Flying probe tester APT-9411 series

Extension Scanner Board

ESC-9500 Operator's Guide

TAKAYA

Preface

The Extension Scanner Board ESC-9500 is an option integrated into the Takaya Fixtureless tester *APT-9411 Series* and the sister models to extend its capabilities.

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

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

(NOTE)

1) The design of the product and software are under constant review and while every effort is made to keep this manual up to date, we reserve the rights to change specifications and equipment at any time without prior notice.
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Introduction

Safety symbols

Symbol	Explanation
	Calls attention to a procedure, practice, or condition that could possibly cause serious accident or death.
	Calls attention to a procedure, practice, or condition that could possibly cause bodily injury or damage to the product.
	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 causes possibly misjudge the unit under test, or damage to the product.
	Calls attention to “One-point advice” which should be useful when you are at a loss to operate the products.

Extension Scanner Board

By integrating the Extension Scanner Board ESC-9500 (hereinafter called “ESC-9500”) into the APT-9411 Series and the sister models, the user is able to use max. 64 extension bottom probes (option) for applying the measuring signals to the UUT. Usually the measuring signal to the UUT is applied through the extension bottom probes, but it is also possible for the user to use a dedicated underside fixture jig or plug in the connector directly into the UUT.

System Configuration

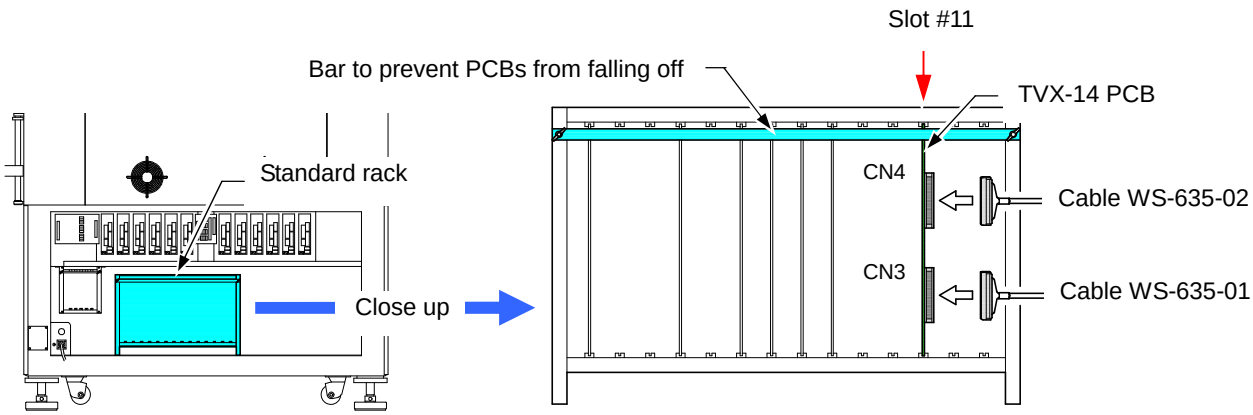
Hardware

The ESC-9500 consists of the following components:

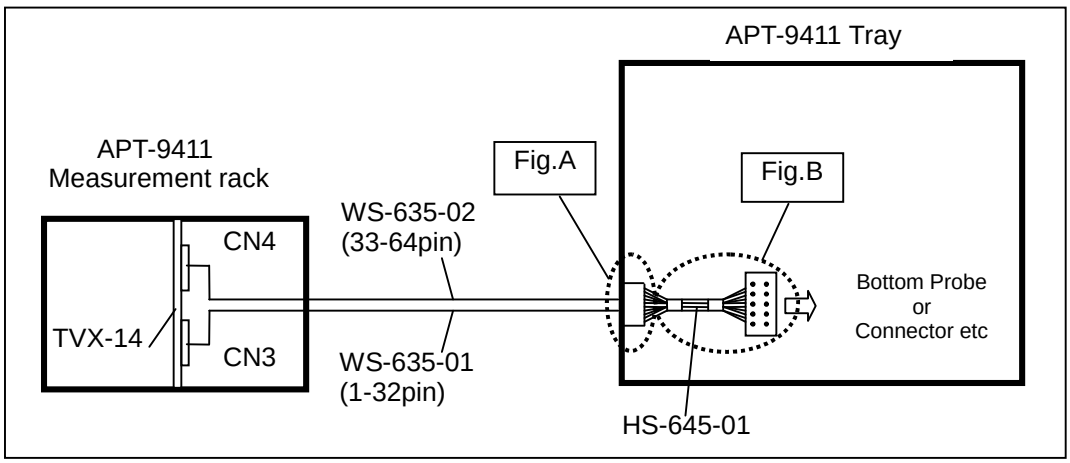
PCB Takaya TVX-14	x 1 Pc
Connecting cable Takaya WS-635-01 (TVX-14 PCB ~ Tray)	x 1 Pc
Connecting cable Takaya WS-635-02 (TVX-14 PCB ~ Tray)	x 1 Pc
Connector cable Takaya HS-645-01 (Tray ~ UUT)	x 1 Pc

(Remarks) The extension bottom probes are extra-cost option to be sold as needed.

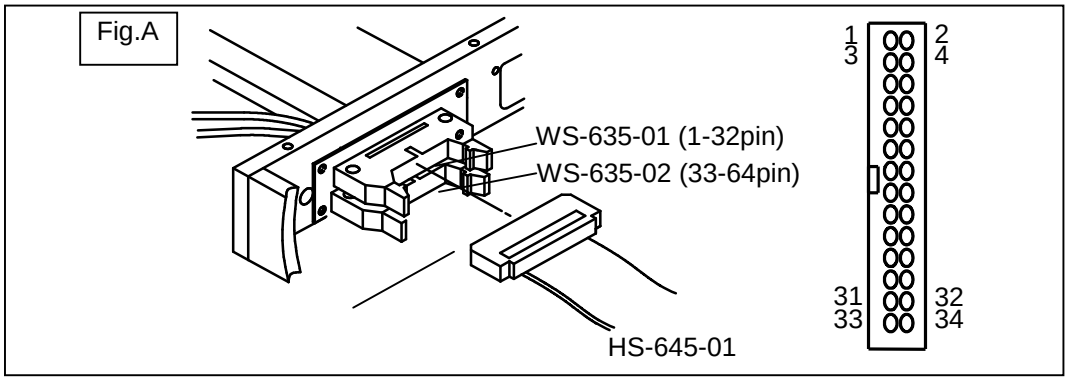
The TVX-14 PCB, as the major component of the ESC-9500, should be installed in the slot #11 of the standard rack in the tester.



[Fig.1] Installation of TVX-14 PCB



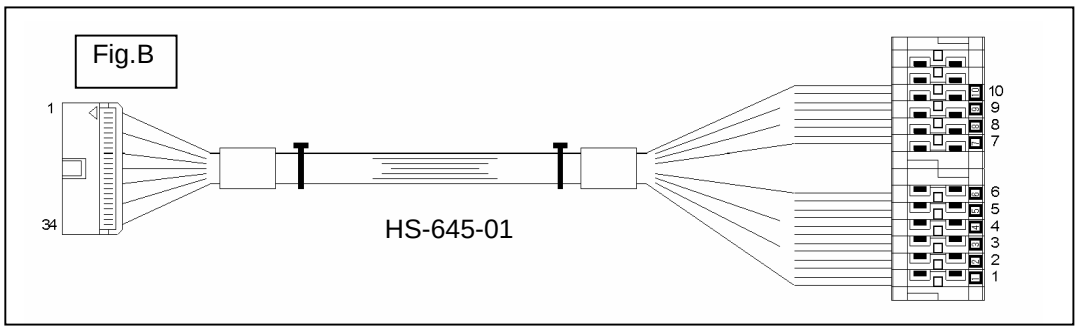
[Fig.2]



[Fig.3]

WS-635-01	TVX-14 (CN3)	WS-635-02	TVX-14 (CN4)
1pin	1	1pin	33
2pin	2	2pin	34
|	|	|	|
31pin	31	31pin	63
32pin	32	32pin	64
33pin	GND	33pin	GND
34pin	GND	34pin	GND

(Cable connection between TVX-14 PCB and WS-635-01/02)



[Fig.4]

Software

The ESC-9500 will be recognized automatically at the time of startup.

(Important reminder)

1. If once the test steps by making use of the ESC-9500 are changed to the following steps, the pin numbers will be initialized and get to use the flying probes:

   - Vision test step
   - Special generation step (CM-)
   - IC Open test step (ICOP)
   - Digital transistor step (DGTR)
   - Pattern open check step (PT-)
   - Photo coupler test step (PC)
   - Kelvin measurement step (Kel.)
   - I/O step

2. The ESC-9500 should be used for normal (MDA) test steps only, not for the steps to measure high voltage or large current.

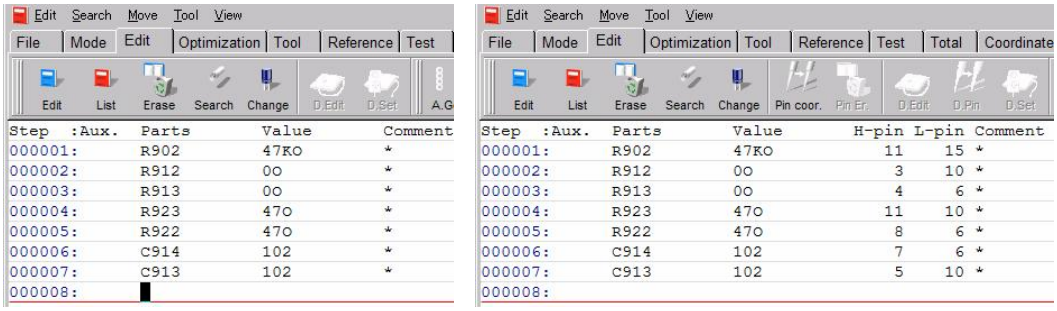
Test Data Generation

Basic data generation

Listed below is the operating procedure to add new basic data using the extension bottom probes.

[Operating procedure]

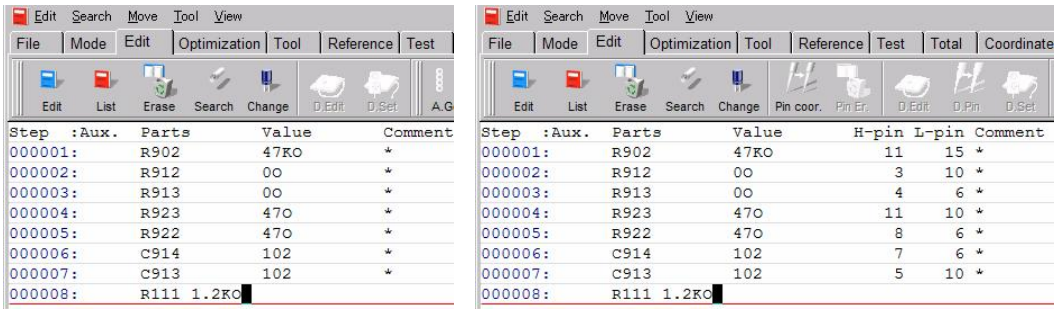
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Use the keyboard to enter the step number and click on the OK button. (Fig.5 indicates a case of generating a new step at Step 000008)



Teaching system Point system

[Fig.5] Step edit list

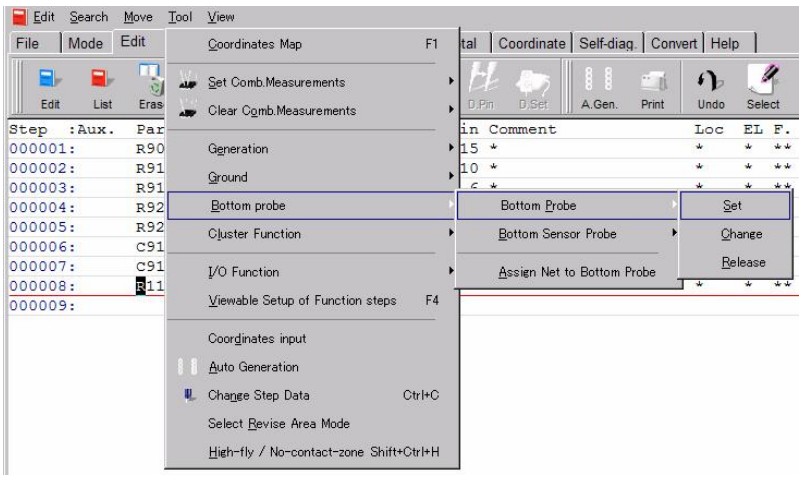
3. Use the keyboard to enter “Parts”, “Value, and “Comment” in order. For Point system (the right screen in Fig.6), you can dispense with “H-pin” and “L-pin”.



Teaching system Point system

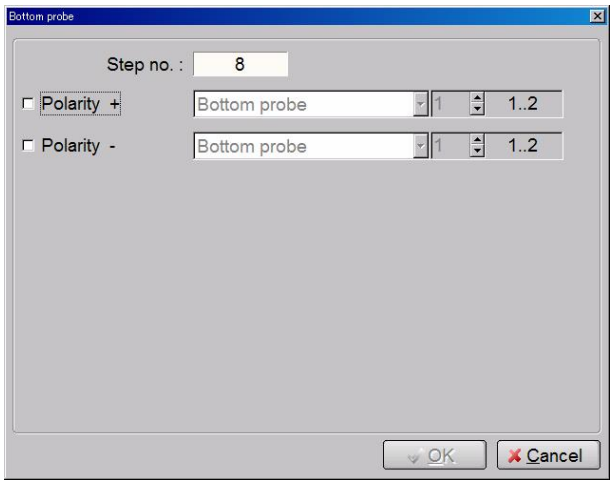
[Fig.6] Step edit list

4. Use your mouse to select “Tool” >“Bottom probe” > “Bottom probe” > “Set” in order.



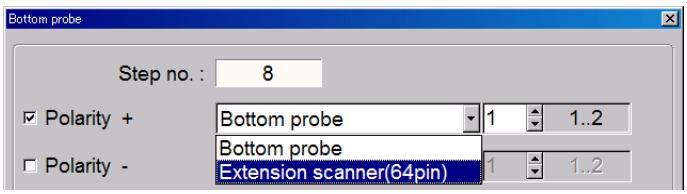
[Fig.7]

5. It displays the Bottom probe setting screen (Fig.8).



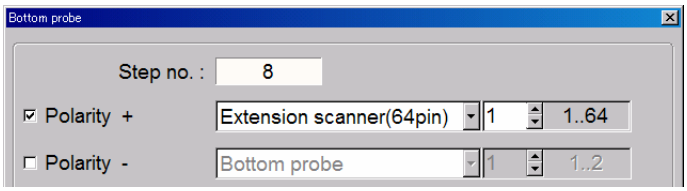
[Fig.8] Bottom probe

6. Fill the box “Polarity +” and select “Extension Scanner (64pin)” from the right pull-down menu.



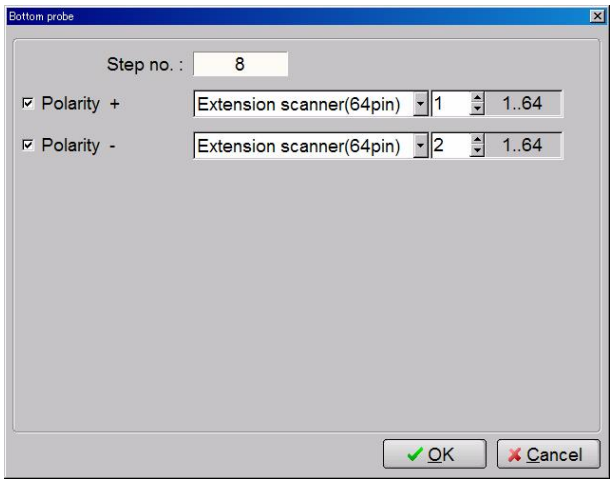
[Fig.9]

7. Specify the extension bottom probe to use for applying the measuring signal.



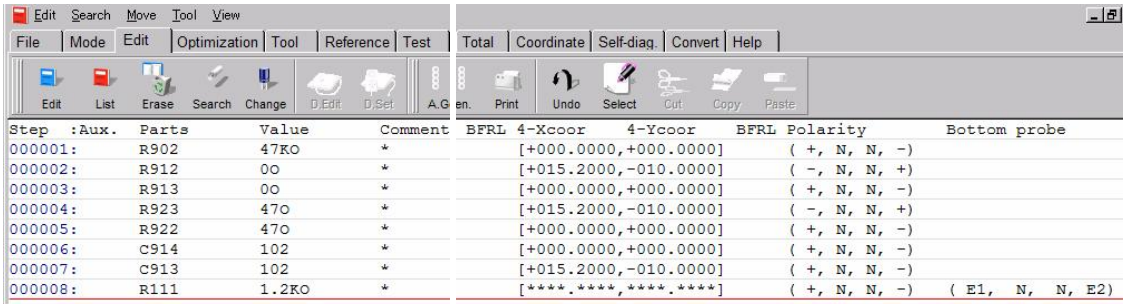
[Fig.10]

8. Only if you want to use the extension bottom probe for “Polarity -” as well, select “Extension Scanner (64pin)” from the right pull-down menu and specify extension bottom probe to use. (Refer to Fig.11) Then Click the OK button.



[Fig.11]

9. The display goes back to Fig.12. Now you can see the Bottom probe column in the Step edit list is substituted by the symbol of “E1, N, N, E2”.
   [E1] means the extension bottom probe#1. [E2] means the extension bottom probe#2.



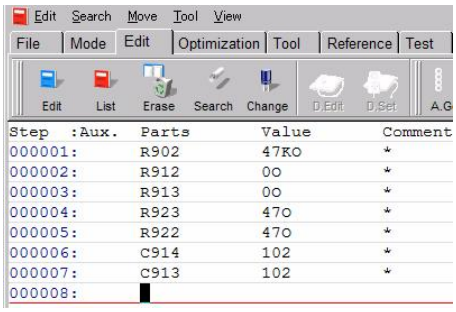
[Fig.12]

Automatic generation function

Listed below is the operating procedure to add new basic data using the extension bottom probes with Automatic generation function. Let’s take “Pin to ground” steps of IC as an example to explain Automatic generation function in a way easy to understand.

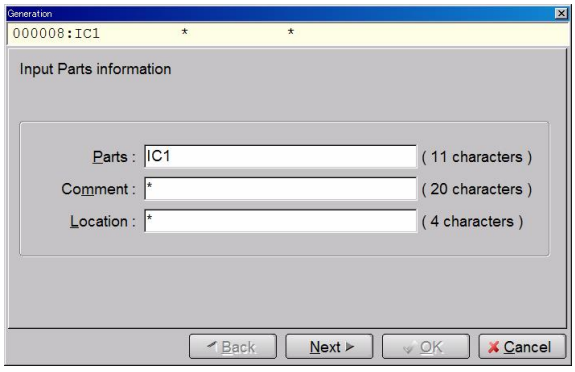
[Operating procedure]

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Use the keyboard to enter the step number and click on the OK button. (Fig.13 indicates a case of generating a new step at Step 000008)



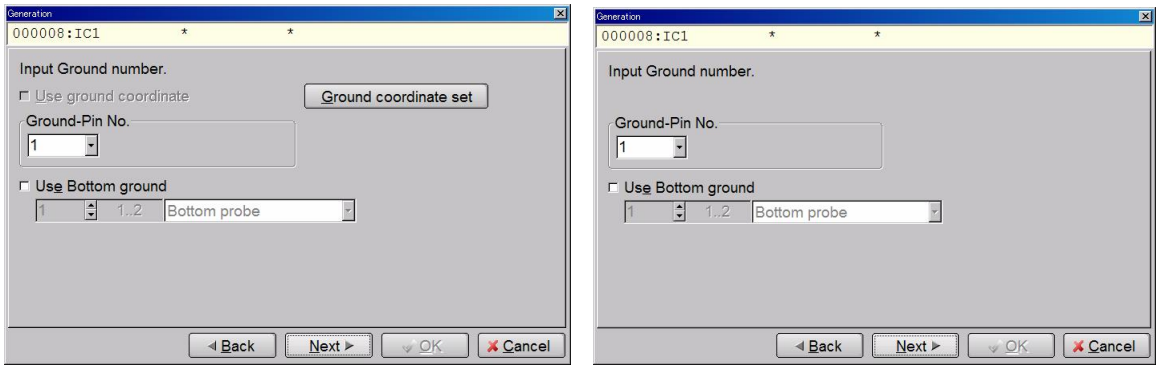
[Fig.13] Step edit list

3. Use the keyboard to enter “Parts” and click on “A.Gen.” icon on the Tool bar, and Fig.14 will be displayed.



[Fig.14] Automatic generation

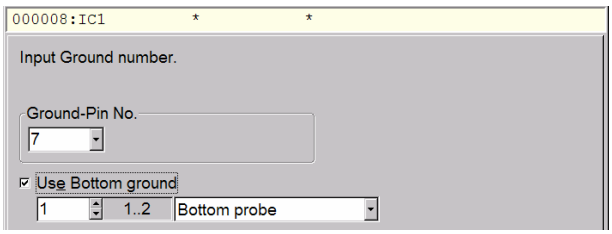
4. Make a series of programming steps to generate “Pin to ground” steps of IC according to the menu guidance until Fig.15 appears on the display.



Teaching system Point system

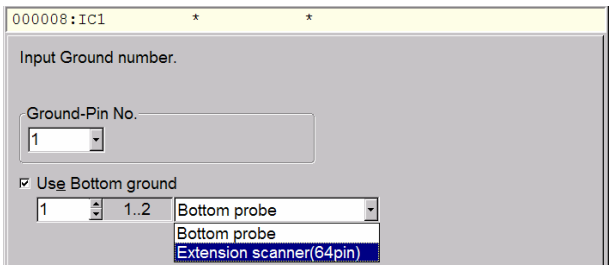
[Fig.15]

5. Specify the ground pin number and fill the box “Use Bottom ground”.



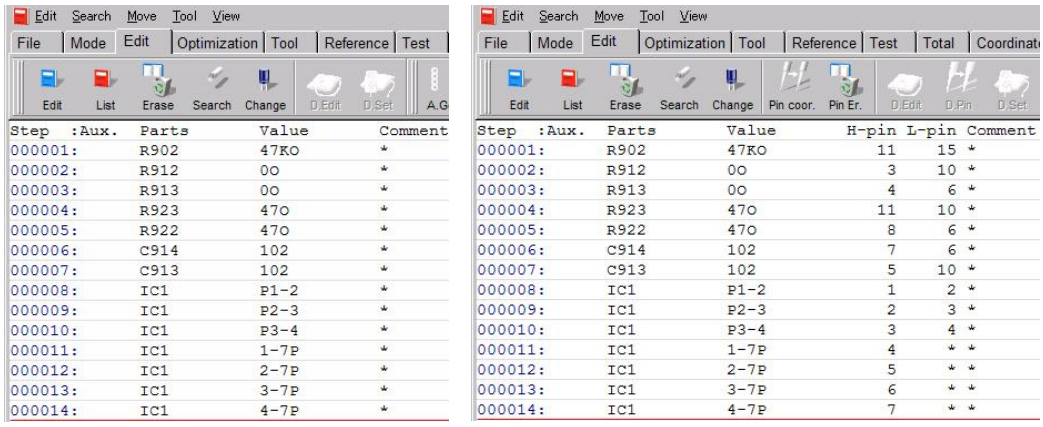
[Fig.16]

6. Select “Extension Scanner (64pin)” from the right pull-down menu and specify the Ground pin number on the bottom.



[Fig.17]

7. Click the Next button and continue generating the IC open test steps according to the menu guidance. Fig.18 indicates a sample of the IC open test steps generated.



Edit Search Move Tool View

File Mode Edit Optimization Tool Reference Test

Edit List Erase Search Change D.Edit D.Set A.G

Step	:Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	0O	*
000003:		R913	0O	*
000004:		R923	47O	*
000005:		R922	47O	*
000006:		C914	102	*
000007:		C913	102	*
000008:		IC1	P1-2	*
000009:		IC1	P2-3	*
000010:		IC1	P3-4	*
000011:		IC1	1-7P	*
000012:		IC1	2-7P	*
000013:		IC1	3-7P	*
000014:		IC1	4-7P	*

Edit Search Move Tool View

File Mode Edit Optimization Tool Reference Test Total Coordinat

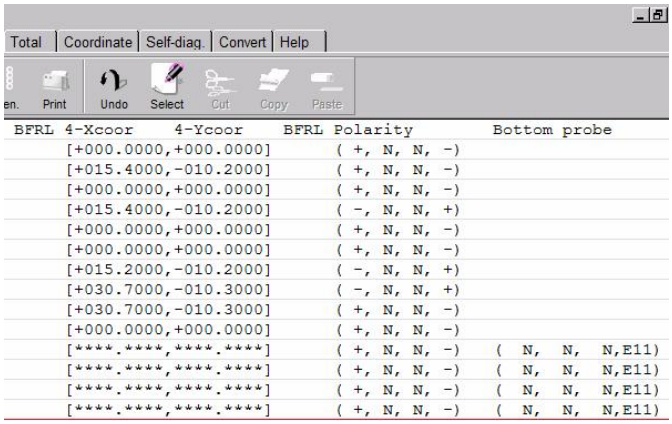
Edit List Erase Search Change Pin coor. Pin Er. D.Edit D.Pin D.Set

Step	:Aux.	Parts	Value	H-pin	L-pin	Comment
000001:		R902	47KO	11	15	*
000002:		R912	0O	3	10	*
000003:		R913	0O	4	6	*
000004:		R923	47O	11	10	*
000005:		R922	47O	8	6	*
000006:		C914	102	7	6	*
000007:		C913	102	5	10	*
000008:		IC1	P1-2	1	2	*
000009:		IC1	P2-3	2	3	*
000010:		IC1	P3-4	3	4	*
000011:		IC1	1-7P	4	*	*
000012:		IC1	2-7P	5	*	*
000013:		IC1	3-7P	6	*	*
000014:		IC1	4-7P	7	*	*

Teaching system Point system

[Fig.18]

8. Now you can see on the Step edit list that the Bottom probe column is substituted by the symbol of “E11”.
   [E11] means the extension bottom probe #11.



[Fig.19]

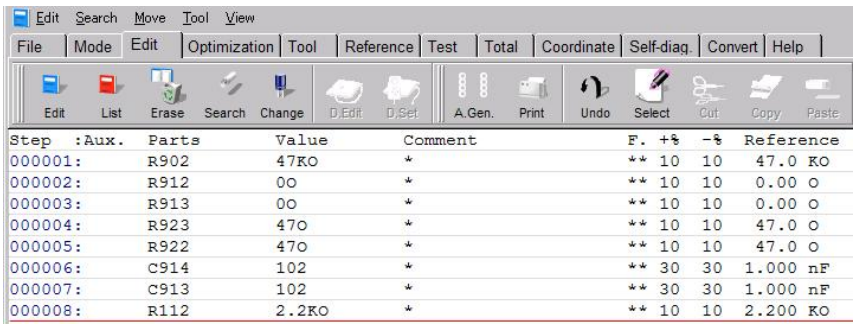
Setup the extension bottom probes in the existing step data

Listed below is the operating procedure to change the existing step data so as to use the extension bottom probes. The explanation is written for Point system, but basically the operating procedure in the Teaching system is the same.

Setup on Step / Edit list

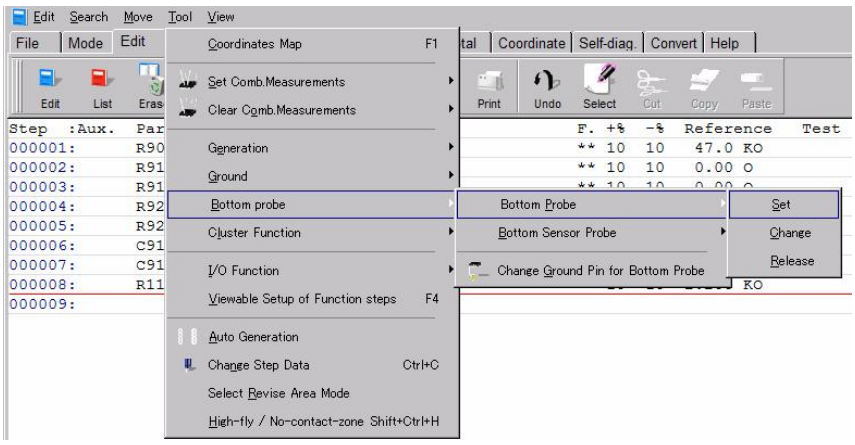
[Operating procedure]

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Use the keyboard to enter the step number and click on the OK button. (Fig.20 indicates a case of changing Step 000008)



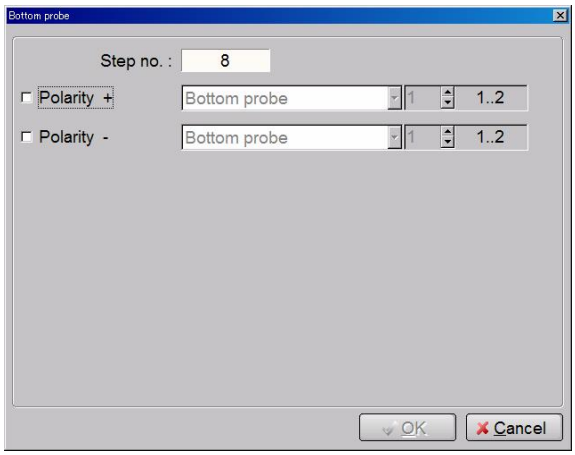
[Fig.20]

3. Use your mouse to select “Tool” >“Bottom probe” > “Bottom probe” > “Set” in order.



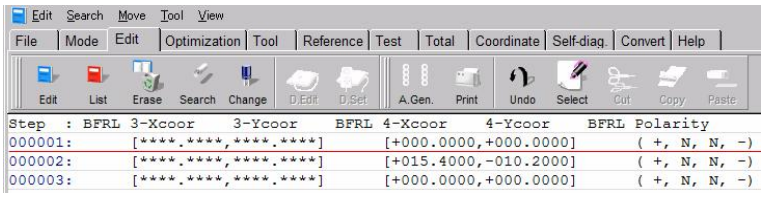
[Fig.21]

4. It displays the Bottom probe setting screen (Fig.22).



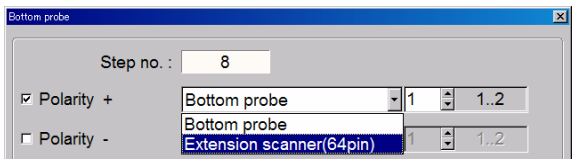
[Fig.22] Bottom probe

5. Fill either the box “Polarity +” or “Polarity –” that should be changed from the flying probe to the extension bottom probe. In the case of Step 000001 in Fig.23 below, Polarity column is substituted by the symbol of “+,N,N,-”. It means that Probe 1 is “Polarity +” and Probe 4 is “Polarity –”.



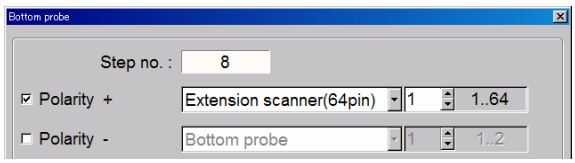
[Fig.23]

6. Fill the box “Polarity +” and select “Extension Scanner (64pin)” from the right pull-down menu.



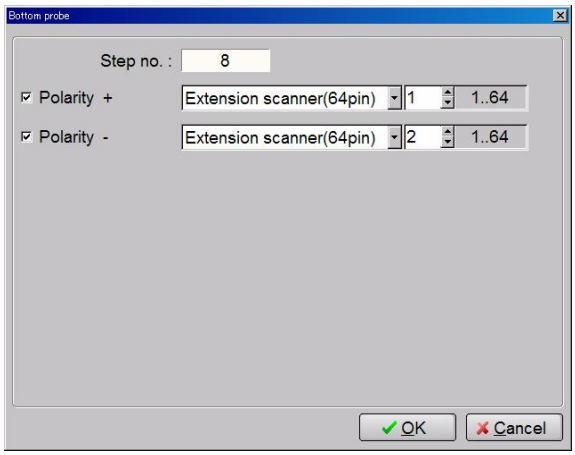
[Fig.24]

7. Specify the extension bottom probe to use.



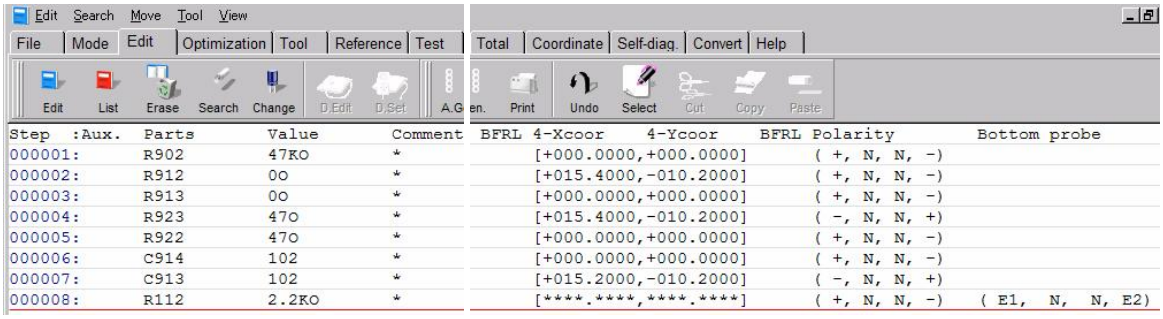
[Fig.25]

8. Only if you want to use the extension bottom probe for “Polarity -” as well, select “Extension Scanner (64pin)” from the right pull-down menu and specify the extension bottom probe to use. Then Click the OK button.



[Fig.26]

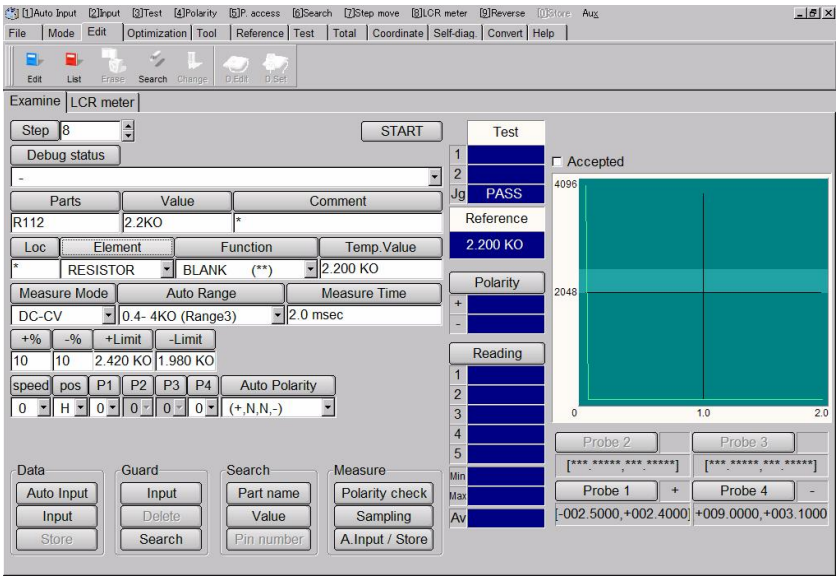
9. The display goes back to Fig.27. Now you can see the Bottom probe column in the Step edit list is substituted by the symbol of “E11, N, N, E12”.
[E11] means the extension bottom probe #11. [E12] means the extension bottom probe #12.



[Fig.27]

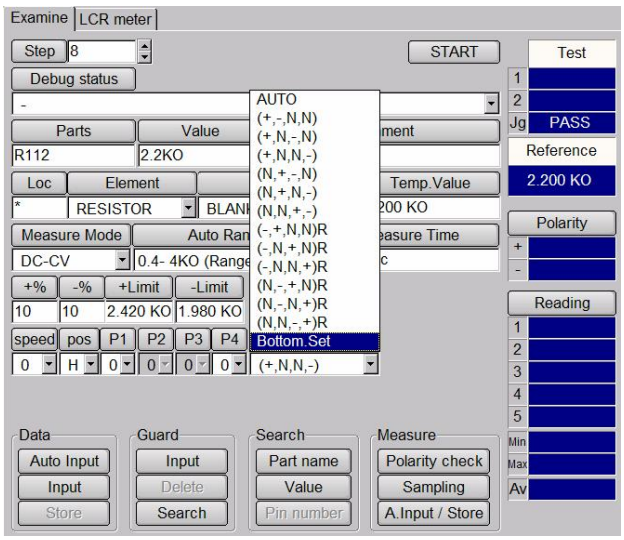
Setup on Step data review

1. Go to the step that should be changed from the flying probe to the extension bottom probe in Step data review.



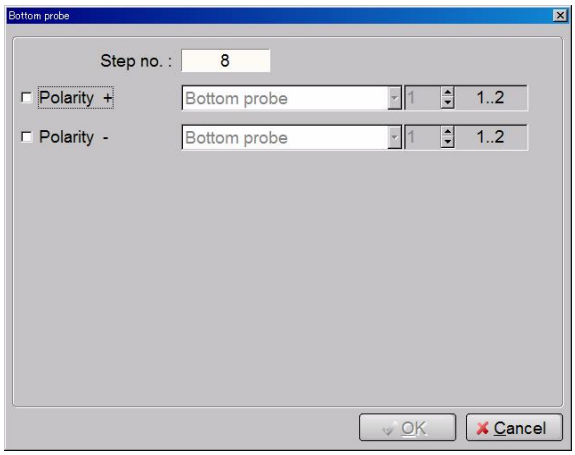
[Fig.28] Step data review

2. Click on [Probe Access] to display the pull-down menu. (Refer to Fig.29)



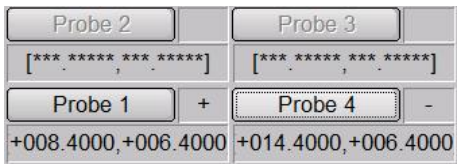
[Fig.29] Probe Access

3. Select [Bottom Set] from the pull-down menu, and it displays the Bottom probe setting screen.



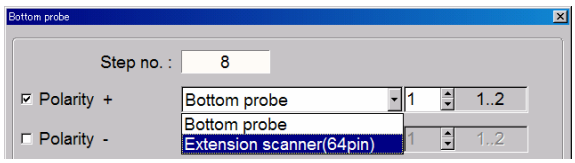
[Fig.30] Bottom probe

4. Fill either the box “Polarity +” or “Polarity –” that should be changed from the flying probe to the extension bottom probe. In the coordinates shown in Fig.31, Probe 1 is “Polarity +” and Probe 4 is “Polarity –“.



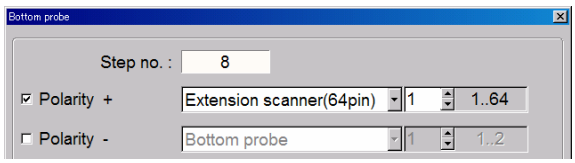
[Fig.31]

5. Fill the box “Polarity +” and select “Extension Scanner(64pin)” from the right pull-down menu.



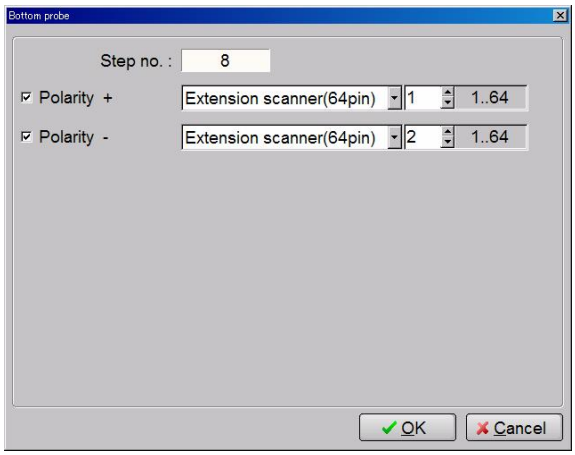
[Fig.32]

6. Specify the extension bottom probe to use.



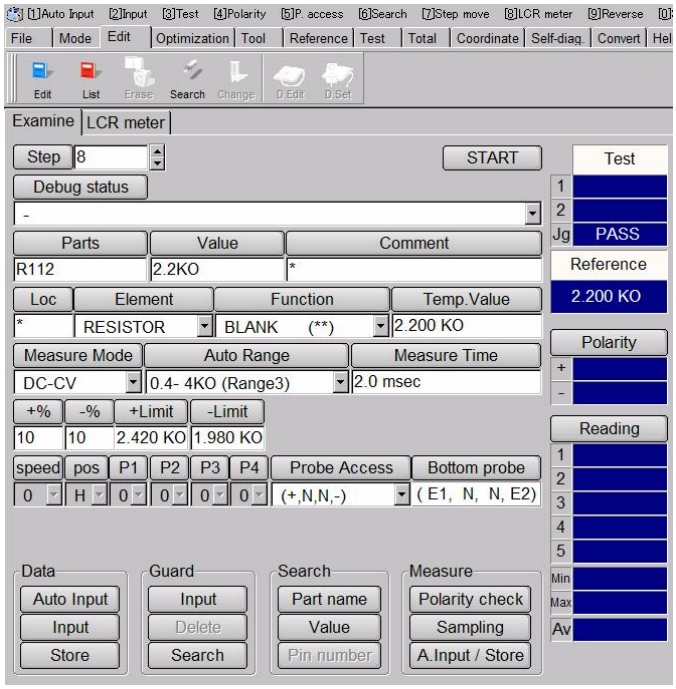
[Fig.33]

7. Only if you want to use the extension bottom probe for “Polarity -” as well, select “Extension Scanner(64pin)” from the right pull-down menu and specify the extension bottom probe to use. (Refer to Fig.34) Then Click the OK button.



[Fig.34]

8. The display goes back to Fig.35. Now you can see the Bottom probe column is substituted by the symbol of “E1, N, N, E2”.
   [E1] means the extension bottom probe #1. [E2] means the extension bottom probe #2.



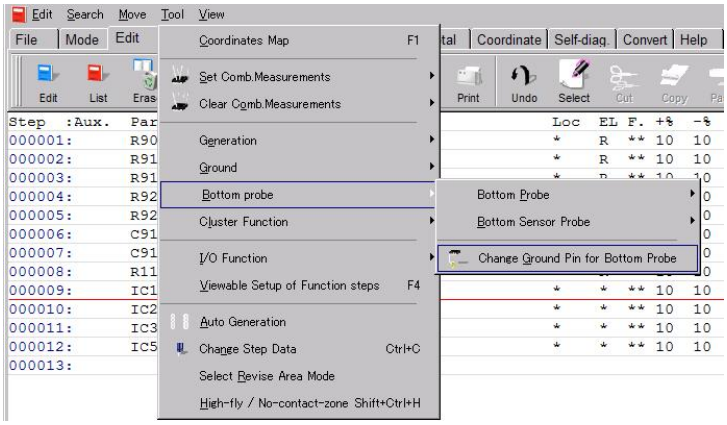
[Fig.35]

Change ground pin of IC to the bottom

Listed below is the operating procedure to change the ground pin used in the existing “Pin to ground” steps to the extension bottom probe. The explanation is made for Teaching system and Point system separately.

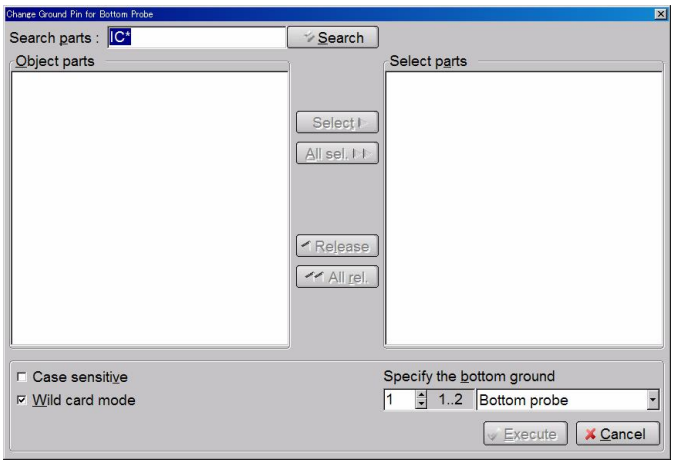
[Operating procedure (by Teaching system)]

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. Use your mouse to select “Tool” > “Bottom probe” > “Change Ground Pin for Bottom Probe” in order.



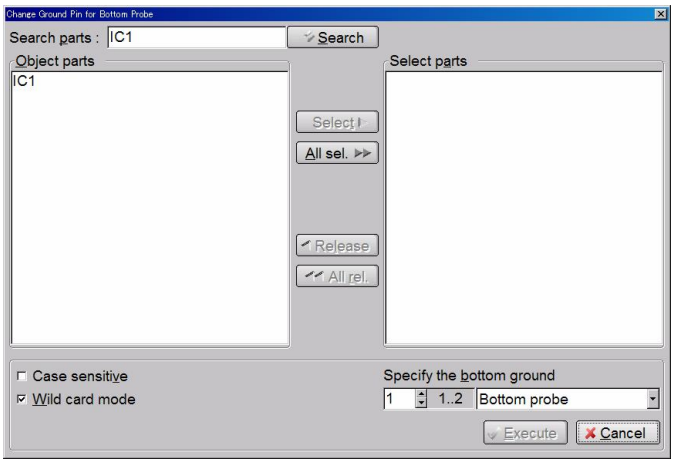
[Fig.36]

3. It displays the Change Ground Pin for Bottom Probe screen.



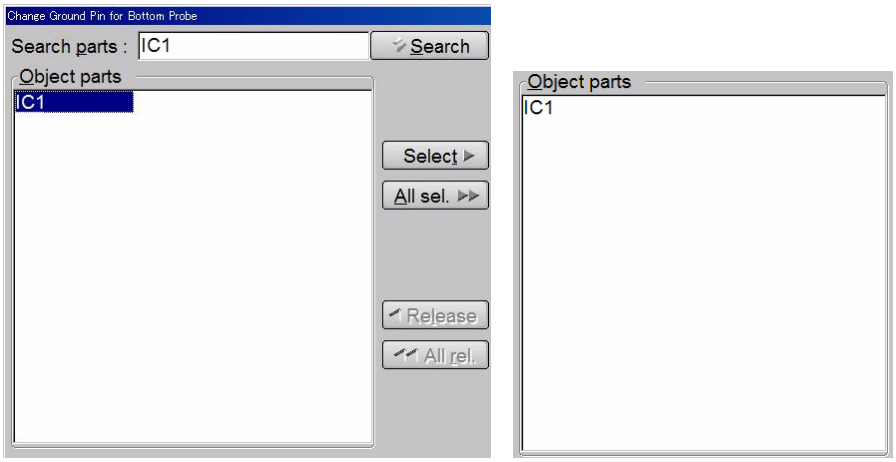
[Fig.37] Change Ground Pin for Bottom Probe

4. Type the search string (ex. IC1) in the Search parts column and click the Search button at the right. Then “IC1” is displayed in the Object parts column as shown in Fig.38.



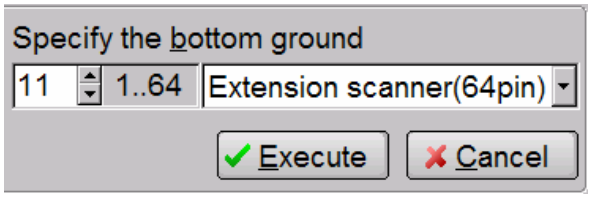
[Fig.38]

5. Use your mouse to select “IC1”and click the Select button, and “IC1” is displayed in the Select parts column as shown in Fig.39.



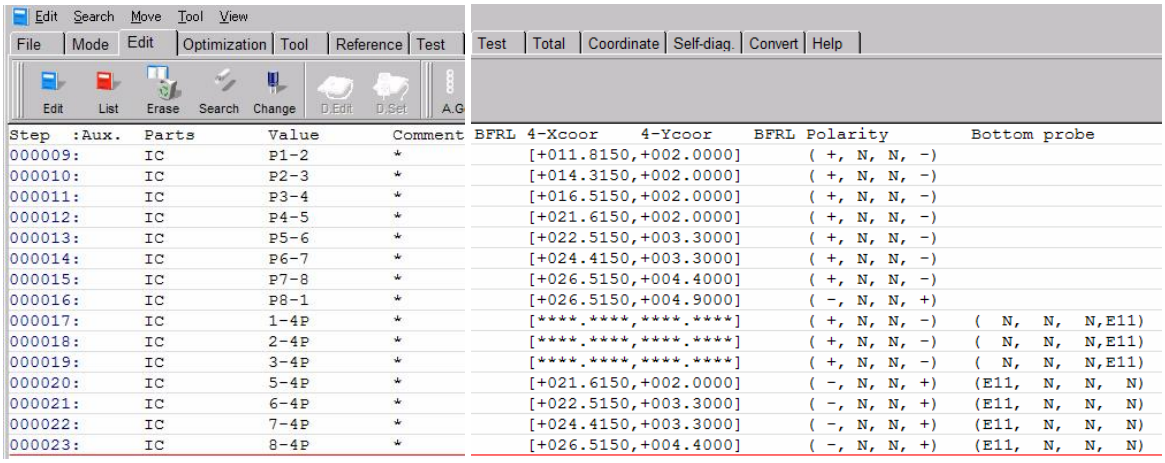
[Fig.39]

6. Select “Extension Scanner(64pin)” from the right pull-down menu at Specify the bottom ground and specify the extension bottom probe.



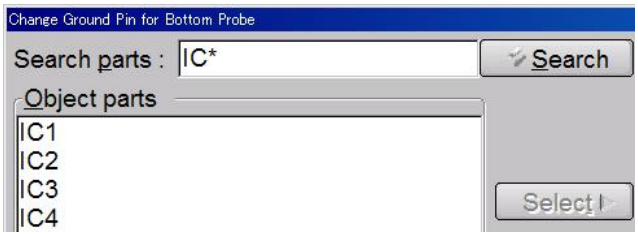
[Fig.40]

7. Click the Execute button to execute your change. Now you can see on the Step edit list that the Bottom probe column of IC1 is substituted by the symbol of “E11”.



[Fig.41]

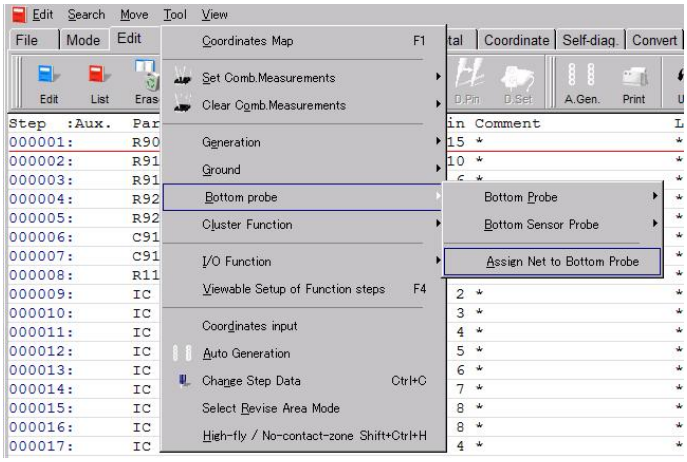
At the operating procedure #4, if you use wildcard character in the searched parts name such like “IC*”, all IC components with the registered name starting from IC will be listed in the Object parts column:



So it becomes that much easier to change the ground pin of lot of ICs to the extension bottom probe.

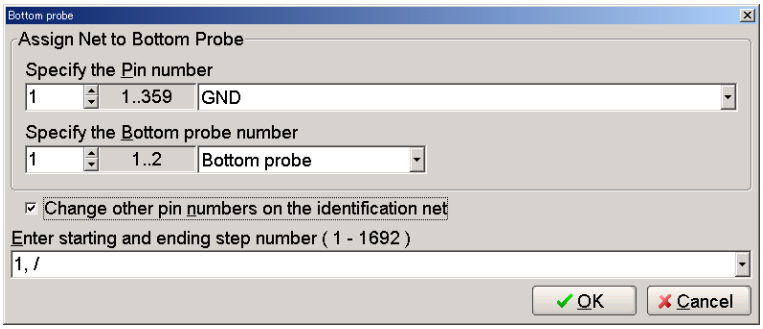
[Operating procedure (by Point system)]

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. Use your mouse to select “Tool” > “Bottom probe” > “Assign Net to Bottom Probe” in order.



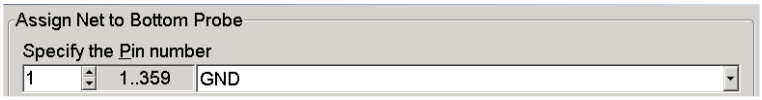
[Fig.42]

3. It displays the Assign Net to Bottom Probe screen.



[Fig.43] Assign Net to Bottom Probe

Use the Specify the Pin number column to select the pin number that should be change to the extension bottom probe.

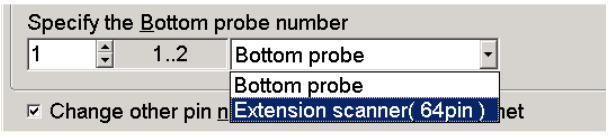


[Fig.44]

It’s also possible for you to select the net name (Ex.GND) from the right pull-down menu, so that the pin number used on the net is substituted in the Specify the Pin number column automatically. When there are more than one pin number are used on the same net, the youngest pin number will be substituted.

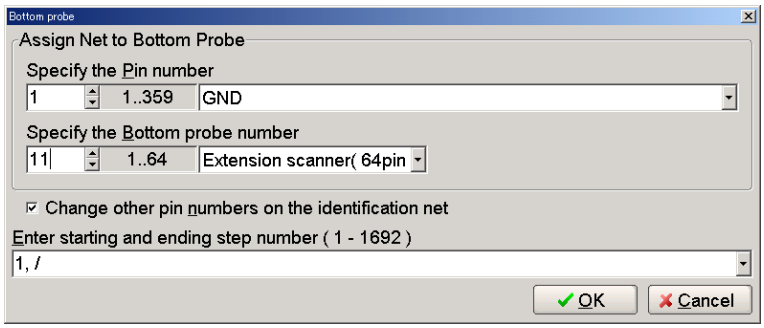
If you want to change all pins used on the same net at one time, fill the following box on the screen

Select “Extension Scanner (64pin)” from the right pull-down menu at Specify the bottom probe number and specify the extension bottom probe.



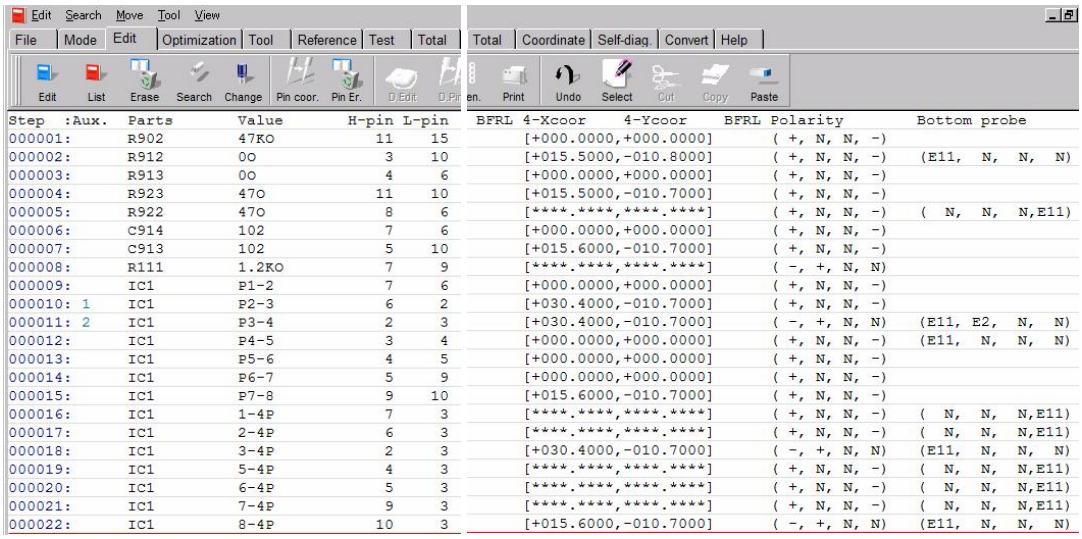
[Fig.45]

Click the OK button to execute your change.



[Fig.46]

4. Now you can see on the Step edit list that Pin #1 is substituted by the symbol of “E11”.



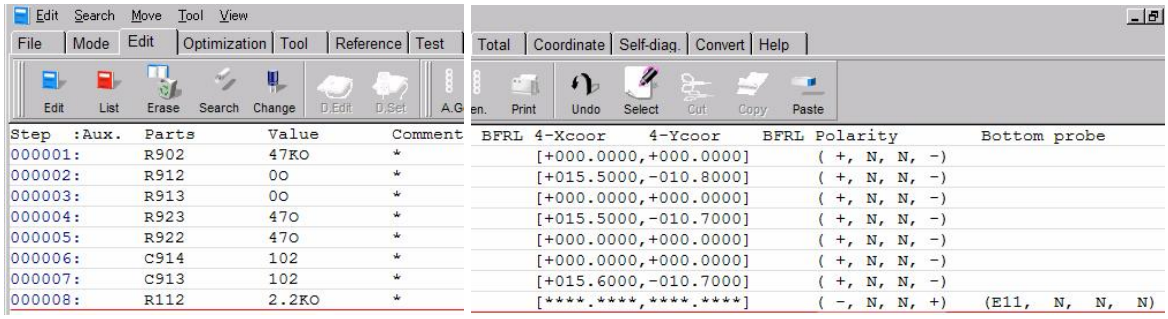
[Fig.47]

Cancel the extension bottom probes

Listed below is the operating procedure to change the existing step data so as to cancel the extension bottom probe. The operating procedure is the same in both the Teaching system and the Point system.

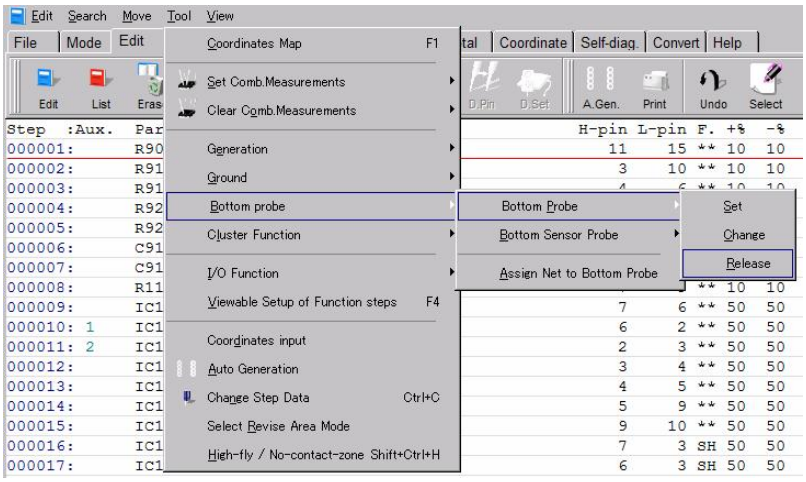
[Operating procedure]

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Use the keyboard to enter the step number and click on the OK button. (Fig.48 indicates the extension bottom probe is used on Step 000008)



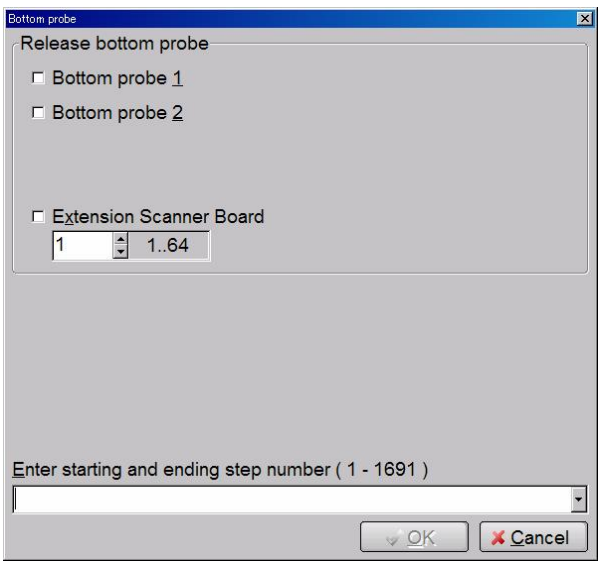
[Fig.48]

3. Use your mouse to select “Tool” > “Bottom probe” > “Bottom probe” > “Release” in order.



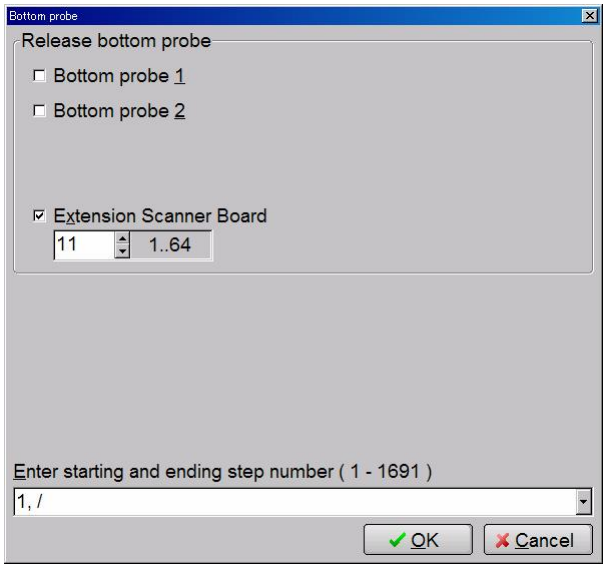
[Fig.49]

4. It displays the Release bottom probe screen.



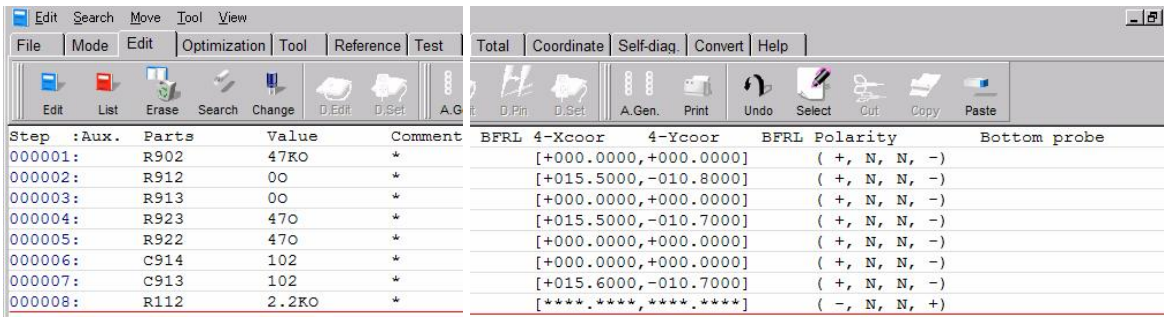
[Fig.50] Release bottom probe

5. Fill the box “Extension Scanner Board” and specify in the box the extension bottom probe to be canceled.



[Fig.51]

6. The display goes back to the Step edit list. Now you can see on Step 000008 that the Bottom probe column isn’t substituted by the extension bottom probe.



[Fig.52]

	If the extension bottom probe is canceled to set the test step to use the flying probe, you should enter the coordinates for the test points (in Teaching system) or the pin numbers (in Point system) when not in there.

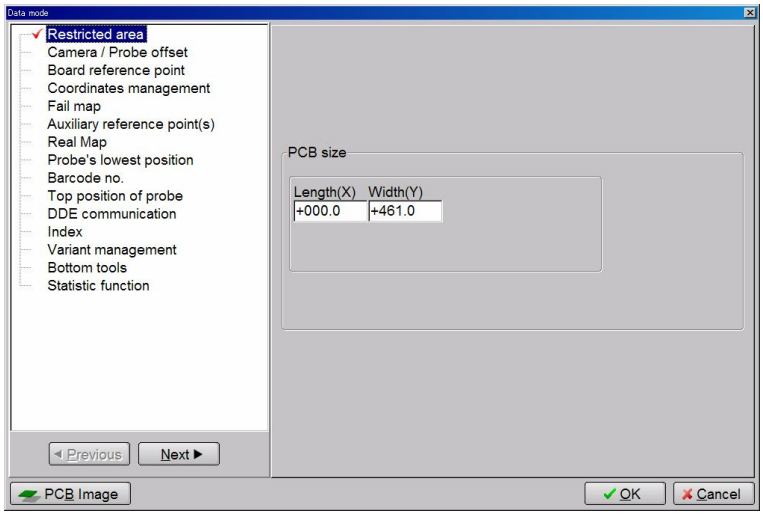
Extension bottom probes (option)

This chapter describes the way to install the extension bottom probes that are used to hook the ESC-9500 up to the UUT to apply the measuring signals.

Position set in Data mode

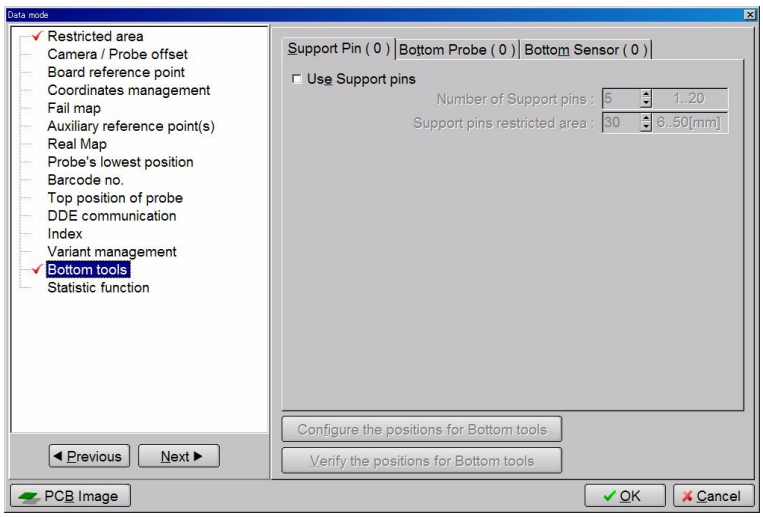
[Operating procedure]

1. Use your mouse to select “Tool” > “Mode Setting” > “Data mode” in order.



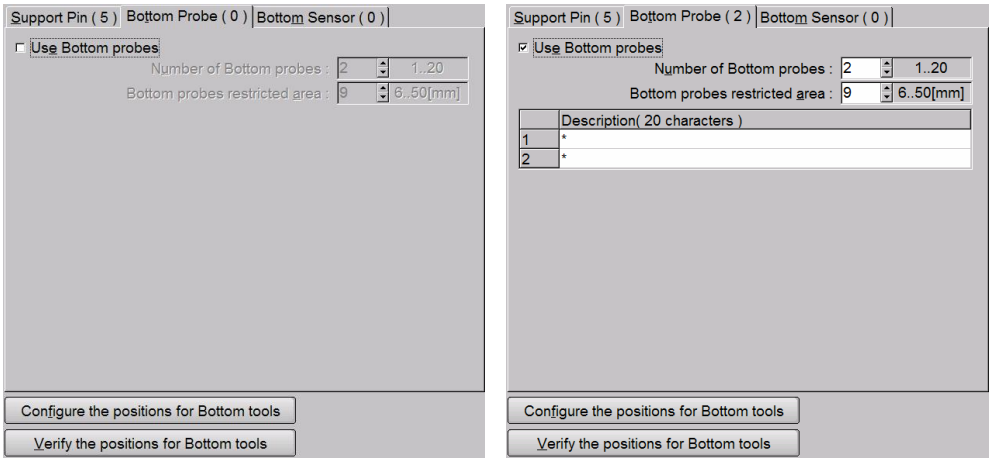
[Fig.53] Option mode

2. Click on Bottom tools, and it displays Fig.54.



[Fig.54] Bottom tools

3. Select “Bottom probe” from the Tabs, and it displays Fig.55 (the left screen).
   Fill the box “Use bottom probes” as shown in Fig.55 (the right screen).



[Fig.55] Bottom Probe

4. Configure [Number of Bottom Probe], [Bottom probes restricted area] and [Description (20 characters)].

   [Number of Bottom Probe]
   Specify how many the extension bottom probes are used. (Max. 20)

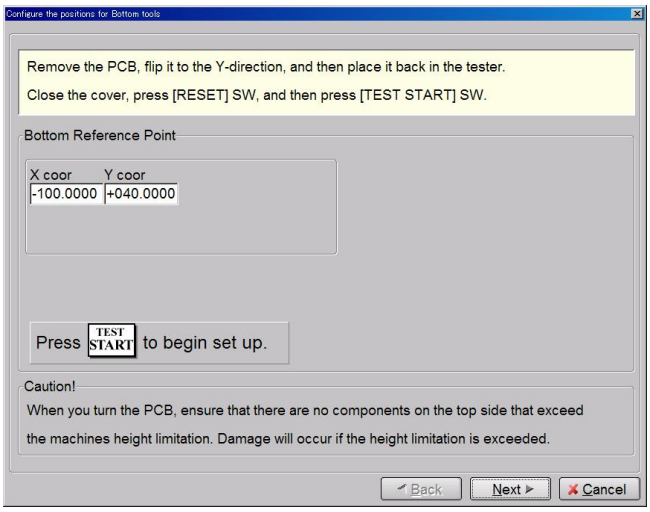
   [Bottom probes restricted area]
   Specify the closest distance that your extension bottom probe can come near each other.

   [Description (20 characters)]
   Type any comment in the boxes so as to identify the standard probes and the extension bottom probes.

	Description(20 characters)
1	St. bottom probe 1
2	St. bottom probe 2
3	Ext. bottom probe 1
4	Ext. bottom probe 2

[Fig.55] Description (20 characters)

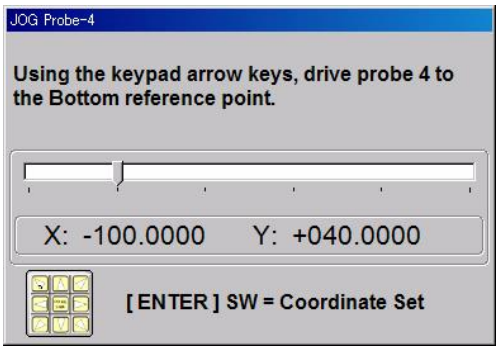
5. Click [Configure the positions for Bottom tools] button in order to enter the bottom reference point for your bottom probes. (Refer to Fig.56)
   First turn the pc board in Y-direction to specify the reference point for the bottom probes.



[Fig.56] Configure the positions for Bottom tools

	At the operating procedure #5, make sure that you use a bare pc board (with no component loaded). If you use the pc board with loaded components which are higher than 35mm, the camera and the probes will touch them resulting in the serious damages.

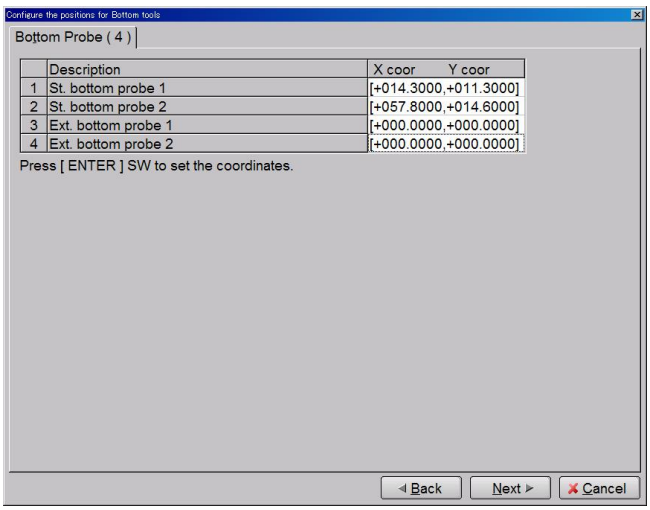
6. Depress [TEST START] SW on the operation panel, and it displays Fig.57 and Probe 4 moves over the Board reference point.



[Fig.57] JOG screen

Make sure that the bottom reference point for your bottom probes is viewable from both the top side and the bottom side.
While using the keypad arrow keys on the operation panel, set the target mark (a cross-hair pointer) over the bottom reference point and depress [ENTER] SW. After that, Probe 4 goes back to the home position and it displays Fig.56.

7. Click the Next button, and it displays Fig.58.



[Fig.58]

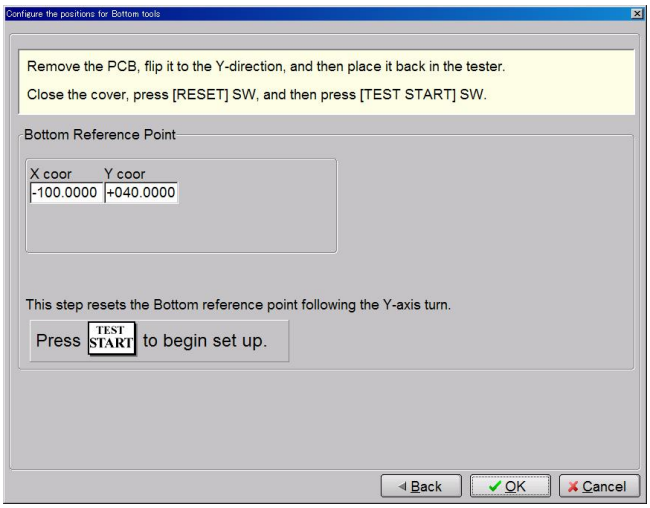
Depress [ENTER] SW on the operation panel, and Probe 4 moves over the bottom reference point for your bottom probes. Then use the keypad arrow keys on the operation panel to set the camera to the coordinates of the standard bottom probe #1. Depress [ENTER] SW to save the coordinates of the standard bottom probe #1.

Depress [ENTER] SW on the operation panel, and it displays the JOG screen. Then use the keypad arrow keys on the operation panel to set the camera to the coordinates of the standard bottom probe #2. Depress [ENTER] SW to save the coordinates of the standard bottom probe #2.

Repeat the same operation for the extension bottom probe #3,4

The display goes back to Fig.58.

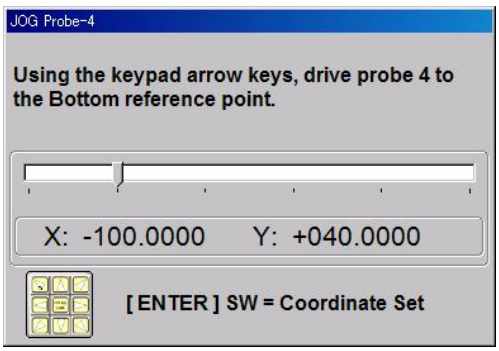
8. Click the Next button, and it displays Fig.59.



[Fig.59] Configure the positions for Bottom tools

You should specify the reference point for the bottom probes from the top side again.
To do this, open the safety cover and turn the pc board in Y-direction again and close the safety cover, and depress [RESET] SW on the operation panel.

9. Depress [ENTER] SW on the operation panel, and Probe 4 moves over the bottom reference point for your bottom probes and it displays Fig.60.



[Fig.60] JOG screen

Use the keypad arrow keys on the operation panel to set the camera to the bottom reference point for your bottom probes. Then depress [ENTER] SW to save the coordinates of the bottom reference point.

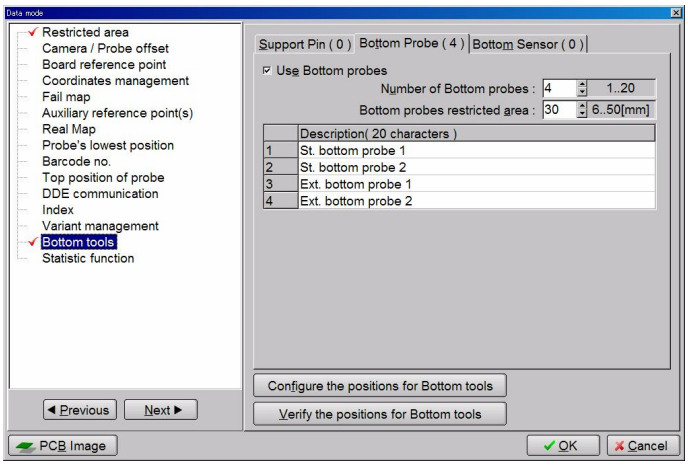
The display goes back to Fig.59. Click the OK button, and the display goes back to Fig.54.Now you were able to complete the position set of your bottom probes.

Installation

Listed below is the operating procedure to place your bottom probes on the predefined positions in Data mode.

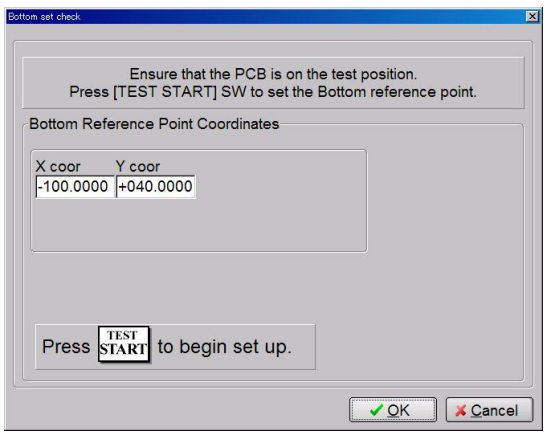
[Operating procedure]

1. Use your mouse to select “Tool” > “Mode Setting” > “Data mode” in order.
2. Move to Bottom tools and select “Bottom probe” from the Tabs.



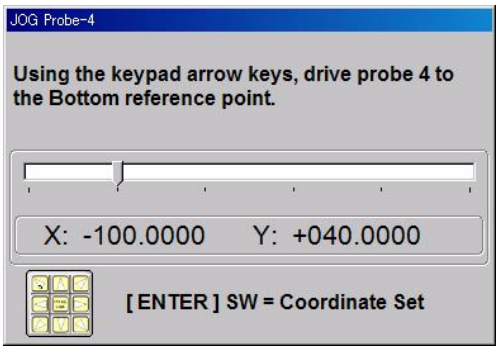
[Fig.61] Bottom probe

3. Click [Verify the positions for Bottom tools] button, and it displays Fig.62.You should specify the reference point for the bottom probes. Make sure that the pc board is placed on the tester and depress [TEST START] SW on the operation panel.



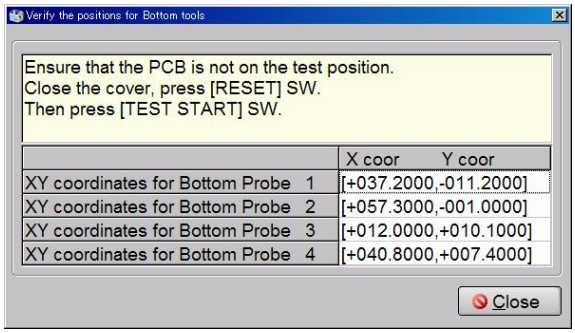
[Fig.61] Bottom probe

4. The JOG screen (Fig. 62) appears on the display and Probe 4 moves to the front. Use the keypad arrow keys on the operation panel to set the target mark to the bottom reference point for your bottom probes and depress [ENTER] SW.



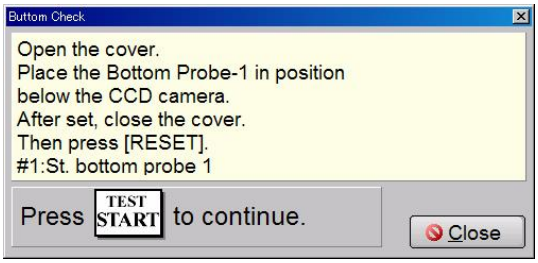
[Fig.62] JOG screen

5. It displays Fig.63. Open the safety cover and take the pc board out of the tester.
   Then close the safety cover and depress [RESET] SW, and depress [TEST START] SW.



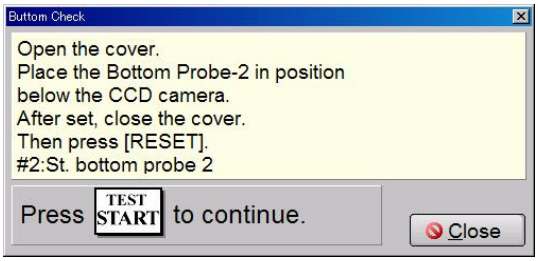
[Fig.63]

6. It displays Fig.64.



[Fig.64]

7. Open the safety cover and place the bottom probe #1 under the target mark whilst monitoring the camera screen. The close the safety cover and depress [RESET] SW, and depress [TEST START] SW. And it displays Fig.65.



[Fig.65]

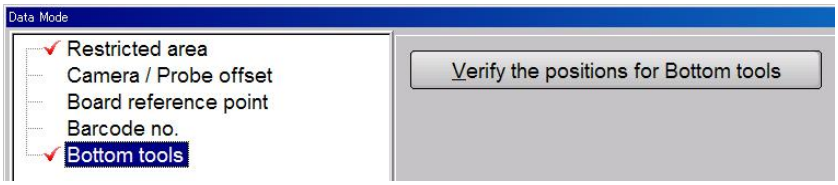
8. Open the safety cover and place the bottom probe #2 under the target mark whilst monitoring the camera screen.

9. Repeat the same operation to install the bottom probe #3,4.

   After all the bottom probes were installed on the predefined positions, close the safety cover and depress [RESET] SW, and depress [TEST START] SW. Now you were able to complete the installation of your bottom probes.

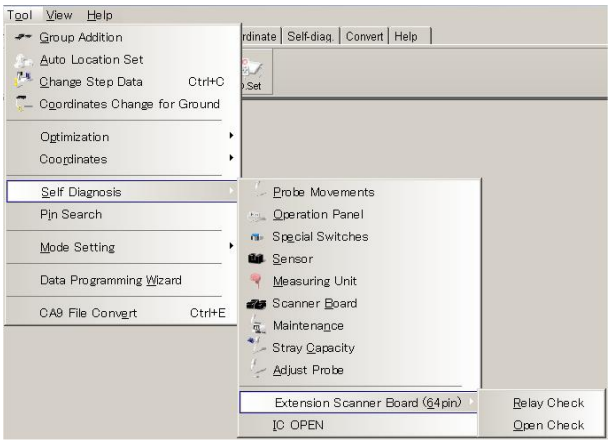
WARNING	Particular care should be paid to the keen-edged head of the bottom probes to be installed. Otherwise it may be an injury to your body.

HINT	If you fill the box “Use Bottom probes” in Data mode and save the test program, the Bottom probe setting menu below will appear automatically following the Board reference point setup operation after the test program was loaded.



Self-diagnosis / Maintenance

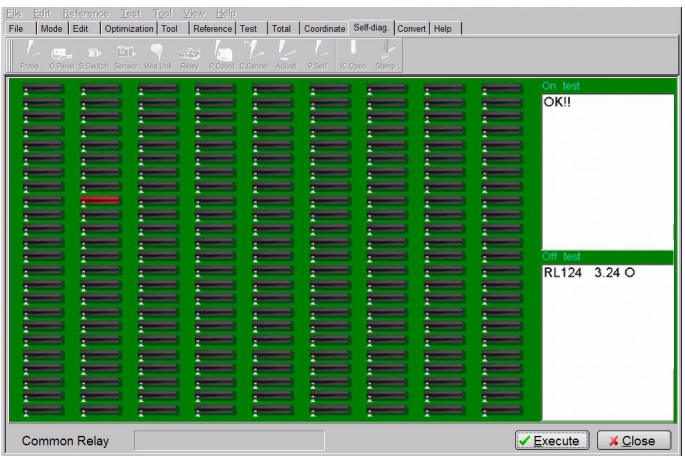
The Self-diagnosis function conducts a relay test on the TVX-14 PCB as well as a wiring cable continuity check.



[Fig.66] Extension Scanner Board (64pin)

Relay Check

Clicking on Execute button on Fig.66, it diagnoses the relays on the TVX-14 PCB.

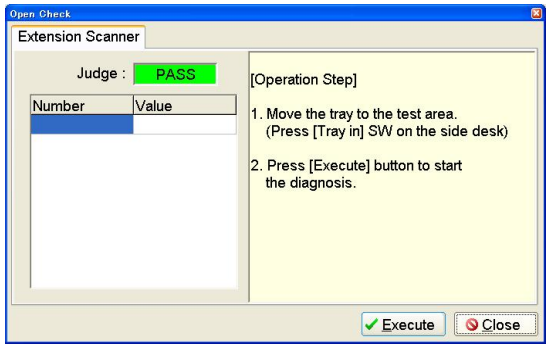


[Fig.67]

If a relays fails during the ON test, that relay is highlighted in blue and the failure information is displayed in the “On test” window. If a relays fails during the OFF test, that relay is highlighted in red and the failure information is displayed in the “Off test” window.

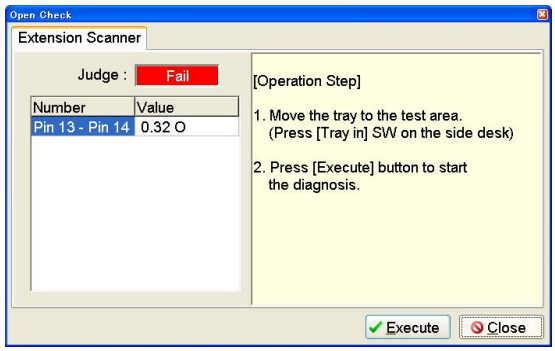
Open Check

Open Check function is available for testing possible “shorts” failure on the wiring cable between the TVX-14 PCB and the Tray.



[Fig.68]

Failures will be identified as shown below:



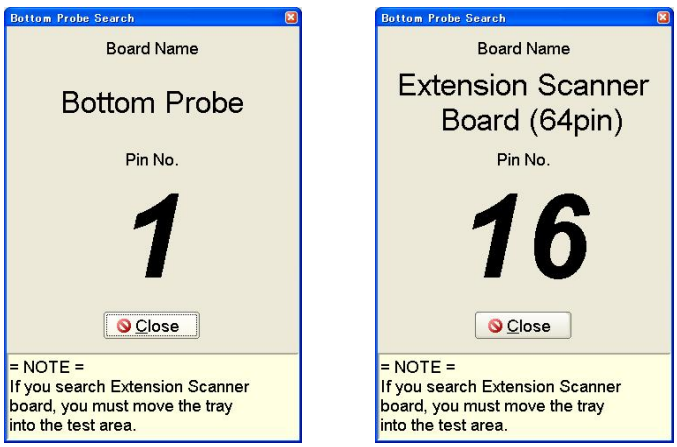
[Fig.69]

Note:

Prior to the Open check, make sure that all cables, the connectors, and/or your underside fixture jig are attached properly inside the Tray. Otherwise false failures may occur.

Pin Search

This function is used to identify the cable inside the Tray. Plug a tester lead cable into the tester terminal (+ pin) provided on the APT-9411CE/CJ, and then connect the tester lead cable to the objective cable. The cable number is displayed as follows:



[Fig.70]

While performing this function, “Board name” identifies where the cable is connected and “Pin No.” identifies the individual pin.

Note:

Prior to Pin search, you are recommended to perform Open check test to verify that it passes. Otherwise you might receive inaccurate cable information.

The above screens will close automatically it passed over 10 minutes without displaying any pin number.

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APT-9411 Extension Scanner Board ESC-9500 Operator’s guide (VOL.3)

TAKAYA CORP.

Issued on: April, 2009
Made in Japan