Flying probe tester APT-9411 series

IC open test System

CS-9500 Operator's Guide

TAKAYA

Preface

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

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 Operator's guide is written about System version [V1.0-1] for the APT-9411CE/CJ. As for further new system version, refer to our "Version up news" issued later on needed.

2) Windows®, Windows®NT is a resistered trademark of Microsoft Corporation. Also the company name and the product name listed in this Operator's guide are the trademark of each company.

3) 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 CORP.

4) 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

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

Precautions

This manual contains many important notices relating to the installation, operation and testing. Please read through this manual to use the product correctly, and keep this manual near the product.

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

(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)

(7) 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.

(8) 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.

(9) 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.

(10) The product power must be OFF and unplugged before replacing or maintaing any part of this option.

(11) 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.

Chapter 1   General

This chapter gives an outline of IC Open Test system CS-9500, and describes some notandums to use this system effectively.

Outline

With this optional system buit-in, Takaya APT-9411CE/CJ (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.
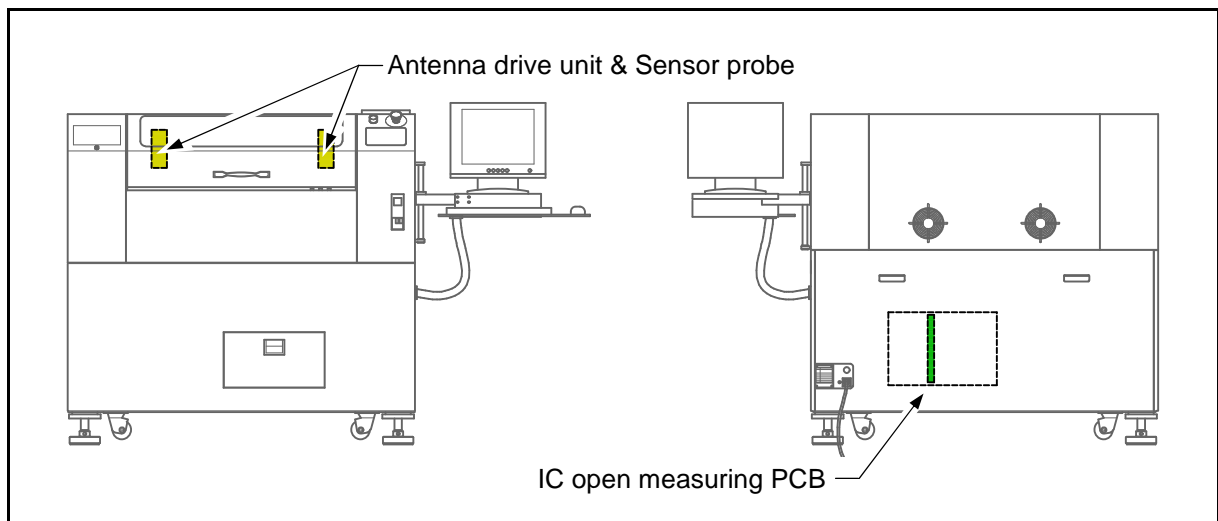The test program is easily and automatically created in a very short period of time.

CS-9500 Hardware

(1)   IC Open measuring PCB (TAKAYA TVX-11)

(2)   Antenna drive unit and Sensor probe (Each one at Left/Right)
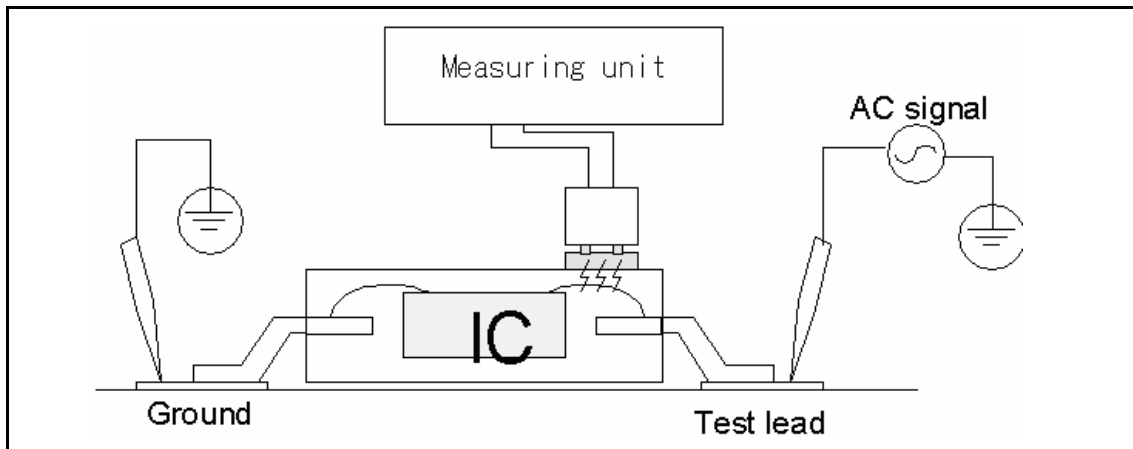
Hardware location

The system hardwares are built-in the tester as shown in Fig.1 below.

[Fig.1] Tester appearance

Measuring principle

The measurement principle is described in Fig.2 below.


[Fig.2] Measuring principle

As Fig.2 introduce, the sensor probe is contacted 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 value so that their failure can be detected accordingly.

Antenna Drive unit & Sensor probe installation

The antenna drive unit and the sensor probe are installed onto the Z2 axis and the Z3 axis.

Contact position of Sensor probe and probe

As shown in Fig.3 below, the sensor probe installing a sensor plate (diameter φ5mm) on the top steps on IC package where is nearby each lead to be measured. So their stepping position shifts sequently according to the testing procedure.
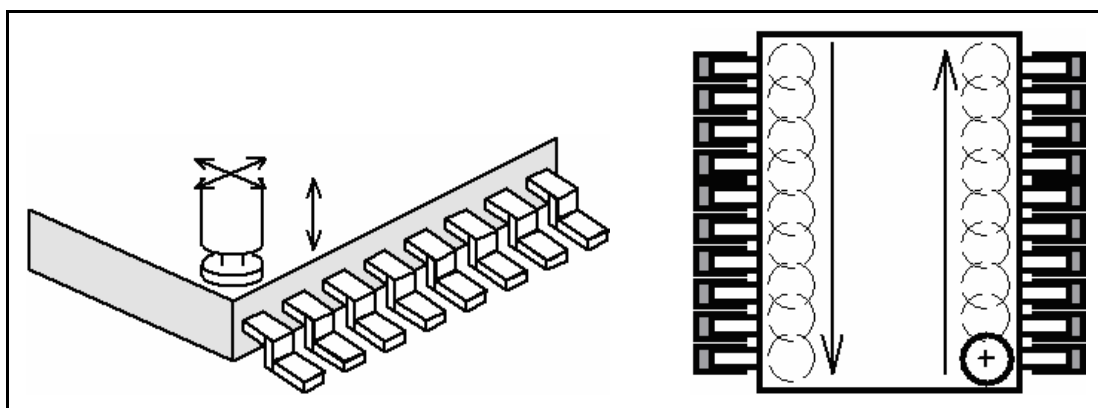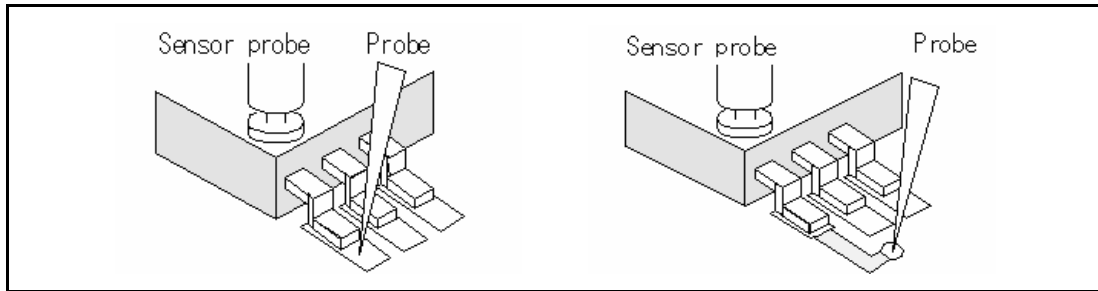

[Fig.3] Sensor probe's contact position

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

For large solder pad

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

For small solder pad

When there is less space on the IC solder pad, thus some probe may possibly interfere with the IC lead, otherwise when the objective IC is PLCC type, etc., it should contact on any other point which is short connected from the objective IC solder pad.

[Fig.4] Probe's contact position

Further more, two GND points where you need to contact by another probe should be preset on theleft-handsb and the right-hand 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 Judgement

The reference value for the IC open test is also learned from a good sample PC board automatically as well as usually programming component steps.

Programming IC Open Steps

The data programming is made by the same manner as the test steps generation for standard IC step measurements, which is selected by Teaching input using CCD camera or CAD data input. Entering XY coordinates for all four corners of the IC package also their IC lead number, it can automatically generate the contact position for the sensor probes.

Measurable IC and Condition

1. IC outward dimension is over 6mm each side (QFP, SOP, PLCC, LCC, MSP, so on)

2. IC mold thickness is less than 2.0mm-2.5mm from the lead frame. (it depends on the material and the frame area)

3. Distance between the probe and the sensor probe requires 2.8mm or more.
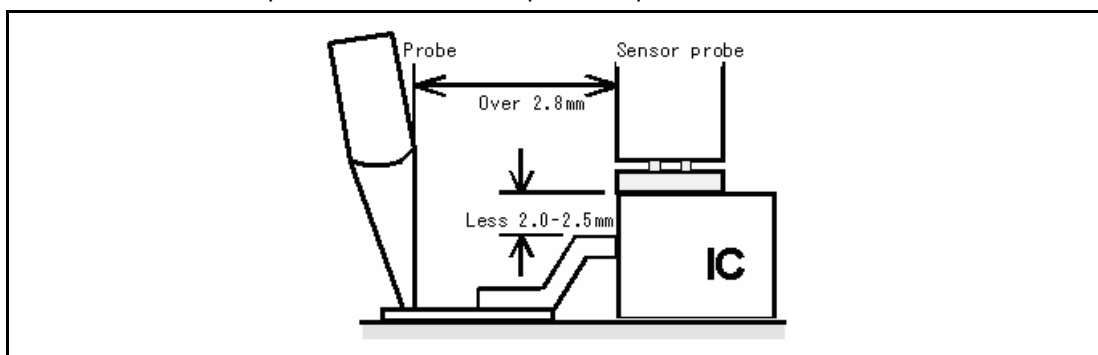
[Fig.5]

Unmeasurable IC and Condition

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 2.0 - 2.5mm from the lead frame
   - ICs in which shield plate or heat sink is installed over the lead frame

2. Unmeasurable IC leads
   - GND line and Vcc line
   - IC's lead with very low impedance of less than 20 ohm (equivalent to approx. 0.9μF or more in Capacitance) against GND line or Vcc line.

$\triangle$ Measurable when both two were fail at a time
✖ Unmeasurable IC lead
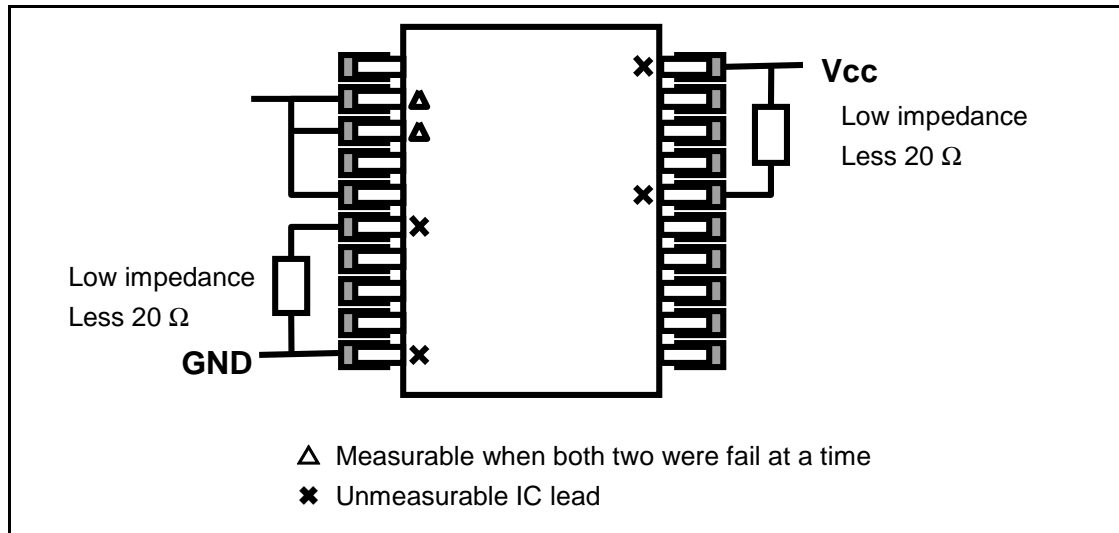
[Fig.6] Unmeasurable IC leads

	The IC open measurement for two IC leads on the same line which are very closely located is also possible when both were fail together.
	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 any measurement is not possible depending on the wiring (and mounting) condition on the boards or type of the ICs being tested.

Test speed

The test speed is highly influenced by moving distance of the test probes for impressing the measurement signal and GND. For instance, however, if a QFP with 0.65mm pitch was inspected while the test probe for impressing the measurement signal direct contact on the IC land, we can estimate max. 0.10 - 0.15 sec./point approximately.

Test area (Sensor probe's moving area)

W540 x D460 x H15 (mm)
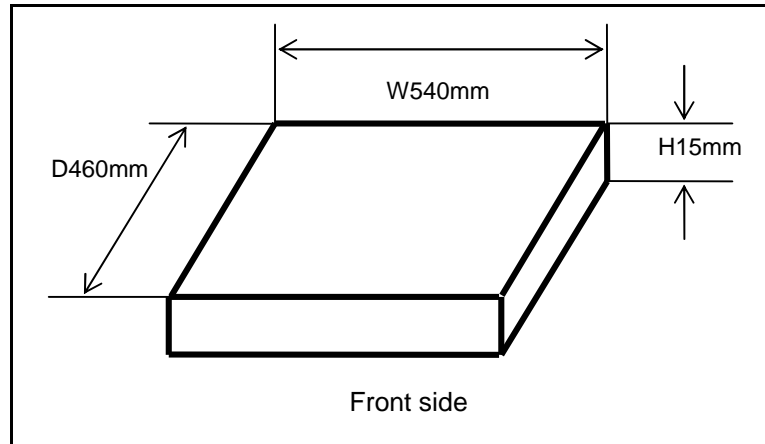
[Fig.7] Sensor probe's moving area

HINT	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)

Chapter 2　Test Data programming

In this chapter, you will find all the information required to prepare a test data for the IC open test practically using some instance.
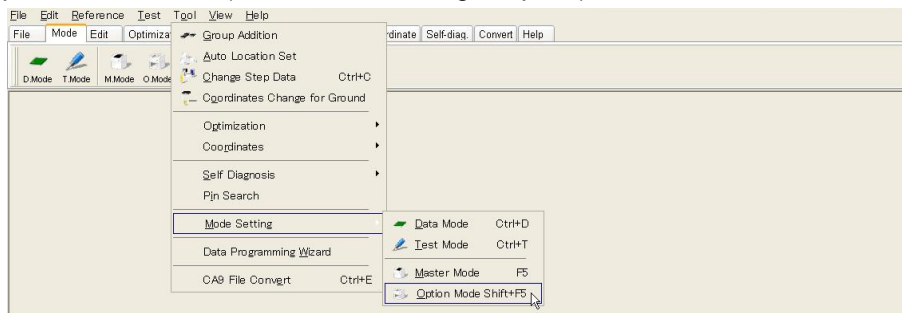
Initial set

The following operation allows you to set up the IC open test system.

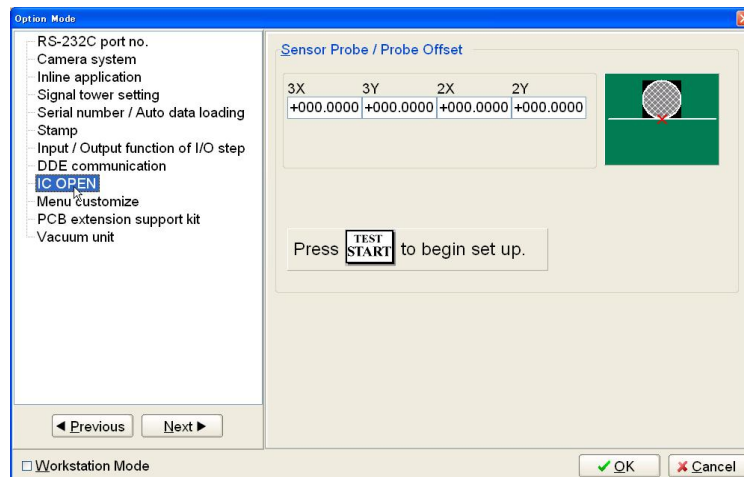After you installed this system or replaced any sensor probe, be sure to set as follows:

1) Open Option Mode menu. (Tool > Mode Setting > Option)



2) It displays Option Mode menu.

3) Open IC Open menu.

4) Click on [TEST START] button.

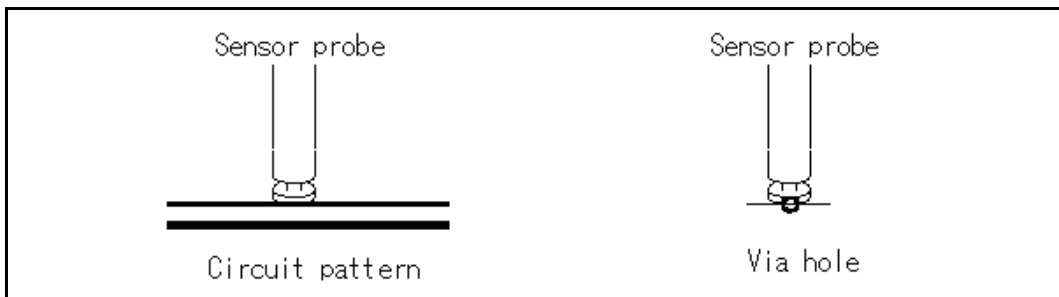5) It displays a message "Press [TEST START] to begin set up".
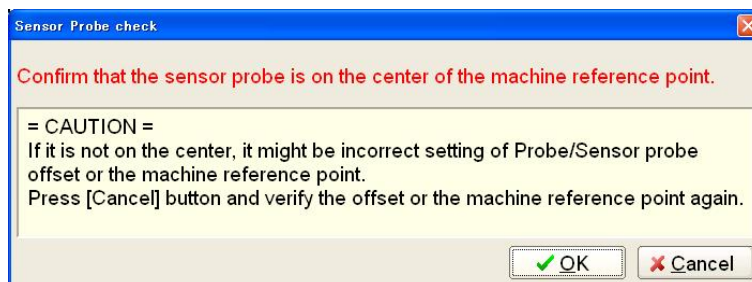

6) Press [TEST START] SW on the operation panel.

7) Using the keypad arrow keys, move Probe (3Z) to set the position for any reference point on the horizontal line or any Via hole on your PC board. After the position was set there, press [Enter] SW to enter the X,Y coordinates.
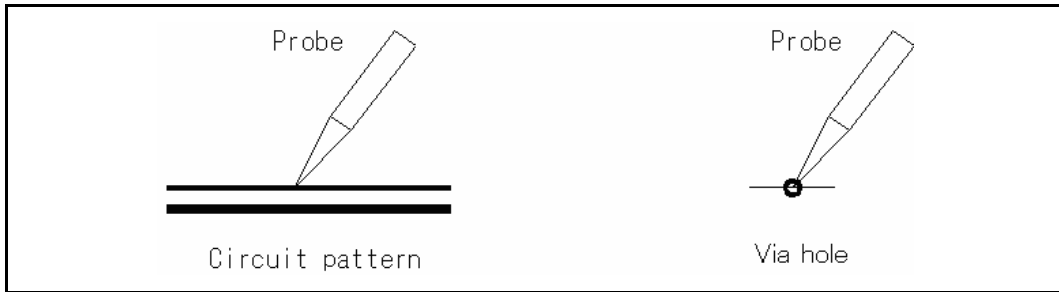
8) Press [TEST START] SW on the operation panel.

9) Using the keypad arrow keys, move Sensor probe (3Z) to set the front side of the sensor plate for the X,Y coordinates assigned by Probe (3Z).any reference point on the horizontal line or any Via hole on your PC board. After the position was set there, press [Enter] SW to enter the X,Y coordinates.
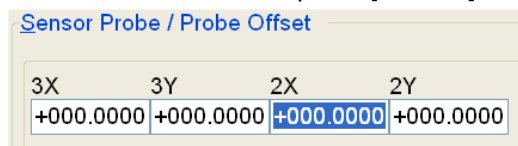

10) The sensor probe moves to the Machine reference point automatically.

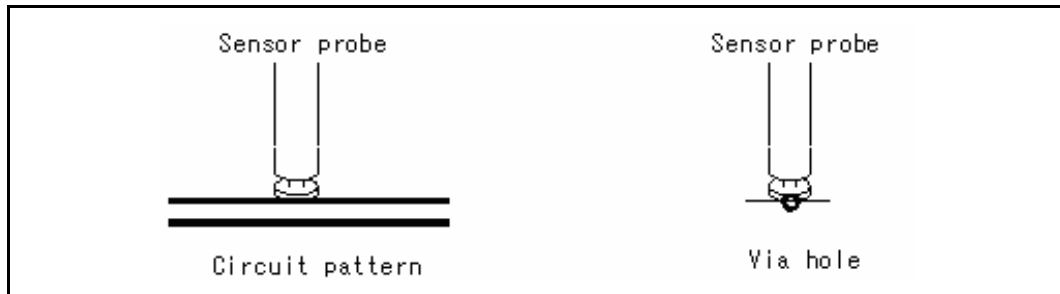11) It displays a message "Confirm that the sensor probe is on the center of the machine reference point."

12) If the sensor probe is over the Machine reference point correctly, click on [OK] button. If the position was incorrect, press [Cancel] button and operate the same process from 4 above again.

13) Verify that the cursor is now at 2X field, and then press [ENTER] SW on the operation panel.

Using the keypad arrow keys, move Probe (2Z) to set the position for any reference point on the horizontal line or any Via hole on your PC board. After the position was set there, press [Enter] SW to enter the X,Y coordinates.

14) Press [TEST START] SW on the operation panel.

15) Using the keypad arrow keys, move Sensor probe (2Z) to set the front side of the sensor plate for the X,Y coordinates assigned by Probe (2Z).any reference point on the horizontal line or any Via hole on your PC board. After the position was set there, press [Enter] SW to enter the X,Y coordinates.

16) The sensor probe moves to the Machine reference point automatically.

17) It displays a message "Confirm that the sensor probe is on the center of the machine reference point."
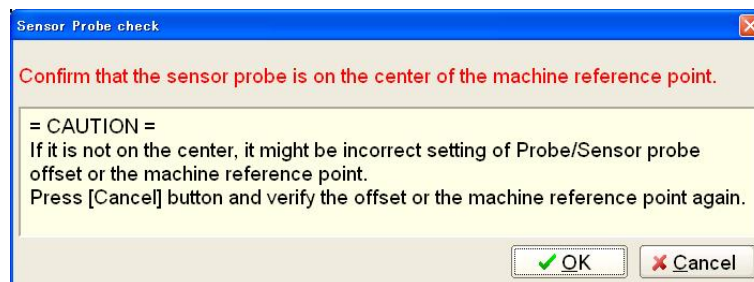
18) If the sensor probe is over the Machine reference point correctly, click on [OK] button. If the position was incorrect, press [Cancel] button and operate the same process from 13 above again.

19) Click on [OK] button in IC Open menu.

20) All that you need to do for Initial set was finished.

Test data programming

To make a test program on the tester, two kinds of coordinate management systems is selectable from the application software. One is "Teaching system" that utilizes Component land to contact the PCB, and another is "Point system" that utilizes Node information to contact the PCB.

⚠	**Prior to start programming a test data, be sure to fill "Use Auxiliary Reference Point(s)" checkbox in Auxiliary Reference Point(s) menu.** **(Tool > Mode setting > Data Mode)**

| 💡 HINT	**"Teaching system" and "Point system" is switchable at Coordinates Management menu. (Tool > Mode setting > Data Mode)**

Sample programming (Teaching system)

IC Open test steps is programmable using Auto. Generation function available on either Step Edit or Step List menu. (Tool > Step Edit/Step List > Auto. Generation)
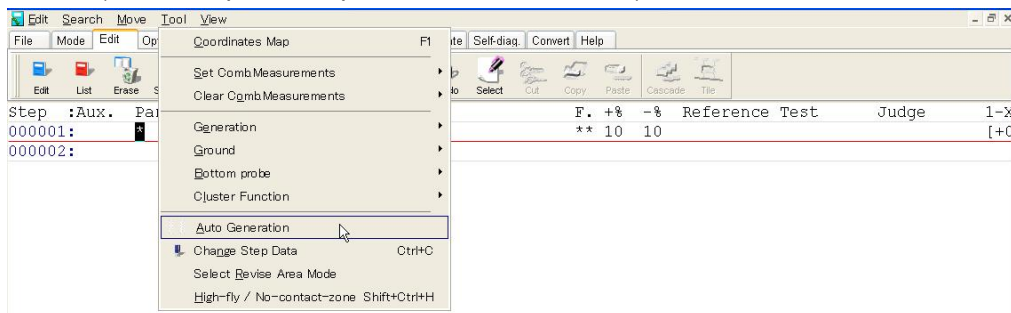
Undermentioned is a practical example to make IC Open test steps.

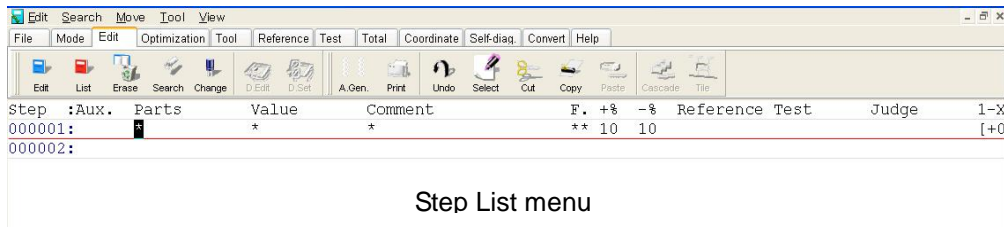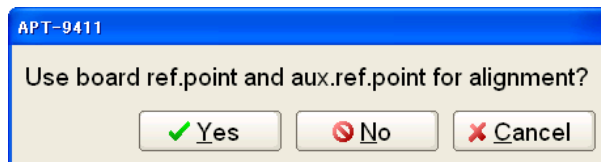## (Ex.1) How to program test steps only for the IC below
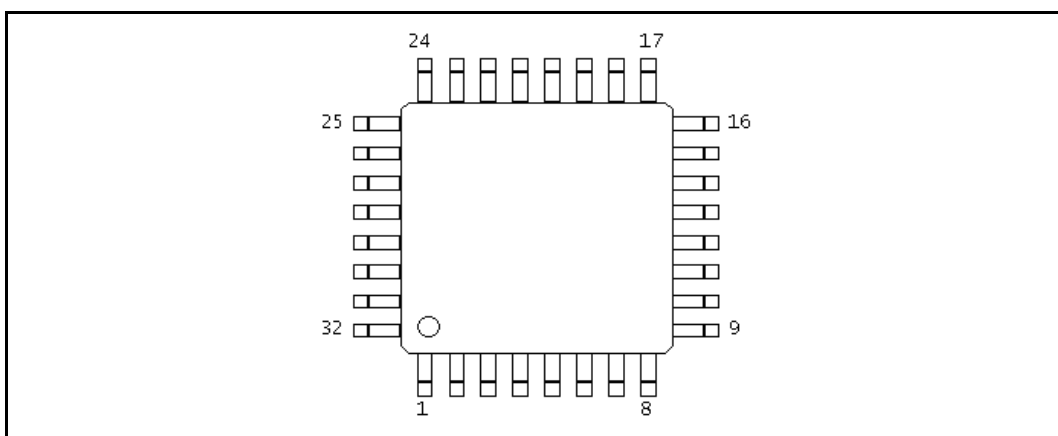
Preparation

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 Step Edit menu or Step List menu as per your assignment.

Step List menu

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

4) It displays "Use board ref. point and aux. ref. point for alignment ?".

5) Click on [Yes] button.

6) It displays a message "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) Next it displays Auto. Generation menu.

10) Input "Parts name', 'Comment' and 'location'.

11) Click on [Next] button.

12) It displays the next menu where you can specify a preferable generation function.

13) Fill 'IC automatic generation' radio button.

14) Click on [Next] button.

15) It displays the next menu where you can specify a preferable generation style.

16) Fill 'IC open test only' radio button.

17) Click on [Next] button.

18) It displays the next menu where you can specify a preferable generation pitch.

19) Fill 'Regular pitch' radio button.

20) Click on [Next] button.

21) It displays a combo box where is substituted by the IC lead number information.

22) Then specify "1, 8, 9, 16, 17, 24, 25, 32" in order.

23) Click on [Next] button.

24) It displays a combo box where is substituted by GND-pin number.

25) Then specify "7".

26) Click on [Next] button.

27) It displays Coordinates input menu for your assigned pins.

28) Then enter X,Y coordinates of the IC lead #1, 8, 9, 16, 17, 24, 25 and 32 in order.
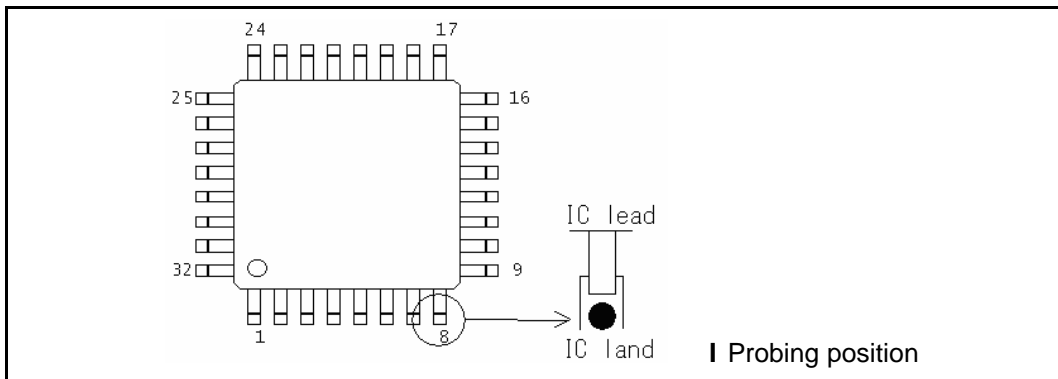
| Probing position

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

29) Click on [OK] button.

30) It displays the next menu where you can specify GND-points.
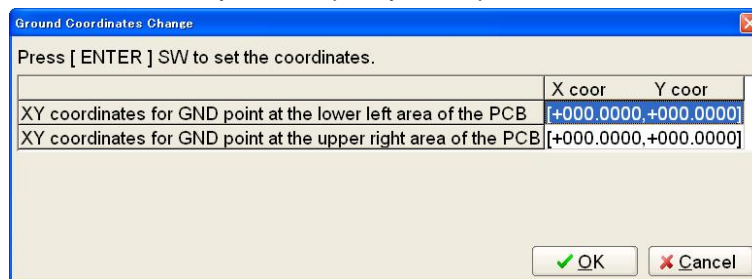
31) Enter X,Y coordinates for two GND points at the lower left area and the upper right area of the PC board.

Upper right area

Lower left area

Front side
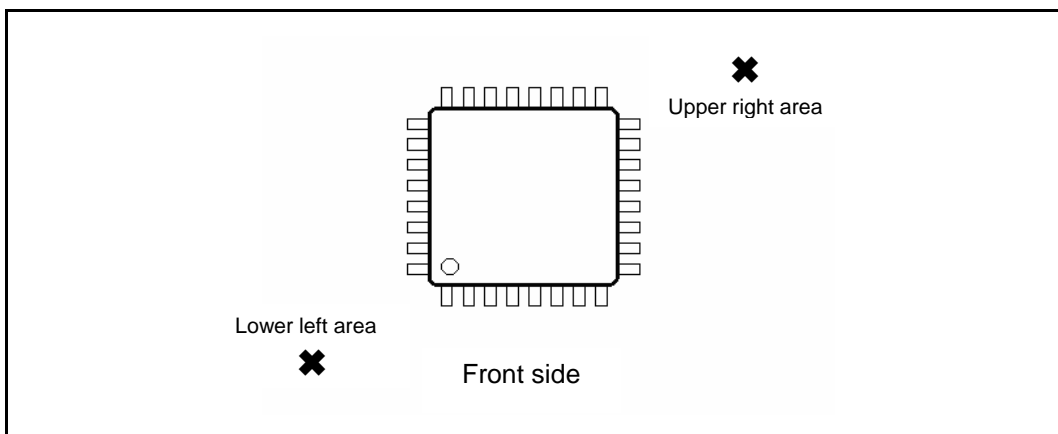
32) Click on [OK] button.

33) It displays the next menu where you can specify X,Y coordinates for each corners of the IC package.
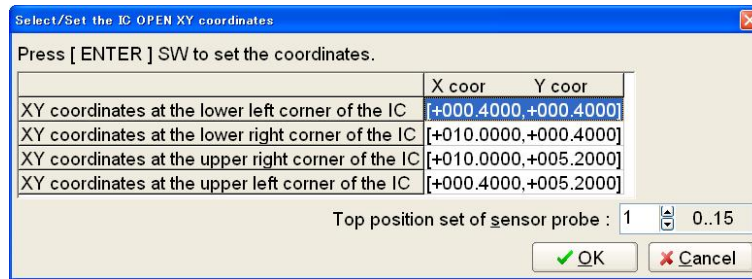
34) Enter the X,Y coordinates at their corner of the IC package.
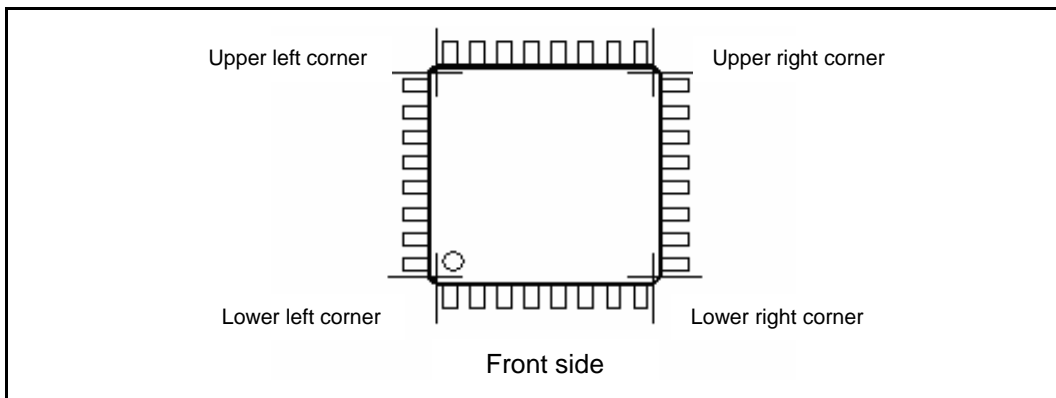
35) Click on [OK] button.

36) 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.

	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.

Sample programming (Point system)

IC Open test steps is programmable using Auto. Generation function available on either Step Edit or Step List menu. (Tool > Step Edit/Step List > Auto. Generation)
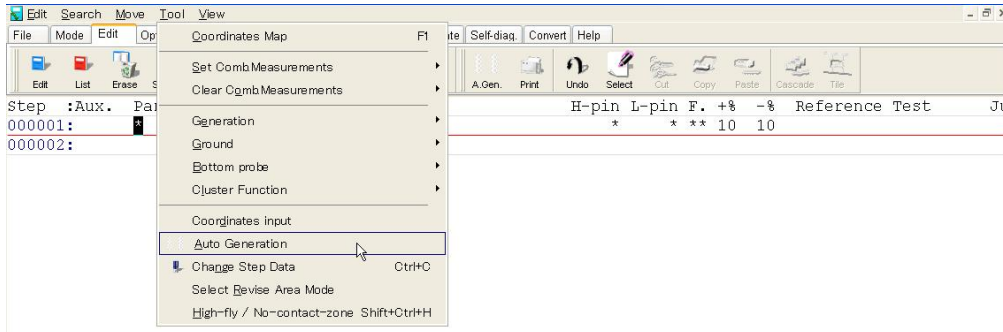
Undermentioned is a practical example to make IC Open test steps.

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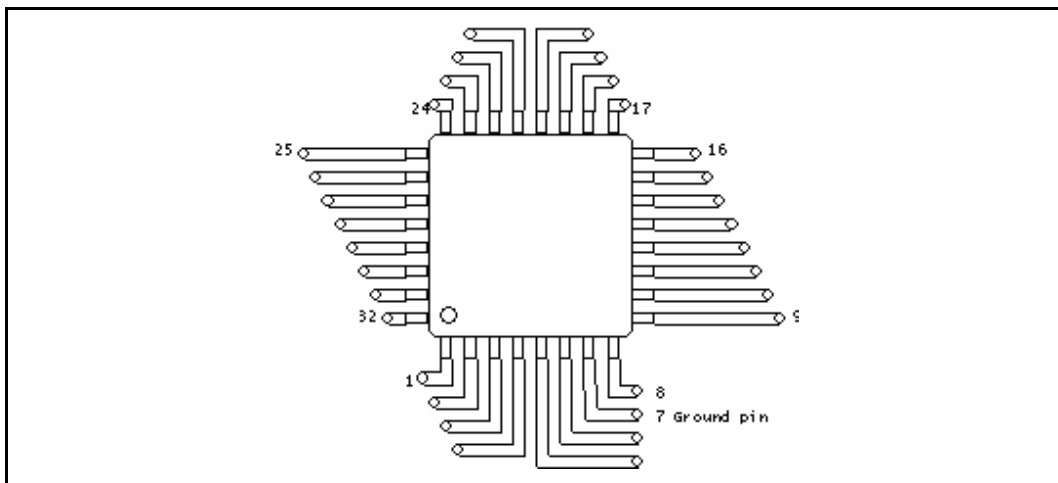
Preparation

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 Step Edit menu or Step List menu as per your assignment.

Step List menu

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

4) It displays "Use board ref. point and aux. ref. point for alignment ?".

5) Click on [Yes] button.

6) It displays a message "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) Next it displays Auto. Generation menu.

10) Input "Parts name', 'Comment' and 'location'.
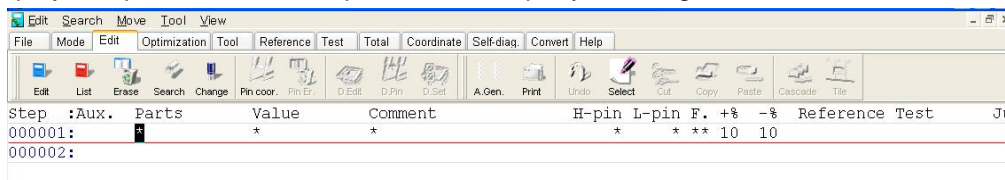
11) Click on [Next] button.

12) It displays the next menu where you can specify a preferable generation function.

13) Fill 'IC automatic generation' radio button.

14) Click on [Next] button.

15) It displays the next menu where you can specify a preferable generation style.

16) Fill 'IC open test only' radio button.

17) Click on [Next] button.

18) It displays a combo box where is substituted by pin number information of the IC. Then specify "1, 8, 9, 16, 17, 24, 25, 32" in order.

19) Click on [Next] button.

20) It displays a combo box where is substituted by GND-pin number. Then specify "7".

21) Click on [Next] button.

22) It displays Node number input menu.

23) Input the Node number for each IC leads.

• Node number
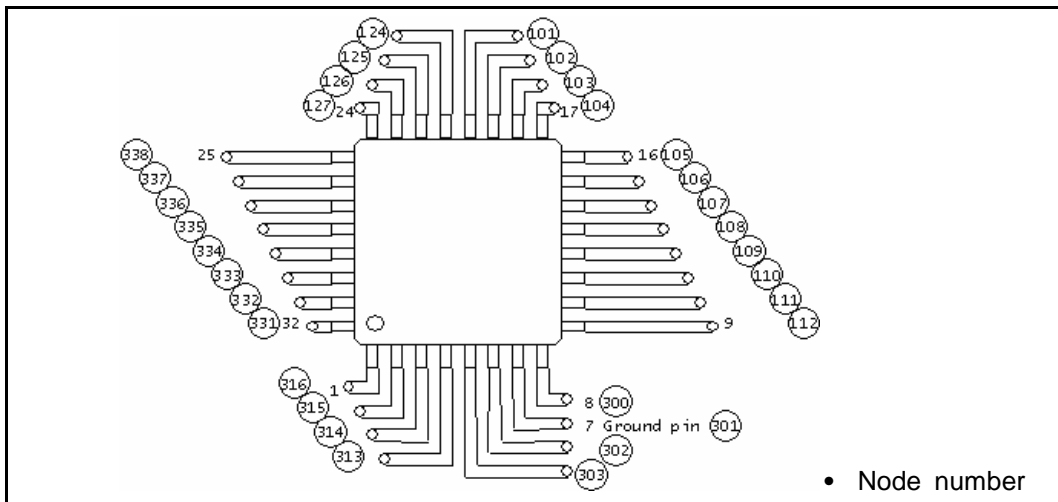
24) Click on [OK] button.

25) Then enter X,Y coordinates of each IC lead #1, 8, 9, 16, 17, 24, 25 and 32 in order, using the camera target.

26) It displays the next menu where you can specify GND-points.
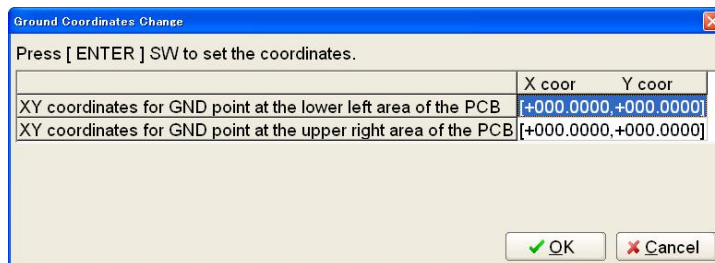
27) Enter X,Y coordinates for two GND points at the lower left area and the upper right area of the PC board.
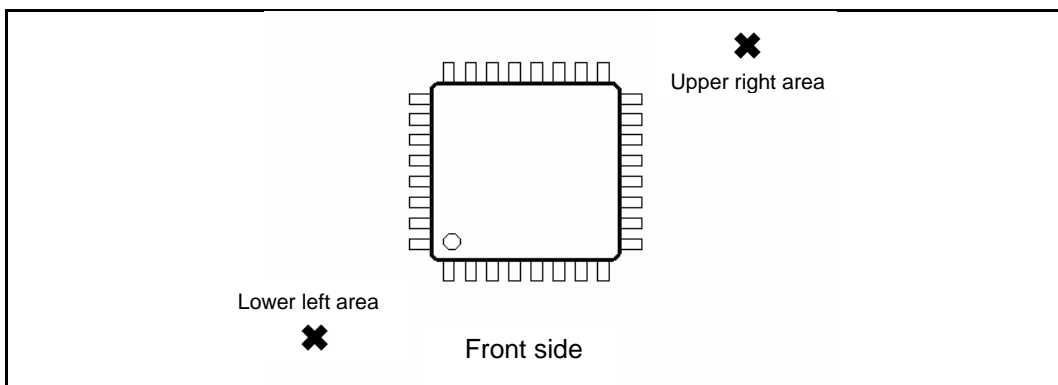
28) Click on [OK] button.

29) It displays the next menu where you can specify X,Y coordinates for each corners of the IC package.
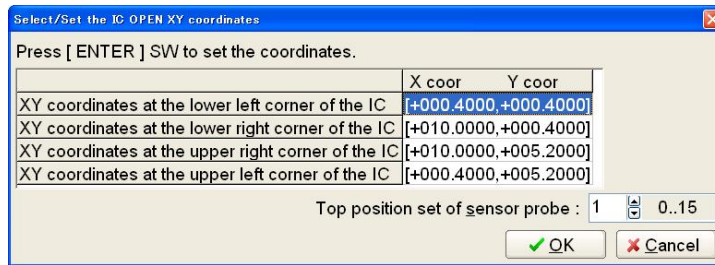
30) Enter the X,Y coordinates at their corner of the IC package.
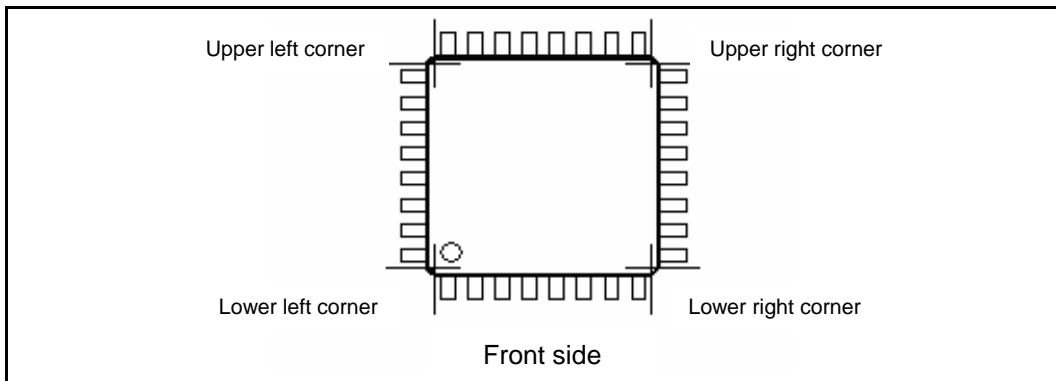
31) Click on [OK] button.

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

⚠	**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 normalVF measurement steps ('Pin to GND') automatically.

HINT	**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

This section is very important, since it tells you how to enter reference value for IC open test steps and examine them correctly.

Reference Value Input

Like usual test steps, IC open test step use Reference value input menu to input their reference value.

⚠ CAUTION	**Prior to entering the reference value, be sure to set the lowest position of the sensor probe properly. In case that the lowest position had been preset extremely lower than the IC package, it may give possible damage to the PC board or the sensor probe.**

Operate

1) Select Change step data menu. (Tool > Change step data)

2) It displays Change step data menu.

3) Fill "Parts" checkbox in Search category, then enter the part name which bottom position is to be changed.

4) Fill both "Bottom position of probe 2" checkbox and "Bottom position of probe 3"in Change category, then enter your preferable bottom position there. (Refer to [List 1])

5) Click on [Execute] button on the bottom.

6) Select Reference Value Input function. (Tool > Reference Value Input)

7) It displays Reference Value Input menu.

8) Specify input condition and step range to be input.

9) Press [TEST START] SW on the operation panel.

10) Reference value is input automatically.

💡 HINT	**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 function)**

Reference Value Examination

Like usual test steps, IC open test step use Examination menu to change the measurement condition, Probe's top position, so on.

Reference value

Usually the reference value of IC open measurement steps shows more than 50, which is a dedicated value but has no unit with it. The value is changeable depending on the sensor probe position or the IC type being measured.

Normally if the measured value had over 50, it indicates that the tester can detect the open pin failure stably.

Pass/Fail judgement

If your IC open test was measured higher than lower threshold of the reference value, which was learned from good sample board, it judges "PASS". The lower threshold is automatically set to "30%" under Automatic reference input.

However, the reference value for IC open test is changeable among lot of ICs under test or by influence from the peripheral circuit. Therefeore, occasionally the tester may misjudge even though they were in good condition. In such case, you must reset the tolerance properly through not a little sampling. Its operation is explained in below.

1) Select Change step data menu. (Tool > Change step data)

2) It displays Change step data menu.

3) Fill "IC Open" checkbox in Search category.

4) Fill "IC Open" checkbox in Change category, then click on […] button on the righthand.

5) It displays Set low tolerance from the ref. value menu.

6) Specify your preferable low tolerance value for each reference value, then click on [OK] button.

7) Click [Execute] button to enter your change in Change step data menu.

Unmeasurable condition

For such unmeasurable cases as aforementioned, their function (FC) are automatically substituted by "JP" under Auto. Input reference value.

Also, if either [Auto. Input] key or [Input] key was selected on their examination steps, following error messages are displayed.

"The IC open measurement is difficult!"
"The IC open measurement is impossible!"

In this case, the following reason may be considerable:

Unmeasurable conditions or reasons
① ICs which mold thickness is more than 2.0 - 2.5mm from the lead frame.
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 μF 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 change

An existing IC measurement steps (regular 'Pin to GND' steps) is translated to IC open test steps. In reverse, it is also possible to translate the IC open test steps to regular 'Pin to GND' steps.

Undermentioned is a procedure to translate a sequential regular IC steps ('Pin to GND') to IC open test steps. <u>This translation is available under Teaching system only</u>.

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

2) It displays Step Edit menu or Step List menu as per your assignment.

3) Move the cursor on the top of the sequential IC steps.

4) Select IC Open function from Menubar. (Tool > Generation > IC Open)

5) It displays "Use board ref. point and aux. ref. point for alignment?".
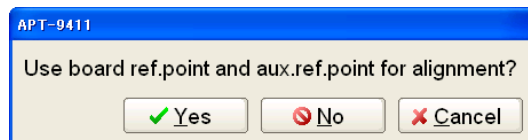
6) Click on [Yes] button.

7) It displays a message "Press [TEST START] SW".

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 a message "Do you use the bottom sensor probe?".

11) Click on [No] button.

12) It displays a message "Is it irregular pitch?".

13) Click on [No] button.

14) It displays the next menu where you can specify GND-points.

15) Enter X,Y coordinates for two GND points at the left-bottom side and at the right-top side of the PC board.

16) Click on [OK] button.

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

18) Enter the X,Y coordinates at their corner of the IC package.

19) Click on [OK] button.

20) It displays a message "Is this J-leaded package IC?".

21) Click on [No] button.

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

	Under such data translation for plural steps, their reference values cannot be changed. So enter their reference value again after the data translation.
	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.

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

How to translate IC open steps to regular IC steps (Plural steps)

Undermentioned is a procedure to translate a sequential IC open test steps to regular IC steps ('Pin to GND'). This translation is available under Teaching system and Point system.

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

2) It displays Step Edit menu or Step List menu as per your assignment.

3) Move the cursor on the top of the sequential IC open test steps.

4) Select IC Open Clear function from Menubar. (Tool > Generation > IC Open Clear)

5) It displays "Do you convert regular generation?".

6) Click on [Yes] button.

7) Regular IC steps are generated on the list automatically.

	Under such data translation for plural steps, their reference values cannot be changed. So enter their reference value again after the data translation.

How to translate regular IC steps to IC open steps (One step only)

Undermentioned is a procedure to translate one(1) regular IC step ('Pin to GND') to IC open test step. This translation is available under Teaching system and Point system.
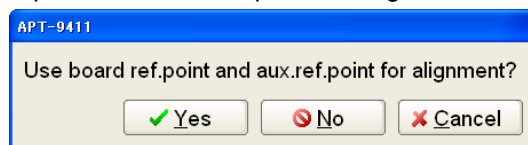

1) Select Review Step Data function from Menubar. (Test > Review Step Data)

2) After the next menu where you can select Examination Mode appeared, fill "Step data review" radio button.

3) Enter the IC open step number to be changed.

4) Press [TEST START] SW on the operation panel.

5) It displays "Use board ref. point and aux. ref. point for alignment?".

6) Click on [Yes] button.

7) It displays a message "Press [TEST START] SW".

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 Review Step Data menu.

11) Substitute 'DIODE' for Element combo box.

12) Substitute 'LD-CN' for Measure Mode combo box.

13) It displays a message "Do you use the bottom sensor probe?".

14) Click on [No] button.

15) It displays the next menu where you can specify GND-points.

16) Enter X,Y coordinates for two GND points at the left-bottom side and at the right-top side of the PC board. Then, click on [OK] button.

17) It displays the next menu where you can specify X,Y coordinates for IC open sensor (Sensor probe).

18) Enter the X,Y coordinates and the top position of the Sensor probe. Then, click on [OK] button.

19) Substitute '30' for +% edit box and '30' for -% edit box.

20) Click on [Auto Input] button to learn the reference value.

21) Hit [0] key to save the reference value.

22) Now the original step changed to IC open test step.

How to translate IC open step to regular IC step (One step only)

Undermentioned is a procedure to translate one(1) IC open test step to regular IC step ('Pin to GND'). This translation is available under Teaching system and Point system.

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

2) After the next menu where you can select Examination Mode appeared, fill "Step data review" radio button.

3) Enter the IC open step number to be changed.

4) Press [TEST START] SW on the operation panel.

5) It displays "Use board ref. point and aux. ref. point for alignment?".

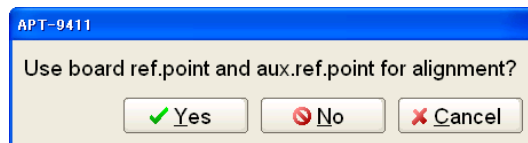6) Click on [Yes] button. It displays a message "Press [TEST START] SW".

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 Review Step Data menu.

10) Substitute 'Auto' for Measure Mode combo box.

11) Substitute '50' for +% edit box and '50' for -% edit box.

12) Click on [Auto Input] button to learn the reference value.

13) Hit [0] key to save the reference value.

14) Now the original step changed to regular IC test step.

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 menu (Tool > Change Step Data).

The lowest position is a distance lowered from the PC board, 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 storoke is too much shorted, it would take longer time for readjusting the storke.**

Value	Lowest position	Value	Lowest position
0	0mm	8	8.0 mm
1	1.0 mm	9	9.0 mm
2	2.0 mm	A	10.0 mm
3	3.0 mm	B	11.0 mm
4	4.0 mm	C	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
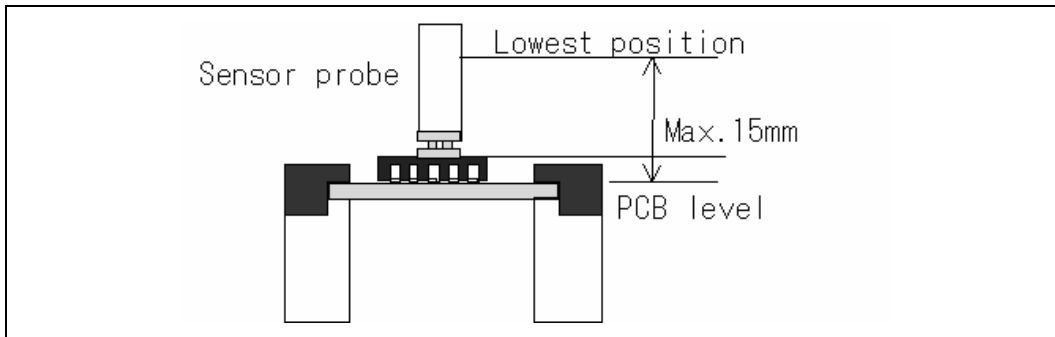
[Fig.1] Sensor probe stroke

1) Select Step List from Menubar.

2) It displays Step List menu.

3) Move the cursor to the IC open test step to be changed.

4) Change 'PL' value for 2Z or 3Z axis on the list.

> ⚠ **PL (Lowest position) changes in Step 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

Top position of the Sensor probe is specified by "H / M / L" in the same manner as the probe. Their distance from the PC board level is preset to 40.0mm(H), 16.4mm(M) and 6.4mm(L).

If the H position was lower than standard 40mm, the time of raising the probe and the Sensor probe is cut, so that the test time is reduced.

⚠️ **CAUTION**	**In case that M / L stroke is changed, be sure to consider some mergin of height clearance from the devices on the PC board. Otherwise this may damage the probes or the Sensor probes or the PC board because of possible intereference.**

💡 **HINT**	**M / L stroke is changeable at Top Position of Probe menu.** **(Tool > Mode Setting > Data Mode > Top Position of Probe)**

Operate

1) Select Change step data menu. (Tool > Change step data)

2) It displays Change step data menu.

3) Fill "Parts" checkbox in Search category, then enter the part name which bottom position is to be changed.

4) Fill both "Top position of probe" in Change category, then select your preferable top position (H/M/L) from the combo box there.

5) Click on [Execute] button on the bottom.

⚠️ **CAUTION**	**In case that any top position for the probe or the Sensor probe is changed, be sure to consider some mergin of height clearance from the devices on the PC board. Otherwise this may damage the probes or the Sensor probes or the PC board because of possible intereference.**

IC Open Special

IC Open Special data is such test data that X,Y coordinates for Sensor probe managed in the IC open test steps were rearranged so as the test time is reduced as much as possible.
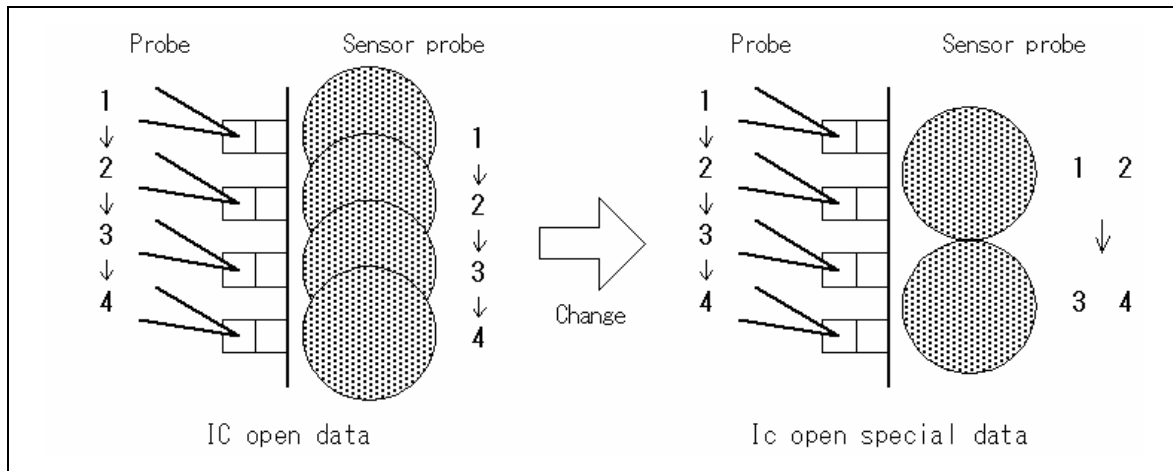
[Fig.2] X,Y coordinates management for Sensor probe

As shown in Fig.2, normally one X,Y coordinates for the Sensor probe is allocated every IC lead. However, in IC Open Special data, two adjoining IC leads use just one X,Y coordinates for the Sensor probe. Under this condition, if the test data was set in combination, the probe's moving time is a half so that the test time is much reduced. (Refer to Fig.3)
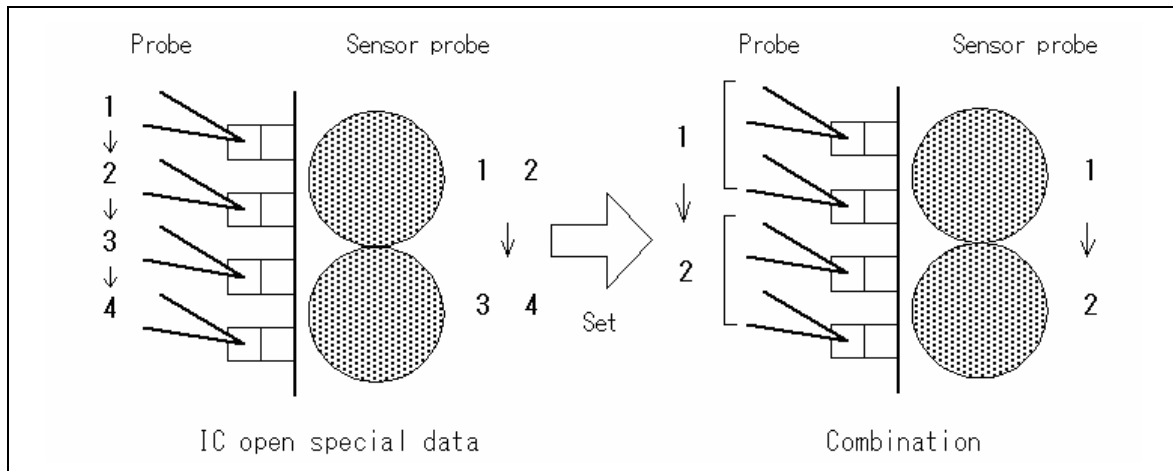
[Fig.3] Combination set for IC Open Special data

⚠	**After translated to IC Open Special data, be sure to set the test data in combination. Otherwise the test time would not be reduced.**
	Translation to IC Open Special data must be made under Teaching system. (Any translation under Point system is not possible)

How to translate regular IC steps to IC Open Special

Undermentioned is a procedure to translate a sequential regular IC steps ('Pin to GND') to IC Open Special steps. This translation is available under Teaching system only.

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

2) It displays Step Edit menu or Step List menu as per your assignment.

3) Move the cursor on the top of the sequential IC steps which are to change to IC Open Secial data.

4) Select IC Open Special function from Menubar. (Tool > Generation > IC Open Special)

5) It displays a message "Is it irregular pitch?".

6) Click on [No] button.

7) It displays the next menu where you can specify GND-points.

8) Enter X,Y coordinates for two GND points at the left-bottom side and at the right-top side of the PC board.

9) Click on [OK] button.

10) It displays the next menu where you can specify X,Y coordinates for each corners of the IC package.

11) Enter the X,Y coordinates at their corner of the IC package.

12) Click on [OK] button.

13) It displays a message "Is this J-leaded package IC?".

14) Click on [No] button.

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

	Under such data translation for plural steps, their reference values cannot be changed. So enter their reference value again after the data translation.
	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.

	After IC Open Special steps were generated, 'ICOP' is substituted in Aux. column of their test steps. If they were set in combination, combination number is also displayed.

How to translate IC Open Special steps to regular IC steps

Undermentioned is a procedure to translate a sequential IC Open Special steps to regular IC steps ('Pin to GND'). This translation is available under Teaching system and Point system.

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

2) It displays Step Edit menu or Step List menu as per your assignment.

3) Move the cursor on the top of the sequential IC Open Special steps which are to change to regular IC steps.

4) Select IC Open Clear function from Menubar. (Tool > Generation > IC Open Clear)

5) It displays a message "Do you convert regular generation?".

6) Click on [Yes] button.

7) IC Open Special steps are translated back to regular IC steps.

Under such data translation for plural steps, their reference values cannot be changed. So enter their reference value again after the data translation.

Chapter 3　Maintenance

This chapter gives a short guidance how to do maintenance and troubleshooting on Sensor probes.

Sensor Probe Base CS8000-S21

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

The CS8000-S21 usually lasts 10 million times of stroke or more. 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.
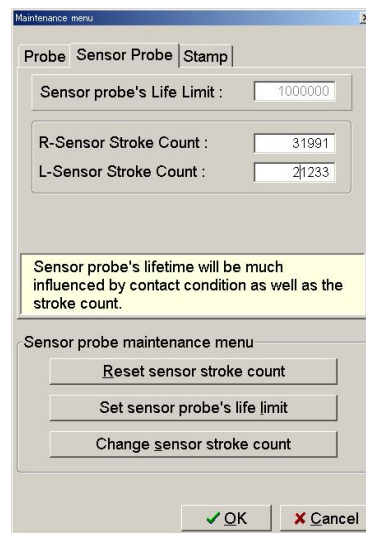
"Sensor probe's Life Limit" on this tab enables to preset the lifetime of the Sensor probes. After this entry, when the stroke count of any Sensor probe reached to the preset number, it displays a message **"Now is time to maintenance S-probe"** to alert you for inspection or replacement of the CS8000-S21. 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, PCB's flux, so on. Especially the over stroke or the interference to the probe shortens the lifetime.

Set sensor probe lifetime

In order to get the message during testing as soon as the system counted up the preset number of sensor strokes, you need to set 'Set sensor probe lifetime' as indicated below.

1) Select Probe Count menu. (Tool > Self Diagnosis > Maintenance)

2) Select Sensor Probe tab.

3) Click on "Set sensor probe's life limit" button.

4) The cursor moves into "Sensor probe's Life Limit" edit box.

5) Specify the stroke number, then hit [Enter] key on the keyboard.

6) Click on [OK] button.

7) 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 changing the test data.**

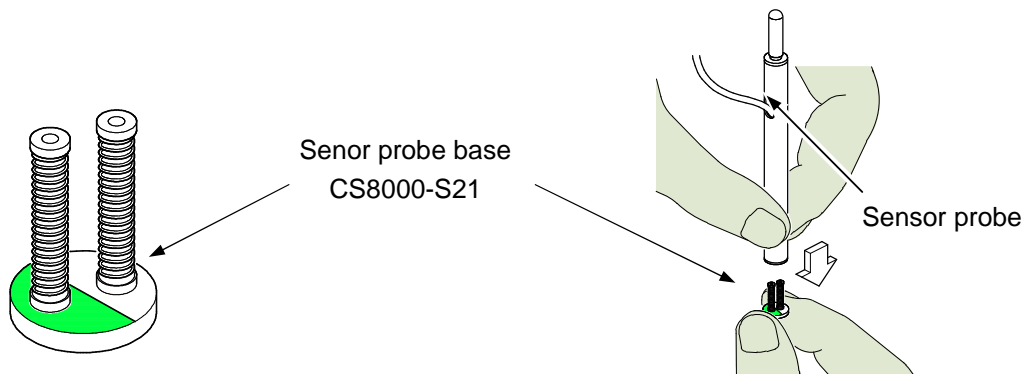|	**To reset the stroke number, click "Reset sensor stroke count" button at above process 3.**

Replacing CS8000-S21

How to remove

Pull out the CS8000-S21 straight.

(NOTE) Never try to pull it in an oblique direction so hard the sensor probe is bent.

Senor probe base
CS8000-S21

Sensor probe

CAUTION	**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).**

How to install

1) 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)

2) Push up the CS8000-S21 straight tightly. (Refer to Fig.-3)

   (NOTE) When you do not go to the prescribed distance (1.5 ~ 2.5mm) or the CS8000-S21 is installed with some inclination, it has not been all the way seated. (Refer to Fig.-4)
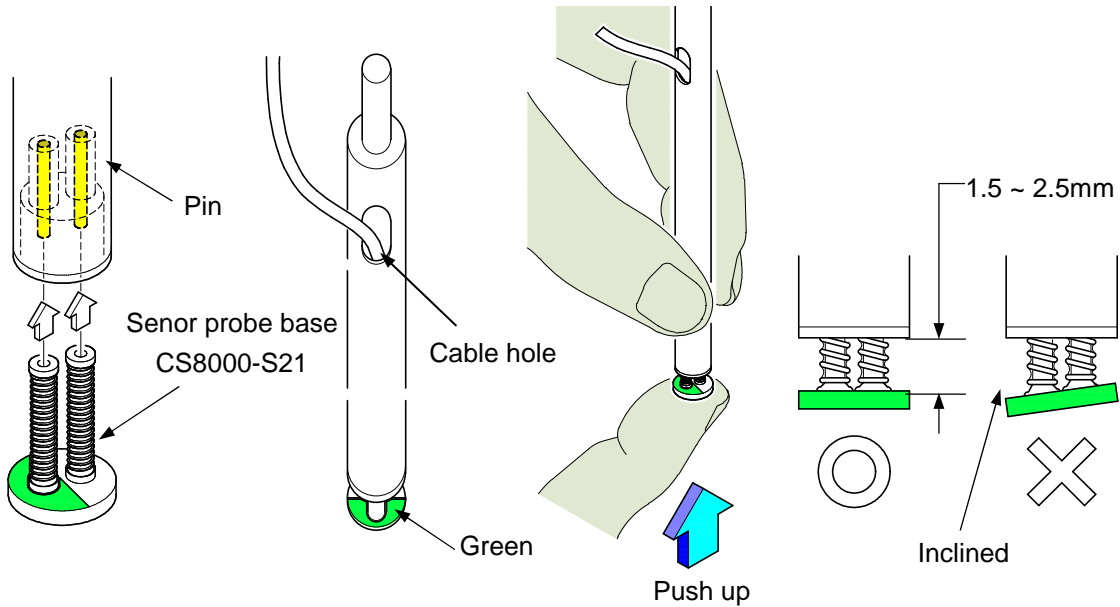
Pin

Senor probe base
CS8000-S21

Cable hole

Green

Push up

1.5 ~ 2.5mm

Inclined

Fig.-1   Fig.-2   Fig.-3   Fig.-4

Sensor probe Inspection

List 1 below is our recommended inspection.

Check item	Contents	Action
Spring mechanism	> Transformation of spring > Smooth moving	Replace Sensor probe base Replace Sensor probe *1)
Sensor electrode surface	> Dust or smudge > Worn out surface	Cleaning *2) Replace Sensor probe base
Connector and wire	> Breaking of wire > Disconnect of connector	Replace Sensor probe Plug in the connector tightly
Appearance	> Warpage	Replace Sensor probe

[List 1] Sensor probe inspection

> 1) **Never lubricate oil to spring mechanism. It causes bad moving finally.**
> 2) **The cleaning of the electrode surface should be made softly by some using alcohol cotton stick.**
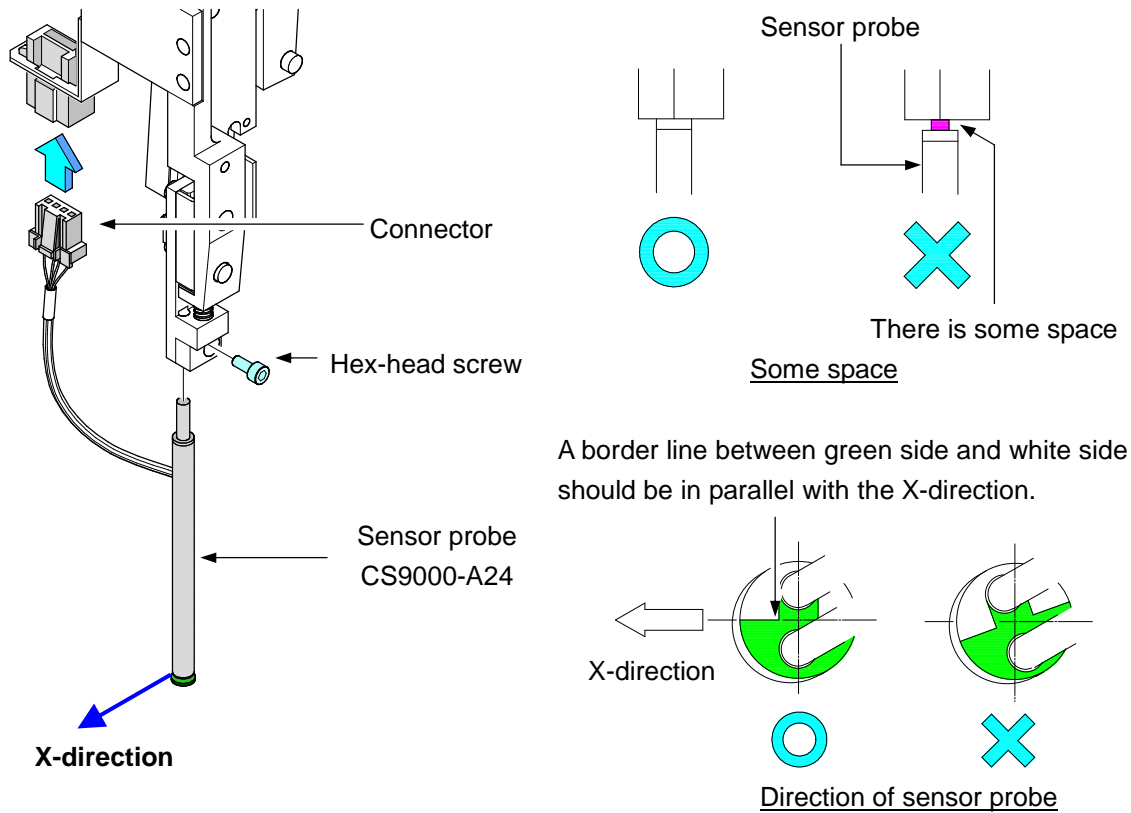
Replacing Sensor probe CS9000-A24

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

Following is procedures to replace the whole sensor probe CS9000-A24.

1) Select Adjust Probe menu. (Tool > Self Diagnosis > Adjust Probe).

2) It shows Adjust Probe menu.

3) Click on [Probe 2] / [Probe 3] button.

4) It displays "Press [TEST START] SW".

5) Press [TEST START] SW.

6) Probe moves to the front side.

7) It displays "It is now safe to open the safety cover in order to access the probe…".

8) Open the safe cover.

9) Unscrew the hex-head screw, and remove the sensor probe.

10) Disconnect a connector of the sensor probe.

11) Install a new sensor probe on the antenna drive unit, then fix it with the Allen screw. In this case, pay attention to the sensor plate faces 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.

12) Joint the connector tightly.

13) Close the safe cover.

14) Press [RESET] SW.

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.

Connector

Hex-head screw

Sensor probe
CS9000-A24

X-direction

Sensor probe

There is some space

Some space

A border line between green side and white side
should be in parallel with the X-direction.

X-direction

Direction of sensor probe

	After the CS9000-A24 was replaced, be sure to reset the sensor probe offset to probes. (Refer to 'Initial Set' in Chapter 1)
	After the CS9000-A24 was replaced, be sure to reset Sensor Stroke Count. (Refer to 'Set sensor probe lifetime' in Chapter 3)
	When the sensor probe offset to probe 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.

Troubleshooting

If the IC open step is judged to unmeasurable or the measured value decreases, the Sensor probe is supposed to be out of order. In addition, there may be other causes as indicated in List 2. Please carefully check one by one when the sensor was in good condition.

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 1 above were found correct when the Sensor probe was in good condition, then check the next possibilities as described in List 3.

Possible cause 2	Countermeasure
IC open measuring board is fail	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.
Any connecting cable or its connector is corrupted	Call to our local distributer.

[List 3] IC open troubleshoot (2)

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