Flying probe tester APT-9411 series

Vision System TOS-5/TOS-4/TOS-41 Operator's Guide



Preface

The Vision System *TOS-5/TOS-4/TOS-41*, one of exclusive options for Takaya Fixtureless Tester APT-9411 Series (hereinafter "Tester"), offers Simple vision test to the components that are nondetectable under electrical test and Coordinates alignment function that secures accurate probes contact on the board under test. In addition, a crosshair (Target marker) displayed on the camera window plays essential role in inputting and correcting X,Y coordinates of the probe contact position. Also, what is special about the TOS-5 system, the great-granddaddy of them all, is a unique feature to recognize the barcode labels that can achieve the serial number input through a CCD camera.

Please read this manual before using this option. Then keep this manual handy for answers to any questions you may have.

If you have any question or thoughts you would like to share with us - we would like to hear from you.

(NOTE)

- 1) This User's guide is written about System version [V1.3-2] for the APT-9411 Series.
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- 4) The design of the product is under constant review and whilst every effort is made to keep this User's guide up to date, the rights is reserved to change specifications and equipment at any time without prior notice.

Introduction

Operation keys and SW

- 1) All operation keys on the keyboard are enclosed by [] mark such like [Enter] key, [SP] key.
- 2) All SWs on the operation panel are also displayed like [TEST START] .
- 3) If some plural keys need to be depressed in order, they are combined with " > ".For example, in case of [A] > [3] key, first depress [A] key then [3] key.
- 4) If some plural keys need to be depressed at a time, they are combined with " + ".
 For example, in case of [Ctrl] + [Y] key, depress [Ctrl] key and [Y] key at a time.

Safety symbols

Symbol	Explanation
WARNING	Calls attention to a procedure, practice, or condition that could possibly cause serious accident or death.
DANGER	Calls attention to a procedure, practice, or condition that could possibly cause bodily injury or damage to the product.
CAUTION	Calls attention to a procedure, practice, or condition that could possibly damage to the product.
(/)	Calls attention to general instruction. Failing to follow this could loss of data stored on disks, cause possibly misjudge the unit under test, or damage to the product.
	Calls attention to "One-point advice" which should be useful when you are at a loss to operate the products.

General

The Simple vision test available in the TOS-5/TOS-4/TOS-41 system is for the components that are nondetectable under electrical test and is classified into as follows.

- 1. Presence check
- 2. Polarity check (Electrolytic capacitors, Tantalum capacitors, ICs, Connectors, etc.)
- 3. Letter recognition check

In addition, this option ensures high accurate probing contact on the PC boards under test which tend to shift in X-Y direction, slant and expandable otherwise contract inconsistently, by aligning the XY coordinates with Board Reference Point and Auxiliary Reference Point(s) automatically. The Coordinates alignment function is also applicable in a limited test area designated by steps, group or parts name (\rightarrow Region alignment in Page 25).

In addition to above, the TOS-5 is able to recognize the barcode labels (Datamatrix, QR code) that can achieve the serial number input through the CCD camera.

<u>(</u>	The reference object has no limitation in its shape, but the image processing area must be set larger than the object size so as the background of the object is included there. As for the details, refer to Page 10.
	Occasionally your objects may not be recognized depending on their kind, color, size, shape, color of polarity mark or letter, and so on.
	By reason of the camera focus, a relatively tall component may not be detectable.

Specifications

Search method :		Gray-scale pattern matching Geometric pattern matching (TOS-5/TOS-4 only)
Measuring resolution :		Approx. 2µm (Image processor unit) Approx. 2.5µm (while Tester works for position alignment)
Measuring repeatable accuracy:		±2μm (Image processor unit) ±50μm (while Tester works for position alignment)
Pass/Fail judgment :	1	By comparing the object image to the reference image learned from a known PCB, it judges pass when its correlation value was over 20% - 100%.
Max. Scene number :		500
Barcode labels (TOS-5 only) :		Reading of Datamatrix, QR code

- The Gray-scale pattern matching is analyzing pixel-grid values, a process known correlation. This method locates objects by comparing a gray-level model (or reference image) of the object to the image. The X-Y position at which the model best matches the image is calculated and, from this, the object's location is determined.
- The Geometric pattern matching looks at the geometric features of the object to accurately locate an object despite changes in its appearance (i.e. piece-to-piece variations of mounting angle and size). In addition, the Geometric pattern matching has features to cope with such environmental changes as the illumination, the outside light and so on. In that sense, this search method overcomes a weakness in the the Gray-scale pattern matching.

Installation

As the diagram below indicates, connect the Camera Control Unit (CCU), the Image processor board (TOS-5/TOS-4/TOS-41) and other peripheral devices with the dedicated cables.



[Fig. 1] System connection diagram



As for the installation procedures of the system software and the driver for the TOS-5/TOS-4/TOS-41 system, refer to the Operator's guide (Software) written for the APT-9411 Series.

Make sure that the tester is unplugged and the power switch is turned off before installing this option into the tester. Otherwise it could possibly cause bodily injury or mechanical trouble.

CCU (Front panel)







[Fig. 4] Image processor board (TOS-5/TOS-4/TOS-41)

The connector drawn by shilling mark in Fig. 4 is connected to the CCU. But the other connectors should not connect to anything else.
The Image processor board (TOS-5/TOS-4/TOS-41) is equipped with various jumpers. If they were set incorrectly, the camera image is not displayed correctly.
In Fig. 4, the black-out terminals mean "short", and the others mean "open".



Option Mode Set

In case that the TOS-5/TOS-4/TOS-41 system is first used with the tester, it is necessary to set up the system software (Option Mode) correctly. This setting is saved into Master Mode file in the system directory.

[Operation steps]

1. Click [Tool] on Menu bar and select [Mode Setting] > [Option Mode] in order. After this, Option Mode window (Refer to Sample display-2) appears on the screen.



[Sample display-2] Option Mode window

2. Click on [Camera System] and fill "Optical System Installed" checkbox.

RS-232C port no. Camera system Inline application Signal tower setting Serial number / Auto data loading Stamp Input / Output function of I/O step DDE communition IC Open Menu customize PCB Support Jigs Vacuum unit	Optical System Installed NTSC OPAL TOS-4 (PCI-TYPE) V2.3.2 NTSC OPAL Standard PCB Standard PCB CAUTION = Agreat deal of thought should be given to your selection of the box "Standard PCB" Fill this box only if you always use the PCB support japs and the upper surface of the PCBs differs in height from the Achine reference point at constant level. After selecting the box, proceed to set up the Camera/Probe Offset according to the display menu.
□ <u>W</u> orkstation Mode	QK XX Qancel

[Sample display-3] Camera System menu

- 3. Set up [Add recognition errors to the failure counter], [Visual test (WA) hold time (1-255sec)] and [Standard PCB] as you like. As for their details, refer to the next section.
- 4. After then, click on [OK] button to close the Option Mode window.

Option Mode set for Camera

Optical System Installed

When the tester is equipped with the Image processor board (TOS-5/TOS-4/TOS-41), fill "Optical System Installed" checkbox and specify either NTSC or PAL as your Color system.

Add recognition errors to the failure counter

When "Add recognition errors to the failure counter" checkbox is filled, if the Vision system got errors trying to recognize fiducial marks, the board is also counted as test fail number. Unless the checkbox is filled, this is not regarded as test fail number.

Visual test (WA) hold time (1-255sec)

When "Visual test (WA) hold time (1-255sec)" checkbox is filled, it is possible to preset the time to suspend the camera movement at Visual test step from 1 - 255 sec. Unless that checkbox is filled, the camera does not move to the next step until any operation panel SWs ([ENTER] SW, [PROBE DOWN] SW, Left-arrow key) is depressed by the operator.



When the camera is suspended at Visual test step, pressing [ENTER] SW on the operation panel judges the step as PASS. And, pressing [PROBE DOWN] SW judges the step as FAIL. If Left-arrow key was depressed, it goes back to the former Visual step.

Standard PCB

In case that "Standard PCB" checkbox is filled, the Camera/Probe Offset value is managed in Option Mode. Unless the checkbox is filled, the Camera/Probe Offset value is managed in Data Mode. Means, you are required to configure it every test programs.



While "Standard PCB" checkbox is filled, Camera/Probe Offset menu does not appear on Data Mode.

About Camera / Probe Offset

To ensure minimum probe pitch, all moving probes are installed on Z arm at a certain angle with a vertical line. If the contact level on the board under test changes when PCB Extension Support Kit (option) is used, as a matter of fact, any probe does not contact the position where the camera read out, as shown in Fig. 6 below.

Whenever the contact level on every PC boards remains unchanged, it is recommended that "Standard PCB" checkbox in Option Mode window is filled in advance.





In case that Camera/Probe Offset value was input incorrectly, any probe may not contact the position where the camera read out.

Test Target

This section explains each size of "Camera area", "Search area" and "Image processing area".

Please make sure that both the Board reference point and the Aux. Reference point for X-Y Coordinates alignment fall inside the Image processing area shown in Fig. 7.

Likewise, at the step data for Presence check and Polarity check, the test target must fall inside the Image processing area and the Search area.



[Fig. 7] Area size (Standard camera)

About 2nd Camera (Option)

The 2nd Camera to install on the Probe 4 arm is also available as option for the APT-9411 Series. As the drawing below indicates, the 2nd Camera with a wide-angle lens has a fifferent Area size than the standard camera installed on Probe 3 arm.





Camera Window

When the tester is equipped with the Image processor board (TOS-5/TOS-4/TOS-41), Camera window (Refer to Sample display-4 below) is displayed when the test program is created (X-Y coordinates input) and/or when the fiducial marks are adjusted.



[Sample display-4] Camera window

While the Camera window is displayed, the dedicated menubar (Refer to Sample display-5 below) appears.

Game	era Window (1	008)	
<u>S</u> ize	<u>T</u> argetMark	T <u>o</u> ol	

[Sample display-5] Camera window menubar

Size

You can click on Size and select any magnification from 400%, 200%, 100% and 50%. The image will be displayed in answer to the size appointed by you.





Any magnification change is conserved until the reference image input or test is executed. After these operation, it turns back to default (100%).

Target Mark

You can click on Target Mark and select any the target marker from the table below. The target marker is displayed in answer to the image color and/or shape appointed by you.

Menu	Explanation
ON	Target marker is overlayed on the camera image. (Normal = ON)
OFF	Target marker is removed from the camera image.
Circle (small)	Target marker is changed to "Circle (small)" type.
Square (small)	Target marker is changed to "Square (small)" type.
Circle (large)	Target marker is changed to "Circle (large)" type.
Square (large)	Target marker is changed to "Square (large)" type.
Circle (oblique line)	Target marker is changed to "Circle (oblique line)" type.
Square (oblique line)	Target marker is changed to "Square (oblique line)" type.

Sample display-7 shows all available Target markers. Please choose the most desirable type in answer to the object shape on your PC board.



[Sample display-7] Target marker



This setting is managed by Data Mode and saved in the disk together with each test program.

Tool

This menubar includes two menus, "Mode 1 ~ Mode 4" and "Property".

Menu	Explanation
Mode 1 ~ Mode 4	You can choose the most desirable Mode (Mode 1 ~ Mode4), in which Target marker, Camera image and LED illumination was already reserved.
Property	Type of Target marker, Camera image and LED illumination can be allocated in each Mode (Mode 1 ~ Mode 4) in advance.

Mode 1 ~ Mode 4

You can choose the most desirable Mode to use, in which Target marker (Shape, Color), Camera image (Gain, Offset) and LED illumination (Upper Blue, Side Red, Side Blue) was already reserved on Property menu.

Property

Your desirable Target marker (Shape, Color), Camera image (Gain, Offset) and LED illumination (Upper Blue, Side Red, Side Blue) can be allocated in each Mode 1 ~ Mode 4.

OMI Property	OMI Property
Target Mark Screen	Target Mark Screen
Mode :	<u>S</u> hape
<u>G</u> ain: 👙 0255	Cojor
Upper Side Side Blue Red Blue	Black Blue
	Red Magenta Green
	Cyan Yellow
Turn off the LEDs during in-circuit testing	White
✓ <u>O</u> K X Cancel	✓ QK ¥ Çancel
Screen tab	Target Mark tab
[Sampl	e display-8]

If choose [Tool] > [Property] in order, both Screen tab and Target Mark tab above appear.

Screen tab (Sample display-8)

This tab allows to set up Camera property (such as Gain, Offset) and LED illumination separately for Mode 1-4.

(1) Mode	Mode where your designated Camera property (such as Gain, Offset) and LED illumination are conserved.
(2) Gain	The Camera image is reproduced with the 256 gradations of 0 (black) - 255 (white). If Gain was adjusted to smaller, the whole image becomes more bright. On the other hand. If adjusted to bigger, it becomes more dark.
(3) Offset	If Gain was adjusted to so smaller that the brightness level exceeds the range of 256 gradations, occasionally the image edge cannot be distinguishable. In this case, it is recommendable to make Offset bigger so as the gradation of the whole image becomes dark and the image edge is distinguishable.
(4) Upper Blue	Blue LED illumination installed at the top of the image is adjustable.
(5) Side Red	Red LED illumination installed at the sides of the image is adjustable.
(6) Side Blue	Blue LED illumination installed at the sides of the image is adjustable.
(7) Turn off the LEDs during in-circuit testing	If this checkbox is filled, all LED illuminations turns off, with the exception of when the Board reference point/Auxiliary reference point is automatically aligned and when the Simple vision test is executed.

Target Mark tab (Sample display-8)

This tab allows you to set up Target marker (Shape, Color) as desired.

(1) Shape	Choose the most desirable type in answer to the object shape on your PC board.
(2) Color	Choose the most desirable color from Black, Blue, Red, Magenta, Green, Cyan, Yellow and White.



Differently from Screen tab, all setting in Target Mark tab applies equally to every Mode (Mode 1 - 4).

This setting is managed by Data Mode and saved in the disk together with each test program.

Coordinates Alignment

Equipped with the TOS-5/TOS-4/TOS-41 system, the tester can align possible inclination and/or scale of PC boards each time before tested by automatically detecting the center point of fiducial marks provided on the PC boards through the CCD camera.

This section introduce a sample operation how to input reference image usable for aligning "Inclination" or "Inclination & scale" of the PC boards under test.

Inclination alignment set at new test programming

- 1) Start with proper setting up of "Conveyor Set Up", "Camera/Probe Offset", "Board Reference Point", "Coordinates Management" and "Fail Map" in Data Mode window.
- 2) Fill "Use Auxiliary Reference Point(s)" checkbox on the Auxiliary Reference Point(s) menu..

Previous Next OK X Cancel	Value Camera / Probe offset Board reference point Cordinates management Fail map Value Qptical system Real Map Probe's lowest position Top position of probe Index Variant management Batter model Statistic function	Use auxiliary reference point(s) Align inclination only Align inclination and scale Reference image input X-BRP Y-BRP X-Aux. -100.0000 +040.0000 +020.0000 +020.0000 Press TINT to begin set up.
PCB Image		
	PCB Image	✓QK ¥ <u>Cancel</u>



X-BRP/Y-BRP shown on Sample display-9 is for X-Y coordinates for Board Reference Point. And X-Aux/Y-Aux. is X-Y coordinates for Auxiliary Reference Point.

- 3) Fill "Align inclination only" radio-button (Sample display-9)
- 4) Fill "Reference image input" checkbox and press [TEST START] SW on the operation panel. (Sample display-9)
- 5) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates.



[Sample display-10] Camera Window

6) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose the Board reference point with Image processing area shown by a red box and then click on "Mark OK" button.



[Sample display-11] Image processing area set

7) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box and then click on "Area OK" button.



[Sample display-12] Search area set

8) The camera shifts 1mm toward the right-top side automatically. Shift your Search area (the red box) so as it encloses the Board reference point and then click on "Area OK" button.



[Sample display-13] Reference image input

- 9) With the above operation, the reference image is input.
- 10) Center the Target marker on the auxiliary reference point using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates. (Sample display-10)
- 11) Enclose the Auxiliary reference point with Image processing area shown by a red box and then click on "Mark OK" button. (Sample display-11)
- 12) The Image processing area box changes from red to blue and Search area is shown by a red box. (Sample display-12) Specify your Search area with the red box and then click on "Area OK" button.
- 13) With the above operation, the reference image is input.
- 14) When all process to setup and input the Board reference point and the Auxiliary reference point was finished, the display goes back to Data Mode window. (Sample display-9)



To align possible inclination of the PC boards, it is enough to use two fiducial marks, Board reference point and Auxiliary reference point.

But in case of aligning their inclination and/or scale, it must use three fiducial marks, Board reference point, Auxiliary reference point-1 and Auxiliary reference point-2.

Inclination & scale alignment set at new test programming

- 1) Start with proper setting up of "Conveyor Set Up", "Camera/Probe Offset", "Board Reference Point", "Coordinates Management" and "Fail Map" in Data Mode window.
- 2) Fill "Use Auxiliary Reference Point(s)" checkbox on the Auxiliary Reference Point(s) menu.

Data mode	
Restricted area Camera / Probe offset Board reference point Coordinates management Fail map Auxiliary reference point(s) Optical system Probe's lowest position Top position of probe Index Variant management Bottom tools Statistic function	✓ Use auxiliary reference point(s) ○ Align inclination only ○ Align inclination and scale □ Reference image input X-BRP Y-BRP X-BRP Y-BRP X-Aux.2 Y-Aux.1 1-100.0000 +040.0000 X-Aux.2 Y-Aux.2 +040.0000 +000.0000 Press \$TANT to begin set up.
Section 2015 PCB Image	<u>✓ QK</u> <u>× C</u> ancel
1 11 1 4 17 0	

[Sample display-14] Coordinates Management (Data mode)



X-BRP/Y-BRP shown on Sample display-14 is for X-Y coordinates for Board Reference Point. X-Aux.1/Y-Aux.1 is X-Y coordinates for Auxiliary Reference Point-1 and X-Aux.2/Y-Aux.2 is X-Y coordinates for Auxiliary Reference Point-2.

- 3) Fill "Align inclination and scale" radio button (Sample display-14)
- 4) Fill "Reference image input" checkbox and press [TEST START] SW on the operation panel. (Sample display-14)
- 5) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates.



[Sample display-15] Camera Window

6) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose the Board reference point with Image processing area shown by a red box and then click on "Mark OK" button.



[Sample display-16] Image processing area set

7) The Image processing area box changes from red to blue and Search area is shown by a red box. Specify your Search area with the red box and then click on "Area OK" button.



[Sample display-17] Search area set

8) The camera shifts 1mm toward the right-top side automatically. Shift your Search area (the red box) so as it encloses the Board reference point and then click on "Area OK" button.



[Sample display-18] Reference image input

- 9) With the above operation, the reference image is input.
- 10) Enclose the Auxiliary reference point-1 with Image processing area shown by a red box and then click on "Mark OK" button. (Sample display-15)
- The Image processing area box changes from red to blue and Search area is shown by a red box. (Sample display-17)

Specify your Search area with the red box, then click on "Area OK" button.

- 12) With the above operation, the reference image is input.
- 13) Enclose the Auxiliary reference point-2 with Image processing area shown by a red box and then click on "Mark OK" button. (Sample display-15)
- 14) The Image processing area box changes from red to blue and Search area is shown by a red box. (Sample display-17)
 Specify your Search area with the red box, then click on "Area OK" button.
- 15) With the above operation, the reference image is input.
- 16) When all process to setup and input the Board reference point and the Auxiliary reference point-1, 2 finished, the display goes back to Data Mode window. (Sample display-14)



To align possible inclination and/or scale of PC boards, it must use three fiducial marks, Board reference point, Auxiliary reference point-1 and Auxiliary reference point-2.

But in case of aligning their inclination only, it is enough to use two fiducial marks, Board reference point and Auxiliary reference point.

Inclination alignment set to an existing test program

- 1) After loaded an objective test program, set up "Conveyor Set Up", "Camera/Probe Offset" and "Board Reference Point" in Data Mode window properly.
- 2) Open Data Mode window (Tool > Mode Setting > Data Mode).

🚳 APT-9411 Version 1.X.X (Point system)			001
<u>File Edit Reference Test Tool View Help</u>			
File Mode Edit Optimizz - Group Addition Edit Optimizz - Auto Location Set Change Step Data Cognitiates Change for G Ogtimization Cooglinitation Cooglinitation Cooglinitation	CtrI+C round	dinate Self-diag Convert Help Set	
Mode Setting		Data Mode Ctrl+D	
1 Data Programming Wizard			
CA9 File Conversion	,	S Master Mode F5	

[Sample display-19] Menu bar (Data Mode)

 Open Optical System menu and fill the "Use optical system" checkbox. Also set up Camera Properties, if necessary (Refer to Page 12)

Data mode	
	⊠ Use optical system Carnera Properties
	QK <mark>≭C</mark> ancel

[Sample display-20] Data Mode window

4) Open Image data input menu (Reference > Optical Reference Value Input), where you can input the image data for both Board reference point and Auxiliary reference point.

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<u>File E</u> dit	<u>R</u> eference <u>T</u> est T <u>o</u> ol <u>V</u> iew <u>H</u> elp		
File Mor	are Reference Value Input	Test Total Coordinate Self-diag. Convert Help	
-	🖌 Reference Value Generation		
D.Mode T	▶♥ <u>O</u> pen Data Generation		
	🝃 Data Average		
	Ogtical Reference Value Input		
	Auxiliary •		

[Sample display-21] Menu bar (Image data input menu)

- 5) Press [TEST START] SW on the operation panel.
- 6) It shows "Use board ref.point and aux.ref.point for alignment?" on the display. So click on [YES] button, then [TEST START] SW on the operation panel.

7) It shows "Set the board reference point using the CCD camera" on the display. Then press [TEST START] SW on the display.

X-BRP	Y-BRP	X-Aux.	Y-Aux.	
			-	
	TTET			

[Sample display-22] Board reference point set message

8) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates.



[Sample display-23] Camera Window

- 9) Next, center the Target marker on the Auxiliary reference point using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates. (Sample display-23)
- 10) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose the Board reference point with Image processing area shown by a red box and then click on "Mark OK" button.



[Sample display-24] Image processing area set

11) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box and then click on "Area OK" button.



[Sample display-25] Search area set

12) The camera shifts 1mm toward the right-top side automatically. (Sample display-26) Shift your Search area (the red box) so as it encloses the Board reference point and then click on "Area OK" button.



[Sample display-26] Reference image input

- 13) With the above operation, the reference image is input.
- 14) Enclose the Auxiliary reference point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-24)
- 15) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-25) Specify your Search area with the red box, and then click on "Area OK" button.
- 16) With the above operation, the reference image is input.
- 17) When "Image Reference" window was closed, your operation of inputting the image data for Board reference point and Auxiliary reference point is finished.



To align possible inclination of the PC boards, it is enough to use two fiducial marks, Board reference point and Auxiliary reference point.

But in case of aligning their inclination and/or scale, it must use three fiducial marks, Board reference point, Auxiliary reference point-1 and Auxiliary reference point-2.

Inclination & scale alignment set to an existing test program

- 1) After loaded an objective test program, set up "Conveyor Set Up", "Camera/Probe Offset" and "Board Reference Point" in Data Mode window properly.
- 2) Open Data Mode window (Tool > Mode Setting > Data Mode).

🙀 APT-9411 Version 1.X.X (Point system)		80
<u>File Edit Reference Test Tool View H</u> elp		
File Mode Edit Optimizz - Group Addition Edit List Erss Search Quantization Coordinates Self Diagnosis Pin Search	dinate Selfdiag Convert Help	
Mode Setting	- Data Mode Ctrl+D	
👌 Data Programming Wizard	Lest Mode Ctrl+T	
CA9 File Conversion	▶ Master Mode F5	

[Sample display-27] Menu bar (Data Mode)

3) Open Optical System menu and fill the "Use optical system" checkbox. Also set up Camera Properties, if necessary (Refer to Page 12)

Data mode	
	⊠ Use optical system Carnera Properties
	QK <mark>≭C</mark> ancel

[Sample display-28] Data Mode window

4) Open Image data input menu (Reference > Optical Reference Value Input), where you can input the image data for both Board reference point and Auxiliary reference point-1, 2.

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File Edit Reference Test Tool View Help		
File Mor 🗽 Reference Value Input	e Test Total Coordinate Self-diag. Convert Help	
📕 🔺 Reference Value Generation		
D.Mode T St Open Data Generation		
📴 Data Average		_
Ogtical Reference Value Input		
Auxiliary		

[Sample display-29] (Image data input menu)

- 5) Press [TEST START] SW on the operation panel.
- 6) It shows "Use board ref.point and aux.ref.point for alignment?" on the display. So click on [YES] button, then [TEST START] SW on the operation panel.
- 7) It shows "Set the board reference point using the CCD camera" on the display. Then press [TEST START] SW on the display.

X-BRP	Y-BRP	X-Aux.1	Y-Aux.1	
X-Aux.2	Y-Aux.2			

[Sample display-30] Board reference point set message

8) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates.



[Sample display-31] Camera Window

- 9) Center the Target marker on the Auxiliary reference point-1 using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates. (Sample display-31)
- 10) Center the Target marker on the Auxiliary reference point-2 using the keypad arrow keys on the operation panel and then press [ENTER] SW to enter the coordinates. (Sample display-31)
- 11) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose the Board reference point with Image processing area shown by a red box and then click on "Mark OK" button.



[Sample display-32] Image processing area set

12) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box and then click on "Area OK" button.



[Sample display-33] Search area set

13) The camera shifts 1mm toward the right-top side automatically. Shift your Search area (the red box) so as it encloses the Board reference point and then click on "Area OK" button.



[Sample display-34] Reference image input

- 14) With the above operation, the reference image is input.
- 15) Enclose the Auxiliary reference point-1 with Image processing area shown by a red box and then click on "Mark OK" button. (Sample display-32)
- 16) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-33) Specify your Search area with the red box, and then click on "Area OK" button.
- 17) With the above operation, the reference image is input.
- 18) Enclose the Auxiliary reference point-2 with Image processing area shown by a red box and then click on "Mark OK" button. (Sample display-32)
- 19) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-33) Specify your Search area with the red box, and then click on "Area OK" button.
- 20) With the above operation, the reference image is input.
- 21) When "Image Reference" window was closed, your operation of inputting the image data for Board reference point and Auxiliary reference point-1, 2 is finished.



To align possible inclination and/or scale of PC boards, it must use three fiducial marks, Board reference point, Auxiliary reference point-1 and Auxiliary reference point-2.

But in case of aligning their inclination only, it is enough to use two fiducial marks, Board reference point and Auxiliary reference point.

Region Alignment

The Coordinates alignment function is also applicable to your specified area in a test program. This is called "Region Alignment" in the software and is chosen among three options below;

- * Coordinates alignment after this step
- * Coordinates alignment only in this group
- * Coordinates alignment at the steps using this parts name

In this section, each Region alignment function is explained based on their concrete operating procedures.

Coordinates alignment after this step

Specify "Coordinates alignment after this step" function, and the X,Y coordinates in all steps following the designated step are aligned automatically. If this was designated to the test step, "After-correct" is substituted in the Comment column.

Followings are your operating procedures to set up "Coordinates alignment after this step" function. (Ex.) X,Y coordinates after Test step #3 are aligned for possible incline & scale.



To align X,Y coordinates in some part of area against possible inclination and/or scale, it must use three fiducial marks. On the other hand, in case of the inclination only, it is enough to use two fiducial marks. (Above excludes both Board reference point and Auxiliary reference point(s))

- 1) Open Step Edit window (Edit > Step Edit) or Step List window (Edit > Step List).
- 2) It shows "Enter step number" on the dialog box. Enter the top step number to be aligned on the keyboard and click on [OK] button.

Editor			
Enter step number (-)-	
			~
			✓ <u>O</u> K X Cancel

[Sample display-35] Step number input

3) The step data list appears while showing the cursor on the specified step (Test step #3).

🍏 АРТ-	9411 V	ersion [·]	I.X-X (Teachir	ng system)									
Edit	Searc	h <u>M</u> ov	e <u>T</u> ool <u>V</u> iew										_ 8 ×
File	Mode	Edit	Optimization To	ool Reference Tes	t Total	Coordina	te S	elf-diag. Con	nvert Help				
Edit	List	Erase	🍫 🦊 Search Change	DEdr D.Set	A.Gen. Pr	int Uni	do s	elect Cat	Copy Pas	te Cescade			
Step	: Aux.	Parts	Value	Conment		F. 4	-k -1	Referer	ace Test	Judge	1-Xcoor	1-Ycoor	BFRL
000001	:	C5214	10NF			** 3	0 3	0 1089 t	JF		[+005.930	0,+008.0000]	
000002		C5215	100NF			** 3	0 3	0 100.0 r	1F		[+000.000	0,+000.0000]	
000003		IC300:	1 1-7P	TKY0123		** 5	0 5	0.539 1	1		[****.***	*, ****. ****]	
000004		IC300:	1 2-7P	TKY0123		** 5	0 5	0.407 1	1		[****.***	*, ****. ****]	
000005	:	IC300:	1 3-7P	TKY0123		** 5	0 5	0.539	1		[****,***	*, ****, ****]	
000006		IC300:	1 4-7P	TKY0123		** 5	0 5	0.538 \	,		[****.**	*, ****. ****]	
000007	:	IC300:	1 5-7P	TKY0123		** 5	0 5	0.700 \	1		[****.**	*, ****. ****]	
000008	:	IC300:	1 6-7P	TKY0123		** 5	0 5	0.539 1	1		[****.***	*, ****. ****]	
000009	:	IC300:	1 8-7P	TKY0123		** 5	0 5	0.539 1	1		[****.**	*, ****, ****	-
000010	:	IC300:	1 9-7P	TKY0123		** 5	0 5	0.406 1	1		[****.***	*, ****. ****]	

[Sample display-36] Step data list (Step No.3)

4) Click on Tool to select Region alignment.

👹 АРТ	-9411	Version 1	I.X-X	(Point system) - [C	¥TAKAYA¥TAKAY	A.SWXJ												
Edit	Searc	ch <u>M</u> ove	e <u>T</u> o	ol <u>V</u> iew														- 8 ×
File	Mode	Edit	Op	<u>C</u> oordinates Map		F1	ite	Self-dia	g,	Cor	wert	Help						
Edit	List	Erase	5 - 4	🎽 Set Comb Measura 🚽 Clear Comb Measu	iments irements	;		A.Gen.	-	Print	6 U	hdo Select		Copy	Paste	Cescade		
Step	:Aux.	Parts	1	200 000			n	L-pin	F.	+8	-8	Referenc	e Te	st	Ju	dge	1-Xc	oor
000001	•	C5214		Generation		,	*	*	**	30	30	10.00 nF					[+00	5.9300
000002		C5215		Ground			*	*	**	30	30	100.0 nF					[+00	0.0000
000003		IC3001	1	Giodina			*	*	SH	50	50	0.00 0					[+00	0.0000
000004	:	IC3001	L	Bottom probe			*	*	SH	50	50	0.00 0					[+00	0.0000
000005		IC3001	L.	Olivation Everation			*	*	SH	50	50	0.00 0					[+00	0.0000
000006		IC3001	L.	Gjuster Function			*	*	SH	50	50	0.00 0					[+00	0.0000
000007		IC3001	L	(1992)121 (19)			*	*	SH	50	50	0.00 0					[+00	0.0000
000008	:	IC3001	L	I/O Function		•	*	*	SH	50	50	0.00 0					[+00	0.0000
000009	:	IC3001		Viewable Seturi of	Euroption steps	F4	*	*	SH	50	50	0.00 0					[+00	0.0000
000010	:	IC3001		Tourne couch of	r anocioni ocopo	10	*	*	SH	50	50	0.00 0					[+00	0.0000
000011		IC3003	Ľ	Coordinates insut			*	*	SH	50	50	0.00 0					[+00	0.0000
000012		IC3001	E .	ooorginates input			*	*	SH	50	50	0.00 0					1+00	0.0000
000013		IC3001		Auto Generation			*	*	SH	50	50	0.00 0					00+1	0.0000
000014		IC3001					*	*	SH	50	50	0.00 0					100+1	0.0000
000015		IC3001		Change Step Data	L	itn+G	*	*	SH	50	50	0.00 0					1+00	0.0000
000016		IC3001		Select Revise Are	a Mode		*	*	SH	50	50	0.00 0					00+1	0.0000
000017		IC3001		111 A ()	011010	C. LE L	*	*	SH	50	50	0.00 0					00+1	0.0000
000018		TC3001		High-Tiy / No-cor	tact-zone Shift+C	itn+H		*	SH	50	50	0.00.0					[+00	0.0000

[Sample display-37] Select Revise Area Mode (Menu bar)

5) The Region alignment window appears on the display.



6) Choose "Coordinates alignment after this step" from a pull-down menu.

Region alignment	a a a a a a a a a a a a a a a a a a a
Coordinates alignment after this step	Position and inclination alignment
Set No.1 auxiliary point for this alignment area (After 5	step).
If at any time you want to set or change Region alignment	t mode, don't fail to perform either
	an ([root] > [coordinates]) in advance.
coor1X coor1Y coor2X coor2Y	
+000.0000 +000.0000 +000.0000	
Proce CTANT to begin set up	
Fless START to begin set up.	
	✓ OK X Cancel

[Sample display-39] Region alignment window

7) Choose "Position, scale and inclination alignment" from a pull-down menu.



[Sample display-40] Region alignment window

- 8) Press [TEST START] SW on the operation panel.
- 9) After "Camera Window" appeared on the display, center the Target marker on No.1 auxiliary point for your assigned area using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.



[Sample display-41] Camera Window

- Center the Target marker on No.2 auxiliary point for your assigned area using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates. (Sample display-41)
- Center the Target marker on No.3 auxiliary point for your assigned area using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates. (Sample display-41)
- 12) After all auxiliary points were set, the display goes back to the step data list, where "After-correct" is substituted in the Comment column.
- 13) Press [Esc]key on the keyboard to close the step data list.



14) Select the Optical Reference Value Input from the Reference menu.

🖏 APT-9411 Version 1.X-X (Point system)	
<u>File Edit Reference Test Tool View Help</u>	
File Mo 🖢 Beference Value Input 🛛 Fist Total C	oordinate Self-diag. Convert Help
A Reference Value Generation	
DMode T 🔊 Open Data Generation	
🍃 Data Average	
Ogtical Reference Value Input	
Auxiliary	

[Sample display-43] Menu bar (Optical Reference Value Input)

15) The Optical Reference Value Input window appears to show you all optical steps. The steps in black have already input the optical data, but the steps in blue has not yet input. Thus, please fill the checkbox which optical data should be input.

Input Optical Reference Value						
Move D Board reference point						
Move D First auxiliary reference point						
Move Second auxiliary reference point						
Move V No.1 auxiliary point after 3 step						
Move V. No.2 auxiliary point after 3 step						
Move V No.3 auxiliary point after 3 step						
An image will be input for all checked points. Select OK when ready to begin.						
All select All release						

[Sample display-44] Optical Reference Value Input window

16) The Optical data input condition window appears. (Sample display-45)



[Sample display-45] Optical data input condition window



- 17) Press [TEST START] SW on the operation panel.
- 18) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 19) After a message "Set board reference point using the CCD camera" appeared, press [TEST START] SW on the operation panel.

et the boa	rd reference	e point using	the CCD c	amera.
X-BRP	Y-BRP	X-Aux.1	Y-Aux.1	
X-Aux.2	Y-Aux.2			
Press	TEST START to	begin set	up.	
				✓ <u>O</u> K X Cancel

[Sample display-46] Board reference point set

- 20) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 21) Center the Target marker on the Auxiliary reference point-1 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 22) Center the Target marker on the Auxiliary reference point-2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 23) It shows "Set the No.1 auxiliary point after 3 steps using the CCD camera." Then press [TEST START] SW on the operation panel.

svise				Σ
Set the No.1	auxiliary po	int after 3 st	eps using th	he CCD camera.
coor1X	coor1Y	coor2X	coor2Y	
coor3X	coor3Y			
COOLOX	000101			
	TEST			
Press	TART to b	begin set	up.	
				✓ OK X Cancel

[Sample display-47] Auxiliary point set

- 24) After "Camera Window" appeared on the display, center the Target marker on No.1 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 25) Center the Target marker on No.2 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 26) Center the Target marker on No.3 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 27) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. (Sample display-16)
 Enclose No.1 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button.



[Sample display-48] Image processing area set

28) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box, and then click on "Area OK" button.



[Sample display-49] Search area set

- 29) Enclose No.2 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-48)
- 30) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-49) Specify your Search area with the red box, then click on "Area OK" button.
- 31) Enclose No.3 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-48)
- 32) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-49) Specify your Search area with the red box, and then click on "Area OK" button.
- 33) When "Image Reference" window was closed, your operation of inputting the image data from auxiliary point1 to 3 is finished.

Coordinates alignment only in this group

Specify "Coordinates alignment only in this group" function, and the X,Y coordinates in the designated test group are aligned automatically. If this was designated to the test step, "Group-correct" is substituted in the Comment column.

Followings are your operating procedures to set up "Coordinates alignment only in this group" function. (Ex.) X,Y coordinates in Group #2 are aligned for possible incline & scale.



To align X,Y coordinates in some part of area against possible inclination and/or scale, it must use three fiducial marks. On the other hand, in case of the inclination only, it is enough to use two fiducial marks. (Above excludes both Board reference point and Auxiliary reference point(s))

- 1) Open Step Edit window (Edit > Step Edit) or Step List window (Edit > Step List).
- It shows "Enter step number" on the dialog box. Enter the top step number of the group (Group #2) to be aligned on the keyboard and click on [OK] button.



3) The step data list appears while showing the cursor on the specified step.

IN APT	APT-9411 Version 1.X-X (Teaching system) - [C:¥TAKAYAYTAKAYA,SWX]									
Edit	Searc	h Move	e <u>T</u> ool ⊻iew					- 8 ×		
File	Mode	Edit	Optimization Tool	Reference Test	Total Coordinate	Self-diag. Convert Help		Sector Sector		
Edit	List	Erase	Search Change	D.Edil D.Set	Sen. Print Undo	Select Cut Copy Paste	Cascade Tae			
Step	:Aux.	Parts	Value	Comment	F. +8	-% Reference Test	Judge	1-Xcoor 1-Ycoor 🔥		
000295	:	IC2001	19-10P	*	** 50	50 0.690 V		[-012.5825,+024.821		
000296		IC2003	20-10P	*	** 50	50 0.690 V		[-007.7563,+016.160		
000297		C4001	lONF	*	** 30	30 10.00 nF		[+000.0000,+000.000		
000298		IC4002	i P1-2	*	OP 50	50 400.0 O		[+000.6900,+025.360		
000299		IC4002	P2-3	*	OP 50	50 400.0 O		[-036.6625,+046.722		
000300		IC4002	P3-4	*	OP 50	50 400.0 O		[-055.8163,+063.186		
000301		IC4002	1 P4-5	¥	OF 50	50 400.0 O		[-033.4163,+049.586		
000302		IC4002	1 P5-6	*	OF 50	50 400.0 O		[+025.7288,+067.076		
000303	:	IC4002	P6-7	*	OF 50	50 400.0 O		[-077.7750,+007.497		
000304		IC4003	P7-8	*	OP 50	50 400.0 O		[-014.5175,+007.497		

[Sample display-51] Step data list (Step No. 418)

4) Click on Tool to select Region alignment.

Edit Searc	h Move	X (Point system) − LC+TAKAYA‡TAKA [ool: <u>V</u> iew	YA.5WX									_ # ×
File Mode	Edit Op	<u>C</u> oordinates Map	F1	ite	Self-di	ag.	Cor	ivert	Help			
Edit List	Erase S	Set Comb Measurements			A.Gen.		Print	6 U	The Select	Cut Copy	Paste Cascade	
Step :Aux.	Parts		2	n	L-pin	F.	+%	-8	Reference	Test	Judge	1-Xcoor
000001:	C5214	Generation		* *	*	**	30	30	10.00 nF			[+005.9300
000002:	C5215	Ground		• *	*	**	30	30	100.0 nF			[+000.000
000003:	IC3001	2000.00		*	*	SH	50	50	0.00 0			[+000.000
000004:	IC3001	Bottom probe		• •	*	SH	50	50	0.00 0			[+000.000
000005:	IC3001	Objectes Evention		. *	*	SH	50	50	0.00 0			[+000.000
000006:	IC3001	Cjuster Function		8 E.	*	SH	50	50	0.00 0			[+000.000
000007:	IC3001	100		. *	*	SH	50	50	0.00 0			[+000.000
000008:	IC3001	1/O Function				SH	50	50	0.00 0			[+000.000
000009:	IC3001	Viewable Setup of Function steps	F4	*	*	SH	50	50	0.00 0			[+000.0000
000010:	IC3001		10 10	*	*	SH	50	50	0.00 0			[+000.0000
000011:	IC3001	Coordinates innut		*	*	SH	50	50	0.00 0			[+000.0000
000012:	IC3001	oborginateo mpat		*	*	SH	50	50	0.00 0			[+000.000
000013:	IC3001	Auto Generation		*		SH	50	50	0.00 0			[+000.0000
000014:	IC3001	Change Stee Data	Otdato	*	*	SH	50	50	0.00 0			[+000.0000
000015:	IC3001	S Oriange Step Data	ouno	*	*	SH	50	50	0.00 0			(+000.000
000016:	IC3001	Select Revise Area Mode		*	*	SH	50	50	0.00 0			[+000.0000
000017:	IC3001	Liber A. (Ma contrast and Oble	OWNER	- ×		SH	50	50	0.00 0			1+000.000
000018:	IC3001	Eign=ny / No=Contact=zone Shift-	Out H	*	*	SH	50	50	0.00 0			1+000.0000

[Sample display-52] Select Revise Area Mode (Menu bar)

5) The Region alignment window appears on the display. (Refer to Sample display-53)



[Sample display-53] Region alignment window

6) Choose "Coordinates alignment only in this group" from a pull-down menu.



7) Choose "Position, scale and inclination alignment" from a pull-down menu.

R	ecion alignment								8	
	Coordinates :	alignment or	nly in this gro	oup		🍟 Position, scale	and inclination	alignment	*	
	Set No.1 auxiliary point for this alignment area (Group 1)									
	If at any ti	me you want l	to set or chan " or "PCB Inc	ge Region align	ment m	iode, don't fail to perf ([Tool] > [Coordinate	orm either s1) in advance			
	1 00 110				000011	([real] [coordinate	oj, in datanco.			
	coor1X	coor1Y	coor2X	coor2Y						
	+000.0000	+000.0000	+000.0000	+000.0000						
	coor3X	coor3Y								
	+000.0000	+000.0000								
	Proce CT	EST to by	agin eat u	n						
	FIESS SI	ART to be	sym set u	φ.						
							✓ ок	X Cance		
								Juneo	1	

[Sample display-55] Region alignment window

- 8) Press [TEST START] SW on the operation panel.
- 9) After "Camera Window" appeared on the display, center the Target marker on No.1 auxiliary point in Group #2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.



[Sample display-56] Camera Window

- 10) Center the Target marker on No.2 auxiliary point in Group #2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates. (Sample display-56)
- 11) Center the Target marker on No.3 auxiliary point in Group #2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates. (Sample display-56)
- 12) After all auxiliary points in Group #2 were set, the display goes back to the step data list, where "Group-correct" is substituted in the Comment column.

13) Press [Esc]key on the keyboard to close the step data list.



[Sample display-57] Main Window

14) Select Optical Reference Value Input from the Reference menu.

🎒 APT-9411 Version 1. X-X (Point system)		
File Edit Reference Test Tool View Help		
File Mot 🗽 Reference Value Input	e Test Total Coordinate Self-diag. Convert Help	
📕 🖌 Reference Value Generation		
D Mode T N Deen Data Generation		
📴 Data Average		
Ogtical Reference Value Input		
Auxiliary		

[Sample display-58] Menu bar (Optical Reference Value Input)

15) The Optical Reference Value Input window appears to show all optical steps The steps in black have already input the optical data, but the steps in blue have not yet input. Thus, please fill the checkbox which optical data should be input.



[Sample display-59] Optical Reference Value Input window

16) The Optical data input condition window appears. (Sample display-60)



[Sample display-60] Optical data input condition window



Unless "Reset window size" checkbox displayed on Optical data input condition window was filled, Image processing area and Search are same as the ones used at your last operation. Be sure to fill the checkbox whenever the optical data is newly input.

If "Clear Jumped (JP) setting" checkbox displayed on Optical data input condition window was filled, the measuring function in the optical step where has been preset to JUMP(JP) is initialized to "BLANK(**)".

- 17) Press [TEST START] SW on the operation panel.
- 18) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 19) After a message "Set board reference point using the CCD camera" appeared, press [TEST START] SW on the operation panel.

evise				
Set the boa	rd reference	e point using	the CCD ca	amera.
X-BRP	Y-BRP	X-Aux.1	Y-Aux.1	
X-Aux 2	Y-Aux 2			
_ [TEST .			
Press	START to	begin set	up.	
				✓ OK X Cancel

[Sample display-61] Board reference point set

- 20) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 21) Center the Target marker on the Auxiliary reference point-1 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 22) Center the Target marker on the Auxiliary reference point-2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 23) It shows "Set the No.1 auxiliary point in group 2 using the CCD camera." Then press [TEST START] SW on the operation panel.

Revise
Set the No.1 auxiliary point in group 2 using the CCD carnera.
coor1X coor1Y coor2X coor2Y
coor3X coor3Y
Press START to begin set up.
✓QK X Cancel
Company display (CO) As will any maintenant

[Sample display-62] Auxiliary point set

- 24) After "Camera Window" appeared on the display, center the Target marker on No.1 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 25) Center the Target marker on No.2 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 26) Center the Target marker on No.3 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.

27) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose No.1 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button.



[Sample display-63] Image processing area set

28) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box, and then click on "Area OK" button.



[Sample display-64] Search area set

- 29) Enclose No.2 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-63)
- 30) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-64)

Specify your Search area with the red box, and then click on "Area OK" button.

- 31) Enclose No.3 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-63)
- 32) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-64) Specify your Search area with the red box, and then click on "Area OK" button.
- 33) When "Image Reference" window was closed, your operation of inputting the image data from auxiliary point 1 to 3 is finished.

Coordinates alignment at the steps using this parts name

Specify "Coordinates alignment at the steps using this parts name" function, and the X,Y coordinates in all steps with the designated parts name are aligned automatically. If this was designated to the test step, "Parts-correct" is substituted in the Comment column.

Followings are your operating procedures to set up "Coordinates alignment at the steps using this parts name" function.

(Ex.) X,Y coordinates of the step data which parts name is "IC5403" are aligned for possible incline & scale.



To align X,Y coordinates in some part of area against possible inclination and/or scale, it must use three fiducial marks. On the other hand, in case of the inclination only, it is enough to use two fiducial marks. (Above excludes both Board reference point and Auxiliary reference point(s))

- 1) Open Step Edit window (Edit > Step Edit) or Step List window (Edit > Step List).
- 2) It shows "Enter step number" on the dialog box. Enter the top step number to be aligned on the keyboard and click on [OK] button.



[Sample display-65] Step number input

3) The step data list appears while showing the cursor on the specified step.

IN APT-	🕼 APT-9411 Version 1_X-X (Teaching system) - [C:¥TAKAYA¥TAKAYA.SWX]									
Edit	Edit Search Move Iool View _ 8 ×									
File	Mode	Edit	Optimization Tool	Reference Test	Total Coordinate	Self-diag. Convert Help				
Edit	List	Erase	Search Change	DEdt D.Set	en. Print Undo	Select Cut Copy Paste				
Step	:Aux.	Parts	Value	Comment	F. +%	-% Reference Test Judge	1-Xcoor 1-Ycoor 🔺			
000101	:	C5214	10NF	*	** 30	30 10.00 nF	[-061.1088,+055.715			
000102		C5215	100NF	*	** 30	30 100.0 nF	[-060.5388,+058.285			
000103	:	IC3001	1 1-7P	TKY0123	** 50	50 0.538 V	[+000.0000,+000.000			
000104	:	IC3001	2-7P	TKY0123	** 50	50 0.407 V	[+000.0000,+000.000			
000105	:	IC3001	1 3-7P	TKY0123	** 50	50 0.538 V	[+000.0000,+000.000			
000106		IC3001	1 4-7P	TKY0123	** 50	50 0.537 V	000.000+,0000.000			
000107	:	IC3001	1 5-7P	TKY0123	** 50	50 0.700 V	[+000.0000,+000.000			
000108		IC3001	1 6-7P	TKY0123	** 50	50 0.540 V	(+000.0000,+000.000			
000109	:	IC3001	1 8-7P	TKY0123	** 50	50 0.540 V	1+000.0000,+000.000			
000110	:	IC3001	1 9-7P	TKY0123	** 50	50 0.406 V	[+000.0000,+000.000			

[Sample display-66] Step data list (Step No.103)

4) Click on Tool to select Region alignment.

🎒 APT-94	11 Version 1.X	X (Point system) - [C:¥TAKAYA¥TAK	AYA.SWX									
Edit S	earch <u>M</u> ove	Tool View										- @ ×
File Mo	ide Edit Op	<u>C</u> oordinates Map	F1	ite	Self-di	ag.	Cor	ivert	Help			
Edit	List Erase 5	Set Comb Measurements	;		A.Gen.		Print	6 U	hdo Select	Cut Copy	Paste Cascade	
Step :Au	ax. Parts			n	L-pin	F.	+8	-8	Reference	Test	Judge	1-Xcoor
000001:	C5214	Ggneration	,	*	*	**	30	30	10.00 nF			[+005.9300
000002:	C5215	Ground		*	*	**	30	30	100.0 nF			[+000.0000
000003:	IC3001	Giodila		*	*	SH	50	50	0.00 0			[+000.0000
000004:	IC3001	Bottom probe	,	*	*	SH	50	50	0.00 0			[+000.0000
000005:	IC3001	Olympic Experience		*	*	SH	50	50	0.00 0			[+000.0000
000006:	IC3001	Gjuster Function	3	*	*	SH	50	50	0.00 0			[+000.0000
000007:	IC3001	I/O Evanting		٠		SH	50	50	0.00 0			[+000.0000
000008:	IC3001	D O Punction		*		SH	50	50	0.00 0			[+000.0000
000009:	IC3001	Viewable Setup of Function steps	F4	*	*	SH	50	50	0.00 0			[+000.0000
000010:	IC3001		100.00	٠		SH	50	50	0.00 0			[+000.0000
000011:	IC3001	Coordinates input		*	*	SH	50	50	0.00 0			[+000.0000
000012:	IC3001	and a second		٠	*	SH	50	50	0.00 0			[+000.0000
000013:	IC3001	Auto Generation		٠	*	SH	50	50	0.00 0			[+000.0000
000014:	IC3001	Change Sten Data		٠	*	SH	50	50	0.00 0			[+000.0000
000015:	IC3001	p		*	*	SH	50	50	0.00 0			[+000.0000
000016:	IC3001	Select <u>R</u> evise Area Mode		*	*	SH	50	50	0.00 0			[+000.0000
000017:	IC3001	High-fly / No-contact-zone Shift	HONG	*		SH	50	50	0.00 0			[+000.0000
000018:	IC3001	Tight hy / No contact zone only	country	*	*	SH	50	50	0.00 0			[+000.0000

[Sample display-67] Select Revise Area Mode (Menu bar)

5) The Region alignment window appears on the display.



[Sample display-68] Region alignment window

6) Choose "Coordinates alignment at the steps using this parts name" from a pull-down menu.



7) Choose "Position, scale and inclination alignment" from a pull-down menu.

Coordinates alignment at the steps using this parts name Position, scale and inclination alignment Set No.1 auxiliary point for this alignment area (Parts name: 5 : IC101) If at any time you want to set or change Region alignment mode, dont fail to perform either "PCB Incline Correction" or "PCB Incline/Scale Correction"([Tool] > [Coordinates]) in advance. coor1X coor1Y coor2X coor2Y +000.0000 +000.0000 +000.0000 +000.0000 coor3X coor3Y coor3Y +000.0000 +000.0000 +000.0000 Press START to begin set up.	ion alignment								
Set No.1 auxiliary point for this alignment area (Parts name: 5 : IC101) If at any time you want to set or change Region alignment mode, don't fail to perform either "PCB Incline Correction" or "PCB Incline"Scale Correction"([Tool] > [Coordinates]) in advance. coor1X coor1Y coor2X coor2Y +000.0000 +000.0000 +000.0000 +000.0000 coor3X coor3Y coor3Y +000.0000 +000.0000 +000.0000 Press TEST to begin set up.	Coordinates alignment at the steps using this parts name 🚽 Position, scale and inclination alignment 🚽								
coor1X coor1Y coor2X coor2Y +000.0000 +000.0000 +000.0000 +000.0000 coor3X coor3Y +000.0000 +000.0000 +000.0000 +000.0000	et No.1 auxiliary point for this alignment area (Parts name: 5 : IC101) If at any time you want to set or change Region alignment mode, don't fail to perform either "PCB Incline Correction" or "PCB Incline/Scale Correction"([Tool] > [Coordinates]) in advance.								
+000.0000 +000.0000 +000.0000 coor3X coor3Y +000.0000 +000.0000 Press start to begin set up.	coor1X coor1Y coor2X coor2Y								
ecor3X coor3Y +000.0000 +000.000 Press START to begin set up.	+000.0000 +000.0000 +000.0000								
+000.0000 +000.0000 Press TEST to begin set up.	coor3X coor3Y								
Press START to begin set up.	+000.0000 +000.0000								
	Press START to begin set up.								
✓ <u>Q</u> K ¥ <u>C</u> ancel	✓QK ¥ Cancel								

[Sample display-70] Region alignment window

- 8) Press [TEST START] SW on the operation panel.
- 9) After "Camera Window" appeared on the display, center for your assigned area using the keypad arrow keys on the operation panel, then press [ENTER] the Target marker on No.1 auxiliary point SW to enter the coordinates.



[Sample display-71] Camera Window

- Center the Target marker on No.2 auxiliary point for your assigned area using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates. (Sample display-71)
- Center the Target marker on No.3 auxiliary point for your assigned area using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates. (Sample display-71)
- 12) After all auxiliary points were set, the display goes back to the step data list, where "Parts-correct" is substituted in the Comment column.
- 13) Press [Esc]key on the keyboard to close the step data list.



[Sample display-72] Main Window

14) Select Optical Reference Value Input from the Reference menu.

APT-9411 Version 1.X-X (Point system)		
<u>Ble Edit Reference Test Tool View H</u> elp		
File 🛛 Mor 🦢 Beference Value Input	e Test Total Coordinate Self-diag. Convert Help	
📕 🖌 Reference Value Generation		
D.Mode T S Open Data Generation		
🍃 Data Average		
Ogtical Reference Value Input		
Auxiliary		

[Sample display-73] Menu bar (Optical Reference Value Input)

15) The Optical Reference Value Input window appears to show all optical steps. The steps in black have already input the optical data, but the steps in blue have not yet input. Thus, please fill the checkbox which optical data should be input.



[Sample display-74] Optical Reference Value Input window

16) Optical data input condition window appears. (Sample display-75)

👪 APT-9411 1.X-X (Teaching system)		
[BSC] Back		
File Mode Edit Optimization Tool	Reference Test Total Coordinate Self-clag. Convert Help	
Ref. Average Ref.0. OpenD. O.Ref.		
TAKAYA.SWX		
Step :		
□ <u>R</u> eset window size □ Clear <u>J</u> umped(JP) setting	6	
Graphic		

[Sample display-75] Optical data input condition window



- 17) Press [TEST START] SW on the operation panel.
- 18) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 19) After a message "Set board reference point using the CCD camera" appeared, press [TEST START] SW on the operation panel.

et the boa	rd reference	e point using	the CCD ca	amera.	
X-BRP	Y-BRP	X-Aux.1	Y-Aux.1		
X-Aux.2	Y-Aux.2				
Press	TEST START to	begin set	up.		
				<u></u>	

[Sample display-76] Board reference point set

- 20) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 21) Center the Target marker on the Auxiliary reference point-1 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 22) Center the Target marker on the Auxiliary reference point-2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 23) It shows "Set the No.1 auxiliary point in parts 103: IC5403 using the CCD camera." Then press [TEST START] SW on the operation panel.

Revise	
Set the No.1 auxiliary point in parts : IC3001	using the CCD camera.
coor1X coor1Y coor2X coor2Y	
coor3X coor3Y	
Press START to begin set up.	
	✓ <u>O</u> K × <u>C</u> ancel

[Sample display-77] Auxiliary point set

- 24) After "Camera Window" appeared on the display, center the Target marker on No.1 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 25) Center the Target marker on No.2 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 26) Center the Target marker on No.3 auxiliary point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.

27) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose No.1 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button.



[Sample display-78] Image processing area set

28) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box, and then click on "Area OK" button.



[Sample display-79] Search area set

- 29) Enclose No.2 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-78)
- 30) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-79) Specify your Search area with the red box, and then click on "Area OK" button

Specify your Search area with the red box, and then click on "Area OK" button.

- 31) Enclose No.3 auxiliary point with Image processing area shown by a red box, then click on "Mark OK" button. (Sample display-78)
- 32) The Image processing area box changes from red to blue, and Search area is shown by a red box. (Sample display-79) Specify your Search area with the red box, and then click on "Area OK" button.
- 33) When "Image Reference" window was closed, your operation of inputting the image data from auxiliary point1 to 3 is finished.

Simple Vision Test

The Simple Vision Test Function available in Vision System TOS-5/TOS-4/TOS-41 enables to detect such component failure as omission, mis-placement, and mis-orientation, which could not be checked electrically. Undermentioned is their general applications.

Polarity check of Electrolytic capacitors (TOS-5/TOS-4: Gray Search, TOS-41)

This is used for testing Electrolytic capacitors (orientation, presence, position), and their test step are discriminable by "E.Capa.-Image." in Comment column and also "IM-E." in Aux. column.

Polarity check of Tantalum capacitors (TOS-5/TOS-4: Gray Search, TOS-41)

This is used for testing Tantalum capacitors (orientation, presence, position), and their test step are discriminable by "T.Capa.-Image." in Comment column and also "IM-T." in Aux. column.

Polarity check of Connectors (TOS-5/TOS-4: Gray Search, TOS-41)

This is used for testing Connectors (presence, position), and their test step are discriminable by "Connec.-Image." in Comment column and also "IM-Co." in Aux. column.

Letter recognition check (TOS-5/TOS-4: Gray Search, TOS-41)

This is used for testing printed letter on the devices, and their test step are discriminable by "Charac.-Image." in Comment column and also "IM-Ch" in Aux. column.

Presence check (TOS-5, TOS-4, TOS-41)

This is used for some other components, like Resistance (SMT), Capacitance (SMT) so on. Their test steps are discriminable by "Parts-Image." in Comment column and also "IM-Pa" in Aux. column.

Polarity check (TOS-5/TOS-4: PatQuick Algorithm only)

This is used for testing Electrolytic capacitors (orientation, presence, position) and Tantalum capacitors (orientation, presence, position). Their test steps are discriminable by "Pol.-image" in Comment column and also "IM-Po" in Aux. column.

DATA PROGRAMMING PROCESS

1. Polarity check of Tantalum capacitors

(Ex.) C5213 (10uF) at 518step

- 1) Open Step Edit window (Edit > Step Edit) or Step List window (Edit > Step List).
- It shows "Enter step number" on the dialog box. Then input "518" from the keyboard and click on [OK] button.

Editor			
Enter step number (-)—]
			~
		<u>✓ 0</u> K	A <u>C</u> ancel
TO a second a self-second as a	201	01	and a second second

[Sample display-80] Step number input

3) The step data list appears while showing the cursor on the specified step number.

🚵 APT-	9411 \	fersion (1.X-X (Teaching	system) - [C:¥TA	KAYA¥TAKAY	A.SWX]						80	
Edit	Searc	h <u>M</u> ov	e <u>I</u> ool ⊻iew									_ é	9 ×
File	Mode	Edit	Optimization Tool	Reference Tes	Total Co	ordinate	Self	diag. Convert	Help				
Edit	List	Erase	Search Change		A.Gen. Print	n Undo	Sele	et Cut c	opy Paste	Cascade Tile			
Step :	Aux.	Parts	Value	Comment		F. +%	-8	Reference	Test	Judge	1-Xcoor	1-Ycoor	^
000251:		IC500:	1 19-10P	*		** 50	50	0.670 V			[-012.5825	,+024.821	1
000252:		IC500:	1 20-10P	*		** 50	50	0.690 V			[-007.7563	,+016.160	3
000253:		C5213	10UF	*		** 30	30	10.00 UF			[+000.0000	,+000.000	5
000254:		IC600:	1 P1-2	*		OP 50	50	400.0 O			[+007.0438	,+025.360	5
000255:		IC600:	1 P2-3	*		OP 50	50	400.0 O			[+000.0000	,+000.000	5
000256:		IC6003	1 P3-4	*		OP 50	50	400.0 O			[-055.8163	,+063.186	5
000257:		IC600:	1 P4-5	*		OP 50	50	400.0 O			[-033.4163	,+049.586	3
000258:		IC600:	1 P5-6	*		OP 50	50	400.0 O			[+025.7288	,+067.076	3
000259:		IC600:	1 P6-7	*		OP 50	50	400.0 O			[-077.7750	,+007.497	ī -
000260:		IC600:	1 P7-8	*		OP 50	50	400.0 O			[-014.5175	,+007.497	ř –

[Sample display-81] Step data list (Step No.518)

4) Open Select Optical Test Mode window. (Tool > Optical > Select Optical Test Mode)

🛃 АРТ	-9411 \	lersion 1.	X-X (Poin	system)	 EC:¥TAKAYA¥T 	AKAYA.S	WX]											
Edit	Searc	h <u>M</u> ove	Tool Vi	ew														_ 0 >
File	Mode	Edit		ordinates	з Мар		F1	lf-di	aq.	Con	wert	Help						
Edi	List	Erase	s Se	t Comb	/leasurements		2) Sen		nint (6 U) Indo S	dect		ару Сору	Paste	Cascade	
Step	:Aux.	Parts		ear Comb	Measurements		,	Ln.	F.	+%	-8	Refer	rence	Tes	71	Ju	dge	1-Xcoor
00000		C5214						*	**	30	30	10.00	0 nF					[+005.9300
00000;	2:	C5215	G	eneration			,	*	**	30	30	100.0	0 nF					(+000.0000
00000	8:	IC3001	0					*	SH	50	50	0.00	0.0					[+000.0000
00000	1:	IC3001	9	ound			,	*	SH	50	50	0.00	0 0					[+000.0000
000003	5 t	IC3001	Be	attom nm	he		•	*	SH	50	50	0.00	0 0					[+000.0000
00000	5:	IC3001	<u> </u>	recom pro-				*	SH	50	50	0.00	0 0					(+000.0000
00000	1:	IC3001	C	uster Fun	nction		•	*	SH	50	50	0.00	0 0					[+000.0000
000008	31	IC3001				_		í –	-	-								[+000.0000
00000	91	IC3001	0	ptical						Sele	ect (Optical	Test	Mode	Shift+	Ctrl+I		[+000.0000
00001	11	IC3001													BLO H	A REAT		(+000.0000
00001:		IC3001	A	ito Gener	ation						ie n					- 200-1		[+000.0000
000012	21	IC3001			-			*	SH	50	50	0.00	0 0					[+000.0000
000013	8:	IC3001	🦫 CI	hange Ste	p Data		Ctrl+C	*	SH	50	50	0.00	0 0					[+000.0000
00001-		IC3001	0.	la et Davi	an Arma Mada			*	SH	50	50	0.00	0 0					[+000.0000
000015	5:	IC3001	00	Hect Revi	se Area Mode			*	SH	50	50	0.00	0 0					[+000.0000
00001	5:	IC3001	Hi	oh-fly / N	No-contact-zor	e Shift	+Ctrl+H	*	SH	50	50	0.00	0 0					[+000.0000
00001	11	IC3001						*	SH	50	50	0.00	0 0					[+000.0000
00001	1:	IC3001							SH	50	50	0.00	0 0					(+000.0000
		-				-									-			

[Sample display-82] (Tool > Optical > Select Optical Test Mode)

- 5) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 6) The camera moves to the Board reference point, then to the Auxiliary reference point(s) to align inclination and/or scale of the board automatically.
- It shows "Select Mode" window (Sample display-83).
 After selected "Polarity check of Tantalum", click on [Next] button.



[Sample display-83] Select Mode window

8) It shows Sample display-84 below.
 Press [TEST START] SW on the operation panel.

Image Information	×
X coor Y coor	
Press START to begin set up.	
Back Next V CK X Cance	э
[Sample display-84]	

9) After "Camera Window" appeared on the display, center the Target marker on the objective device (C5213) using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.



[Sample display-85] Camera Window

- 10) Camera Window is closed and it shows Sample display-84 again. Click on [OK] button to fix your assignment in "Select Mode" window.
- 11) The display goes back to the step data list. On your assigned test step (518 step), you see "T.Capa.-Image." is already substituted in Comment column and also "IM-T." in Aux. column.
- 12) Press [Esc] key on the keyboard to close the step data list.



[Sample display-86] Main Window

13) Select Optical Reference Value Input from the Reference menu.

🍓 APT-9411 Version 1.X-X (Point system)	
<u>File Edit Reference Test Tool View H</u> elp	
File Mot 🦢 Reference Value Input	e Test Total Coordinate Self-diag. Convert Help
🖌 🖌 Reference Value Generation	
D Mode T Den Data Generation	
📴 Data Average	
Ogtical Reference Value Input	
Auxiliary	

[Sample display-87] Menu bar (Optical Reference Value Input)

14) The Optical Reference Value Input window appears to show all optical steps. The steps in black have already input the optical data, but the steps in blue have not yet input. Thus, please fill the checkbox which optical data should be input.



[Sample display-88] Optical Reference Value Input window

15) The Optical data input condition window appears.

🎲 APT-9411 1.X-X (Teaching system) - [C-¥TAKAYAYTAKAYA SWX]	
[ESC] Back	
File Mode Edit Optimization Tool Reference Test Total Coordinate Self-diag. Convert Help	
Ser Average Refo. Open.	
TAKAYA.SWX TEST STOP START	
Designated image : step :	
□ Reset window size □ Clear Jumped(JP) setting	
Graphic	

[Sample display-89] Optical data input condition window

Unless "Reset window size" checkbox displayed on Optical data input condition window was filled, Image processing area and Search are same as the ones used at your last operation. Be sure to fill the checkbox whenever the optical data is newly input.
If "Clear Jumped (JP) setting" checkbox displayed on Optical data input condition window was filled, the measuring function in the optical step where has been preset to JUMP(JP) is initialized to "BLANK(**)".

- 16) Press [TEST START] SW on the operation panel.
- 17) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 18) After a message "Set board reference point using the CCD camera" appeared, press [TEST START] SW on the operation panel.

X-BRP	Y-BRP	X-Aux.1	Y-Aux.1	
X-Aux.2	Y-Aux.2			
Press	TEST START to	begin set	up.	

[Sample display-90] Board reference point set

- 19) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 20) Center the Target marker on the Auxiliary reference point-1 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 21) Center the Target marker on the Auxiliary reference point-2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 22) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area.

Enclose the objective device (C5213) with Image processing area shown by a red box, then click on "Mark OK" button.



[Sample display-91] Image processing area set

23) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box, and then click on "Area OK" button.



[Sample display-92] Search area set

24) When "Image Reference" window was closed, your operation of inputting the image data for the C5213 is finished.

2. Presence check

(Ex.) C5214 (0.01uF) at 289 step

- 1) Open Step Edit window (Edit > Step Edit) or Step List window (Edit > Step List).
- 2) It shows "Enter step number" on the dialog box. Then input "289" from the keyboard and click on [OK] button.



[Sample display-93] Step number input

3) The step data list appears while showing the cursor on the specified step number.

🚵 APT	-9411	Version	1.X-X (Teachin	s system) - [(:¥TAKA	YA¥TAKA	YA.SW	(X)							
Edit	Searc	h <u>M</u> ov	e <u>⊺</u> ool ⊻iew											- 6	9 ×
File	Mode	Edit	Optimization To	Reference	Test	Total (Coordin	ate Se	lf-diag.	Conver	t Help				
Edil	List	Erase	Search Change		A.G	en. Print	6 Un	do Se	A lect		Copy Paste	Cascade Tie			
Step	:Aux.	Parts	Value	Comme	1t		E. 4	\$ - \$	Refe	erence	Test	Judge	1-Xcoor	1-Ycoor	^
000198	:	IC700	1 19-10P				** 5	0 50	0.0	0 0			[-012.5825	,+024.821	
000199	(a)	IC700	1 20-10P	*			** 5	0 50	0.0	0 00			[-007.7563	,+016.160	
000200	:	C5214	lonf	*			** 3	0 30	10.0	00 nF			[+002.2438	,+025.360	1
000201		IC100	1 P1-2	*			OP 5	0 50	400.	0.0			[+007.0438	,+025.360	<i>.</i>
000202		IC100	1 P2-3	*			OP 5	0 50	400.	0 0			[+000.0000	,+000.000	
000203	:	IC100	1 P3-4	*			OP 5	0 50	400.	0 0			1-055.8163	,+063.186	
000204		IC100	1 P4-5	*			OP 5	0 50	400.	0 0			[-033.4163	,+049.586	
000205	:	IC100	1 P5-6	*			OP 5	0 50	400.	0 0			[+025.7288	.+067.076	
000206	:	IC100	1 P6-7	*			OP 5	0 50	400.	0 0			[-077.7750	,+007.497	
000201		IC100	1 P7-8	*			OP 5	0 50	400.	0 0			[-014.5175	,+007.497	

[Sample display-94] Step data list (Step No.289)

4) Open Select Optical Test Mode window. (Tool > Optical > Select Optical Test Mode)

🕲 APT-9	9411 Version 1.X.	X (Point system) - [C:#TAKAYA#TAKAYA.SWX								
Edit	Search Move	Tool View								_ 0 >
File 1	Vode Edit Op	<u>C</u> oordinates Map	F1	lf-dia	q. Co	nvert	Help			
Edž	List Erase \$	Set Comb Measurements	,	Jen.	Print	4	No Select	Cat. Copy	Paste Cas	icade Tile
Step :	Aux. Parts	Clear Comb Measurements	,	in F	. +5	-8	Reference	Test	Judge	1-Xcoor
000001:	C5214			* *	• 30	30	10.00 nF			[+005.9300
000002:	C5215	Generation	•	**	• 30	30	100.0 nF			(+000.0000
000003:	IC3001			* 3	H 50	50	0.00 0			[+000.0000
000004:	IC3001	Ground		* 3	H 50	50	0.00 0			[+000.0000
000005:	IC3001	Bottom probe	,	* 9	H 50	50	0.00 0			[+000.0000
000006:	IC3001	Tought brone		* 9	H 50	50	0.00 0			(+000.0000
000007:	IC3001	Cluster Function	•	* 3	H 50	50	0.00 0			[+000.0000
:800000	IC3001			(T						[+000.0000
000009:	IC3001	Ogtical			Sel	ect	Optical Test	Mode Shif	t+Ctrl+I	[+000.0000
000010:	IC3001				See	no f	a avala	SHEHO	tella Albait	(+000.0000
000011:	IC3001	Auto Generation		_		ile i	1 <u>e</u> oyole		crissues1	[+000.000
000012:	IC3001			* 5	H 50	50	0.00 0			[+000.000
000013:	IC3001	Change Step Data	trl+C	* 5	H 50	50	0.00 0			[+000.000
000014:	IC3001	Salast Davies Area Made		* 5	H 50	50	0.00 0			[+000.0000
000015:	IC3001	Select Revise Area Mode		* 2	H 50	50	0.00 0			(+000.000)
000016:	IC3001	High-fly / No-contact-zone Shift+C	trl+H	* 3	H 50	50	0.00 0			[+000.0000
000017:	IC3001			* 5	H 50	50	0.00 0			[+000.0000
000018:	IC3001			× 3	H 50	50	0.00 0			(+000.0000

[Sample display-95] (Tool > Optical > Select Optical Test Mode)

- 5) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 6) The camera moves to the Board reference point, then to the Auxiliary reference point(s) to align inclination and/or scale of the board automatically.
- It shows "Select Mode" window.
 After selected "Presence check", click on [Next] button.

Image Information	×
Select Mode	
Polarity check of E.capacitor Polarity check of Tantalum Polarity check of Connector Letter recognition	
Presence check	
■ Back Next ► ✓ OK X Cancel	5

[Sample display-96] Select Mode window

It shows Sample display-97 below.
 Press [TEST START] SW on the operation panel.

Image Information	×
X coor Y coor	
Press START to begin set up.	
■ <u>Back</u> Next IN ✓ <u>O</u> K × <u>C</u> ance	
[Sample display-97]	

 After "Camera Window" appeared on the display, center the Target marker on the objective device (C5214) using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.



[Sample display-98] Camera Window

- 10) Camera Window is closed and it shows Sample display-97 again. Click on [OK] button to fix your assignment in "Select Mode" window.
- 11) The display goes back to the step data list. On your assigned test step (518 step), you see "Parts-Image." is already substituted in Comment column and also "IM-Pa" in Aux. column.
- 12) Press [Esc]key on the keyboard to close the step data list. (Sample display-99)



[Sample display-99] Main Window

13) Select Optical Reference Value Input from the Reference menu.

APT-9411 Version 1.X-X (Point system)	
<u>File Edit Reference Test Tool View H</u> elp	
File Mo 🖢 Reference Value Input	e Test Total Coordinate Self-diag. Convert Help
🕳 🛷 Reference Value Generation	
D.Mode T S Open Data Generation	
📴 Data Average	
Ogtical Reference Value Input	
Auxiliary	

[Sample display-100] Menu bar (Optical Reference Value Input)

14) The Optical Reference Value Input window appears to show all optical steps. The steps in black have already input the optical data, but the steps in blue have not yet input. Thus, please fill the checkbox which optical data should be input.



[Sample display-101] Optical Reference Value Input window

15) The Optical data input condition window appears. (Sample display-102)

🃸 APT-9411 1.X-X (Teaching system) - E	[C:¥TAKAYAYTAKAYA.SWX]	
[ESC] Back		
File Mode Edit Optimization Tool	Reference Test Total Coordinate Self-diag. Convert Help	
Ref. Average Ref.0. OpenD. O.Ref.		
TAKAYA.SWX TEST STOP		
Designated image : step :		
□ <u>R</u> eset window size □ Clear <u>J</u> umped(JP) setting		
Graphic		

[Sample display-102] Optical data input condition window

Unless "Reset window size" checkbox displayed on Optical data input condition window was filled, Image processing area and Search are same as the ones used at your last operation. Be sure to fill the checkbox whenever the optical data is newly input.
If "Clear Jumped (JP) setting" checkbox displayed on Optical data input condition window was filled, the measuring function in the optical step where has been preset to JUMP(JP) is initialized to "BLANK(**)".

- 16) Press [TEST START] SW on the operation panel.
- 17) After a message "Use board ref. point and aux. ref. point for alignment?" appeared, click on [Yes] button then press [TEST START] SW on the operation panel.
- 18) After a message "Set board reference point using the CCD camera" appeared, press [TEST START] SW on the operation panel.

X-BRP	Y-BRP	X-Aux.1	Y-Aux.1	
X-Aux.2	Y-Aux.2			
Press	TEST START to	begin set	up.	

[Sample display-103] Board reference point set

- 19) After "Camera Window" appeared on the display, center the Target marker on the Board reference point using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 20) Center the Target marker on the Auxiliary reference point-1 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 21) Center the Target marker on the Auxiliary reference point-2 using the keypad arrow keys on the operation panel, then press [ENTER] SW to enter the coordinates.
- 22) It shows "Image Reference" window, where are two boxes indicating Image processing area and Search area. Enclose the objective device (C5214) with Image processing area shown by a red box, then click on "Mark OK" button.



[Sample display-104] Image processing area set

23) The Image processing area box changes from red to blue, and Search area is shown by a red box. Specify your Search area with the red box, and then click on "Area OK" button.



[Sample display-105] Search area set

24) When "Image Reference" window was closed, your operation of inputting the image data for C5214 is finished.

Optical data review / Optical data test

Using Optical data review or Optical data test, you can evaluate and/or change the measuring conditions so on in your image data.

These two functions are selectable from Sample display-106 below (Test > Review Step data).

The Optical data review function is used for evaluating and/or changing the measuring conditions. The Optical data test function is used for assuring of the stability of the optical test.



[Sample display-106] Data Examination window (Main display)

Optical data review

Selecting "Optical data review" from Sample display-106 then pressing [TEST START] SW on the operation panel, a message "Use board ref. point and aux. ref. point for alignment?" appears.

Then click on [Yes] button and align possible inclination/scale of the board using [TEST START] SW and the keypad arrow keys on the operation panel, so that [Sample display-107] appears.



[Sample display-107] Optical Reference Value Input window

After selected the objective image point from Sample display-107, click on [OK] button then press [TEST START] SW on the operation panel. (Sample display-108)



[Sample display-108] Optical data review window

Optical data test

Selecting "Optical data test" from Sample display-106 then pressing [TEST START] SW on the operation panel, a message "Use board ref. point and aux. ref. point for alignment?" appears.

Then click on [Yes] button and align possible inclination/scale of the board using [TEST START] SW and the keypad arrow keys on the operation panel, so that Sample display-109 appears.



[Sample display-109] Camera movement volume set

While evaluating Coordinates alignment points (Board reference point and Auxiliary reference point), in fact the CCD camera can move toward each four directions (right-top, right-bottom, left-bottom, left-top) with the distance specified in [Sample display-109] as if the board under test shifted its position.

As for Polarity check and Presence check, the objective device is tested to evaluate the measuring stability.

When some optical data was judged inadequate under Optical data test, Sample display-110 appears to ask your correction.



[Sample display-110] Optical data test window

Optical data review

The Optical data review window (Sample display-111) allows you to learn the optical data again, check the measuring stability and also change the measuring conditions.



[Sample display-111] Optical date review window

The combobox on the upside of Sample display-111 screen shows Step number, Parts name and the testing category of the optical data under evaluation. From this combobox, you can select another optical data step to be jumped, if necessary.

Scene number and Step number so on are also displayed at the left-top side of the same screen. (Sample display-112)



[Sample display-112]

Scene :	Scene number of optical data under evaluation (not changeable)
Step :	Step number of optical data under evaluation In case of the Board reference point or the Auxiliary reference points, the step number is not displayed. After specified any step number and hit [Enter] key, the window jumps to Optical data review at the specified step.
XY Coordinate :	The center coordinates of the objective device is changeable using the keypad arrow keys.
Start :	Clicking on [Start] button, the tester continues Optical data test.
Debug status :	It shows Debug category in the combobox. (Refer to the User's manual)
JUMP (JP) :	Test parameter configuring the Optical test to be skipped (no test).
Group Jump (GJ):	Test parameter configuring all steps following the Optical step to be skipped (no test) when the test judged fail. The test starts from the beginning of next group.
Vision test (WA) :	Test parameter configuring to Visual check step ("WA" step). The operator can judge the step whether Pass or Fail visibly by comparing to a sample reference image.
Snapshots (SS) :	Test parameter configuring to the step where the APT system takes a picture after the camera moves over the position and save it as a file, instead of the image test.

Snap Shot Function

When the optical step is setup for SS (=Snap Shot), the APT system takes a picture after the camera moves over the position and save it as a file, instead of the image test.

Step	:Aux.	Parts	Value	Comment	F.
000001	:IM-E.	*	*	E.CapaImage.	SS
000002	P:IM-E.	*	*	E.CapaImage.	SS
000003	B:IM-E.	*	*	E.CapaImage.	SS
000004	4:IM-E.	*	*	E.CapaImage.	SS

[Sample display-112_1] Optical steps



[Sample display-112_2] Optical Data Review window

(Remarks)

1. The registration destination folder is configured by "Image data folder" on File/Folder menu (Master Mode) and the program name.

For example, when Image data folder is set for C:¥TAKAYA¥Image (default) and Program name is 123456789.SW92, the registration destination folder is C:¥TAKAYA¥Image¥123456789.

Master mode	
Machine reference point Printer setup Standard output format Advanced output format File/Folder Short / Open setup Probes crossing distance Debug status User preferences Kelvin measurement setup Data programming wizard Editor customize Reminder	Main folder C:\TAKAYA Convert data folder C:\TAKAYA Test data (*ATD /*.NGD) folder Save into the same loaded folder C:\TAKAYA External information folder C:\TAKAYA\External Statistic data folder C:\TAKAYA\Image Test data Save as file name Save as Auto loading file name Auto saye 1 2 130[min]
▲ Previous Next ▲	Change default in Data mode
	✓ OK ¥ Cancel

[Sample display-112_3] File / Folder (Master Mode)

2. When Serial Number Input function is used, the file name is equal to the Serial number if the check box for "Apply serial number as the file name of snapshots" on Serial Number/Auto data loading menu (Option mode) is filled.

For example, when Serial number is ABCDEF and step number is 1, the file name is [ABCDEF]_000001.

If the check box for "Apply serial number as the file name of snapshots" is cleared, the file name is "Date + Time + Step number".

For example, now is December 13, 2005 PM13:18 and step number is 1, the file name is 0512131318.

RS-232C port no. Camera system Inline application Signal tower setting Serial number / Auto data loading Stamp Input / Output function of I/O step DDE communication IC Open Menu customize PCB Support Jigs Vacuum unit	Use Serial Number Input Keyboard Apply serial number as the file name of snapshots Auto. data loading by Z key Use serial number per each Group Number of serial number : 1 g 13 Keep the previous serial number displayed on the next test
✓ Previous Next ►	Kayboard Starter for keyboard input : [[0x21] Baccode reader

[Sample display-112 4] Serial Number/Auto data loading (Option Mode)

Explanation of menu button

Menu button (Sample display-113) which is on the downside of the Optical data review window is used to display the evaluation result, reinput the objective image data, and so on.

Gap angle	Test Time	Correlat. ratio(%)	Distance from ref.	mark position	Judgment
Auto input	Input	Mask Te	st Model	Histogram	Store

[Sample display-113] Menu button (Optical data review window)

Gap angle

This shows how much the object under evaluation is slant against the reference image.

Test Time

This shows the time how long it takes to disposal the object under evaluation.

Correlat. Ratio (%)

This shows how much the object under evaluation correlates to the reference image.

Distance from ref. mark position

This shows how far the object under evaluation is from the reference image.

Judgment

This shows the judgment result made under the Simple vision test.

PASS : The test passed.

Agre-ER : The correlation rate was lower than the threshold.

Angl-ER : The object under test is slant.

- M.OFFS : The object under test is not positioned well.
- **INV-NG** : The object under test highly correlates to the reference image with opposite polarity.

Auto input

The existing reference data (Reference image, Measuring condition) under evaluation is once initialized, then a new reference data is input again. To do this, it is necessary to specify the Image processing area and the Search area again.

Input

Reference data is input again without initializing the Image processing area and the Search area and Measuring condition.

Mask

This exempts any specified region of the reference image from Pass/Fail judgment. For example, when some characters drawn on the device are always different depending on the production lot and causes misjudgment under test, so on.



If you would set mask size too large, this causes possibly misjudgment.

Test

It tests the measuring stability of the optical data.

Its result is displayed on each combo box of "Gap angle", "Test time", "Correlat. ratio", "distance from ref. mark position" and "Judgment".

Model

Reference image is displayed on the screen.

Histogram

The comparison is made to the histogram value (parameter) of both the object under test and the reference image. With the histogram the gray value ratio is displayed by a graph.

Store

All changes (ex. new reference image, measuring conditions, so on) at the Optical data review window can be saved into the disk.

Auxiliary Menu Tab

There are three Menu tabs ("Step Data", "Image Data" and "Condition") at the left of the Optical data review window. (Sample display-114)



[Sample display-114] Auxiliary Menu Tab

Step Data

"Parts", "Value" and "Comment" from the test step is displayed and changeable. To save your change into the disk, be sure to click on [Save] button.

Image Data

"Image Select", "Camera Gain", "Offset", "Mask" and "LED lights" used for the object under evaluation are displayed and changeable.

Image Select combobox enables to save maximum 9 auxiliary scenes. These auxiliary scenes are used together with the reference image under test. In case that the measured object image could agree with the reference image otherwise any of these auxiliary scenes, it judges PASS. Usually these auxiliary scenes are used for Polarity check, which device condition changes inconsistently board by board.

To add any auxiliary scene, click on Image Select bar then click on [Add] button. And if double-clicking on the auxiliary scene name added on the list, the optical data can be input.

To erase any auxiliary scene, click on [Delete] button on the downside of the auxiliary scene list.



The auxiliary scene is erasable in order of bigger scene number.

Condition

Condition of pass/fail judgment is displayed and changeable.

"Tol. Gap V.(X)" and "Tol. Gap V.(Y)" enable to set the tolerance of the device position. (unit : mm)

If "Tol. Angle" checkbox was filled, you can specify the tolerance of slant angle of the object under test. (unit : degree)

"L-cor.rate" enables to set the tolerance for PASS/FAIL judgment based on the reference image. (unit :%) "Scale", "X-Scale" and "Y-Scale" enables to set the tolerance of measured object size. (unit : %)



As for the tester equipped with the TOS-41 system, you cannot change any of "Tol. Angle", "Scale", "X-Scale" and "Y-Scale".

Simple Vision Test Programming flow

The drawing below indicates a sample flow of data programming for the Simple vision test.



Sample Setting Optical Data

In this section we describe the basic programming know-how, introducing how to step the window frame and area.

Object (Test mode)	Good sample	Bad sample	Remarks
Fiducial marks	Windo Test area Fiducial mark (no solder) is best to use.	Similar marks locate near around.	Any mark with varied shape is not proper. (i.e. solder land)
Electrolytic capacitors (Polarity check)	Tightly enclosed by the window.	Much opening between the object and the window.	Tall component may not be tested. The judgment owe to a black bar of polarity.
Tantalum capacitors (Polarity check)	Tightly enclosed by the window.	Much opening between the object and the window.	The judgment owe to the difference color on the surface.
Connectors (Polarity check)	Unti-contrast point (top - bottom, left – right is enclosed)	Contrast point is enclosed	When misplaced or mis-oriented, it shows incompatibility error.
ICs (Letter recognition)	TAKAYA T710830 Stable point is enclosed.	TAKAYA T710830 Varied point is enclosed.	Any letter is not recognized actually.

Object (Test mode)	Good sample	Bad sample	Remarks
ICs (Polarity, Presence)	TAKAYA T710830 Oriented point only is enclosed	Mis-orientation sometimes may not detected.	
Chip transistor (Presence check)	All area including leads is enclosed.	Only package unit is enclosed.	Reference value should be learned from some known good PC boards. <m. mode=""> Gray search</m.>
Test pin / Test point (Presence check)	Whole test pin including possible moving area is enclosed.	Test pin only is enclosed.	
Others (Presence check)	Whole device is enclosed together with the soldering part.	Only device package is enclosed, not the pc board part	

Barcode reading by camera

Specifications

The TOS-5 is able to recognize the barcode labels as described below.

(1) 2D codes

Туре	"Data Matrix"	"QR code"
Size	When using the standard camera: 8 x 8mm or so When using 2nd Camera(option): 21 x 21mm or	maller smaller
	(NOTE) When using the 2nd Camera, the A dealing with larger target than above. divides into multiple pieces and the automatically.	PT system is capable of It owes to the feature that n merges them into one
Number of characters	(Data Matrix) Figures: max 348 characters, Alphameric: Ma (QR code) Figures: max 370 characters, Alphameric: Ma	x 259 characters x 224 characters
Number of cells	(Data Matrix) Max 48 x 48 cells (QR code) Max 45 x 45 cells	
Size of cells	When using the standard camera: 0.1mm or larg When using 2nd Camera(option): 0.25mm or larg	ger (recommended) ger (recommended)



(Data Matrix)

	Number of cells	Data capacity								
	Number of Cells		fig	ure		figure				
	10×10		6	6			(3		
	12×12		1	0		10				
	14×14		1	6		16				
	16×16		2	4			2	4		
	18×18		3	6			3	6		
	20×20		4	4			4	4		
	22×22		6	0			6	0		
	24×24		7	2			7	2		
Date Matrix	26×26		8	8			8	8		
ECC200	32×32		12	24			12	24		
	36×36		17	72			17	72		
	40×40		22	28			22	28		
	44×44		28	38			28	38		
	48×48		34	48			34	48		
	8×18		1	0		10				
	8×32		2	0		20				
	12×26		3	2		32				
	12×36		4	4		44				
	16×36		64				64			
	16×48		98			98				
	Sizo	figure				alpha	meric			
	0126	L	М	Q	Н	L	М	Q	Н	
	21×21	40	33	25	16	24	20	15	10	
OB code	25×25	81	66	52	33	49	40	31	20	
	29×29	131	100	81	52	79	60	49	31	
Model 1	33×33	186	138	114	76	113	84	69	46	
	37×37	253	191	157	105	154	116	95	63	
	41×41	321	249	201	133	194	151	122	81	
	45×45	402	311	253	167	244	188	154	101	
	Sizo		fig	ure			alpha	meric		
	5126	L	М	Q	Н	L	М	Q	Н	
	21×21	41	34	27	17	25	20	16	10	
OB aada	25×25	77	63	48	34	47	38	29	20	
	29×29	127	101	77	58	77	61	47	35	
Model 2	33×33	187	149	111	82	114	90	67	50	
	37×37	255	202	144	106	154	122	87	64	
	41×41	322	255	178	139	195	154	108	84	
	45×45	370	293	207	154	224	178	125	93	

[Chapter 1] Number of readable letters

	Number of cells	Size of cell (mm)								
	Number of Cells	0.1	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5
	10×10	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0
	12×12	1.6	2.4	3.2	4.0	4.8	5.6	6.4	7.2	8.0
	14×14	1.8	2.7	3.6	4.5	5.4	6.3	7.2	8.1	
	16×16	2.0	3.0	4.0	5.0	6.0	7.0	8.0		
	18×18	2.2	3.3	4.4	5.5	6.6	7.7			
	20×20	2.4	3.6	4.8	6.0	7.2	8.4			
	22×22	2.6	3.9	5.2	6.5	7.8				
	24×24	2.8	4.2	5.6	7.0	8.4				
Data Matrix	26×26	3.0	4.5	6.0	7.5					
	32×32	3.6	5.4	7.2						
	36×36	4.0	6.0	8.0						
	40×40	4.4	6.6							
	44×44	4.8	7.2							
	48×48	5.2	7.8							
	8×18	2.2	3.3	4.4	5.5	6.6	7.7			
	8×32	3.6	5.4	7.2						
	12×26	3.0	4.5	6.0	7.5					
	16×36	4.0	6.0	8.0						
	16×48	5.2	7.8							
	21×21	2.1	3.2	4.2	5.3	6.3	7.4	8.4		
	25×25	2.5	3.8	5.0	6.3	7.5				
	29×29	2.9	4.4	5.8	7.3					
QR code	33×33	3.3	5.0	6.6	8.3					
	37×37	3.7	5.6	7.4						
	41×41	4.1	6.2	8.2						
	45×45	4.5	6.8							

[Chapter 2] Readable code size (mm) against the cell size

(2) Barcodes

 Type
 "Code128"

 Size
 21 x 21mm or smaller

 (NOTE) The APT system is capable of dealing with larger target than above. It owes to the feature that divides into multiple pieces and then merges them into one automatically.

 Number of characters
 (Code128) Max. 44 characters

 (Code39)
 Max. 19 characters



The 2nd camera (option) is always necessary to read the barcode.

System setup

To enable this function, please select the radio button for "Camera system" (Option Mode > Serial number / Auto data loading).



[Sample display-115] Serial number / Auto data loading

Barcode setup

To activate the barcode reading, it's necessary to drill the APT system on where to be your barcode and its properties correctly.

1. Teaching the exact placement of barcode

1) Move to Data mode > Configure the settings for barcode.



[Sample display-117] Data mode

2) Fill "Enable barcode scanning by camera" checkbox.



Scan barcode per group This appears only when there are two or more groups in the program.

[Sample display-118] Configure the settings for barcode

3) Press the Test Start button to specify the XY coordinates at the left-top and the right-bottom of the barcode.

Probe=4	Probe=4
Iransparency	Iransparency
Using the keypad arrow keys, drive the CCD camera to your preferable barcode left-top point.	Using the keypad arrow keys, drive the CCD camera to your preferable barcode right-down point.
· · · · · ·	Ţ. Ţ
X: +000.0000 Y: +000.0000	X: +000.0000 Y: +000.0000
[ENTER] SW = Coordinate Set	[ENTER] SW = Coordinate Set

2. Setting Barcode properties

- 1) Click on "Barcode properties" button on the Configure the settings for barcode menu.
- 2) Choose the type of barcode (Data matrix or QR code)
- 3) Fill "Auto. Setting of parameter" checkbox and click on "Auto Scan" button.

Decomposition of parameter Setup Data Matrix Cels color : Cals Rows : 24 Cols : 24 ECC : 200 Form : Squa	arameter K V		×	When the check box for "Scan
		in the state of th		barcode per group" is filled, press
				following button to move the
Gain C	Offset			ionowing batton to move the
Upper Side S Blue Red	Side			properties menu for each group
		Tearritine Detect ratio(%) Judgment	<u> Previous</u> <u> Next </u>
Barcode scanning f	failed! Please ma	ke certain of the barcode type and its parameter.		
		✓ <u>OK</u>	X <u>C</u> ancel	

[Sample display-119] Auto. setting of parameter

4) The barcode number is displayed on the left box. Click on the OK button to after confirmation of the barcode number.

(Remark 1)

If "Auto. Setting of parameter" checkbox wasn't filled in Process 2), it displays "F.Pattern-1", "F.Pattern-2" and "F.Pattern-3" on the left side of the menu. In this case, please go through the following steps to specify the Finder patterns;

Finder pattern:

called "Finder pattern".

On both Data Matrix and QR code, there are some reference symbols

You need to specify the XY coordinates of each Finder pattern in order to read the barcode correctly.

Barcode Parameter	Setup		8
Data Matrix	~		
Auto. setting	of parameter		
Cels color :	Black 🖌	Unchecked	
Rows :	20 🖌	ononcokeu	
Cols :	20 👻		
ECC :	200 💌		
Form :	Square 👱	Constant and the second s	
F.Pattern-1 :	F.Pattern-1	F 1	
F.Pattern-2 :	F.Pattern-2	 kak Na 	
F.Pattern-3 :	F.Pattern-3	1.00000222	
APT-9411CE TAK	AYA CORP.		
Gain	Offset		
100 🕃 0255	0 255		
Upper Sid Blue Re	e Side d Blue		
	-		
		Test Time Detect ratio(%) Judgment
		Test Scan 0 msec 98.80 %	PASS
Barcode scan	ning is finished		
		<u>✓ 0</u> K	X Cancel

[Sample display-119] Setting of parameter

Run on "F.Pattern-1" (or "F.Pattern-2" or "F.Pattern-3") and specify any Finder pattern at the click of a mouse.



Clicking on the Scan button, the barcode number is displayed on the left box. Click on the OK button after confirmation of the barcode number.

(Remark 2)

The Code 128 and Code39 are more likely to cause the reading error by environmental influences (i.e. lighting). Especially for the Code39, so you need to drill the APT system on what each character means in the manner below;



This portion appears only when Code39 was selected. Please configure these 19 characters to accurize the reading.

[Sample display-121] Setting of parameter

Character set for Code 39

Character	Contents
*	0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ \$/+%
A	ABCDEFGHIJKLMNOPQRSTUVWXYZ
1	0123456789
-	-
¥0	No character following this discrimination mark

Clicking on "Test" button, the barcode number is displayed on the left box. Click on the OK button after confirmation of the barcode number.

3. Optical data review

1) Select object to be examined

Select objec	t to be examined	×
Move] ⊙ Board reference point	
Move] ○ Auxiliary reference point	
Move] ○ Primal barcode	
Move	O Aux.1 barcode	
Move	⊖ Aux.2 barcode	
	Examination starts from your checked point.	-
	OK X Cancel	

[Sample display-122] Optical data review

When the barcode label is not recognized with accuracy due to incorrect configuration in the barcode properties, they are displayed in blue color.

In addition, if pressing "Move" button next to the barcode step, the camera drives to XY the coordinates in Group 1.

2) Optical data review

When the barcode image needs to be examined, move to the Optical data review window (Refer to [Sample display-123]). On this window, you are able to correct the XY coordinates of barcode label and configure the properties. Be sure to save your changes by pressing the Store button.



[Sample display-123] Optical data review



[Sample display-124] Optical data review

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