Flying probe tester APT-9411 series

IC open test system CS-9500 Operator's Guide



Preface

The IC Open test system CS-9500, one of exclusive options for Takaya Fixtureless Tester APT-9411 Series, enables to detect unsoldered IC leads of QFP, SOJ, so on while contacting the independently moving sensor probes on the IC's package.

This Operator's guide covers the functions, programming, operation, maintenance and specifications of the IC Open Test system CS-9500. Read this Operator's guide thoroughly before using this option in order to understand the features and keep this Operator's guide readily available for reference.

In addition, this Operator's guide also explains you on the Underside IC Open Test system CSU-9500 at the end of this Operator's guide.

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

(NOTE)

- (1) This Operator's guide is based on the APT-9411 Series software Ver1.3-3.
- (2) No portion of the contents of this publication may be reproduced or transmitted in any form or by any means without the express written permission of TAKAYA Corporation.
- (3) The design of the product is under constant review and whilst every effort is made to keep this Operator'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 begirt 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

The Operator's guide uses the following headings to display important safety information and so on. Strict adherence to the instruction next to these heading is required at all times.

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 especially key operation.	
	Calls attention to "One-point advice" which should be useful when you are at a loss to operate the products.	

Safety precautions

Since this section summarizes the precautions to be observed to operate the IC Open Test system CS-9500 in safety, be sure to read it before operation.



All instructions below are very important! Do not attempt to install and/or use the product unless you could understand any of them.

- 1. Never modify or repair any part of the product by yourself. Otherwise it may possibly cause an electric shock or other bodily accident.
- 2. For safety reason, it is recommended that only one person operate the product. If not, the product may cause an unthought of action and a serious accident as the result.
- 3. Never attempt to put a part of your body in the working area of the product. Otherwise it may possibly cause a serious accident.
- 4. While using the product, be sure to close the safe cover of the tester. Otherwise it may possibly cause an electric shock or other bodily accident.
- 5. Once some smoke or bad smell came from the product, it may possibly cause a burning or electric shock and is very dangerous. In such case happened, switch the power off and stop operating the product on the spot, then consult to our local distributor for the solution. Do not use the product until safe operation can be verified by service-trained personnel.
- 6. Once some liquid or foreign material was put in the product, it may possibly cause a burning or electric shock and is very dangerous. In such case happened, unplug the product and stop your operation on the spot, then consult to our local distributor for the solution. Do not use the product until safe operation can be verified by service-trained personnel.
- 7. Once you felt something strange during the operation (i.e. noise, smell, malfunction, etc.), switch the power off, unplug the product and stop your operation on the spot, then consult to our local distributor for the solution. Do not use the product until safe operation can be verified by service-trained personnel.
- 8. The product power must be OFF and unplugged when the product is serviced for maintenance or cleaning. Needless to say, the service must be made by service trained personnel only who are familiar with electronic circuitry and understand the hazard involved.
- 9. The product power must be OFF and unplugged before replacing or maintenance any part of this option.
- 10. The manufacturer has no responsibility for such defect resulting from misuse or unauthorized modification by user, as well as operation outside of the environmental specifications for the product.

§ 1 General

This section provides fundamental information on the IC Open Test system CS-9500.

Outline

With this optional system built-in, the Takaya APT-9411CE Series (hereafter "Tester") enables to detect unsoldered IC leads of QFP, SOJ, so on while contacting the independently moving sensor probes on the IC's package. A unique spring-embedded sensor probe (hereafter "Sensor probe") contacts the IC leads directly in place of the probe, so that the test is unlikely to be falsely judged due to possible contact error. In addition, the test program is easily and automatically created in a very short period of time.

CS-9500 Hardware

- (1) IC Open measuring PCB (TAKAYA TVX-11)
- (2) Antenna drive unit and Sensor probe (Each one at Left/Right)

Hardware location

The hardware is installed in the tester as shown in Fig.1 below.



[Fig.1] Tester appearance

Measuring principle

The measurement principle is outlined below.



[Fig.2] Measuring principle

As Fig.2 introduce, the sensor probe is supposed to contact directly on the IC package under test while impressing AC measurement signal between an individual IC's lead and the GND point on the PC board. This sensor probe consists of a special antenna that can receive a signal radiated from the lead frame inside the IC through its mold package. If some IC's leads were improperly soldered otherwise open, the signal level becomes small so that their failure can be detected accordingly.

Antenna drive unit & Sensor probe installation

The antenna drive unit that includes the sensor probe is installed on the Z2 axis and the Z3 axis.

Contact position of Sensor probe and probe

As shown in Fig.3 below, the sensor probe which is equipped with a round sensor plate (diameter ϕ 5mm) on the top steps on IC package where is nearby each IC lead to be measured. So their stepping position shifts sequentially according to the testing order.



[Fig.3] Sensor probe's contact position

Meanwhile, the contact position for the probes which impress the necessary measurement signal should be properly selected depends on the IC solder pad.

Large solder pad

When there is enough space on the IC solder pad and a few possibilities that any probe may interfere with the IC lead, it should contact on the IC solder pad directly.

Small solder pad

When there is less space on the IC solder pad, in other words there is a risk for the probe to interfere with the IC lead, otherwise when the objective IC is PLCC-type which has no IC solder pad, the probe should contact any other point where is connected with the objective IC solder pad on the same circuit pattern.



[Fig.4] Probe's contact position

In addition, two GND points where to contact by another probe should be available on the left-hands and the right-hand corners on your PC board. If the GND point was set incorrectly, some of IC open test steps would not be created. (In this case, the VF measurement steps is created instead)

Reference Value for PASS/FAIL Judgment

The reference value for the IC open test is also learned from a good sample PC boards automatically as usually done to program the component steps.

Programming IC Open Steps

The tester allows easy programming of IC Open test as well. The user can use a CCD camera to directly input the XY coordinates where the sensor probe contacts or outsource the creation of test program to CAD data converters. Inputting the XY coordinates of all four corners on the IC package as well as the number of the IC leads, the tester can automatically create the XY coordinates for the sensor probes to contact.

Measurable ICs and conditions

- 1. IC outward dimension is over 6mm each side (QFP, SOP, PLCC, LCC, MSP, so on)
- 2. IC mold thickness is less than 2.5mm from the lead frame. (It depends on the material and the frame area)
- 3. The probe is more than 2.8mm away from the sensor probe





Unmeasurable ICs and conditions

- 1. Unmeasurable ICs
 - SIP and such ICs that has no or a very small lead frame inside the IC's package
 - ICs which mold thickness is more than 2.5mm from the lead frame
 - ICs in which shield plate or heat sink is installed over the lead frame
- 2. Unmeasurable conditions
 - GND line and Vcc line
 - IC's lead with very low impedance of less than 20 ohm (equivalent to approx. 0.9μ F or more in Capacitance) against GND line or Vcc line.





Any breaking of the lead wire inside the ICs, any miss-orientation, or any miss-mount cannot be detected.

There may be other cases that are unmeasurable due to the wiring (and mounting) condition on the boards or type of the ICs being tested.

Test speed

The test speed depends largely on travel distance of the test probes and the IC lead pitches. Let's say for instance that we test a QFP with 0.65mm pitch while directly contacting the IC lead pads. In this case, we can estimate max. 0.10 - 0.15 sec./point approximately.

Test area (Sensor probe's moving area)

APT-9411CE : W540 x D460 x H15 (mm)



APT-9411SL : W635 x D609 x H15 (mm)



[Fig.7] Sensor probe's moving area



Movable area of the sensor probe is equal with the maximum PC board size to be set on the tester.

Other specifications

Measurement signal	AC140mVrms (f=5KHz,10KHz)
Up/Down mechanism	Stepping servo motor & timing belt
Lowest position set	Programmable for 0-15mm per step
Maximum sensor stroke	Approx. 6mm
Initial spring pressure	Approx. 124g
Spring pressure under 1/2 stroke	Approx. 409g
Spring pressure under full stroke	Approx. 694g
Spring lifetime	More than 10 million strokes (at 1/2 stroke)

§ 2 Test Data programming

This section describes the procedure for preparing a program of the IC open test.

Initial setup

The sensor probe to probe offset must be adjusted carefully by the following operation. The tester requires this initial setup by the user at the time of first using the IC open test system and each time the sensor probe (also the sensor probe base) is replaced by new one.



1. Use your mouse to click Option Mode. (Tool > Mode Setting > Option Mode)

<u>File Edit R</u> eference <u>T</u> est	Tool View Help	
File Mode Edit Optimiza	🛩 Group Addition	dinate Self-diag. Convert Help
D.Mode T.Mode MMode O.Mod	Auto Location Set	
	Pin Search	
	Mode Setting	Zata Mode Ctrl+D
	Data Programming <u>W</u> izard	Lest Mode Ctrl+T
	CA9 File Convert Ctrl+E	Master Mode F5 □Qution Mode Shift+F5

- 2. The Option Mode window is displayed on the screen.
- 3. Choose IC Open from the menu list.

Option Mode	
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 čustomize PCB extension support kit Vacuum unit	Sensor Probe / Probe Offset 3X 3Y 2X 2Y +000.0000 +000.0000 +000.0000 +000.0000 Press START to begin set up.
□ <u>W</u> orkstation Mode	✓ <u>Q</u> K <mark>× <u>C</u>ancel</mark>

- 4. Let's say for example that you need to adjust the sensor probe to probe offset on Arm #3. In this instance, double click on the coordinates at the 3X box.
- 5. It displays the pop-up message "Press [TEST START] SW" on the screen.



- 6. Press [TEST START] SW on the operation panel.
- 7. The JOG window is displayed on the screen.

JOG Probe-3		
Using the keypad arrow keys, drive probe 3 to the offset point.		
Ţ		
X: +000.0000 Y: +000.0000		
ENTER] SW = Coordinate Set		

Use the keypad arrow keys to drive the 3Z arm and set the probe on any reference point on the horizontal line or any Via hole on your PC board. After the position was determined, press [Enter] SW to enter the X,Y coordinates.



8. The next window appears on the screen. Press [TEST START] SW on the operation panel.

Sensor Probe / Probe Offset 3X-s.probe 3Y-s.probe +000.0000 -021.0000	
Press $\frac{TEST}{START}$ to begin set up.	

9. The JOG window is displayed on the screen.

JOG Probe-3			
Using the keypad arrow keys, line the sensor probe as shown below.			
		Ū	
	•	· · ·	
	X:	+000.0000	Y: -021.0000
ſ			
l			
l			
l			
l			
l			
l			
L			
			SW = Coordinate Set
-			

10. Use the keypad arrow keys to drive the 3Z arm and set the front side of the sensor plate for the X,Y coordinates assigned by Probe (3Z). After the position was determined, press [Enter] SW to enter the X,Y coordinates.



11. The sensor probe moves to the Machine reference point automatically while displaying the following window on the screen.

Sensor Probe check	
Confirm that the sensor probe is o	n the center of the machine reference point.
= CAUTION = If it is not on the center, it might b offset or the machine reference p Press [Cancel] button and verify t	e incorrect setting of Probe/Sensor probe ooint. he offset or the machine reference point again.
	<u>✓ OK</u> <u>× C</u> ancel

- 12. Ensure that the sensor probe is at the center of the Machine reference point and click on [OK] button. If the sensor probe has some deviations, click on [Cancel] button and repeat the same operation from Process 4.
- 13. The JOG window is displayed on the screen. Now the sensor probe to probe offset on Arm #2 requires to be adjusted.

J0 <u>B Probe-2</u> Using the keypad arrow keys, drive probe 2 to the offset point.	
· · · · · · · · · · · · · · · · · · ·	
X: +000.0000 Y: +000.0000	
[ENTER] SW = Coordinate Set	

14. Use the keypad arrow keys to drive the 2Z arm and set the probe on any reference point on the horizontal line or any Via hole on your PC board. After the position was determined, press [Enter] SW to enter the X,Y coordinates.



15. The next window is displayed on the screen. Press [TEST START] SW on the operation panel.

Sensor Probe / Probe Offset 2X-s.probe 2Y-s.probe +000100000 +021.0000	
Press START to begin set up.	

16. The JOG window is displayed on the screen.

JOG Probe-2		
Using the keypad arrow keys, line the sensor probe as shown below.		
X: +000.0000 Y: +021.0000		
[ENTER] SW = Coordinate Set		

17. Use the keypad arrow keys to drive the 2Z arm and set the front side of the sensor plate for the X,Y coordinates assigned by Probe (2Z). After the position was determined, press [Enter] SW to enter the X,Y coordinates.



- 18. The sensor probe moves to the Machine reference point automatically.
- 19. It displays the following window on the screen.

ensor Probe check	×
confirm that the sensor probe is on the center of the machine reference point.	
= CAUTION = If it is not on the center, it might be incorrect setting of Probe/Sensor probe offset or the machine reference point. Press [Cancel] button and verify the offset or the machine reference point again	
<u>✓ Q</u> K X <u>×</u> <u>C</u> ancel	

- 20. Ensure that the sensor probe is at the center of the Machine reference point and click on [OK] button. Then the display goes back to the Option Mode window. If the sensor probe has some deviations, click on [Cancel] button and repeat the same operation from Process 13.
- 21. Click on [OK] button to quit the Option Mode window.
- 22. All that you need to do for Initial set was finished.

Automatic generation of IC open test

The tester offers two options to manage the XY coordinates in your test programs. One method is so-called "**Teaching system**" that utilizes the solder lands and the electrodes to test the UUT. Another one is so-called "**Point system**" that utilizes any test point from each circuit patterns. Those coordinate management systems are user-selectable on the Coordinates Management window in Data mode.



Prior to start programming a test data, ensure that the box "Use Auxiliary Reference Point(s)" on the Auxiliary Reference Point(s) window (Tool > Mode setting > Data Mode) is selected.

Practical operation in Teaching system

The IC open test is automatically created by using the Auto. Generation function available on Step Edit/List menu. (Tool > Step Edit/Step List > Auto. Generation)

<mark>∖ E</mark> dit <u>S</u> earch <u>M</u> ove <u>T</u> ool <u>V</u> iew		-	a x
File Mode Edit Op Goordinates Map	F1	F1 Ite Self-diag. Convert Help	
Eat List Erase S Clear Comb Measurements		, b Seect Cit Copy Paste Cascade Tite	
Step :Aux. Pai		- F. +% -% Reference Test Judge	1-X
000001: * Generation	•	** 10 10	[+0
000002: Ground	•		
Bottom probe	•	•	
Cluster Function	•	•	
Auto Generation			
💺 Change Step Data Ctr	1+C	+C	
Select <u>R</u> evise Area Mode			
High-fly / No-contact-zone Shift+Ctr	1+H	•H	

(Ex.1) How to program the IC open test for the following IC



Preparation

Coordinates Management system (Tool > Mode setting > Data Mode) should be specified to **Teaching system** in advance.



- 1) Select either Step Edit or Step List from Menubar.
- 2) It displays the Step Edit window or the Step List window.

😽 <u>E</u> dit	Searc	:h <u>M</u> o	ove <u>T</u> oo	l <u>V</u> iew														- 8 ×
File	Mode	Edit	Optimiz	ation Too	I Ref	erence	Test To	tal Co	ordinate	Self-dia	g. Com	/ert He	lp					
Edit	L ist	Era	se Search	Change	Æ D.Edt	D.Set	A.Gen.	Sil. Print	∩¢ Undo	Select	Sec.	🥁 Сору	Paste	Casci	de Tie			
Step	:Au	х.	Parts		Val	.ue	C	ommer	nt			F.	+8	- %	Reference	Test	Judge	1-X
00000	1:		×		×		*					* *	10	10				[+0
00000	2:																	

Step List window

- 3) Select Auto. Generation function from the Menubar. (Tool > Auto. Generation)
- 4) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.

Use board ref.point and aux.ref.point f	or alignment?
<u>✓ Y</u> es	<mark>≭</mark> <u>C</u> ancel

- 5) Click on [Yes] button.
- 6) It displays the pop-up message "Press [TEST START] SW" on the screen.

START Press [TEST START] SW

- 7) Press [TEST START] SW on the operation panel.
- 8) Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- 9) It displays the Auto. Generation window.

Generation			×
000001:*	*	*	
Input Parts informa	ation		
<u>P</u> arts :	*		(11 characters)
Co <u>m</u> ment :	*		(20 characters)
<u>L</u> ocation :	*		(4 characters)
	 < <u>B</u>acl 	k <u>N</u> ext	t▶ <u>∢_0K</u> <mark>× <u>C</u>ancel</mark>

Type "Parts name', 'Comment' and 'location' from the keyboard. Then click on [Next] button.

10) It proceeds to the next window where you can specify a preferable generation function.

Select generation t	уре.		
Data generation m	ienu		
 IC automatic ge Transistor autor 	neration natic genera	tion	
 Connector auto Pattern check a 	matic genera utomatic ger	ation neration	
O Photo coupler a	utomatic ge	neration	
	generation		

Fill 'IC automatic generation' radio button and click on [Next] button.

11) It proceeds to the next window where you can specify a preferable generation style.



Fill 'IC open test only' radio button and click on [Next] button.

12) It proceeds to the next window where you can specify a preferable generation pitch.

Generation		
000001:IC101	* *	
Select pitch.		
<u>P</u> itch select menu —		
 Regular pitch 		
O Irregular pitch		
	I Back	Nevt Mext
	4 Dack	

Fill 'Regular pitch' radio button and click on [Next] button.

13) It proceeds to the next window where you can specify information on the IC lead number.

Generation 🛛	Generation 🖸
000001:IC101 * *	000001:IC101 * *
Input pin number.	Input pin number.
Ex.) 1,10,11,20 Start1,End1 - Start5,End5 1.	Ex.) 1,10,11,20 Start1_End1 - Start5_End5 1.8.9,16.17,24,25,32
▲ Back Next ► ✔OK X Cancel	■ <u>B</u> ack Next > ✓ OK X Cancel

Type "8, 9, 16, 17, 24, 25, 32" from the keyboard and click on [Next] button.

14) It proceeds to the next window where you can specify GND pin number.

Generation		
000001:IC101	* *	
Input Ground number.		
□ <u>U</u> se ground coordinat	te	<u>G</u> round coordinate set
Ground-Pin No.		
1 🖌		
Use Bottom ground		
1 😫 12		
Use Bottom sensor		
1 😫 16		
	▲ <u>B</u> ack	Next ► ✓ OK X Cancel

Type "7" from the keyboard and click on [Next] button.

15) It proceeds to the next window where you can input the XY coordinates for the IC leads you specified at Process #13.



Drive the camera to enter the X,Y coordinates of the IC lead #1, 8, 9, 16, 17, 24, 25 and 32 in order and click on [OK] button.





Ideally all probing position should be on the IC land, not directly on any IC leads. Otherwise it may possibly mislead the judgment, because the open circuit at IC lead can be touched by the probing pressure.

16) It proceeds to the next window where you can input the XY coordinates for the two GND points that should set at the lower left and the upper right of the IC which is under way.



Drive the camera to enter the X,Y coordinates at the two GND points and click on [OK] button.

17) It proceeds to the next window where you can input the X,Y coordinates at each corners of the IC package.





Drive the camera to enter the X,Y coordinates at the four corners of the IC package and click on [OK] button.

18) The IC Open test steps are generated on the list automatically.



In case that the GND points for IC open test were set up incorrectly, otherwise when probe access was limited, IC open test steps may be not generated so that they are converted to normal VF measurement steps ('Pin to GND') automatically.



Practical operation in Point system

The IC open test is automatically created by using the Auto. Generation function available on Step Edit/List menu. (Tool > Step Edit/Step List > Auto. Generation)

॑ Edit Search Move Tool ⊻iew	_ = = =
File Mode Edit Op <u>C</u> oordinates Map	FI te Self-diag. Convert Help
Edit List Erase S Clear Comb Measure	ients , A.Gen. Prit Undo Select Of Copy Pade Cascade Tie
Step :Aux. Pai	H-pin L-pin F. +% -% Reference Test J
000001: deneration	* * ** 10 10
000002: Ground	•
Bottom probe	۰ ۲
Cluster Function	•
Coordinates input	
Auto Generation	N
💺 Cha <u>n</u> ge Step Data	Ctri+C
Select <u>R</u> evise Area M	Mode
High-fly / No-conta	act-zone Shift+Ctrl+H

Undermentioned is a practical example to make IC Open test steps.

(Ex.2) How to program test steps only for the IC below

Preparation

Coordinates Management system (Tool > Mode setting > Data Mode) should be specified to **Point system** in advance.



- 1) Select either Step Edit or Step List from Menubar.
- 2) It displays the Step Edit window or the Step List window.

🛃 Edit 🖇	<u>S</u> earch	Mov	e <u>T</u> ool	View																	- 8	×
File M	lode E	Edit	Optimizat	tion Too	ol Refe	erence	Test T	otal (Coordinate	e Self-dia	g. Conv	ert Help										
Edit	E r	Erase	≪∕∕ Search	No. Change	Pin coor.	Pin Er.	D.Edit	LL' D.Pin	D.Set	A.Gen.	Sili. Print	۶) Undo	Select	Cut	Д Сору	Paste	Cascade					
Step	:Aux	. F	arts		Val	.ue		Comm	ent			H-p	in L	-pin	F. 4	+% -	% Re	ferer	nce T	est		Ju
000001	÷	*			*			¥					*	*	**]	10 1	0					
000002	:																					

Step List menu

3) Select Auto. Generation function from the Menubar. (Tool > Auto. Generation)

4) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.

Use board ref.point and aux.ref.point for alignment?
✓ Yes SNo X Cancel

- 5) Click on [Yes] button.
- 6) It displays the pop-up message "Press [TEST START] SW" on the screen.

START Press [TEST START] SW	/
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- 7) Press [TEST START] SW on the operation panel.
- Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- 9) It displays the Auto. Generation window.

Generation				×
000001:*	*	*		
Input Parts inform	ation			
<u>P</u> arts :	*		(11 ch	aracters)
Co <u>m</u> ment :	*		(20 ch	aracters)
<u>L</u> ocation :	*		(4 cha	racters)
	< <u>B</u>	ack <u>N</u> ex	t ▶ <u>√</u> <u>O</u> K	<mark>≭</mark> <u>C</u> ancel

Type "Parts name', 'Comment' and 'location' from the keyboard. Then click on [Next] button.

10) It proceeds to the next window where you can specify a preferable generation function.

Generation			8
000001:IC101	*	*	
Select generation t	ype.		
Data generation m	enu		
IC automatic ge	neration		
 Transistor autor 	natic generat	ion	
Connector auto	matic general	tion	
Photo coupler a	utomatic gen utomatic gen	eration	
○ FET automatic	generation		
□ Data generation	by <u>T</u> eaching r	mode	
	<u></u> ∎a	ack <u>N</u> ext ▶	K <mark>∡ <u>C</u>ancel</mark>

Fill 'IC automatic generation' radio button and click on [Next] button.

11) It proceeds to the next window where you can specify a preferable generation style.

Generation	(
000001:IC101 * *	
Select generation mode.	
Data generation mode	
• Pin to pin and pin to ground	
• Pin to ground only	
Pin to pin and IC open test IC open test only	
I Back Next ► I OK X Ca	ncel

Fill 'IC open test only' radio button and click on [Next] button.

12) It proceeds to the next window where you can specify information on the IC lead number.

Generation	Generation 🔀
000001:IC101 * *	000001:IC101 * *
Input pin number.	Input pin number.
Ex.) 1,10 Start1,End1 - Start5,End5 1,	Ex.) 1,10 Start1,End1 - Start5,End5 1.8,9,16,17,24,25,32
■ Back Next I> @ OK X Cancel	■ Back Next ► I I OK X Cancel

Type "8, 9, 16, 17, 24, 25, 32" from the keyboard and click on [Next] button.

13) It proceeds to the next window where you can specify GND pin number.

Generation			
000001:IC101	* .	t.	
Input Ground number.			
Ground-Pin No.			
Use Bottom ground			
Use Bottom sensor			
		<u>N</u> ext ► <u>√</u> <u>O</u> K	<mark>, ≍</mark> <u>C</u> ancel

Type "7" from the keyboard and click on [Next] button.

14) It proceeds to the next window where you can specify the Node number for the IC leads you specified at Process #12

Generation	Generation 🔀
000001:IC101 * *	000001:IC101 * *
Input Pin number. Pin. Pin No. 2 3 4 5 6 7 8 9 Coordinates input	Input Pin number. Pin. Pin No. 26 337 27 336 28 335 29 334 30 333 31 32 32 331 Coordinates input Back Nextb ØK ØK Gancel



Type the Node number for each IC leads from the keyboard and click on [OK] button.

15) Drive the camera to enter the X,Y coordinates of the IC lead #1, 8, 9, 16, 17, 24, 25 and 32 in order and click on [OK] button.

Generation	Generation
000001:IC101 * *	000001:IC101 * *
Press [ENTER] SW to set the coordinates. Pin. X coor 1 1 8 9 16 1 17 24 25 32	Press [ENTER] SW to set the coordinates. Pin. X coor Y coor 1 (+020.8000,+025.6000) 8 (+020.8000,+093.6000) 9 (+031.6000,+093.2000) 16 (+071.6000,+093.2000) 17 (+086.0000,+093.2000) 24 (+086.0000,+032.8000) 25 [+067.6000,+027.6000] 32 (+030.0000,+027.6000)
■ <u>B</u> ack Next ► ✓ <u>O</u> K ¥ <u>C</u> ancel	■ Back Next ► ● ▲ QK ▲ Cancel

16) It proceeds to the next window where you can input the XY coordinates for the two GND points that should set at the lower left and the upper right of the IC which is under way.



Drive the camera to enter the X,Y coordinates at the two GND points and click on [OK] button.



17) It proceeds to the next window where you can specify X,Y coordinates for each corners of the IC package.





Drive the camera to enter the X,Y coordinates at the four corners of the IC package and click on [OK] button.

18) The IC Open test steps are generated on the list automatically.

📕 <u>E</u> dit	<u>S</u> earch	<u>M</u> ove	<u>T</u> ool	⊻iew										
File	Mode E	Edit C	Optimiza	tion Too	ol Refe	erence	Test T	otal	Coordir	nate	Self-dia	g. Con	vert Help	5
Edit	I iet	Frase	erch.	Chapter			O D. Edit			5	A Gen	Print	n.	Select
Sten	• 7.11.92	Dor	ta	Change	Zalua	- HITEL	H-ni	n T-	nin	Com	mont		ondo	Loc
noovo.	.Aux.	rai Tai			aiue 1 7n		- n-pi 21	п 11-	201	*	ment			13
00000.	-	101		-	L-7P		31	-	201					IA
000002	2:ICOP	IC1	.01		2-7P		31	5	301	*				1A
000000	3:ICOP	IC1	101		3-7P		31	4	301	×				1A
000004	4:ICOP	IC1	.01		4-7P		31	3	301	×				1A
000005	5:ICOP	IC1	.01	ļ	5-7P		30	3	301	×				1A
000006	5:ICOP	IC1	.01	1	5-7P		30	2	301	×				1A
00000	7:ICOP	IC1	.01	1	3-7P		30	0	301	×				1A
000008	B:ICOP	IC1	.01	9	9-7P		11	2	301	×				1A
000009	9:ICOP	IC1	.01		10-7P		11	1	301	×				1A
000010]:ICOP	IC1	101		11-7P		11	0	301	×				1A
00001:	l:ICOP	IC1	.01		12-7P		10	9	301	×				1A
000012	2:ICOP	IC1	.01		13-7P		10	8	301	*				1A

Prior to generate IC open test steps, you are recommended to fill "Use Auxiliary Reference Point(s)" checkbox available in Data Mode menu. Otherwise it may give bad influence to the IC open test if the PC board under test is set with some inclination.

In case that the GND points for IC open test were set up incorrectly, otherwise when probe access was limited, IC open test steps may be not generated so that they are converted to normal VF measurement steps ('Pin to GND') automatically.



Auto. Generation menu is also displayed by substituting "=" mark in Value column and hitting [Enter] key on Step Edit menu or Step List menu.

After IC open steps were generated, 'ICOP' is substituted in Aux. column of their test steps.

Reference Value Input & Examination

The important part begins here as you will need to input and examine the reference value for IC open test correctly.

Reference Value Input

Like usual test steps, use Reference value input window to input the reference value for the IC open test.



- 1) Select "Reference Value Input" from the Menubar. (Reference > Reference Value Input)
- It displays the Reference Value Input window. It can input the reference value according to the set criteria in Reference Input area (2) and Enter the starting and ending step numbers box (1), as needed.



3) Press [TEST START] SW on the operation panel, and the reference value input starts automatically.



If you prefer to input reference value for IC open test steps only, use IC Open Reference Value Input function (Reference > Auxiliary > IC Open Reference Value Input).

Reference Value Examination

Like usual test steps, use the Examination function (Step data review, Step data test) to examine and change the measurement condition for IC open test.

Reference value

The reference value of IC open test is something special and has no unit with it.

Pass/Fail judgment

The IC open test is judged PASS when it was measured within the tolerance ($\pm 30\%$) of the reference value which you learned from good sample board(s). The tolerance is assigned to $\pm 30\%$ automatically during the automatic reference input.

However, the reference value for IC open test may vary significantly depending on the IC components under test and/or due to the effect of the substrate, which occasionally causes misjudgment even though the tester is in good condition. In such case, you should make the proper adjustment of the tolerance through not a little sampling.



The operation below is just for convenience to save low tolerance (%) that is applied to the IC open test automatically depending on the reference value.

- 1) Select "Change Step Data" from the Menubar. (Tool > Change Step data)
- 2) It displays the Change Step Data window.

Change step data	
Edit Reference Coordinate Probe	Edit Reference Coordinate Probe
Search category	Change category
Parts	Top position of probe
□ Value	Bottom position of probe 1
Comment *	Bottom position of probe 2
Location *	Bottom position of probe 3
Net name *	Bottom position of probe 4
□ I/O,DDE step	Probe stroke speed
	Access probe
□ Case sensiti⊻e	Enter the starting and ending step numbers
⊠ <u>W</u> ild card mode	·
□ Se <u>a</u> rch by exclusion	Execute Science

3) Fill "IC Open" checkbox in Search category on the Reference tab. After that, fill "IC Open" checkbox in Change category, then click on [...] button on the right-hand.

Change step data	
Edit Reference(1) Coordinate Probe	Edit Reference(1) Coordinate Probe
Search category	Change category
Element AUTO	Element AUTO
Measuring mode AUTO	Measuring mode AUTO
Measuring range	Measuring range AUTO
Measuring time 0.0 [msec] =	Measuring time
Reference Value	Reference Value
Function BLANK (**)	Function BLANK (**)
□ Judgment +% tolerance 100 🖢 0999	□ Judgment +% tolerance 100 🛊 0999
Judgment -% tolerance	Judgment -% tolerance
☑ IC Open	☑ IC Open
Direction of retry test Move 360	Direction of retry test Move 360
Debug Status	Debug Status -
□ Optical step	
□ Case sensiti <u>v</u> e	Enter the starting and ending step numbers
☑ Wild card mode	×
□ Se <u>a</u> rch by exclusion	✓ <u>E</u> xecute SClose

4) It displays the Set low tolerance from the Ref. value window. Specify the low tolerance (%) you want to set for each range of the reference value of the IC open test and then click on [OK] button.

Set low tolerance from the Ref.Value			
Ref.Value	Low Tolerance(-%)		
Over 130.0	50		
120.0 - 129.9	50		
110.0 - 119.9	50		
100.0 - 109.9	50		
90.0 - 99.9	50		
80.0 - 89.9	50		
70.0 - 79.9	50		
60.0 - 69.9	50		
50.0 - 59.9	50		
40.0 - 49.9	50		
30.0 - 39.9	50		
20.0 - 29.9	50		
10.0 - 19.9	50		
	✓ <u>O</u> K		

5) The display goes back to the Change Step Data window. Click on [Execute] button.

Unmeasurable condition

As for the unmeasurable cases which were described in a previous chapter, the Function (FC) column is automatically substituted by "JP" at the time of the automatic reference value input.

In addition, when either [Auto. Input] key or [Input] key was pressed on those steps in the Step data review, following error messages may be displayed.

"The IC open measurement is difficult!"

"The IC open measurement is impossible!"

In this case, the error messages are likely to be caused by the following facts:

Unmeasurable conditions or reasons
(1) ICs which mold thickness over the lead frame are thicker than 2.5mm.
(2) ICs in which shield plate or heat sink is installed over the IC's package or the lead frame.
(3) IC lead is on either GND line and Vcc line
(4) IC lead with very small impedance of less than 10 ohm (equivalent to approx. 0.9 μ F or more in capacitance) against the Vcc or the GND line.
(5) IC lead wire breaks in the IC's package.
(6) The distance between the sensor probe and the probe pin is too near to measure.(Less 2.8mm approx.)

If any of cases above, it is recommended to change the step to "JP" (jump).

Data conversion

Electric test of the IC components (i.e. conventional Pin to GND steps) can be easily converted into the IC open test -- and vice versa.

How to convert electric test to IC open test (Plural steps)

The procedure of converting more than one electric test in series into the IC open test is outlined below.



(NOTE) The procedure below is the case for Teaching system.

- 1) Select either Step Edit or Step List from the Menubar.
- 2) It displays the Step Edit window or the Step List window.
- 3) Put your mouse pointer over the first step of the existing electric test.

Step :Aux.	Parts	Value	Comment
000590:	IC12	1-8P	74HC192A
000591:	IC12	2-8P	74HC192A
000592:	IC12	3-8P	74HC192A
000593:	IC12	4-8P	74HC192A
000594:	IC12	5-8P	74HC192A
000595:	IC12	6-8P	74HC192A
000596:	IC12	7-8P	74HC192A
000597:	IC12	9-8P	74HC192A

4) Select "Convert" from the Menubar. (Tool > Generation > IC Open > Convert)

<u>T</u> ool	⊻iew												
	<u>C</u> oordinates Map	F1		ıtı	e	Self-diag	. Co	nvert	Hel	р			
4	Set Comb.Measurements Clear Comb.Measurements		•	6 10	,)	Select	S Cut	di Co	s py		aste		
			_				F	+>		2	Rei	ference	Э
	Generation					<u>S</u> pecia	il Gei	nerati	on	•			
	Ground		۲			<u>K</u> elvin				۰	_		
	Bottom probe		•			IC Op	∋n					<u>C</u> onvert	
	Cluster Function		١,	F			* *	10	10	7		<u>R</u> elease	
	Auto Generation			Ľ			* *	10	1)	_		
	Change Step Data	Ctrl+C					**	10	10)	_		
~	Onalige Step Data	ouno		Γ			**	10	10)			
	<u>Region alignment</u>						* *	10	10)	_		
	High-fly / No-contact-zone	Shift+Ctrl+H					**	10	10)	_		

5) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.



- 6) Click on [Yes] button.
- 7) It displays the pop-up message "Press [TEST START] SW" on the screen.



- 8) Press [TEST START] SW on the operation panel.
- 9) Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- It displays the pop-up message "Do you use the bottom sensor probe?" on the screen. Click on [No] button.

Do you use	the bottom s	ensor probe?
	✓ Yes	<u> N</u> o

11) It displays the pop-up message "Is it irregular pitch?" on the screen. Click on [No] button.

ls it Irregular p	oitch?
✓ Yes	<u>⊗ N</u> o

12) It displays the following window on the screen. Enter X,Y coordinates for two GND points at the left-bottom side and at the right-top side of the PC board and click on [OK] button.

Ground Coordinates Change		23
Press [ENTER] SW to set the coordinates.		
	X coor	Y coor
XY coordinates for GND point at the lower left area of the PCB	[-127.9113,-	000.1412]
XY coordinates for GND point at the upper right area of the PCB	[-000.0250,-	000.0675]
	√ <u>О</u> К	<mark>≭</mark> <u>C</u> ancel

13) It displays the following window on the screen. Enter the X,Y coordinates for each corners of the IC package and click on [OK] button.

Select/Set the IC Open XY coordinates								
Press [ENTER] SW to set the coordinates.								
	X coor Y coor							
XY coordinates at the lower left corner of the IC	[+011.2000,+004.0000]							
XY coordinates at the lower right corner of the IC	[+053.2000,+004.0000]							
XY coordinates at the upper right corner of the IC	[+053.2000,+004.0000]							
XY coordinates at the upper left corner of the IC	[+011.2000,+004.0000]							
Bottom position of <u>S</u> ensor probe								
1 😧 015	✓ <u>O</u> K X Cancel							

14) It displays the pop-up message "Is this J-leaded package IC?" on the screen. Click on [No] button.



15) IC Open test steps are generated on the list automatically.

	_		-
Step :Aux.	Parts	Value	Comment
000590:ICOP	IC12	1-8P	74HC192A
000591:ICOP	IC12	2-8P	74HC192A
000592:ICOP	IC12	3-8P	74HC192A
000593:ICOP	IC12	4-8P	74HC192A
000594:ICOP	IC12	5-8P	74HC192A
000595:ICOP	IC12	6-8P	74HC192A
000596:ICOP	IC12	7-8P	74HC192A
000597:ICOP	IC12	9-8P	74HC192A

	Make sure that you enter the reference value after the data conversion.
(/)	When the GND points for IC open test were set improperly or when the probe access is strictly limited, IC open test may be not generated so that they are converted to normal electric test (Pin to GND steps) automatically.
	After IC open test was generated, 'ICOP' is substituted in Aux. column of the test steps.

How to convert IC open test to electric test (Plural steps)

The procedure of converting more than one IC open test in series into the electric test is outlined below.



- 1) Select either Step Edit or Step List from the Menubar.
- 2) It displays the Step Edit window or the Step List window.
- 3) Put your mouse pointer over the first step of the existing IC open test.

tep :Aux.	Parts	Value	Comment
00590:ICOP	IC12	1-8P	74HC192A
00591:ICOP	IC12	2-8P	74HC192A
00592:ICOP	IC12	3-8P	74HC192A
00593:ICOP	IC12	4-8P	74HC192A
00594:ICOP	IC12	5-8P	74HC192A
00595:ICOP	IC12	6-8P	74HC192A
00596:ICOP	IC12	7-8P	74HC192A
00597:ICOP	IC12	9-8P	74HC192A

4) Select "Release" from the Menubar. (Tool > Generation > IC Open > Release)

	Tool	View									
1		<u>C</u> oordinates Map	F1		ite	Self-diag.	Co	nvert	Help		
		Set Comb Measurements Clear Comb Measurements		+ +	b 10	J Select	9 Cut	Coj	əy I	Paste	
				_			ਸ਼	+>	_ %	Re	ference
		G <u>e</u> neration		×		<u>S</u> pecia	l Ger	ne ratio	on 🕨		
		Ground		۲		<u>K</u> elvin			•		
		Bottom probe		×		<u>I</u> C Ope	en		•		<u>C</u> onvert
		Cluster Function		×			**	10	10		<u>R</u> elease
	1.1	Auto Generation	_				**	10	10	_	
1		- Ohan - Stan Data					**	10	10		
		Change Step Data	Jtri≖C				* *	10	10	_	
		<u>R</u> egion alignment					**	10	10	_	
		High-fly / No-contact-zone Shift+C	Ctrl+H				**	10	10	_	

5) It displays the pop-up message "Do you convert regular generation?" on the screen. Click on [Yes] button.

Do you con∨ert regular	generation?
✓⊻es	<u> </u>

6) The electric test steps are generated on the list automatically.

Step :Aux.	Parts	Value	Comment
000590:	IC12	1-8P	74HC192A
000591:	IC12	2-8P	74HC192A
000592:	IC12	3-8P	74HC192A
000593:	IC12	4-8P	74HC192A
000594:	IC12	5-8P	74HC192A
000595:	IC12	6-8P	74HC192A
000596:	IC12	7-8P	74HC192A
000597:	IC12	9-8P	74HC192A



Make sure that you enter the reference value after the data conversion.

How to convert electric test to IC open test (One step only)

The procedure of converting one electric test into the IC open test is outlined below.



1) Select Review Step Data from the Menubar. (Test > Review Step Data)

[ESC] Back					
File Mode Edit	Optimization Too	Reference Test	Total Coordinate Self-	fiag. Convert Help	
Les line a	2 80 2				A-side
Ref. Average Re	rt.G. Open D. IC Ref.				
	Interes	l maratan di	≂)(
Carrier 4	Start step	End step			
Group 1	21	3084			
Group 2	-				
Group 3	-				
Group 5				Na 10 (11) 👔	
Group 6				(金融) 비 時 (金融)	
Group 7	-				
Group 8	-			وي الملك :	
Group 9					
Group 10					
Group 11					
		1		······································	
TAKAYA_94	11-1.SWX			Message	
			TEST TEST		
Inp		2	TOP START		
	step :				
Reference In	put				
⊠ Initialize m	easuring mod	_			
	cubanny mou				
Clear guar	d point		2)	(1)	
	ent		<u>´</u>)		
	ient			V	
Clear JP s	teps				
Sot tolerar	no automotio			Enter the starting and ending step numb	ers
Set tolerar	ice automatic	any			~

- 2) Fill the box "Evaluation of reference value" in the Examination Mode menu (2).
- 3) Use the input box (1) to specify the step number of the step to be converted into the IC open test.
- 4) Press [TEST START] SW on the operation panel.
- 5) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.

Use board ref.point and a	ux.ref.point f	or alignment?
<u>✓ Y</u> es	<u> N</u> o	<mark>≭ <u>C</u>ancel</mark>

- 6) Click on [Yes] button.
- 7) It displays the pop-up message "Press [TEST START] SW" on the screen.



- 8) Press [TEST START] SW on the operation panel.
- 9) Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- 10) It displays the Review Step Data window below.

(1) Auto Input [2] Inp	out [3]Test [4]Polarity	/ [5]P. access [6]	Search [7]Step move	L[8]	CR meter [9]F	Neverse [0]Store A	٩X		- 8
			our and the	onven	Ticip			A-sic	le
Edit List Erase	Search Change D.Edit							B-sid	
Examine LCR meter									
Step 4	8		START	1	Test				
Debug status				1					
-	J			2		Accepted			
Parts	Value	Co	mment	Jg	PASS	4096		E.	,
IC12	4-7P	*		1	Reference	-			
Loc Elem	nent F	unction	Temp.Value	Ĩ	0.700 V				
* DIODE	V BLANK	(**) 🗸 0	.700 V			- /2			
Measure Mode	Auto Range	,	Measure Time	1	Polarity				
DC-CC	0.5 mA (Range3)	🗸 1.0 mse	эс	+		2048			
+% -% +L	_imitLimit			-					
50 50 1.05	0 V 0.350 V				Reading				
speed pos P1	P2 P3 P4	Probe Access	7	1					
0 • H • 0 •	0 0 0 0 0 0 (-,N,N,+)R	~	2					
				3		0		0.5	1.0
				4		Probe 2		Probe 3	
Data	Quard	oarob	Maggura	5		[*** ***** ***	*****1	[*** ***** ***	
		Determe	Delastration	Min	-	Probe 1	, 	Probe 4	, + P
	Imput	Fart name	Folarity crieck	Ma)		[+010 6000 +0	4.00001	11000 +000	4.00001
Input	Delete	Value	Sampling	Av		[+013.6000,+0	04.0000J	[+050.8000,+00	4.0000]
Store	Search	Pin number	A.Input / Store						

11) Assign 'LD-CN' to the Measure Mode box.

][]Auto	Input [2]In	put [3]Test	[4]Polarity	/ [<u>5</u>]P. ac	cess [j]Search []Step mo	ve
File Mo	de Edit (Optimization	Tool Refer	ence Test	Total	Coordinate	Self-diag.	Co
Edit	List Erase	Search Chan	ge D.Edit	D.Set				
Examine	LCR meter	r						
Step	4	e e e e e e e e e e e e e e e e e e e				_	START	
Debu	ua status							
		_						~
F	Parts) Va	lue		C	Comment		-
IC12		4-7P		*				
Loc	Eler	nent	F	unction		Temp	.Value	
	DIODE	*	BLANK	(**)	*	✓ 0.700 V		
Measu	ure Mode	/	Auto Range			Measure Time		
DC-CC	~	0.5 mA (R	5 mA (Range3) 1.0 msec					
AUTO DC-CO DC-ZE		0.3	Limit 50 V					
DC-VI	Л	2 P:	3 P4	Probe A	Access			
DT-NF	N	- 0	- 0 - (-,N,N,+)F	2	~		
DT-PN	18							
DC-PC	5							
FET-E	Ν	and		loarab		Modeling		
FET-EP		arti		Building		(Medsule		
FET-D	P	Input		Part na	Polari	ty cneck	4	
AC-VA	Л	Delete	e:	Value	•	Sa	mpling	
	<i>n</i>					Constant of the second se		_

12) It displays the pop-up message "Do you use the bottom sensor probe?" on the screen. Click on [No] button.

D	you use the bottom sensor probe?
	✓ Yes ON

13) It displays the following window on the screen. Enter X,Y coordinates for two GND points at the left-bottom side and at the right-top side of the PC board and click on [OK] button.

Ground Coordinates Change		
Press [ENTER] SW to set the coordinates.		
	X coor	Y coor
XY coordinates for GND point at the lower left area of the PCB	[-128.3113,-	006.1413]
XY coordinates for GND point at the upper right area of the PCB	[+070.3750,	-000.0675]
	✓ <u>O</u> K	<mark>≭</mark> <u>C</u> ancel

14) It displays the following window on the screen. Enter the X,Y coordinates and the top position of the Sensor probe. Then, click on [OK] button.



- 15) The display goes back to the Step data review window. Assign '30' to both +% edit box and -% edit box.
- 16) Click on [Auto Input] button to learn the reference value.
- 17) Hit [0] key to save the reference value.

🏐 [1]Auto Input 🛛 [2]In	put [3]Test [4]Polarit	y [5]P. access [6	Search [7]Step move	[8]LCR r	meter [9]Rev	verse [0]	Store Au <u>x</u>		- 8 ×
File Mode Edit (Optimization Tool Refe	rence Test Total	Coordinate Self-diag. Co	onvert Hel	p				
🕞 🔒 🖏	4 1 m							A-sic	le
Edit List Erase	Search Change D.Edt	D.Set						B-sic	
Examine LCR mete	r								
Step 4			START		Test				
Dobug status				1	TOSE				
Debug status				2			ted		
-	Ŷ	Ϋ́	×		PASS	4096			
Parts	Value	Co	omment						
IC12	4-7P	*		Ret	terence				
Loc Eler	ment F	Function	Temp.Value	0.3	700 V				
* DIODE	BLANK	(**) 😽 😽	0.0						
Measure Mode	Measure Rar	nge	Measure Time	P	olarity	20.40			
LD-CN V	10KHz 50% (Rang	e2) 🗸 0.0 ms	ec	+		2048 -			
+% -% +	Limit -Limit		1	-					
50 50 105	0 35.0								
croad page D1		Brobo Accore	7	R	eading				
speed pos PT	P2 P3 P4	Probe Access		1					
		(-,N,A,+)	×	2					
				3		0		0.0	0.0
				4		Pr	obe 2	Probe 3	A
Data	Guard	Search	Measure			[***.	***** *** ******	[-047.6000,-034	1.0000]
Auto Input	Innut	Part name	Polarity check	Min		Pr	obe 1 -	Probe 4	+
lanut	Delete) (alua	Campling	Max		L-128	7113 -006 14131	[+019 6000 +00	4.00001
	LJelete	value	Sampling	AV		[=120.	/110,-000.1415]	[1018.0000,*00	4.0000]
Store	Search	Pin number	A.Input / Store						

18) Now the original step was changed to IC open test.

How to convert IC open test to electric test (One step only)

The procedure of converting one IC open test into the electric test is outlined below.



1) Select Review Step Data from the Menubar. (Test > Review Step Data)

[ESC] Back	
File Mode Edit Optimization Tool Reference Test Total Coordinate Se	If-diag. Convert Help
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A-side
Ref. Average Ref.G. Open D. IC Ref.	B-side
Start step End step	
Group 1 1 3584	
Group 2	
Group 3	n an
Group 4	14.1 日間電
Group 5	
Group 8	
Group 8	
Group 9	
Group 10	
Group 11	
	用 计数据数据
TAKAYA_9411-1.SWX	Message
TEST	
Input time : STOP START	
step :	
✓ Initialize measuring mode	\frown
Clear guard point	(1)
□ Clear element	
Clear IP steps	
L Clear of Steps	Enter the starting and ending step numbers
☑ Set tolerance automatically	

- 2) Fill the box "Evaluation of reference value" in the Examination Mode menu (2).
- 3) Use the input box (1) to specify the step number of the step to be converted into the electric test.
- 4) Press [TEST START] SW on the operation panel.
- 5) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.



- 6) Click on [Yes] button.
- 7) It displays the pop-up message "Press [TEST START] SW" on the screen.



- 8) Press [TEST START] SW on the operation panel.
- Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- 10) It displays the Review Step Data window below.

1 Auto Input [2]	nput [3]Test [4]Polarity Optimization Tool Refere	[5]P. access ance Test Total	6]Search [7]Step move Coordinate Self-diag. C	[8]LCF	Rmeter [9]R Help	everse [0]Store Aux	_ 8
	de La co	8.72					A-side
Edit List Erose	Search Change D.Edt						
Examine LCR met	er						
Step 4	8		START	٦ F	Test		
Debug status				1			
-				2		Accepted	
Parts	Value	(Comment	Jg	PASS	4096	F
IC12	4-7P	*		F	Reference	1	
Loc Ele	ement Fi	unction	Temp.Value	1	0.700 V		
* DIODE	BLANK	(**)	70.0	1-			
Measure Mode	Measure Rang	je	Measure Time	1	Polarity		
LD-CN	 10KHz 50% (Range 	2) <mark>v</mark> 0.0 m	sec	+		2048	
+% _%	+Limit -Limit			-			
50 50 10	5.0 35.0				Reading		
speed pos P	1 P2 P3 P4	Probe Access		1		2	
0 <mark>-</mark> H - 0	0 0 0 0 0 0	-,N,A,+)	~	2			
				3		0	0.0 0.
				4		Probe 2	Probe 3 A
Data	Guard	earch	Measure	5		[****,*****,****	[-047.6000,-034.0000]
Auto Input	Innut	Part name	Polarity check	Min		Probe 1	Probe 4 +
loput	Delete	Value	Sampling	max		[-128 7113 -006 1413]	[+019 6000 +004 0000]
Ohm	Delete	Value	Sampling	AV		1 12011110,000.1410]	[
Store	Search	Pin number	A.input / Store				

11) Assign 'DC-CC' to the Measure Mode box.

Examine	LCR meter					
Step	4					START
Debu	ug status]				
-						
F	Parts	Va	lue	ſ	С	omment
IC12		4-7P		*		
Loc	Elem	nent	F	unction		Temp.Value
*	DIODE	~	BLANK	(**)	~	70.0
Measu	ure Mode	Me	asure Rar	ige	[Measure Time
LD-CN	*	10KHz 5	0% (Rang	e2) 🗸	0.0 ms	ec.
AUTO		-][-	Limit			
DC-CC		35.	0			
DC-VN	Ń	2 P3	3 P4	Probe A	ccess	
DT-NF	N	0	- 0 -	(-,N,A,+)		~
DT-PN	IP I					
DC-PC	5					
FET-E	N					NUMBER OF
FET-E	P	ard		search	_	Ivieasure
FET D		Input		Part nar	ne	Polarity check
AC-VA	1	Delete		Value		Sampling
Sto	ore	Searc	h	Pin num	per	A.Input / Store

- 12) Assign '50' to both +% edit box and -% edit box.
- 13) Click on [Auto Input] button to learn the reference value.
- 14) Hit [0] key to save the reference value.

[1]Auto Input [2]Input [3]Test	[4]Polarity [5]P. access	6]Search [7]Step move	[8]LCR meter [9]Rev	verse [0]Store Aux	- 6 >
	and the				A-side
Edit List Erase Search Chang	e D.Edit D.Set				
Examine LCR meter					
Step 4		START	Test		
Debug status			1		
-		~	2	Accepted	
Parts Val	ue (Comment	Jg PASS	4096	
IC12 4-7P	*		Reference		
Loc Element	Function	Temp.Value	0.700 V		
* DIODE Y	BLANK (**)	0.700 V			
Measure Mode A	uto Range	Measure Time	Polarity	2048	
DC-CC v 0.5 mA (Ra	ange3) 🚽 1.0 m	nsec	+	2010	
+% -% +Limit -L	.imit		-		
50 50 1.050 V 0.35	i0 V		Reading		
speed pos P1 P2 P3	P4 Probe Access		1		
0 • H • 0 • 0 • 0	0 🗸 (-,N,N,+)R	· ·	2	-	
			3	0	0.5 1.0
			4	Probe 2	Probe 3
Data Guard	Search	Measure	J Ma	[****,******,****,*****]	[****,*****,****,*****]
Auto Input Input	Part name	Polarity check	Max	Probe 1 - I	R Probe 4 + R
Input Delete	Value	Sampling	Av	[+019.6000,+004.0000] [+030.8000,+004.0000]
Store	Pin number	A.Input / Store			

15) Now the original step changed to regular electric test.

Lowest position of Sensor probe

Sensor probe's stroke (the lowest position) for 2Z and 3Z axis is step by step changeable at "PL" column displayed in Step List menu. Also they are changeable in the block on Change step data window (Tool > Change Step Data).

The lowest position means a distance being lifted upward from the board surface and is regulated as shown in [List 1] below. In case of over stroke or short stroke, readjust this lowest position properly.



Even if any Sensor probe had short stroke, it is adjusted automatically under Auto. reference value input of IC open test steps. However, their stroke is too much shorted, it would take longer time for readjusting the stroke.

Value	Lowest position	Value	Lowest position
0	0 mm	8	8.0 mm
1	1.0 mm	9	9.0 mm
2	2.0 mm	А	10.0 mm
3	3.0 mm	В	11.0 mm
4	4.0 mm	С	12.0 mm
5	5.0 mm	D	13.0 mm
6	6.0 mm	E	14.0 mm
7	7.0 mm	F	15.0 mm

[List 1] Lowest position of Sensor probe



[Fig.1] Sensor probe stroke



- 1) Select either Step Edit or Step List from the Menubar.
- 2) It displays the Step Edit window or the Step List window.
- 3) Put your mouse pointer over the step to be changed.
- 4) Change 'PL' value for 2Z or 3Z axis on the list.

Edit <u>S</u> earch <u>M</u> ove File Mode Edit	e <u>T</u> ool <u>V</u> iew Optimization Tool Re	eference Test Total Coordina	te Self-diag. Convert He	alb	Prob	e 1,2,3,4	from the left
Edit List Erase	Search Change	D.Set A.Gen. Print Unc	ko Select Cut Copy	⊂∎ Paste			
Step :Aux. Pa	rts Value	e Comment	Loc EL	F. +% -	% PP PS	PL PL PI	L PL
000005:ICOP IC	1 5-8P	74HC192A	* D	** 50 5	0 H O	0 0 2	0
000006:ICOP IC	1 6-8P	74HC192A	* D	** 50 5	0 H O	0 0 2	0
000007:ICOP IC	1 7-8P	74HC192A	* D	** 50 5	0 H O	0 0 2	0
000008:ICOP IC	1 9-8P	74HC192A	* D	** 50 5	0 Н О	0 0 2	0



PL (Lowest position) changed in the Step Edit/List menu is applicable when the reference value is input. At that time, the stroke shortage from the changed lowest position is aligned automatically.

Top position of Sensor probe

The top position of the Sensor probe is managed by "H / M / L" in the same manner as the probe. The distance upward from the board surface is preset to 40.0mm(H), 16.4mm(M) and 6.4mm(L).

If the top position was lowered than the default (H), the rising time of the probe and the Sensor probe shorten, so that the test time is reduced.



In case that the M / L stroke needs to be changed, be sure to leave some margin for height clearance to avoid the mechanical interference with the devices on the PC board. Otherwise this may damage the probes, the Sensor probes or the PC board.



The M / L stroke is changeable on the Top Position of Probe window. (Tool > Mode Setting > Data Mode > Top Position of Probe)



1) Select Change step data from the Tool menu.

2) It displays the Change step data window.

Change step data			Ohange step date			
Edit Reference Coordinate Probe	Edit Reference Coordinate Probe		Edit(1) Reference Coordinat	e Probe	Edit Reference Coordinate Prob	ie(1)
Search category	Change category	I COLUMN TO A	Search category		Change category	increase for the
Parts	Top position of probe	L -	Parts	IC101	Top position of probe	
□ Value 1	Bottom position of probe 1	4	Value		Bottom position of probe 1	4 8
Comment	Bottom position of probe 2	1	Comment		Bottom position of probe 2	1
Location	Bottom position of probe 3	3 8	Location		Bottom position of probe 3	4 8
l_Netname	Bottom position of probe 4	1 -	Net name		Bottom position of probe 4	1 -
UO,DDE step	Probe stroke speed	0	I/O,DDE step		Probe stroke speed	0
	□Access probe (".".NJ	4)			Access probe	(N) E
Case sensitive ⊇ Wild card mode □ Search by exclusion	Enter the starting and ending step num	bers	□ Case sensitive ❷ Wild card mode □ Search by exclusion		Enter the starting and ending step nu	mbers e <mark>o</mark> <u>C</u> lose

- 3) Fill the box "Parts" in Search category and enter the name of the part which top position should be changed.
- Fill the box "Top position of probe" in Change category and select your preferable top position (H/M/L) from the combo box there.
- 5) Click on [Execute] button on the bottom.



In case that top position of the probe or the Sensor probe needs to be changed, be sure to leave some margin for height clearance to avoid the mechanical interference with the devices on the PC board. Otherwise this may damage the probes, the Sensor probes or the PC board.

§ 3 Maintenance

This section describes a short guidance how to do maintenance and troubleshooting on the sensor probes.

Maintenance of Sensor Probe Base CS8000-S21

The Sensor probe base CS8000-S21 is a small round plate locates on the top of the Sensor probe and is absolutely consumable and needs to be replaced periodically.

The CS8000-S21 usually lasts more than 10 million times of the Sensor probe's stroke. As a guideline of your periodical inspection, you can take advantage of Sensor Probe tab (Tool > Self Diagnosis > Maintenance) where their stroke count is strictly managed.

Probe Sensor Probe S	stamp	
Sensor probe's Life L	imit :	1000000
R-Sensor Stroke Cour	nt: 🗌	31991
L-Sensor Stroke Cour	it:	21233
Sensor probe's lifetime	will be mu	:h
Sensor probe's lifetime influenced by contact of stroke count.	e will be mu ondition as	ch well as the
Sensor probe's lifetime influenced by contact of stroke count. Sensor probe maintenar <u>R</u> eset senso	e will be muc ondition as nce menu r stroke cou	ch well as the
Sensor probe's lifetime influenced by contact of stroke count. Sensor probe maintenar <u>R</u> eset senso Set sensor pr	e will be mud ondition as nce menu r stroke cou robe's life lin	ch well as the int nit
Sensor probe's lifetime influenced by contact of stroke count. Sensor probe maintenar Reset sensor Set sensor pr Change sensor	e will be mu ondition as nce menu r stroke cou robe's life lin pr stroke co	ch well as the int nit unt
Sensor probe's lifetime influenced by contact of stroke count. Sensor probe maintenar Reset sensor Set sensor pr Change sensor	e will be mud ondition as nce menu r stroke cou robe's life (in or stroke co	nt unt

"Sensor probe's Life Limit" on this tab enables to preset the lifetime of the Sensor probes. After this entry, when the stroke count of any Sensor probe reached to the preset number, it displays a message *"Now is time to maintenance S-probe"* to alert you for inspection or replacement of the CS8000-S21. As for this setting process, refer to section 'Set sensor probe lifetime' in the next page.



The lifetime of CS8000-S21 much depends on your test condition, such like the stroke length, the type of IC package, flux applied over the PCB, so on. Especially the over stroke or the interference to the probe shortens the lifetime.

Set sensor probe lifetime

For the message *"Now is time to maintenance S-probe"* to be received during testing as soon as the system counted up the preset number of sensor strokes, you need to set 'Set sensor probe lifetime' according to the following procedure.



- 1) Select Maintenance from the Tool menu. (Tool > Self Diagnosis > Maintenance)
- 2) Select the Sensor Probe tab.

Maintenance menu	8
Probe Sensor Probe	
Probe's Life Limit :	0
Probe 1 stroke count :	27592
Probe 2 stroke count :	6546
Probe 3 stroke count :	7400
Probe 4 stroke count :	26991
Probe maintenance menu	
Probe maintenance menu	
Reset probe stroke	count
Set probe's life li	mit
Change probe stroke	count

- 3) Click on "Set sensor probe's life limit" button.
- 4) The cursor moves in the box "Sensor probe's Life Limit".
- 5) Specify the stroke number and hit [Enter] key on the keyboard.
- 6) Click on [OK] button.
- 7) The Sensor Probe tab is closed.



The Sensor probe's stroke count is saved automatically when your test data is saved in the disk and also when the system application is closed. So be sure to save or overwrite data before exchanging the test data.

Click "Reset sensor stroke count" button at above process 3 if you need to reset the stroke number.

Sensor probe Inspection

List 1 below is our recommended check points and your action to be taken.

Check points	Failure	Action
Spring mechanism	> Transformation of spring> Smooth moving	Replace CS8000-S21 *1)
Sensor electrode surface	> Dust or smudge> Worn out surface	Cleaning *2) Replace CS8000-S21
Connector and wire	> Breaking of wire> Disconnect of connector	Replace Sensor probe CS9000-A24 Plug in the connector tightly
Appearance	> Warpage	Replace Sensor probe CS9000-A24

[List 1] Sensor probe inspection



Never lubricate oil to spring mechanism. It causes bad moving finally.
 The cleaning of the electrode surface should be made softly by some using alcohol cotton stick.

Troubleshooting

When the IC open test is judged as unmeasurable or measures lower, the Sensor probe is considered to be unable to function normally. In addition, there may be other causes as indicated in List 2. Please check one by one carefully to find the root cause.

Possible cause 1	Countermeasure		
Sensor probe to probe offset is not suitable.	Readjust Sensor probe to probe offset. (Option Mode>IC Open>Sensor Probe/Probe Offset)		
Sensor probe's stroke is short.	Check either short-stroked or over-stroked.		
Sensor probe position is displaced.	Check incorrect coordinates position, any bent Sensor probe, so on.		
Sensor probe interferes with any probe.	Check the contact position is correct.		

[List 2] IC open troubleshoot

If everything in List 2 were checked without no success or the same effects appears even after the Sensor probe was replaced with a new one, check the next possibilities as described in List 3.

Possible cause 2	Countermeasure
IC open measurement board is out of order.	Execute IC-Open Self Test (Tool > Self Diagnosis > IC Open) to verify if it judges good. If any failure was detected, please call to our local distributor.
IC open unit is defective.	Call to our local distributor.
Any connecting cable or its connector is corrupted.	Call to our local distributor.

[List 3] IC open troubleshoot (2)

Replacing Sensor probe CS9000-A24



Particular care should be paid to the keen-edged head of the probe. Otherwise it may be an injury to your body.

The procedure below shows an example of replacing the Sensor probe which is located at Probe 3.

- 1) Select Adjust Probe from the Tool menu. (Tool > Self Diagnosis > Adjust Probe).
- 2) It shows Adjust Probe menu.

PROBE Adjustment	×
Please select the	e probe that you need to adjust.
	Probe <u>1</u>
[Probe <u>2</u>
[Probe <u>3</u>
[Probe <u>4</u>
	<u>S</u> Lose

- 3) Click on [Probe 3] button on the screen.
- 4) It displays "Press [TEST START] SW". Press [TEST START] SW.



- 5) The Probe 3 moves to the front side.
- 6) The pop-up window below appears on the screen.



- 7) Open the Safety cover.
- 8) Disconnect a connecting cable of the Sensor probe. Then unscrew the hex-head screw and remove the Sensor probe.
- 9) Install a new Sensor probe on the Antenna drive unit and fix it with the Allen screw. In this case, pay attention to the Sensor plate's face so as the border between white and green is in parallel with X-direction. Also there should be no space between the Sensor probe and the Antenna holder.



- 10) Joint the connector cable of the Sensor probe tightly.
- 11) Hook the connecting cable of the Sensor probe on Cable holder (Mini-clamp).



- 12) Close the Safety cover.
- 13) Press [RESET] SW.
- 14) Click on [Continue] button.
- 15) Click on [Close] button.
- 16) It displays "Press [TEST STOP] SW".



- 17) Press [TEST STOP] SW.
- 18) Adjust Probe menu is closed.
- 19) All operation is finished.



When the sensor probe to probe offset changed, Probe access and/or measured value at the IC open steps in the test program that had been created before the Sensor probe was replaced may possibly change. In such case, please input their reference value again.

Replacing Sensor probe base CS8000-S21



The procedure below shows the way of replacing the Sensor probe base CS800-S21.

- 1) Operate the same procedures 1 ~ 8 as the Sensor probe CS9000-A24 to remove the Sensor probe.
- 2) Pull the CS8000-S21 straight out of the Sensor probe.





Never try to pull the Sensor probe base in an oblique direction so hard the sensor probe is bent.

- 3) Fit the CS8000-S21 in the pins at the sensor probe after faced its green side in the direction where the cable hole is. (Refer to Fig.-1,2)
- 4) Push up the CS8000-S21 straight tightly. (Refer to Fig.-3)

When you do not go to the prescribed distance $(1.5 \sim 2.5 \text{mm})$ or the CS8000-S21 is installed with some inclination, it has not been all the way seated. (Refer to Fig.-4)





Once the CS8000-S21 is pulled out of the Sensor probe, usually the springs is extended so that they can't reuse it any more. Also, pay much attention to the mounting direction (See below).

§ 4 Underside IC Open test system

The tester is designed to use up to 6 Sensor plates (fixed type) on the bottom of the UUT while applying the measuring signal through the flying probes. This section gives an introduction to "Underside IC Open Test System CSU-9500" which is separately available as option of the CS-9500.

Outline

The Underside IC open test system CSU-9500 is equipped with 6 sensor blocks to be able to contact on the IC's package loaded on the bottom side of the UUT.



The Underside IC open test system is usable only while IC open test system CS-9500 (option) is installed on the tester.

Hardware construction

The Underside IC open test system CSU-9500 consists of the following parts.

#	Description	Model / Type	Q'ty
(1)	CSU block	P9071	6
(2)	Sensor & cable	SU9122 (22mm × 22mm)	6
(3)	Sensor & cable	SU9132 (32mm × 32mm)	6
(4)	Control cable 1	TAKAYA LS-441-01A (TVX-11~TVX-21)	1
(5)	Control cable 2	TAKAYA LS-441-02A (TVX-11~TVX-21)	1
(6)	Connection cable	TAKAYA LS-461-01A (TVX-21 ~ Tray)	6
(7)	Cable holding magnet	CH02	2



(1)(3)



(7)

(2)

Installation area

Fig.1 below shows the area where the bottom sensor plates are placeable directly on the Tray.



(Note) Shaded portion is prohibited the bottom sensors from being placed.

Height limitation

The IC package where the bottom sensor plate can contact should be max.12mm height from the substrate. (Refer to Fig.2)





Don't try to use the Underside IC open test system for any UUT which loads the component taller than 12mm. If it was wrong used, this may cause some damage to the bottom sensor plates or the UUT.

Test programming

You can prepare a test program with use of the Underside IC open test system as shown below.

Installation of bottom sensor plate



The procedure below shows the way to configure the XY coordinates of the bottom sensor plates.

- 1) Select Data Mode from the Mode menu. (Tool > Mode Setting > Data Mode)
- 2) The Data mode window appears on the display.
- 3) Click on "Bottom tools" from the menu.



Data mode > Bottom tools

4) Click on the Bottom sensors tab and check the box "Use Bottom sensors".



Bottom sensor

- 5) Configure both "Number of Bottom sensors" and "Bottom sensors restricted area".
- 6) Click on the Configure the position of Bottom tools button on the screen.
- 7) The Bottom Reference Point window appears on the display.
- 8) Flip the PC board over in Y-direction to specify the Bottom reference point from the bottom side.

emove the PCB, flip it to the Y-direction, and then place it back in the tester. Close the cover, press [RESET] SW, and then press [TEST START] SW.	
ottom Reference Point	
100.0175 +039.9688	
Press START to begin set up.	
aution!	
ne machines height limitation. Damage will occur if the height limitation is exceeded.	
✓ Back Next ► X Ca	incel

Bottom Reference Point

9) Press [TEST START] SW, and it displays the JOG window below.



Put the target marker over the Bottom reference point where is visible from the top as well (ex. through-hole) and press [ENTER] SW on the operation panel. The display goes back to the Bottom Reference Point window.

10) Click on [Next] button, and it displays Configure the positions for Bottom tools window.

Configure the positions for Bottom tools	
Bottom Sensor (1)	
	1
X coor Y coor	
XY coordinates for Bottom Sensor 1	
Press [ENTER] SW to set the coordinates.	
4 <u>B</u> ac	k <u>N</u> ext ≽ <mark>≭ <u>C</u>ancel</mark>

Configure the positions for Bottom tools

Press [ENTER] SW on the operation panel to specify the bottom sensor position, where is the left-bottom corner, the right-bottom corner and the right-top corner of the IC package.

JOG Bottom sensor	JOG Bottom sensor	JOG Bottom sensor
XY coordinates at the lower left side of the IC	XY coordinates at the lower right side of the IC	XY coordinates at the upper right side of the IC
· · · · · · ·	· · · · · ·	· · · · · · ·
X: -011.0000 Y: +020.4000	X: +020.0000 Y: +018.4000	X: +033.2000 Y: -008.4000
[ENTER]SW = Coordinate Set	[ENTER] SW = Coordinate Set	ENTER] SW = Coordinate Set

11) It displays the Configure the positions for Bottom tools window.

figure the positions for Botto	m tools		
otto <u>m</u> Sensor(1)			
	X coor	Y coor	
XY coordinates for Bott	om Sensor 1 [+000.1025.	+000.0925]	
Press [ENTER] SW to	set the coordinates.		
			-

12) Click on [Next] button, and it displays the next window.Flip the PC board over in Y-direction to specify the Bottom reference point from the top side.

ottom Reference	Point	ori, and along		enangen	•.	
X coor Y coo -100.0175 +039	vr .9688					
his step resets th	ne Bottom refer	ence point foll	owing the Y-a	xis turn.		
Press START	to begin se	t up.				

Press [TEST START] SW, and it displays the JOG window below.
 Put the target marker over the Bottom reference point and press [ENTER] SW on the operation panel. The display goes back to the previous window.

JOG Probe-4
Using the keypad arrow keys, drive the CCD camera to the Bottom reference point.
· · · ·
X: -100.0175 Y: +039.9688
ENTER] SW = Coordinate Set

- 14) Click on [OK] button.
- 15) Your setup operation was finished.



Be sure to take up some space between each bottom sensor plates, so as they are not touched each other. If they touched, it may cause ill effect to the IC open measurement.



The procedure below shows the way to place the bottom sensor plates.

- 1) Select Data Mode from the Mode menu. (Tool > Mode Setting > Data Mode)
- 2) The Data mode window appears on the display.
- 3) Click on "Bottom tools" from the menu and click on the Bottom sensors tab.

Data mode A-side	8
Restricted area Camera / Probe offset Board reference point Coordinates management Fail map Auxiliary reference point(s) Real Map Probe's lowest position Top position of probe Index Variant management Statistic function	Support Pin (0) Bottom Probe (0) Bottom Sensor (1) Use Bottom sensors Number of Bottom sensors : 1 1 1.6 Bottom sensors restricted gree : 30 2 6.50[mm]
▲ Previous Next ▲	⊻erify the positions for Bottom tools
Section 2015 PCB Image	 ✓QK ¥ <u>C</u> ancel

Data mode > Bottom tools

- 4) Click on the Verify the position of Bottom tools button on the screen.
- 5) It displays Bottom set check window.

Ensure that the PCB is on the Press [TEST START] SW to set the Bo	test position. ottom reference point.
Bottom Reference Point Coordinates	
X coor Y coor 100.0175 +039.9688	
Press $\frac{TEST}{START}$ to begin set up.	
	✓ <u>O</u> K X <u>C</u> ancel

Bottom set check

5) Press [TEST START] SW, and it displays the JOG window below. Put the target marker over the Bottom reference point and press [ENTER] SW on the operation panel.

JOG Probe-4
Using the keypad arrow keys, drive the CCD camera to the Bottom reference point.
· · · · · ·
X: -100.0175 Y: +039.9688
ENTER] SW = Coordinate Set

6) It displays [Fig.13]. Open the safety cover, remove the PC board and close the safety cover again. Press [RESET] SW and then [TEST START] SW on the operation panel.

👹 Verify the positions for Bottom tools	X
Ensure that the PCB is not on the test p Close the cover, press [RESET] SW. Then press [TEST START] SW.	osition.
	X coor Y coor
XY coordinates for Bottom Sensor 1	[+000.1025,-000.0925]
	<u>S</u> lose

7) The camera moves over the XY coordinates of the bottom sensor plate-1 and Bottom Check window appears on the screen. Open the safety cover and install the bottom sensor plate-1 on the position where the cross-hair mark on the bottom sensor plate-1 fits with the target marker. After that, close the safety cover and press [RESET] SW and [TEST START] SW on the operation panel.



Bottom Check

- 8) The camera moves over the XY coordinates of the bottom sensor plate-2. Install the bottom sensor plate-2 in the same manner as done for the bottom sensor plate-1.
- After all the bottom sensor plates were installed, the display goes back to the Bottom tools window.
- 9) Click on [OK] button.
- 10) Your installation of the bottom sensor plates was finished.



Be sure to take up some space between each bottom sensor plates, so as they are not touched each other. If they touched, it may cause ill effect to the IC open measurement.

Program creation

There are two kinds of coordinate management systems: "Teaching system" having the probes contact solder pads of the components and "Point system" managing node numbers to use one test point on behalf of the other ones connected on the same circuit.

Programming operation in Teaching system

We explain the programming operation with complete descriptions.



(Ex.1) How to program the bottom IC open test for the following IC

Preparation

Coordinates Management system (Tool > Mode setting > Data Mode) should be specified to *Teaching system* in advance.



- 1) Select either Step Edit or Step List from Menubar.
- 2) It displays the Step Edit window or the Step List window.

😽 <u>E</u> dit	<u>S</u> earch	Mov	e <u>T</u> ool	<u>⊻</u> iew														- 8	×
File	Mode E	dit	Optimiza	ation Too	I Ref	erence	Test To	tal Co	ordinate	Self-dia	g. Con	/ert He	q						
Edit	⊒ ⊭ List	Erase	No. Search	Change	ATT D.Edit	D.Set	A.Gen.	Drint	∩¢ Undo	Select	Sec.	Д Сору	C	Casci	ade Tie				
Step	:Aux	. I	arts		Val	.ue	Ċ	comme:	nt			F.	+8	- %	Reference	Test	Judge	1	-x
00000	1:	*			*		*					* *	10	10				[+0
00000	2:																		

Step List window

- 3) Select Auto. Generation function from the Menubar. (Tool > Auto. Generation)
- 4) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.

Use board ref.point and aux.ref.poin	t for alignment?
<u>✓ Y</u> es	<mark>≭ <u>C</u>ancel</mark>

- 5) Click on [Yes] button.
- 6) It displays the pop-up message "Press [TEST START] SW" on the screen.



- 7) Press [TEST START] SW on the operation panel.
- 8) Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- 9) It displays the Auto. Generation window.

Ge	eneration				8
0	00001:*	*	*		
	Input Parts informa	ation			
	<u>P</u> arts :	*		(11 chara	acters)
	Co <u>m</u> ment :	*		(20 chara	acters)
	<u>L</u> ocation :	*		(4 charao	cters)
		< <u>B</u>	ack Nex	t ▶ <u> </u>	<mark>≭</mark> <u>C</u> ancel

10) Type "Parts name', 'Comment' and 'location' from the keyboard. Then click on [Next] button.

11) It proceeds to the next window where you can specify a preferable generation function. Fill 'IC automatic generation' radio button and click on [Next] button.

ieneration			
000001:IC101	*	ABCD	
Select generation	type.		
Data generation n	1enu		
 IC automatic ge 	eneration		
O Transistor auto	matic generati	on	
O Connector auto	matic generat	ion	
O Photo coupler a	automatic gen	eration	
○ FET automatic	generation		

12) It proceeds to the next window where you can specify a preferable generation style. Fill 'IC open test only' radio button and click on [Next] button.

Generation				×
000001:IC101	*	ABCD		
Select generation m	ode.			
<u>∂D</u> ata generation mo	de			
 Pin to pin and pin Pin to pin only Pin to ground on Pin to pin and IC IC open test only 	n to ground y open test			
□ <u>J</u> -leaded package	IC			
		Back Next ►	<u> </u>	ancel

13) It proceeds to the next window where you can specify a preferable generation pitch. Fill 'Irregular pitch' radio button and click on [Next] button.

Generation					
000001:IC101	*		ABCD		
Select pitch.					
Pitch select menu					
 ○ Regular pitch ● Irregular pitch 					
	•	Back	Next	≪ OK	ancel

14) It proceeds to the next window where you can specify information on the IC lead number. Type "32" from the keyboard and click on [Next] button.

Generation 🛛	Generation
000001:IC101 * ABCD	000001:IC101 * ABCD
Input pin number. Ex.) 1,10 Start,End 1	Input pin number. Ex.) 1,10 Start.End 1,32
	■ Back Next ► I I Source X Cancel

15) It proceeds to the next window where you can specify GND pin number.

Type "7" as GND pin number and fill "Use Bottom sensor" checkbox while specifying the Bottom sensor number to be used and click on [Next] button.

Generation		
000001:IC101	*	ABCD
Input Ground number.		
Ground-Pin No.		
Use Bottom ground		
✓ Use Bottom <u>sensor</u> 1 ■ 16		
	Rack	

16) It proceeds to the next window where you can input the XY coordinates for the IC leads you specified at Process #14. Drive the camera to enter the X,Y coordinates of the IC lead #1, 8, 9, 16, 17, 24, 25 and 32 in order and click on [OK] button.



17) The IC Open test steps are generated on the list automatically. The Bottom probe column indicates the probe access information. "A1" indicates the Bottom sensor 1.

Step :Aux.	Parts	Value	Comment	F. +%	- %	Polarity	Bottom	probe
000006:ICOP	IC1	1-8P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000007:ICOP	IC1	2-8P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000008:ICOP	IC1	3-8P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000009:ICOP	IC1	4-7P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000010:ICOP	IC1	5-8P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000011:ICOP	IC1	6-8P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000012:ICOP	IC1	7-8P	74HC192A	** 50	50	(+, N, A, -)	(N,	N, A1, N)
000013:ICOP	IC1	9-8P	74HC192A	** 50	50	(-, N, A, +)	(N,	N, A1, N)



The Auto. Generation window is also displayed by substituting "=" mark in Value column and hitting [Enter] key on the Step Edit menu and the Step List menu.

After IC open steps were generated, 'ICOP' is substituted in Aux. column of their test steps.

Programming operation in Point system

We explain the programming operation with complete descriptions.

(Ex.2) How to program the bottom IC open test for the following IC



Preparation

Coordinates Management system (Tool > Mode setting > Data Mode) should be specified to **Point system** in advance.



1) Select either Step Edit or Step List from Menubar.

2) It displays the Step Edit window or the Step List window.

Edit Search Move Iool View	_ @ ×
File Mode Edit Optimization Tool Reference Test Total Coordinate Self-diag. Convert Help	
Edit List Erese Search Change DEdit DEST AGen. Print Lindo Select Out Copy Paste Cascade Te	
Step :Aux. Parts Value Comment F. +% -% Reference Test Judg	e 1-X
000001: * * * ** 10 10	[+C
000002:	

Step List window

- 3) Select Auto. Generation function from the Menubar. (Tool > Auto. Generation)
- 4) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.



- 5) Click on [Yes] button.
- 6) It displays the pop-up message "Press [TEST START] SW" on the screen.



- 7) Press [TEST START] SW on the operation panel.
- 8) Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).

9) It displays the Auto. Generation window.

Generation				
000001:*	*	*		
Input Parts informa	ation			
<u>P</u> arts :	*		(11 cł	naracters)
Co <u>m</u> ment :	*		(20 cł	naracters)
Location :	*		(4 cha	aracters)
	< <u>B</u> a	ck <u>N</u> ext	:▶] [<u>∢ o</u> k	X <u>C</u> ancel

- 10) Type "Parts name', 'Comment' and 'location' from the keyboard. Then click on [Next] button.
- 11) It proceeds to the next window where you can specify a preferable generation function.
 - Fill 'IC automatic generation' radio button and click on [Next] button.

Generation				
000001:IC101	*	ABCD		
Select generation t	ype.			
Data generation m	ienu			
IC automatic de	neration			
 Transistor autor 	natic generati	on		
O Connector auto	matic general	ion		
O Pattern check a	utomatic gen	eration		
O Photo coupler a	utomatic gen	eration		
or Er automatic	generation			
	(1.0
		ack <u>N</u> ext ▶	V OK	X Cancel

12) It proceeds to the next window where you can specify a preferable generation style. Fill 'IC open test only' radio button and click on [Next] button.

Generation				×
000001:IC101	*	ABCD		
Select generation	node.			
Data generation n	node			
 Pin to pin and p Pin to pin only Pin to ground o Pin to pin and li IC open test on 	in to ground nly C open test			
□ <u>J</u> -leaded packag	e IC			
	■ <u>B</u>	ack <u>N</u> ext	► <u>✓ ΩK</u>	X Cancel

13) It proceeds to the next window where you can specify information on the IC lead number. Type " 32" from the keyboard and click on [Next] button.

Generation	Generation
000001:IC101 * *ABCD	000001:IC101 * ABCD
Input pin number.	Input pin number.
Ex.) 1,10 Start1,End1 - Start5,End5	Ex.) 1,10 Start1.End1 - Start5.End5 1.32
Back Next P & OK X Cancel	Back Next ►KK

14) It proceeds to the next window where you can specify GND pin number.

Type "7" as GND pin number and fill "Use Bottom sensor" checkbox while specifying the Bottom sensor number to be used and click on [Next] button.

Generation 000001:IC101	*	ABCD
Input Ground number.		
Ground-Pin No.		
Use Bottom ground		
1 🔁 12		
Use Bottom <u>s</u> ensor		
1 💽 10		
	I <u>B</u> ack	Next ► ✓ OK ズ Cancel

15) It proceeds to the next window where you can input the Pin numbers for the IC leads you specified at Process #13. After entered the Pin numbers (#1, 8, 9, 16, 17, 24, 25 and 32), click on [OK] button.



o means the XY coordinates to read out by the camera

16) The IC Open test steps are generated on the list automatically. The Bottom probe column indicates the probe access information. "A1" indicates the Bottom sensor 1.

Step :Aux.	Parts	Value	Comment	H-pin L-pin	Polarity	Bottom	probe
000001:ICOP	IC101	1-7P	ABCD	316 301	(-, N, A, +)	(N,	N, A1, N)
000002:ICOP	IC101	2-7P	ABCD	315 301	(-, N, A, +)	(N,	N, A1, N)
000003:ICOP	IC101	3-7P	ABCD	314 301	(-, N, A, +)	(N,	N, A1, N)
000004:ICOP	IC101	4-7P	ABCD	313 301	(-, N, A, +)	(N,	N, A1, N)
000005:ICOP	IC101	5-7P	ABCD	303 301	(-, N, A, +)	(N,	N, A1, N)
000006:ICOP	IC101	6-7P	ABCD	302 301	(-, N, A, +)	(N,	N, A1, N)
000007:ICOP	IC101	8-7P	ABCD	300 301	(+, N, A, -)	(N,	N, Al, N)



The Auto. Generation window is also displayed by substituting "=" mark in Value column and hitting [Enter] key on the Step Edit menu and the Step List menu.

After IC open steps were generated, 'ICOP' is substituted in Aux. column of their test steps.

Reference Value Input

Refer to Reference Value Input on Page 19.

Reference Value Examination

Refer to Reference Value Examination on Page 19.

Data conversion

Electric test of the IC components (i.e. conventional Pin to GND steps) can be easily converted into the bottom IC open test -- and vice versa.

How to convert electric test to the bottom IC open test (Plural steps)

The procedure of converting more than one electric test in series into the bottom IC open test is outlined below.



- 1) Select either Step Edit or Step List from the Menubar
- 2) It displays the Step Edit window or the Step List window.
- 3) Put your mouse pointer over the first step of the existing electric test.

	<u>E</u> dit	<u>S</u> earc	oh <u>M</u> or	/e <u>T</u> ool	⊻iew				
File N		Mode	Edit	Optimizat	tion Too	l Refe	erence	Test To	ital Co
		-	, П	1					
	Edit	List	Erase	e Search	Change	D.Edit	D.Set	A.Gen.	Print
S	tep	:Aux	K. Pá	arts	V	alue		Comme	ent
0	0000	1:	I	2101	1	–7P		ABCD	
0	0000	2:	I	2101	2	–7P		ABCD	
0	0000	3:	I	2101	3	–7P		ABCD	
0	0000	4:	I	2101	4	–7P		ABCD	
0	0000	5:	I	2101	5	-7P		ABCD	

4) Select "Convert" from the Menubar. (Tool > Generation > IC Open > Convert)



5) It displays the pop-up message "Use board ref. point and aux. ref. point for alignment?" on the screen.



- 6) Click on [Yes] button.
- 7) It displays the pop-up message "Press [TEST START] SW" on the screen.



- 8) Press [TEST START] SW on the operation panel.
- Align the inclination and/scale of the PC board by manually centering the camera target on the board reference point and auxiliary reference point(s) or automatically using the image processing unit (option).
- 10) It displays the pop-up message "Do you use the bottom sensor probe?" on the screen. Click on [Yes] button.



11) It displays the pop-up message box below.

Use your keyboard to enter the bottom sensor probe number. (Example "1")

Bottom Sensor Probe	×
⊖Set the bottom sensor probe number(1 - 6)?−	
1	~
<u>✓ o</u> ĸ	<mark>X</mark> <u>C</u> ancel

12) The bottom Open test steps are generated on the list automatically.



How to convert bottom IC open test to the electric test (Plural steps)

The procedure of converting more than one bottom IC open test in series into the electric test is outlined below.



- 1) Select either Step Edit or Step List from the Menubar.
- 2) It displays the Step Edit window or the Step List window.
- 3) Put your mouse pointer over the first step of the existing bottom IC open test.

	<u>E</u> dit	<u>S</u> earc	h <u>M</u> ove	e <u>T</u> ool	<u>∨</u> iew					
Fi	le	Mode	Edit	Optimizat	tion Too	I Refe	erence	Test	Tota	al C
				d'j						
	Edit	List	Erase	Search	Change	D.Edit	D.Set	A.G	en.	Print
St	ер	:Aux	. Pa	rts	V	alue		Con	nmer	nt
00	000	1:ICC	P IC	101	1	-7P		ABC	D	
00	0003	2:100	P IC	101	2	-7P		ABC	CD	
00	0000	3:ICC	P IC	101	3	-7P		ABC	D	
00	000	4:ICC	P IC	101	4	l-7P		ABC	CD	
00	000	5:ICC	P IC	101	5	-7P		ABC	CD	
00	000	6:ICC	P IC	101	É	5-7P		ABC	CD	
00	000	7:ICC	P IC	101	6	I-7P		ABC	CD	
00	000	8:ICC	P IC	101	9	1-7P		ABO	CD	

4) Select "Release" from the Menubar. (Tool > Generation > IC Open > Release)

<u>T</u> ool	⊻iew									
	Coordinates Map F1			ite	Self-diag.	Co	nvert	Help		
1	<u>S</u> et Comb Measurements Clear Comb Measurements) 	b to	J Select	Cut	Coj	ay F	Paste	
			_			F	+>	_ >	Re	ference
	G <u>e</u> neration				<u>S</u> pecial	l Ger	ne ratio	on 🕨		
	Ground		۲		<u>K</u> elvin			•		
	Bottom probe		۲		<u>I</u> C Ope	en		×		<u>C</u> onvert
	Cluster Function		۲			* *	50	50		<u>R</u> elease
11	Auto Generation					**	50	50	_	
	Ohan an Ota a Data	04-11-0				* *	50	50		
	Change Step Data	Otri+C				**	50	50	_	
	Region alignment					**	50	50	_	
	High-fly / No-contact-zone	Shift+Ctrl+H				**	50	50	_	

5) It displays the pop-up message "Do you convert regular generation?" on the screen. Click on [Yes] button.

Do you convert regular generation?
<u>✓Y</u> es <u>⊘N</u> o

6) The electric test steps are generated on the list automatically.

📃 <u>E</u> dit 🛛 S	earch	<u>M</u> ove	<u>T</u> ool	<u>V</u> iew				
File Mode Edit Optim				tion Too	l Refe	rence	Test Tot	al Co
			d,	9				1
Edit	List	Erase	Search	Change	D.Edit	D.Set	A.Gen.	Print
Step :	Aux.	Par	ts	ν	alue		Comme	nt
000001:		IC1	.01	1	-7P		ABCD	
000002:		IC1	.01	2	-7P		ABCD	
000003:		IC1	.01	3	-7P		ABCD	
000004:		IC1	.01	4	-7P		ABCD	
000005:		IC1	.01	5	-7P		ABCD	



Make sure that you enter the reference value after the data conversion.

Maintenance

Refer to § 3 Maintenance.

Replacement of bottom sensor plate





Be sure to close your active job before you start replacing the bottom sensor plate. The active job is suspended with an error as soon as the safety cover is open.

- 1) Open the safety cover.
- 2) Pull the clamp lever toward to take the pc board out of the tester.
- 3) Disconnect the bottom sensor cables as shown below.





You need to release a locking mechanism when you disconnect the bottom sensor cable. If you try to disconnect the bottom sensor cables with brute force, you may cause damage to the cables.

- 4) Take the bottom sensor unit out of the Tray.
- 5) Loose the set screw to remove the bottom sensor plate. And put a new bottom sensor plate in the bottom sensor unit. Then tighten the set screw to fix the bottom sensor plate.



6) Plug the bottom sensor cables in the interface connectors as they were.





The interface connector is equipped with a locking mechanism. Push the bottom sensor connector into the interface connector until it is locked tightly. Unless the bottom sensor cable is fixed, this may effect the IC open test.

7) Put the bottom sensor unit back on the Tray.

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