
CP-6 Series PAM Operation Manual

CP-6/6E
CP-6M/6ME
CP-642/642E
CP-642M/642ME
CP-643E
CP-643ME
CP-65/65E
CP-652CE

OPS-C6PM-3.0E

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Safety Guidelines

1. About Symbols

To avoid injury to persons and damage to the machine, Fuji employs a number of messages and symbols that are used in manuals and on the machines. Be sure you understand the meanings of these symbols before reading the manual.

	DANGER	The hazard or unsafe practice will cause severe injury or death.
	WARNING	The hazard or unsafe practice may cause severe injury or death.
	CAUTION	The hazard or unsafe practice may lead to personal injury or damage to the machine.

To distinguish the type of hazard, the following symbols are used in combination with the ones above.

	Hazard Alert A triangle is used to draw your attention to a hazard. The symbol inside the triangle indicates the nature of the hazard (in this case electrical shock).
	Prohibition A circle with a diagonal line inside is used to draw your attention to an operation that is prohibited. The symbol inside the circle indicates the nature of the operation (in this case disassembly).
	A circle with an exclamation mark is used to draw your attention to a mandatory action. In other words, you are required to carefully carry out the given instructions.

2. Safety Rules for All Machine Types

 **DANGER**

Do not approach moving parts during automatic or manual operation.

- Do not place hands or other body parts inside the machine during automatic operation or positioning. Body parts or clothing may be caught in the machine causing personal injury.



Do not operate the machine with the safety covers or doors open.

- Do not leave covers or safety doors open, except during adjustment.
- When adjustments are completed, return the covers and doors to their original (closed) position.
- When safety covers or doors are removed, body parts or clothing may be caught in the machine causing personal injury. Always be sure to replace the safety covers or doors.



 **WARNING**

Always verify the position of the EMERGENCY STOP buttons before operating the machine.

- Always be aware of the positions of the EMERGENCY STOP buttons so that they can be pressed quickly in case of an emergency.
- To reduce accidents and injury to a minimum, it is essential to know the positions and understand the use of the EMERGENCY STOP buttons.



Check the safety functions before starting operation.

- Before starting the machine check the operation of the EMERGENCY STOP button, the safety switches on the acrylic covers, the safety switch on the rear fence gate, the optical sensors on the rear fence and all other machine safety features.
- Contact a Fuji serviceman immediately if any of the safety functions fails.



Do not remove safety switches.

- Do not remove safety switches or disarm the safety functions.
- Disarming the safety switches may result in injury when others unknowingly press the START button.
- Fuji does not take any responsibility when a machine is disassembled without Fuji's permission, even if this results in accidents or trouble.



 **WARNING**

Check that there is nobody inside the machine when working on the machine with two persons or more.

- Verify that nobody is within or near the machine before operating the machine. Operating the machine may cause injury to the person who is carrying out maintenance.
[Example]
If one person moves the device table while another person is exchanging a feeder, the latter may be injured.



Do not close the fence when someone is inside the fence.

- When the fence is opened, it is safe to approach the machine. Closing the fence, however, will put anybody working inside the fence in immediate danger when the RESET or START button is pressed. Be sure to leave the fence open when anyone is inside the fence.



Do not approach a machine that has stopped moving.

- There are times during automatic operation when the machine may appear to have stopped while it is waiting for a board, waiting for the next machine, reading marks, transmitting data, etc. In such cases, once certain conditions are fulfilled, the machine will begin moving again automatically, so care should be taken. Only approach the machine after the EMERGENCY STOP button has been pressed. When the message "Ready" displays at the machine display, the machine will begin to move once certain conditions are fulfilled.
- Keep in mind that the machine will begin to move regardless of whether these conditions are fulfilled intentionally or inadvertently.



 **WARNING**

Resupply solder paste, glue and parts while the machine is in manual mode.

- Never resupply solder, glue or parts during automatic operation unless instructed otherwise. Body parts or clothing may be caught in the machine causing personal injury.



Do not place hands near the main conveyor.

- Hands or other body parts may be caught in the machine.



Always turn the 200 V power supply off when cleaning or lubricating the machine.

- When the 200 V power supply to the machine is turned on, the servo amps will be activated. In this condition the machine may unexpectedly begin to move.



Do not insert or remove connectors while power is being supplied to the machine.

- Removing or inserting connectors while power is supplied to the machine may not only cause damage to the machine, but may also cause electrical shock.
- Be sure to cut the power to the machine before inserting or removing connectors.



Do not touch the high voltage section within the machine's control box.

- The Brown tube section within the machine's control box contains high voltage wiring. Do not insert your hand or any metal object into this part as it may cause electrical shock.



Stay clear from the machine when it is being lifted.

- Never put hands or feet under the machine when the machine is being raised by means of a jack or other device for leveling or transport.



 **WARNING**

Do not look into the conveyor inlet or outlet and do not open the cover. (Reflow oven)

- Do not look into the conveyor inlet or outlet and do not open the cover.
[Example]
The UV light on the reflow oven may damage eyesight or result in burns.



Exchange the halogen lamp only after it has cooled down.

- When turned on, halogen lamps will reach high temperatures, resulting in skin burns when touched. To exchange a halogen lamp, turn off the power and allow the lamp to cool off sufficiently.



Do not wear gloves made of cloth when operating the machine.

- Rubber gloves will tear when caught by the machine and prevent hands from being drawn into the machine. Gloves made of cotton or similarly strong material may cause hands to be drawn into the machine.



Long hair should be tied back.

- Long hair may get caught in running machines.
Hair should be kept short or tied back so that it does not get caught in the machine.



Turn off the air supply when carrying out maintenance on cylinders, valves, and filters.

- Removing cylinders, valves, or filters without turning the air supply off, may cause parts or particles to be propelled into the eyes.
- Be sure to turn off the air supply when carrying out maintenance on cylinders, valves, and filters.



 **WARNING**

Be sure to wear protective glasses.

- Be sure to wear protective glasses.
[Example]
CP-6 nozzles use springs which may be propelled during disassembly. Be sure to handle the nozzles carefully to prevent eye injuries.



Check the machine monitor and the target axes while manually operating the machine.

- When operating the machine, carefully follow the instructions that are displayed at the machine display.
- Operating the machine without looking at the machine display may lead to operating errors or result in damage to the machine or products.



 **CAUTION**

Do not operate the machine after removing or disabling sensors.

- Removing or disabling sensors will disarm the interlock, leading to collisions and damage to the machine.



Check the machine display to determine whether HELPS compatible machines are in the middle of performing changeover.

- During operation in automatic mode on machines equipped with automatic changeover equipment, it may be difficult to actually see automatic changeover taking place from the front of the machine. When a message appears at the machine display, follow the instructions that are given.



3. Safety Rules for Individual Machine Types

■ CP-series Machines

 WARNING	
<p>Do not reach into the machine over the rear fence during operation.</p> <ul style="list-style-type: none"> ● Body parts or clothing may be caught in the machine causing personal injury. 	
<p>Do not enter within the safety fence, even in cases of an emergency stop.</p> <ul style="list-style-type: none"> ● When an emergency stop occurs in step mode, power to the servo amps is only cut after all axes have stopped moving. As a result, there may be a short delay between the moment the emergency arises and the power to the servo amps is cut. ● Do not enter the safety fence immediately following an emergency stop, body parts or clothing may be caught in the machine causing personal injury. 	
<p>Do not operate the machine after removing the transparent shutters from the D-axis.</p> <ul style="list-style-type: none"> ● Body parts or clothing may be caught in the machine causing personal injury. 	
<p>Do not lean on the in- and out-conveyors during operation.</p> <ul style="list-style-type: none"> ● During operation do not lean on or across the in- and out-conveyors to check the feeders. 	
<p>Turn the power off when inspecting the cam box.</p> <ul style="list-style-type: none"> ● When inspecting the upper part of the cam box, turn off the power to the machine and exercise sufficient caution. 	

 **WARNING**

Make sure the cam is at its origin (0 deg.)

- Exercise extreme caution when working on the machine if the cam is not at its origin (0 deg.). (The cam may not stop at its origin (0 deg.) in an emergency stop.) Recoil of the cam axis can endanger the operator.
- If the cam is not at its origin (0 deg.), use a crank to rotate the cam shaft until the indicator points to 0 degrees.



Do not stare into the laser beam.

- The CP-643E / CP-643ME is equipped with laser type fiber sensors (class 2). Exercise extreme caution when working in areas where there is a risk of eye damage from the laser beams.



1. Using PAM

Purpose

PAM (Placing Accuracy Measurement) is a function for measuring the part placing accuracy.

Note: Use of the machine for long periods without proper maintenance can reduce the original placing accuracy. PAM can be used at such times to restore the placing accuracy to original levels.

PAM Kit

Please verify the contents of the PAM shipping container.

Item Name	Quantity	Model
Dummy parts for PAM	1 reel	MPJ2220
Board for PAM	1 board	K2096E(CP/IP/QP96-001)
Program FD disk for PAM	1 disk	
Card ROM for PAM	1 card	
Double-sided tape	1 roll	Scotch Tape 666 25.4

C6PM1001

Overview

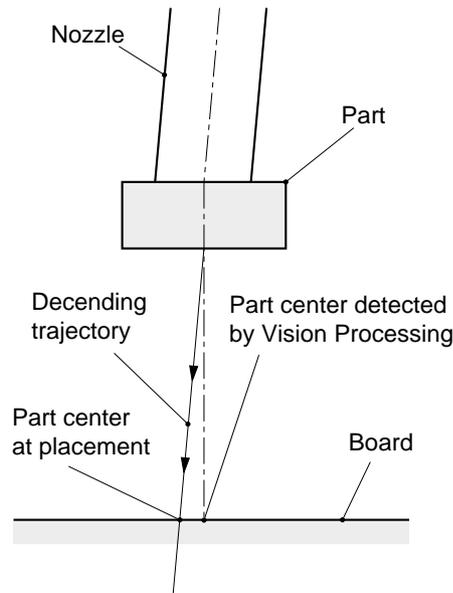
When PAM is started, a correction value for the station 11 (part placing station) proper data is calculated, and the ST11 proper data is re-entered and saved in accordance with this correction value. This data is also transmitted back to the host computer (F4G or MCS).

This ST11 proper data acts to correct mechanical positional error (due to working and mounting error amounts), resulting in a uniform correction. X and Y direction correction values are entered for each nozzle. As the system consists of 20 heads with 6 nozzles per head, this results in a total of 240 proper data input items.

The Need for Station 11 Proper Data Calibrations

Corrections in Station 11 Proper data are required to counter the mechanical deviation of each nozzle at station 11.

Although it is possible to measure the nozzle centers of station 6 with the parts camera, it is impossible to measure the centers at station 11. The placement position of parts will be inaccurate without compensating for these mechanical deviations because, it is impossible for each nozzle to stop at the exact same point.



C6PM1002

As shown in this illustration, when a nozzle cannot move in a completely vertical direction due to mechanical errors, the center of a part, as seen by the vision processing system, and the actual center may not correlate.

The measurement performed by PAM involves a process in which dummy chips are actually placed on a mark reference board, with the chip placement accuracy being checked by a mark camera. Each nozzle is rotated to 0 degrees, 90 degrees, 180 degrees, and 270 degrees and the vision processing data for the placed parts then undergoes statistical processing to provide an accurate measurement of the mechanical error amount.

Notes on Using PAM

In order to use PAM, the machine's control card ROM must be replaced with the PAM card ROM. Production operations are not possible while the PAM card ROM is installed in the machine. To restore the machine's production capabilities, the machine's control card ROM must be re-installed.

Moreover, the CP-6 PAM does not support the following commands and functions.

Commands

- Block skip
- Recovery
- Pass Mode
- Turnover Operation
- Nozzle skip

Functions

- Nozzle skip following a nozzle-centering alarm
- Statistical nozzle skip
- HELPS

Procedure Overview

1. Prepare the part data and Nozzle Assignment Table for PAM.
 - (1) 6 types of part data must be created.
The 6 types of part data are based on the standard 3216R part data, with only the nozzle size being specified (input item: Nozzle_size_CP6).

- Part Data

	Nozzle	
No.1_3216	1.1 mm	Data for part pick-up with the No.1 nozzle
No.2_3216	1.2 mm	Data for part pick-up with the No.2 nozzle
No.3_3216	1.3 mm	Data for part pick-up with the No.3 nozzle
No.4_3216	1.4 mm	Data for part pick-up with the No.4 nozzle
No.5_3216	1.5 mm	Data for part pick-up with the No.5 nozzle
No.6_3216	1.6 mm	Data for part pick-up with the No.6 nozzle

- (2) Create the Nozzle Assignment Table as shown below.

- Nozzle Assignment Table

Nozzle_No	Nozzle_Size	Back_light_size	Bend_Limit	Nozzle_type
1	1.1	12	0.050	0
2	1.2	12	0.050	0
3	1.3	12	0.050	0
4	1.4	12	0.050	0
5	1.5	12	0.050	0
6	1.6	12	0.050	0

Notes: Regarding the input items at the part data and Nozzle Assignment Table

1. *Although the 1.3 mm size nozzle is used for all the PAM nozzles (Nos.1 to 6), different sizes (in 0.1 mm increments) must be entered as shown above in the "Part Data" and "Nozzle Assignment Table" in order to differentiate between the 6 nozzles (this prevents nozzle changes during PAM placement operations). By entering the nozzle sizes in 0.1 mm increments, parts will only be picked up by the nozzle number specified in the program.
Within the vision processing system for PAM, however, all the nozzle sizes are processed as 1.3 mm.*
2. *If there are not enough 1.3 mm nozzles, perform measurement by placing all 20 1.3 mm nozzles on each head in order from No.1 to No.6 nozzle positions.*
2. The PAM measurement occurs using the 20 No.1 nozzles at the 20 heads. If an accuracy measurement fails, it is repeated until a result is obtained.
Note: The No.2 to No.6 nozzles are not used in the accuracy measurement.
3. The No. 2 to No. 6 nozzle measurements are performed in the same manner as step 2.

Simplified Measurement Technique

The CP-6 series is designed so that the nozzle shafts are aligned in a straight line relative to the head shafts. When a nozzle is changed, there is almost no variation between the nozzle centers. This means that a PAM measurement can be performed for only 1 of the 6 nozzles, with the results for that nozzle applying to the other nozzles. The accuracy can therefore be checked simply by repeating the nozzle center measurement.

1. Use the standard 3216R part data as the measurement part data.
2. Assuming that the following nozzle combination is used, a 1.3mm nozzle is mounted at No.3.
 - No.1 nozzle 0.7mm
 - No.2 nozzle 1.0mm
 - No.3 nozzle 1.3mm
 - No.4 nozzle *.mm
 - No.5 nozzle *.mm
 - No.6 nozzle *.mm

3. Create the Nozzle Assignment Table as shown below.

- Nozzle Assignment Table

Nozzle_No	Nozzle_Size	Back_light_size	Bend_Limit	Nozzle_type
1	0.0	00	0.000	0
2	0.0	00	0.000	0
3	1.3	12	0.050	0
4	0.0	00	0.000	0
5	0.0	00	0.000	0
6	0.0	00	0.000	0

4. Copy the No.3 measurement results to all the other nozzles.
5. Perform a nozzle center measurement.
6. Run PAM again to verify that an accuracy result is obtained.

Notes:

2. Boot-up in PAM Mode

Insert the PAM software ROM card and reset start the machine. The machine will boot up in the PAM mode. Transmit the Proper data, status data, and the programs once the machine reboots. Reboot the machine after transmitting the data.

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000			
ST 1N	3D 5Er****	STATUS		Machine Not Zero-Set Press START	
ST 2N	3D 5Er****	P Mode	Product		
ST 3N	3D 5Er****	Recovery	E Pass		
ST 6N	3D 5Er****	T Mode	Joint		
ST 7N	3D 5Er 0	PAM Mode			
ST 8N	3D 5Er 0				
ST 10N	3D 5Er 0				
ST 11N	3D 5Er 0				
				000000000000 jog XY	Page000
				000000000000 C	
PAM		LOADER	PROGRAM	SET	*

C6PM2001

- The display shown above is the first screen in the PAM mode. "PAM Mode" displays on the screen if the machine boots up in the PAM mode.
- The Proper data measurements for the machine and the Mark camera (excluding those for station 11) must be complete prior to using the PAM software.

Notes:

3. ST11 Proper Data Setting Procedure

Follow the procedures listed below to adjust the Proper data for station 11.

Procedures

1. Replace the nozzles

Install 1.3 mm nozzles (with 12 mm reflective disks) in all the nozzle holders.

2. Mounting the Cartridge

PAM requires only 1 cartridge for a paper tape (width: 8mm, feed pitch: 4mm). The PAM dummy parts reel is set on the cartridge, and the cartridge is then mounted on device number 1.

3. Loading the PAM Measurement Board

Use the [LOADER] command to load the PAM measurement board.

Note: In the PAM mode, the [LOADER] command must always be used to load and unload the board.

4. Nozzle Center Measurement

Perform a nozzle center measurement. The Nozzle Assignment Table should be such that nozzles with bend amounts of 0.05mm or more are skipped.

Replace the unacceptable nozzles, then repeat the nozzle center measurement using the following command sequence:

[SET] —> [MANUAL] —> [NOZZLE] —> [CENTER] — —> START button

Note: Refer to the "The Need for Station 11 Proper Data Calibrations" section of Chapter 1 for information concerning the necessity of nozzle center measurements.

3. ST 11 Proper Data Setting Procedure

5. Initializing ST11 Proper Data

The proper data must be changed to "0" by a manual input using the PAM editor commands.

The ST11 proper data will have been transmitted from the host computer (MCS or F4G) to the machine (current machines).

Using the PAM editor commands, initialize this ST11 proper data (Proper X, Proper Y) by entering "0" for each of the 1 to 6 nozzles at each head.

- Execute the following command sequence:
PAM [EDITOR] → [NOZZLE TYPE] → [SELECT NZL.]
(select the number of the nozzle being measured)
- Use [F] + [F4] to copy the dx and dy "0" values to Proper X, Y.

Note: When the dx and dy values are other than "0" (factory correction values are entered), change all the Proper X, Y values to "0" by manual input.

FUJI		P1.00		off line	
CP_6.PROGRAM			Prod 00004 Sche 00000		
Proper data		Nozzle type 2		Operation: Front	
		X Y dX dY [1/100mm]		Ready	
HEAD	Proper X	Proper Y	Avg.dX	Avg.dY	
A	- 7	3	- 2	2	
B	- 4	2	- 1	1	
C	- 7	2	- 2	0	
D	- 5	3	- 1	1	
E	- 7	1	- 2	1	Nozzle Skip
F	- 5	2	- 2	0	
G	- 6	3	- 2	1	1 AB CD EF 2 AB CD EF
H	- 4	3	- 1	1	3 AB CD EF 4 AB CD EF
I	- 8	1	- 3	1	5 AB CD EF 6 AB CD EF
J	- 3	0	- 1	0	
			000000000000	jog XY	Page150
			000000000000	C	
▲	▼	Proper	Input Data	Data Save	Return

C6PM3001

6. Placing Dummy Parts

After initializing all heads, end the editor command mode, then use the placing commands to place the parts.

- Press [RETURN] to return to the initial screen.
- Select [PAM] → [PLACE].
- Press the START button.
- Press the START button again to begin part placement.

7. Dummy Parts Measurement

After the dummy parts have been placed, use the measurement command to measure them with the board still on the XY table. This procedure consists of measuring the amount of deviation from the program coordinate values (nozzle center measurement values).

1. Select [MEASUREMENT]
The XY table begins to move, and the fiducial mark camera acquires images of the actual positions where the parts have been placed. This is followed by statistical processing.

2. Deviation display

- (1) Select the following commands:
[EDITOR] → [NOZZLE TYPE] → [SELECT NZL.]
(select the number of the nozzle being measured).
- (2) Check the Avg. dx, and dy values.

Note: A correction is required if the deviation exceeds 10 (0.1).

3. Proper data correction

The following is the correction procedure which must be performed at placing heads where the deviation (Avg. dx, dy) exceeds 10.

- (1) When the Avg. dx, and dy values exceed 10, add half their value to the Proper X, Y values.

Example:

Proper X	Proper Y	Avg.dx	Avg.dy
6	-7	12	-16
<hr/>			
Proper X	Proper Y		
12	-15		

C6PM3002

Note: The deviation in the placement position is corrected by correcting the proper data. Attempts to perform a 100% correction will result in an over-correction, and will cause an even greater deviation (overshoot). Therefore, only 1/2 of the calculated value should be added (never add the full value).

- (2) If the deviation (Avg. dx, dy) is 10 or less, repeat the step 6 “Placing Dummy Parts” to step 7 “Dummy Part Measurement, 3. Proper data correction” procedures shown above.

8. Results Display

9. sig.X,Y,Q (3-Sigma) Check

1. Select the [RESULTS] command.
2. The correction procedure is complete if all the sig. X, Y, Q values are 100 or less. If any values exceed 100, repeat step 6 “Placing Dummy Parts”, then check the sig. X, Y, Q values again.

3. ST 11 Proper Data Setting Procedure

- Select the [DATA SAVE] command.
Continue with the Proper data corrections for all the other nozzles.

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		Data Display	
Measurement Result				Operation : Front Ready	
Avg.dX - 13	Avg.dY - 9	Avg.dQ - 278	Nozzle Type All Nozzle All degrees		
Max.dX 26	Max.dY 19	Max.dQ 476	All data 5000		
Max.dX - 13	Max.dY - 9	Max.dQ - 278	dXdY [1/1000mm]		
3sig.X - 18	3sig.Y 4	3sig.Q 483	Data Save dQ [1/1000deg]		
				000000000000 jog XY 000000000000 C	Page140
SIZE				Data Save	RETURN

C6PM3003

10. Transmitting Proper Data From Machine to Host

Transmit (and back-up) the Proper data from the machine to the host (F4G or MCS). This completes the ST11 Proper data adjustments using PAM.

* Tolerance range

After the PAM measurement is completed, the following information can be output (to printer if connected) for all the number 1 to 6 nozzles: deviation amount, deviation average, max./min. deviation, accuracy result.

Fuji guarantees a CP-6 placing accuracy of ± 0.1 mm. However, because machine efficiency can vary due to maintenance and operating conditions, it is impossible to group all machines into one tolerance range. Keep this in mind when deciding the best placing accuracy for your specific machine in order to obtain better results from the calibration process.

Using PAM at Pin Reference Boards

- Use a mark reference board to adjust the ST11 Proper data.
- With the Proper data set (step 1 above), perform the part placement and measurement operations using a pin reference program. Verify that the accuracy is acceptable.

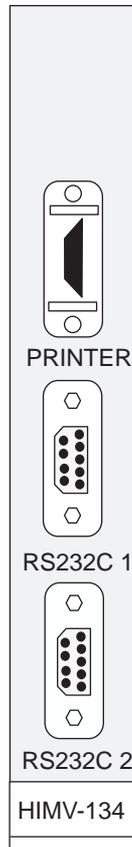
Downloading Measurement Results to a PC

This procedure consists of downloading data lines, and it requires the following environment.

- A Windows computer with NTCC installed.
- The Digi board (RS232C expansion port recommended by Fuji).
- Machine <—> PC transmission cable (Dwg. No. EEHH1061 or EEHH1071).

Procedure at Machine

1. Using the machine commands, proceed to “Page: Data Save-3”, then select the [Change Port] command to specify the port (CH1 or CH2) where the data is to be output.
2. Connect the transmission cable to the specified port.



C6PM3004

The machine's CPU board is equipped with a printer port and 2 RS232C ports as shown at left.

The “RS232C 1” port is CH1.

The “RS232C 2” port is CH2.

When transmitting Proper data using an RS232C port, the data line is connected from the machine's side-face connector to CH1 by internal wiring. In this case, production information (PT) is also sent to the host from CH1. The connector should therefore be connected to CH2.

(Use the [Change Port] command to specify CH2)

When using the internal CC, either CH1 or CH2 may be used. In this case, the machine <—> PC transmission cable must be connected to the machine's side-face connector. (Transmission cable Dwg. No.: EEHH1061 or EEHH1071).

3. ST 11 Proper Data Setting Procedure

Procedure at PC

Setting the Communication Conditions

1. At the PC side, connect the transmission cable (machine <—> NTCC) to the port which is not being used by NTCC. If there are no vacant ports, leave the cable as it is, and end NTCC. (When NTCC is ended, acquisition of production information from other machines is disabled.)
2. When using WindowsNT3.51
 - (1) Start up the communication software at the PC as follows: “Program Manager” —> “Accessories” —> “Terminal”.
 - (2) At the Terminal menu, select “Settings” —> “Communication Conditions”, then specify the following settings:

Communication speed (bps):	9600
Flow control:	Xon/off
Serial port:	COM?
	(PC port connected to transmission cable)
Data length:	8
Stop bit:	1
Parity:	None
 - (3) At the menu, select [File] —> [Save As] to save the setting conditions. (Once saved, these settings are convenient when using the trace port. e.g., trace.trm).
3. When using WindowsNT4.0
 - (1) Click the START button, select “Accessories”, then start up the Hyper Terminal.
 - (2) Enter the name (e.g., trace) at the connection settings, select the icon, then click OK.
 - (3) Select the PC port (COM?) where the transmission cable is connected, then click OK.
 - (4) At the port settings, specify the same settings as those at 2.2 above, then click OK.
 - (5) At the menu, select [File] —> [Save] to save the setting conditions. (A shortcut is created at the START button. e.g., trace.ht)

Starting Communication

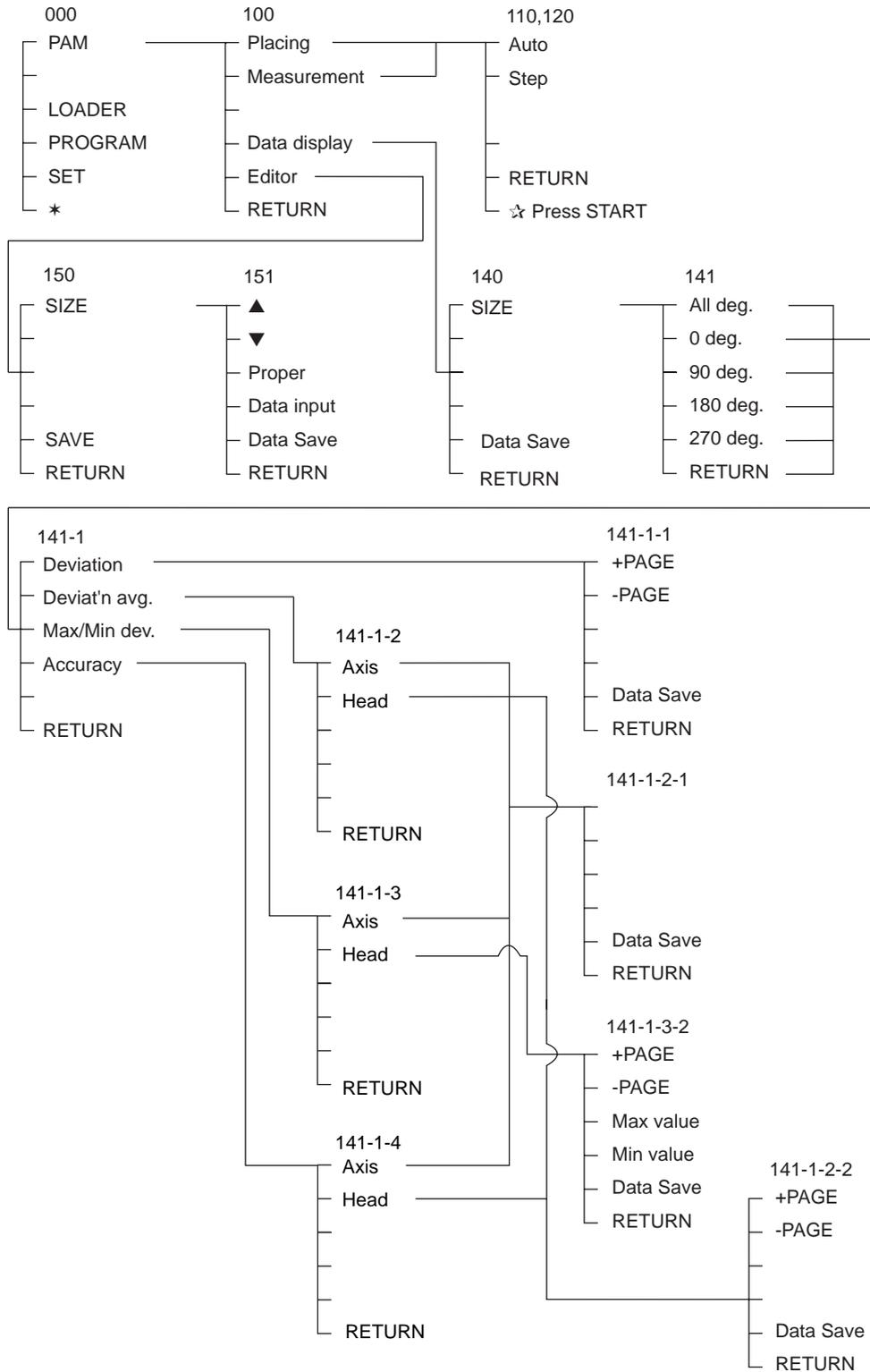
When using WindowsNT3.51

1. Start up the “Terminal” (not necessary if already running).
2. At the Terminal menu, select [File] —> [Open] to open the settings file saved at 2.3 in the above section. (Not necessary if the communication conditions have already been set.)
3. Select [TRANSMIT] —> [TEXT FILE RECEPTION], then enter the name of the file where the trace list is to be saved. After entering the file name, click OK to enable reception.
4. When reception is completed, select [Exit] to quit the Terminal application.

When using WindowsNT4.0

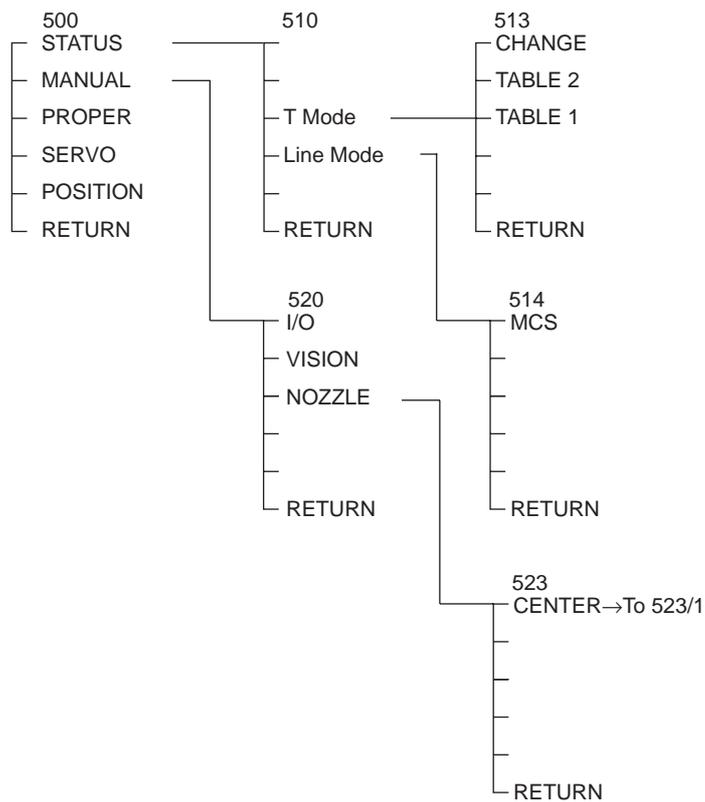
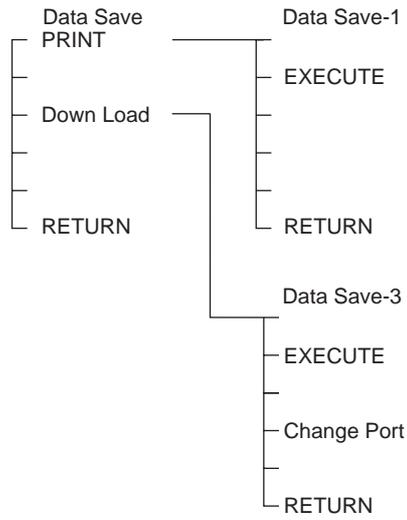
1. Click the START button, select “Accessories”, then open the shortcut (e.g., trace.ht) in Hyper Terminal which was saved at 3.5 above.
2. At the menu, select [Transfer] —> [Capture Text], then enter the name of the file where the trace list is to be saved. After entering the file name, click OK to enable reception.
3. When reception is completed, select [Transfer] —> [Capture Text] —> [Exit] to quit the Terminal application.

4. Command Hierarchy



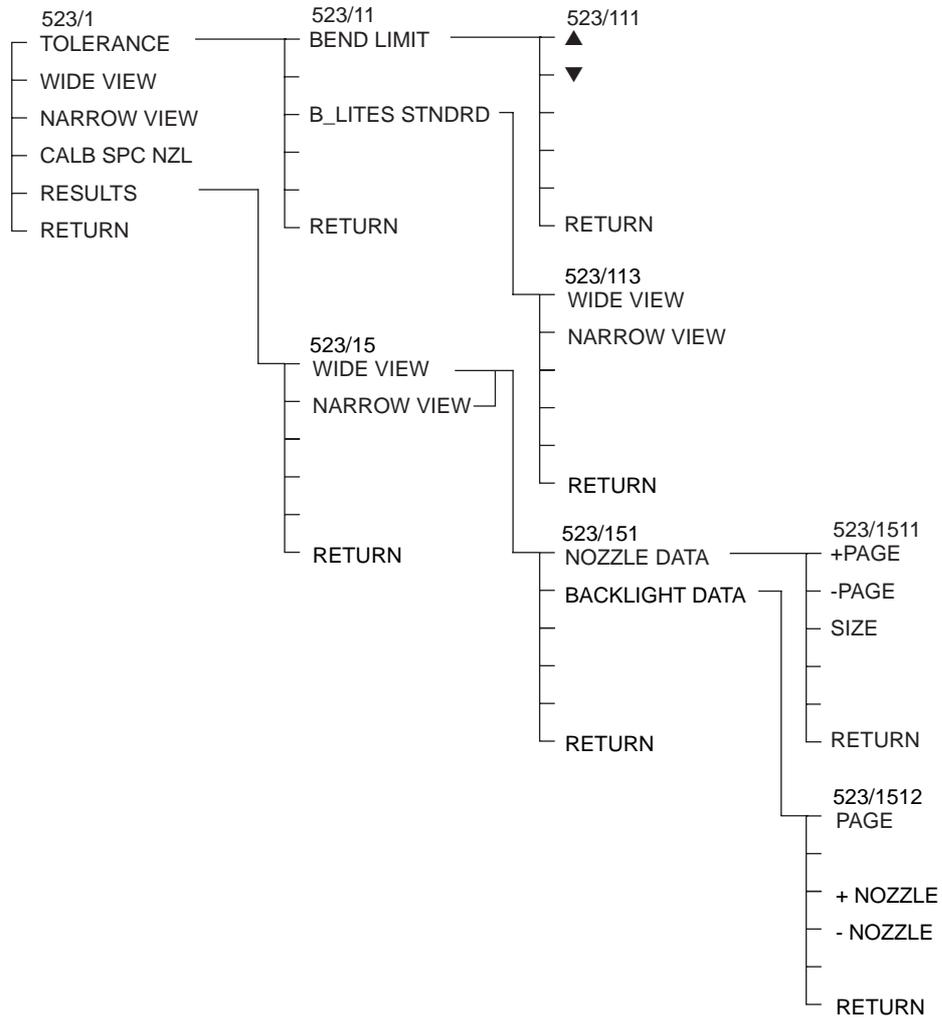
C6PM4001

4. Command Hierarchy



C6PM4002

4. Command Hierarchy

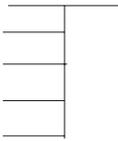


C6PM4003

Notes:

5. Command Index

Refer to the following command index for the commands described in chapter 6. The command page number on each screen will only display a maximum of three digits.

Command	Contents	Command page	
PAM	PAM mode	Page 100	
Placing.....	Places components with PAM program	Page 110	
Measurement	Measures component placement results.....	Page 120	
Data display	Displays the data	Page 140	
SIZE	Displays the nozzle data	Page 141	
All deg.		Displays the angle data	
0 deg.			Page 141-1
90 deg.			
180 deg.			
270 deg.			
Deviation	Displays the nozzle deviation	Page 141-1-1	
Deviat'n avg.....	Displays the nozzle deviation average.....	Page 141-1-2	
Max/Min dev.	Displays the max/min deviation.....	Page 141-1-3	
Accuracy	Displays the nozzle placement accuracy	Page 141-1-4	
Editor	Station 11 Proper data editor	Page 150	
SIZE	Editing Station 11 nozzle Proper data per nozzle	Page 151	
Data Save	Data is output to the printer, or to the personal computer	Page Data Save	

Notes:

6. Description of Commands

This chapter describes each of the commands.

Description	Command Name	Page	Command Page
-------------	--------------	------	--------------

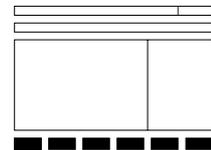
The layout of each page is the same as this one.

The box on the left describes the command, the center box lists the command name, and the box on the right specifies the command page number.

Function Key Menu

F1	F2	F3	F4	F5	F6
----	----	----	----	----	----

Each command listed here corresponds with the function key on the screen.



Monitor Display Area

This area explains any messages that display in the monitor display area.



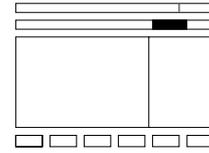
Second Display Area

This area explains any messages that display in the second display area.



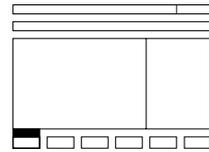
First Status Area

This area explains any messages that display in the first status area.



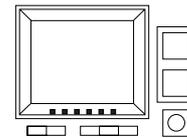
Second Status Area

This area explains any messages that display in the second status area.



After Pressing the Function Key

This area explains what happens upon selection of the function keys (1~6). It also states the command page where more information can be found.



PAM Mode	PAM
----------	-----

Page	100
------	-----

Select the PAM Mode.

Function Key Menu

Placing	Measurement		Data display	Editor	RETURN
---------	-------------	--	--------------	--------	--------

Monitor Display

FUJI		P1.00	off line		
CP_6.PROGRAM	Prod.00000 Sche.00000	P A M			
ST 1N	3D 5Er****	STATUS	Operation : Front Ready		
ST 2N	3D 5Er****	P Mode Product			
ST 3N	3D 5Er****	Recovery E Pass			
ST 6N	3D 5Er****	T Mode Joint			
ST 7N	3D 5Er 0	PAM Mode			
ST 8N	3D 5Er 0				
ST 10N	3D 5Er 0				
ST 11N	3D 5Er 0				
		000000000000 jog XY	Page100		
		000000000000 C			
Placing	Measurement		Data display	Editor	RETURN

C6PM6011

Second Display Area : READY

First Status Area : PAM

Function Key Operation

- Placing: Begins placement with the PAM measurement program To page 110
- Measurement: Measures the coordinates of the placed parts with the mark camera To page 120
- Data display: Displays the deviation amount, deviation average, max./min. deviation, and placement accuracy, calculated at each angle To page 140
- Editor: Edits the Proper data values for Station 11 To page 150
- RETURN: Returns the screen to page 000 To page 000

Placement Using PAM Mode	PAM
--------------------------	-----

Page	110
------	-----

Place the PAM program.

Function Key Menu

Automatic operation

	Step				RETURN
--	------	--	--	--	--------

Step operation

Auto					RETURN
------	--	--	--	--	--------

Monitor Display

FUJI _____		P1.00	off line		
CP_6.PROGRAM	Prod 00000 Sche 00000		PLACE		
ST 1N 3D 5Er****	STATUS	Operation : Front Press START			
ST 2N 3D 5Er****	P Mode Product				
ST 3N 3D 5Er****	Recovery E Pass				
ST 6N 3D 5Er****	T Mode Joint				
ST 7N 3D 5Er 0	PAM Mode				
ST 8N 3D 5Er 0					
ST10N 3D 5Er 0					
ST11N 3D 5Er 0					
		000000000000 jog XY	Page110		
		000000000000 C			
	Step				RETURN

C6PM6015

Second Display Area

"Press START" displays if the start-up conditions are fulfilled.
An error message displays if the conditions are not met.

First Status Area : PLACE

Function Key Operation

Auto: Begins continuous part placement
Step: Places one sequence at a time
 The START button must be pressed for each sequence.
RETURN: Returns to page 100

To page 100

Loading and Unloading the PCB

Load a board to the reference pin on the XY-table with the [LOAD PCB] command.
Unload a board with [UNLOAD PCB].

After pressing the START button

- When there are mark read sequences for the board, the PAM program begins placement after performing the mark read sequences. Placement begins immediately if there are no mark sequences.
- An "XY table not at lower limit" error message displays in the 1st display area if the XY-table is not in the lower position when the START button is pressed, and the software returns to page 100.
- The error "No board" displays in the 1st display area if the machine determines that no board exists during its board check, and the software returns to page 100.
- Head A is automatically used for the 1st placing sequence.
- Once the PAM program finishes the last sequence, the XY-table moves to the loading position without unloading the board and the software returns to page 100.
- The Recovery operation is the same process as Error Pass. Recovery is not performed when there is an error in a particular sequence.
- The software monitor alarms are the same as in automatic operation. The software returns to page 100 after reset button input if the machine stops due to an abnormal condition. At this point the message "Place from 1st sequence" displays in the 1st display area and the machine will resume placement from the 1st sequence.
The next sequence is performed if an abnormality does not initiate an emergency stop.
- The software returns to page 100-1 after searching for the nozzle origin in the placement commands. "Place from 1st sequence" then displays in the error domain of the 1st display area and the machine will continue placement from the 1st sequence.
- The screen displayed during placement is identical to the automatic operation screen.

After pressing the CYCLE STOP button

The machine waits for START button input before performing the next process.

Starting from the first sequence

Move back one command level to restart the process from the first sequence after stopping the machine during operation.

The software reads the coordinates of placed parts using the mark camera and prepares the data base necessary to calculate the placement accuracy deviations.

Placement Result Measurement	Measurement	Page	120
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The software reads the coordinates of placed parts using the mark camera and prepares the data base necessary to calculate the placement accuracy deviations.

Function Key Menu

Automatic operation

	Step				RETURN
--	------	--	--	--	--------

Step operation

Auto					RETURN
------	--	--	--	--	--------

Monitor Display

FUJI		P1.00	off line
CP_6.PROGRAM	Prod 00000 Sche 00000	MEASURING	
ST11N	3PAM	STATUS P Mode Product Recovery E Pass T Mode Joint PAM Mode	Operation : Front Press START
		000000000000 jog XY	Page120
		000000000000 C	
	Step		RETURN

C6PM6017

Second Display Area

"Press START" displays if the start-up conditions are fulfilled.
 An error message displays if the conditions are not met.

First Status Area : MEASURING

Function Key Operation

- Auto: Press this to continuously read part locations.
- Step: Press this to read part locations one sequence at a time
 The START button must be pressed for each sequence.
- RETURN: Returns to page 100

To page 100

Loading and Unloading the PCB

- Press [LOAD PCB] to load a board to the reference pin on the XY-table.
- Press [UNLOAD PCB] to unload a board.

After pressing the START button

- When fiducial mark sequences exist in the program, the software reads the coordinates for the parts placed after reading the fiducial marks. The software immediately starts reading the placement coordinates if no mark sequences exist.
- The error message "XY table not at lower limit" displays in the 1st display area with Start input, if the XY-table is not in the lower-limit, and the software returns to page 100.
- "No Board" displays in the 1st display area if the machine determines that no board exists during a board check, and the software returns to page 100.
- Part processing begins with the first sequence placed by head-A.
- Coordinate data is not collected for parts that produce vision processing errors.
- The XY-table returns to the loading position once the software processes the last coordinate data, without unloading the board. The software then totals the measurement results and displays the message "Analyzing" in the 2nd display area. The software returns to page 100 after calculating the data.
- The software monitor alarms are the same as in automatic operation. The software returns to page 100 after reset button input if the machine stops due to an abnormal condition. At this point, the message "Place from 1st sequence" displays in the first display area, and the machine will resume placement from the 1st sequence. The next sequence is performed if an abnormality does not initiate an emergency stop.
- "Measuring" displays on the monitor in the 2nd display area after Start button input. Sequence numbers (including mark sequences) are counted the same as in the placing mode.

After pressing the CYCLE STOP button

The machine waits for START button input once again. The next process is performed upon START button input.

Starting from the first Sequence

Move back one command level to restart the process from the first sequence after stopping the machine during operation.

Displaying the Data

Data display

Page 140

This displays the measured data. It also selects the nozzle type from the following data.

Function Key Menu

SIZE PRINT RETURN

Monitor Display

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		DATA	
Measurement Result				Operation : Front Ready	
Avg.dX - 13	Avg.dY - 9	Avg.dQ - 278	Nozzle Type All Nozzle All degrees		
Max.dX 26	Max.dY 19	Max.dQ 476	All data 5000		
Max.dX - 13	Max.dY - 9	Max.dQ - 278	dXdY [1/1000 mm]		
3sig.X 18	3sig.Y 4	3sig.Q 483	dQ [1/1000 deg]		
				000000000000 jog XY	Page140
				000000000000 C	
SIZE				Data Save	RETURN

C6PM6020

- This display shows all nozzle and angle measurement data.
- The data displayed on the monitor represents the Avg. (average) dX, Avg. dY, Max. dX, Max. dY, Min. dX, Min. dY, s in 1/1000 mm and Avg. dQ, Max dQ and Min. dQ. in 1/1000°.
- The data used to calculate deviation is displayed in the middle right side of the display.

Second Display Area : READY

First Status Area : DATA

Function Key Operation

SIZE: This selects the nozzle type
The message "Nozzle No. ? " displays on the screen. Enter the nozzle number you want displayed. To page 141

Data Save: This prints or saves the data currently displayed on the monitor.
The print format is shown below.

Total data	dx [1/1000 mm]	dy [1/1000 mm]	dQ [1/1000 deg]
Average Deviation	Avg. dX: -13	Avg. dY: -9	Avg. dQ: -278
Maximum Deviation	Max. dX: 26	Max. dY: 19	Max. dQ: 476
Minimum Deviation	Min. dX: -13	Min. dY: -9	Min. dQ: -278
Placing Accuracy	3sig. X: 18	3sig. Y: 4	3sig. Q: 83

RETURN: Return to page 100 To page 100

Selecting the Angle Display

SIZE

Page 141

This command is particular to the version that displays the measurement values for each angle. Select which placement/measurement data angle to display for the nozzle type selected on command page 140.

Function Key Menu

All deg.	0 deg.	90 deg.	180 deg.	270 deg.	RETURN
----------	--------	---------	----------	----------	--------

Monitor Display

FUJI			P1.00	off line	
CP_6.PROGRAM		Prod 00000 Sche 00000		No.1 NOZZLE	
Measurement Results				Operation : Front Ready	
Avg.dX - 13	Avg.dY - 9	Avg.dQ - 278	Nozzle Type All Nozzles All deg.		
Max.dX 26	Max.dY 19	Max.dQ 476	Data No. 5000		
Max.dX - 13	Max.dY - 9	Max.dQ - 278	dXdY [1/1000 mm]		
3sig.X 18	3sig.Y 4	3sig.Q 483	dQ [1/1000 deg]		
			000000000000 jog XY 000000000000 C	Page141	
All deg.	0 deg.	90 deg.	180 deg.	270 deg.	RETURN

C6PM6046

- This display shows all nozzle and angle measurement data.
- The data displayed on the monitor represents the Avg. (average) dX, Avg. dY, Max. dX, Max. dY, Min. dX, Min. dY, s in 1/1000 mm and Avg. dQ, Max dQ and Min. dQ. in 1/1000°.
- The data used to calculate deviation is displayed in the middle right side of the display.

Second Display Area : READY

First Status Area : "No.1 NOZZLE", "No.2 NOZZLE",
 "No.3 NOZZLE", "No.4 NOZZLE",
 "No.5 NOZZLE", "No.6 NOZZLE"

Function Key Operation

All deg.:	Displays the placement/measurement sequence data at all angles for the nozzle type selected on command page 140	To page 141-1
0 deg.:	Displays the placement/measurement sequence data for placement at 0 degrees for the nozzle type selected on command page 140	To page 141-2
90 deg.:	Displays the placement/measurement sequence data for placement at 90 degrees for the nozzle type selected on command page 140	To page 141-3
180 deg.:	Displays the placement/measurement sequence data for placement at 180 degrees for the nozzle type selected on command page 140	To page 141-4
270 deg.:	Displays the placement/measurement sequence data for placement at 270 degrees for the nozzle type selected on command page 140	To page 141-5
RETURN:	Returns to page 140	To page 140

6. Description of Commands

Specific Nozzle Data Display	No.1 ~ No.6 NOZZLE	Page	141-1
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The nozzle data selected on command page 140 displays here.

Function Key Menu

Deviation	Deviat'n avg.	Max/Min dev.	Accuracy		RETURN
-----------	---------------	--------------	----------	--	--------

Monitor Display

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		No.1 NOZZLE	
Measurement Result				Operation : Front Ready	
Avg.dX	Avg.dY	Avg.dQ	Nozzle Type		
- 13	- 9	- 278	All Nozzle		
			All degrees		
Max.dX	Max.dY	Max.dQ	All data		
26	19	476	5000		
Max.dX	Max.dY	Max.dQ	dXdY		
- 13	- 9	- 278	[1/1000mm]		
3sig.X	3sig.Y	3sig.Q	dQ		
18	4	483	[1/1000deg]		
				000000000000 jog XY	Page141
				000000000000 C	
Deviation	Deviat'n avg.	Max/Min dev.	Accuracy		RETURN

C6PM6023

Second Display Area : READY

First Status Area : "No.1 NOZZLE", "No.2 NOZZLE", "No.3 NOZZLE"
"No.4 NOZZLE", "No.5 NOZZLE", "No.6 NOZZLE"

Function Key Operation

Deviation:	Displays the nozzle deviation for each axis (X, Y and Q)	To page 141-1-1
Deviat'n avg.:	Displays the nozzle deviation average for each head and specified axis (X, Y or Q)	To page 141-1-2
Max/Min dev.:	Displays the max/min nozzle deviation amount for each head and specified axis (X, Y or Q)	To page 141-1-3
Accuracy:	Displays the nozzle accuracy (3s) for each head and specified axis (X, Y or Q)	To page 141-1-4
RETURN:	Returns to page 141	To page 141-1

Specific Nozzle Deviation Display	Deviation	Page	141-1-1
-----------------------------------	-----------	------	---------

Pressing [All deg.] displays the deviation for the X, Y and Q-axes for all sequences placed with the nozzle type selected on command page 141.

When [0 deg.], [90 deg.], [180 deg.], or [270 deg.] is selected, the deviation for the X, Y and Q-axes for all sequences placed with the selected nozzle types and placement angles are displayed.

Function Key Menu

+PAGE	-PAGE			Data Save	RETURN
-------	-------	--	--	-----------	--------

Monitor Display

FUJI					P1.00	off line
CP_6.PROGRAM			Prod 00000 Sche 00000		DEVIATION	
Deviations for each measuring point					Operation : Front Ready	
Seq.	dX	dY	dQ	Nozzle Type		
3	- 10	- 1	90	No. 1		
4	18	3	- 320	All degrees		
5	- 9	4	100	All data		
6	- 26	- 7	489	5000		
7	****	****	****			
8	10	- 1	- 789	dXdY		
9	5	2	545	[1/1000 mm]		
10	0	5	798			
11	- 1	- 3	- 743	dQ		
12	- 4	- 6	754	[1/1000 deg]		
000000000000					jog	XY
000000000000					C	Page141
+PAGE	-PAGE			Data Save	RETURN	

C6PM6026

- The selected nozzle data displays under the heading "Nozzle Type" at the upper right of the first display area.
- The selected angle data is displayed under the heading "Nozzle Type".
- The units of measurement in the display are 1/1000 mm for dX and dY; and 1/1000° for dQ.
- The data used to calculate the deviation amount displays in the middle right of the 1st display area.
- "****" displays as an error message if a vision processing error occurs while the software reads the placement data.
- Inputting a sequence number from the numerical keypad jumps the display to that particular sequence.

Specific Nozzle Deviation Average	Deviat'n avg.	Page	141-1-2
-----------------------------------	---------------	------	---------

This function displays the deviation average for the X, Y and Q-axes for all heads (A~T).

The X, Y, and Q-axis deviation averages for all of the sequences placed with the nozzle type specified on command page 141 will display after selecting "All deg."

The X, Y and Q-axis deviation averages for all sequences placed with the selected nozzle types and placement angles are displayed when [0 deg.], [90 deg.], [180 deg.], or [270 deg.] are selected.

If a vision processing error occurs while reading placement coordinates, that sequence data cannot be used for the calculations.

A "0" displays for the placing positions not yet calculated.

Function Key Menu

Axis	Head				RETURN
------	------	--	--	--	--------

Monitor Display

FUJI		P1.00	off line
CP_6.PROGRAM	Prod 00000 Sche 00000	DEV. AVG.	
ST 1N	3D 5Er****	STATUS	Operation : Front Ready
ST 2N	3D 5Er****	P Mode Product	
ST 3N	3D 5Er****	Recovery E Pass	
ST 6N	3D 5Er****	T Mode Joint	
ST 7N	3D 5Er 0	PAM Mode	
ST 8N	3D 5Er 0		
ST 10N	3D 5Er 0		
ST 11N	3D 5Er 0		
		000000000000 jog XY	Page141
		000000000000 C	
Axis	Head		RETURN

C6PM6029

Second Display Area : READY

First Status Area : DEV. AVG.

Function Key Operation

Axis: Press to display average deviation for each of the X, Y and Q-axes.
The monitor displays what is shown below.

FUJI			P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		DEV. AVG.
Measurement Results			Operation : Front Ready	
Avg.dX - 13	Avg.dY - 9	Avg.dQ - 278	Nozzle Type All Deg Data 5000	
			dXdY [1/1000 mm]	
			dQ [1/1000 deg]	
			000000000000 000000000000	jog XY C
			Page141	
			Data Save	RETURN

C6PM6030

- The data displayed is for the nozzle and angle(s) listed in the upper right region of the 1st display area under the heading "Nozzle Type".
- The units of measurement displayed are 1/1000 mm for dX, dY, and 1/1000 deg for dQ.
- The data used to calculate the deviation amount displays in the middle right side of the 1st display area.
- All of the data displayed on the screen prints when [Data Save] is pressed if [All deg.] is selected. Selecting [0 deg.], [90 deg.], [180 deg.], or [270 deg.], prints the deviation data for all of the other angles as well. The print format is shown on the following page.
- After selecting [RETURN], the display clears and the monitor returns to the initial screen where either [Axis] or [Head] may be selected.

Output Format (deviation average per axis)

With [All deg.] selected:

Average Deviation	Nozzle type 1		
	All deg.		
	dX, dY [1/1000 mm]	dQ [1/1000 deg]	
Avg. dX -13	Avg. dY -9	Avg. dQ -278	

Output Format (deviation average per axis)

With [All deg.] selected:

Average Deviation Nozzle type 1
 All deg.
 dX, dY [1/1000 mm] dQ [1/1000 deg]

	Avg. dX	Avg. dY	Avg. dQ
HEAD A	-13	-9	-278
↓			
HEAD T	-1	6	214

With [0 deg.], [90 deg.], [180 deg.], or [270 deg.] selected:

Average Deviation Nozzle type 1
 dX, dY [1/1000 mm] dQ [1/1000 deg]

	0 deg.			90 deg.			180 deg.			270 deg.		
HEAD	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ
A	21	6	-34	20	-3	-152	14	0	-56	17	5	-166
↓												
T	18	2	14	14	0	-275	14	-1	-47	15	3	-56

6. Description of Commands

Specific Nozzle Max/Min Deviation Display	Max/Min Dev.	Page	141-1-3
---	--------------	------	---------

This function displays the minimum and maximum deviation for the X, Y and Q- axes for each head (A~T).

The X, Y, and Q-axis deviation averages for all of the sequences placed with the nozzle type specified on command page 141 will display after selecting "All deg.". The X, Y and Q-axis deviation averages for all sequences placed with the selected nozzle types and placement angles are displayed when [0 deg.], [90 deg.], [180 deg.], or [270 deg.] are selected.

If a vision processing error occurs while reading placement coordinates, that sequence data cannot be used for the calculations.

A "0" displays for the placing positions not yet calculated.

Function Key Menu

Axis	Head				RETURN
------	------	--	--	--	--------

Monitor Display

FUJI		P1.00	off line
CP_6.PROGRAM	Prod 00000 Sche 00000	MAX/MIN DEV.	
ST 1N	3D 5Er****	STATUS	Operation : Front Ready
ST 2N	3D 5Er****	P Mode Product	
ST 3N	3D 5Er****	Recovery E Pass	
ST 6N	3D 5Er****	T Mode Joint	
ST 7N	3D 5Er 0	PAM Mode	
ST 8N	3D 5Er 0		
ST 10N	3D 5Er 0		
ST 11N	3D 5Er 0		
		000000000000 jog XY	Page141
		000000000000 C	
Axis	Head		RETURN

C6PM6029

Second Display Area : READY

First Status Area : MAX/MIN DEV.

Function Key Operation

Axis: This displays the X, Y and Q-axis minimum and maximum deviation values for all of the heads (A ~T).

The monitor displays what is shown below.

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		MAX/MIN DEV.	
Max/Min Deviation for Each Axis				Operation : Front Ready	
Max.dX	Max.dY	Max.dQ	Nozzle Type		
26	19	476	No. 1		
			All Deg.		
Max.dX	Max.dY	Max.dQ	Data		
- 13	- 9	- 278	5000		
			dXdY		
			[1/1000 mm]		
			dQ		
			[1/1000 deg]		
				000000000000	jog XY
				000000000000	C Page141
				Data Save	RETURN

C6PM6048

- The data displayed is for the nozzle and angle(s) listed in the upper right region of the 1st display area under the heading "Nozzle Type".
- The unit of measurement displayed is 1/1000 mm for the Min/Max dX, dY and 1/1000° for the Min/Max dQ.
- The data used to calculate Min/Max deviation amount is displayed in the middle of the right side in the 1st display area.
- The current display is sent to the printer if [Data Save] is selected. The output is shown below.
- When [RETURN] is pressed, the screen is cleared and the monitor will return to the initial display where [Axis] or [Head] can be selected.

6. Description of Commands

Output Format (deviation average per axis)

With [All deg.] selected:

Average Deviation			Nozzle type 1 All deg. dX, dY [1/1000 mm] dQ [1/1000 deg]		
Max. dX	26	Avg. dY	19	Avg. dQ	-476
Min. dX	-13	Avg. dY	-9	Avg. dQ	-278

With [0 deg.], [90 deg.], [180 deg.], or [270 deg.] selected:

Maximum and Minimum Deviation			Nozzle type 1 dX, dY [1/1000 mm] dQ [1/1000 deg]											
	0 deg.			90 deg.			180 deg.			270 deg.				
	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ		
Max.	29	11	61	26	11	-35	27	11	73	23	11	-22		
Min.	12	-9	-123	8	-8	-332	7	-10	-121	8	-4	-390		

6. Description of Commands

Head: The minimum and maximum deviations for the X, Y and Q-axes of all sequences placed with the nozzle type selected on command page 141 are displayed when [All deg.] is selected.

The minimum and maximum deviations for X, Y, and Q-axes for all sequences placed with the selected nozzle types and placement angles are displayed when [0 deg], [90 deg.], [180 deg.] or [270 deg.] are selected.

The monitor display is shown above.

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		MAX/MIN DEV.	
Average Deviation for Each Head				Operation : Front Ready	
HEAD	Avg.dX	Avg.dY	Avg.dQ	Nozzle Type	
HEAD A	13	9	278	No. 1	
HEAD B	23	12	543	All deg.	
HEAD C	12	9	324	Data	
HEAD D	9	11	765	5000	
HEAD E	1	3	89		
HEAD F	4	4	87	dXdY	
HEAD G	1	10	65	[1/1000 mm]	
HEAD H	10	5	213		
HEAD I	7	3	68	dQ	
HEAD J	3	2	324	[1/1000 deg]	
				000000000000	jog XY
				000000000000	C Page141
+PAGE	-PAGE	Max value	Min value	Data Save	RETURN

C6PM6049

- The monitor will display the maximum deviation values. Press [Min value] to display the minimum values.
- The data displayed is for the nozzle and angle(s) listed in the upper right region of the 1st display area under the heading "Nozzle Type".
- The unit of measurement displayed is 1/1000 mm for Max/Min dX, dY and 1/1000 deg for Max/Min dQ.
- The number of data used to calculate the deviation amount displays in the middle on the right side of the 1st display area.
- Pressing [+PAGE] or [-PAGE] displays data for the other heads which overflow from the monitor screen.
- Press [Max value] to display the maximum deviation for the X, Y and Q- axes.
- Press [Min value] to display the minimum deviation for the X, Y and Q- axes.
- Press [Data Save] to print out the current display. The format is shown on the following page.
- Press [RETURN] to clear the monitor and return to the initial screen to select either [Axis] or [Head].

RETURN: Returns to page 141 or to page 141-1.

To page 141-1

Output Format (deviation average per head)

With [All deg.] selected:

- **Maximum Value Output**
Maximum Deviation Nozzle type 1
All deg.
dX, dY [1/1000 mm] dQ [1/1000 deg]

	Max.dX	Max.dY	Max.dQ
HEAD A	13	19	476
↓			
HEAD T	1	6	214

- **Minimum Value Output**
Minimum Deviation Nozzle type 1
dX, dY [1/1000 mm] dQ [1/1000 deg]

	Max.dX	Max.dY	Max.dQ
HEAD A	-13	-9	-278
HEAD T	-1	6	214

With [0 deg.], [90 deg.], [180 deg.], or [270 deg.] selected:

- **Maximum Value Output**
Maximum Deviation Nozzle type 1
dX, dY [1/1000 mm] dQ [1/1000 deg]

HEAD	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ
A	29	11	-11	26	4	-103	19	4	-46	23	9	-76
↓												
T	19	6	61	22	4	-135	25	6	-61	18	11	-146

- **Minimum Value Output**
Minimum Deviation Nozzle type 1
dX, dY [1/1000 mm] dQ [1/1000 deg]

HEAD	0 deg.			90 deg.			180 deg.			270 deg.		
	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ	dX	dY	dQ
A	29	11	-11	26	4	-103	19	4	-46	23	9	-76
↓												
T	19	6	61	22	4	-135	25	6	-61	18	11	-146

6. Description of Commands

Specific Nozzle Placement Accuracy

Accuracy

Page

141-1-4

The standard deviation curve wherein 99.7% of the placing results fall is calculated for every head (A~T). The 3σ value is displayed on the monitor.

Upon selection of [All deg.], the accuracy is calculated and displayed for the X, Y and Q-axes for all placing sequences that were placed with the nozzle type selected on command page 141.

The X, Y and Q-axis accuracy for all sequences placed with the selected nozzle type is displayed when [0 deg.], [90 deg.], [180 deg.] or [270 deg.] is selected.

If a vision processing error occurs while reading placement coordinates, that sequence data cannot be used for the calculations.

A "0" is displayed for placing positions not yet calculated.

Function Key Menu

Axis	Head				RETURN
------	------	--	--	--	--------

Monitor Display

FUJI		P1.00	off line
CP_6.PROGRAM	Prod 00000 Sche 00000	ACCURACY	
ST 1N	3D 5Er****	STATUS	Operation : Front
ST 2N	3D 5Er****	PMode Product	Ready
ST 3N	3D 5Er****	Recovery E Pass	
ST 6N	3D 5Er****	T Mode Joint	
ST 7N	3D 5Er 0	PAM Mode	
ST 8N	3D 5Er 0		
ST10N	3D 5Er 0		
ST11N	3D 5Er 0		
		000000000000 jog XY	Page 141
		000000000000 C	
Axis	Head		RETURN

C6PM6033

Second Display Area : READY

First Status Area : ACCURACY

Function Key Operation

Axis: Press to display the X, Y and Q-axis placement accuracy (3σ).
The monitor display is shown below.

FUJI			P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		ACCURACY
Placing Accuracy			Operation : Front Ready	
3sig. X	3sig. Y	3sig. Q	Nozzle Type	
18	4	483	No. 1	
			All Deg	
			Data	
			5000	
			000000000000	jog XY
			000000000000	C
				Page141
			Data Save	RETURN

C6PM6034

- The data displayed is for the nozzle and angle(s) listed in the upper right region of the first display area under the heading "Nozzle Type".
- The data used to calculate accuracy (3σ) is displayed in the middle of the right side in the first display area.
- Press [Data Save] to print out the current display. The format is shown on the following page.
- Press [RETURN] to clear the monitor and return to the initial screen to select either [Axis] or [Head].

Output Format (accuracy per axis)

With [All deg.] selected:

Placing Accuracy					Nozzle type 1
					All deg.
3sig.X	18	3sig.Y	4	3sig.Q	483

With [0 deg.], [90 deg.], [180 deg.] or [270 deg.] selected:

Placing Accuracy					Nozzle type 1						
	0 deg.		90 deg.		180 deg.		270 deg.				
3sigX	3sigY	3sigQ	3sigX	3sigY	3sigQ	3sigX	3sigY	3sigQ			
9	15	114	15	15	177	15	15	110	12	15	180

6. Description of Commands

Head: The X, Y and Q-axis accuracy for of all sequences placed with the nozzle type selected on command page 141 is displayed when [All deg.] is selected.

The accuracy for the X, Y and Q-axes of all sequences placed with the selected nozzle types and placement angles is displayed when [0 deg.], [90 deg.], [180 deg.] or [270 deg.] is selected.

The monitor display is shown below.

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		ACCURACY	
Placing Accuracy for Each Head					Operation : Front
HEAD	3sig. X	3sig. Y	3sig. Q	Nozzle Type	Ready
HEAD A	3	11	0	No. 1	
HEAD B	1	10	13	All Deg	
HEAD C	3	12	27	Data	
HEAD D	0	7	4	5000	
HEAD E	7	9	33		
HEAD F	3	10	1		
HEAD G	4	8	1		
HEAD H	2	10	24		
HEAD I	1	11	4		
HEAD J	0	12	7		
				000000000000 jog XY	Page141
				000000000000 C	
+PAGE	-PAGE			Data Save	RETURN

C6PM6035

- The data displayed is for the nozzle and angle(s) listed in the upper right region of the 1st display area under the heading "Nozzle Type".
- The data used to calculate accuracy (3 σ) is displayed in the middle of the right side in the 1st display area.
- Pressing [+PAGE] or [-PAGE] displays the placing accuracy data for the X, Y and Q-axes not displayed on the current page.
- Press [Data Save] to print out the current display. The format is shown on the following page.
- Press [RETURN] to clear the monitor and return to the initial screen to select either [Axis] or [Head].

RETURN: Returns to page 141-1.

To page 141-1

Output Format (accuracy per head)

With [All deg.] selected:

Placing Accuracy	Nozzle type 1		
	All deg.		
	dX, dY [1/1000 mm]		dQ [1/1000 deg]
	3 sig.X	3 sig.Y	3 sig.Q
HEAD A	3	11	0
↓			
HEAD T	2	11	2

With [0 deg.], [90 deg.], [180 deg.] or [270 deg.] selected:

Placing Accuracy	Nozzle type 1											
	dX, dY [1/1000 mm]											
	dQ [1/1000 deg]											
	0 deg.			90 deg.			180 deg.			270 deg.		
HEAD	3sigX	3sigY	3sigQ	3sigX	3sigY	3sigQ	3sigX	3sigY	3sigQ	3sigX	3sigY	3sigQ
A	18	12	57	15	18	189	12	9	45	21	12	243
↓												
T	9	6	21	15	21	102	8	18	210	9	21	159

Station 11 Proper Data Editor	Editor	Page	150
-------------------------------	--------	------	-----

Select the corresponding nozzle size editor to edit Station 11 Proper data for that nozzle.

Function Key Menu

SIZE				SAVE	RETURN
------	--	--	--	------	--------

Monitor Display

FUJI		P1.00	off line
CP_6.PROGRAM	Prod 00000 Sche 00000	EDITOR	
ST 1N	3D 5Er****	STATUS	Operation : Front Ready
ST 2N	3D 5Er****	P Mode Product	
ST 3N	3D 5Er****	Recovery E Pass	
ST 6N	3D 5Er****	T Mode Joint	
ST 7N	3D 5Er 0	PAM Mode	
ST 8N	3D 5Er 0		
ST10N	3D 5Er 0		
ST11N	3D 5Er 0		
		000000000000 jog XY	Page150
		000000000000 C	
SIZE			SAVE RETURN

C6PM6037

Second Display Area : READY

First Status Area : EDITOR

Function Key Operation

SIZE: Select the nozzle type for which the Station 11 Proper data is to be edited. The message "Nozzle No.?" is displayed on the screen. Enter the nozzle number for editing. To page 151

SAVE: The average deviation is added in a batch to all ST11 Proper data. This occurs each time SAVE is executed.

RETURN: Returns to page 100. To page 100

SAVE Command Supplement

Press the [SAVE] command to check the data. Use the following steps to process the data check results.

1. If the data check is OK:
The deviation average data is within the correct range (-0.45 mm ~ 0.45 mm).
Press the [YES] command to save the data, and the [NO] command to cancel the operation.
The software will return a prompt to transmit the Proper to the host computer after [YES] command input, when the data is saved.
2. If there is data that cannot be processed:
Data that cannot be processed is the data for a nozzle whose calculated deviation average is unacceptable. All the parts placed with that nozzle produced vision processing errors.
The software will display up to sixty-four nozzle number/head number data items (including the message) whose deviation average cannot be calculated because of vision processing errors.
The message "No nozzle data due to VP error(s)" will display.
Following that message, the software displays [YES] which starts the saving process, and [NO] which cancels the process if selected.
In cases where the data cannot be calculated, the original proper data is saved as is. When the [SAVE] command is executed, a message displays prompting a data transmission from the machine to the host computer.
3. When the data is out of the range:
The software displays up to sixty-four nozzle number/head number data items (including the message) whose calculated deviation average is unacceptable.
The message "Data out of range" will display.
The data-save command will not be completed if this error occurs.
An effective range for the deviation average is -0.45 ~ 0.45 mm.
4. When there is no data:
Selecting a command during the measurements or after pressing the RESET button will display the following message:
"No nozzle Data"
The data-save command will not be completed if this error occurs.

6. Description of Commands

Proper Data Editor for Specific Nozzle	No.1~No.6 Nozzle	Page	151
--	------------------	------	-----

The Station 11 Proper data for the nozzle selected on command page 150 is edited with this function.

Function Key Menu

▲	▼	Proper	Data input	Data Save	RETURN
---	---	--------	------------	-----------	--------

Monitor Display

FUJI				P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000		No.1 NOZZLE	
Station 11 Proper Settings					Operation : Front Ready
HEAD	Proper X	Proper Y	Avg.dX	Avg.dY	
HEAD A	- 10	25	- 15	- 5	
HEAD B	9	- 7	- 7	- 2	
HEAD C	12	10	20	13	
HEAD D	8	9	- 18	- 8	
HEAD E	5	12	1	2	
HEAD F	- 11	- 14	- 3	- 5	
HEAD G	9	3	- 0	- 1	
HEAD H	15	- 24	5	26	
HEAD I	- 10	- 7	- 4	- 19	
HEAD J	- 3	16	- 8	- 4	
				000000000000	jog XY
				000000000000	C
					Page151
▲	▼	Proper	Data input	Data Save	RETURN

C6PM6050

- The monitor displays the current Station 11 Proper data and the average deviation results for all heads and angles.
- The cursor will not move into the average deviation field. This is due to the fact that averages are calculated values and therefore cannot be edited.
- The unit of measurement is 1/100 mm. The average deviation is rounded up to the nearest 1/100 mm from an initial precision of 1/1000 mm.
- The selected nozzle of which Station 11 Proper data is to be edited is displayed in the 1st status area.

Second Display Area : READY

First Status Area : "No. 1 NOZZLE", "No. 2 NOZZLE", "No. 3 NOZZLE",
"No. 4 NOZZLE", "No. 5 NOZZLE", "No. 6 NOZZLE"

Funtion Key Operation

- ▲: Press to move the cursor up one item.
 Pressing this key with the cursor positioned in the Proper X, HEAD A, changes the screen and moves the cursor to the Proper X, HEAD T. This key changes the screen and moves the cursor to the Proper X, HEAD J if the cursor is positioned in the Proper X, HEAD K.
- ▼: Press to move the cursor down one item.
 Pressing this key with the cursor positioned in the Proper X, HEAD T, changes the screen and moves the cursor to the Proper X, HEAD A. Pressing this key when the cursor is positioned in the Proper X, HEAD J, changes the screen and moves the cursor to the Proper X, HEAD K.
- Proper: It is possible to move the cursor to and from the Proper X and the Proper Y.
- Data input: When selected it is possible to perform Proper data input. It is not possible to input if the function key is pressed for a second time.

The monitor displays the following screen.

FUJI		P1.00	off line
CP_6.PROGRAM		Prod 00000 Sche 00000	
		No1 NOZZLE	
Station 11 Proper Settings			
HEAD	Proper X	Proper Y	Avg.dX
HEAD A	- 10	25	- 15
HEAD B	9	- 7	- 7
HEAD C	12	10	20
HEAD D	8	9	- 18
HEAD E	5	12	1
HEAD F	- 11	- 14	- 3
HEAD G	9	3	- 0
HEAD H	15	- 24	5
HEAD I	- 10	- 7	- 4
HEAD J	- 3	16	- 8
			Operation : Front Ready
		000000000000	jog XY
		000000000000	C
			Page151
▲	▼	Proper	△
		Data Save	RETURN

C6PM6051

- Highlight an item and input the new value with the numerical keypad.
- Station 11 Proper data is changed and the screen returns to the regular input screen when [CR] is pressed. The input value is deleted to allow input of a new value if the [BS] key is pressed before the [CR] key.
- The unit of input is 1/100 mm.

6. Description of Commands

Data Save: Print all of the Proper data and deviation averages for the nozzle currently designated.

The printing format is as follows:

Proper data Nozzle type 1
 X, Y, dX, dY [1/100 mm]

HEAD	Proper X	Proper Y	Avg. dX	Avg. dY
A	-10	25	-15	-5
:	:	:	:	:
T	-3	16	-8	4

RETURN: Returns to page 150.

To page 150

Output/Save the Measurement Results

PRINT

Page

Data Save

Function Key Menu

PRINT

Down Load

RETURN

Monitor Display

Continue to display previous page.

First Status Area : Data Save

Function Key Operation

PRINT: Print measurement results. To Data Save 1

Down Load: Transmit measurement results. To Data Save 3

RETURN: Returns to previous page.



Function Key Menu



Monitor Display

Press function key number 2 in the print mode.

First Status Area : PRINT

Function Key Operation

EXECUTE: Print measurement results.

RETURN: Returns to Data Save. To Data Save



Function Key Menu



Monitor Display

Press function key number 2 in the computer wait mode.

First Status Area : Down Load

Function Key Operation

EXECUTE: Transmit measurement result to the host computer.

Change Port: Select port when transmitting to the host computer.
The selected port will change from RS232C port, CH1 and CH2 on the CPU board.
Default port is CH2.

RETURN: Returns to Data Save. To Data Save

Notes:

The FUJI Internet

Fuji Internet aims at providing information to our customers in the most efficient manner. This site makes a range of services available, from manual updates and FAQs, to online technical reports. Fuji hopes that this site will be used as a source of information in addition to the services provided by your agent. Fuji's website is located at **<http://www.fuji.co.jp/>**

Fuji Internet membership is required to access the Technical Information section of the site, contact your agent for details.

Any comments or opinions regarding this manual can be sent to **intnetqst@fuji.co.jp**

CP-6 Series PAM Operation Manual

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