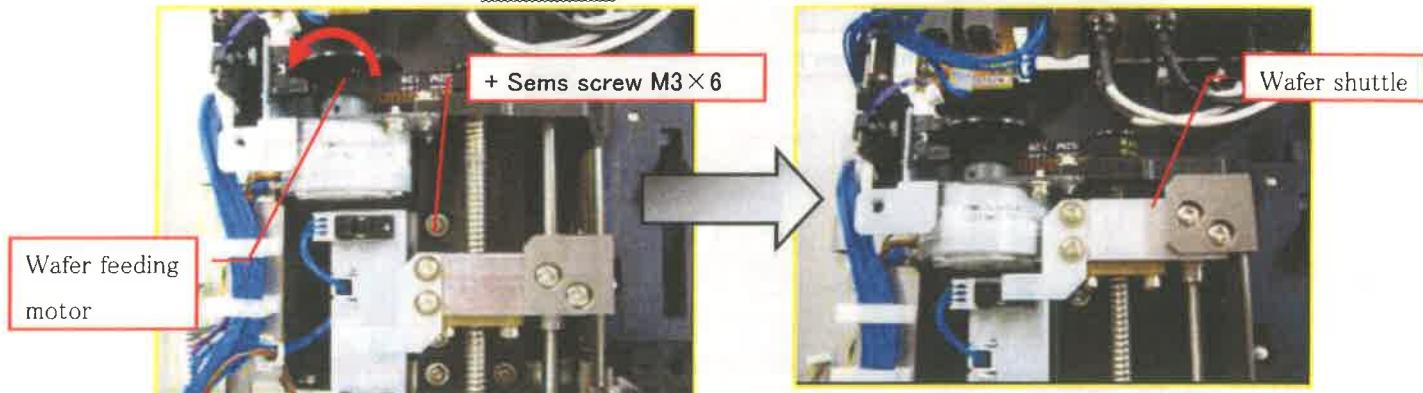
- ② Slide in the sensor bracket in the direction of the red arrow and attach the screw (+ sems screw M3 × 6). (See fig. 8.2.4.(3))



- ③ Move the wafer shuttle in the direction of the red arrow to return it to its original position. (See fig. 8.2.4.(5))



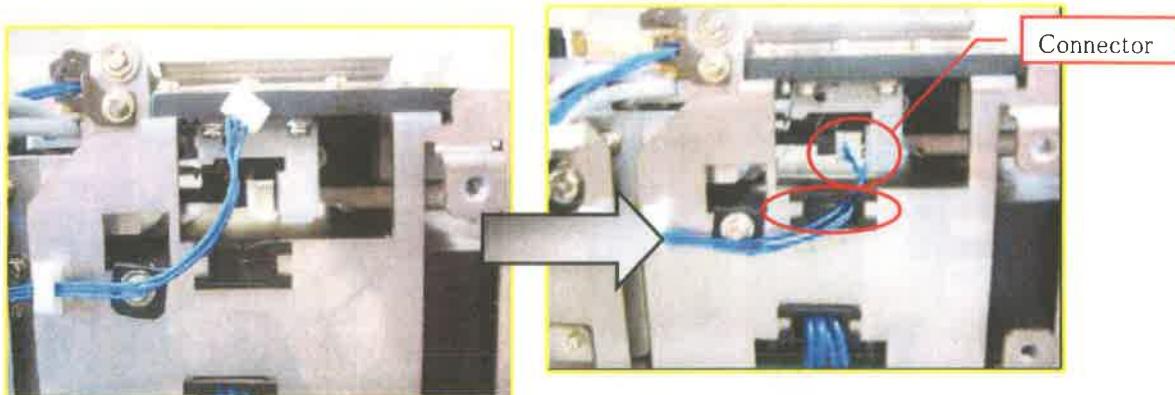
- ④ After attaching the sensor bracket with the screw (+ sems screw M3 × 6), manually turn the wafer feeding motor in the direction of the red arrow to move the wafer shuttle to the location displayed below. (See Fig. 8.2.4.(8))



【Fig. 8.2.4.(7)】

【Fig. 8.2.4.(8)】

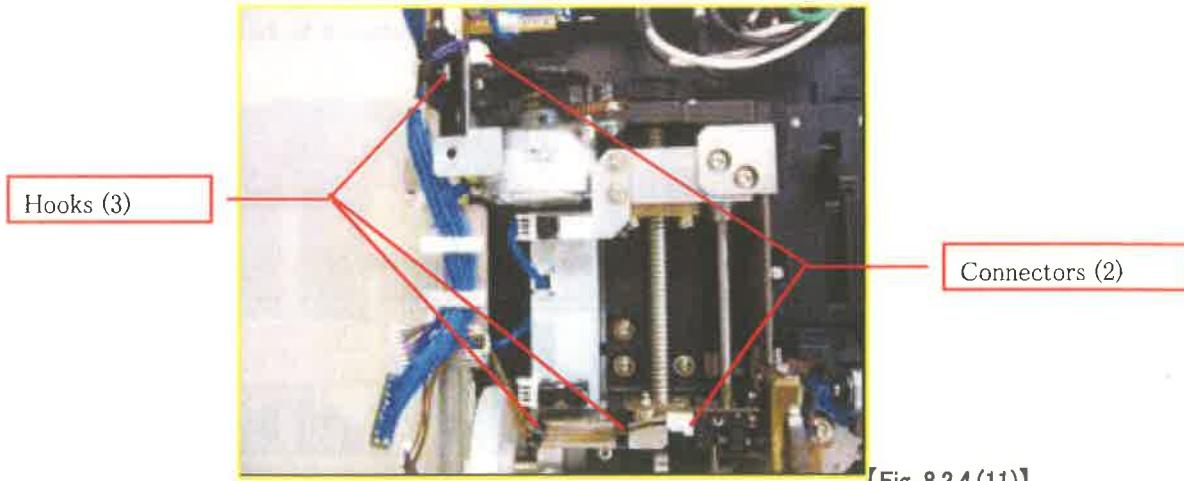
- ⑤ Attach the hook to the harness and attach the connector on the right side.



【Fig. 8.2.4.(9)】

【Fig. 8.2.4.(10)】

- ⑥ Attach the two connectors on the wafer feeding unit and attach the three hooks displayed below.



【Fig. 8.2.4.(11)】

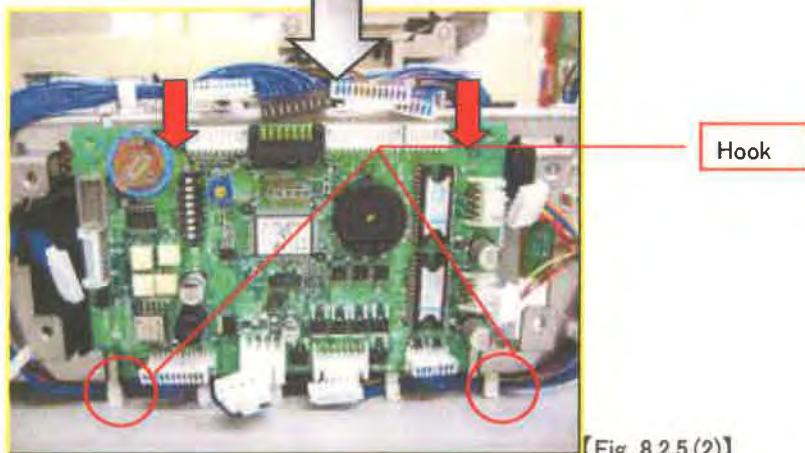
◇ 8.2.5 Attach main CPU board

- ① Lower the main CPU board in the direction of the red arrow and attach the hooks.

(See fig. 8.2.5.(2))

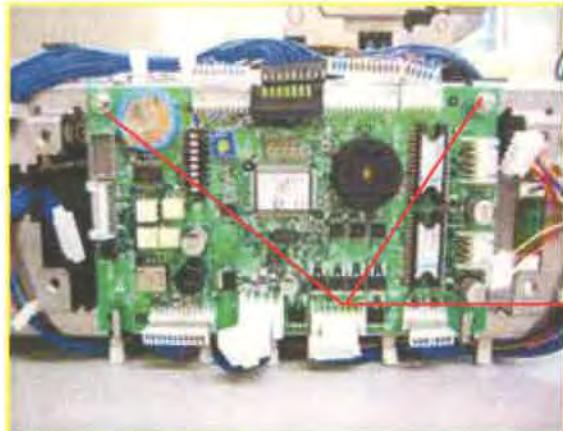


【Fig. 8.2.5.(1)】



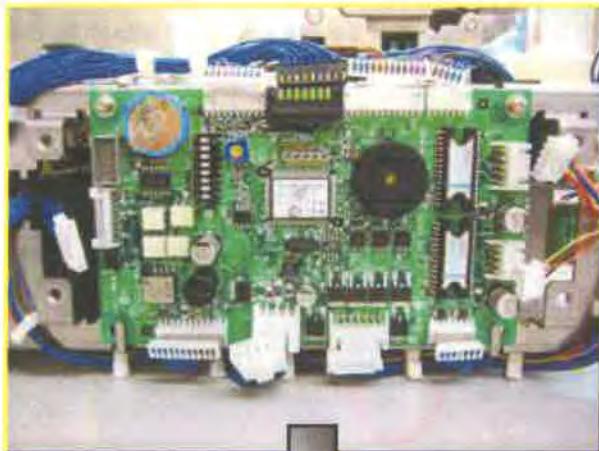
【Fig. 8.2.5.(2)】

- ② Attach the two screws (+ sems screw M3 × 6).

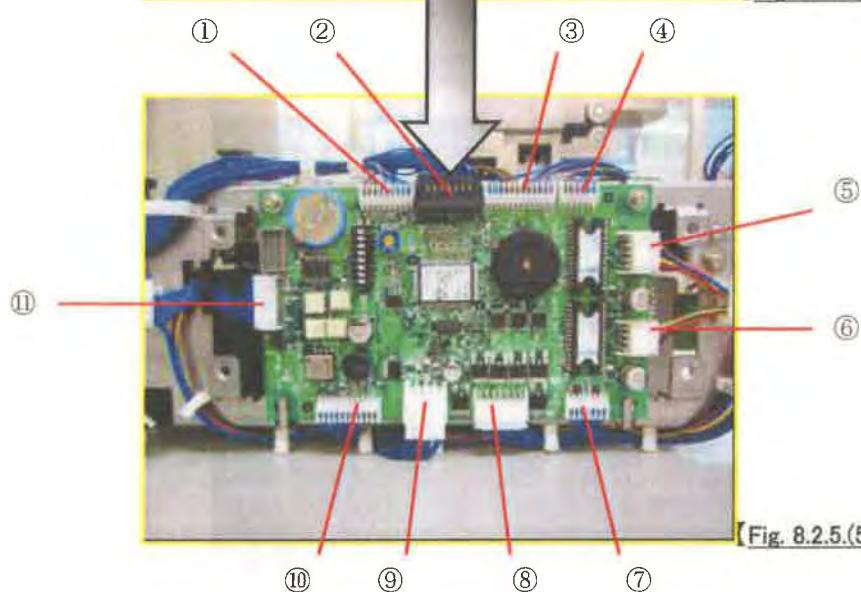


【Fig. 8.2.5.(3)】

③ Attach the 11 connectors.



【Fig. 8.2.5.(4)】



【Fig. 8.2.5.(5)】

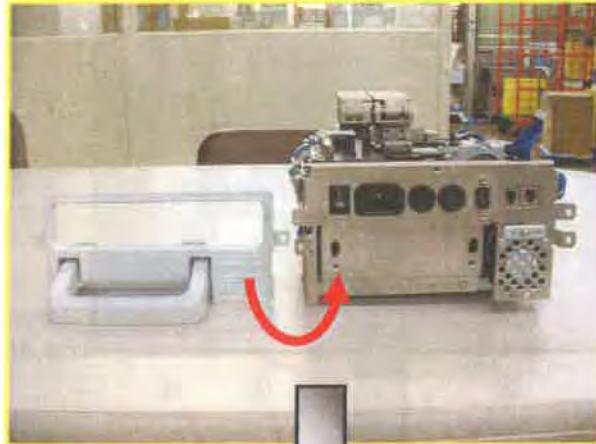


Be sure to hold the cable housing when attaching connectors.

Pulling on the cables to attach the board could cause damage to the device.

◇ 8.2.6 Attach rear cover unit

- ① Lift the rear cover unit in the direction of the red arrow and attach to the main unit.
(See Fig. 8.2.6.(1))

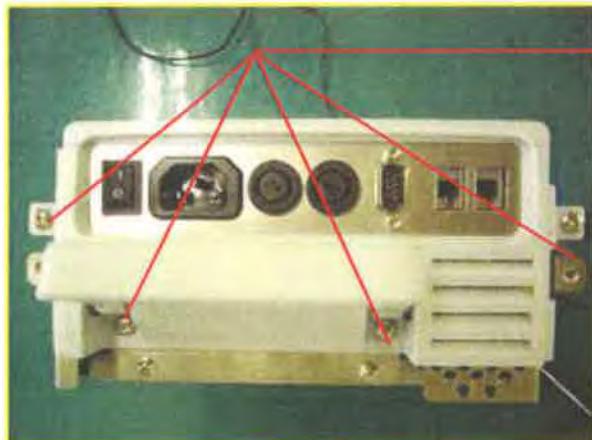


【Fig. 8.2.6.(1)】



【Fig. 8.2.6.(2)】

- ② Attach the four screws (+ button screws M4 × 8) displayed below.

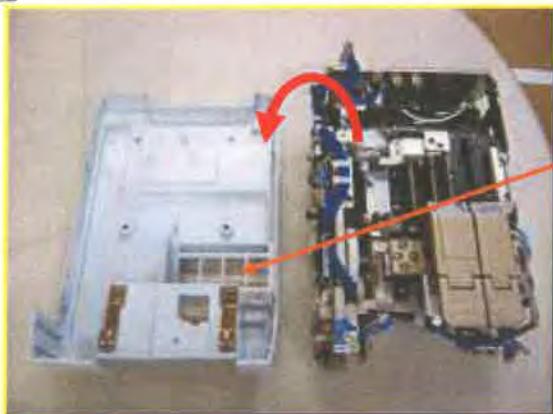


【Fig. 8.2.6.(3)】

◇ 8.2.7 Attach base cover unit

- ① Lift the frame unit in the direction of the red arrow and attach to the base cover unit.

(See Fig. 8.2.7.(1))



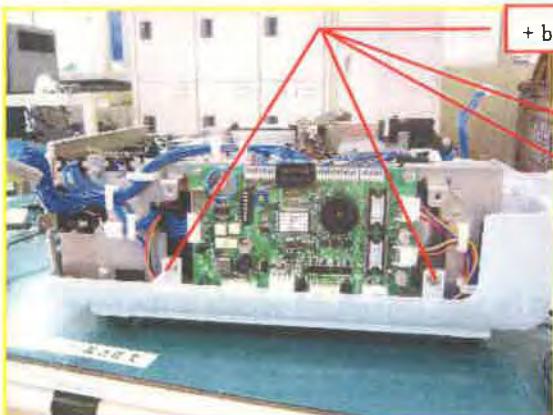
【Fig. 8.2.7.(1)】

- ② Attach the five screws (+ button screw M4 × 8) on the bottom of the unit displayed below.

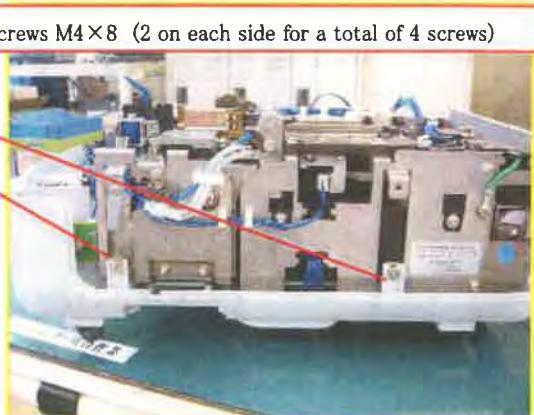


【Fig. 8.2.7.(2)】

- ③ Attach two screws (+ button screw M4 × 8) on each side, attaching a total of four screws on both sides.



【Fig. 8.2.7.(3)】



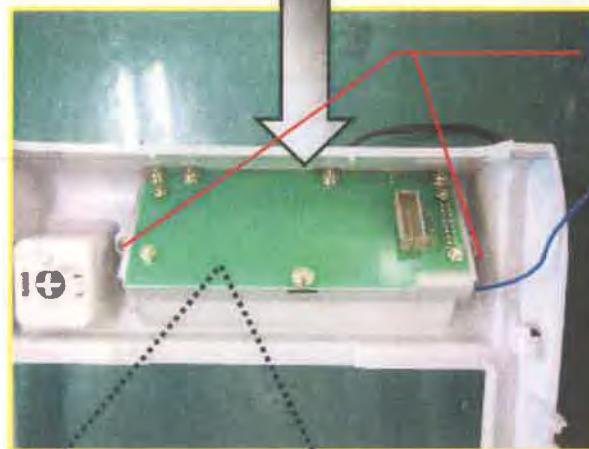
【Fig. 8.2.7.(4)】

◇ 8.2.8 Attach LCD panel unit

- ① Attach the two screws (tap tight screw M3 × 10) and attach the LCD panel unit to the top main cover unit.



【Fig. 8.2.8.(1)】

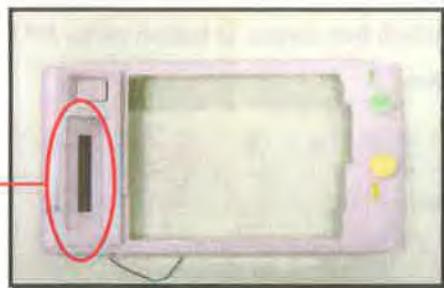


【Fig. 8.2.8.(2)】



【LCD panel unit】

【Fig. 8.2.8.(3)】



【Top main cover unit】

【Fig. 8.2.8.(4)】

Attach so the LCD screen can be seen through the outside of the top main cover unit.

◇ 8.2.9 Attach top main cover

- ① Attach the top main cover in the direction of the red arrow. (See fig. 8.2.9.(1))



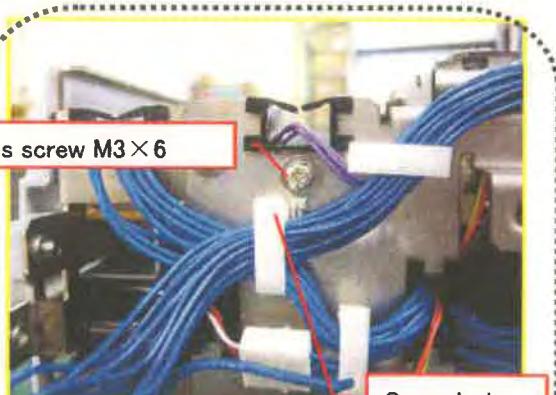
【Fig. 8.2.9.(1)】

- ② Attach the screw (+ sems screw M3 × 6) and embed the ground wire.



【Fig. 8.2.9.(2)】

+ Sems screw M3 × 6



【Fig. 8.2.9.(3)】

※Magnified

- ③ Attach the keyboard connector cable to the main unit.



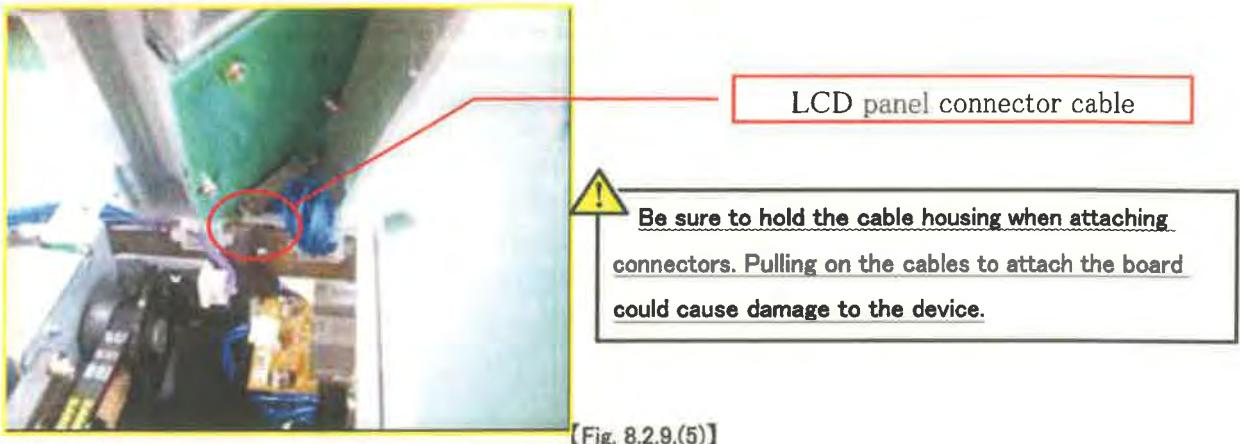
Keyboard connector cable



Be sure to hold the cable housing when attaching connectors. Pulling on the cables to attach the board could cause damage to the device.

【Fig. 8.2.9.(4)】

- ④ Attach the LCD panel connector cable to the main unit.



- ⑤ Move the top main cover in the direction of the red arrow to attach to the main unit.

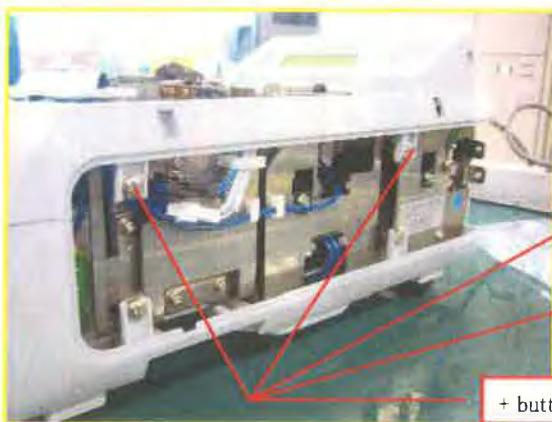
(See fig. 8.2.9.(6))



- ⑥ Attach the screw (+ sems screw M3×6) on the bottom.



- ⑦ Attach two screws (+ button screw M4×8) on each side, attaching a total of four screws on both sides.



+ button screws M4×8 (2 on each side for a total of 4 screws)

【Fig. 8.2.9 (8)】

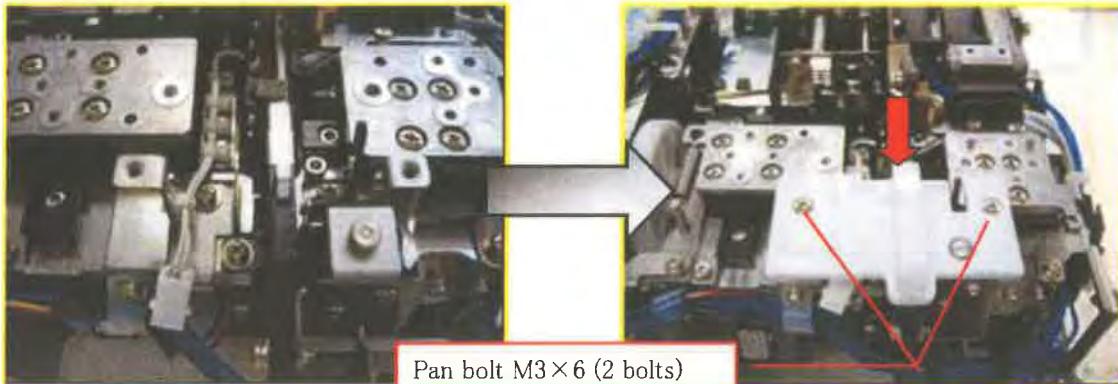
【Fig. 8.2.9 (9)】



Please reference 8.3.1 (LCD panel unit backlight adjustment procedure) after attaching the screws on both sides,

◇ 8.2.10 Attach right clamp unit

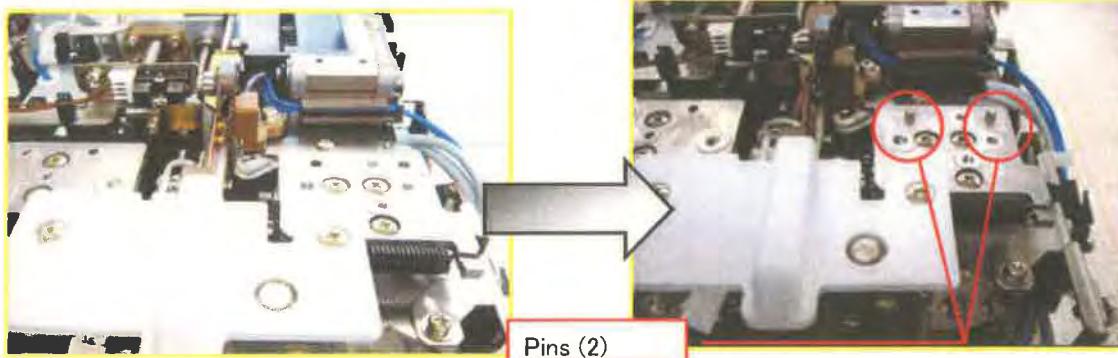
- ① Attach the wafer outlet guide cover unit in the direction of the red arrow and attach the two bolts (pan bolt M3 × 6). (See fig. 8.2.10.(2))



【Fig. 8.2.10.(1)】

【Fig. 8.2.10.(2)】

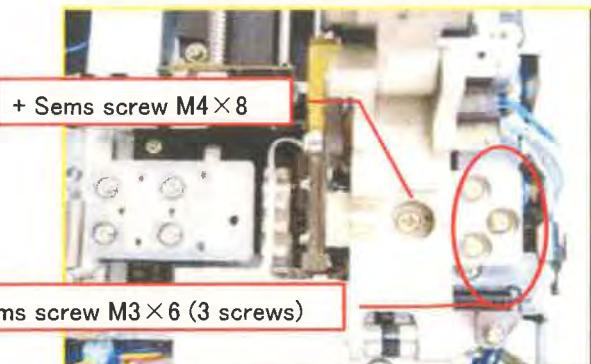
- ② Attach the two pins.



【Fig. 8.2.10.(3)】

【Fig. 8.2.10.(4)】

- ③ Attach the right clamp unit and attach the four screws (three + sems screwM3 × 6 and one + sems screw M4 × 8).

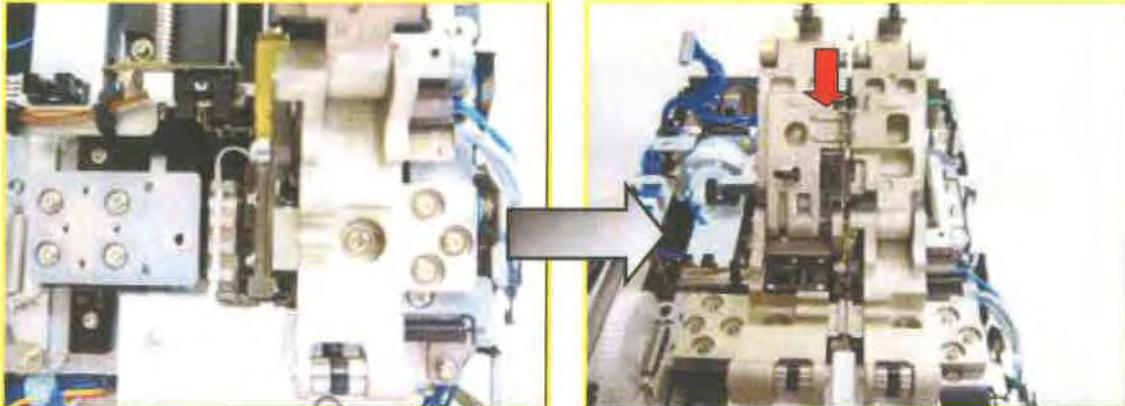


【Fig. 8.2.10.(5)】

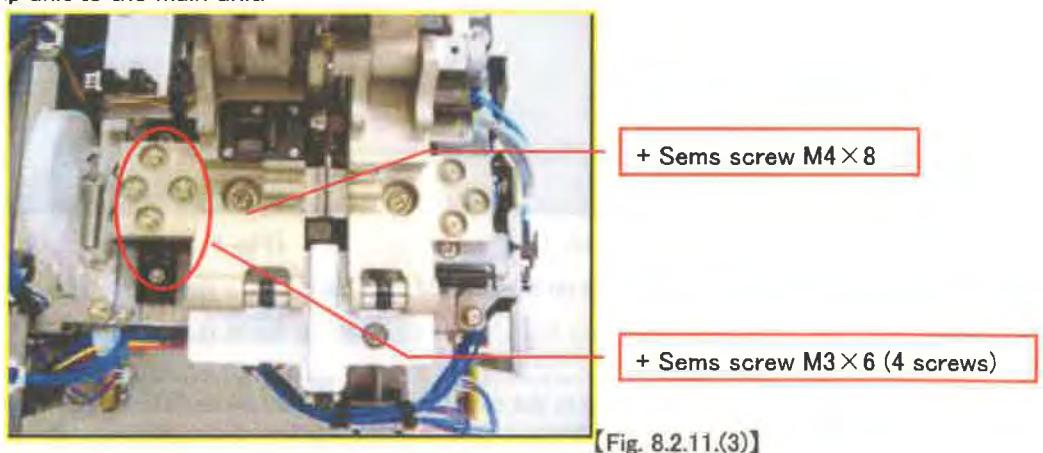
! Please reference 8.3.2 (R/L clamp unit adjustment procedure) when attaching the right clamp unit.

◇ 8.2.11 Attach left clamp unit

- ① Attach the left clamp unit in the direction of the red arrow. (See fig. 8.2.11.(2))



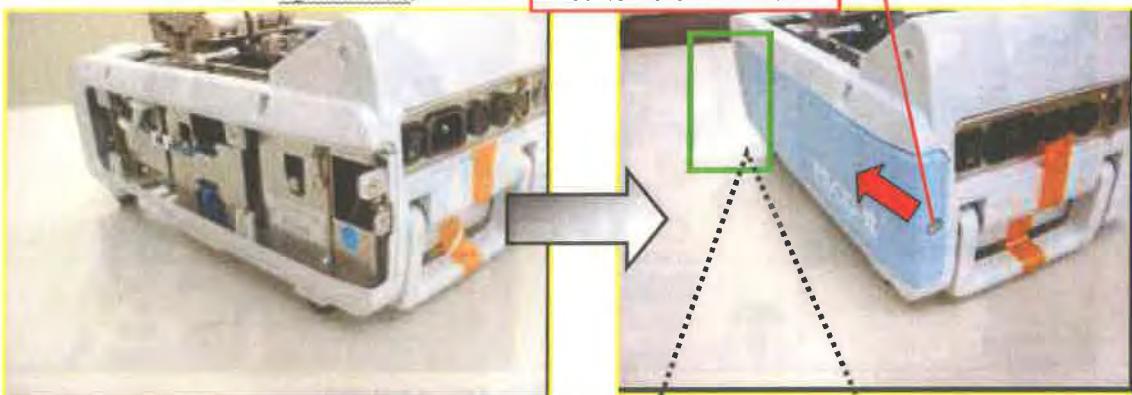
- ② Attach the five screws (four + sems screw M3 × 6 and one + sems screw M4 × 8) to secure the left clamp unit to the main unit.



⚠ Please reference 8.3.2 (R/L clamp unit adjustment procedure) when attaching the left clamp unit.

◆ 8.2.12 Attach left / right side cover

- ① Slide the right side cover in the direction of the red arrow and attach the screw (+ button screw M4×8). (See fig. 8.1.12.(2))

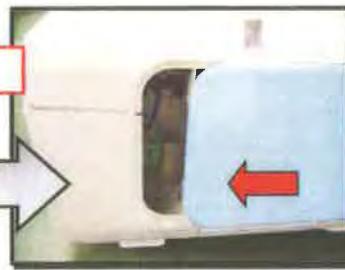


【Fig. 8.2.12 (1)】

【Fig. 8.2.12 (2)】



【Fig. 8.2.12. (3)】

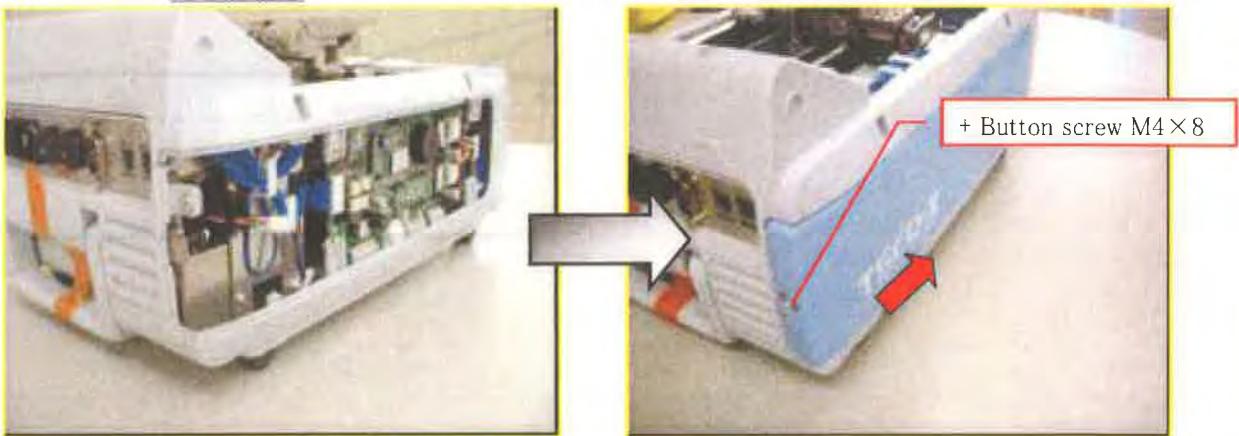


【Fig. 8.2.12. (4)】

※Attach the hook on the front of the side cover to the main unit when attaching.

(Do the same for the left side cover explained in step ②.)

- ② Slide the left side cover in the direction of the red arrow and attach the screw (+ button screw M4×8) (See fig. 8.2.12.(6))



【Fig. 8.2.12 (5)】

【Fig. 8.2.12 (6)】

◇ 8.2.13 Attach wafer disposal box

- ① Push the wafer disposal box in the direction of the red arrow to attach to the main unit.
(See fig. 8.2.13.(2))



【Fig. 8.2.13.(1)】



【Fig. 8.2.13.(2)】

◇ 8.2.14 Attach upper plate

- ① Push in the upper plate in the direction of the red arrow. (See fig. 8.2.14.(2))



【Fig. 8.2.14.(1)】



【Fig. 8.2.14.(2)】

- ② Attach the two screws (hexagon socket head screw) displayed below.



Hexagon socket head screw

【Fig. 8.2.14.(3)】

- ③ Using tweezers, attach the two rubber caps.



Rubber caps

【Fig. 8.2.14.(4)】

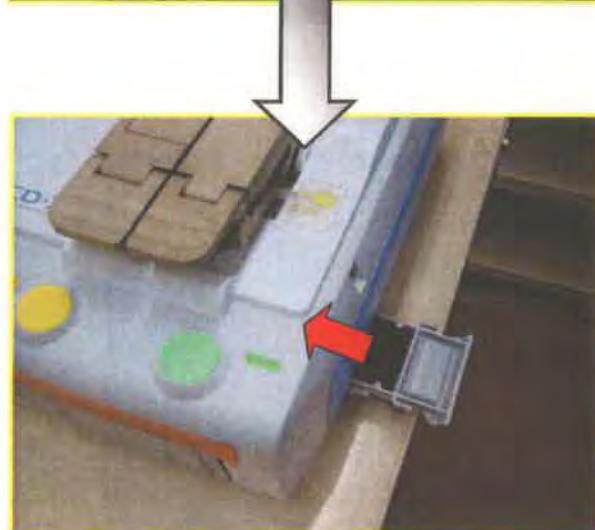
◇ 8.2.15 Attach filter cover

- ① Push the filter cover in the direction of the red arrow to attach to the main unit.

(See fig. 8.2.15.(2))



【Fig. 8.2.15.(1)】



【Fig. 8.2.15.(2)】

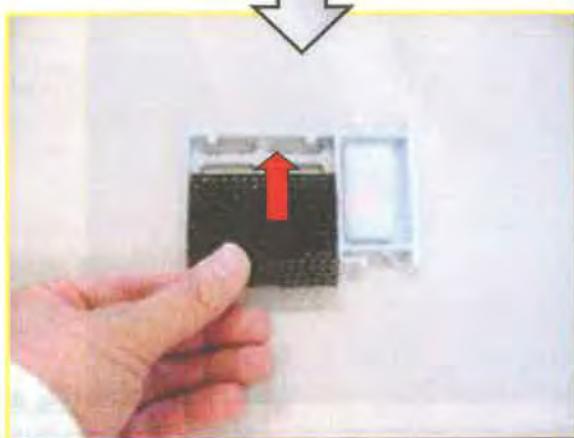
◇ 8.2.16 Attach filter

- ① Set the filter in the direction of the red arrow to attach the filter to the filter cover.

(See fig. 8.2.16.(2))



【Fig. 8.2.16.(1)】



【Fig. 8.2.16.(2)】

◇ **8.2.17 Attach bag support table**

- ① Attach the bag support table in the direction of the red arrows (from the side) to attach to the main unit. (See fig. 8.2.17.(2))



[Fig. 8.2.17.(1)]



[Fig. 8.2.17.(2)]

◇ 8.2.18 Attach lid

- ① Push the lid in the groove and pull the lid in the direction of the red arrow to attach to the main unit. (See fig. 8.2.18.(2))



【Fig. 8.2.18.(1)】

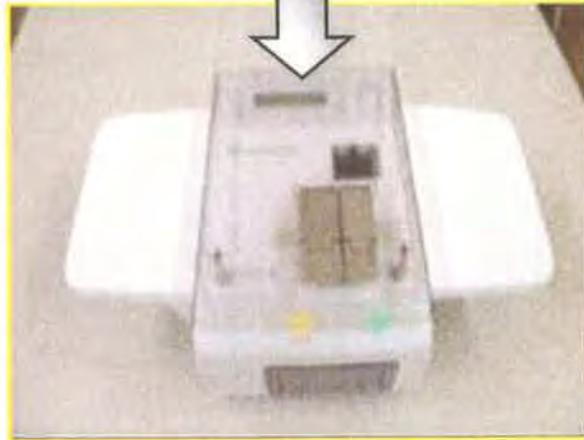


【Fig. 8.2.18.(2)】



Hold both ends of the lid with both hands to snap the lid into the groove.

【Fig. 8.2.18.(3)】



【Fig. 8.2.18.(4)】

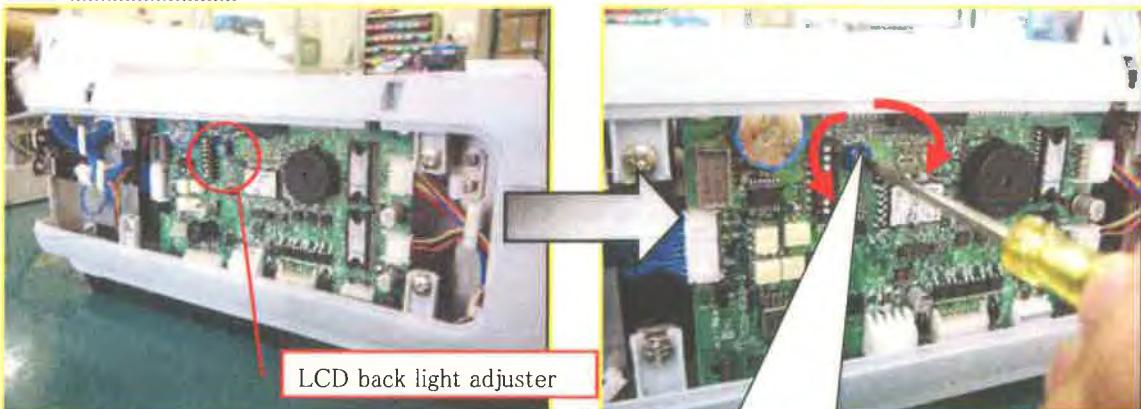
8.3 Adjustment procedures

The following is the adjustment procedure for the TSCD-II. When working with the chassis or frame unit, lay a soft cloth on the workspace to prevent scratches or damage. Please reference the parts diagram and configuration diagram for the part names and attachment location.

◇ 8.3.1 LCD panel unit backlight adjustment procedure

- ① Insert a screwdriver inside the LCD back light adjuster and turn in the direction of the red arrow to adjust the brightness of the LCD panel unit backlight.

(See fig. 8.3.1.(2))



【Fig. 8.3.1.(1)】

【Fig. 8.3.1.(2)】

※ How to adjust the brightness of the LCD panel unit

- ① Right → Brighter
- ② Left → Darker



【Fig. 8.3.1.(3)】

◇ 8.3.2 R/L clamp unit adjustment procedure

※ Make sure to follow the procedure below when attaching the R/L clamp unit.

- ① Operate the wafer feeding motor in test mode and insert a dummy wafer. Please see the test mode section for details on how to operate in test mode. Attach the right clamp unit to the main unit.

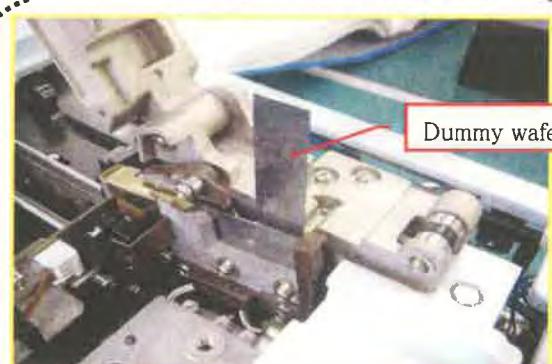


【Fig. 8.3.2.(1)】

- ② Adjust the right clamp unit sideways so the distance between the dummy wafer and right clamp unit is 0~0.1mm.

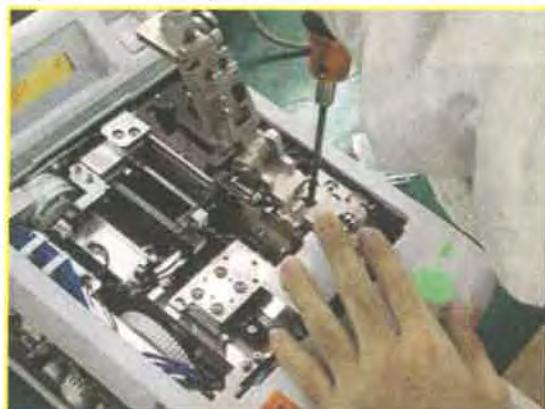


【Fig. 8.3.2.(2)】



【Fig. 8.3.2. (3)】

- ③ Align the right clamp unit with the pin and secure the screws.



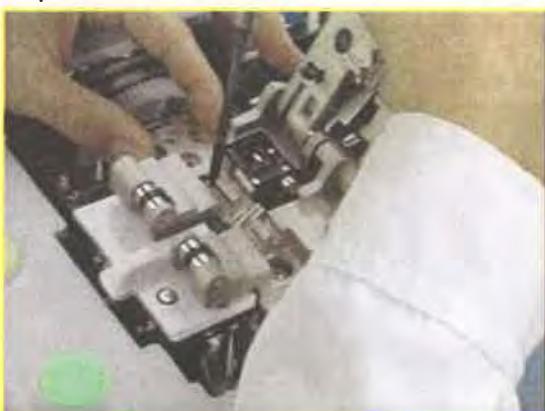
【Fig. 8.3.2.(4)】

- ④ Lift the center clamp up.



【Fig. 8.3.2.(5)】

- ⑤ Attach the left clamp unit to the main unit.

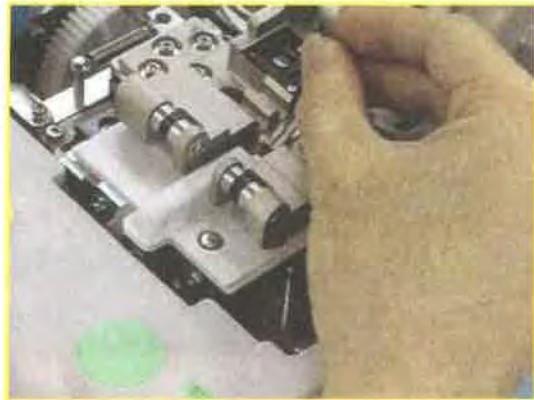


【Fig. 8.3.2.(6)】

- ⑥ Adjust the position of the left clamp unit so the distance between the left and right clamp unit is within 0.79~0.90mm.



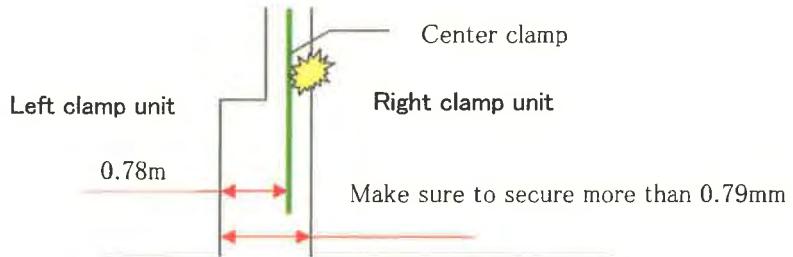
【Fig. 8.3.2.(7)】



【Fig. 8.3.2.(8)】



Make sure the distance between the right clamp unit and the left clamp unit is not below 0.79mm. The center clamp unit will damage the right clamp unit if this distance is below 0.79mm.

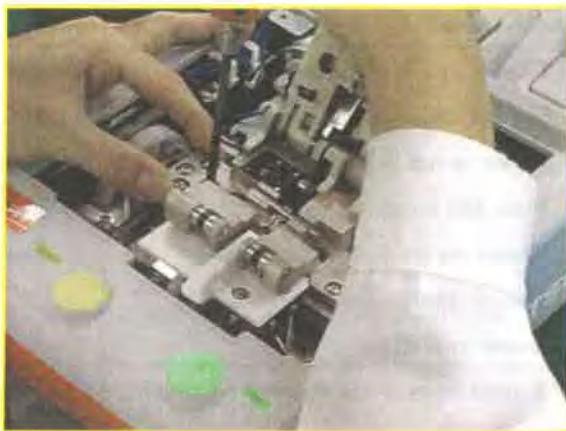


- ⑦ Check that the special pin gauge slots into place correctly.



【Fig. 8.3.2.(9)】

- ⑧ Tighten the screws when the clamp position is set. Cover the two screws on the clamps with a rubber cap.



【Fig. 8.3.2. (10)】

9. Troubleshooting (Failure diagnosis by error type)

Please refer to the error list in chapter 10 for errors not listed in the table below.

Error	Possible cause	How to fix
Does not power on	① Power cord is not connected (on the device end and outlet end) ② Power is not being supplied from outlet ③ Fuse has blown ④ Power switch is malfunctioning ⑤ Device interior (i.e. malfunction in power circuit)	① Reconnect the power cord ② Make sure power is being supplied ③ Replace fuse ④ Replace rear panel unit ⑤ Replace main frame unit
LCD display does not turn on	① Stored in an unsatisfactory condition and condensation has formed inside the LCD. ② Power is not turned on	① Replace LCD panel unit ② Turn the power on
Cooling fan does not turn on	① Cooling fan is malfunctioning	① Replace main frame unit
Communication error (When IS connection exists)	① Is not connected to IS ② IS power is not turned on. ③ IS connection cable type is straight	① Connect properly to IS ② Turn IS power on and retransmit from the side of the device ③ Use a cross type connection cable
Communication error (No IS connection)	① IS connection is set to ON in initial settings.	① Set IS connection to OFF in initial settings.
Exhaust fan does not turn on	① Exhaust fan is malfunctioning ② Foreign object entered exhaust fan.	Send back to factory for repair for both cases ① and ②.
Frequent wafer defects	① Problems with wafer ② Connection problems with wafer and electrodes ③ Disconnected harness ④ Problems with the main CPU board	① Replace wafer cassette ② Replace contact unit ③ Replace contact unit ④ Replace main CPU board
Frequent wafer jams	① Problems with wafer feeding unit sliding ② Problems with the wafer feeding unit ③ Deformed wafer in the wafer path	① Clean sliding parts ② Replace wafer feeding unit ③ Remove deformed wafer <u>Ref. Document number PQD-T6008 for removal</u>
Welding burns the tubes	① Welding non-specified tubes ② Malfunction in device interior	① Check welding with specified tubes ② Send to factory for repair

10. LCD display

A buzzer sounds notifying the user when an error occurs.

An orange or red warning LED turns on and the error is indicated on the LCD display.

10.1 Types of errors

The types of errors are generally categorized into the following five types. A description of the error and its priority level is described below.

Priority	Error	Description of error
High	Irrecoverable error (coding)	Error occurs due to software or CPU (from updating firmware).
	Irrecoverable error (system)	Error occurs in surrounding IC or CPU (internal RAM).
	Irrecoverable error (hardware)	Hardware-related error occurs.
	Communication error	Error occurs due to IS and its connection..
	Recoverable error	Operation can be recovered by pressing the reset switch.
Low	Normal error	Error is resolved by eliminating the cause of error. (Replace wafers, close clamps, etc.)

If multiple errors occur simultaneously, errors with a higher priority will be displayed first.

10.2 Normal operation / normal error screen

No	LCD display English	Japanese	Error code	Error detection method	Detection timing	Notes
					Detection value	
0	POWER ON	電源投入				
1	SYSTEM CHECK	初期チェック				
2	HOLDER WARM UP ***	ホルダー温度上昇 待ち				* increases with temp. Heating is complete when 20 characters are displayed.
3	ALIGN CLAMP OPEN CLAMP	リセットスイッチ クランプ開 待ち	100	Press reset switch with the clamp closed	Pre-clamp align Clamp closed	Open clamp to recover.
4	ALIGN CLAMP PRESS RESET	リセットスイッチ 入力待ち				
5	CLAMP ALIGNING	クランプ整列 動作中				
6	ADVANCING WAFER	ウェハー送り 動作中				
7	DISPOSAL BOX FULL DISCARD WAFERS	ウェハー送り 使用済みウェハー満杯	103	Conduct a 10ms flash and 90ms blackout and use the 3 matching data.	At beginning of wafer replacement. ON/OFF	Remove the wafer disposal box to recover.
8	CASSETTE EMPTY INSTALL CASSETTE	ウェハー送り ウェハー無しまたはカセット無し	102	Cassette sensor	At beginning of wafer replacement. ON/OFF	Attach cassette to recover.
9	PLACE TUBING OPEN CLAMP	クランプ開 待ち				Displayed when clamp is aligned, wafer is replaced, and clamp has not been opened since boot up.
10	PLACE TUBING CLOSE CLAMP	クランプ閉 待ち	101	Press start switch while clamp is open.	Clamp is open before welding.	Close the clamp.

11	WELDING PRESS START	開始SW 待ち				
12	HEATING WAFER	昇温中				
13	WELDING	接合中				
14	COOLING	冷却中				
15	WELD COMPLETE OPEN CLAMP	接合終了				
16	OPERATING TEMP OUT OF RANGE	装置内温度異常	104	Room temp. sensor. (Below 10°C according to specs.)	Always below 8°C. Error margin ±2°C	Press reset switch when room temp. is above 8°C.
17	WAFER JAM PRESS RESET	ウェハージャム ジャム解除動作無し	109	Motor output pulse is larger than the encoder input pulse count.	During wafer feeding. Above 20 pulses.	Press the reset switch.
		ウェハージャム ジャム解除動作有り	110	The cassette cannot be removed if the wafer jams once it has moved forward past 25mm from the home position. In which case, conduct the jam repair procedure to release the jammed wafer.		Press the reset switch and jump to number 22 if wafer jam repair is necessary.
18	DEFECTIVE WAFER1 PRESS RESET	ウェハー加熱時 使用済みウェハー検出	105	Resistance is calculated from the product of current and voltage out of 4PWM outputs of 5ms intervals, then converted using ref. temp. of 25°C.	Just after replacement of the wafer. Less than 7.39[Ω] (Normally 8.2~ 11.7Ω)	Press reset switch to recover. Temperature tolerance 0.21[Ω] Detection tolerance 0.4[Ω] Shipping tolerance 0.2[Ω]
19	DEFECTIVE WAFER2 PRESS RESET	ウェハー加熱時 SUS箔ウェハー検出	106	Resistance shift rate from beginning of heating to 1.8 seconds after heating.	Less than 114 [%] from start of wafer heating to 1.8 seconds.	Press reset switch to recover.

20	DEFECTIVE WAFER3 PRESS RESET	ウェハー加熱時 液ぬれ検出	107	Use the resistance at the beginning of heating as a reference and use the resistance shift rate from 0.5 seconds to 1.8 seconds.	Less than 15[%] from start of wafer heating to 1.8 seconds.	Press reset switch to recover.
21	DEFECTIVE WAFER4 PRESS RESET	ウェハー加熱時 電流値異常検出	108	Wafer AD input during wafer current output.	During wafer heating or resistance measuring. Above 6.77[A]	Press reset switch to recover.
22	WAFER JAM REMOVE WAFER	ウェハージャム解除動 作:ジャム解除位置で待 機中、ジャム解除後、リ セットSW入力待ち				Take out wafer and press the reset switch. Go to number 23.
23	INSTALLATION CLOSE CLAMP	ウェハージャム解除動 作:カムHP移動前、クラ ンプ閉確認 リセットSW入力待ち				Close the clamp and press the reset switch.
24	DEFECTIVE WAFER5 PRESS RESET	ウェハー加熱時 電源電圧低下	111	Voltage is low for wafer PWM output (5ms intervals) for 20 consecutive times.	During wafer heating. Below 21.4[V]	Press reset switch to recover.
25	ADVANCE WAFER PRESS RESET	ウェハー送り リセットSW入力待ち				During wafer replacement after clamp alignment.
26	DEFECTIVE WAFER6 PRESS RESET	ウェハー加熱時初期抵 抗値上限エラー検出	112	Resistance is calculated from the product of current and voltage out of 4PWM outputs of 5ms intervals, then converted using a reference temp. of 25°C.	Just after replacement of the wafer. More than 12.31[Ω] (Normally 8.2~ 11.7Ω)	When resistance is too high. Temperature tolerance 0.21[Ω] Detection tolerance 0.4[Ω] Shipping tolerance 0.2[Ω]

27	DEFECTIVE WAFER7 PRESS RESET	ウェハー加熱時最大出力状態が続いた。	113	From wafer PWM output calculation (product of current and voltage)	Maximum power was supplied to the wafer for 100ms during heating.	Constant power control not possible.
28	DEFECTIVE WAFER8 PRESS RESET	ウェハー加熱時ウェハ一不良による電流値下限超え。	114	During wafer current output and wafer current A/D input. (Average of 3 for 5ms interval)	During wafer resistance measuring and heating. Less than 1.07[A].	Wafer disconnected internally. Electrodes are not in contact.
29	START RESTORING PRESS RESET	電源投入時、パニック操作操作復旧開始。 リセットSW入力待ち				
30	RESTORE COMPLETE OPEN CLAMP	パニック操作復旧完了				
31	Retry IS connection? START: yes RESET: no	IS通信エラー発生時の通信再開/切断確認				Press start switch to resend command. Press reset switch to disconnect the communication.
32	IS connection now connecting	IS通信再送 リトライ中				Go to operating mode if communication is successful. If the connection fails, display communication error.

10.3 Recoverable error screen

All of the below can be recovered by pressing reset.

No	LCD display English	Japanese	Error code	Error detection method	Detection timing	Notes
					Detection value	
0	SENSOR ERR 0 PRESS RESET	クランプソレノイド センサONエラー	200	Solenoid sensor is ON after clamp solenoid is locked. (5ms × 3 times)	During clamp lock (suction). More than 500ms	
1	SENSOR ERR 1 PRESS RESET	クランプソレノイド センサOFFエラー	201	Solenoid sensor is OFF after clamp solenoid is released.(5ms × 3 times)	During clamp release (releasing motion). More than 1s	
2	SENSOR ERR 2 PRESS RESET	クランプソレノイド ON出力中、センサOFFエ ラー	202	Solenoid sensor is OFF from time clamp solenoid locks to weld completion (5ms × 3 times)	During solenoid lock. From beginning of weld to completion of cooling. Lock solenoid sensor is OFF	
3	CAM ERR 0 PRESS RESET	カムモータ 初期化時センサ未検出	203	Cam HP sensor and cam weld sensor do not turn ON when cam HP position moves after cam HP sensor and Cam weld sensor turn OFF. (determined after 2 pulses)	During start of clamp reset and jam repair 1.2 times the pulse of HP sensor OFF～weld sensor ON. (2500pls)	Sensor distance between HP sensor OFF～weld sensor ON is the longest.
4	CAM ERR 1 PRESS RESET	カムモータ 初期化時ホームセンサOF F未検出	204	HP sensor does not turn OFF after HP sensor turns on during initializing. (determined after 2 pulses)	During cam initializing in test mode 1.5 times the pulse of 24° HP sensor ON section (300pls)	Only detected during cam initializing in test mode.
5	CAM ERR 2 PRESS RESET	カムモータ 初期化時接合センサON 未検出	205	Weld sensor does not turn ON after HP sensor OFF is detected during cam initialization. (determined after 2 pulses)	During cam initializing in test mode 1.2 times the pulse of HP sensor OFF ~ weld sensor ON distance. (2500pls)	Only detected during cam initializing in test mode.

6	CAM ERR 3 PRESS RESET	カムモータ 初期化ORリセット時接合 センサOFF未検出エラー	206	Weld sensor does not turn OFF after weld sensor turns ON during cam reset. (determined after 2 pulses)	During clamp reset. 1.5 times the pulse of 24° angle weld sensor ON. (300pls)	
7	CAM ERR 4 PRESS RESET	カムモータ 初期化ORリセット時ホー ムセンサON未検出エラー	207	Cam HP sensor does not turn ON after weld sensor turns OFF during cam reset. (determined after 2 pulses)	During clamp reset. 1.2 times the pulse of weld sensor OFF ~ HP sensor ON distance. (620pls)	
8	CAM ERR 5 PRESS RESET	カムモータ クランプホームセンサOFF 未検出エラー	208	HP sensor does not turn OFF after HP sensor ON during cam weld operation. (determined after 2 pulses)	During welding. 1.5 times the pulse of 24° angle HP sensor ON section. (300pls)	
9	CAM ERR 6 PRESS RESET	カムモータ クランプ接合センサON未 検出エラー	209	Weld sensor does not turn ON after HP sensor OFF during cam weld operation. (determined after 2 pulses)	During welding. 1.2 times the pulse of HP sensor OFF ~ weld sensor ON distance. (2500pls)	
10	RESET JAM ERR PRESS RESET	ウェハージャム解除時 カムホームセンサOFF未 検出エラー	210	HP sensor does not turn OFF after HP sensor ON during wafer jam recovery (determined after 2 pulses).	During jam recovery (cam reversing). 1.5 times the pulse of 24° angle HP sensor ON section. (300pls)	
11	ENCODER ERR PRESS RESET	ウェハー送りモータ エンコーダークロック脱調	211	Output pulse and encoder pulse is different when wafer feeding motor is on.	During shuttle motor reverse motion. Encoder pulse is different by more than 20 pulses.	
12	REPL WF ERR 0 PRESS RESET	ウェハー送りモータ 前進時、後退端センサOF F未検出エラー	212	HP sensor does not turn OFF after HP limit sensor ON during wafer feeding motor FWD motion (determined after 2 pulses).	During wafer replacement. HP limit sensor ON max distance over 8mm (192pls). 5mm with margin of 3mm.	

13	REPL WF ERR 1 PRESS RESET	ウェハー送りモータ 前進時、前進端センサON 未検出エラー	213	FWD limit sensor does not turn ON after HP sensor OFF during wafer feeding motor FWD motion (determined after 2 pulses).	During wafer replacement. Distance between HP sensor OFF ~FWD limit sensor ON is above 1367 pls. 49.5mm with margin of 7.5mm.	(Note: 7.5mm is the same as the width of the light visor.)
14	REPL WF ERR 2 PRESS RESET	ウェハー送りモータ 後退時、前進端センサOFF F未検出エラー	214	FWD limit sensor does not turn OFF after FWD limit sensor ON during wafer feeding motor reverse motion (determined after 2 pulses).	During wafer replacement. FWD limit sensor ON max distance over 8mm (192pls). 5mm with margin of 3mm.	
15	REPL WF ERR 3 PRESS RESET	ウェハー送りモータ 後退時、後退端センサON 未検出エラー	215	HP limit sensor does not turn ON after FWD limit sensor OFF during wafer feeding motor reverse motion (determined after 2 pulses).	During wafer replacement. Distance between FWD limit sensor OFF ~HP sensor ON is above 1367 pls. 49.5mm with margin of 7.5mm.	(Note: 7.5mm is the same as the width of the light visor.)
16	CAM ERR 7 PRESS RESET	ウェハーホルダ上昇センサ ONエラー	216	Wafer holder up sensor is OFF during the wafer holder up sensor ON section between cam HP sensor OFF and weld sensor ON.	During welding. Sensor is OFF 750～1775 pls. from cam HP sensor OFF.	Wafer holder up sensor does not turn ON during weld. Does not detect during restore (position is unknown so is impossible to detect).
17	SENSOR ERR 3 PRESS RESET	廃棄ボックス外光検出エラ ー	217	RX status of disposal box sensor before disposal box full sensor emits light. (5ms × matches 3 times)	During wafer replacement. RX sensor ON.	The RX sensor receiving light before the light goes off (disposal box empty). may be caused by outside lights or circuit failure.

10.4 Communication error screen

No	LCD display English	Japanese	Error code	Error detection method	Detection timing	Notes
Detection value						
0	COMM ERR 0 PRESS RESET	通信エラー キャリッジリターン無し	300	Carriage return (CRLF) is detected from command received from IS.	When enabling connection. No CRLF code.	
1	COMM ERR 1 PRESS RESET	通信エラー キャリッジ該当コマンド無し	301	Checks the command code (beginning of code) received from IS.	When receiving command to enable connection. Command code is incorrect.	
2	COMM ERR 2 PRESS RESET	通信エラー 受信コマンドデータ数エラー	302	Checks bite number of command data received from IS.	Command data number is incorrect when receiving command to enable connection.	
3	COMM ERR 3 PRESS RESET	通信エラー 受信カンマ無し	303	Check for comma code (",") in command data received from IS.	"," is not found in command code when receiving command to enable connection.	
4	COMM ERR 4 PRESS RESET	通信エラー 受信数値コードエラー	304	Check for comma value code in command data received from IS.	Comma value code is not a numerical code when receiving command to enable connection.	
5	COMM ERR 5 PRESS RESET	通信エラー パリティ、オーバーラン、フレーミングの各CPU検出受信エラー	305	Check for CPU communication interruption error and CPU error detection bit.	When receiving command to enable connection. Detected by CPU	
6	COMM ERR 6 PRESS RESET	通信エラー STコマンド受信	306	When receiving ST command (stop command).	When enabling connection. Receive ST command.	Disable connection as an error if ST command is received.
7	COMM ERR 7 PRESS RESET	通信エラー ABコマンド受信	307	Received AB command (retry command) when not welding (waiting for barcode input).	When enabling connection. Receive AB command.	Disable connection as an error if AB command is received when not welding.
8	COMM ERR TIME OUT PRESS RESET	通信エラー 応答タイムアウト	308	No reply for 5 seconds after transmitting command when IS is ON.	No reply command for 5 seconds after transmitting package command.	

10.5 Irrecoverable error screen (Peripheral)

No	LCD display English	Japanese	Error code	Error detection method	Detection timing Detection value	Notes
0	E0100 HOLDER CALL SERVICE	ホルダー温度調節 温度上昇異常	400	The holder temperature remains lower than the set holder temperature range.	During holder heating. 20 minutes.	Note: Time it takes to get to target temperature directly after boot up.
1	E0101 HOLDER CALL SERVICE	ホルダー温度調節 温度下降異常	401	Holder temperature remains higher than set holder temperature range.	During holder heating. 20 minutes.	
2	E0102 FAN CALL SERVICE	冷却ファン ロック	402	Lock signal detected (5m x 3times) 1 second after cooling fan starts.	When cooling fan is on. Lock signal ON.	
3	E0103 FAN CALL SERVICE	排煙ファン ロック	403	Lock signal detected (5m x 3times) 1 second after exhaust fan starts	From weld start to when cooling is completed. Lock signal ON.	
4	E0104 WAFER CALL SERVICE	AD入力(ダイレクト値) ウェハー電流上限超え	404	Check wafer current AD input value when there is no current output to wafer (Average of 3 of 5ms intervals)	Constant (Except when measuring resistance and heating wafer.) Above 6.770[A]	Note: If current is being outputted to wafer, normal error is detected through "irregular current value detection during wafer heating".
5	E0105 WAFER CALL SERVICE	AD入力(ダイレクト値) ウェハー電流下限超え	405	Check wafer current AD input value when there is current output to wafer. (Average of 3 of 5ms intervals)	Canceled due to switch to normal error. Lower than 1.07[A]	Not in use. (Cancellation scheduled). Still included to keep error number consistent.
6	E0106 WAFER CALL SERVICE	AD入力(ダイレクト値) ウェハー電圧上限超え (上流側)	406	Check wafer 24V source AD input value after wafer power switch is turned ON. (Average of 3 of 5ms intervals)	Constant Above 26.5[V]	The wafer 24V will not be supplied if wafer power switch is not turned ON.
7	E0107 WAFER CALL SERVICE	AD入力(ダイレクト値) ウェハー電圧下限超え (上流側)	407	Check wafer 24V source AD input value after wafer power switch is turned ON. Voltage dropped multiple times after 2 s. (Average of 3 of 5ms intervals)	Constant Note: handle as normal error if it continues for 100ms during wafer heating. Above 21.4[V]	The wafer 24V will not be supplied if wafer power switch is not turned ON.
8	E0108 HOLDER CALL SERVICE	AD入力(ダイレクト値) ホルダーサーミスタ 上限超え	408	Check AD input of holder thermostat. (Once during a 5ms interval)	Constant Above 250[°C]	

9	E0109 HOLDER CALL SERVICE	AD入力(ダイレクト値) ホルダーサーミスタ 下限超え	409	Check AD input of holder thermostat. (Once during a 5ms interval)	Constant Below -35[°C]	
10	E0110 TEMP. CALL SERVICE	AD入力(ダイレクト値) 装置内温度上限超え	410	Check AD input of room temperature. (Once during a 5ms interval)	Constant Above 70[°C]	
11	E0111 TEMP. CALL SERVICE	AD入力(ダイレクト値) 装置内温度下限超え	411	Check AD input of room temperature. (Once during a 5ms interval)	Constant Below -35[°C]	
12	E0112 WAFER CALL SERVICE	AD入力(ダイレクト値) 2.5V基準電源電圧上限 超え	412	Check AD input of 2.5V reference voltage. (Average of 3 of 5ms intervals)	Constant Above 2.744[V]	
13	E0113 WAFER CALL SERVICE	AD入力(ダイレクト値) 2.5V基準電源電圧下限 超え	413	Check AD input of 2.5V reference voltage. (Average of 3 of 5ms intervals)	Constant Below 2.246[V]	
14	E0114 SENSOR CALL SERVICE	センサ カム待機位置センサとカ ム接合完了センサが両方 ON	414	Check status of cam HP sensor and cam weld complete sensor. (Average of 3 of 5ms intervals)	Constant Both ON.	
15	E0115 SENSOR CALL SERVICE	センサ ウェハー送り前進端とウェ ハー後退端センサが両方 ON	415	Check status of wafer feeding HP limit sensor and wafer feeding FWD limit sensor. (Average of 3 of 5ms intervals)	Constant Both ON.	
16	E0116 SENSOR CALL SERVICE	センサ ウェハー上昇センサON のとき、カムHPセンサが ON	416	Check status of wafer holder unit up sensor and cam HP sensor. (Average of 3 of 5ms intervals)	Standby (Motor is turned off) Both ON	
17	E0117 SENSOR CALL SERVICE	センサ ウェハー上昇センサON のとき、カム接合センサが ON	417	Check status of wafer holder unit up sensor and cam weld sensor. (Average of 3 of 5ms intervals)	Standby (Motor is turned off) Both ON.	
18	E0118 SENSOR CALL SERVICE	センサ ウェハー加熱中にシャト ルモータ後退センサOFF	418	Check status of wafer heating and shuttle HP sensor. (Average of 3 of 5ms intervals)	During wafer heating. Shuttle HP sensor OFF.	The shuttle moved forward for some reason during heating.
19	E0119 SENSOR CALL SERVICE	センサ ウェハー加熱中にクラン プ開	419	Check status of wafer heating and clamp closed sensor. (Average of 3 of 5ms intervals)	During wafer heating. Clamp closed sensor is set to open.	

20	E0120 SENSOR CALL SERVICE	センサ ウェハー加熱中にクラン プロックソレノイド開放	420	Currently same as "Clamp solenoid ON during sensor OFF error".	(Delete) (Not in use. No plan for implementation).	Not in use Same as clamp solenoid ON during sensor OFF error in recoverable errors.
21	E0121 SENSOR CALL SERVICE	パニック操作復旧処理で、 ロックソレノイド又はクラ ンプが開放された。	421	Check status of lock solenoid sensor and clamp closed sensor when wafer up sensor is ON during welding.	Panic operation detected (during boot up) Solenoid sensor is OFF or clamp is open.	
22	E0122 RESTOR CALL SERVICE	パニック操作復旧処理で、 リトライ系エラーが発生し、 復帰失敗となった。	422	Retry error occurs.	Retry error occurred during restoring process.	
23	E0123 SOL CALL SERVICE	クランプロックソレノイド ロック解除時、駆動信号 モニタエラー	423	High solenoid 2 signal monitor detected during clamp unlock. (Matches 3 times in a 5ms interval.)	When clamp is unlocked. High solenoid 2 signal monitor detected	To avoid circuit breaking or shorting.
24	E0124 SOL CALL SERVICE	クランプロックソレノイド ロック時、駆動信号モニタ エラー	424	High solenoid 1 signal monitor detected when solenoid was being pulled. (3 times in a 5ms interval.)	When clamp is locked. High solenoid 1 signal monitor detected.	To avoid circuit breaking or shorting.
25	E0125 SOL CALL SERVICE	クランプロックソレノイド ロック解除側信号モニタエ ラー	425	Low solenoid 2 signal monitor detected for 3 seconds when solenoid was stationary. (3 times in a 5ms interval.)	Constant Low solenoid 2 signal monitor detected.	To avoid circuit breaking or shorting.
26	E0126 SOL CALL SERVICE	クランプロックソレノイド ロック側信号モニタエラー	426	Low solenoid 1 signal monitor detected for 3s when solenoid was stationary. (3 times in a 5ms interval.)	Constant Low solenoid 1 signal monitor detected.	To avoid circuit breaking or shorting.
27	E0127 HOLDER POSI. CALL SERVICE	クランプロック解除時、ホ ルダ上昇クランプ閉状態 でクランプロック解除防止 エラー。	427	Check status of clamp closed sensor and holder up sensor when clamp is unlocked. (3 times in a 5ms interval.)	When clamp is unlocked. (Clamp meets holder if clamp is opened when holder is up.)	To avoid clamp and holder contact.

10.6 Irrecoverable error screen (system)

No	LCD display English	Japanese	Error code	Error detection method	Detection timing	Notes
						Detection value
0	E0000 RAM CALL SERVICE	RAMエラー チェック時のエラー	500	Enter 0x55, 0xAA, 0x0 in RAM (skip stack area) and check data.	After initializing CPU. Value is different from inputted value.	Only used in debug.
1	E0001 RAM CALL SERVICE	RAMエラー スタック領域エラー	501	Enter 0x55, 0xAA, 0x0 in stack area and check data.	Directly after boot up. Value is different from inputted value.	Only used in debug.
2	E0002 ROM CALL SERVICE	ROMエラー ダミーデータ異常	502	Even if the check sum value is set, add the set check sum value and dummy data so that the check sum does not change.	After initializing CPU. The check sum value and dummy data are added and do not equal 0xFFFF.	Only used in debugging.
3	E0003 ROM CALL SERVICE	ROMエラー チェックサムエラー	503	Compare the set check sum value and the additional value of the flash memory.	After initializing CPU. Data is not the same.	Only used in debug.
4	E0004 E2PROM CALL SERVICE	E2PROMエラー ビジータイムアウト	504	Checks for the E2PROM busy status after writing to E2PROM.	Constant. Longer than 25ms.	
5	E0005 E2PROM CALL SERVICE	E2PROMエラー ライトリードエラー	505	Reads the data from the same address after writing to E2PROM.	Constant Data is not the same.	
6	E0006 LCD CALL SERVICE	LCDエラー アドレス書き込みエラー	506	Checks for the LCD busy status after setting LCD address.	Constant Longer than 100ms.	
7	E0007 LCD CALL SERVICE	LCDエラー データ書き込みエラー	507	Checks for the LCD busy status after setting LCD data.	Constant Longer than 100ms.	

10.7 Irrecoverable error screen (coding)

No	LCD display English	Japanese	Error code	Error detection method	Detection timing	Notes
					Detection value	
0	E0300 CALL SERVICE	LED DEFAULT エラー	600	Jumps to unidentified address in control function displayed on the left.	Constant Jump to default	
1	E0301 CALL SERVICE	ブザー DEFAULT エラー	601	"	"	
2	E0302 CALL SERVICE	ウェハー温度制御 DEFAULT エラー	602	"	"	
3	E0303 CALL SERVICE	TSCD-IS 受信コマンド DEFAULT エラー	603	"	"	
4	E0304 CALL SERVICE	TSCD-IS 送信コマンド DEFAULT エラー	604	"	"	
5	E0305 CALL SERVICE	ホルダー温度制御 DEFAULT エラー	605	"	"	
6	E0306 CALL SERVICE	クランプソレノイド制御 DEFAULT エラー	606	"	"	
7	E0307 CALL SERVICE	冷却ファン DEFAULT エラー	607	"	"	
8	E0308 CALL SERVICE	排煙ファン DEFAULT エラー	608	"	"	
9	E0309 CALL SERVICE	満杯センサ DEFAULT エラー	609	"	"	
10	E0310 CALL SERVICE	カムモータ監視 DEFAULT エラー	610	"	"	
11	E0311 CALL SERVICE	カムモーター動作設定 DEFAULT エラー	611	"	"	
12	E0312 CALL SERVICE	ウェハー送りモータ 監視 DEFAULT エラー	612	"	"	
13	E0313 CALL SERVICE	ウェハー送りモータ 動作設定 DEFAULT エラー	613	"	"	
14	E0314 CALL SERVICE	カムモータ割り込み DEFAULT エラー	614	"	"	
15	E0315 CALL SERVICE	シャトルモータ割り込み DEFAULT エラー	615	"	"	
16	E0316 CALL SERVICE	LCD初期化 DEFAULT エラー	616	"	"	

17	E0317 CALL SERVICE	LCD表示 DEFAULT エラー	617	"	"	
18	E0318 CALL SERVICE	受信コマンド DEFAULT エラー	618	Command was detected as unidentified after it was received and processed.	When receiving command. Analyzes and processes command and jumps to default.	
19	E0319 CALL SERVICE	カムモータ2重起動 エラー	619	Cam motor operation command was set when cam motor was running.	Start flag was set when cam motor was running.	
20	E0320 CALL SERVICE	ウェハー送りモータ 2重起動エラー	620	Wafer motor operation command was set when wafer motor was running.	Start flag was set when wafer-feeding motor was running.	
21	E0321 CALL SERVICE	通常モードステータス DEFAULT エラー	621	Jumped to unidentified address in control function displayed to the left.	Constant Jump to default	
22	E0322 CALL SERVICE	テストモードステータス DEFAULT エラー	622	"	"	Not in use
23	E0323 CALL SERVICE	ニスカサンプリングモード DEFAULT エラー	623	"	"	Not in use
24	E0324 CALL SERVICE	LCD上書きステータス DEFAULT エラー	624	"	"	
25	E0325 CALL SERVICE	LCD上書きデータ データ数 エラー	625	When overwriting LCD screen, compare the numbers in the overwritten data and the numbers from the beginning of the address overwriting to the end of the address overwriting.	Constant Data number does not match	
26	E0326 CALL SERVICE	電源投入時表示画面ステータス DEFAULT エラー	626	Jumped to unidentified address in control function displayed on the left.	Constant Jump to default	

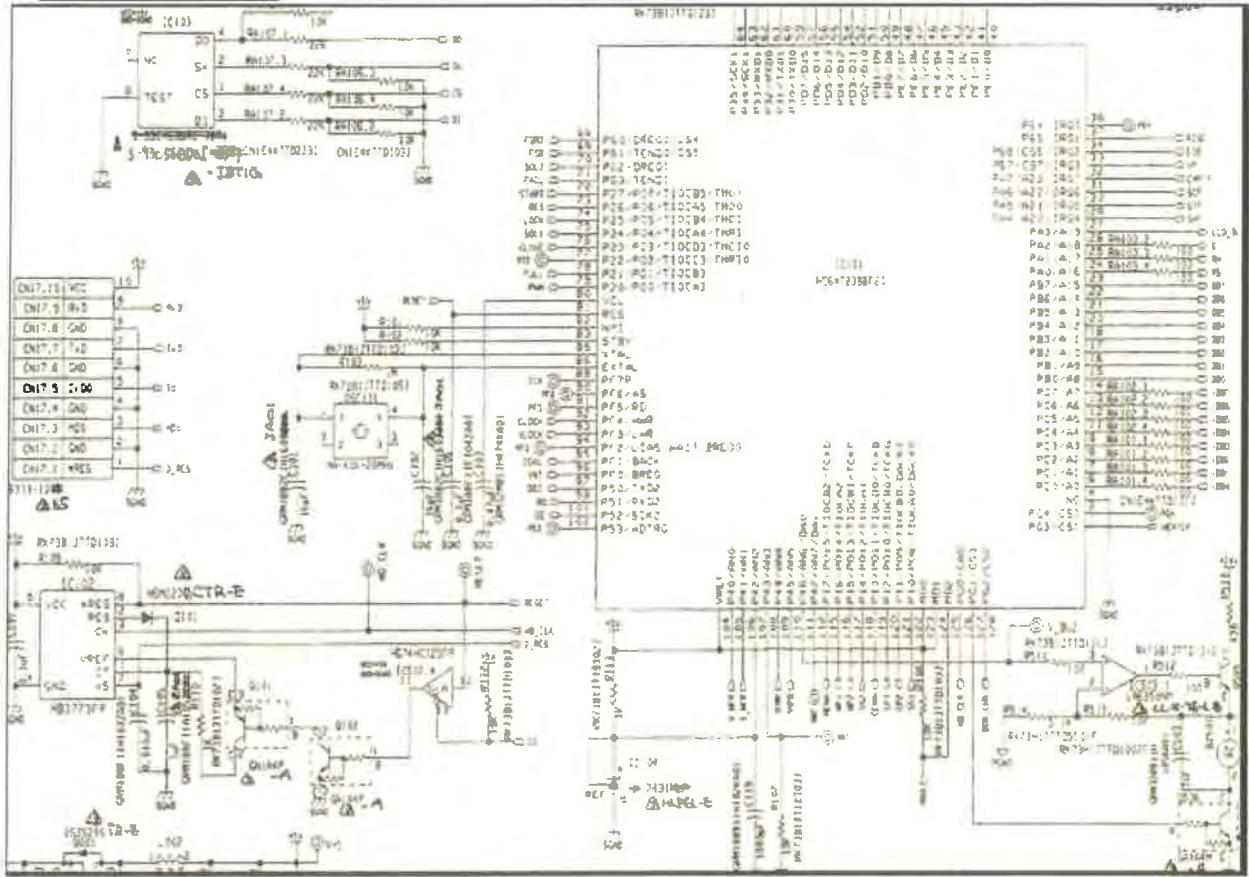
11. Circuit diagram

TSCD-II Electrical circuit explanation document

11.1 Parts list

No.	Circuit name
2	CPU circuit
3	Main CPU board
4	Clock circuit
5	Reset circuit (watchdog circuit)
6	Memory circuit and microcomputer flash memory write circuit
7	RS232C circuit and RS485 circuit
8	Reference voltage circuit
9	5V power generating circuit
10	Sensor input circuit
11	Button press SW circuit and room temperature sensor circuit
12	DIP SW circuit
13	Cam motor control circuit
14	Wafer feeding motor control circuit
15	Cooling fan and exhaust fan circuit
16	Buzzer circuit
17	Holder heater temp. control and clamp lock solenoid output circuit
18	Wafer temperature control circuit
19	RTC circuit
20	Wafer full sensor
21	LCD display circuit
22	Power circuit
23	Wiring system diagram
24	Main circuit diagram

11.2 CPU circuit



The device is controlled using the IC101 microcomputer.

The 16-bit HD64F2398F20 microcomputer manufactured by Renesas is used. The following is a summary of the microcomputer specs:

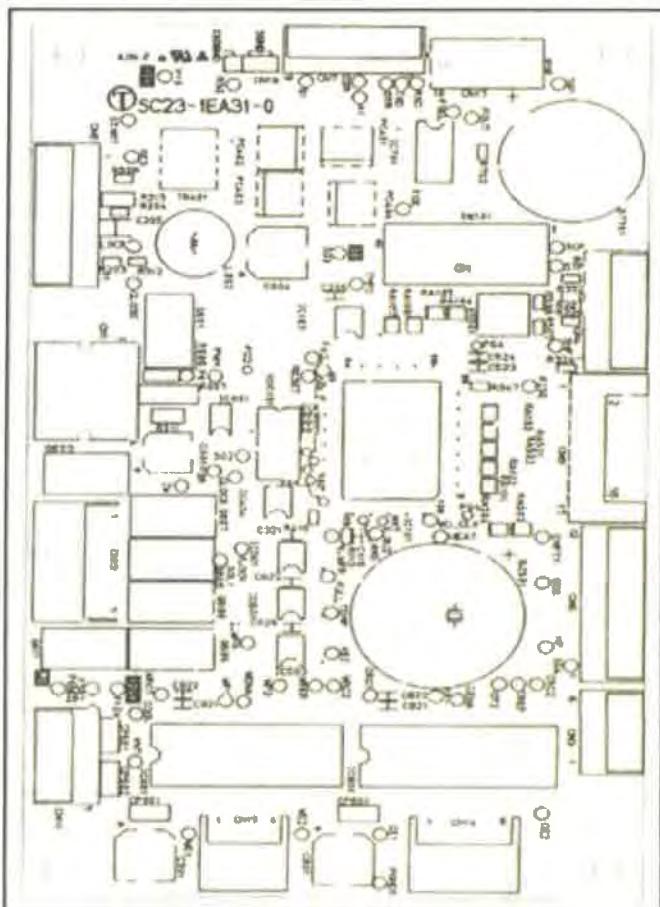
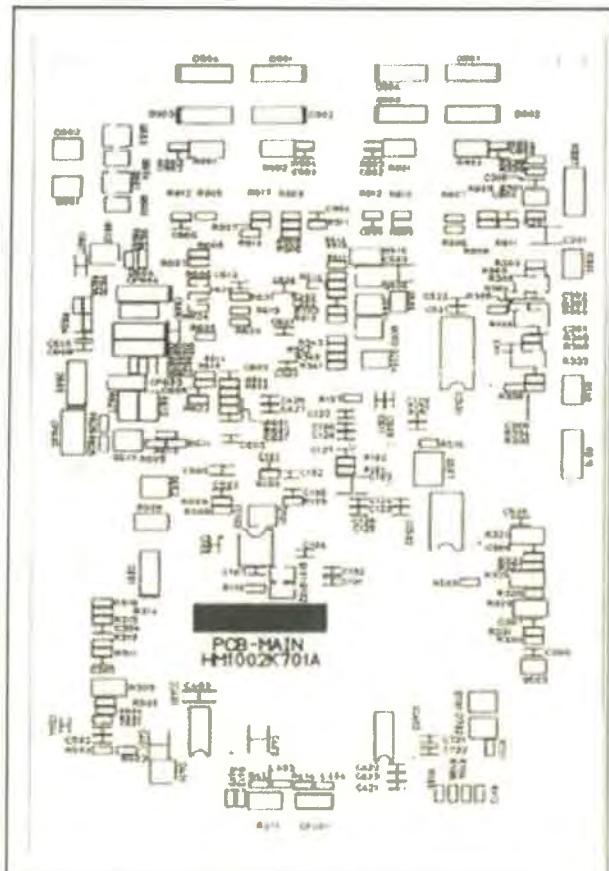
ROM 256Kbit, RAM 8Kbit, pin count 120

Operating voltage DC5V Operating frequency 2~20MHz→20MHz is inputted for this device.

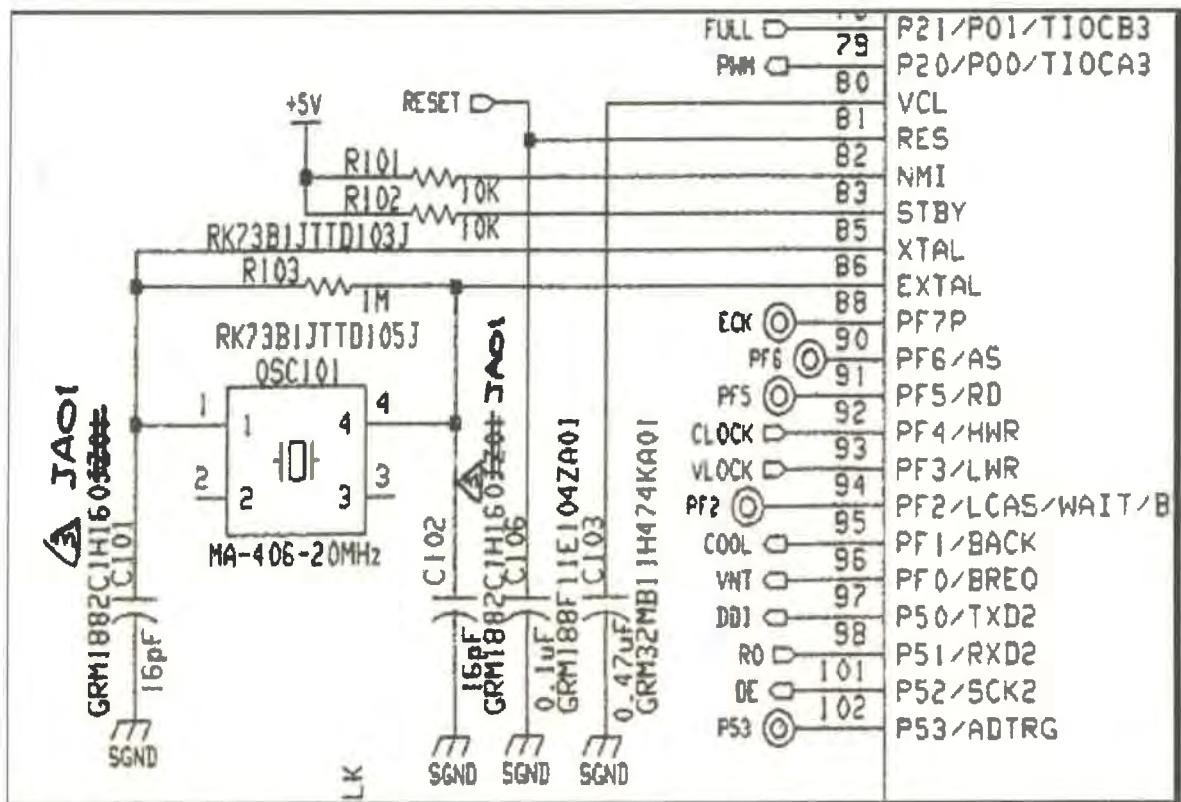
This microcomputer is equipped with flash memory and is compatible to run software updates.

11.3 Main CPU board

The following is the layout diagram of the main CPU board.



11.4 Clock circuit



The microcomputer clock is OSC101 and has a frequency of 20MHz.

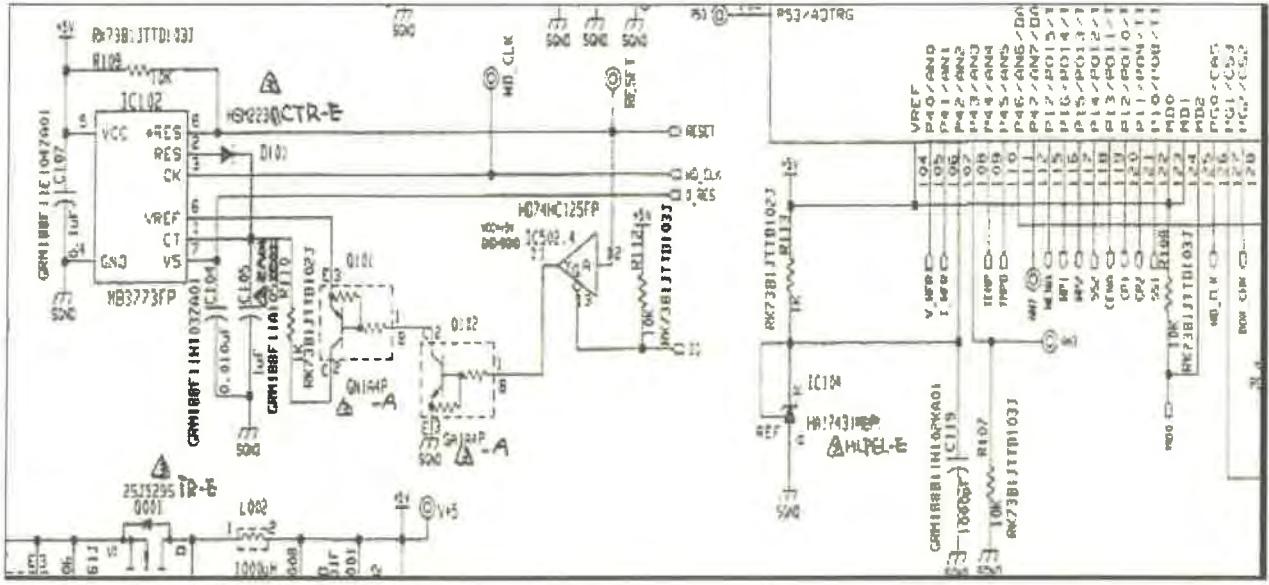


Manufacturer: River Eletec Corp.

Name: Miniaturized quartz crystal unit

Model: MA—406—20MHz.

11.5 Reset circuit (watchdog circuit)



IC102 reset IC— Fujitsu MB3773FP

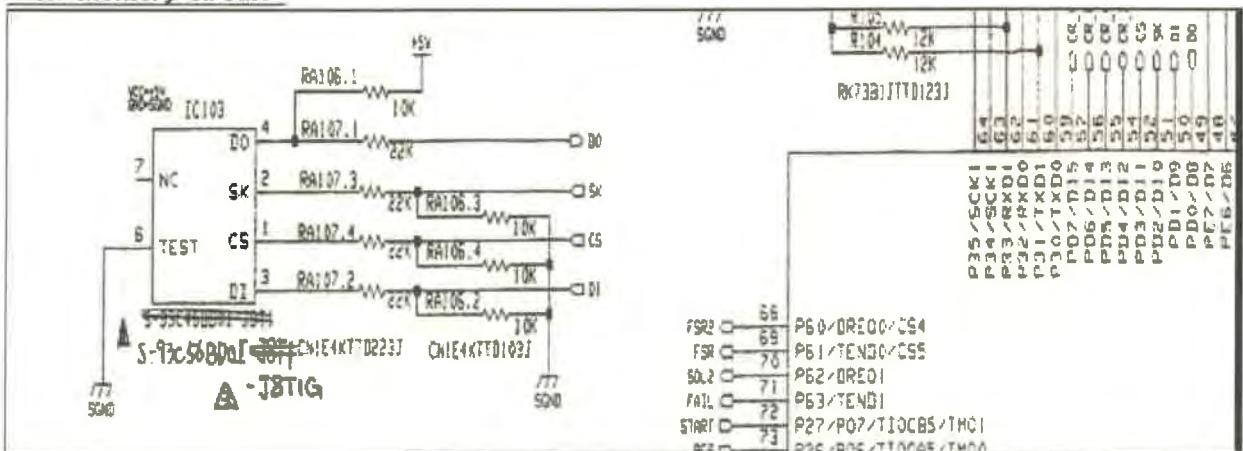
Sends a reset signal if the source voltage momentarily shuts off or drops and sends a power on reset signal when power returns to normal and inputs it to the microcomputer input terminal.

This IC also has a watchdog function to monitor the system's normal operation. The monitor times can be set by changing the value of C (as shown in the equation below) which is connected to the IC.

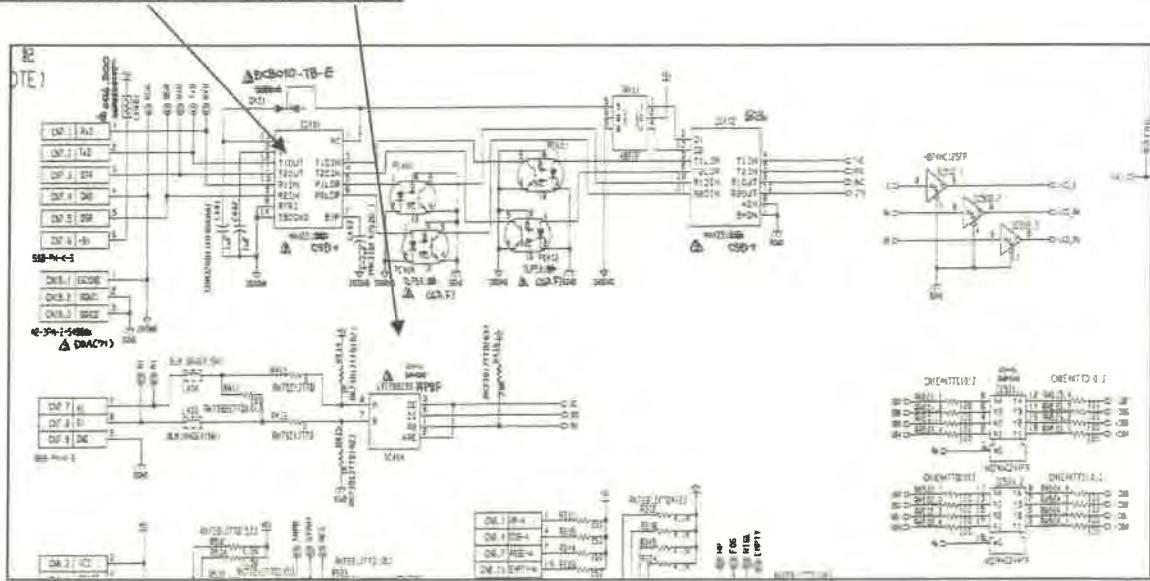
$$\text{Watchdog time (msec)} = 100 \times C (\mu F)$$

If a clock input is not received by the reset IC from the microcomputer within $100 \times 1 (\mu F) = 100\text{msec}$, the watchdog function will detect an error.

11.6 Memory circuit

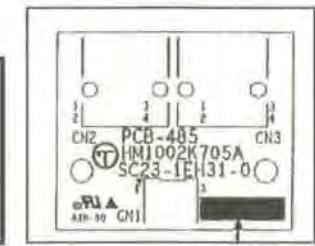
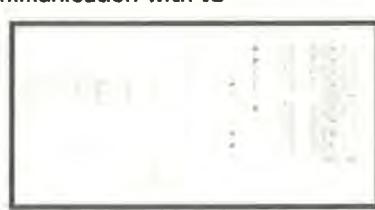


11.7 RS232C and RS485 circuit



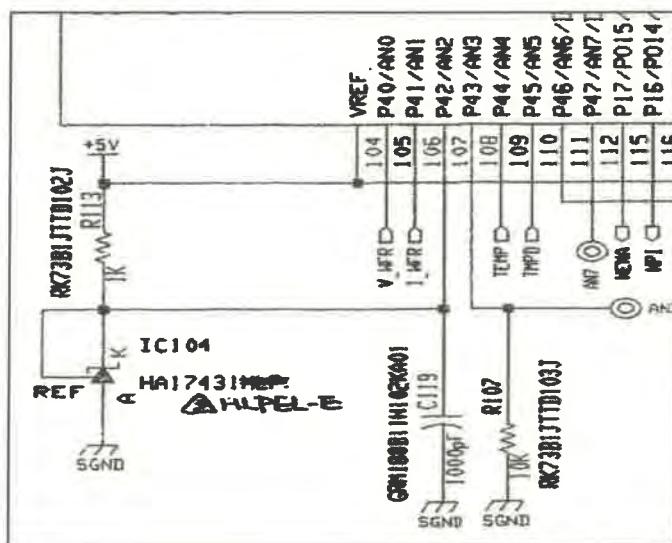
RS232C circuit: Communication interface for communication with IS

RS485 circuit: Installed for future expansion
 but software is currently not
 installed. Currently
 does not function.



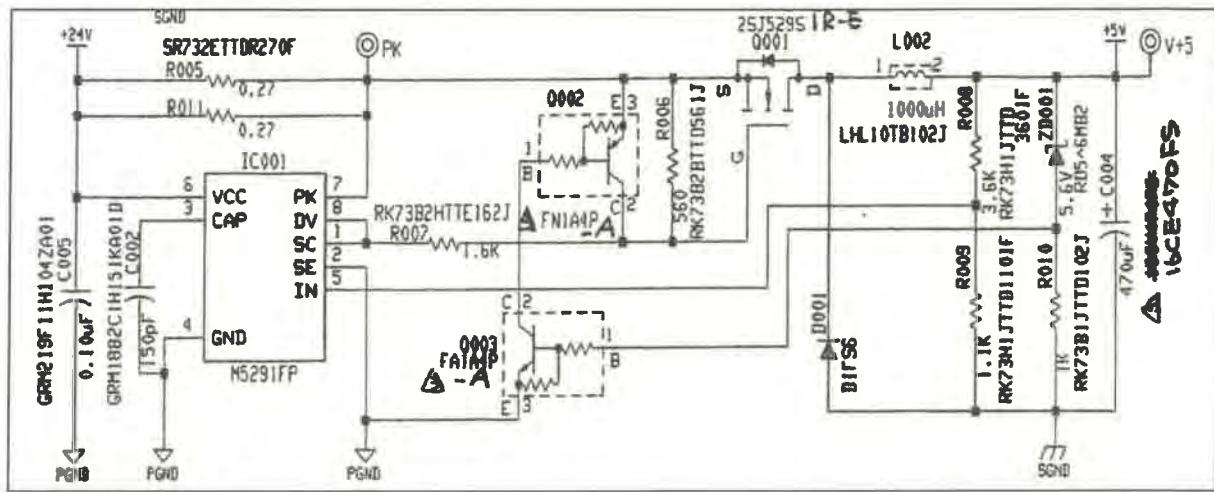
The RS485
 connector circuit and board on rear of device.

11.8 Reference voltage circuit



The reference voltage of the microcomputer must be inputted to the microcomputer when external signals are being read. The IC104 is a Hitachi regulator and supplies the reference voltage to the microcomputer with a $2.5V \pm 1\%$ margin for error.

11.9 5V power generating circuit

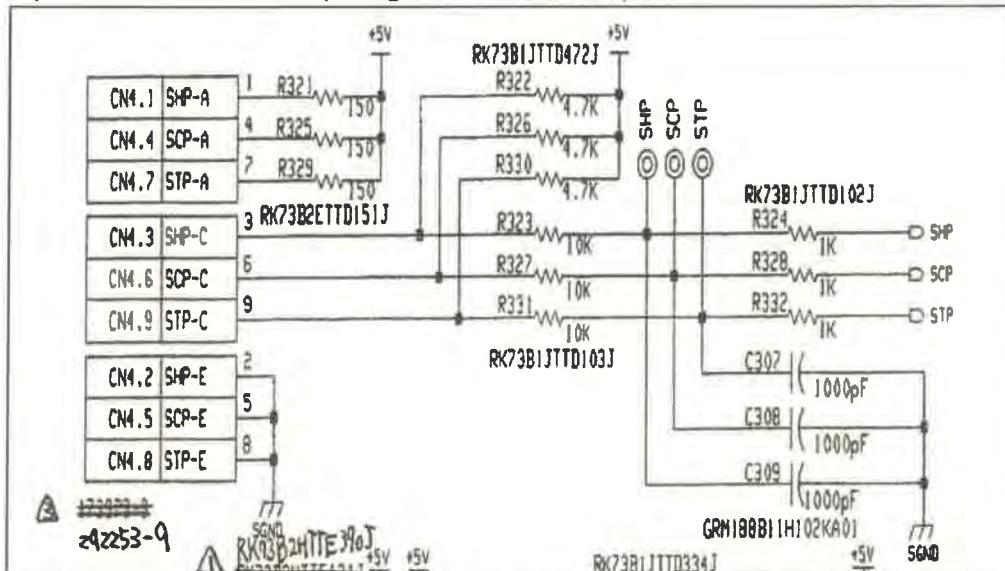


The TSCD-II generates DC5V as a power source for the microcomputer and sensor input/output.

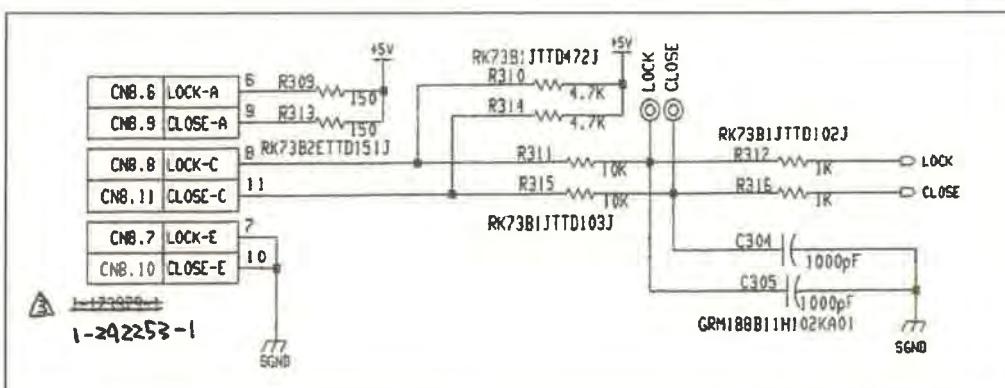
DC24V is generated in the DC power supply board (different circuit board) and is inputted to the IC001 DC-DC converter and outputted as DC5V.

11.10 Sensor input circuit

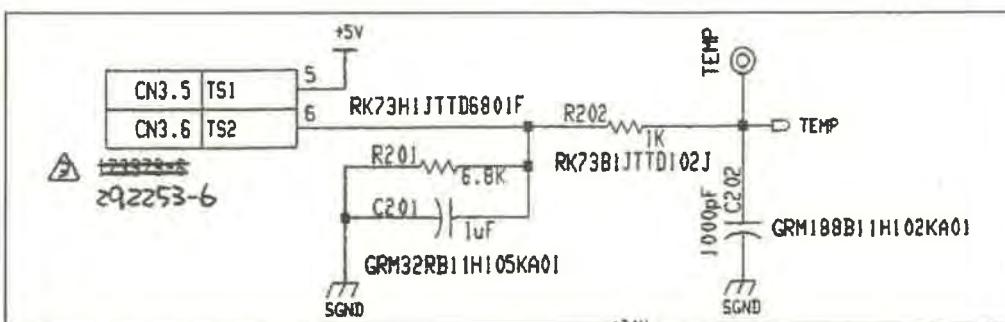
The pull-up circuit consists of the input signal to the microcomputer from each sensor.



Sensor input of cam position sensor and wafer feeding shuttle position sensor.

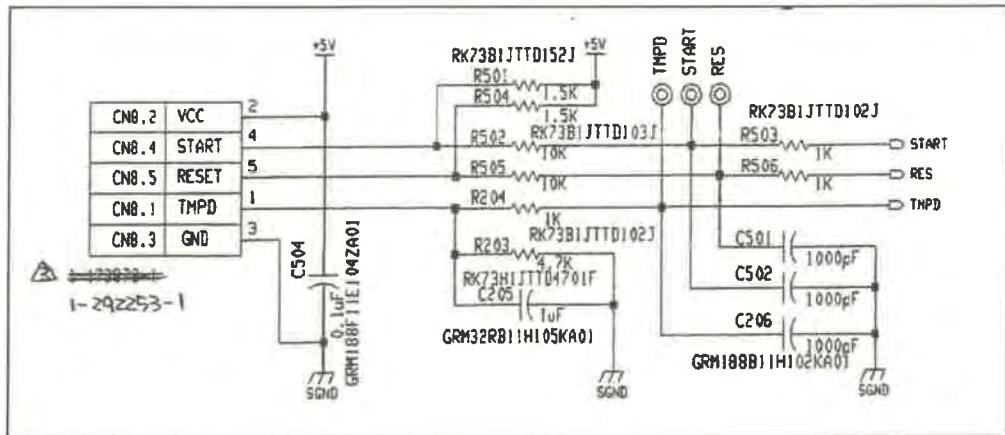


Sensor inputs of clamp closed, interlock, closed check sensors.



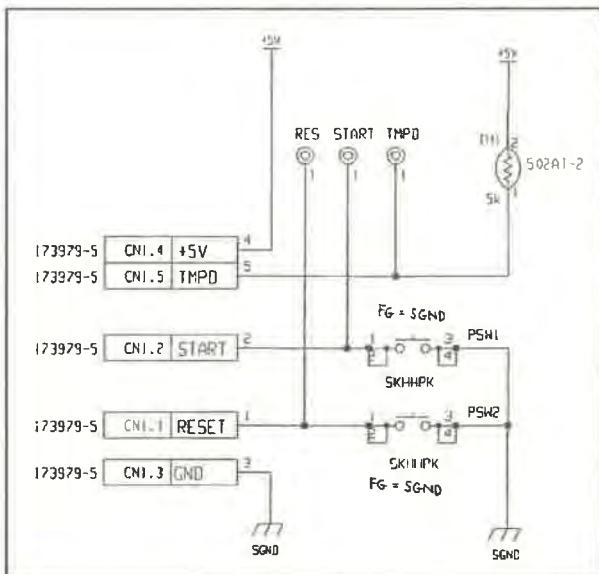
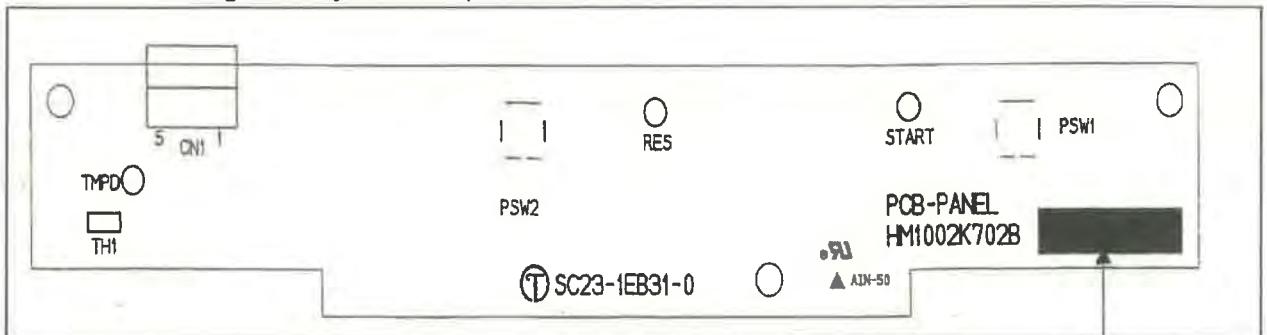
Holder temperature measurement sensor input.

11.11 Button press SW circuit and room temperature sensor circuit



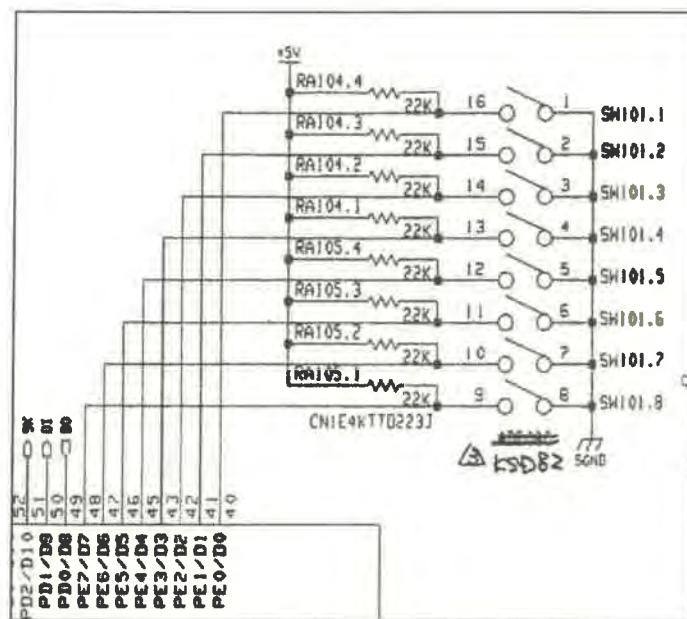
Reset and start switch circuit → The basic framework is the same as the sensor input circuit.
The TMPD is installed on this board to connect to the thermostat measuring room temperature.

The button press SW circuit and room temperature sensor circuit is located in the front side of the device. The following is the layout of the parts on the board.



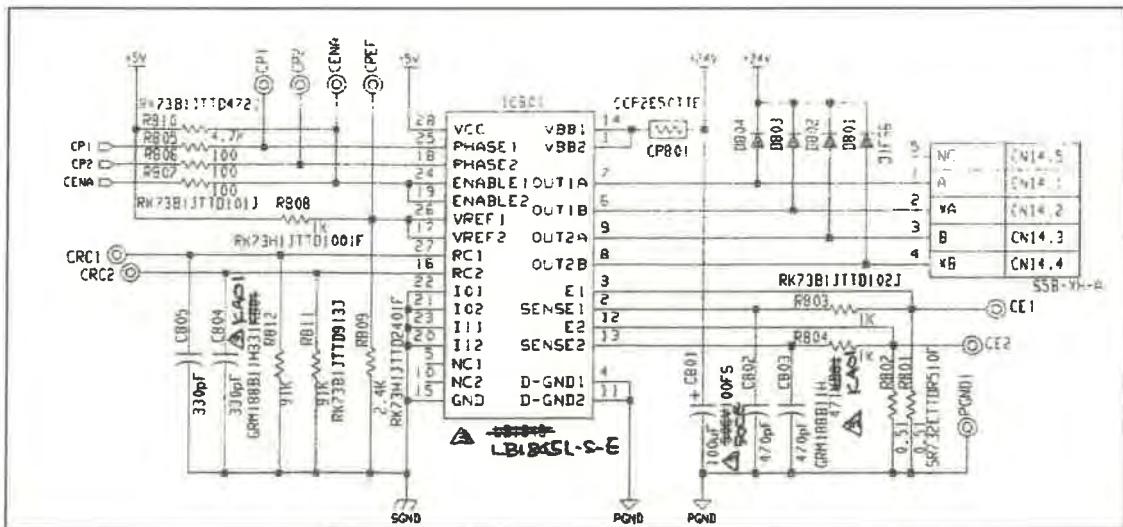
The button press circuit is configured as shown on the left.

11.12 DIP SW circuit



Used to switch the device between operating mode, adjusting mode, test mode, and debugging mode.

11.13 Cam motor control unit

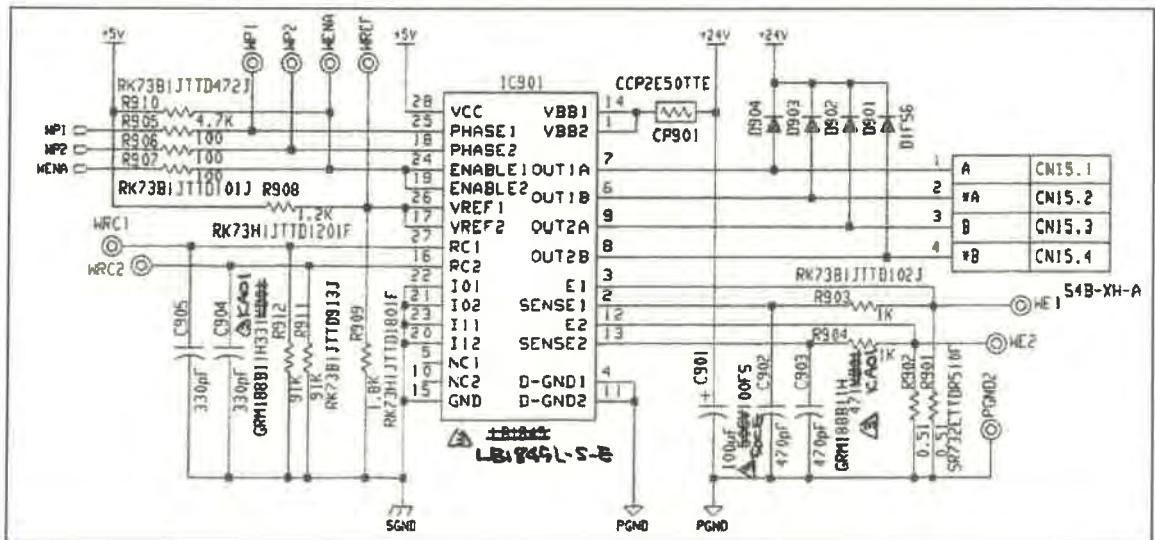


Circuit that controls the stepping motor which controls the cam motor.

The signal to operate the stepping motor is sent from the microcomputer to the IC801.

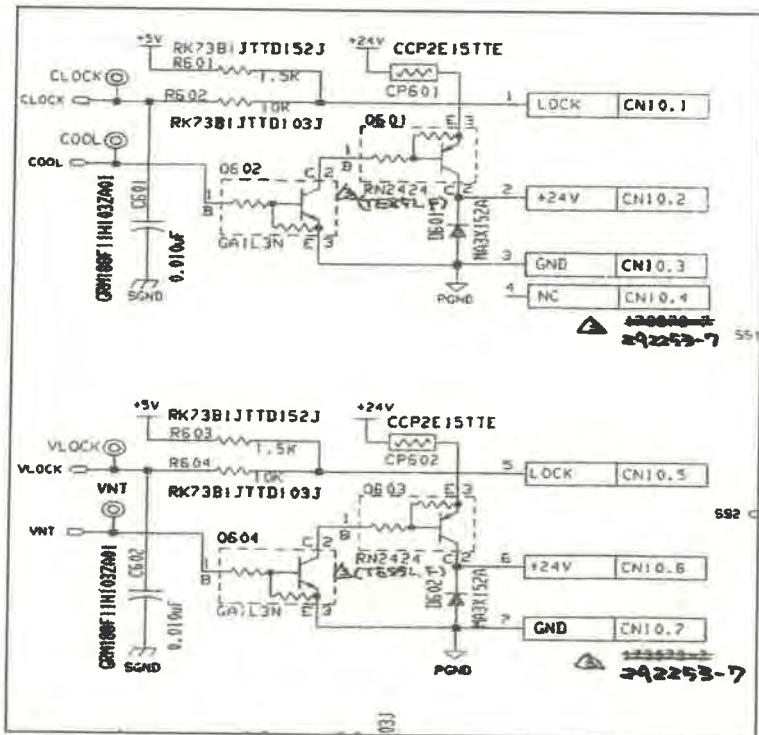
IC801 is a dedicated IC (SANYO LB1845 PWM current control stepping motor driver) that controls the stepping motor and outputs a signal that controls the stepping motor from OUT1A~OUT1B.

11.14 Wafer feeding motor control unit



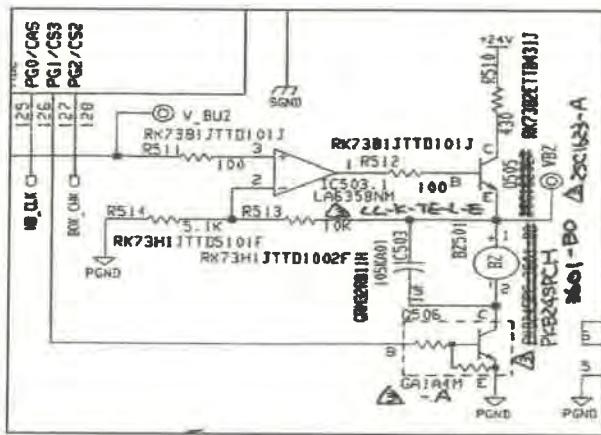
The wafer feeding is performed automatically by moving the wafer-feeding unit forward and backward with the stepping motor. The control circuit configuration is the same as in 12.

11.15 Cooling fan circuit and exhaust fan circuit



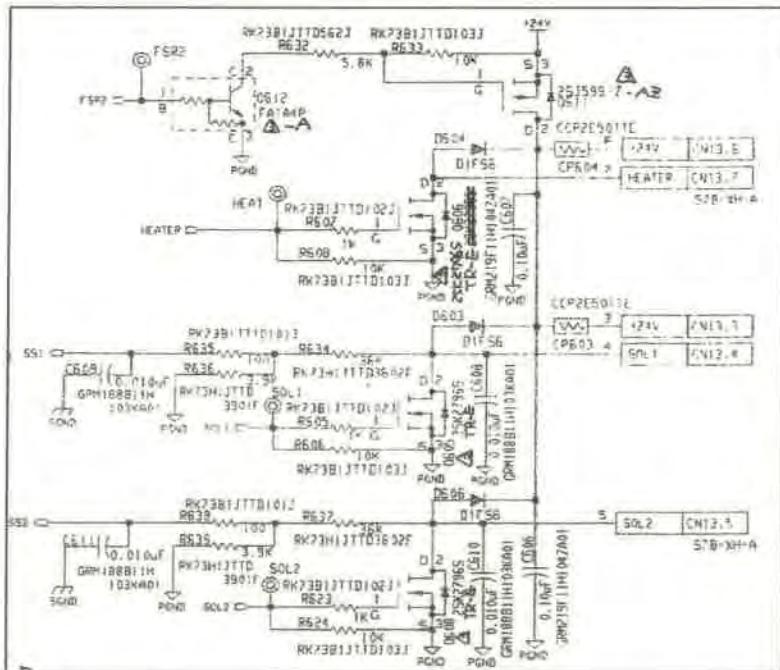
The cooling fan and exhaust fan turns ON/OFF with the signals from the microcomputer.
 The "LOCK" in the circuit diagram is a signal line that sends a signal to the microcomputer when the fan is locked.

11.16 Buzzer circuit



The buzzer used is the PKB24SPCH-3601 manufactured by MURATA.
This buzzer is a self-drive magnetic type and emits sound above 92dB (when 12VDC supplied and measured at 10cm) at a frequency of 2.7kHz.

11.17 Holder heater temperature control circuit and clamp lock solenoid output circuit



① Holder heater temperature control circuit:

A constant power format is used for the wafer heating in the TSCD-II.

The wafer set in the holder must be held at a constant temperature before the wafer is heated in a constant power format.

The TSCD-II has a thermostat installed on the holder that measures the temperature of the heater and holder.

The holder is set to keep the temperature at 78°C at an operating temperature of 25°C.

The holder temperature changes depending on the room temperature, so keep the wafer temperature constant after heating by controlling the heater ON/OFF with the microcomputer.

The heater on the holder is switched ON/OFF by the microcomputer which switches the Q603 (Hitachi 2SK2796S), a high-speed electronic switching FET, ON/OFF.

② Clamp lock solenoid output circuit:

The device has a feature that raises a pin which locks the clamp to prevent it from opening during welding and unlocks it when the weld is complete so the clamp cannot be accidentally opened by the user during a weld. The pin is operated by a double solenoid. Solenoid 1 is set to ON when the pin is in lock position and solenoid 2 is ON when the pin is in unlock position.

The circuit structure is the same as in 17.

About Q611:

This element is a failsafe structure that cuts off the DC24V and turns all outputs OFF when the

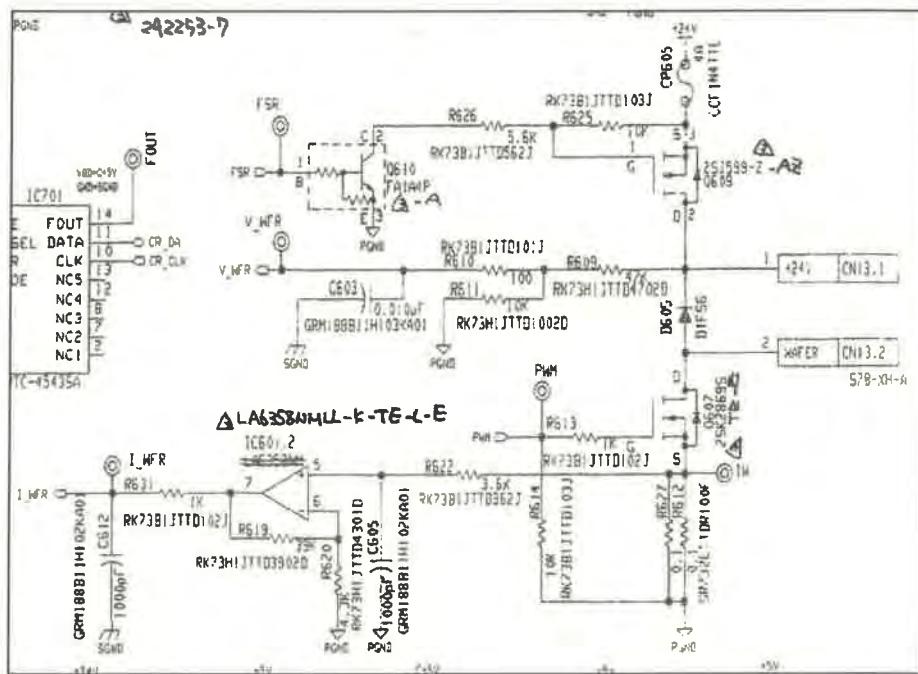
Document No. PQD-T6007

Applicable lot0312001~

2nd Edition

device becomes uncontrollable due to a device error. It is installed specifically to prevent the heater from overheating.

11.18 Wafer temperature control circuit



The TSCD-II does not measure the actual temperature of the wafer surface but uses a constant power control system that uses the open loop control which supplies constant electrical power (28W) to the wafer. This same system is used in the TSCD, which is used for dialysis.

It takes about five seconds for the wafer to warm up.

When constant electrical power is being transferred to the wafer, the device reads the current and voltage in the wafer during wafer heating. The wafer's resistance can be calculated from the current and voltage measured from this process and this detects any irregularities in the wafer resistance values.

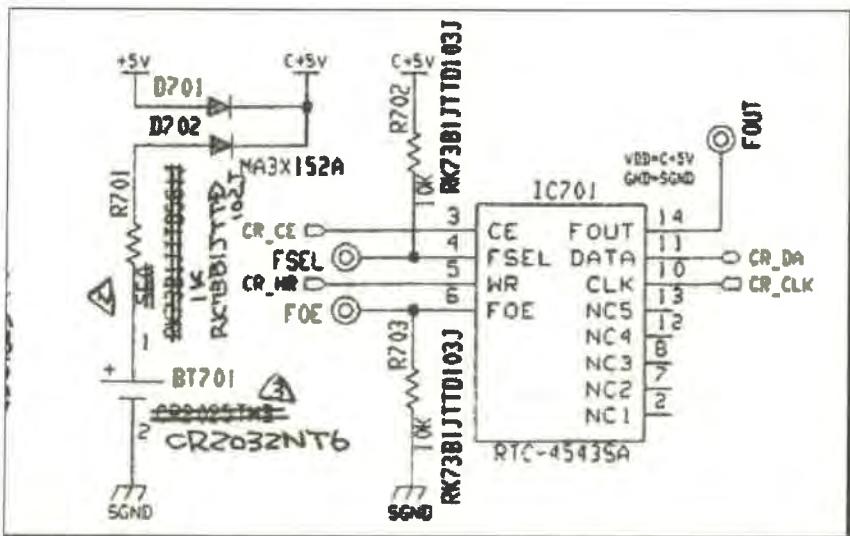
For the wafer current, the IC601-2 amplifies the current running between R612 and R627 and records the wafer current as I_WFR in the microcomputer.

For the wafer voltage, the voltage on the wafer is divided between R509 and R511 and records the voltage as V_WFR in the microcomputer.

To adjust the current wafer voltage from the product of I_{WAF} and V_{WAF} to the target value, the microcomputer controls the PD and the output to the wafer is outputted as PWM output and applied to Q607.

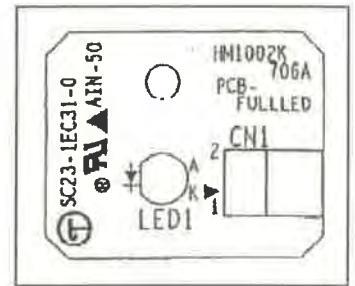
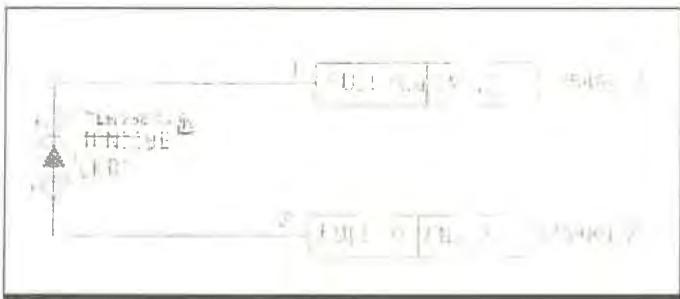
The wafer current and voltage is read by the microcomputer every 10m seconds during wafer heating.

11.19 RTC circuit

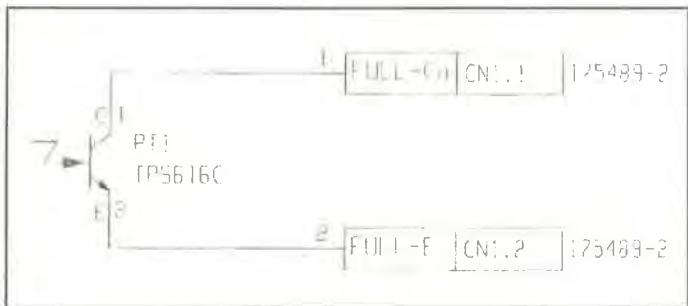


Element IC-107 RTC (REAL TIME COUNTER: EPSON RTC-45435A), which has a timer function, is installed to the TSCD-II for the clock function. The RTC needs to run even when the power is down, so a coin cell battery BT701 is installed as a backup power source. This battery can run for five years as a backup power source and must be replaced at the end of this period.

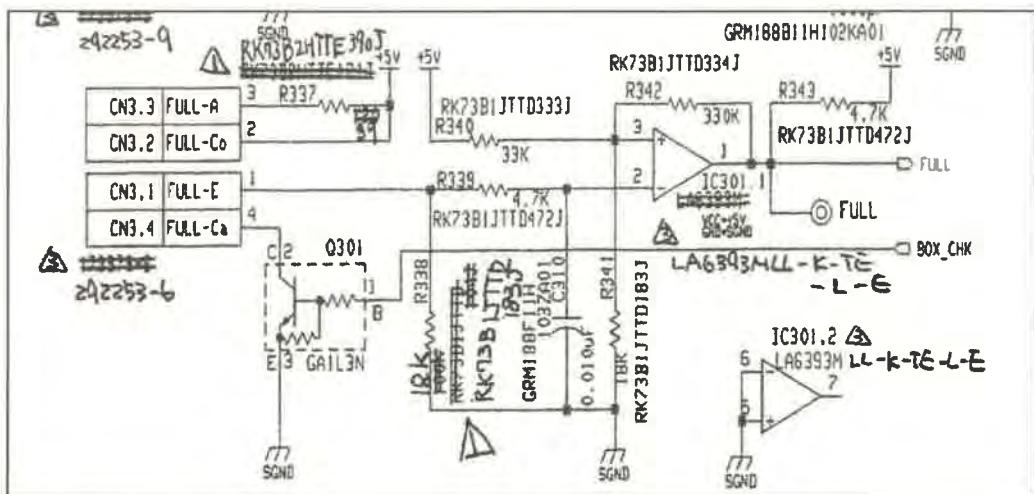
11.20 Wafer full sensor circuit



LED circuit located close to the wafer disposal box



Phototransistor circuit located on the opposite side of the LED circuit shown above.

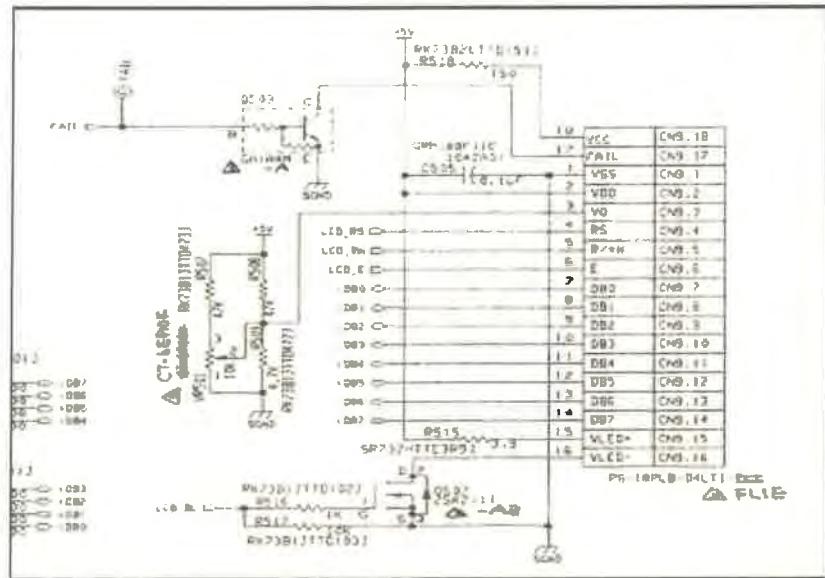


Main CPU board: Wafer full sensor circuit (receiving and emitting circuit)

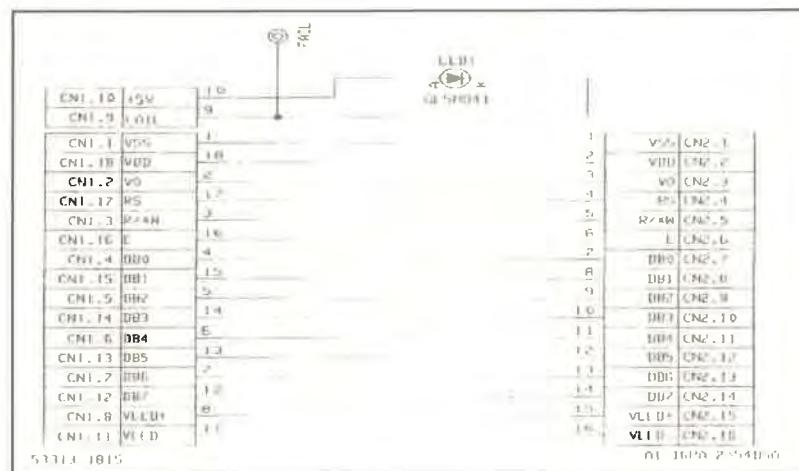
The microcomputer sets the value of BOX-CHK to HIGH when checking the amount of used wafers in the wafer disposal box. By doing so, the value of Q301 changes to ON and the LED1

turns on. PT1 outputs a signal depending on the level of light received and checks if the wafer disposal box is full.

11.21 LCD display circuit



LCD display (& LED) circuit on Main CPU board



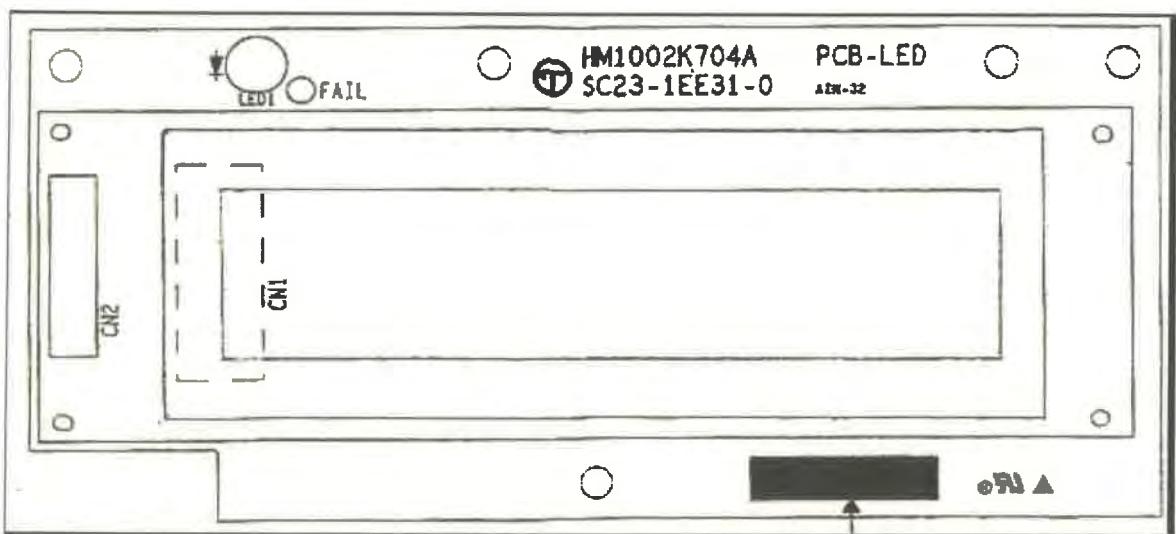
Connection circuit to LCD substrate

The LCD display circuit is separated between the main CPU board and the LCD display. The circuit in the LCD display is separated between the LCD and the LED (one red LED).

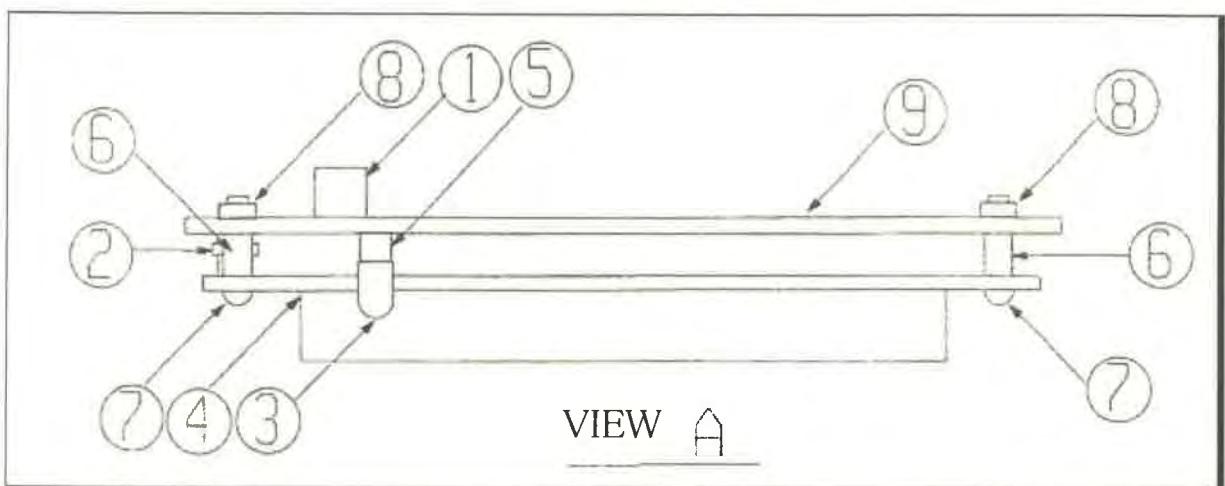
Part 20245 from TECHNOLOGIES DISPLAY, which has a dedicated LCD driver underneath the

LCD screen, is used. (20CH × 2LINES, MODULE SIZE 116W × 37H × 16D (mm))

The LCD is a DOT matrix type with a backlight function and a dedicated driver that processes alphanumeric characters to display on the screen. The specified character is displayed from the screen by sending a signal to the dedicated driver from the microcomputer.



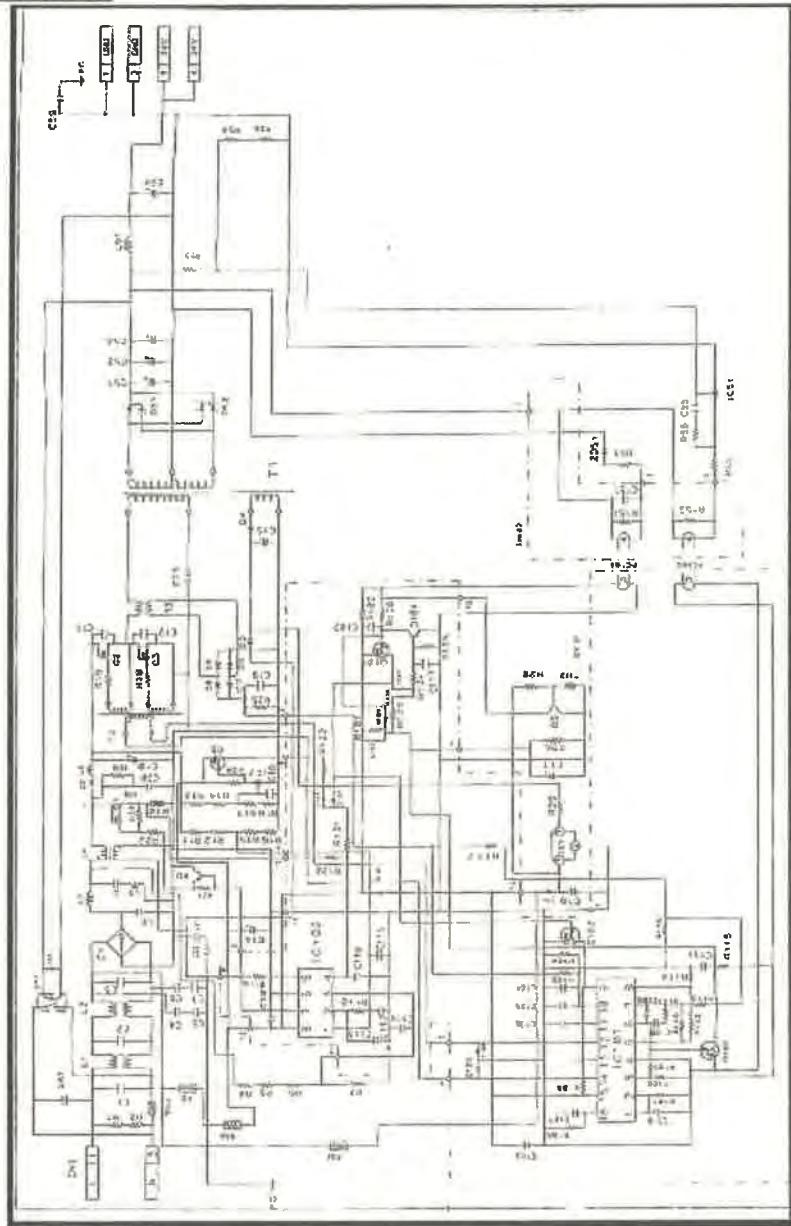
Display: LED board from the front (Parts layout diagram)



Display: LED board from the front (Parts layout diagram)

Display: LED board from the side

11.22 Power circuit



Power source unit is located toward the bottom of the device.

Power source is type RPS-3415 and manufactured by Rubicon. (Unit is custom-made so UL is not acquired.)

Rating INPUT single-phase AC 100–120V/220–240V 50/60Hz

Efficiency: 75% or above

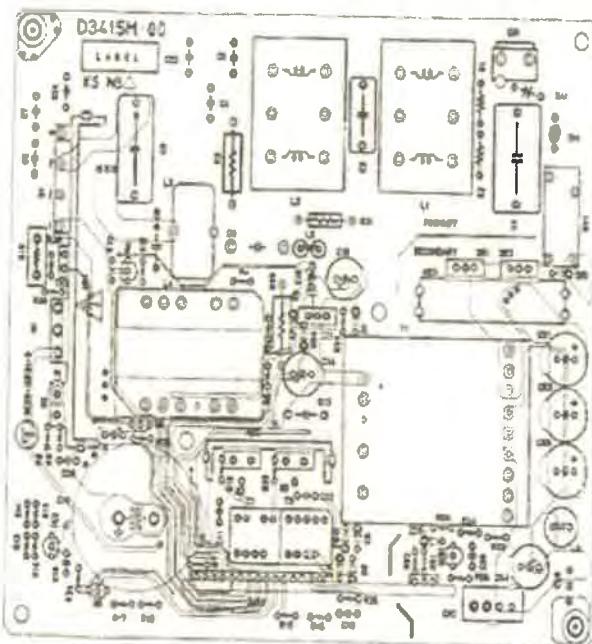
OUTPUT DC24V (Current output 7A MAX)

Over-current protection turns off output at 8A or above. Over-voltage protection turns off output at DC27V or above.

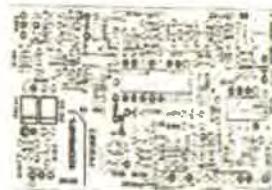
Overheat protection turns off output at 110°C or above.

Turn off the power to reset the device after an error. Wait 90 seconds before rebooting.

Main Board



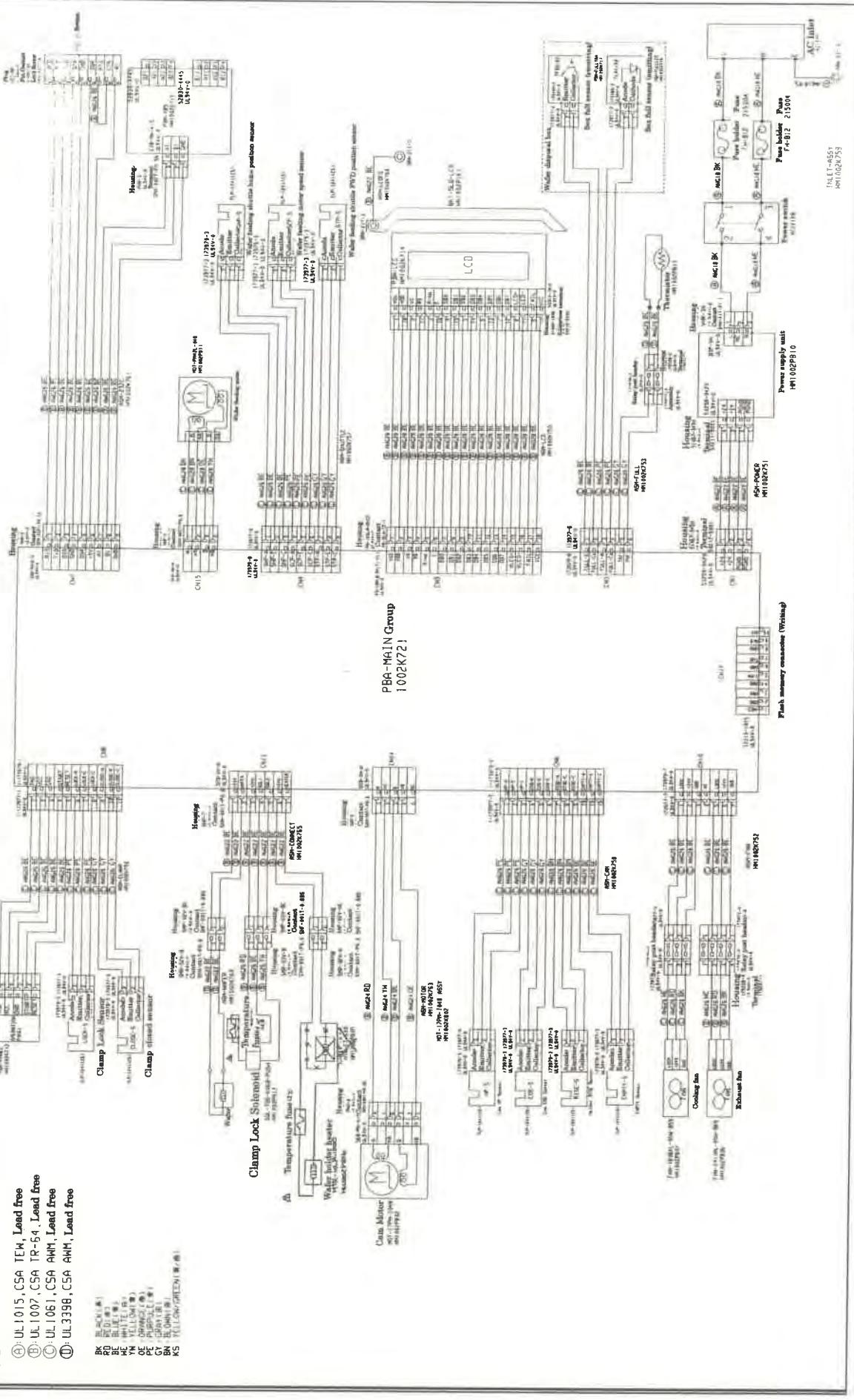
SUB Board



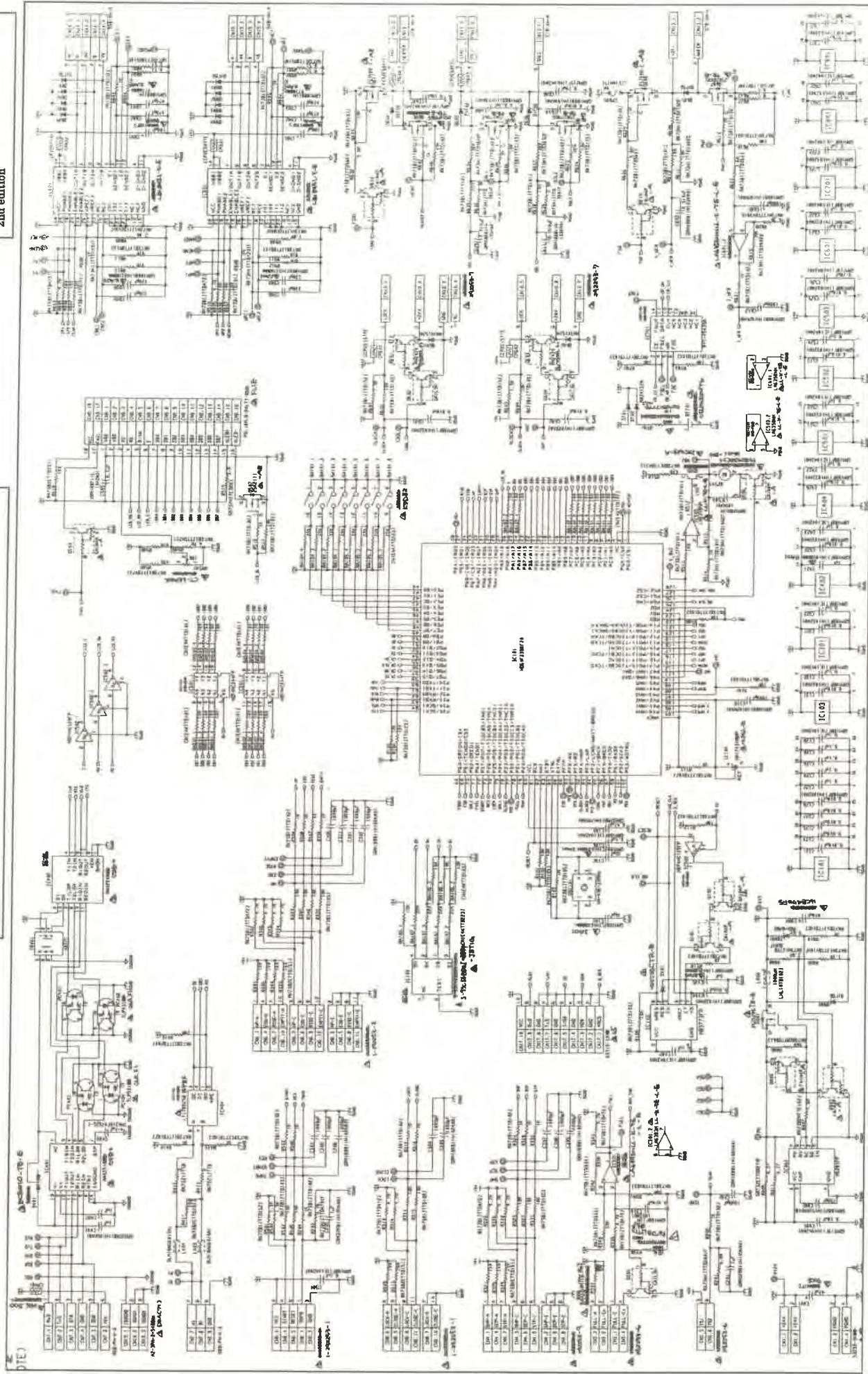
DC CPU board parts layout diagram: The CPU board is located towards the bottom of the device.

11.23 T SCD-II Wiring System Diagram

本圖(接線図)上に○印を示す。
 (NOTE)
 □ UL 1015, CSA TEW, Lead free
 ○ UL 1007, CSA TR-51, Lead free
 ○ UL 1061, CSA AEM, Lead free
 ○ UL 3398, CSA AWM, Lead free



11.24 T S C D-II Main Circuit Diagram



12. TSCD-II Inspection Procedures

Warning: Medical gloves must be used and proper measures to avoid infection must be taken before conducting the inspection.

Model	ME*SC203A	Inspection	1. Outside view ① Broken parts, damage			N.O.	1 – 1
Document No:	P Q D – T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	O 3 1 2 0 0 1 ~	



Inspection procedure	
Description	In case of failure
<ol style="list-style-type: none"> Visually inspect for damage or broken parts in the device from falls or other impacts. Visually inspect cover, clamp, and disposal box for damage. Visually inspect handle for damage. Visually inspect power switch, AC inlet, fuse holders and connectors on the rear panel for damage. 	If damage is found, confirm with the user and replace the part as necessary.

12. TSCD-II Inspection Procedures

Model	ME*SC203A	Inspection	1. Outside view ② Screws on device	NO.	1 - 2
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot 0 3 1 2 0 0 1 ~
<hr/>					
					
					
<hr/>					
Inspection procedure					
Description				In case of failure	
1. Screws must not be loose on clamp portion. 2. Screws must not be loose on the upper plate. 3. Screws must not be loose on the case and handle.				Tighten the screws if loose. Tightening torque 1 0 0 N · c m ± 2 0 %	

12. TSCD-II Inspection Procedures

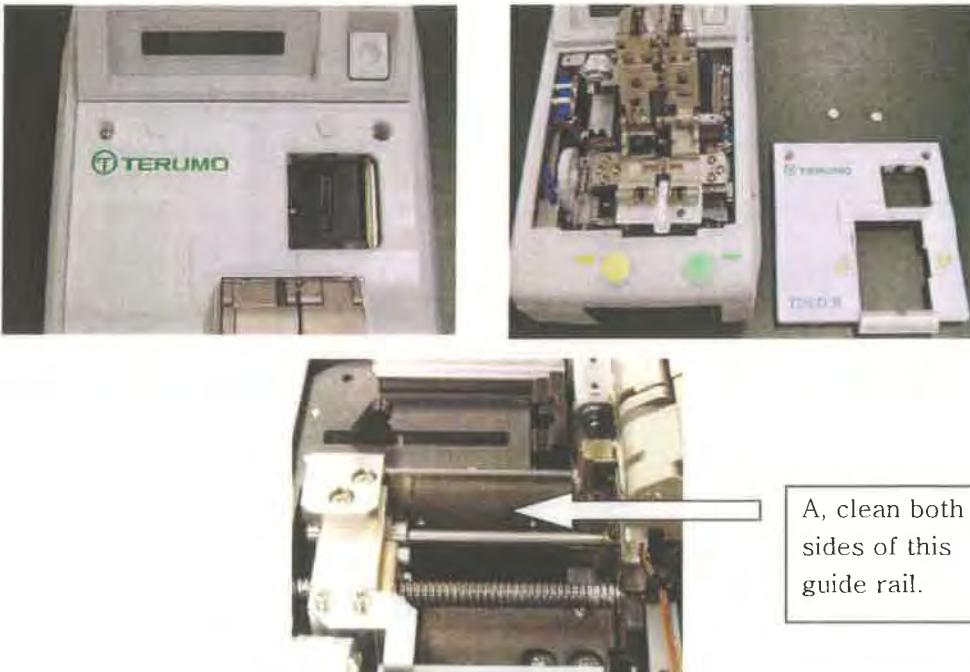
Model	ME*SC203A	Inspection	1. Outside view ③ Outside view, Contamination on clamp	NO.	1 - 3
Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~
					
Inspection procedure					
Description			In case of failure		
1. Visually check if clamp is clean of any blood or medicinal solutions			<p>If the clamp needs to be cleaned, wipe the surface with a clean piece of cloth soaked in rubbing alcohol or a 0.1~0.5% Chlorhexidine gluconate solution.</p> <p>Do not oversoak the cloth in the cleaning solution. (The solution may drip into the device and cause malfunction.)</p>		

12. TSCD-II Inspection Procedures

Model	ME*SC203A	Inspection	1. Outside view ④ Contaminants on wafer feeder			N.O.	1 – 4
Document No:	P Q D – T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	O 3 1 2 0 0 1 ~	

Clean the wafer feeding unit displayed below after using approximately 10,000 times following the last inspection.

Any contaminants on the part displayed below can lead to malfunction in wafer feeding and may cause jams.



Inspection procedure	
Description	In case of failure
<ol style="list-style-type: none"> 1. Turn the power off. 2. Disconnect the power cable from the device. 3. Let it sit for 20 minutes. (This allows the heater to cool down since it may be hot after use.) 4. Remove the rubber caps on the upper plate. 5. Take out the 2 screws using a hex wrench. 6. Remove the upper plate. 7. Clean the section labeled (A) in the above picture with a clean cloth being careful not to scratch. 8. Reset the plate in the device. 9. Fix the 2 screws with a hex wrench. (Tightening torque: 100 N · cm ± 20 %) 10. Put the rubber caps on. 	

12. TSCD-II Inspection Procedures

Model	ME*SC203A	Inspection	1. Outside view ⑤ Greasing the wafer feeder			NO.	1 - 5
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	

Grease the screws of the wafer feeding unit displayed below after using approximately 150,000 times following the last inspection



Ball screw

Inspection procedure

Description	In case of failure
<ol style="list-style-type: none"> 1. Turn the power off. 2. Disconnect the power cable from the device. 3. Let it sit for 20 minutes. (This allows the heater to cool down since it may be hot after use). 4. Remove the rubber caps on the upper plate. 5. Take out the 2 screws using a hex wrench. 6. Remove the upper plate. 7. Apply a thin coat of specified grease (Molykote: EM-50L) on the ball screw. 8. Replace the upper plate. 9. Fix the 2 screws with a hex wrench. (Tightening torque: 100 N · cm ± 20%) 10. Put the rubber caps on. 	

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	1. Outside view ⑥ Foreign objects in device			NO.	1 – 6
Document No:	P Q D – T 6 0 0 7	No:	Edition	2 nd Edition	Applicable lot	O 3 1 2 0 0 1 ~	



Inspection procedure	
Description	In case of failure
<ol style="list-style-type: none"> 1. Turn the power off. 2. Disconnect the power cable from the device. 3. Pull out the disposal box. 4. Place unnecessary tubes in the clamp and lock the clamp cover. 5. Hold down the handle with fingers and shake the device vertically and horizontally. 6. Check for any irregular noises coming from inside. 	Send the device back to the factory for repair if irregular noises are heard from inside the device and the object causing the noises cannot be removed.

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	2. Setup ① Power cord			NO.	2 – 1
Document No:	P Q D – T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	



Inspection procedure

Description	In case of failure
<p>1. Turn the power off. (Switch the power switch to O).</p> <p>2. Insert the power cord into the AC inlet and ensure that it is plugged in properly.</p>	<p>If any problems are found with the connection:</p> <p>Problem is with the power cord: replace the power cord.</p> <p>Problem is with the AC inlet: replace the rear panel unit.</p>

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	2. Setup ② Opening / closing / attaching / detaching the cover	NO.	2 - 2
Document No:	P Q D - T 6 0 0 7		Edition No: 2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~

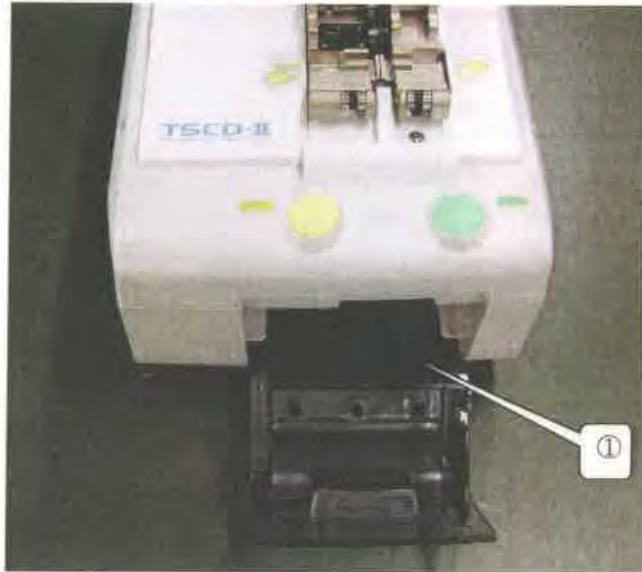


Inspection procedure

Description	In case of failure
<ol style="list-style-type: none"> 1. Hold the end of the cover and check that the cover opens and closes properly. 2. Attach / detach the cover and check that it attaches and detaches properly. 	<p>Problems with opening / closing / attaching / detaching the cover can be caused by damage, deformation, or problems with the magnet. Please exchange the cover if this occurs.</p>

12. TSCD-II Inspection Procedures

Model	ME*SC203A	Inspection	2. Setup ③ Attaching / detaching the disposal box	NO.	2-3
Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~

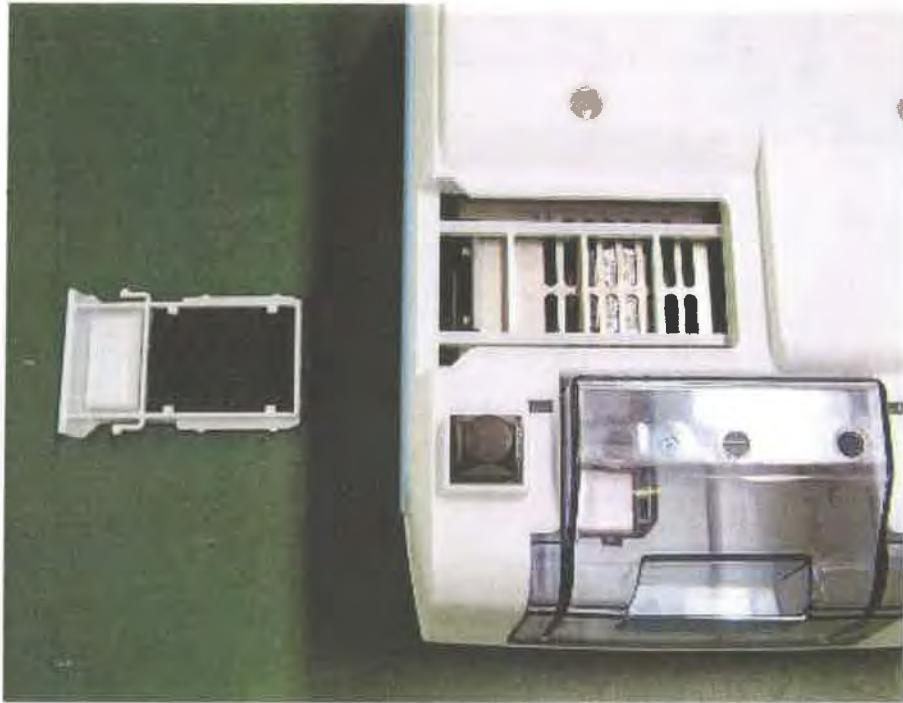


Warning: Do not touch the inside of the disposal box or used wafers to avoid possibility of infection.

Inspection procedure	
Description	In case of failure
<p>1. Hold the indentation in the front of the disposal box and check that the disposal box attaches/ detaches properly.</p> <p>Check for the following if a problem occurs:</p> <ul style="list-style-type: none"> A. Is there any damage or deformity to the disposal box? B. Is the metallic attachment of the disposal box deformed? C. Check for any jammed used wafers as shown by ① in the image above. (This is where the used wafers are ejected.) 	<p>If A: Replace the disposal box If B: Contact the factory and ask for instructions If C: Remove the wafer using tweezers.</p>

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	2. Setup ④ Attaching / detaching the filter guide	NO.	2 – 4
Document No:	P Q D – T 6 0 0 7		Edition No: 2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~



Inspection procedure	
Description	In case of failure
<p>1. Check that the filter cover located on the bottom of the device attaches / detaches properly.</p> <p>2. Be careful when attaching / detaching the filter cover because it could be contaminated with the tube plasticizing agent.</p>	<p>Replace the filter cover if there is any damage or deformation.</p>

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	2. Setup ⑤ Attaching / detaching the bag support table		NO.	2 – 5
Document No:	P Q D – T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	O 3 1 2 0 0 1 ~

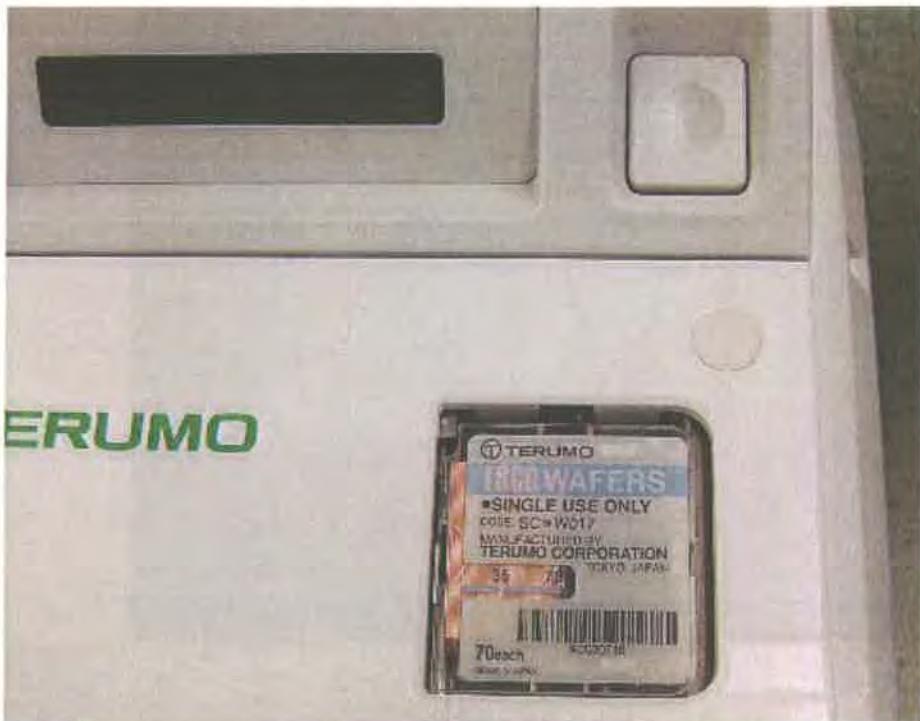


Inspection procedure

Details	In case of failure
1. Check that the bag support table attaches / detaches properly.	<p>Replace the bag support table if it has any damage or deformation</p> <p>Replace the top cover if there is any damage or deformation on the attachment part of the device.</p>

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	2. Setup	⑥ Attaching / detaching the wafer cassette	NO.	2 – 6
Document No:	P Q D – T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	O 3 1 2 0 0 1 ~



Inspection procedure	
Description	In case of failure
<p>1. Open the cover.</p> <p>2. Attaching the wafer cassette → Attach the wafers by inserting it into the cassette compartment at an angle and check that it can be installed properly.</p> <p>3. Check that pressing the eject cassette button lifts the wafer cassette and allows for easy detachment.</p> <p>4. Insert the wafer cassette back into the compartment.</p>	<p>Problems with attaching / detaching the cassette:</p> <ol style="list-style-type: none"> If the problem is with the cassette: replace the cassette. If there is damage or deformation to the cassette compartment: contact the factory for instructions.

12. TSCD-II Inspection Procedures

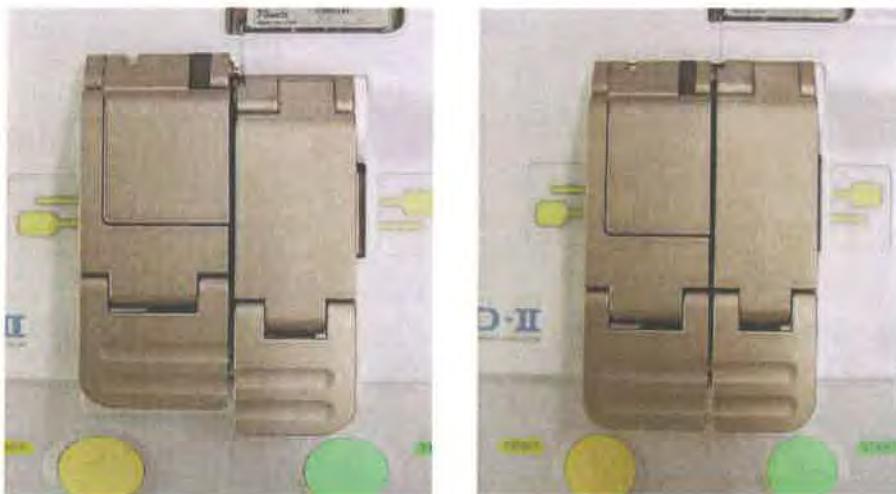
Model	ME*SC203A	Inspection	3. Operation check ① Boot up			NO.	3-1
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	



Inspection procedure	
Description	In case of failure
<p>1. Turn the power on. (Switch the power switch to 1)</p> <p>2. Check the following operations:</p> <ul style="list-style-type: none"> ① Buzzer sound (Beep sound) goes off. ② Cooling fan turns on. ③ The LED display turns on and initiates initial system check. <p>The serial number, total weld count, remaining uses until the next maintenance check, next maintenance check date, IS connection activation and software version will be displayed. Write down the information on the inspection sheet.</p> <p>3. Check that it goes to standby once the holder has finished warming up.</p>	<p>(Support for overseas) When a communication error occurs When the TSCD-IS (communication system) is not connected: press the reset button as displayed on the LED and deactivate communication mode.</p> <p>Check the troubleshooting section for other errors.</p>

12. TSCD-II Inspection Procedures

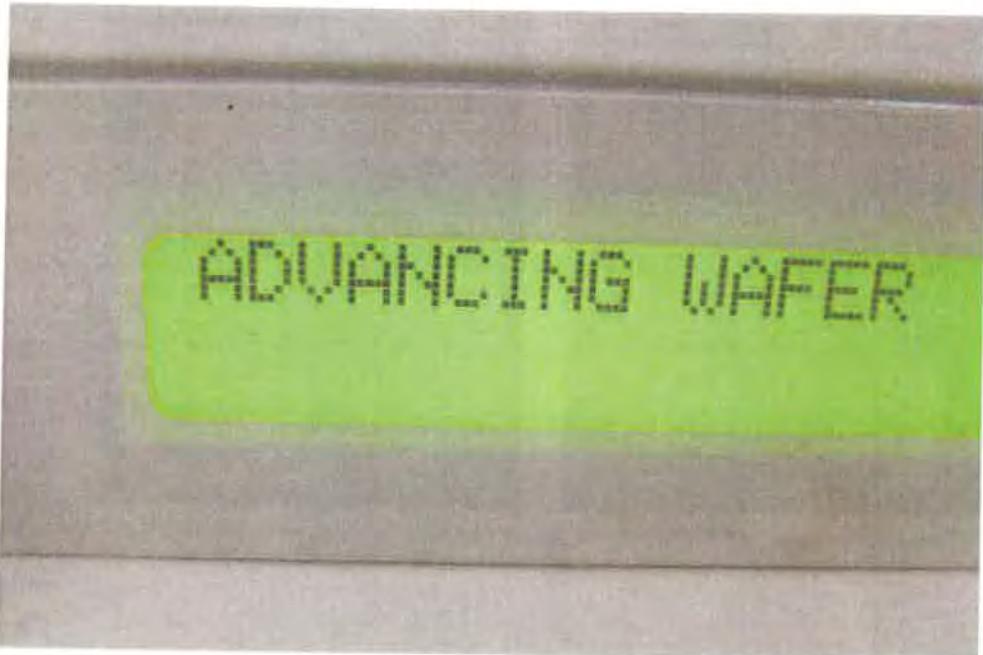
Model	ME*SC203A	Inspection	3. Operation check ② Clamp alignment motion			NO.	3-2
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	



Inspection procedure	
Details	In case of failure
<ol style="list-style-type: none"> 1. Turn the power on as stated in 3-1. 2. If the clamp cover is aligned, conduct welding once and go to step . 3. Open the clamp cover. (When the clamp cover is not aligned) 4. Press the reset button. 5. Check that the left clamp pulls forward and that the clamp aligns. 	<p>Reference the trouble shooting section in case any errors occur.</p> <p>If the error is irrecoverable, contact the factory for instructions.</p>

12. TSCD-II Inspection Procedures

Model	ME*SC203A	Inspection	3. Operation check ③ Wafer feeding motion	③ Wafer feeding motion	NO.	3 - 3
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~



Inspection procedure	
Description	In case of failure
<p>1. If the wafer was not replaced previously, "wafer automatic sending" is also executed by the operation in 3-②</p> <p>2. Check that there are no errors or irregular sounds and that the wafers fall into the disposal box properly.</p>	<p>1. Reference the troubleshooting section if an error occurs. If the error is irrecoverable, contact the factory for instructions.</p> <p>2. In case an irregular noise occurring, remove the upper plate and check for jams in the wafer feeder. If the cause of the jam is unclear, contact the factory for instructions.</p> <p>3. If the used wafer does not properly fall into the disposal box, contact the factory for instructions.</p>

12. TSCD- II Inspection Procedures

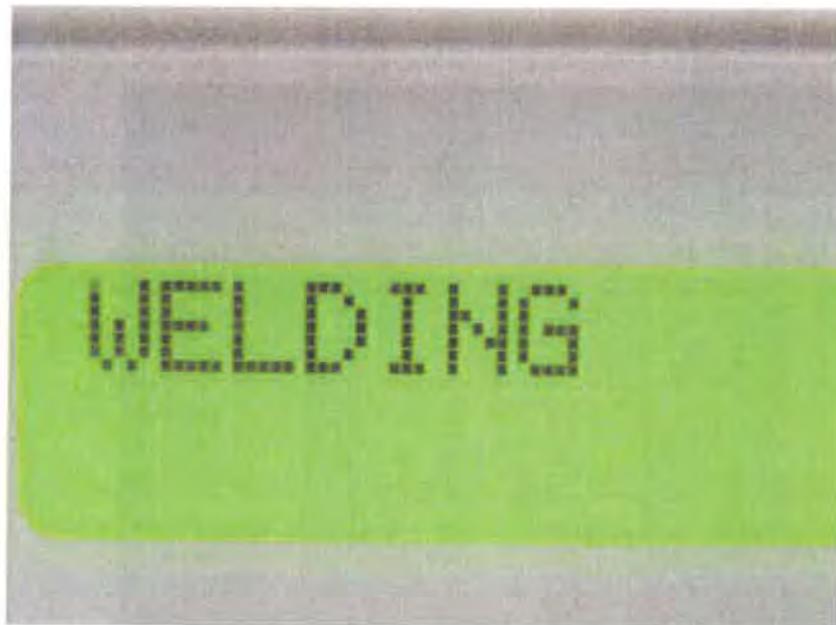
Model	ME*SC203A	Inspection	3. Operation check ④ Tube set			NO.	3 - 4
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	



Inspection procedure	
Description	In case of failure
<p>1. Place 2 tubes into the slots of the clamp and close the clamp cover.</p> <p>2. Check that the clamp cover is not loose and that it fastens the tubes in place securely. Also check that the clamp covers close easily.</p> <p>3. When the wafer exchange has already been executed, check that the device goes to standby once the clamp cover is closed.</p>	<p>If a problem in step 2 occurs, contact the factory for further instructions.</p> <p>If the device does not go to standby awaiting user input, open the clamp once and press the reset button. (It is possible that the wafer has not been replaced.)</p>

12. TSCD-II Inspection Procedures

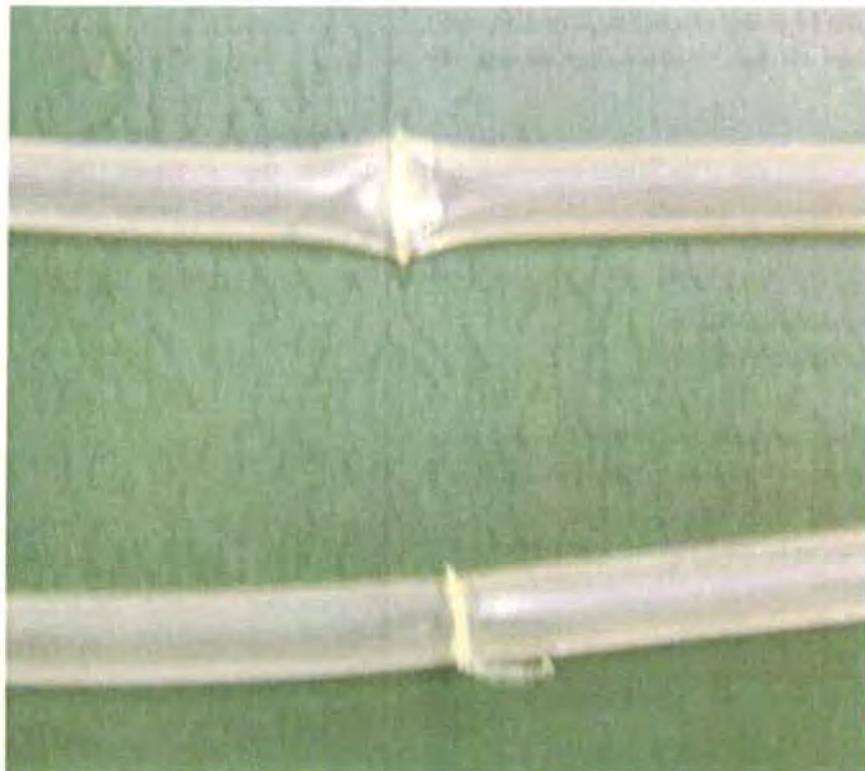
Model	ME*SC203A	Inspection	3. Operation check	⑤ Welding	NO.	3-5
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~



Inspection procedure	
Description	In case of failure
<p>1. Check that the device is in the state described in step 3 of 3-4 and press the start button.</p> <p>2. Check that the exhaust fan rotates, the wafer heating starts and the clamp lock is in place.</p> <p>3. After the wafer is heated (approx. 5 seconds), check for movement of the motor, transition of the clamp and tube welding.</p> <p>4. Check that the buzzer goes off and that the LED indicates the welding is complete once the tube has been welded.</p> <p>5. Check that the exhaust fan stops and the clamp lock goes down.</p> <p>6. Open the clamp cover and remove the tube.</p>	<p>Check the troubleshooting section if an error occurs.</p> <p>If it is an irrecoverable error, contact the factory for further instructions.</p> <p>If an irrecoverable error or unknown error occurs frequently, contact the factory for instructions.</p> <p>If an irregular noise occurs, contact the factory for instructions.</p>

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	4. Weld condition ① Visual inspection of weld		NO.	4 - 1
Document No:	P Q D - T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	O 3 1 2 0 0 1 ~



Inspection procedure	
Description	In case of failure
<p>1. Open the clamp cover and remove the welded tube from the slot after welding.</p> <p>2. Open the welded portion of the tube with fingers.</p> <p>3. Visually inspect the weld and check if any of the following problems are present:</p> <ul style="list-style-type: none"> ① The tube is not welded ② There is a leak in the weld ③ There is a misalignment in the weld ④ There is a burn in the weld <p>Use of the Terumo blood bag tube is required for the above weld inspection.</p>	<p>Check that the tube is not pulled by the weight of the bag in ①~③.</p> <p>If any of the conditions from ①~④ are found, report the condition and reproducibility to the factory and check for instructions.</p>

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	4. Weld condition	② Submerged leak test	NO.	4 - 2
Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	
[Test description]				[Sample conditions]		
Shoot compressed air into the welded tube until the internal pressure reaches the specified value and check for air leaks from the weld.				(Front slot)	(Back slot)	
Prepare a total of 20 tubes from each of the 10 tubes (approximately 150 mm in length) that have the weld in the center				Terumo Dry	Terumo Dry	
• Test tube specifications 7 seconds at or above 101kPa (1.0kgf/cm ²)				Terumo Wet	Terumo Wet	
1. With specified tubes, prepare a total of 20 tubes from each of the 10 tubes (approximately 150 mm in length) that have the weld in the center. * Check that there are no leaks from the cut end if the tubes include a solution.						
2. Check for air leaks in the test tubes created in step 1 following the procedures below.						
① Open one side of the welded tube. The weld section should also be opened. ② Set the open side of the welded tube from ① to the nozzle of the air leak test device. If both ends of the tube open, use a clamp to close one of the ends. ③ Submerge the tube in water and apply air pressure to the tube for 7 seconds and check that air does not leak from the weld.						

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	4. Weld condition	③ Weld strength test	NO.	4 - 3		
Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~			
Test description			Specifications					
<p>Check the rupture strength of the sample used in 4-2 using a tension tester.</p> <p>Record the average value, minimum value, and maximum value of the 20 tubes from each of the 10 sample tubes...</p> <p>* Measure condition chuck distance 30 mm * Chuck Speed 500 mm/min.</p>			Terumo Dry × Terumo Dry Average above 73.5 N Minimum value above 53.9 N Terumo Wet × Terumo Wet Average value above 68.6 N Minimum value above 49.0 N					

12. TSCD- II Inspection Procedures

Model	ME*SC203A	Inspection	5. Exchanging the battery			NO.	5 – 1
Document No:	P Q D – T 6 0 0 7		Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~	

About periodic replacement of the backup memory of the main CPU board

The backup battery for the calendar function is installed on the main CPU board inside the device.

One of the patterns stated in ① ~ ③ will be displayed on the LED display if the battery dies.

↓

The initial display once the power is turned on shows ① or ② where it usually shows the next scheduled maintenance check date.

- ① The message "CALL SERVICE" is displayed for approximately 2 seconds. However, the device can weld tubes and still operate normally even when the "CALL SERVICE" message is displayed.
- ② The maintenance check date shows as normal but the displayed maintenance check date is incorrect. However, the device can weld tubes and still operate normally.
- ③ The message "RTC ERROR" displays when the RTC value is read using the RTC READ function (function to read calendar) in adjustment mode which is used in the factory at time of adjustment. (The error display can be fixed by resetting the calendar using the RTC SET function (calendar setup function))

The calendar function is built so that it does not affect the main functionality (welding) of the device. This also does not affect the IS communication functionality.

Follow the procedures below when the above ① ~ ③ conditions occur.

- a. Turn the power off and remove the power cord.
- b. Remove the side cover, upper plate, and base cover unit.
- c. Remove the connector attached to the main CPU board. Be careful not to injure fingers while doing this.
- d. Remove the screws fixing the main CPU board in place, raise the CPU board up and remove it from the device. Be sure to hold the sides when handling the CPU board.
- e. Place the main CPU board into an anti-static bag.

Be careful of static when conducting steps c ~ e.

- f. Put the bag in cushioned packaging material and ship to the factory. Notify the factory for replacement the battery of the main CPU.

When the CPU board returns from the factory with the replaced battery, conduct the above procedures in reverse to reinstall the main CPU board.

Turn the power on and set the calendar date using the RTC set function in adjustment mode after installation. Check that the other settings are set correctly in adjustment mode and change the device back to operation mode checking the functionality according to the inspection sheet as a precautionary measure.

13. TSCD-II Inspection Sheet

Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~
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No.

TSCD-II Inspection Sheet

Important: Medical gloves must be used and proper measures to avoid infection must be taken before conducting the inspection.

Date Received	/ / /		
Control No.			
Received by			
Inspected by	Checked by		
Date inspected			
1. Customer Information			
Customer name			
Customer address	Contact name		
Product code	M E * S C 2 0 3 A		
Serial No.			
Notes (other notes from the customer)			
2. Items Received			
<input type="checkbox"/> Instruction manual	<input type="checkbox"/> Filter cover	<input type="checkbox"/> Filter	<input type="checkbox"/> Wafer jam repair tool
<input type="checkbox"/> Rubber caps	<input type="checkbox"/> Wafer disposal box	<input type="checkbox"/> Cover	
<input type="checkbox"/> AC power cable	<input type="checkbox"/> Wafer cassette	<input type="checkbox"/> Fuse	
Notes (other items received)			
3. Inspection information			
Date of last inspection	/ / /		
Date of inspection	/ / /		
No. of times used			
No. of uses until the next maintenance check			
Next scheduled maintenance check date			
IS connection mode when received			
Language display when received			
Software VER.			
Error History			

(1 / 3)

1 3 . TSCD-II Inspection Sheet

Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~
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4. Inspection contents

Procedure No.	Parts	Inspection method	Inspect for	Result	Notes
1 - 1	Outside View	Visually	Check for any damage and contamination	<input type="checkbox"/> OK <input type="checkbox"/> NG	
1 - 2	Screws on device	With a screwdriver	Check if any are loose	<input type="checkbox"/> OK <input type="checkbox"/> NG	
1 - 3	Outside View	Visually	Check for any blood or medicinal solutions	<input type="checkbox"/> OK <input type="checkbox"/> NG	
1 - 4	Wafer feeder	Visually	Should be cleaned every 10,000 uses	<input type="checkbox"/> OK <input type="checkbox"/> NG	
1 - 5	Ball screw on Wafer feeder	Visually	The screw should be greased every 150,000 uses	<input type="checkbox"/> OK <input type="checkbox"/> NG	
1 - 6	Device interior	Irregular sounds	Shake the unit and check for any irregular noises	<input type="checkbox"/> OK <input type="checkbox"/> NG	
2 - 1	Power cord	Actual operation	Power cord is able to plug into AC inlet	<input type="checkbox"/> OK <input type="checkbox"/> NG	
2 - 2	Cover	Actual operation	Check for any problems during opening/ close and attaching/detaching of the cover	<input type="checkbox"/> OK <input type="checkbox"/> NG	
2 - 3	Wafer disposal box	Visually Actual operation	1. Check for problems during attaching/detaching 2. Check for visual deformities 3. Check for any wafer jams	<input type="checkbox"/> OK <input type="checkbox"/> NG	
2 - 4	Filter guide	Actual operation	Check for problems during attaching/ detaching	<input type="checkbox"/> OK <input type="checkbox"/> NG	
2 - 5	Bag support table	Actual operation	Check for problems during attaching/ detaching	<input type="checkbox"/> OK <input type="checkbox"/> NG	
2 - 6	Wafer cassette mount	Actual operation	Check for problems during attaching/ detaching	<input type="checkbox"/> OK <input type="checkbox"/> NG	
3 - 1	Boot up	Actual operation	Turn the device on and check if the appropriate display, buzzer, and fans operate and then go to standby.	<input type="checkbox"/> OK <input type="checkbox"/> NG	
3 - 2	Clamp alignment motion	Actual operation	Check if the clamps align when the reset button is pressed	<input type="checkbox"/> OK <input type="checkbox"/> NG	
3 - 3	Wafer feeding motion	Actual operation	1. Check for any irregular noises 2. Check that the wafers are being disposed of properly	<input type="checkbox"/> OK <input type="checkbox"/> NG	
3 - 4	Tube set	Actual operation	1. Tube sets have been made properly 2. Once the tube is set, it goes to standby until the start button is pressed	<input type="checkbox"/> OK <input type="checkbox"/> NG	
3 - 5	Welding	Actual operation	The prescribed welding motions are conducted properly	<input type="checkbox"/> OK <input type="checkbox"/> NG	

(2 / 3)

13. TSCD-II Inspection Sheet

Document No:	P Q D - T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~
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Procedure No.	Parts	Inspection method	Inspect for	Result	Notes																																																								
4 - 1	Welded tube	Visually	Check for any shears, burns, leaks or other welding failures	<input type="checkbox"/> O K <input type="checkbox"/> N G																																																									
4 - 2	Welded tube	Leak test (Submerge)	Check for leaks	<input type="checkbox"/> O K <input type="checkbox"/> N G																																																									
4 - 3	Welded Tube	Tension Test	Terumo Dry × Terumo Dry Average above 73.5 N Minimum above 53.9 N <table border="1"> <thead> <tr> <th>No.</th> <th>Weld</th> </tr> </thead> <tbody> <tr><td>1</td><td></td></tr> <tr><td>2</td><td></td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td></td></tr> <tr><td>5</td><td></td></tr> <tr><td>6</td><td></td></tr> <tr><td>7</td><td></td></tr> <tr><td>8</td><td></td></tr> <tr><td>9</td><td></td></tr> <tr><td>10</td><td></td></tr> <tr><td>Average</td><td></td></tr> <tr><td>Min.</td><td></td></tr> <tr><td>Max</td><td></td></tr> </tbody> </table> Terumo Wet × Terumo Wet Average above 68.6 N Minimum above 49.0 N <table border="1"> <thead> <tr> <th>No.</th> <th>Weld</th> </tr> </thead> <tbody> <tr><td>1</td><td></td></tr> <tr><td>2</td><td></td></tr> <tr><td>3</td><td></td></tr> <tr><td>4</td><td></td></tr> <tr><td>5</td><td></td></tr> <tr><td>6</td><td></td></tr> <tr><td>7</td><td></td></tr> <tr><td>8</td><td></td></tr> <tr><td>9</td><td></td></tr> <tr><td>10</td><td></td></tr> <tr><td>Average</td><td></td></tr> <tr><td>Min.</td><td></td></tr> <tr><td>Max</td><td></td></tr> </tbody> </table>	No.	Weld	1		2		3		4		5		6		7		8		9		10		Average		Min.		Max		No.	Weld	1		2		3		4		5		6		7		8		9		10		Average		Min.		Max		<input type="checkbox"/> O K <input type="checkbox"/> N G	
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5 - 1	Internal battery (CPU board)	Visually	Check if the calendar functionality listed in 12.5-1 is working properly	<input type="checkbox"/> O K <input type="checkbox"/> N G																																																									
Overall Result				<input type="checkbox"/> O K <input type="checkbox"/> N G																																																									

(3 / 3)

Document No:	P Q D -- T 6 0 0 7	Edition No:	2 nd Edition	Applicable lot	0 3 1 2 0 0 1 ~
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Document Revision History

Edition	Change	Issue Day Enforcement Day	Contents and reason for change	Application No.
1	—	8/12/2004 8/12/2004	In response to domestic pharmaceutical applications	0407S II -01
1	1	12/17/2007 12/17/2007	In response to change control No : KeME0694-2 The following was added: P5 : ⑨~⑪ added to attachments P32 : No. 15 added to the service parts list	0712S II -01
2	—		<p>Reason for revised edition :</p> <p>Enhance the contents in order to improve maintenance procedures for overseas office SE</p> <p>1. Edition No. Change 1→2</p> <p>2. Change overall page count 53→178</p> <p>3. New circuit diagram added in chapter 11</p> <p>4. Refined chapters 6, 7, and 8</p> <p>5. Added leak test, pull test, and battery exchange in chapter 12</p> <p>6. Adjusted content of the inspection list in chapter 13 to follow the inspection procedure outlined in chapter 12</p>	0811S II -01