

# *Flying probe tester APT-9411 series*

**Power Relay Board**

**PRL-9500G Operator's Guide**



## **Preface**

The Power Relay Board PRL-9500G 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

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## 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 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.

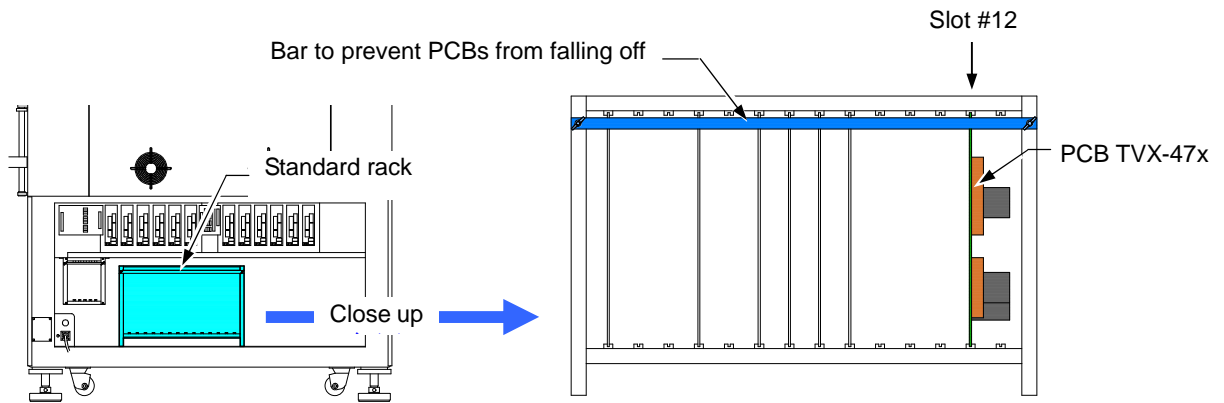


# Power Relay Board

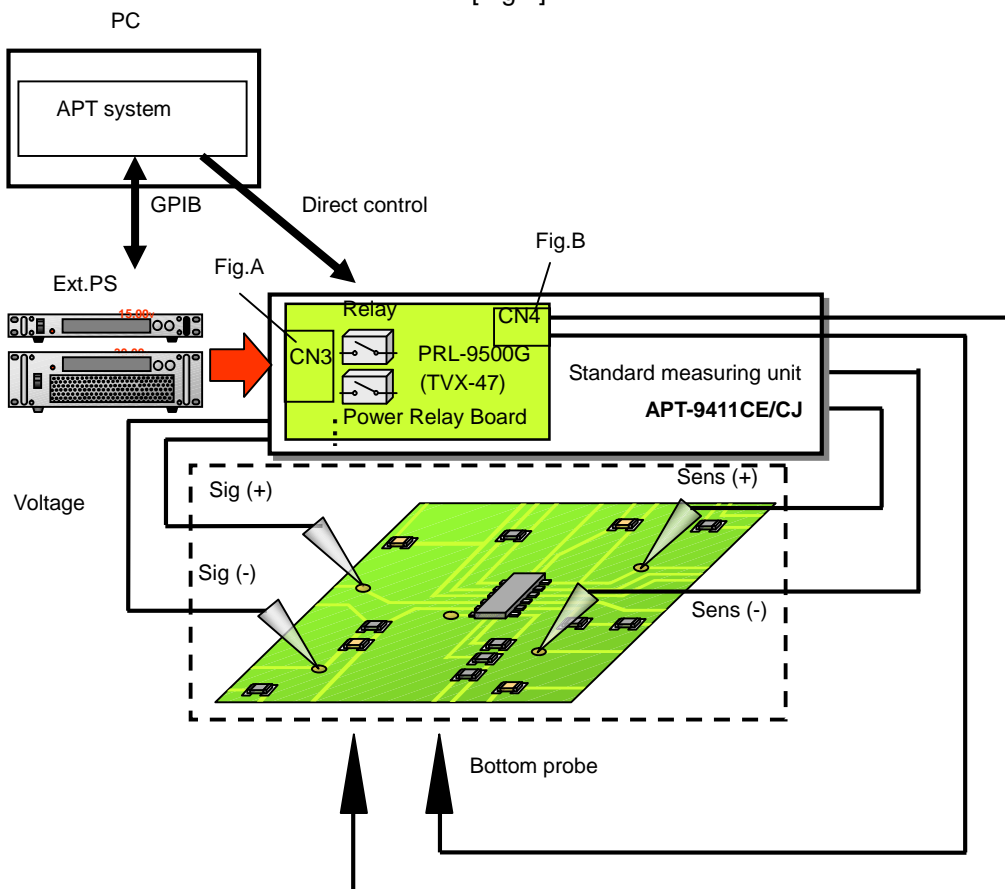
By integrating the Power Relay Board PRL-9500G (hereinafter called "PRL-9500G") into the APT-9411 Series and the sister models, the user can power up PC boards by multiple external power supplies prepared by them through Bottom probes (max. 12) or some connectors or flying probes. They can build-up the test program so that those external power supplies necessary for testing the PC boards is turned On/Off optionally.

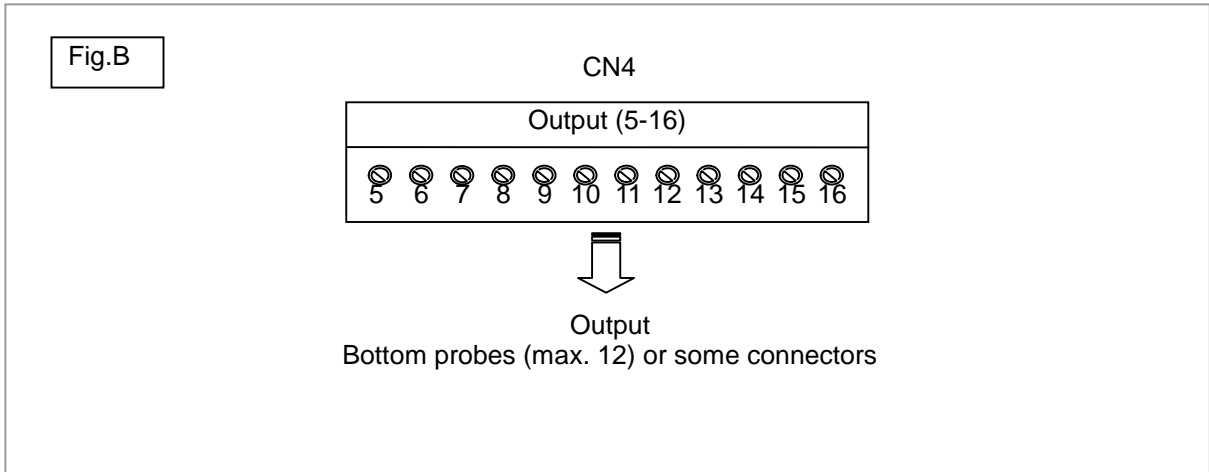
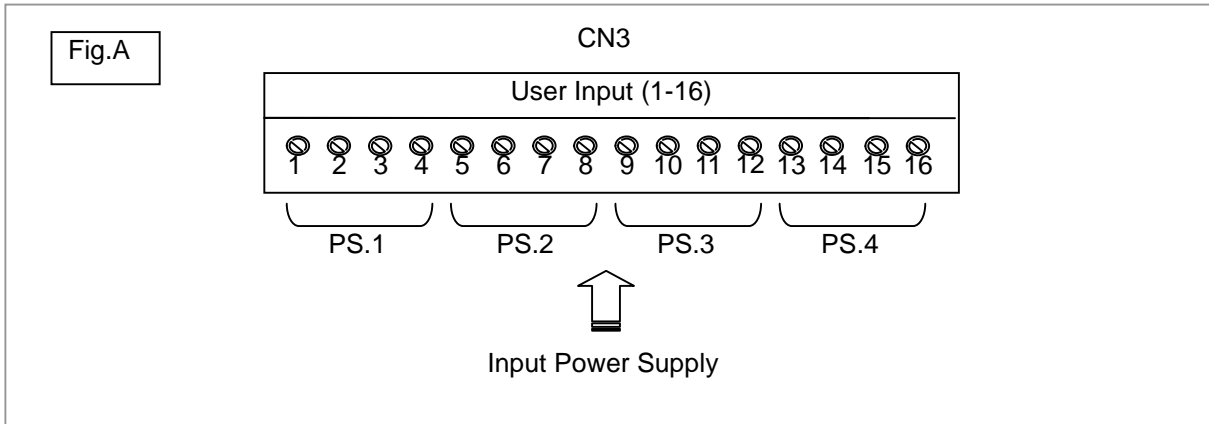
## System Configuration Hardware

Normally, the PCB TVX-47, as the major component of the PRL-9500G, is installed in the slot #12 of the standard rack in the tester. The PCB TVX-47 should be in the slot #10 only when the tester uses the Programmable DC Power Supply Board (PDC-9500) at the same time.



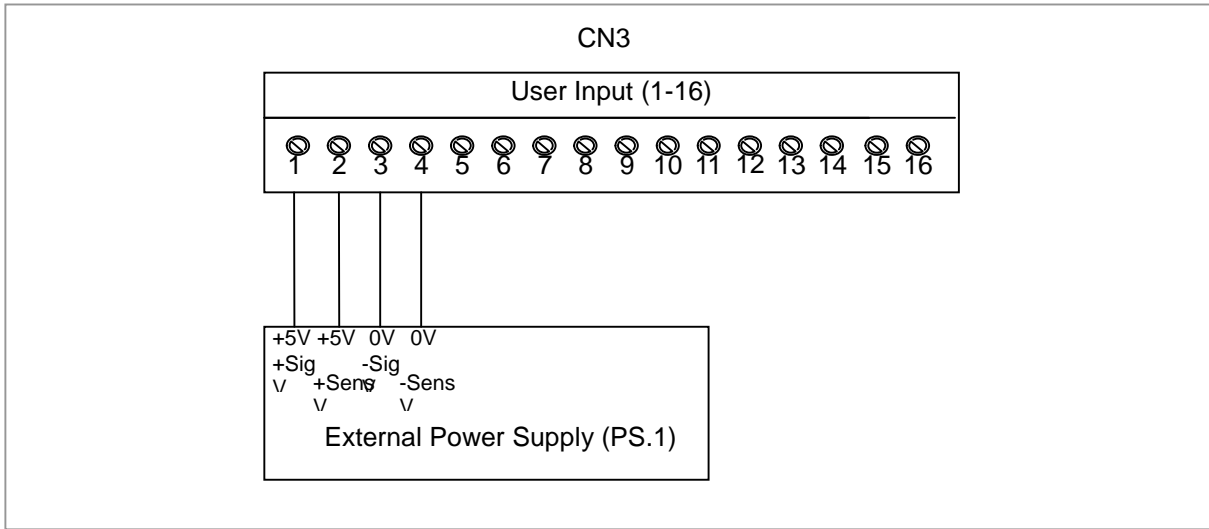
[Fig.1]





**Example of connecting external power supplies**

As shown in Fig.A, the user should connect the external power supplies in the order of PS.1 ~ PS.4.



**Software**

The APT-9411CE/CJ system software supports the PRL-9500G as standard. Prior to use the PRL-9500G, please configure the APT system properly. (Refer to “Option mode setup” in Page 6).

# Specifications

The PRL-9500G bases on our specifications below.

Inport	16 terminals		
Output	16 terminals (Output1~16)	Output 1~4	The external power supplies are output to Bottom probes 1,2 and the flying probes. (Refer to Aux.1)
		Output 5~16	The external power supplies are output to the connector (HS-644-02A) installed on the Tray. (Refer to Aux.2)

(Aux.1) The user cannot output more than two external power supplies for the bottom probe 1,2 at the same time. In addition, it is not possible to select the same external power supplies connected to Output1~4 for the flying probes and the bottom probes.

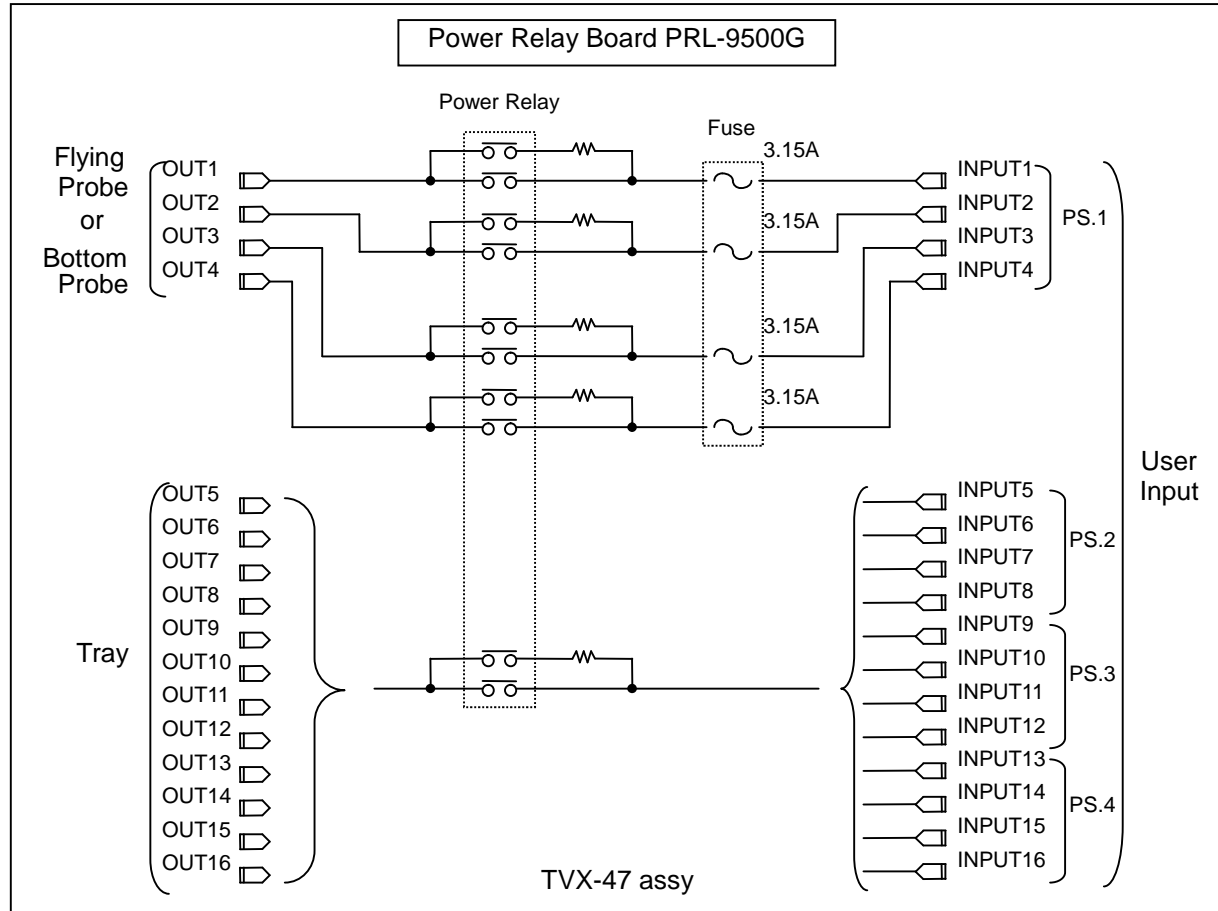
(Aux.2) The wiring from the connector (HS-644-02A) installed on the Tray to the UUT should be prepared by the user.

### Max. rating / circuit

Max. voltage	Inport1~16	DC100V / AC100Vrms
Max. current	Inport1~ 4	Max. 3A (in the case of using the flying probes), with NFB(3.15A)
	Inport5~16	Max. 3A (in the case of using a wire "AWG16") Max. 10A (in the case of using a wire "AWG12")



Max. current differs according to the line thickness between the PRL-9500G and the external power supplies and also the UUT.  
So we invite you to give due consideration to the line thickness listed in above.

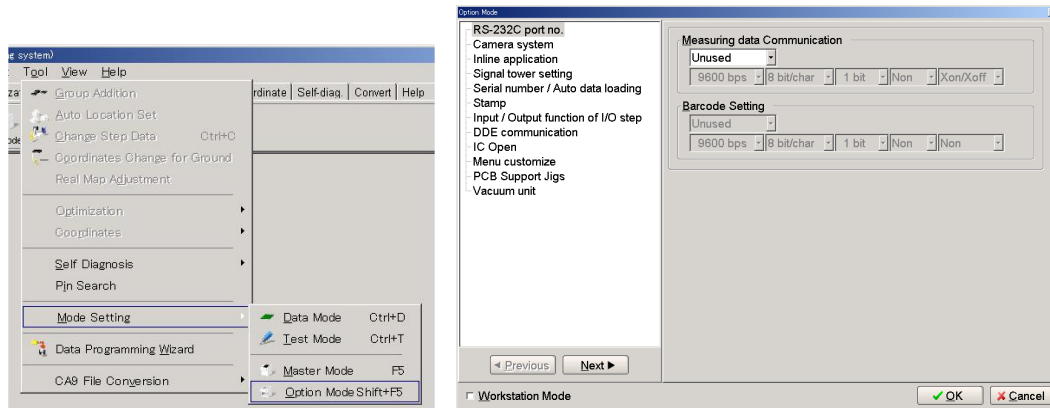


# Option mode setup

When the PRL-9500G is used for the first time, Option mode requires initial setup by the user. This setting will be saved in Master.mdt file in the system directory.

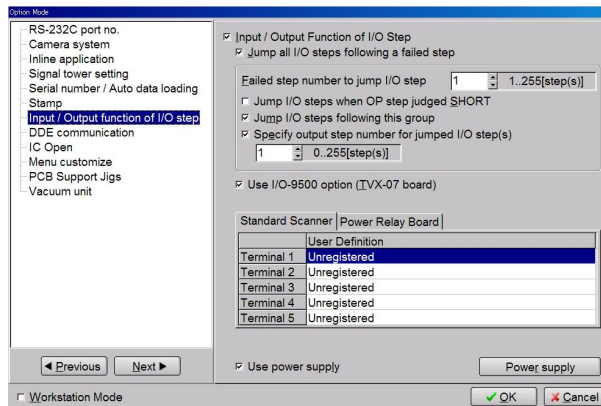
## Setup procedure

1. Choose [Tool] > [Mode Setting] > [Option mode] to open Option mode screen.



[Fig.2] Option mode

2. Click on Input / Output function of I/O step and select the box "Input / Output Function of I/O step".



[Fig.3] Input / Output function of I/O step

3. At this moment, the box "Jump all I/O steps following a failed step" is already selected as default. Be sure to hold this setting because it is preferred for the most users to jump (skip) the I/O steps when some failure was detected in the previous test. In addition, the following parameters affect the treatment of I/O steps following the failed step, so the user must configure them carefully;

### Failed step number to jump I/O step

The I/O steps are not jumped (skipped) until the failed steps reach the specified numbers. But remember this box is specified by "1" as default. If this setting remains unchanged, the I/O steps are jumped (skipped) even if one failure was detected in the previous test.

### Jump I/O steps when OP step judged SHORT

When the Failed step numbers to jump I/O step is specified by other than 1 (let's suppose "10"), the I/O steps are not jumped (skipped) until the failed steps reach the specified numbers. However, if the box "Jump I/O steps when OP step judged SHORT" is selected, the I/O steps are jumped (skipped) if any OP step (Function is substituted by OP) is judged fail even when the failed steps have not reached the specified numbers yet.

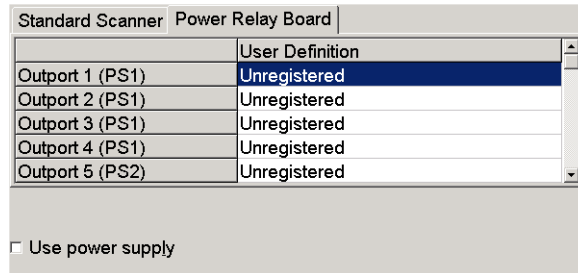
### Jump I/O steps following this group

If the box is selected, the I/O steps to be jumped (skipped) are applied to other groups, not only the group where the failure was detected.

### Use I/O-9500 option (TVX-07 board)

Fill only when IO/O and IO/I command is used. But in this case, the Takaya I/O board (TVX-07) is always necessary.

4. If the TVX-47 PCB was automatically recognized by the software during the tester's start-up process, "Power Relay Board" menu is displayed at the right of the Standard Scanner menu. (Refer to Fig.4) If the Power Relay Board menu is selected, the user can register signal name etc in each Output number (1~16) within max 16 alphameric characters.

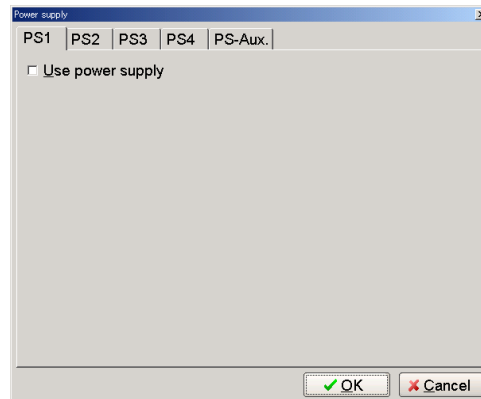


[Fig.4] Power Relay Board

**Use power supply**

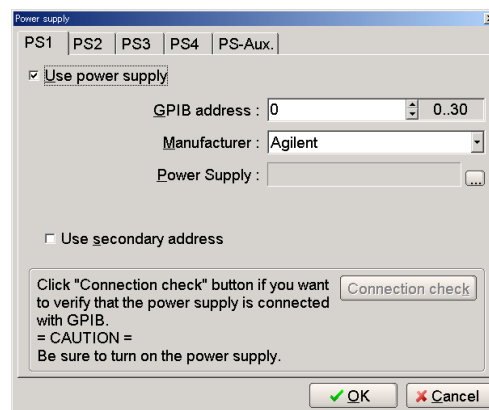
Fill only when the GPIB controllable external power supply is used. In this case, the IO/G command will be utilizable.

If the box is selected and the Power supply button at the right is pressed, it displays Fig.5 below.



[Fig.5] Use power supply

Select appropriate external power supply ("PS-1" to "PS-4" and "PS-Aux") which is connected to the PRL-9500G and select the box "Use power supply" on the display. (Max. 5 external power supplies are controllable by the GPIB) Then the display shows Fig.6 below.



[Fig.6] Use power relay

**GPIB address**

Specify the GPIB address of the external power supply to use. (Refer to the manual for the external power supply)

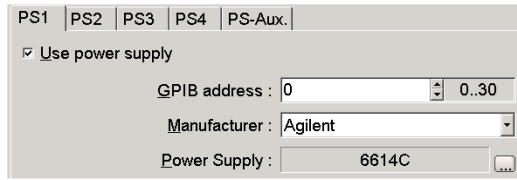
**Manufacturer**

The utilizable GPIB controllable external power supply is Agilent models only.

**Power Supply**

Click the right button to specify the GPIB controllable external power supply automatically.

Fig.7 shows an example of configuration.



[Fig.7] Use power relay

**Use secondary address**

Fill the box only when more than one external power supply shares the GPIB address. In this case, you can specify the secondary address for them.



[Fig.8]

**Connection check button**

Pressing the button can make sure the connection with the external power supplies. If they are connected correctly are controllable by the GPIB, it displays Fig.7 below.



[Fig.9]

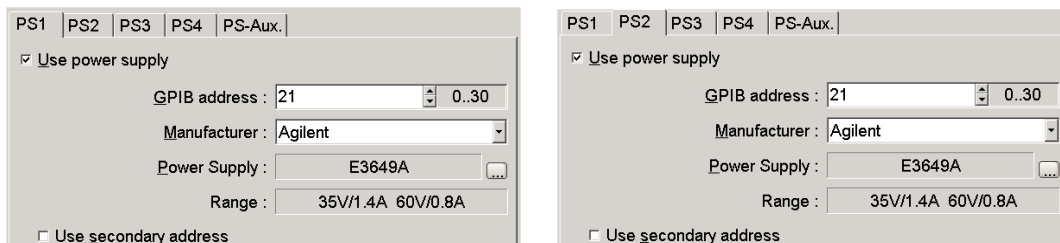
- After the respective setting was complete, click the OK button to get back to the main menu.

**( NOTE 1 )**

When the external power supply is equipped with 2 output ports, it's possible to output voltages separately.

(Example of setting)

Conform the settings for PS1 to PS2 just like below.



Example of setting PS1

[Fig.10]

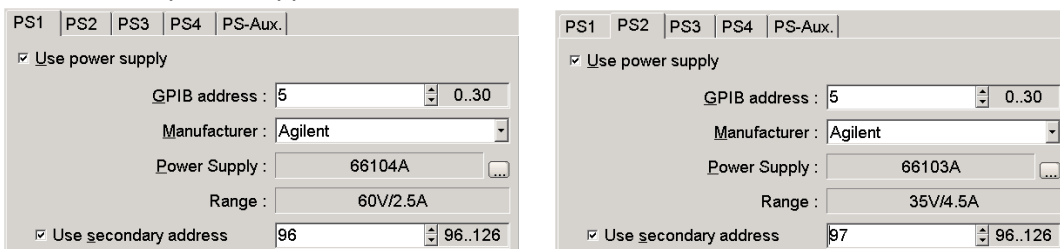
Example of setting PS2

**( NOTE 2 )**

The Agilent 66101A, 66102A, 66103A, 66104A and 66105A are modular type of external power supply. In fact, it's possible to use 8 modular power supplies on the main frame (66000A). Thus the user should configure modular by modular while specifying the secondary address as well.

(Example of setting)

Set the modular power supplies which are installed in Slot#1,2 to PS1, PS2.



Example of setting PS1

[Fig.11]

Example of setting PS2

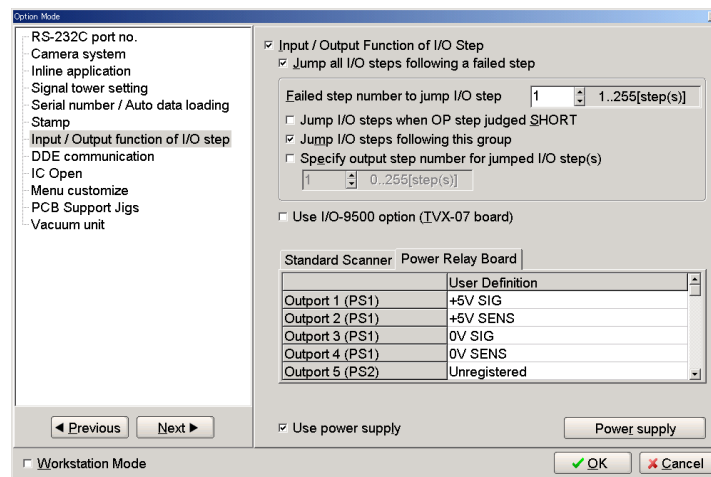
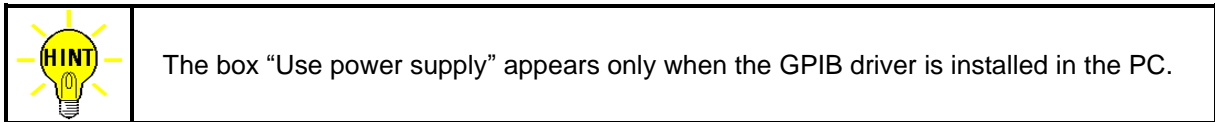
## Preparation for using GPIB controllable external power supplies

### Install GPIB Driver

The user should install a driver for the GPIB interface board. (The GPIB interface board is limited to the product made by National Instruments.)

### Setup Option Mode

The user should select the box “Use power supply” on Input / Output function of I/O step screen in Option mode and configure the GPIB equipment (External power supplies) properly. For details, refer to Page 7.



[Fig.12] Input / Output function of I/O step

### ( NOTE )

The GPIB interface board can be connected on max 14 equipments. In addition, there is limitation to the bus connection;

- \* The total cable length must be shorter than 20m and the number of equipments connected to the GPIB interface board multiplied by 2m.
- \* One cable length must be shorter than 4m.
- \* More than two-thirds equipments must be turned on with rare exceptions.
- \* The equipments should not turn on whenever the APT-9411 software is in operation with rare exceptions.

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# Simple function test

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To implement simple function test, the user should configure the I/O step by specifying I/O command, time and probe to apply signal and the applied voltage so on. Once the I/O step gets executed, the PRL-9500G applies voltage to the UUT in accordance with the established conditions.

There are two ways of configuring the I/O steps;

## 1. I/O Function (Step edit list > Tool > I/O Function)

On the I/O Function screen, the user should select appropriate I/O command (IO/W, IO/X, or IO/G) in accordance with the intended use. The limitation of applying voltage and the measuring contents vary depending on the I/O commands. The user should understand the specification and the property of each I/O command in that way.



I/O command	General application
<b>IO/W</b>	The IO/W command enables to power up the UUT with the external power supplies to measure multiple steps in series. The user cannot set the flying probe to apply voltage in this case.
<b>IO/X</b>	The IO/X command enables to power up the UUT with the external power supplies to measure the specified two points by the flying probes at the same time. The flying probes are able to apply voltage in this case. After the test finished, the voltage to the UUT will be terminated automatically.
<b>IO/G</b>	The IO/G command enables to control the external power supplies (Voltage / Current / Output ON/OFF) via GPIB.

## 2. Viewable Setup of Function steps (Step edit list > Tool > Viewable Setup of Function steps)

The user doesn't have to select I/O command in accordance with the intended use, but he can use the mouse to simply specify necessary connection on a graphic setup screen. The user can recognize the reality of whole connection with ease.



## Basic precautions of I/O steps

 WARNING	<b>The I/O step may cause serious damage to the PC boards and/or the measuring unit if the user misuses it (ex. wrong location, polarity so on). The use of the I/O commands must be carried out under the responsibility of the user.</b>
 CAUTION	<b>Mentioned below are very important things to know. Be sure to read through them to fully understand in advance.</b>

1. If other than DC-VM mode is used while the PCB is applied with the specified voltage, from time to time it shows "The PCB is charged with high voltage!" on the display. In this case, the user should change to DC-VM mode or set "JP".
2. The I/O steps must follow the normal RCLD measurement steps. In addition, be sure to select the box "Jump all I/O steps following a failed step" on the Select Input / Output function of I/O step screen in Option mode. With this, the user can prevent any I/O step following the fail step from execution.
3. In case of Point system, the maximum pin numbers is limited to 3,200.
4. The I/O command is not available in case of the following tests:
  - n Optical steps
  - n Combination test steps
  - n Special generation steps ("CM-x" in Aux. filed )
  - n IC Open test steps ("ICOP" in Aux. filed)
  - n Coordinates revision steps
  - n Kelvin measurement steps ("Kel." in Aux. filed)
  - n ZD (Zener diode) steps
  - n Digital transistor steps ("DGTR" in Aux. filed)
  - n FET steps ("FET" in Aux. filed )
  - n Pattern open check test ("PT-x" in Aux. filed)
  - n Photo coupler steps ("PC" in Aux. filed)
  - n Zone set steps ("ZONE" in Aux. filed)
5. The I/O steps aren't supported by Coordinates Sort function. If executed, it shows an error of "No execution possible due to I/O step existed!" on the display.
6. The I/O steps aren't supported by Combination measurements.
7. If the I/O step is released, all other than "Parts", "Value" and "Comment" column are initialized and put back to the normal step.
8. If the test program is converted to APT-8000 series, the I/O steps are released. Means, all other than "Parts", "Value" and "Comment" column are initialized and put back to the normal step.
9. The reference value of the I/O steps cannot be input automatically during the Reference Value Input function. The user should input the reference value in the Step Review menu.
10. The Data Average function is unable to apply the voltage at the I/O steps. In addition, neither the voltage nor the current is averaged.
11. The Reference Value Generation function does not create the reference value of the I/O steps.
12. Location name of the I/O steps is not changeable at Change Step Data function.
13. Location name of the I/O steps is not changeable at Group Addition function.
14. Location name of the I/O steps is not changeable at Auto Location Set function.
15. The Fail retry test isn't performed.

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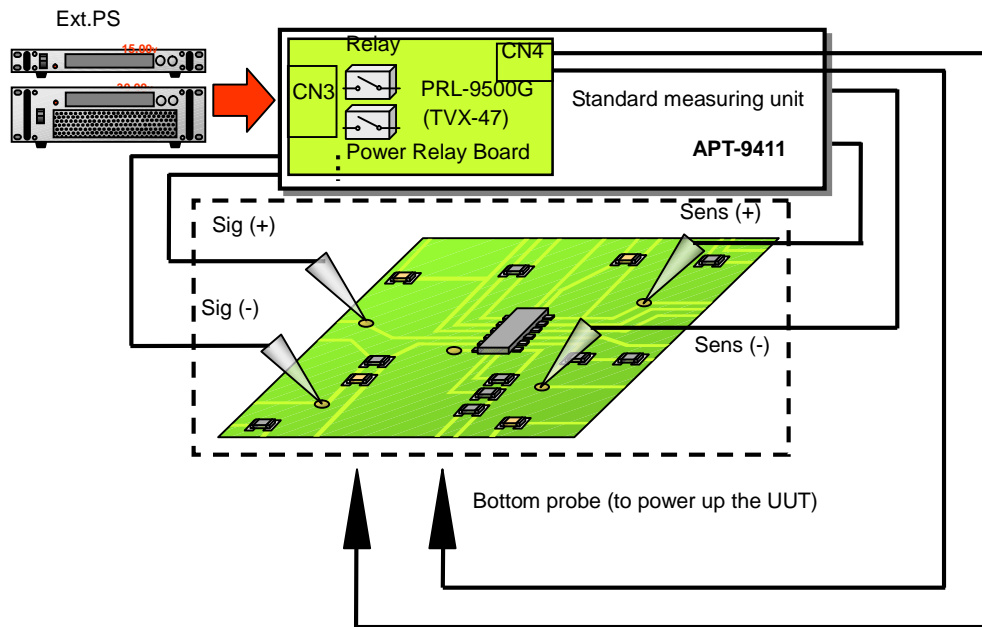
# I/O Function

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This chapter describes the procedures to generate I/O steps (basic data programming and reference input) using the I/O Function screen.

## IO/W Command

The IO/W command enables to power up the UUT with the external power supplies to measure multiple steps in series.



[Fig.13] IO/W

### Basic knowledge of IO/W step

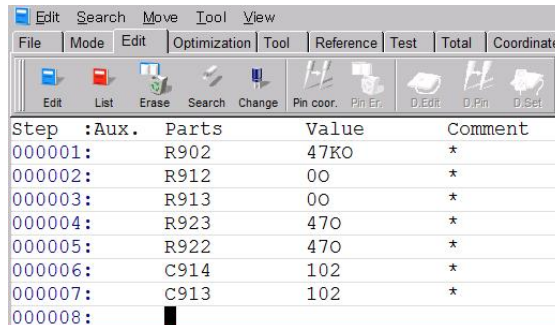
1. The user can select the bottom probes and some connectors at the PCB Tray to power up the UUT. (It's not possible to use the flying probes)
2. Listed below are conditions to halt the voltage output:
  - \* It executed OFF step at the IO/W step.
  - \* The test finished.
  - \* It executed the step using the bottom probes. (Only Output 1-4 halt the voltage output)
  - \* It executed any of IO/M, IO/T, IO/V, IO/C, IO/U or IO/X step.
3. If the step using the bottom probes is changed to IO/W step, the original bottom probe settings will be initialized.
4. Listed below are the means to power up the UUT.
  - \* Output 1~4 use the bottom probe 1,2.
  - \* Output 5~16 are output to the connector (HS-644-02A) installed on the Tray. The wiring from the connector (HS-644-02A) to the UUT should be prepared by the user.

## I/O step generation

The way of programming I/O steps is the same between Point system and Teaching system.

### Howe to apply voltage

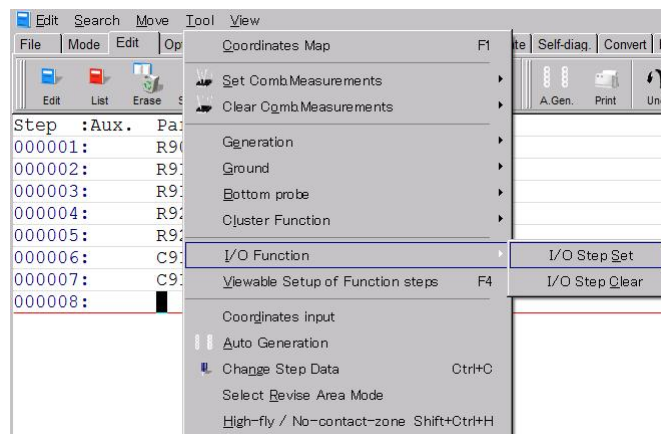
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.14)



Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

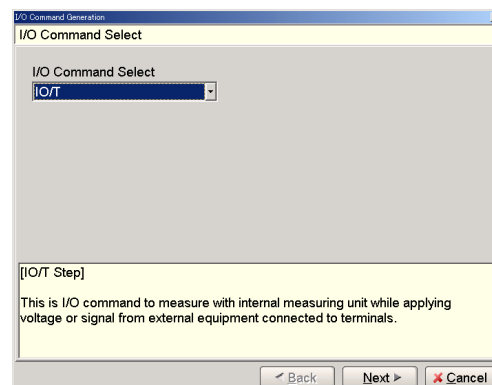
[Fig.14] Step edit list

4. Move to Tool > I/O function and click on “I/O Step Set”. (Refer to Fig.15)



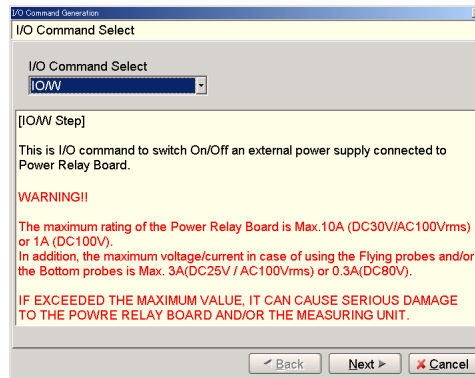
[Fig.15] I/O Function > I/O Step Set

5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays I/O Command Select screen. (Refer to Fig.16)



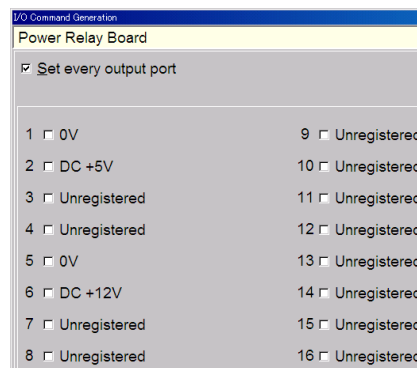
[Fig.16] I/O Command Select

7. Select "IO/W" from the right pull-down menu, and it will display Fig.17.



[Fig.17] I/O Command Select

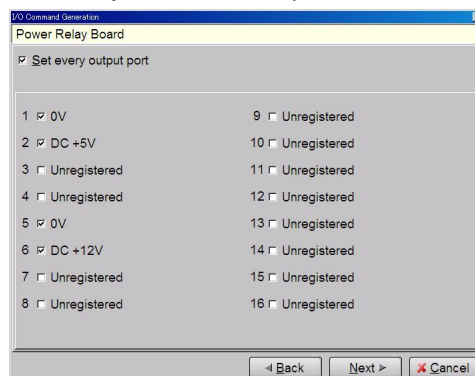
8. Click on the Next button, and it will displays Fig.18




[Fig.18] Power Relay Board

Signal name (ex. DC +5V) on Fig.18 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) "Unregistered" means that signal name is not registered yet.

Select the box of Signal name that you want to output and click on the Next button.

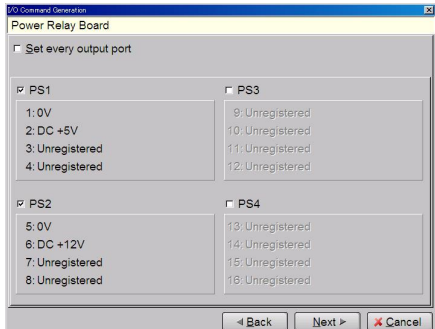


[Fig.19] Power Relay Board



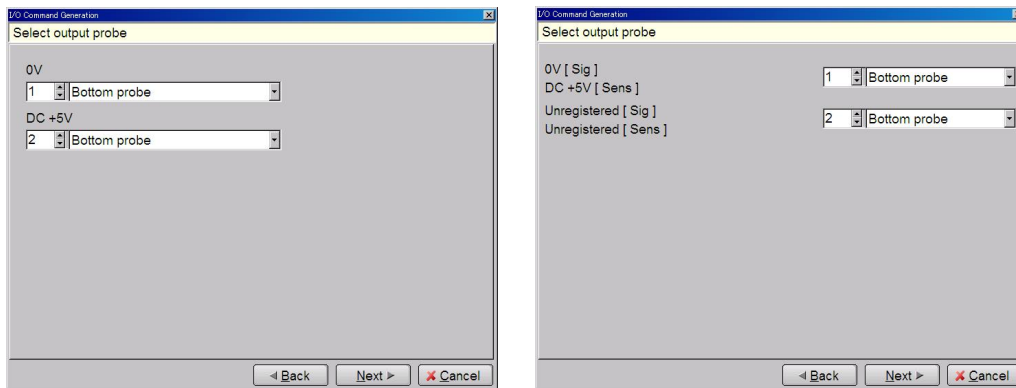
**HINT**

If the check box "Set every output port" is cleared, it becomes possible to set every external power supplies (PS1 ~ PS4). This is done when the external power supplies are four-terminal connection type. (Refer to Fig.20)



[Fig.20] Power Relay Board

9. It displays the selection screen (Fig.21) where the use can specify the output of the voltage. Fig.21 appears when any of 1 ~ 4 or PS1 was specified at Process (8) above. Specify the output of 0V and DC+5V from the bottom probes and click on the Next button.



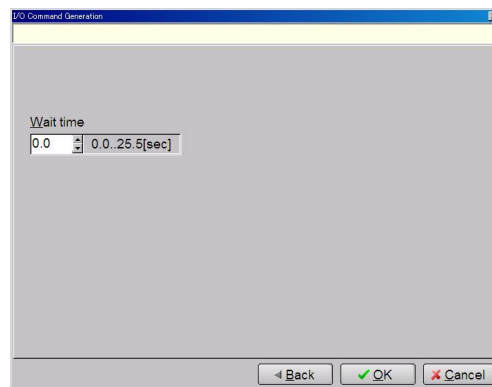
When the box “Set every output port” is selected [Fig.21] Select output probe

In the case of Fig.19, the output of “1(0V)” and “2(DC+5V)” is the bottom probes, but the output of “5(0V)” and “6(DC+12V)” is Output 5 and 6 of the connector at the Tray. In the case of Fig.20, the output of “PS1” is the bottom probes, but the output of “PS2” is Output 5 and 7 of the connector at the Tray.

The external power supplies are connected to the PRL-9500G with four-terminal connection but the output is two-terminal connection. In the case of PS1 in Fig.20, both [1] and [2] are output to one bottom probe and both [3] and [4] are to another bottom probe.

When other than 1 ~ 4 or PS1 was specified at Process (8) above, Fig.22 will be displayed.

10. It displays another screen for Wait time setting (0.0sec ~ 25.5sec). After specified the Wait time, click on the OK button.



[Fig.22] Wait time setting

11. It goes back to the Step Edit (or Step List). (Refer to Fig.23)

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc	EL	F.	+%	-%
000001:		R902	47KO	11	15	*	*	R	**	10	10
000002:		R912	00	3	10	*	*	R	**	10	10
000003:		R913	00	4	6	*	*	R	**	10	10
000004:		R923	47O	11	10	*	*	R	**	10	10
000005:		R922	47O	8	3	*	*	R	**	10	10
000006:		C914	102	7	6	*	*	C	**	30	30
000007:		C913	102	5	10	*	*	C	**	30	30
000008:	IO/W	&h3300	ON/W	*	*	*	IO/W	*	**	10	10

[Fig.23] Step edit list

[AUX.] column is substituted by IO/W and [Loc] column is also by IO/W.

[Parts] column is substituted by the Output number specified in Process (8).

[Value] column is substituted by ON/W. (ON/W means the step to start applying voltage)

12. The use should configure the measurement step next to the IO/W step (Step 00008).

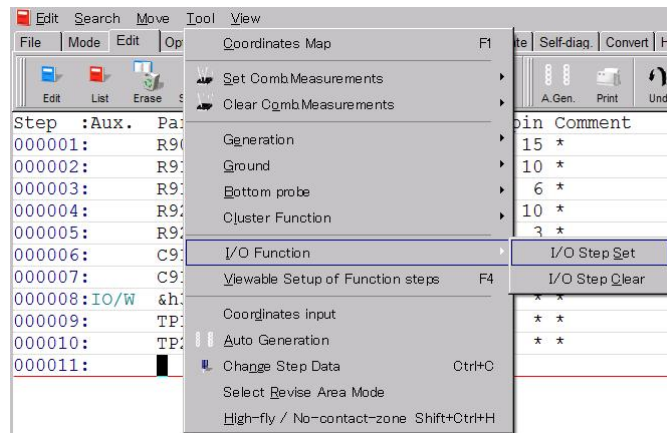
## How to terminate voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to enter the number of the step where you set the output to terminate and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.24)

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc	EL
000001:		R902	47K0	11	15	*	*	R
000002:		R912	00	3	10	*	*	R
000003:		R913	00	4	6	*	*	R
000004:		R923	470	11	10	*	*	R
000005:		R922	470	8	3	*	*	R
000006:		C914	102	7	6	*	*	C
000007:		C913	102	5	10	*	*	C
000008:	IO/W	&h3300	ON/W	*	*	*	IO/W	*
000009:		TP1-GND	3.3V	*	*	*	*	*
000010:		TP2-GND	5.0V	*	*	*	*	*
000011:								

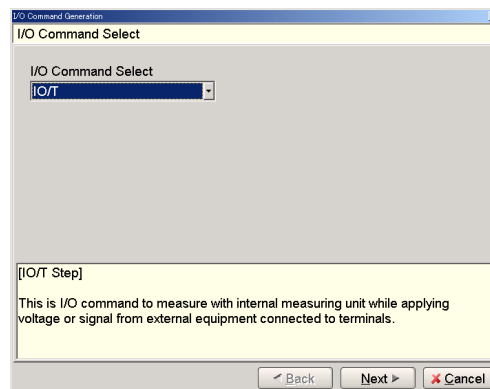
[Fig.24] Step edit list

4. Move to Tool > I/O function and click on “I/O Step Set”. (Refer to Fig.25)



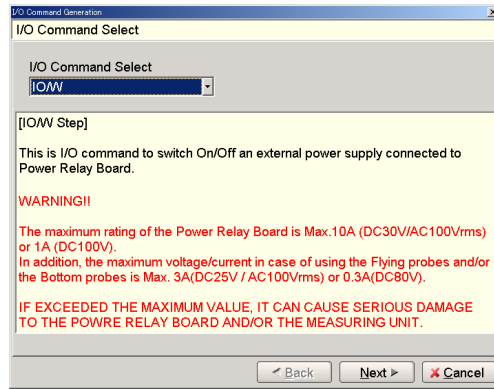
[Fig.25] I/O Function > I/O Step Set

5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays I/O Command Select screen. (Refer to Fig.26)



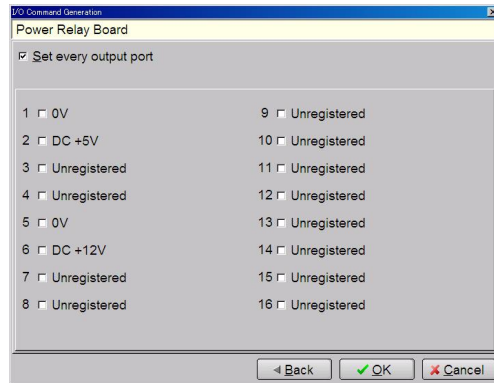
[Fig.26] I/O Command Select

- Select "IO/W" from the right pull-down menu and click on the Next button. (Refer to Fig.27)



[Fig.27] I/O Command Select

- It displays Fig.28.



[Fig.28] Power Relay Board

- Do not select any check box for Outport and click on [OK] button.
- It goes back to the Step edit list. It shows "OFF" in [Value] column on the list.

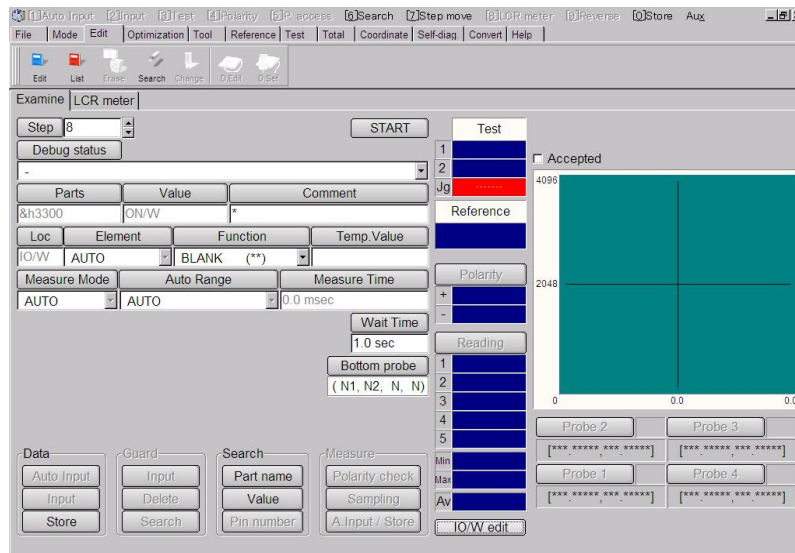
Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc	EL
000001:		R902	47KO	11	15	*	*	R
000002:		R912	00	3	10	*	*	R
000003:		R913	00	4	6	*	*	R
000004:		R923	470	11	10	*	*	R
000005:		R922	470	8	3	*	*	R
000006:		C914	102	7	6	*	*	C
000007:		C913	102	5	10	*	*	C
000008:	IO/W	&h3300	ON/W	*	*	*	IO/W	*
000009:		TP1-GND	3.3V	*	*	*	*	*
000010:		TP2-GND	5.0V	*	*	*	*	*
000011:	IO/W	&h0000	OFF	*	*	*	IO/W	*

[Fig.29] Step edit list



## IO/W step at Step data review

The IO/W command step is displayed on the Step Review menu as follows. Here the user can change the Output and Wait time as they want.



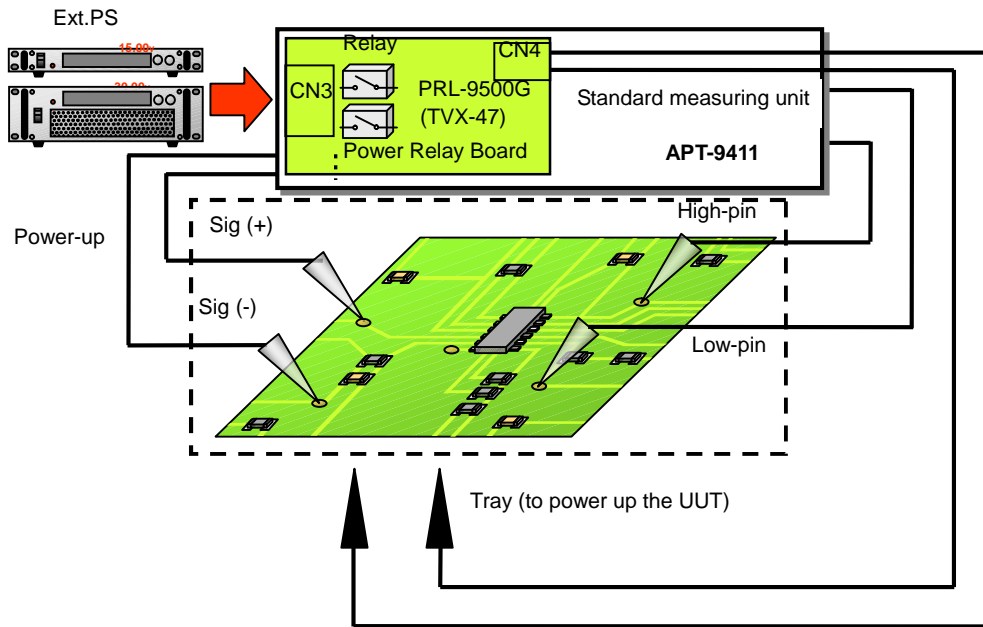
[Fig.30] Step data review

- 1) Parts (Not editable)  
Parts column is substituted by "&h0C00" as an example. This display differs according to the specified Output.
- 2) Value (Not editable)  
Value column is substituted by "ON/W" when it is the step to power up the UUT and is substituted by "OFF" when it is the step to terminate.
- 3) Comment  
Comment column is substituted by information on the contents of test.
- 4) Loc. (Not editable)  
Loc. Column is substituted by I/O command.
- 5) Element (Not editable)
- 6) Function  
Asterisk ( \* ) indicates the step will be executed but JP indicates the step won't be executed.
- 7) Temp. value (Unused)
- 8) Measure Mode (Unused)
- 9) Measure Range (Unused)
- 10) Measure Time (Unused)
- 11) Wait Time  
Wait Time indicates the time from applying voltage to start moving the next step.
- 12) Bottom Probe  
Bottom probe to access the test;  
N1 --> Bottom probe 1 is used  
N2 --> Bottom probe 2 is used  
N --> Unused  
N --> Unused
- 13) IOW edit  
The user can change the Output and the Wait time.



## IO/X Command

The IO/X command enables to power up the UUT with the external power supplies to measure the specified two points by the flying probes at the same time.



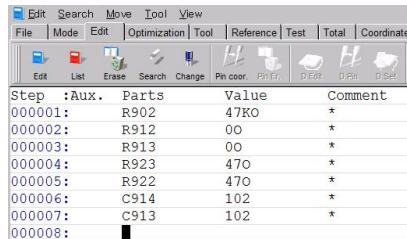
[Fig.31] IO/X

### Basic knowledge of IO/X step

1. The user can select the flying probes and the bottom probes to power up the UUT. (It's not allowed to use more than two flying probes in this case)
2. When more than one external power supply are applied to the UUT, it's not possible to use the flying probes and the bottom probes at the same time. So if the flying probes are used, the user has to select the connector at the Tray.
3. It's the flying probes that the user can select to measure the UUT.
4. No guard point is available to use.
5. Loc column at the IO/X step is substituted by "IO/X" automatically.

## IO/X step generation

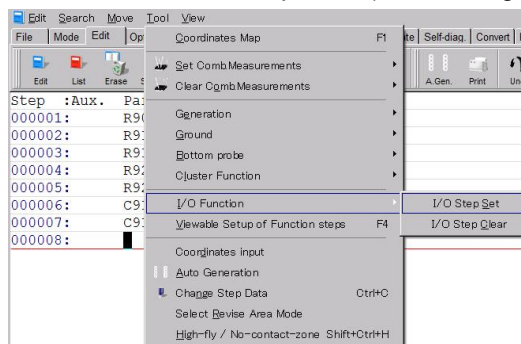
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.32)



Step	Aux.	Parts	Value	Comment
000001:		R902	47K0	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

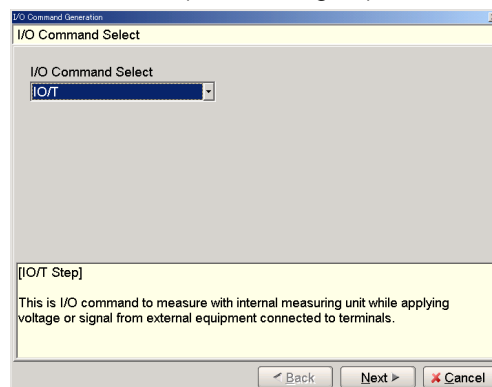
[Fig.32] Step edit list

4. Move to Tool > I/O function and click on “I/O Step Set”. (Refer to Fig.33)



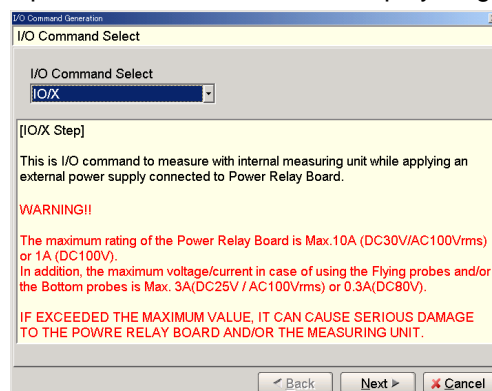
[Fig.33] I/O Function > I/O Step Set

5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays I/O Command Select screen. (Refer to Fig.34)



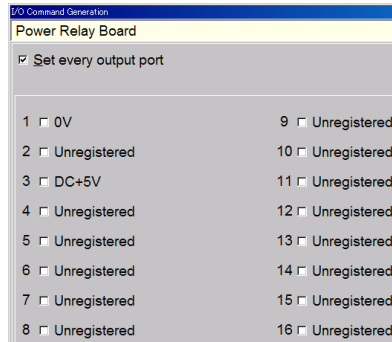
[Fig.34] I/O Command Select

7. Select “IO/X” from the right pull-down menu, and it will displays Fig.35.



[Fig.35] I/O Command Select

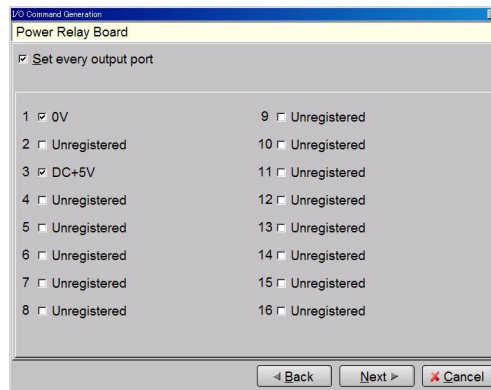
8. Click the Next button, and it will display Fig.36.



[Fig.36] Power Relay Board

Signal name (ex. DC +5V) on Fig.36 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) “Unregistered” means that signal name is not registered yet.

Select the box of Signal name that you want to output and click on the Next button.



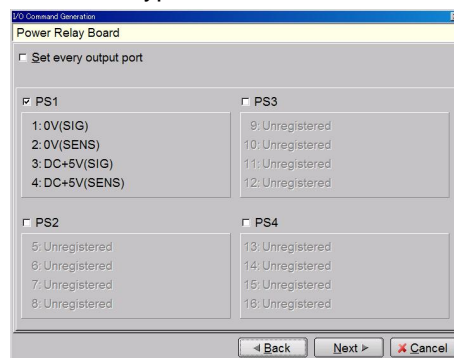
[Fig.37] Power Relay Board



For Output 1~4 above, more than three are not assignable at the same time.

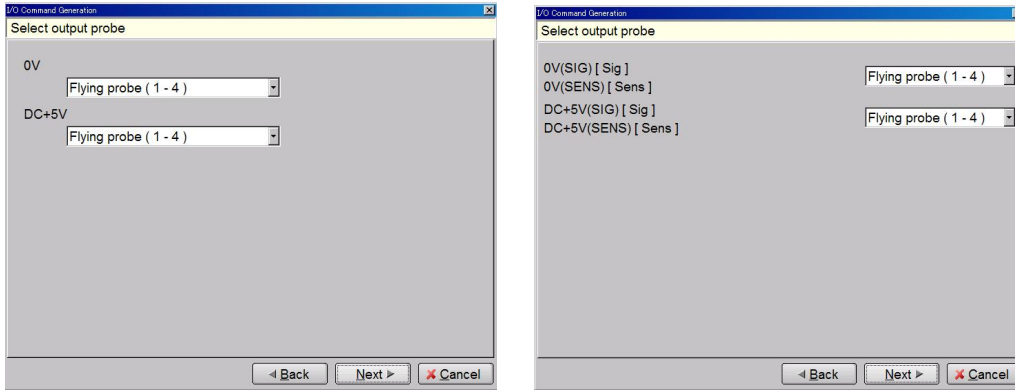


If the check box “Set every output port” is cleared, it becomes possible to set every external power supplies (PS1 ~ PS4). This is done when the external power supplies are four-terminal connection type.



[Fig.38] Power Relay Board

9. When 1 ~ 4 or PS1 was specified at Process 8 above, Fig.39 will be displayed. The user can select the output from the flying probes and the bottom probes. In the case of the flying probes, it's not possible to assign which probe (Probe 1,2,3,4) are to use. The APT software determines it automatically when the coordinates are entered.

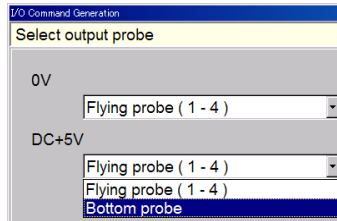


When "Set every output port" is selected

When "Set every output port" is cleared

[Fig.39]

Click the right pull-down menu at Flying probe (1-4), and it will display another screen where the user can select the output. (Refer to Fig.40)



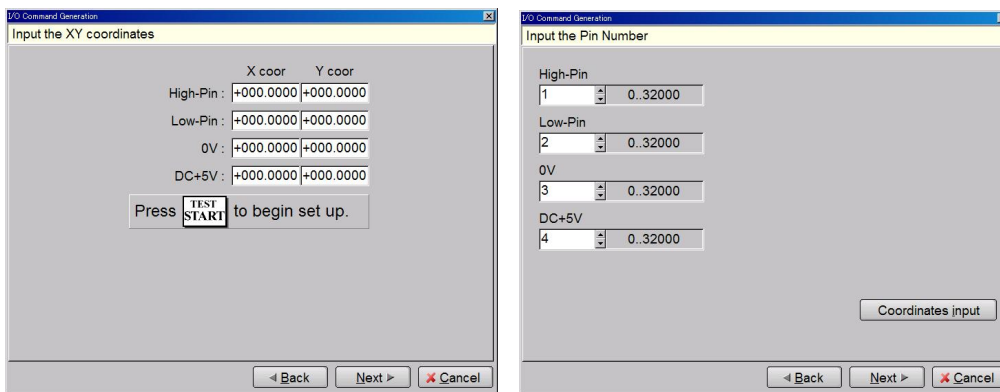
[Fig.40] Select output probe

When other than 1 ~ 4 or PS1 was specified at Process 8 above, Fig.41 will be displayed instead of Fig.39.

In the case of Fig.37, the output of "1(0V)" and "2(DC+5V)" is the flying probes and the bottom probes, but the output of "5(0V)" and "6(DC+12V)" is Output 5 and 6 of the connector at the Tray. In the case of Fig.38, the output of "PS1" is the flying probes and the bottom probes, but the output of "PS2" is Output 5 and 7 of the connector at the Tray.

The external power supplies are connected to the PRL-9500G with four-terminal connection but the output is two-terminal connection. In the case of PS1 in Fig.38, both [1] and [2] are output to one probe and both [3] and [4] are to another probe.

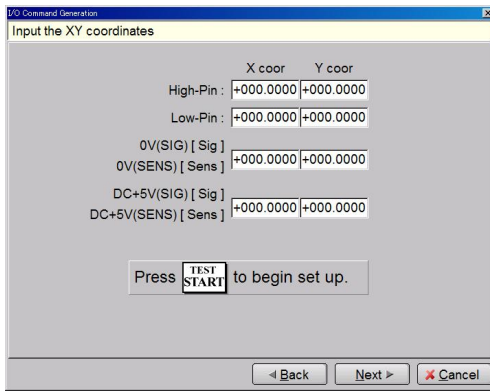
10. After the output was selected, click the Next button to move to the next screen.



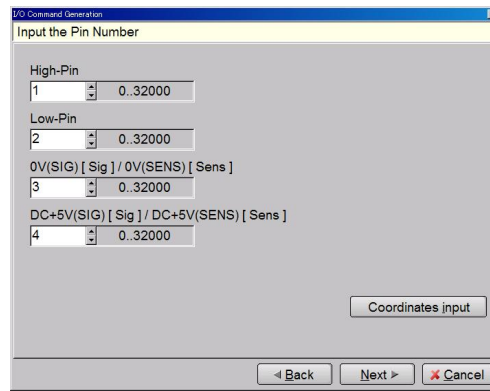
(Teaching system)

(Point system)

[Fig.41] When "Set every output port" is selected



(Teaching system)



(Point system)

[Fig.42] When "Set every output port" is cleared

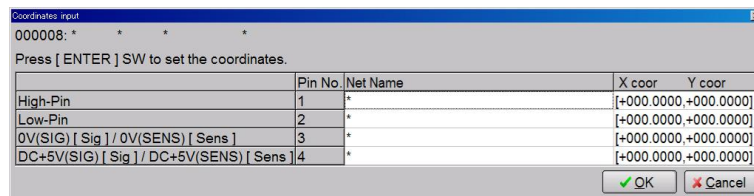
In the case of Teaching system (the left screens of Fig.41 and Fig.42), High-pin and Low-pin must be substituted by the coordinates where performs the measurement. "0V" and "DC+5V" must be substituted by the coordinates where +5V is applied to.

In the case of Point system (the right screens of Fig.41 and Fig.42), High-pin and Low-pin must be substituted by the pin numbers which performs the measurement. "0V" and "DC+5V" must be substituted by the pin numbers where +5V is applied to.

After the coordinates was entered, click the Next button.

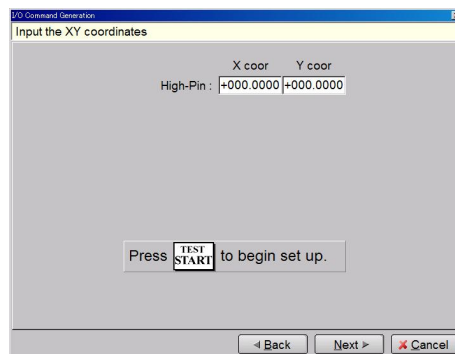
As far as Point system concerns;

- ※ When pin number was newly added, click on the "Coordinate Input" button on the screen to get another screen (see Fig.43) which allows you to input the coordinates for the new pin number added.



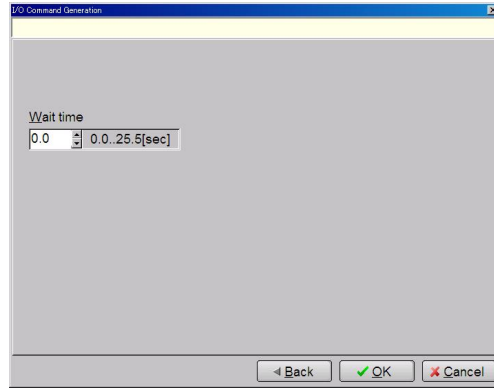
[Fig.43]

- ※ In Fig.41 above, enter "0" as the pin number and click the Next button, and it will display the Coordinate input screen for the pin number "0". In this case, the user can enter the coordinates just like the case of Point system.



[Fig.44]

11. It displays another screen for Wait time setting (0.0sec ~ 25.5sec). After specified the Wait time, click on the OK button.



[Fig.45] Wait time setting

12. It goes back to the Step edit list. (Refer to Fig.46)  
 [AUX.] column is substituted by IO/X and [Loc] column is also by IO/X.  
 [Comment] column is substituted by the specified Outport number.

Step	:Aux.	Parts	Value	Comment		
000001:		R902	47KO	*		
000002:		R912	00	*		
000003:		R913	00	*		
000004:		R923	470	*		
000005:		R922	470	*		
000006:		C914	102	*		
000007:		C913	102	*		
000008:	IO/X	*	*	&h3FC0		

(Teaching system)

Step	:Aux.	Parts	Value	Comment	H-pin	L-pin
000001:		R902	47KO	*	11	15
000002:		R912	00	*	3	10
000003:		R913	00	*	4	6
000004:		R923	470	*	11	10
000005:		R922	470	*	8	3
000006:		C914	102	*	7	6
000007:		C913	102	*	5	10
000008:	IO/X	*	*	&h3FC0	2	3

(Point system)

[Fig.46] Step edit list

As shown in Fig.47, it will be useful to input any information on the test contents in the column "Parts" and "Value".

Step	:Aux.	Parts	Value	Comment		
000001:		R902	47KO	*		
000002:		R912	00	*		
000003:		R913	00	*		
000004:		R923	470	*		
000005:		R922	470	*		
000006:		C914	102	*		
000007:		C913	102	*		
000008:	IO/X	POWER	IN	&h3FC0		

(Teaching system)

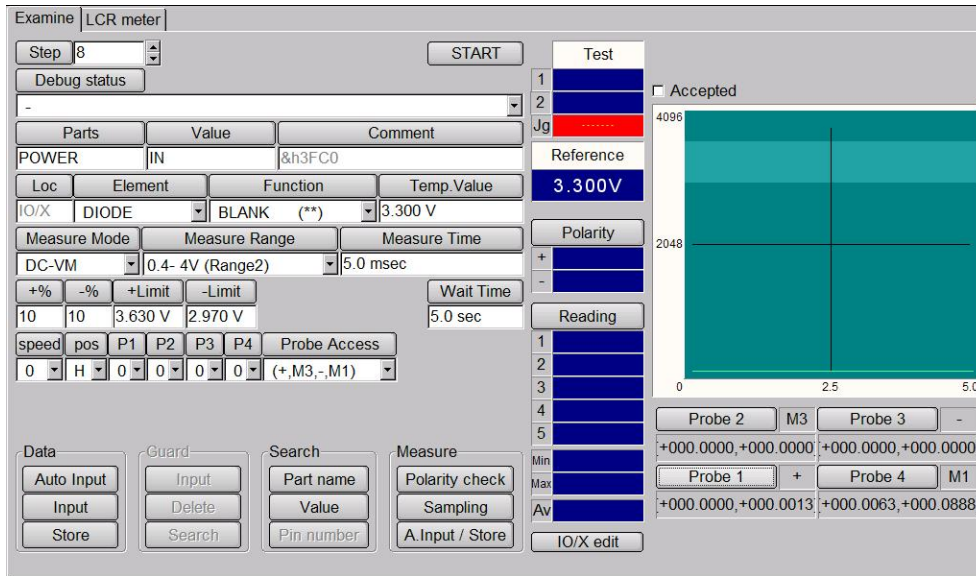
Step	:Aux.	Parts	Value	Comment	H-pin	L-pin
000001:		R902	47KO	*	11	15
000002:		R912	00	*	3	10
000003:		R913	00	*	4	6
000004:		R923	470	*	11	10
000005:		R922	470	*	8	3
000006:		C914	102	*	7	6
000007:		C913	102	*	5	10
000008:	IO/X	POWER	IN	&h3FC0	2	3

(Point system)

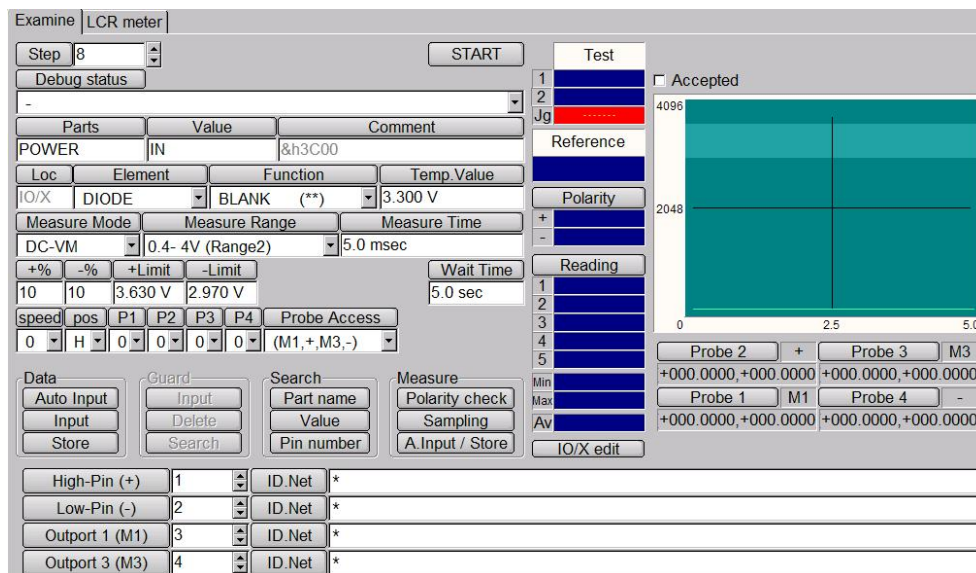
[Fig.47] Step edit list

## IO/X step at Step data review

The IO/X command step is displayed on the Step Review menu as follows. Here the user should input the reference value or change Wait time and Outport number with extreme care.



[Fig.48] Step data review (Teaching system)

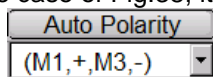


[Fig.49] Step data review (Point system)



- 1) Parts  
Parts column is substituted by information on the contents of test.
- 2) Value  
Value column is substituted by information on the contents of test.
- 3) Comment  
Comment column is substituted by "h0C00" as an example. This display differs according to the specified Output.
- 4) Loc. (Not editable)  
Loc. Column is substituted by I/O command.
- 5) Element  
Element column is substituted by type of component to be measured.  
RESISTOR --> Resistors  
CAPACITOR --> Capacitors  
COIL --> Inductors  
DIODE --> VF measurement / DC voltage measurement
- 6) Function  
Function column is substituted by the Measuring function.
- 7) Temp. value  
Temp. value column is substituted by the value obtained by pressing Input and Auto Input key and is changeable within the same Measuring mode and Measuring range. The Save button can register it as the Reference value.
- 8) Measure Mode  
Measure Mode column is substituted by the measuring signal.
- 9) Measure Range  
Measure Range column is substituted by the Measuring range.
- 10) Measure Time  
Measure Time column is substituted by the Measuring time (1~999msec).
- 11) [%][-%]  
Upper and lower tolerance ratio to the Reference value are shown there.  
In addition, [+Limit][-Limit] will be increased or decreased in sync with the change of these value.
- 12) [+Limit][-Limit]  
Upper and lower tolerance to the Reference value are shown there.  
In addition, [%][-%] will be increased or decreased in sync with the change of these value.
- 13) Wait Time  
Wait Time indicates the time from applying voltage to start moving the next step.
- 14) Probe access (Auto Polarity)  
Probe access information. Probe 1,2,3,4 is meant from the left.  
+ --> Probe to apply the measuring signal (+)  
- --> Probe to apply the measuring signal (-)  
M1 --> Output number assigned in Fig.37  
M3 --> Output number assigned in Fig.37

In the case of Fig.38, it will be shown as follows.



[ Fig.50 ]


- 15) IO/X edit  
The user can change the Output and the Wait time.
- 16) Pin number (Point system only. Refer to Fig.49)  
Here displays the Pin number of H-pin(High Pin, L-pin(Low Pin), G-P1(Guard Pin1) or G-P2(Guard Pin2). Information on the net name is also displays.




## Reference input

When the user is going to measure the UUT while applying voltage, they should specify both Element and Measuring mode. When RESISTOR, CAPACITOR or COIL is set to the Element, the user should specify the Measuring mode to "AUTO" and click the Auto Input button to input the reference value. The Temp. Value column displays the measured value. The user should change Function and/or Measure Time as needed. Clicking the Store button can save the Temp. Value to the Reference value.

When the user is going to specify DIODE to the Element to perform the VF measurement, the Measuring mode should be set to DC-CC. In addition, when the DC voltage is measured, the Measuring mode should be set to DC-VM. The user should click the Input button to input the Reference value. The Temp. Value column displays the measured value. Clicking the Store button can save the Temp. Value to the Reference value.

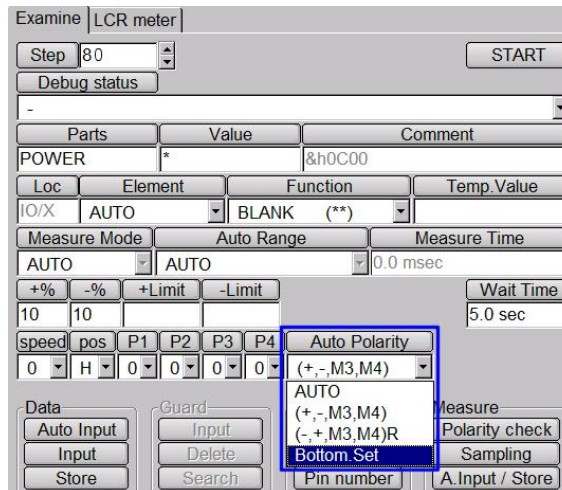
 <b>WARNING</b>	<p><b>This function is used to power up the board to test. And so it may cause serious damage to the PC boards and/or the measuring unit if the user misuses it (ex. wrong location, Output so on). The use of the I/O commands must be carried out under the responsibility of the user.</b></p>
---	---

	<p>When you are going to measure DC voltage, be sure to click the Input button to input the reference value. If the Auto Input button is clicked without due care, the Measuring mode will be initialized and any unexpected Measuring mode will be used to input the reference value.</p> <p>When you try to use other than DC-VM mode while applying voltage to the UUT, sometimes it shows the error "The PCB is charged with high voltage!" on the display. It means, you cannot use other than DC-VM mode.</p>
---	---

## Change to Bottom probes

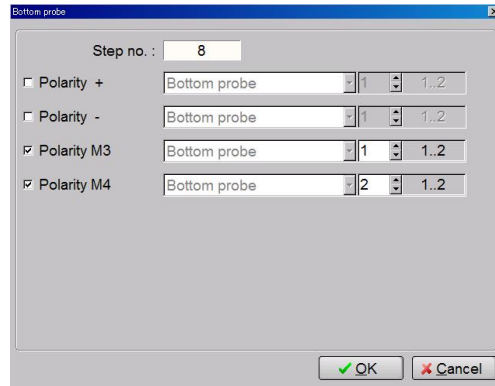
The user should assign the bottom probes to access the test before the reference input is performed. When Output 1~4 are selected in Fig.18, Bottom probe 1,2 are assigned to use in the test.

1. Select "Bottom. Set" from the right pull-down menu of Probe Access. (Refer to Fig.51)



[ Fig.51 ] Probe Access

- It displays the Bottom probe setting screen. (Refer to Fig.52)

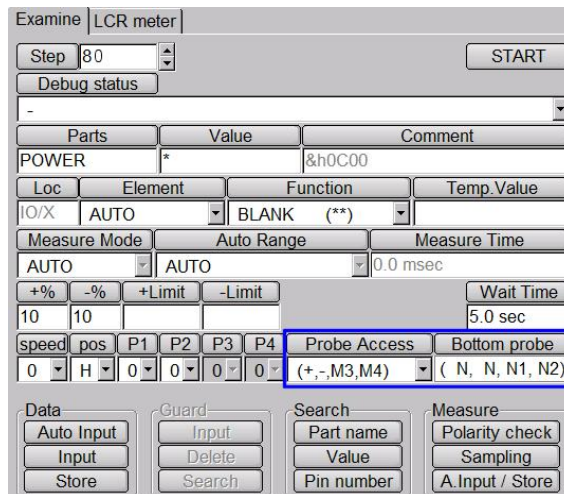


[ Fig.52 ] Bottom probe setting

- Polarity + --> Probe to apply the measuring signal (+)
- Polarity - --> Probe to apply the measuring signal (-)
- Polarity M3 --> Apply voltage connected to Output 3
- Polarity M4 --> Apply voltage connected to Output 4

Check the box of probe you want to change to the bottom probe and select the bottom probe number and click the OK button.

- The display goes back to the Step data review where newly indicates “Bottom probe” at the right of the Probe Access. (Refer to Fig.53)



[ Fig.53 ] Bottom probe setting

[ Bottom probe ]

- N --> unused
- N --> unused
- N1 --> use Bottom probe 1
- N2 --> use Bottom probe 2

Fig.53 indicates that the bottom probe 1,2 will be used to apply the voltage connected to Output 3,4 and the flying probe 1,2 will be used to measure the output. (The flying probe 3,4 will be unused)

## IO/G command

The IO/G command enables to control the external power supplies (Voltage / Current / Output ON/OFF) via GPIB and connect the specified voltage and current to the PRL-9500G to output to the flying probes or the bottom probes.

The GPIB controllable external power supply is Max 5.

For instance, the IO/G command is used for the following examples:

1. It's used to just control the external power supplies (Voltage / Current / Output ON/OFF) without using the PRL-9500G. (The user must think of the way of applying voltage to the UUT)

For example, it's possible to apply voltage from the external power supply via GPIB and apply another voltage through the PRL-9500G at the next step. (This is the case the user wants to apply more than one power supply to the UUT at the interval of time.)

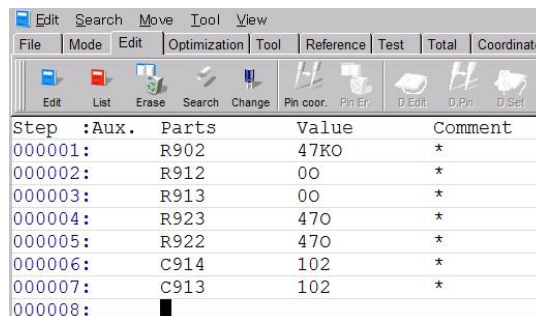
2. It's used to control the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the bottom probes or the connector at the Tray. Therefore, more than one step will be measured until the step to terminate the output is executed.
3. It's used to control the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the flying probes. The measurement is performed by the APT-9411. After the step finished applying voltage through the flying probes, the output to the UUT will be terminated automatically. For instance, the user can perform On/Off check of the 3-terminal regulators and the relay components.

## IO/G step generation

This section describes the programming process of the IO/G steps on the basis of the three (3) examples listed above.

### How to program IO/G steps

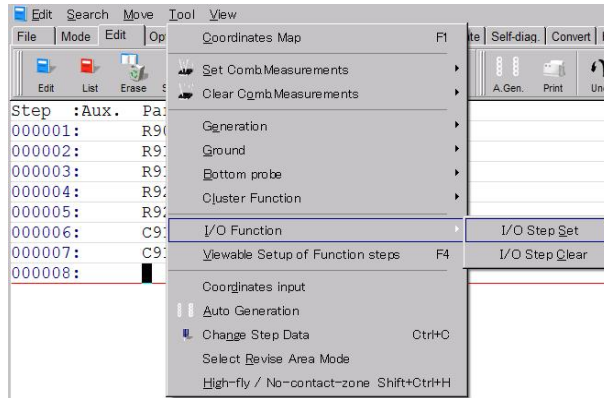
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays "Enter step number (1 – x)". Let's put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.14)



Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	47O	*
000005:		R922	47O	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

[ Fig.54 ] Step edit list

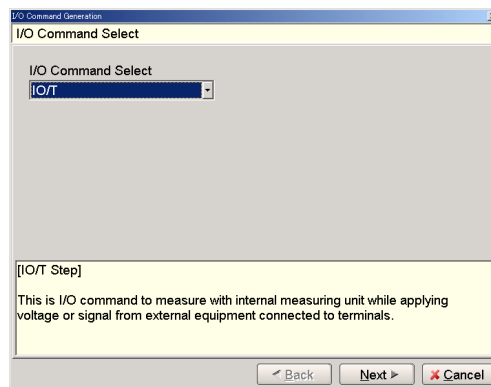
4. Move to Tool > I/O function and click on “I/O Step Set”. (Refer to Fig.55)



[ Fig.55 ] I/O Function > I/O Step Set

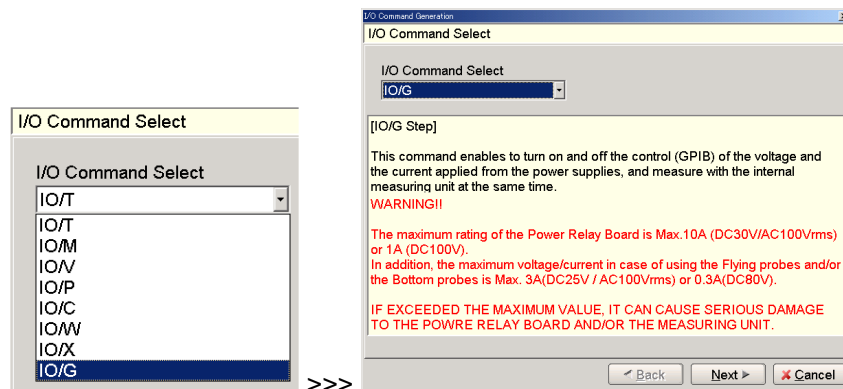
5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.

6. It displays I/O Command Select screen. (Refer to Fig.56)



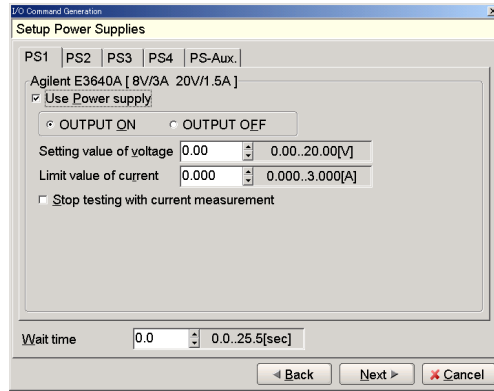
[ Fig.56 ] I/O Command Select

7. Select “IO/G” from the right pull-down menu, and it will display Fig.58.



[ Fig.57 ] I/O Command Select

8. Click the Next button, and it will display Fig.58.



[ Fig.58 ] Setup Power Supplies

**PS-1 ~ PS-Aux**

The user should select the external power supplies from PS1 ~ PS-Aux.

**Use Power supply**

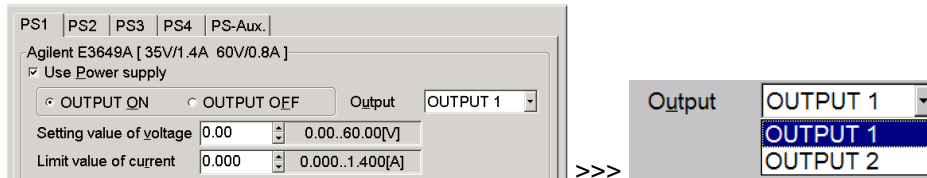
Check the box when the external power supply (i.e. Agilent E3640A) is used.

**OUTPUT ON / OUTPUT OFF**

Only when OUTPUT ON is selected, the user is allowed to configure “Setting value of voltage”, “Limit value of current” and “Stop testing with current measurement”. But when OUTPUT OFF is selected, the voltage to the UUT will be terminated.

**Output**

This appears only when the dual-out type of the Agilent external power supply is selected. Select either OUTPUT1 or OUTPUT2 from the right pull-down menu.



[ Fig.59 ]

**Setting value of voltage**

This can specify the voltage to output by 10mV. The output range at the right will be set automatically according to the external power supply specified by the user.

**Limit value of current**

This can specify the current to output by 1mA. The output range at the right will be set automatically according to the external power supply specified by the user. When IO/G step is performed, if it exceeds this value, the error message will appear. At the same time, the output from the external power supply will be terminated automatically to suspend the test accordingly.

**Stop testing with current measurement**

When the box is selected, the test will be suspended if it goes off the preset current on the IO/G step.

**Reference current value**

This is the standard current value and must be set smaller than “Limit value of current”. Max. current value differs according to the external power supply models and is configurable by 1mA.

**Judgment +% tolerance**

This is the upper limit of the current value shown by %.

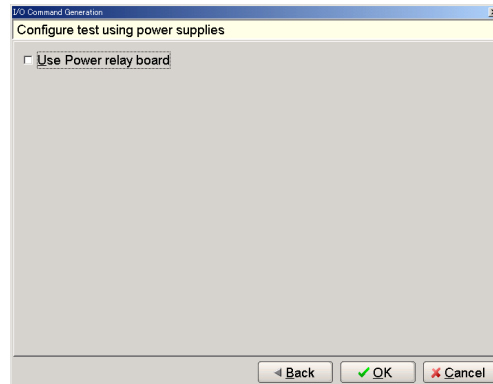
**Judgment -% tolerance**

This is the lower limit of the current value shown by %.

**Wait time**

Wait time should be set within 0.0 ~ 25.5 sec. During this period, the tester turns on the external power supplies and the PRL-9500G and wait until it moves to the next step.

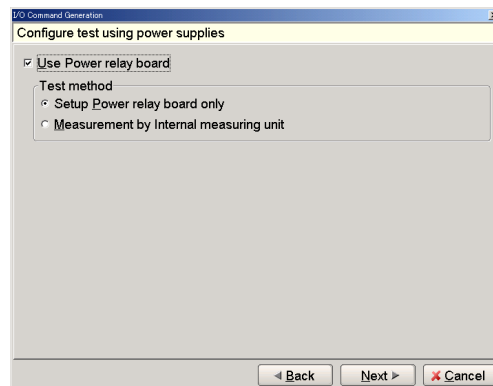
- After every configuration was completed, click the Next button. On the next screen (Fig.60), click the OK button without selecting the box “Use Power relay board” if you just want to control the external power supplies (Voltage / Current / Output ON/OFF) without using the PRL-9500G to apply voltage to the UUT. (In this case, the user must think of the way of applying voltage to the UUT) It goes back to the Step edit list.



[ Fig.60 ] Configure test using power supplies

	<p>The user must think of the way of applying voltage to the UUT. After this step, the user has to program a step to measure the output while applying the voltage to the UUT. In addition, another step to terminate the voltage is necessary to program later.</p>
--	--

- When the PRL-9500G is used, select the box “Use Power relay board”, and it displays Fig.61.



[ Fig.61 ] Configure test using power supplies

**Setup Power relay board only**

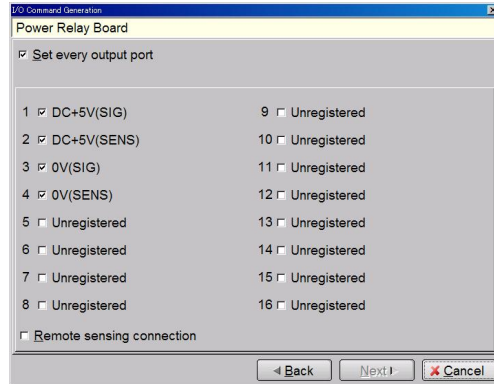
Select the box when you want to control the external power supplies (Voltage / Current / Output ON/OFF) and use the PRL-9500G to apply voltage to the UUT. In this case, read from paragraph 9.

**Measurement by Internal measuring unit**

Select the box when you want to control the external power supplies (Voltage / Current / Output ON/OFF) and use the PRL-9500G to apply voltage to the UUT and then use the APT-9411 measuring unit to measure the output. In this case, read from paragraph 10.

	<p>The probes to apply the voltage are configurable to the bottom probes and the flying probes. It is necessary to add another step to measure the output later.</p>
--	--

If the box “Setup Power relay board only” was selected and clicked the Next button, it will display Fig.62 where the user can configure the PRL-9500G.



[ Fig.62 ] Power Relay Board

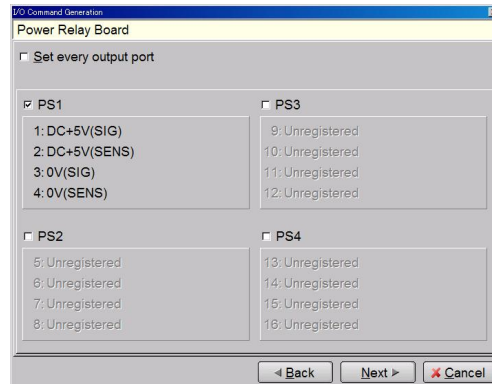
**❑ Set every output port**

Select the box “Set every output port” when the setting is required every output port. And select the Output that should be turned on. In addition, select the box “Remote sensing connection” when the remote sensing connection (4-terminal measurement) is used. (In this case, the external power supply must correspond to the remote sensing.)

Uncheck the box “Remote sensing connection” when the remote sensing connection is not used. In this case, the user cannot select more than two (2) Outputs unlike Fig.62. Be sure to select just two (+SIG and -SIG).

Click the Next button, and it will display Fig.64.

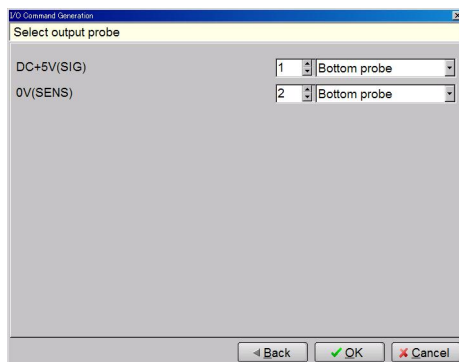
Uncheck the box “Set every output port” when the setting is not required every output port. In this case, it will display Fig.63.



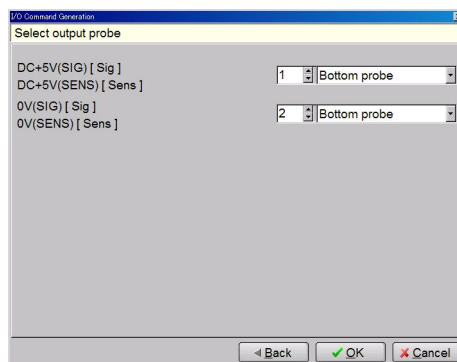
[ Fig.63 ] Power Relay Board

Only when PS1 was selected, it will display Fig.65. Make sure you set PS1 for 4-terminal connection. (Output 1:Sig, Output 2:Sens, Output 3:Sig, Output 4:Sens)

When other than PS1 was selected, it goes back to the Ste edit list, instead of Fig.65.



[ Fig.64 ] Select output probe



[ Fig.65 ] Select output probe



Specify the output to either Bottom probe 1 or Bottom probe 2 and click the OK button. Then it will display the Step edit list (Fig.66).

Step	Parts	Value	Comment
000001:	R902	47KO	*
000002:	R912	00	*
000003:	R913	00	*
000004:	R923	470	*
000005:	R922	470	*
000006:	C914	102	*
000007:	C913	102	*
000008:	IO/G POWER	*	&h3C00

[ Fig.66 ] Step edit list

11. Select the box “Measurement by Internal measuring unit” and click the Next button, and it will display Fig.67.

Power Relay Board

Set every output port

1 <input checked="" type="checkbox"/> DC+5V(SIG)	9 <input type="checkbox"/> Unregistered
2 <input checked="" type="checkbox"/> DC+5V(SENS)	10 <input type="checkbox"/> Unregistered
3 <input checked="" type="checkbox"/> 0V(SIG)	11 <input type="checkbox"/> Unregistered
4 <input checked="" type="checkbox"/> 0V(SENS)	12 <input type="checkbox"/> Unregistered
5 <input type="checkbox"/> Unregistered	13 <input type="checkbox"/> Unregistered
6 <input type="checkbox"/> Unregistered	14 <input type="checkbox"/> Unregistered
7 <input type="checkbox"/> Unregistered	15 <input type="checkbox"/> Unregistered
8 <input type="checkbox"/> Unregistered	16 <input type="checkbox"/> Unregistered

Remote sensing connection

Back Next Cancel

[ Fig.67 ] Power Relay Board

#### Set every output port

Select the box “Set every output port” when the setting is required every output port. And select the Outputport that should be turned on. In addition, select the box “Remote sensing connection” when the remote sensing connection is used. (In this case, the external power supply must correspond to the remote sensing.)

Uncheck the box “Remote sensing connection” when the remote sensing connection is not used. In this case, the user cannot select more than two (2) Outputports unlike Fig.67. Be sure to select just two (+SIG and -SIG).

Click the Next button, and it will displays Fig.69.

Uncheck the box “Set every output port” when the setting is not required every output port. In this case, it will display Fig.63. The user should set every PS.

Power Relay Board

Set every output port

<input checked="" type="checkbox"/> PS1 1: DC+5V(SIG) 2: DC+5V(SENS) 3: 0V(SIG) 4: 0V(SENS)	<input type="checkbox"/> PS3 9: Unregistered 10: Unregistered 11: Unregistered 12: Unregistered
<input type="checkbox"/> PS2 5: Unregistered 6: Unregistered 7: Unregistered 8: Unregistered	<input type="checkbox"/> PS4 13: Unregistered 14: Unregistered 15: Unregistered 16: Unregistered

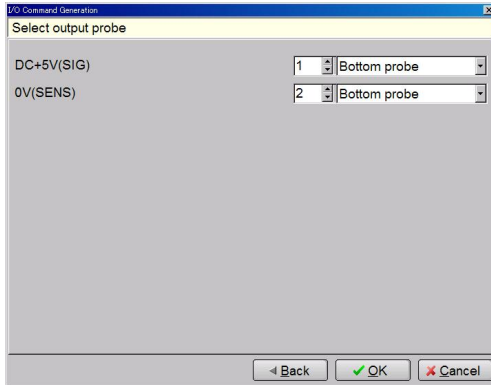
Back Next Cancel

[ Fig.68 ] Power Relay Board

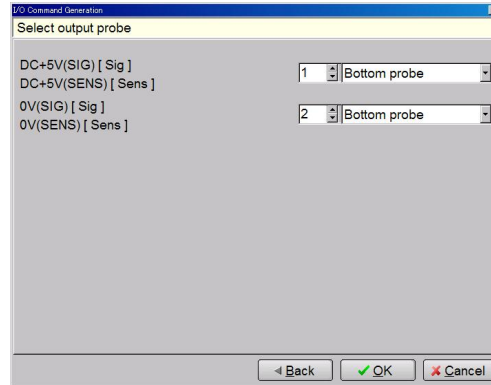


Only when PS1 was selected, the user can select the output from Bottom probe 1 and Bottom probe 2. (Refer to Fig.70) Make sure you set PS1 for 4-terminal connection. (Output 1:Sig, Output 2:Sens, Output 3:Sig, Output 4:Sens)

When other than PS1 was selected, it will display another screen where the user can specify High-pin and Low-pin which are used to measure after the voltage from the external power supply was applied to the UUT. The bottom probes etc are used to apply the voltage from the external power supply to the UUT.



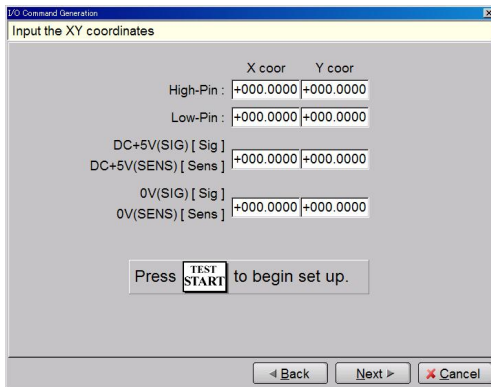
[ Fig.69 ] Select output probe



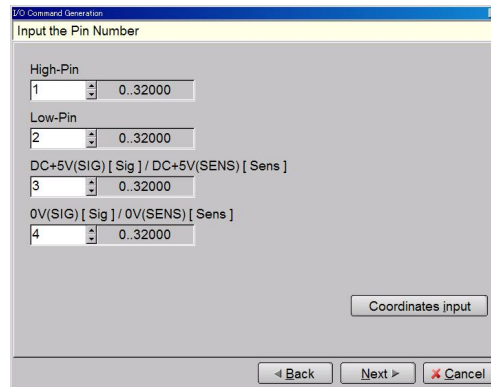
[ Fig.70 ] Select output probe

Specify the output to either Flying probe (1-4) or Bottom probe 1,2. (The explanation below is made assuming that Flying probe (1-4) was selected here.)

Select Flying probe (1-4) and click the Next button, it will display another screen (Fig.71) where the user can specify the coordinates where the voltage from the external power supply is applied and the coordinates (High-pin and Low-pin) where should be measured.



(Teaching system)



(Point system)

[ Fig.71 ]

Depress the TEST START SW on the operation panel and input the coordinates for High-pin, Low-pin, +5V and 0V according to the menu guidance.

After the coordinates input was completed, click the OK button on the display. Then it goes back the Step edit list.

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/G	POWER	*	&h3C00

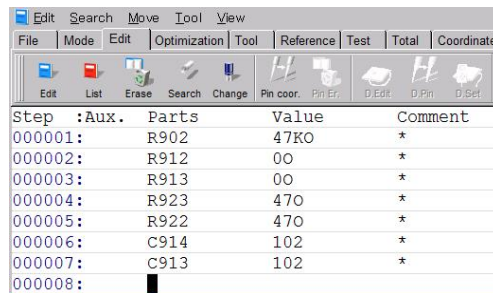
[ Fig.72 ] Step edit list

## Example 1

Let's assume the case that just controls the external power supplies (Voltage / Current / Output ON/OFF). (The user must think of the way of applying voltage to the UUT) After that, next step that controls the PRL-9500G applies another voltage from the external power supply to the UUT. The measurement is performed by the APT-9411.

### How to program

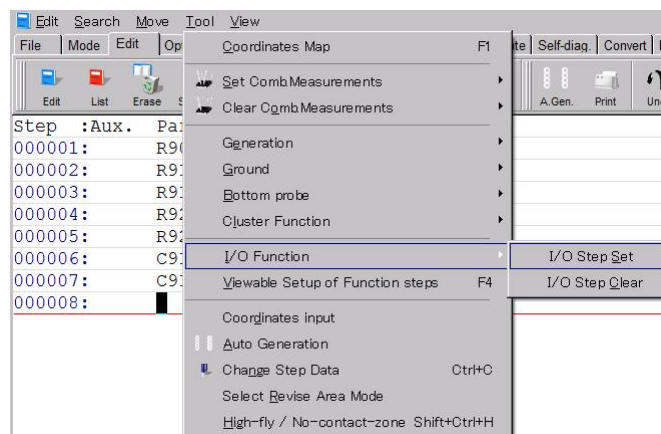
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays "Enter step number (1 – x)". Let's put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.73)



Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

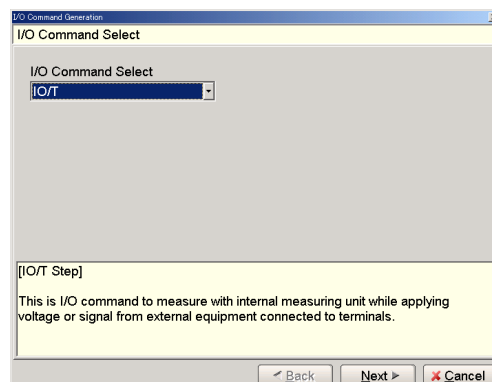
[ Fig.73 ] Step edit list

4. Move to Tool > I/O function and click on "I/O Step Set". (Refer to Fig.74)



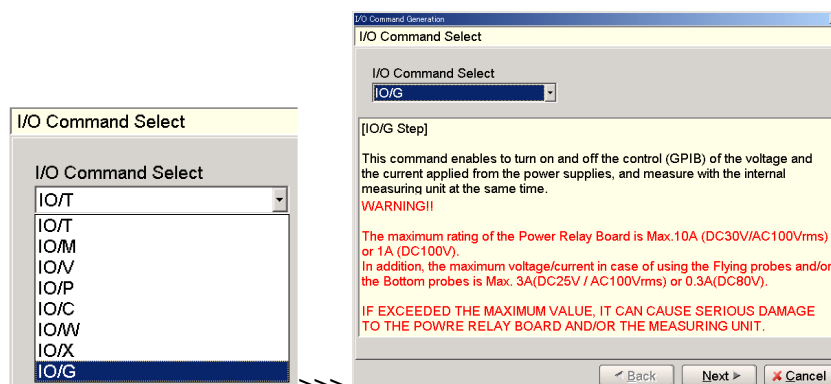
[ Fig.74 ] I/O Function > I/O Step Set

5. It displays "Use board ref.point and aux.ref.point for alignment?". Select Yes or No.
6. It displays I/O Command Select screen. (Refer to Fig.75)



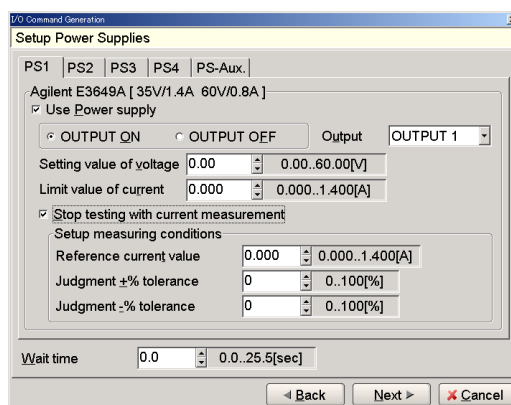
[ Fig.75 ] I/O Command Select

7. Select "IO/G" from the right pull-down menu. (Refer to Fig.76)



[ Fig.76 ] I/O Command Select

8. Click the Next button, and it will display Fig.77.



[ Fig.77 ] Setup Power Supplies

**PS-1 ~ PS-Aux**

Select the external power supplies from PS1 ~ PS-Aux. Let's select PS1 in this example.

**Use Power supply**

Select the box in this case

**OUTPUT ON / OUTPUT OFF**

Select OUTPUT ON in this case

**Setting value of voltage**

Specify the voltage to output.

**Limit value of current**

Specify the current to output.

**Stop testing with current measurement**

When the box is selected, the test will be suspended if it goes off the preset current on the IO/G step. (Select between two)

**Reference current value**

Specify the standard current value to be smaller than the Limit value of current.

**Judgment +% tolerance**

Specify the upper limit of the current value by %.

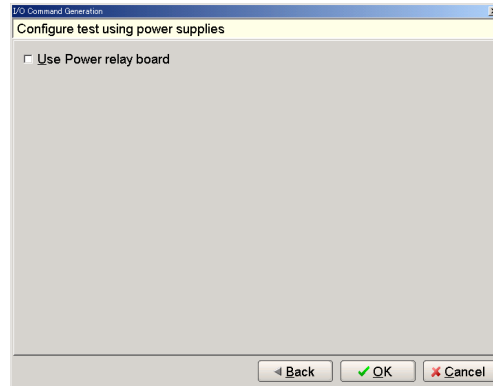
**Judgment -% tolerance**

Specify the lower limit of the current value by %.

**Wait time**

Specify Wait time by 0.0 ~ 25.5 sec.

- After every configuration was completed, click the Next button, and it will display Fig.78. Click the OK button without selecting the box "Use Power relay board".



[ Fig.78 ] Configure test using power supplies

- It goes back to the Step edit list.

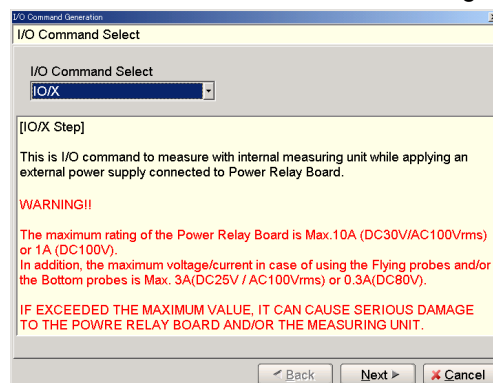
Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc	EL
000001:		R902	47KO	11	15	*	*	R
000002:		R912	00	3	10	*	*	R
000003:		R913	00	4	6	*	*	R
000004:		R923	470	11	10	*	*	R
000005:		R922	470	8	3	*	*	R
000006:		C914	102	7	6	*	*	C
000007:		C913	102	5	10	*	*	C
000008:	IO/G	POWER	IN	*	*	*	IO/G	*

[ Fig.79 ] Step edit list

- This stage, the external power supply outputs the voltage, but it's not possible to apply the voltage to the UUT through the flying probes and the bottom probes yet. The user must think of the way of applying voltage to the UUT.

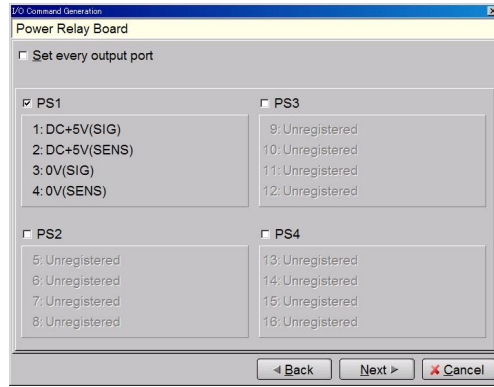
The output of the voltage will be kept until the next IO/G step to suspend the output is executed.

- Program the next step to have the PRL-9500G apply the voltage to the UUT and measure the output by the APT-9411. This will be attained by using the IO/X command. (For details, refer to IO/X command explained earlier.)
- Use the down-arrow key to move the cursor to the next step.
- Move to Tool > I/O function and click on "I/O Step Set".
- It displays "Use board ref.point and aux.ref.point for alignment?". Select Yes or No.
- It displays I/O Command Select screen. Select "IO/X" from the right pull-down menu.



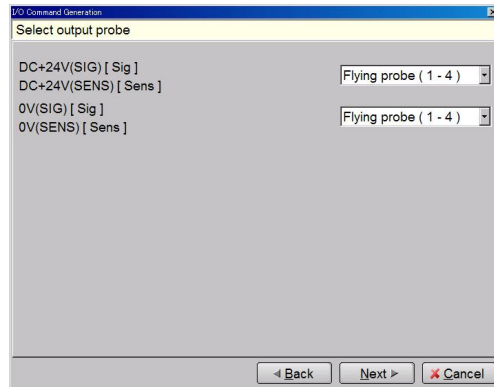
[ Fig.80 ] I/O Command Select

17. Click the Next button, and it will display Fig.81. Specify “PS1”.



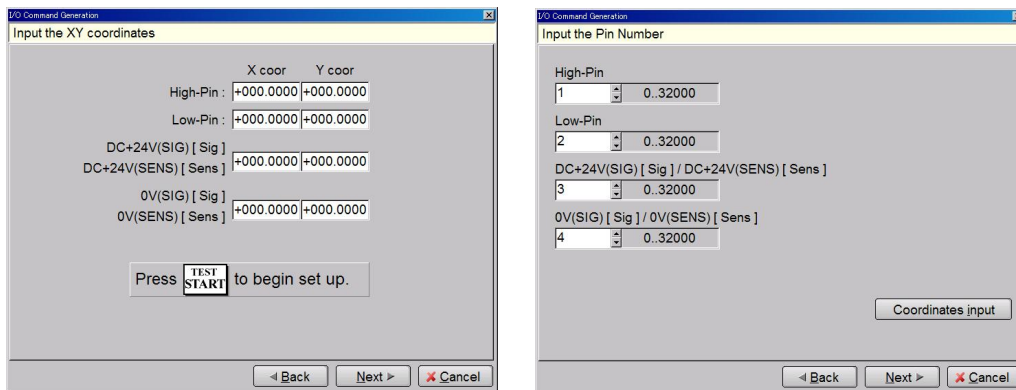
[ Fig.81 ] Power Relay Board

18. Click the Next button, and it will display Fig.82. Specify “Flying probe (1 – 4)”.



[ Fig.82 ] Select output probe

19. Click the Next button, and it will display Fig.83. Specify the XY coordinate or the pin numbers as requested.

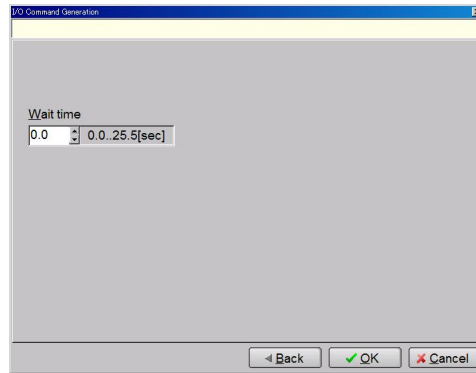


(Teaching system)

(Point system)

[ Fig.83 ] Input the XY coordinates

- Click the Next button, and it will display Fig.84. After specified Wait time by 0.0 ~ 25.5 sec, click the OK button.



[ Fig.84 ] Wait time setting

- It goes back to the Step edit list (the left screen of Fig.85). It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in the right screen of Fig.85.

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc
000001:	R902	47KO		11	15	*	*
000002:	R912	00		3	10	*	*
000003:	R913	00		4	6	*	*
000004:	R923	470		11	10	*	*
000005:	R922	470		8	3	*	*
000006:	C914	102		7	6	*	*
000007:	C913	102		5	10	*	*
000008:	IO/G	POWER	IN	*	*	*	IO/G
000009:	IO/X	*	*	*	*	&h3C00	IO/X

[ Fig.85 ] Step edit list

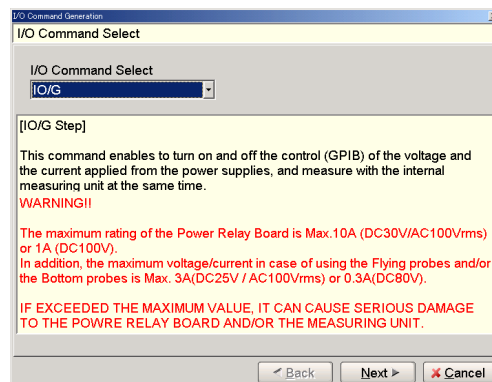
## How to terminate voltage

- Use the down-arrow key to move the cursor to the step where to terminate the output.

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc
000001:	R902	47KO		11	15	*	*
000002:	R912	00		3	10	*	*
000003:	R913	00		4	6	*	*
000004:	R923	470		11	10	*	*
000005:	R922	470		8	3	*	*
000006:	C914	102		7	6	*	*
000007:	C913	102		5	10	*	*
000008:	IO/G	POWER	IN	*	*	*	IO/G
000009:	IO/X	POWER	IN	*	*	&h3C00	IO/X
000010:							

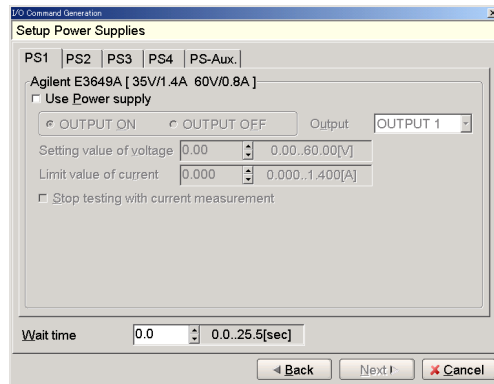
[ Fig.86 ] Step edit list

- Move to Tool > I/O function and click on "I/O Step Set".
- It displays "Use board ref.point and aux.ref.point for alignment?". Select Yes or No.
- It displays I/O Command Select screen.
- Select "IO/G" from the right pull-down menu. (Refer to Fig.87)



[ Fig.87 ] I/O Command Select

Click the Next button, and it will display Fig.88.



[ Fig.88 ] Setup Power Supplies

**PS-1 ~ PS-Aux**

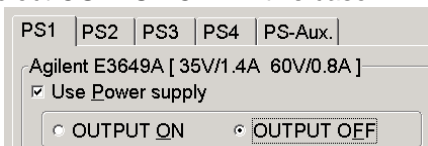
Select the external power supplies PS1 ~ PS-Aux which output should be terminated.

**Use Power supply**

Select the box in this case

**OUTPUT ON / OUTPUT OFF**

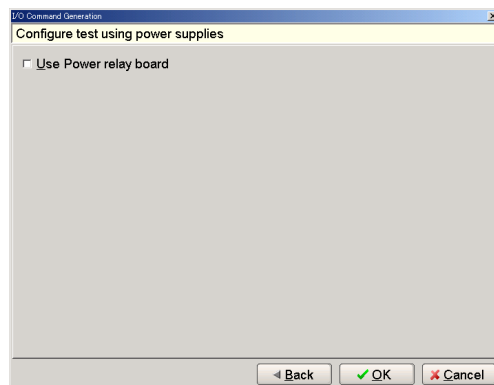
Select OUTPUT OFF in this case



**Wait time**

Specify nothing.

- Click the Next button, and it will display Fig.90. Click the OK button without selecting the box "Use Power relay board".



[ Fig.89 ] Configure test using power supplies

- It goes back to the Step edit list (the left screen of Fig.90). Now you can see Step 000010 was added on the list to terminate the output. It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in the right screen of Fig.90.

Step	:Aux.	Parts	Value	H-pin	L-pin	Comment	Loc
000001:	R902	47KO		11	15	*	*
000002:	R912	00		3	10	*	*
000003:	R913	00		4	6	*	*
000004:	R923	470		11	10	*	*
000005:	R922	470		8	3	*	*
000006:	C914	102		7	6	*	*
000007:	C913	102		5	10	*	*
000008:	IO/G	POWER	IN	*	*	*	IO/G
000009:	IO/X	POWER	IN	*	* &h3C00	*	IO/X
000010:	IO/G	*	*	*	*	*	IO/G

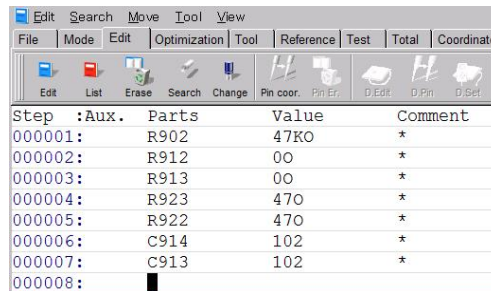
[ Fig.90 ] Step edit list

## Example 2

Let's assume the case that controls the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the bottom probes or the connector at the Tray. Therefore, more than one step will be measured until the step to terminate the output is executed.

### How to program

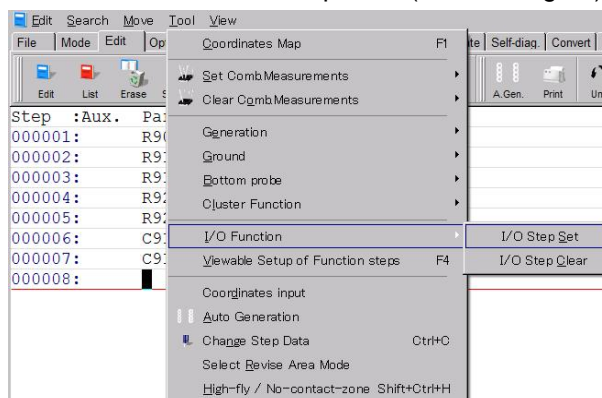
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays "Enter step number (1 – x)". Let's put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.91)



Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

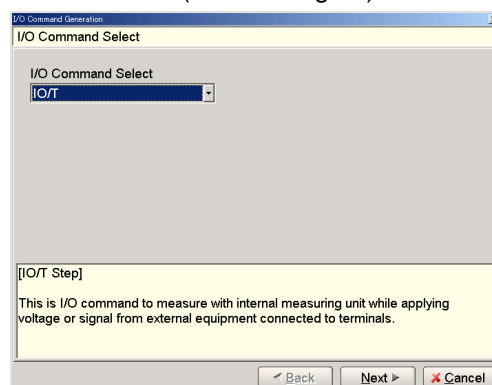
[ Fig.91 ] Step edit list

4. Move to Tool > I/O function and click on "I/O Step Set". (Refer to Fig.92)



[ Fig.92 ] I/O Function > I/O Step Set

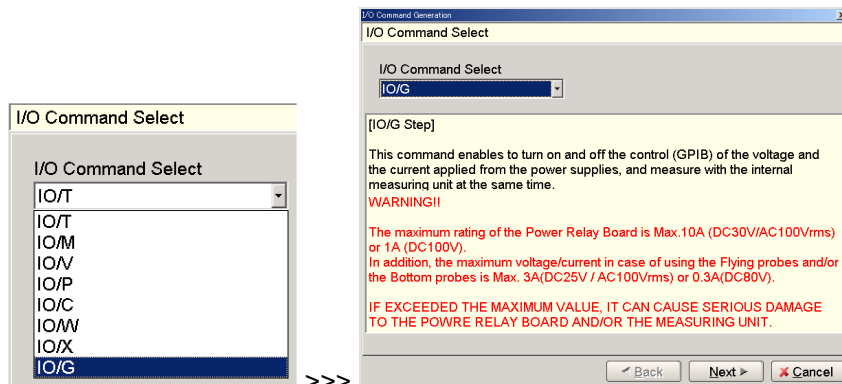
5. It displays "Use board ref.point and aux.ref.point for alignment?". Select Yes or No.
6. It displays I/O Command Select screen. (Refer to Fig.93)



[ Fig.93 ] I/O Command Select

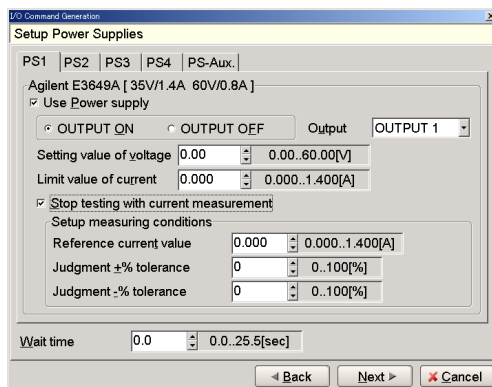


7. Select "IO/G" from the right pull-down menu. (Refer to Fig.94)



[ Fig.94 ] I/O Command Select

8. Click the Next button, and it will display Fig.95.



[ Fig.95 ] Setup Power Supplies

**PS-1 ~ PS-Aux**

Select the external power supplies from PS1 ~ PS-Aux.

**Use Power supply**

Select the box in this case

**OUTPUT ON / OUTPUT OFF**

Select OUTPUT ON in this case

**Setting value of voltage**

Specify the voltage to output.

**Limit value of current**

Specify the current to output.

**Stop testing with current measurement**

When the box is selected, the test will be suspended if it goes off the preset current on the IO/G step. (Select between two)

**Reference current value**

Specify the standard current value to be smaller than the Limit value of current.

**Judgment +% tolerance**

Specify the upper limit of the current value by %.

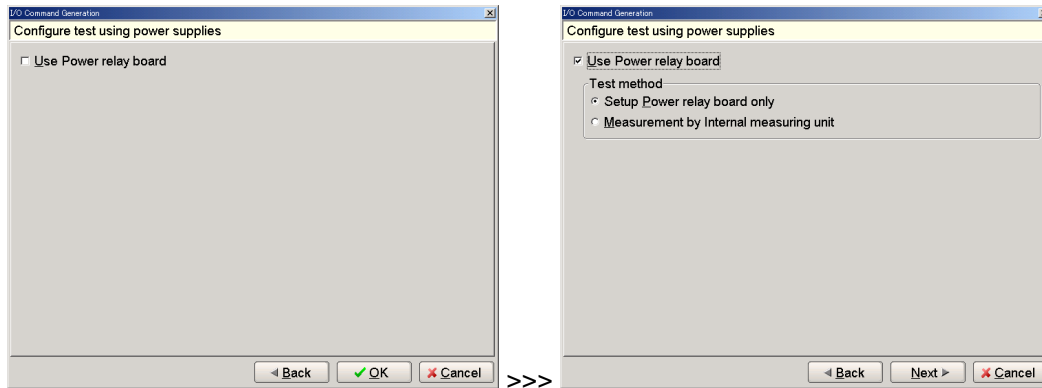
**Judgment -% tolerance**

Specify the lower limit of the current value by %.

**Wait time**

Specify Wait time by 0.0 ~ 25.5 sec.

- After every configuration was completed, click the Next button, and it will display Fig.96. Select the box “Use Power relay board”.

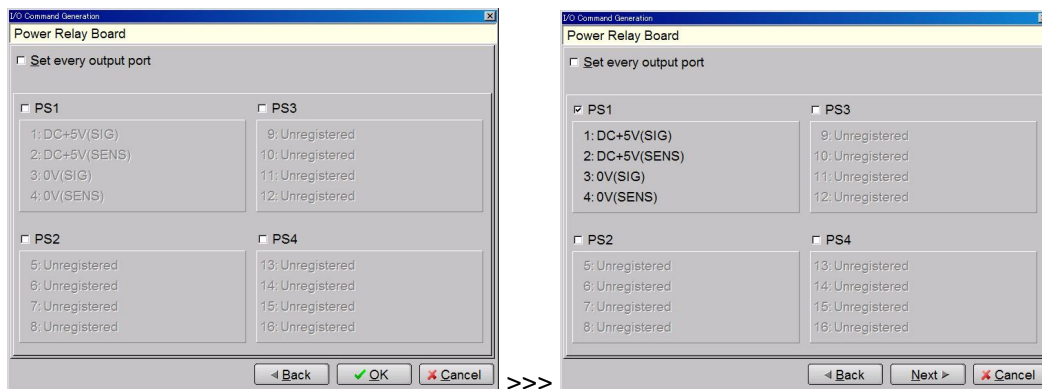


[ Fig.96 ] Configure test using power supplies

### Test method

Select the box “Setup Power relay board only” because you are going to control the external power supplies (Voltage / Current / Output ON/OFF) and use the PRL-9500G to apply voltage to the UUT.

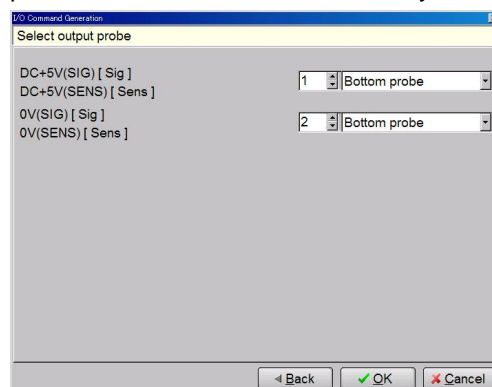
- Click the Next button, and it will display Fig.97. Specify “PS1” in this case.



[ Fig.97 ] Power Relay Board

- Click the Next button, and it will display Fig.98. It is only when you specified PS1 that Fig.98 is displayed. In the case of PS2 ~PS4, it goes back directly to the Step edit list (Fig.99). Specify between Bottom probe 1 and Bottom probe 2.

When PS1 was specified, the Bottom probes are available to use. As for PS2 ~ PS4, the output will be the connector at the Tray.



[ Fig.98 ] Select output probe

12. Click the OK button, and it goes back to the Step edit list (the left screen of Fig.99).

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc
000001:		R902	47K0	11	15	*	*
000002:		R912	00	3	10	*	*
000003:		R913	00	4	6	*	*
000004:		R923	470	11	10	*	*
000005:		R922	470	8	3	*	*
000006:		C914	102	7	6	*	*
000007:		C913	102	5	10	*	*
000008:IO/G	*	*	*	*	* &h3C00		IO/G

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc	IO/G
000001:		R902	47K0	11	15	*	*	
000002:		R912	00	3	10	*	*	
000003:		R913	00	4	6	*	*	
000004:		R923	470	11	10	*	*	
000005:		R922	470	8	3	*	*	
000006:		C914	102	7	6	*	*	
000007:		C913	102	5	10	*	*	
000008:IO/G	*	POWER	IN	*	*	* &h3C00		IO/G

[ Fig.99 ] Step edit list

13. Program the next step to measure the output after powered up the UUT.

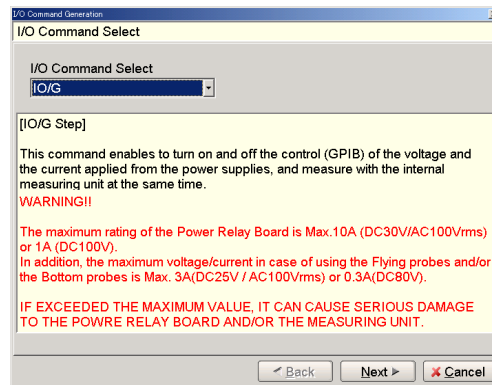
### How to terminate voltage

1. Use the down-arrow key to move the cursor to the step where to terminate the output.

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc
000001:		R902	47K0	11	15	*	*
000002:		R912	00	3	10	*	*
000003:		R913	00	4	6	*	*
000004:		R923	470	11	10	*	*
000005:		R922	470	8	3	*	*
000006:		C914	102	7	6	*	*
000007:		C913	102	5	10	*	*
000008:IO/G		POWER	IN	*	*	* &h3C00	IO/G
000009:							

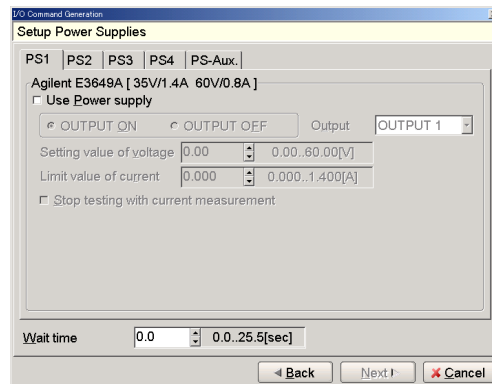
[ Fig.100 ] Step edit list

2. Move to Tool > I/O function and click on “I/O Step Set”.
3. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
4. It displays I/O Command Select screen.
5. Select “IO/G” from the right pull-down menu. (Refer to Fig.101)



[ Fig.101 ] I/O Command Select

6. Click the Next button, and it will display Fig.102.



[ Fig.102 ] Setup Power Supplies

**PS-1 ~ PS-Aux**

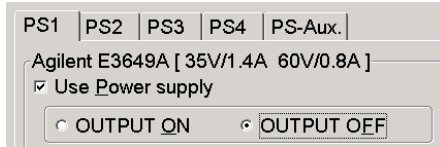
Select the external power supplies PS1 ~ PS-Aux which output should be terminated.

**Use Power supply**

Select the box in this case

**OUTPUT ON / OUTPUT OFF**

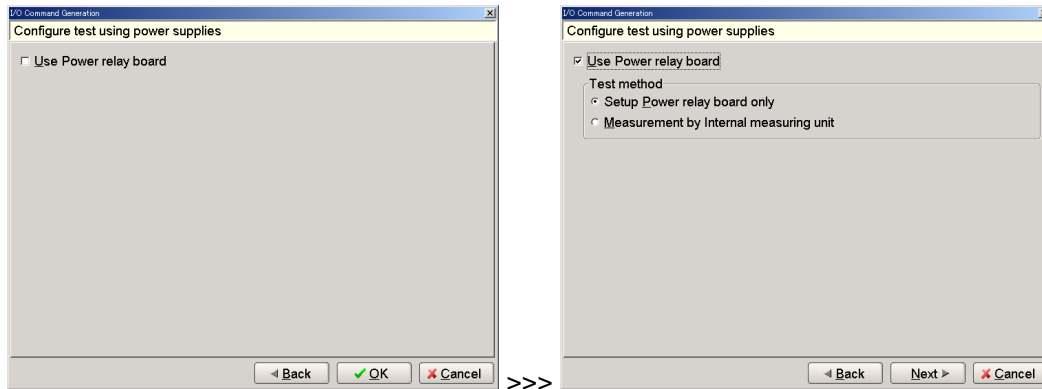
Select OUTPUT OFF in this case



**Wait time**

Specify nothing.

- After every configuration was completed, click the Next button, and it will display Fig.103. Select the box "Use Power relay board".

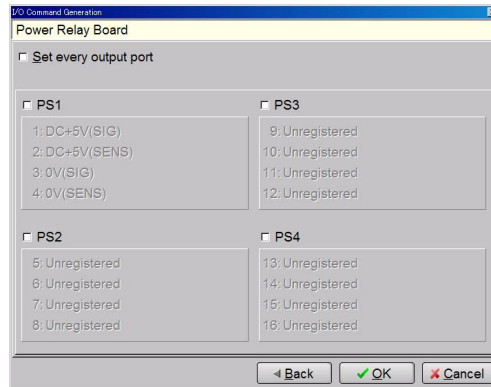


[ Fig.103 ] Configure test using power supplies

**Test method**

Select the box "Setup Power relay board only".

- Click the Next button, and it will display Fig.104. Click the OK button without selecting anything.



[ Fig.104 ] Power Relay Board

- It goes back to the Step edit list (the left screen of Fig.105). Now you can see Step 000010 was added on the list to terminate the output. It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in the right screen of Fig.105.

Step	Aux.	Parts	Value	H-pin	L-pin	Comment	Loc
000001:		R902	47K0	11	15	*	*
000002:		R912	00	3	10	*	*
000003:		R913	00	4	6	*	*
000004:		R923	470	11	10	*	*
000005:		R922	470	8	3	*	*
000006:		C914	102	7	6	*	*
000007:		C913	102	5	10	*	*
000008:	IO/G	POWER	IN	*	*	sh3C00	IO/G
000009:		REG-1	5.0V	*	*	*	*
000010:	IO/G	+	*	*	*	sh0000	IO/G

[ Fig.105 ] Step edit list

### Example 3

Let's assume the case that controls the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the flying probes. The measurement is performed by the APT-9411. After the step finished applying voltage through the flying probes, the output to the UUT will be terminated automatically.

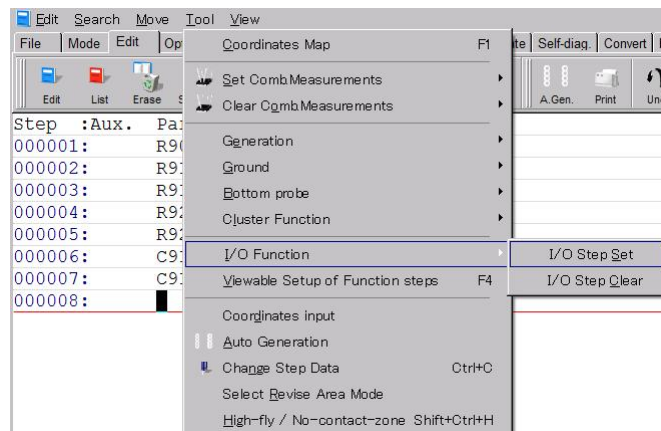
### How to program

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays "Enter step number (1 – x)". Let's put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.106)

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

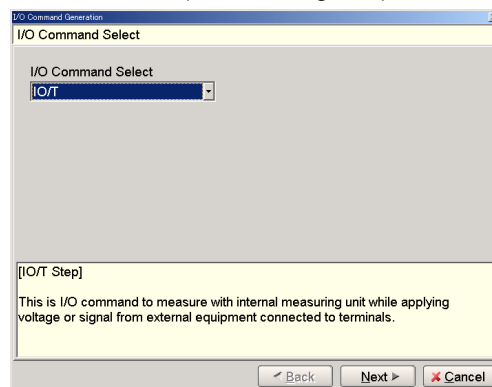
[ Fig.106 ] Step edit list

4. Move to Tool > I/O function and click on "I/O Step Set". (Refer to Fig.107)



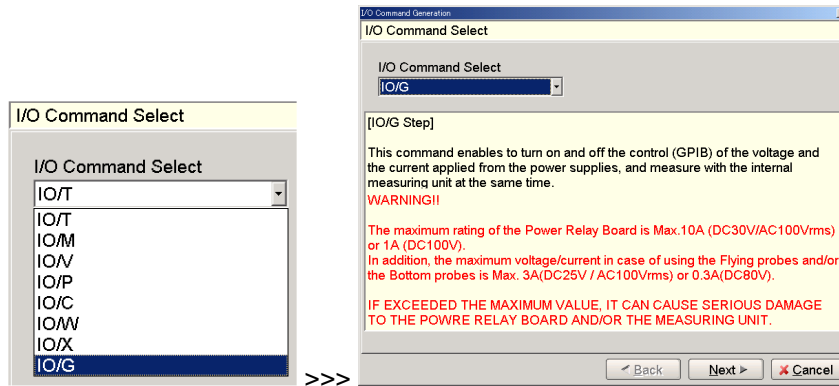
[ Fig.107 ] I/O Function > I/O Step Set

5. It displays "Use board ref.point and aux.ref.point for alignment?". Select Yes or No.
6. It displays I/O Command Select screen. (Refer to Fig.108)



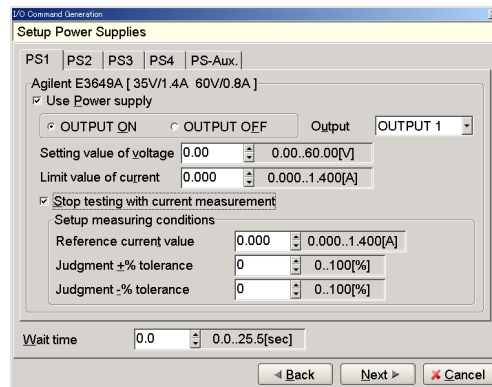
[ Fig.108 ] I/O Command Select

7. Select "IO/G" from the right pull-down menu. (Refer to Fig.109)



[ Fig.109 ] I/O Command Select

8. Click the Next button, and it will display Fig.110.



[ Fig.110 ] Setup Power Supplies

**PS-1 ~ PS-Aux**

Select the external power supplies from PS1 ~ PS-Aux.

**Use Power supply**

Select the box in this case

**OUTPUT ON / OUTPUT OFF**

Select OUTPUT ON in this case

**Setting value of voltage**

Specify the voltage to output.

**Limit value of current**

Specify the current to output.

**Stop testing with current measurement**

When the box is selected, the test will be suspended if it goes off the preset current on the IO/G step. (Select between two)

**Reference current value**

Specify the standard current value to be smaller than the Limit value of current.

**Judgment +% tolerance**

Specify the upper limit of the current value by %.

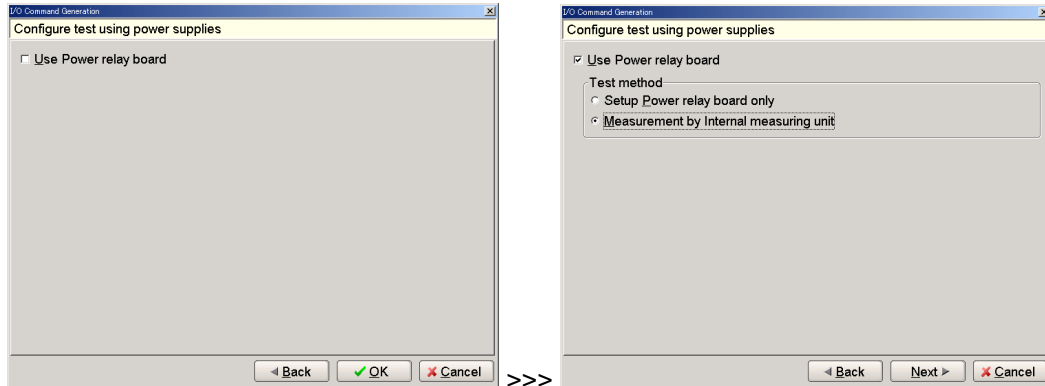
**Judgment -% tolerance**

Specify the lower limit of the current value by %.

**Wait time**

Specify Wait time by 0.0 ~ 25.5 sec.

- After every configuration was completed, click the Next button, and it will display Fig.111. Select the box “Use Power relay board”.

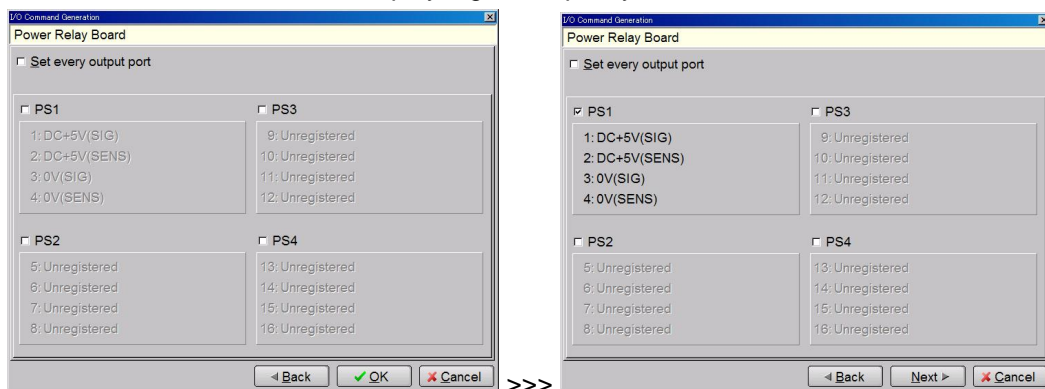


[ Fig.111 ] Configure test using power supplies

### Test method

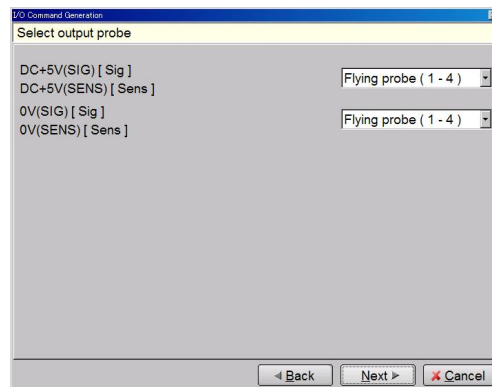
Select the box “Measurement by Internal measuring unit” because you are going to use the APT-9411 measuring unit to measure the output after powered up the UUT.

- Click the Next button, and it will display Fig.112. Specify “PS1” in this case.



[ Fig.112 ] Power Relay Board

- Click the Next button, and it will display Fig.113. It is only when you specified PS1 that Fig.113 is displayed. In the case of PS2 ~PS4, it goes to Fig.115 where the user can input the XY coordinates for High-pin and Low-pin.

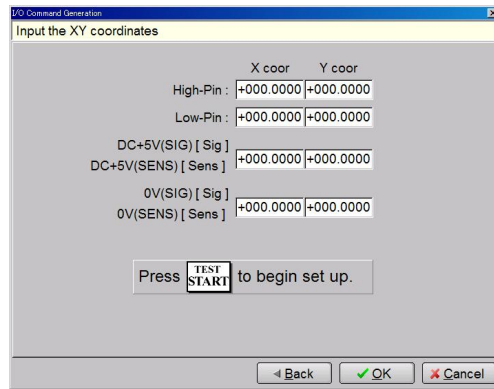


[ Fig.113 ] Select output probe

When PS1 was specified, the flying probes and the bottom probes are available to use. As for PS2 ~ PS4, the output will be the connector at the Tray.

Let’s select Flying probe ( 1 - 4 ) this time.

- Click the Next button, and it will display Fig.114.

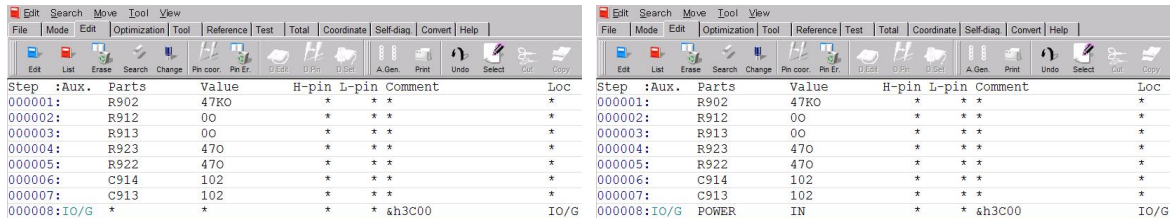


[ Fig.114 ] Input the XY coordinates

Press the TEST START SW on the operation panel to start inputting the XY coordinates according to the menu guidance.

High-pin and Low-pin are used to measure the output. And +5V SIG, +5V SENS, 0V SIG and 0V SENS are used to apply the voltage to the UUT.

- After the XY coordinates input was completed, click the OK button, and it goes back to the Step edit list (the left screen of Fig.115). It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in the right screen of Fig.115.



[ Fig.115 ] Step edit list

### How to terminate voltage

The output from the external power supplies will be terminated automatically after the IO/G step was performed.



# Viewable Setup of Function steps

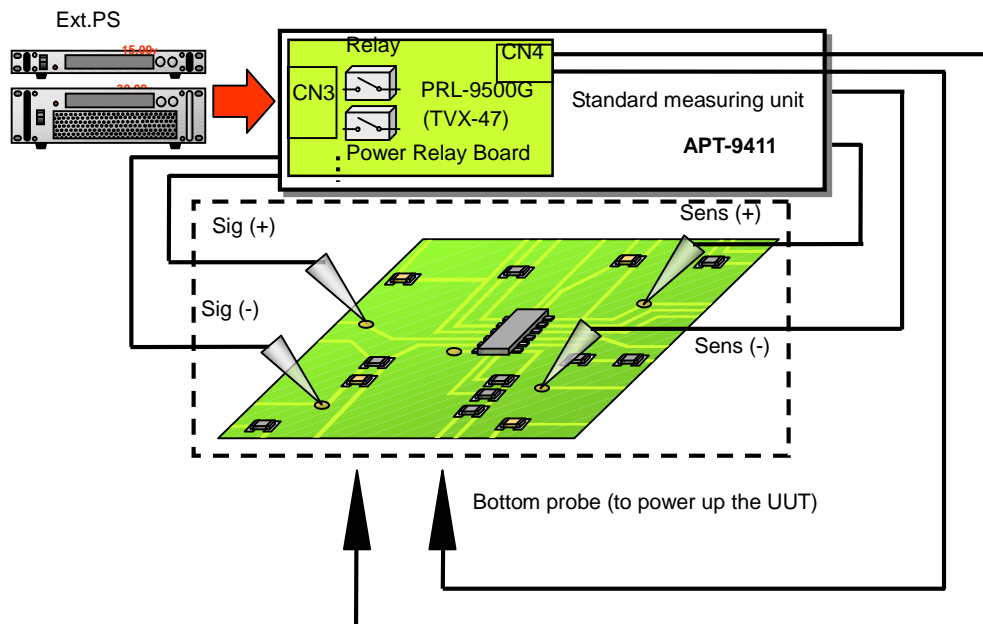
This chapter describes the procedures to generate I/O steps (basic data programming and reference input) using the Viewable Setup of Function steps screen.

We demonstrate three concrete examples (Case1~3) of the way of generating I/O steps are used. In addition, the explanation is made to the case that the external power supplies are connected to the APT-9411 via GPIB.

The Aux. column of the I/O steps will be substituted by "IO/F" automatically only when they were generated by making use of the Viewable Setup of Function steps screen

## CASE 1

When the external power supplies are used to power up the UUT through the bottom probes and the connectors at the Tray and the flying probes measure multiple steps in series.



[ Fig.116 ] CASE 1

(Remarks)

1. The voltage output will terminate automatically in any of the following cases:
  - \* when the IO/F step to terminate the output was performed.
  - \* when test finished.
  - \* when the step using the bottom probes was performed. (Only PS1~PS4 are terminated)
2. If the step using the bottom probes is changed to IO/F step, the original bottom probe settings will be initialized.
3. The way of applying voltage to the UUT are as follows;
  - \* PS1 ~ PS4 use Bottom probe 1,2.
  - \* PS3 ~ PS14 are output to the connector (HS-644-02A) installed on the Tray.  
The user must think of the way of applying voltage from the connector to the UUT.  
(Ex. Bottom probe option, direct linkage with some connector)

# Programming procedure

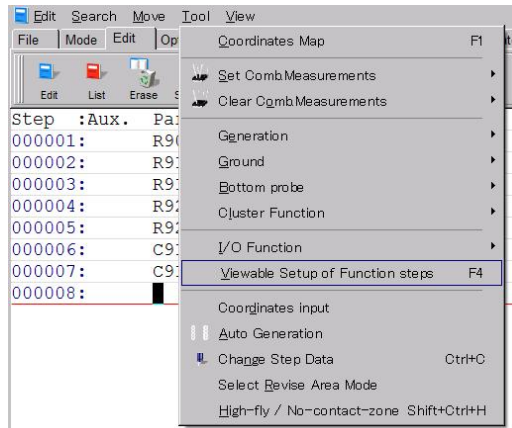
## How to apply voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.117)

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

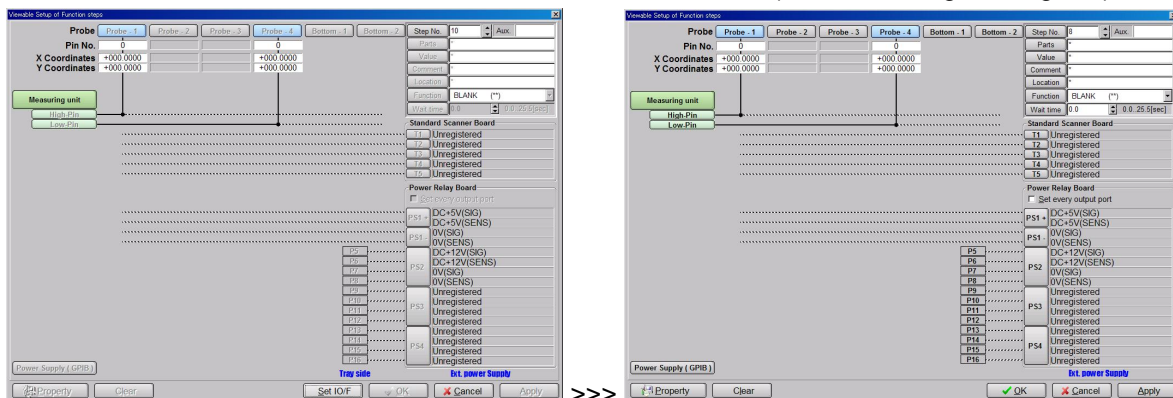
[ Fig.117 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.118)



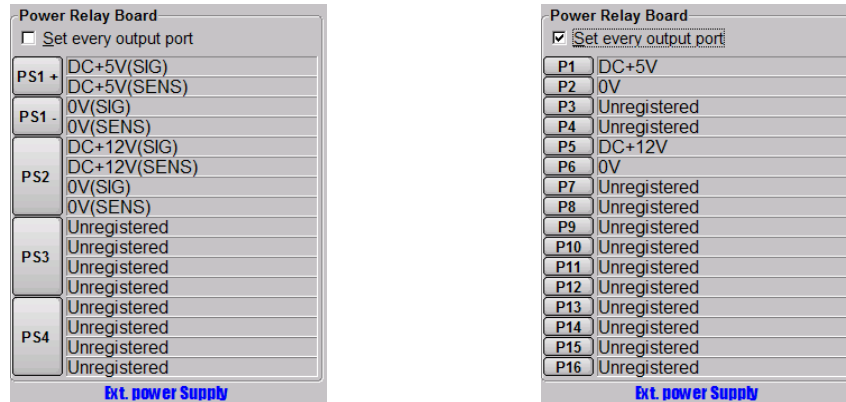
[ Fig.118 ] Viewable setup of Function steps

5. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.119). Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.119)



[ Fig.119 ] Viewable setup of Function steps

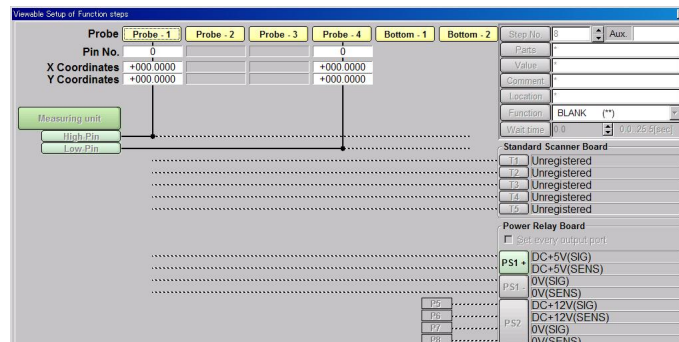
- Select "Set every output port" at Power Relay Board.  
When the box is unchecked, you will get to 4-terminal connection. (Refer to the left of Fig.122)  
When the box is checked, you will get to 2-terminal connection. (Refer to the right of Fig.122)  
Configure it on the basis of the specification of your external power supplies.  
The explanation here is made assuming that the box is unchecked.



when Set every output port is unchecked      when Set every output port is selected  
[ Fig.120 ] Viewable setup of Function steps

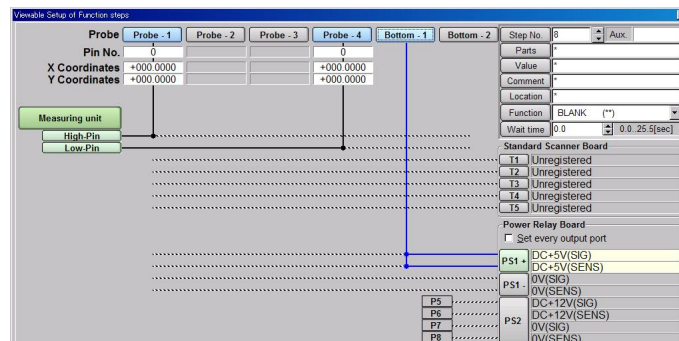
Signal name (ex. 0V, DC +5V) on Fig.120 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) "Unregistered" means that signal name is not registered yet.

- Click [PS1+] to specify the output of the external power supplies connected to the PRL-9500G. Then [Probe-1] to [Bottom-2] buttons are flashing in yellow.



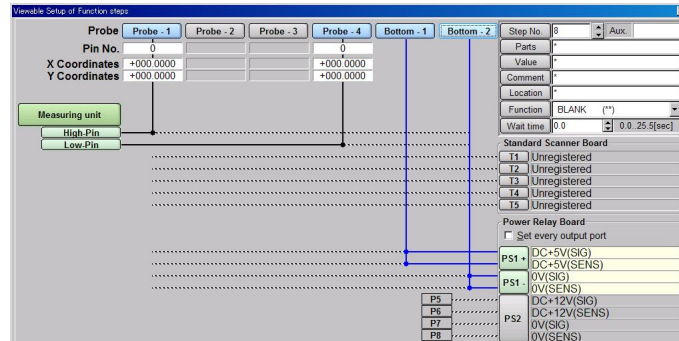
[ Fig.121 ] Viewable setup of Function steps

- Specify [Bottom-1] as the output of [PS1+], and they will be connected with a blue line. (Refer to Fig.122)



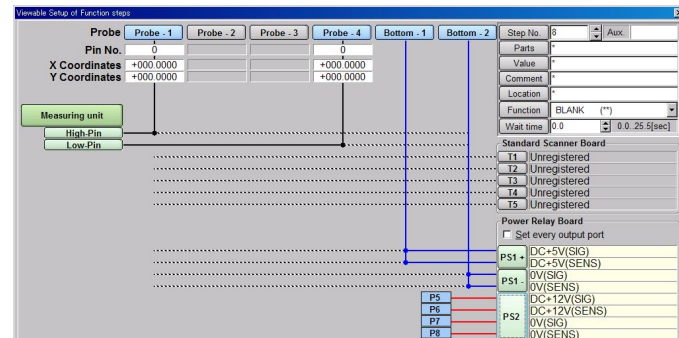
[ Fig.122 ] Viewable setup of Function steps

- Click [PS1-] to specify the output, and [Probe1] to [Bottom-2] are flashing in yellow. Specify [Bottom-2] as the output of [PS1-], and they will be connected with a blue line. (Refer to Fig.123)



[ Fig.123 ] Viewable setup of Function steps

- Click [PS2] to specify the output, and [PS2] will be connected to [P5] to [P8] with red lines. (Refer to Fig.124)



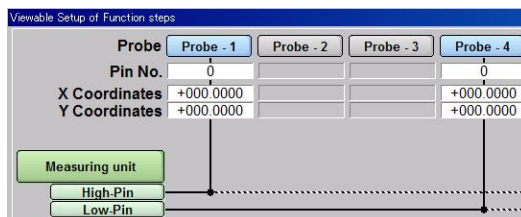
[ Fig.124 ] Viewable setup of Function steps

The two different colors of the lines connecting [PS1] and [PS2] to the output mean maximum current value as follows;

[ blue ] → 3A

[ red ] → 10A

- The two probes used to measure after powered up the UUT are already set to [Probe-1] and [Probe-4]. If you want to change them, click [High-pin] / [Low-pin] to select other probes.



[ Fig.125 ] Viewable setup of Function steps

- Click the Property button, and it will display the Measuring unit screen. (Refer to Fig.126) Use your keyboard to fill in the Parts column. In addition, enter the Value, Comment and Location column as needed.

Fill in the Function, Element and Measure Mode column if the measurement content is already determined as they will assist in inputting the reference value.

[ Fig.126 ] Measuring unit

- Click the OK button and it will displays the Coordinate set screen. (Refer to Fig.127)

(Teaching system)

(Point system)

[ Fig.127 ] Coordinate set

On the Coordinate set screen, enter the coordinates of High-pin and Low-pin (in Teaching system) or the pin numbers (in Point system).

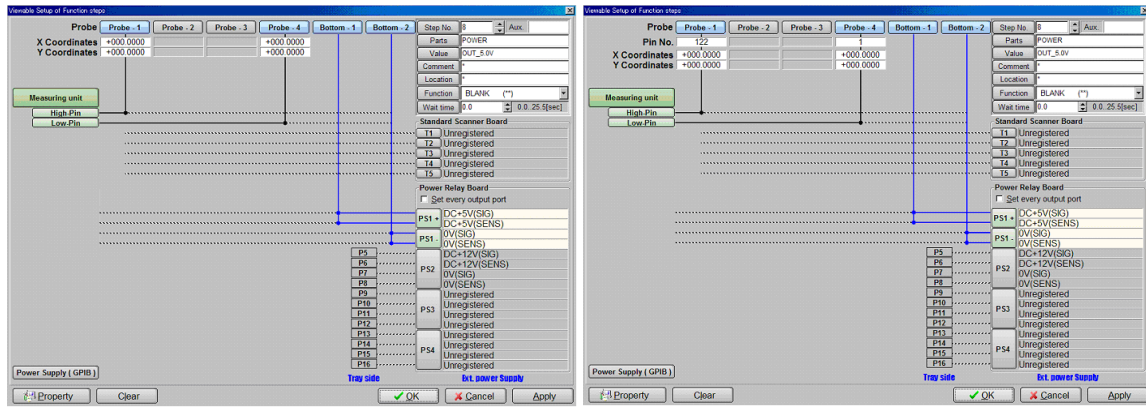
**HINT**

In Point system, when any new pin number was added, click the Coordinates input button so that it displays Fig.128 where the user can enter the coordinates.

[ Fig.128 ] Coordinate input



14. Click the OK button, and it goes back to the Viewable setup of Function steps screen.

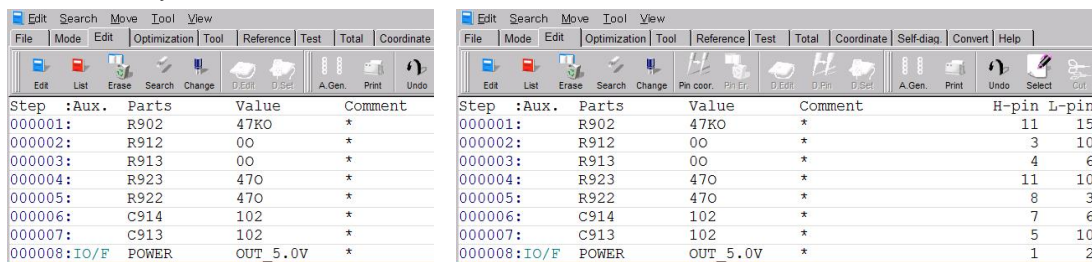


(Teaching system)

(Point system)

[ Fig.129 ] Viewable setup of Function steps

15. Click the OK button, and it goes back to the Step edit list. Now you can see the AUX. column is substituted by "IO/F".

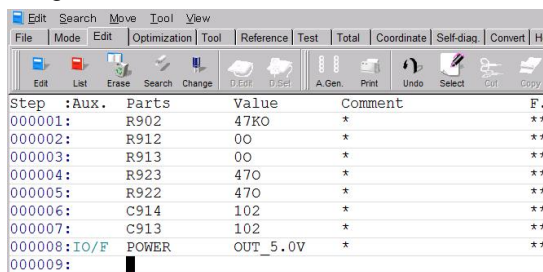


(Teaching system)

(Point system)

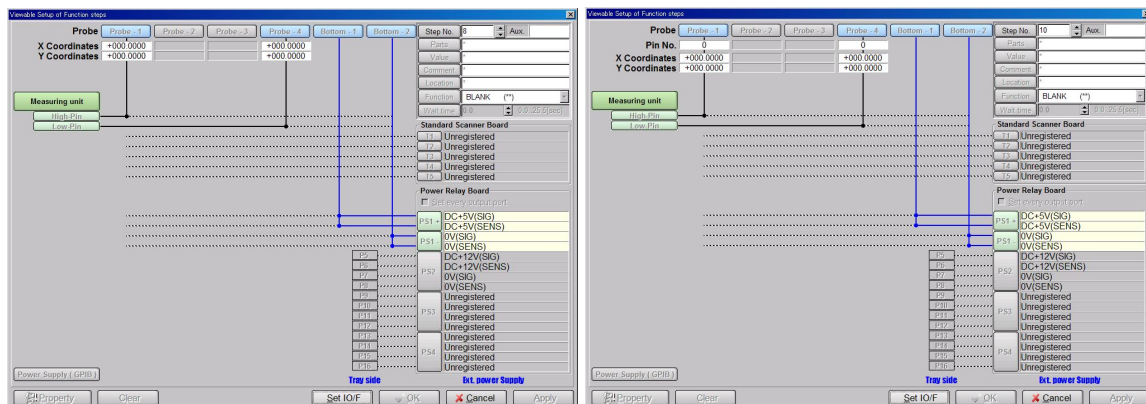
[ Fig.130 ] Step edit list

16. Press the Esc key on the keyboard if you don't have to measure any more. But when there are some other points to measure, use the down-arrow key to move the cursor to the next step. (In case of Fig.130, the cursor should be moved to the step 000009.)



[ Fig.131 ] Step edit list

17. Select Viewable setup of Function steps from the Menu bar, and it will display Fig.132.

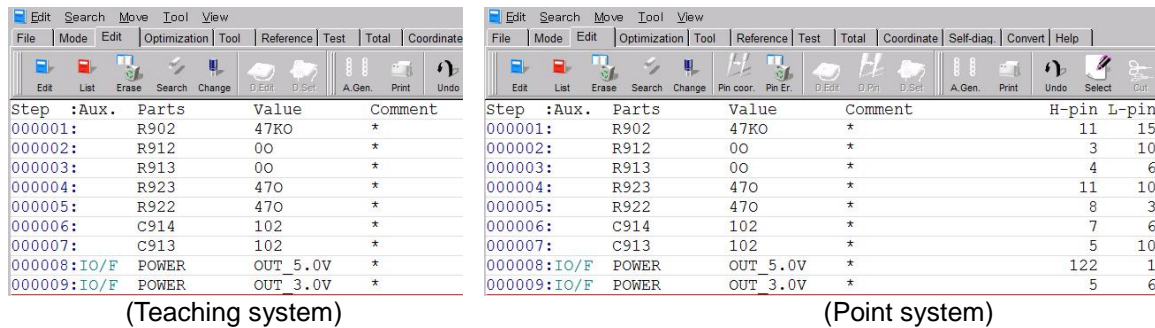


(Teaching system)

(Point system)

[ Fig.132 ] Viewable setup of Function steps

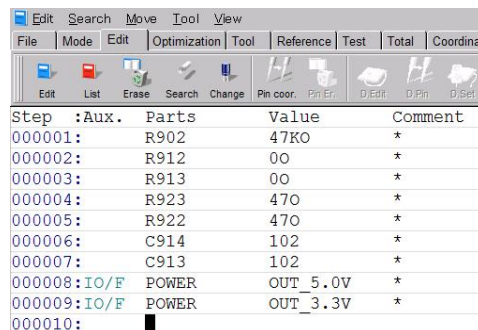
18. Click “Set IO/F” button to activate each function on the screen.  
(You will no longer need to configure the Power relay board because the configuration from the step 000008 is held.)
19. Click the Property button, and it will display the Measuring unit screen.  
Refer to Process 12 and later to complete this step as shown in Fig.133.



[ Fig.133 ] Step edit list

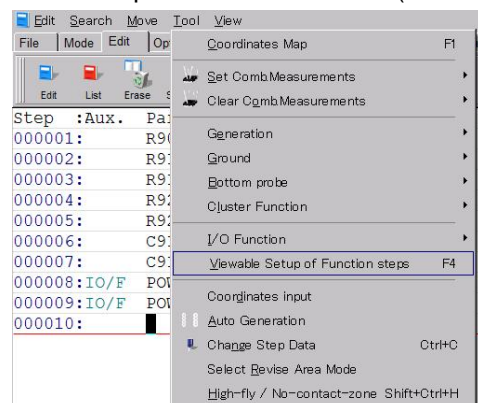
### How to terminate voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to specify the step which should be terminated and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step.  
(Refer to Fig.134)



[ Fig.134 ] Step edit list

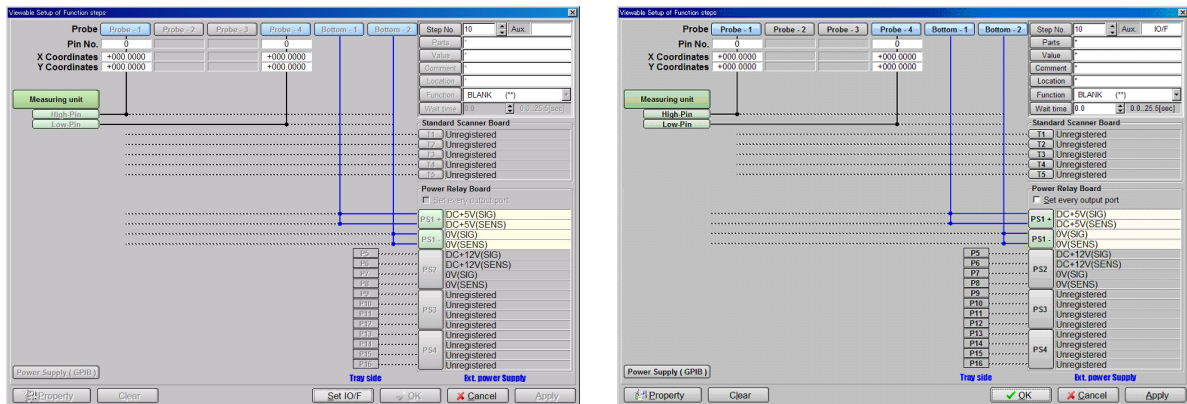
4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.135)



[ Fig.135 ] Viewable setup of Function steps

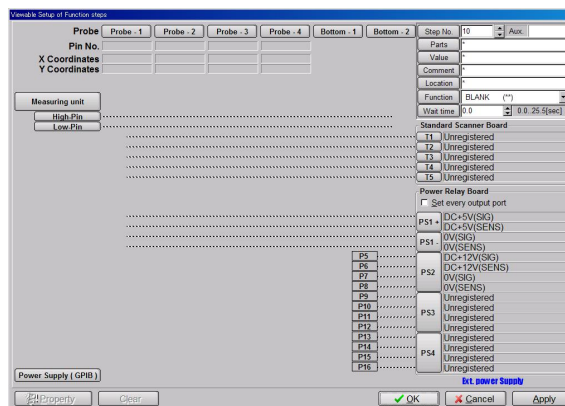
5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.

- It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.136) Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.136) Now you can see the existing configuration that [PS1+] is connected to [Bottom-1] and [PS1-] is to [Bottom-2].



[ Fig.136 ] Viewable setup of Function steps

- Click the Clear button to release the connection of [PS1+], [PS1-] and [PS2] to the bottom probes. With this, you are able to turn off the relays used in the Power relay board so that the voltage applied to the bottom probes is terminated.



[ Fig.137 ] Viewable setup of Function steps

- Click the OK button, and it goes back to the Step edit list. (the left screen of Fig.138). It will be useful to input any information on the test contents in the column “Parts” and “Value” as shown in the right screen of Fig.138.

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/F	POWER	OUT 5.0V	*
000009:	IO/F	POWER	OUT 3.3V	*
000010:	IO/F	*	*	*

[ Fig.138 ] Step edit list



## Step data review

The user should input the reference value on the Step data review screen.

The screenshot shows the 'Step data review' interface for a teaching system. The 'Test' results table is as follows:

Test	Result
1	PASS
2	
Jg	PASS

The 'Reference' value is set to 5.00 V. The 'Reading' section shows the following values:

Reading	Value
1	[*****]
2	[*****]
3	[*****]
4	[*****]
5	[*****]
Min	
Max	
AV	+000.0000,+000.0000

The graph on the right shows a plot with a vertical line at 0.5 and a horizontal line at 2048. The y-axis ranges from 0 to 4096, and the x-axis ranges from 0 to 1.0.

[ Fig.139 ] Step data review (Teaching system)

The screenshot shows the 'Step data review' interface for a point system. The 'Test' results table is as follows:

Test	Result
1	FAIL
2	
Jg	FAIL

The 'Reference' value is set to 5.00 V. The 'Reading' section shows the following values:

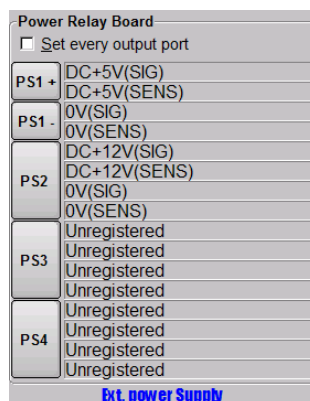
Reading	Value
1	[*****]
2	[*****]
3	[*****]
4	[*****]
5	[*****]
Min	
Max	
AV	+000.0000,+000.0000

The graph on the right is identical to the one in Fig. 139. Below the graph, there are input fields for pin numbers:

Field	Value	ID.Net
High-Pin (+)	122	*
Low-Pin (-)	1	*
Unused	0	ID.Net
Unused	0	ID.Net

[ Fig.140 ] Step data review (Point system)

- (1) Comment  
Comment column is substituted by information on the contents of test.
- (2) Element  
Element column is substituted by type of component to be measured.  
RESISTOR --> Resistors  
CAPACITOR --> Capacitors  
COIL --> Inductors  
DIODE --> VF measurement / DC voltage measurement
- (3) Function  
Function column is substituted by the Measuring function.
- (4) Temp. value  
Temp. value column is substituted by the value obtained by pressing Input and Auto Input key and is changeable within the same Measuring mode and Measuring range. The Save button can register it as the Reference value.
- (5) Measure Mode  
Measure Mode column is substituted by the measuring signal.
- (6) Measure Range  
Measure Range column is substituted by the Measuring range.
- (7) Measure Time  
Measure Time column is substituted by the Measuring time (1~999msec).
- (8) [%][-%]  
Upper and lower tolerance ratio to the Reference value are shown there. In addition, [+Limit][-Limit] will be increased or decreased in sync with the change of these value.
- (9) [+Limit][-Limit]  
Upper and lower tolerance to the Reference value are shown there. In addition, [%][-%] will be increased or decreased in sync with the change of these value.
- (10) Wait Time  
Wait Time indicates the time from applying voltage to start moving the next step.
- (11) Probe Access (Auto Polarity)  
Probe access information. Probe 1,2,3,4 is meant from the left.  
+ --> Probe to apply the measuring signal (+)  
- --> Probe to apply the measuring signal (-)  
N --> Unused
- (12) Bottom probe  
This displays the destination of Bottom probes. (Ex.) PS1+ → "M1", PS1 - → "M3".




[ Fig.141 ]


- (13) Set IO/F  
This enables to activate each function on the Viewable setup of Function steps screen.

## Reference input

When the user is going to measure the UUT while applying voltage, they should specify both Element and Measuring mode. When RESISTOR, CAPACITOR or COIL is set to the Element, the user should specify the Measuring mode to "AUTO" and click the Auto Input button to input the reference value. The Temp. Value column displays the measured value. The user should change Function and/or Measure Time as needed. Clicking the Store button can save the Temp. Value to the Reference value.

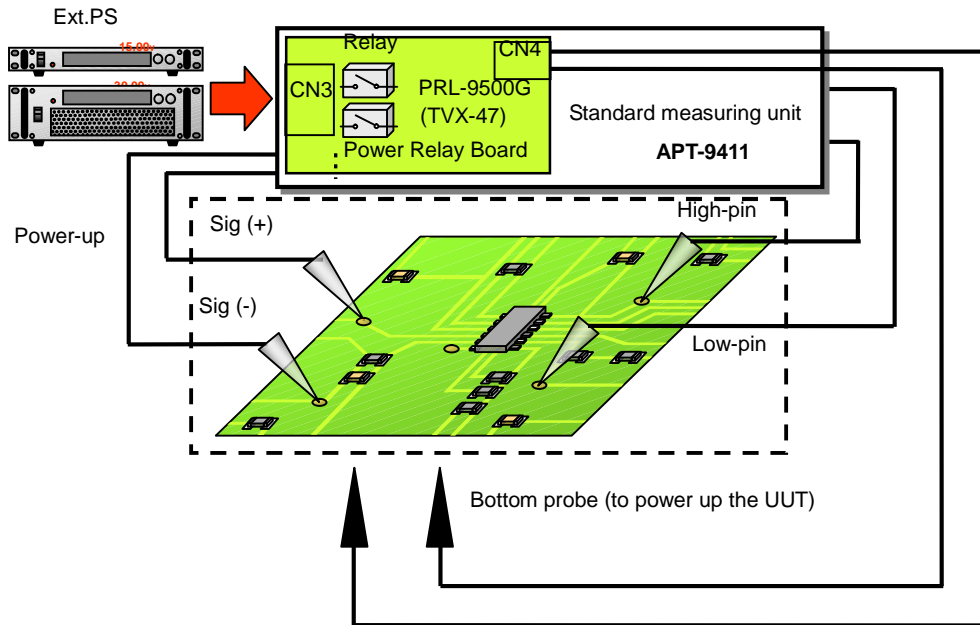
When the user is going to specify DIODE to the Element to perform the VF measurement, the Measuring mode should be set to DC-CC. In addition, when the DC voltage is measured, the Measuring mode should be set to DC-VM. The user should click the Input button to input the Reference value. The Temp. Value column displays the measured value. Clicking the Store button can save the Temp. Value to the Reference value.

 WARNING	<p><b>This function is used to power up the board to test. And so it may cause serious damage to the PC boards and/or the measuring unit if the user misuses it (ex. wrong location, Outport so on). The use of the I/O commands must be carried out under the responsibility of the user.</b></p>
--	--

	<p>When you are going to measure DC voltage, be sure to click the Input button to input the reference value. If the Auto Input button is clicked without due care, the Measuring mode will be initialized and any unexpected Measuring mode will be used to input the reference value.</p> <p>When you try to use other than DC-VM mode while applying voltage to the UUT, sometimes it shows the error "The PCB is charged with high voltage!" on the display. It means, you cannot use other than DC-VM mode.</p>
---	---

## CASE 2

When the external power supplies are used to power up the UUT and the flying probes measure the specified two points at the same time.



[ Fig.142 ] CASE 2

(Remarks)

1. It's the flying probes that the user can select to measure the UUT.
2. When the external power supplies apply the voltage to the UUT through the bottom probes or the connector at the Tray, the voltage output won't be terminated automatically even if it moves to the next step. Therefore, the user should program a step to terminate the voltage to the UUT.
3. The user is able to apply the voltage through both the flying probes and the bottom probes. (Means, it's possible to connect more than one external power supply to the UUT)

# Programming procedure

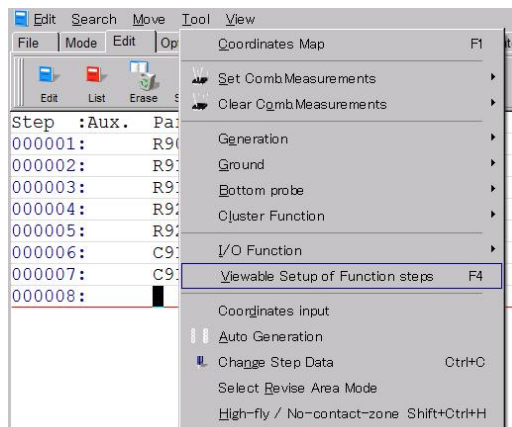
## How to apply voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.143)

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

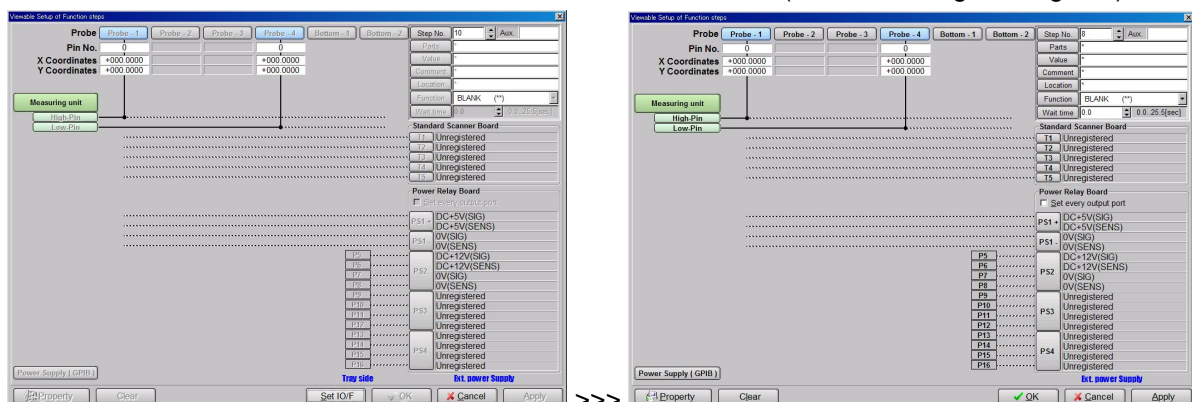
[ Fig.143 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.144)



[ Fig.144 ] Viewable setup of Function steps

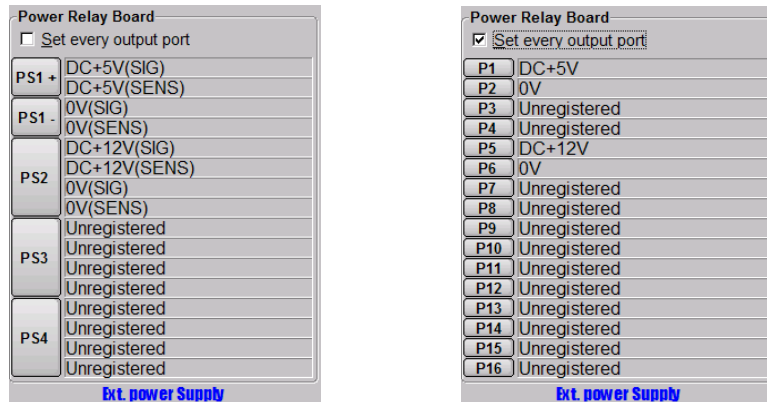
5. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.145).  
Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.145)




[ Fig.145 ] Viewable setup of Function steps

- Select "Set every output port" at Power Relay Board.  
Be sure to select the box when you want to apply voltage through the flying probes and the bottom probes. (Refer to the left of Fig.146)

Unless the box is selected, you will get to 4-terminal connection so that you cannot apply voltage through the flying probes and the bottom probes. (Refer to the right of Fig.146)

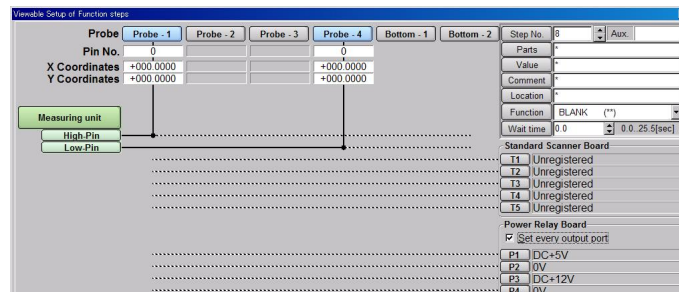


when Set every output port is unchecked    when Set every output port is selected  
[ Fig.146 ] Viewable setup of Function steps



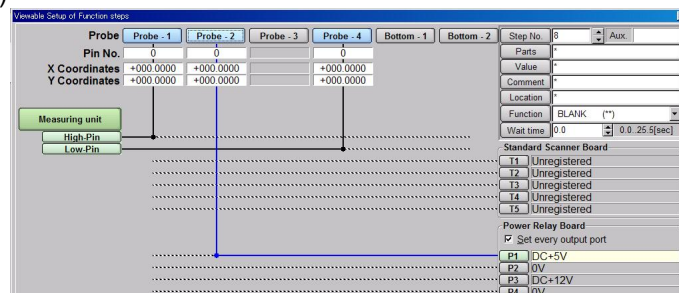
Signal name (ex. 0V, DC +5V) on Fig.146 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) "Unregistered" means that signal name is not registered yet.

- Click [P1] to specify the output of the external power supplies connected to the PRL-9500G. Then [Probe-1] to [Bottom-2] buttons are flashing in yellow.



[ Fig.147 ] Viewable setup of Function steps

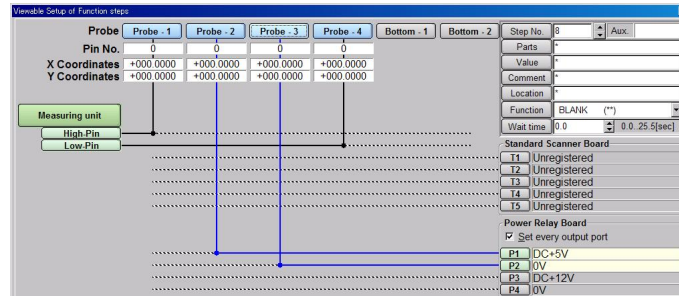
- [High-Pin] and [Low-Pin] of Measuring unit are already connected to [Probe-1] and [Probe-4]. Specify [Probe-2] as the output of [P1], and they will be connected with a blue line. (Refer to Fig.148)



[ Fig.148 ] Viewable setup of Function steps

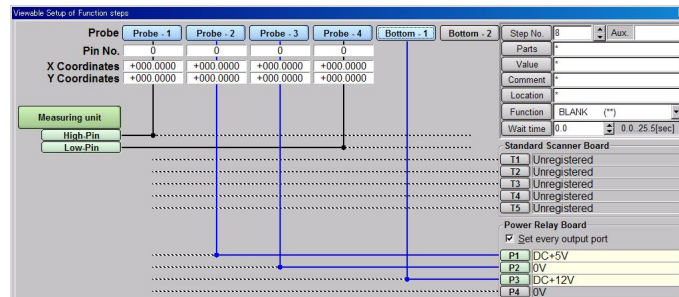


- Click [P2] to specify the output, and [Probe-1] to [Bottom-2] buttons are flashing in yellow. Specify [Probe-3] as the output of [P2], and they will be connected with a blue line. (Refer to Fig.149)



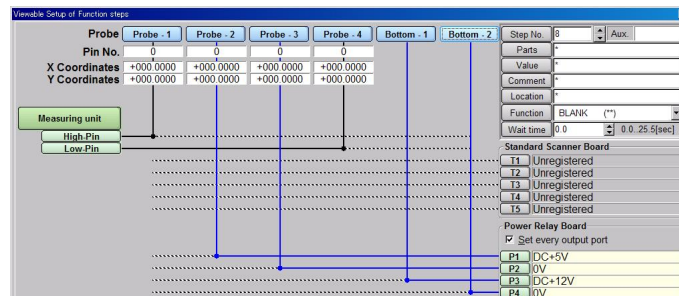
[ Fig.149 ] Viewable setup of Function steps

- Click [P3] to specify the output, and [Probe-1] to [Bottom-2] buttons are flashing in yellow. Specify [Bottom-1] as the output of [P3], and they will be connected with a blue line. (Refer to Fig.150)



[ Fig.150 ] Viewable setup of Function steps

- Click [P4] to specify the output, and [Probe-1] to [Bottom-2] buttons are flashing in yellow. Specify [Bottom-2] as the output of [P4], and they will be connected with a blue line. (Refer to Fig.151)



[ Fig.151 ] Viewable setup of Function steps

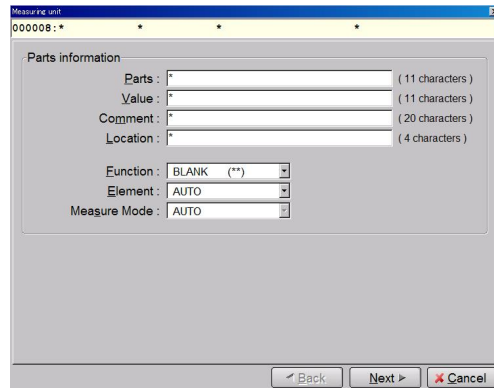
The color of the lines connecting [PS1] to [PS4] to the output mean maximum current value, for example; [ blue ] → 3A

Fig.151 indicates that [Probe-2] and [Probe-3] are connected to the external power supplies and that [Probe-1] and [Probe-4] are to the measuring unit of the APT-9411, but these connection may change according to the coordinates of the contact points.

At Step 11 above, [P4] (0V of DC+12V) was connected to [Bottom-2] as an example. But it is also possible to connect [P4] to [Probe-3] when it is shared with 0V of DC+5V in the circuit.

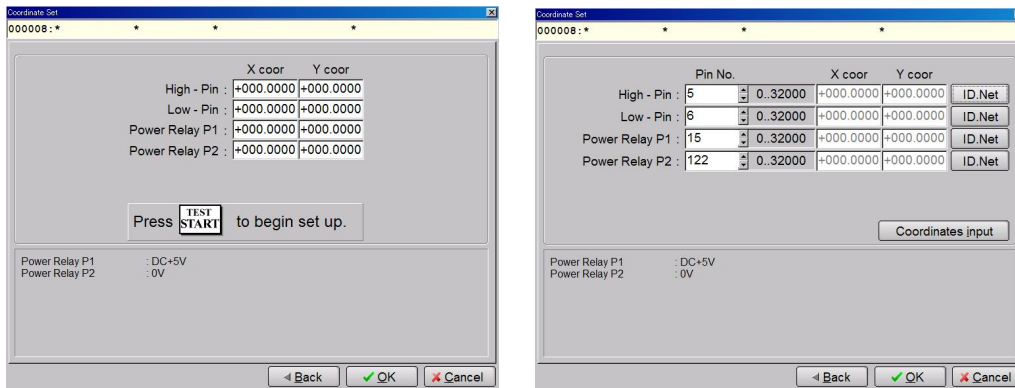
[ Fig.152 ]

12. Click the Property button, and it will display the Measuring unit screen. (Refer to Fig.153) Use your keyboard to fill in the Parts column. In addition, enter the Value, Comment and Location column as needed.  
Fill in the Function, Element and Measure Mode column if the measurement content is already determined as they will assist in inputting the reference value.



[ Fig.153 ] Viewable setup of Function steps

13. Click the Next button, and it will displays the Coordinate set screen. (Refer to Fig.154)




(Teaching system)

(Point system)

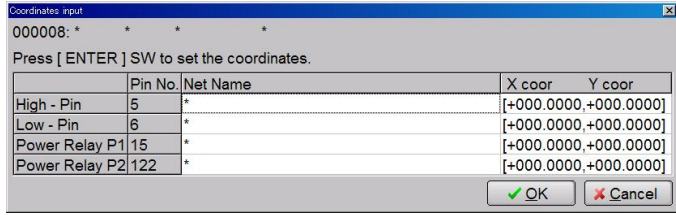
[ Fig.154 ] Coordinate set

On the Coordinate set screen, enter the coordinates (in Teaching system) or the pin numbers (in Point system) as requested by the menu.



**HINT**

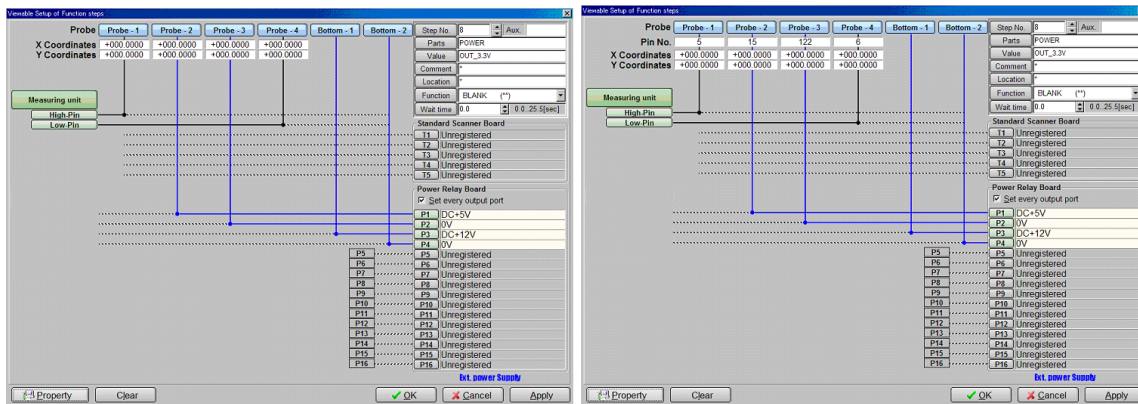
In Point system, when any new pin number was added, click the Coordinates input button so that it displays Fig.155 where the user can enter the coordinates.



[ Fig.155 ] Coordinate input



14. Click the OK button, and it goes back to the Viewable setup of Function steps screen.

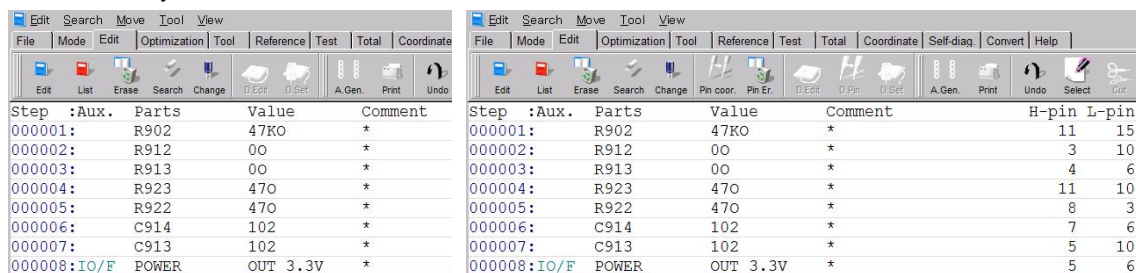


(Teaching system)

(Point system)

[ Fig.156 ] Viewable setup of Function steps

15. Click the OK button, and it goes back to the Step edit list. Now you can see the AUX. column is substituted by "IO/F".



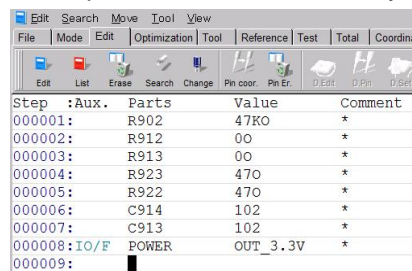
(Teaching system)

(Point system)

[ Fig.157 ] Step edit list

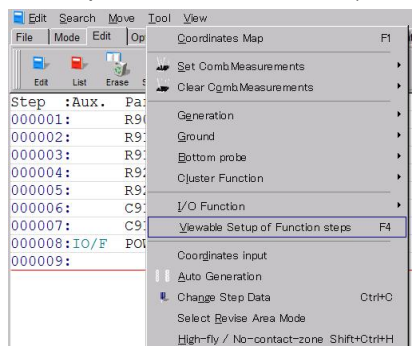
## How to terminate voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays "Enter step number (1 - x)". Let's put a new step to the last step. Use the keyboard to specify the step which should be terminated and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step.



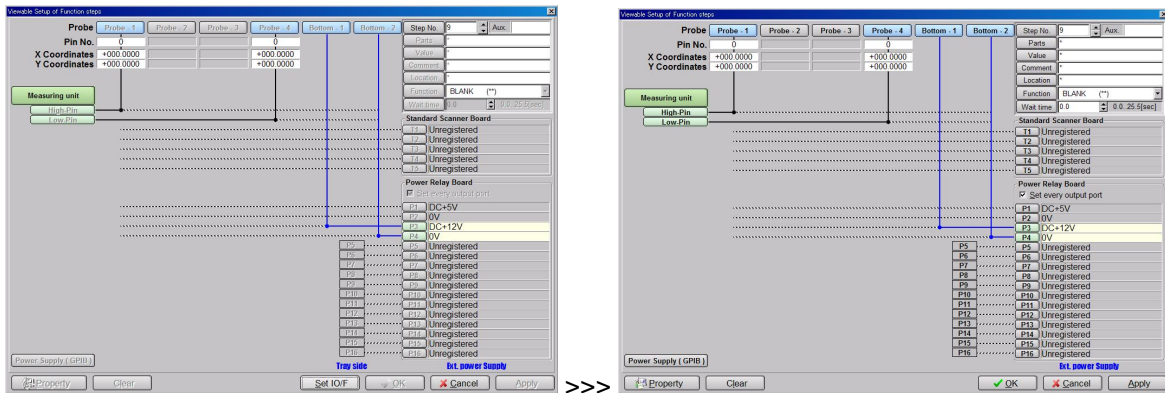
[ Fig.158 ] Step edit list

4. Click "Viewable setup of Function steps" on the Tool menu. (Refer to Fig.159)



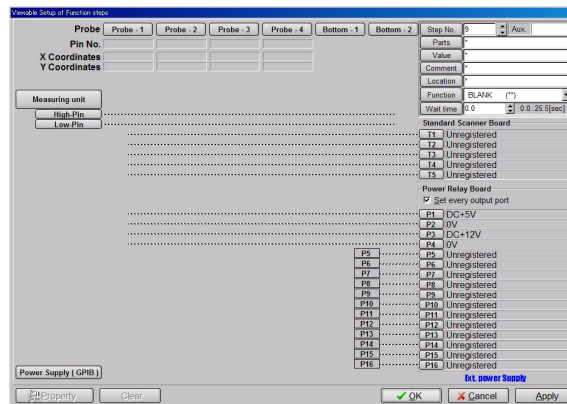
[ Fig.159 ] Viewable setup of Function steps

- It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
- It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.160) Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.160) Now you can see the existing configuration that [PS3] is connected to [Bottom-1] and [P4] is to Bottom-2.



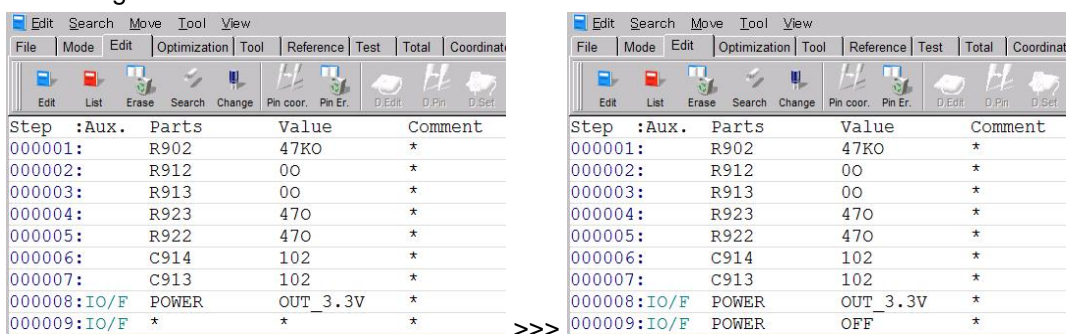
[ Fig.160 ] Viewable setup of Function steps

- Click the Clear button to release the connection of [P3] and [P4] to the bottom probes. With this, you are able to turn off the relays used in the Power relay board so that the voltage applied to the bottom probes is terminated.



[ Fig.161 ] Viewable setup of Function steps

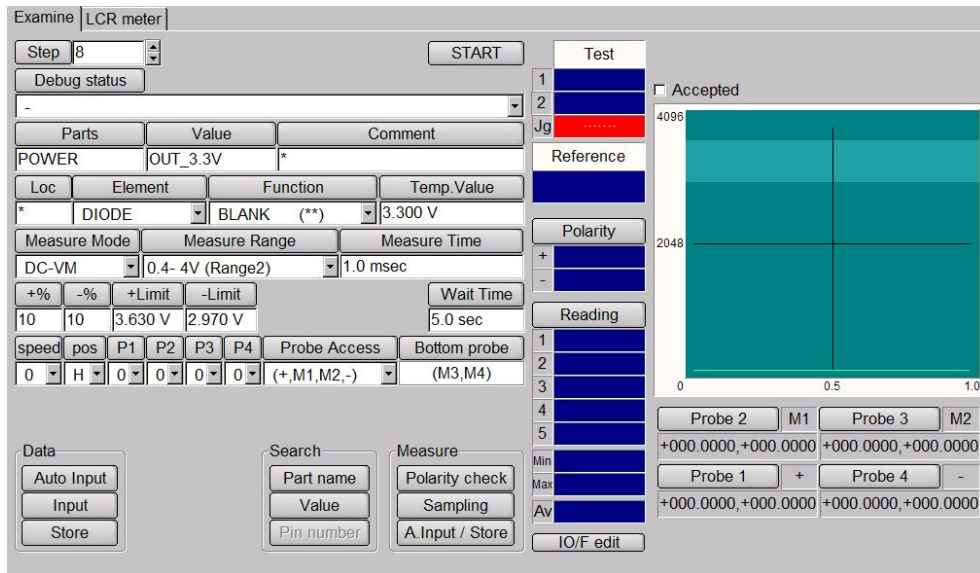
- Click the OK button, and it goes back to the Step edit list. (the left screen of Fig.162). It will be useful to input any information on the test contents in the column “Parts” and “Value” as shown in the right screen of Fig.162.



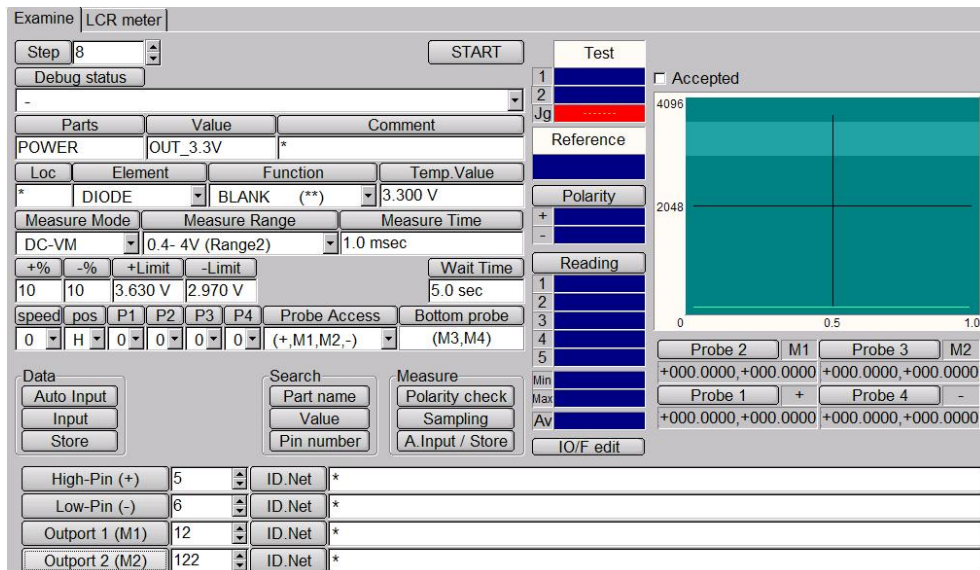
[ Fig.162 ] Step edit list

## Step data review

The user should input the reference value on the Step data review screen.

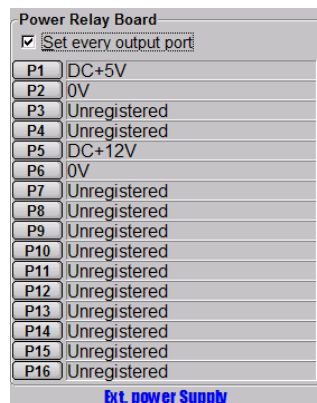


[ Fig.163 ] Step data review (Teaching system)



[ Fig.164 ] Step data review (Point system)

- (1) Comment  
Comment column is substituted by information on the contents of test.
- (2) Element  
Element column is substituted by type of component to be measured.  
RESISTOR --> Resistors  
CAPACITOR --> Capacitors  
COIL --> Inductors  
DIODE --> VF measurement / DC voltage measurement
- (3) Function  
Function column is substituted by the Measuring function.
- (4) Temp. value  
Temp. value column is substituted by the value obtained by pressing Input and Auto Input key and is changeable within the same Measuring mode and Measuring range. The Save button can register it as the Reference value.
- (5) Measure Mode  
Measure Mode column is substituted by the measuring signal.
- (6) Measure Range  
Measure Range column is substituted by the Measuring range.
- (7) Measure Time  
Measure Time column is substituted by the Measuring time (1~999msec).
- (8) [%][-%]  
Upper and lower tolerance ratio to the Reference value are shown there. In addition, [+Limit][-Limit] will be increased or decreased in sync with the change of these value.
- (9) [+Limit][-Limit]  
Upper and lower tolerance to the Reference value are shown there. In addition, [%][-%] will be increased or decreased in sync with the change of these value.
- (10) Wait Time  
Wait Time indicates the time from applying voltage to start moving the next step.
- (11) Probe Access (Auto Polarity)  
Probe access information. Probe 1,2,3,4 is meant from the left.  
+ --> Probe to apply the measuring signal (+)  
- --> Probe to apply the measuring signal (-)  
M? --> This indicates the Output number on Fig.165. For example, M1 means [P1].
- (12) Bottom probe  
Bottom probe access information. Like Fig.165, this indicates the Output number. For example, M3 means [P3].




[ Fig.165 ]


- (13) Set IO/F  
This enables to activate each function on the Viewable setup of Function steps screen.

## Reference input

When the user is going to measure the UUT while applying voltage, they should specify both Element and Measuring mode. When RESISTOR, CAPACITOR or COIL is set to the Element, the user should specify the Measuring mode to "AUTO" and click the Auto Input button to input the reference value. The Temp. Value column displays the measured value. The user should change Function and/or Measure Time as needed. Clicking the Store button can save the Temp. Value to the Reference value.

When the user is going to specify DIODE to the Element to perform the VF measurement, the Measuring mode should be set to DC-CC. In addition, when the DC voltage is measured, the Measuring mode should be set to DC-VM. The user should click the Input button to input the Reference value. The Temp. Value column displays the measured value. Clicking the Store button can save the Temp. Value to the Reference value.

 WARNING	<p><b>This function is used to power up the board to test. And so it may cause serious damage to the PC boards and/or the measuring unit if the user misuses it (ex. wrong location, Outport so on). The use of the I/O commands must be carried out under the responsibility of the user.</b></p>
--	--

	<p>When you are going to measure DC voltage, be sure to click the Input button to input the reference value. If the Auto Input button is clicked without due care, the Measuring mode will be initialized and any unexpected Measuring mode will be used to input the reference value.</p> <p>When you try to use other than DC-VM mode while applying voltage to the UUT, sometimes it shows the error "The PCB is charged with high voltage!" on the display. It means, you cannot use other than DC-VM mode.</p>
---	---

## **Control External power supplies via GPIB**

The user is able to control the external power supplies (Voltage / Current / Output ON/OFF) via GPIB and connect the specified voltage and current to the PRL-9500G to output to the flying probes or the bottom probes. The GPIB controllable external power supply is Max 5.

Appearing below are typical cases:

1. CASE 1

It's used to just control the external power supplies (Voltage / Current / Output ON/OFF) without using the PRL-9500G. (The user must think of the way of applying voltage to the UUT)

2. CASE 2

It's used to control the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the bottom probes or the connector at the Tray. Therefore, more than one step will be measured until the step to terminate the output is executed.

3. CASE 3

It's used to control the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the flying probes. The measurement is performed by the APT-9411. After the step finished applying voltage through the flying probes, the output to the UUT will be terminated automatically. For instance, the user can perform On/Off check of the 3-terminal regulators and the relay components.

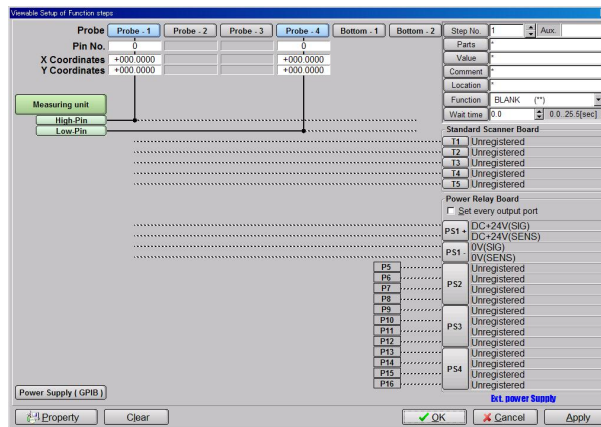
4. CASE 4

It's used to control the external power supplies to measure the Zener diodes. Usually, the APT-9411 is able to measure the Zener diodes up to 40V but the measuring range differs according to the specifications of the external power supplies.



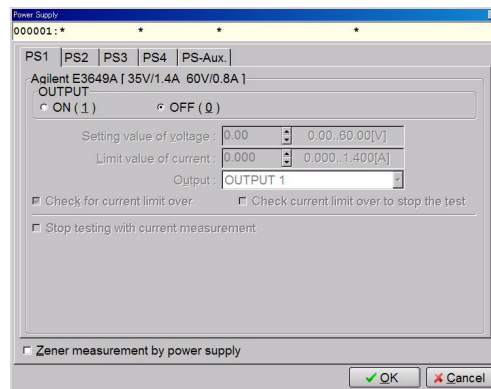
## Programming procedure

This section describes the way of controlling the output voltage etc of the external power supplies using the Viewable setup of Function steps screen.



[ Fig.166 ] Viewable setup of Function steps

Click [Set IO/F] button and then [Power Supply (GPIB)] button on the Viewable setup of Function steps screen. And it will display Fig.167.



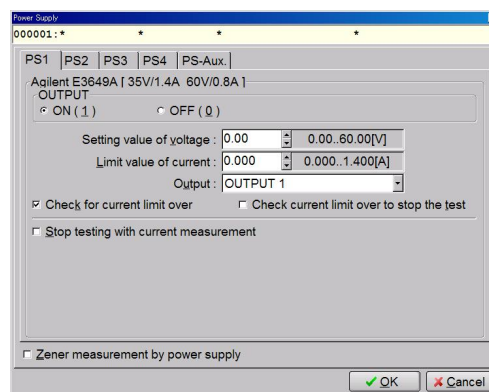
[ Fig.167 ] Power Supply

### PS-1 ~ PS-Aux

Select the external power supplies from PS1 ~ PS-Aux.

### OUTPUT

If ON is selected, the external power supplies turn on. After the box was selected, it displays Fig.168. If OFF is selected, the voltage to the UUT will be terminated.



[ Fig.168 ] Power Supply



### Setting value of voltage

This can specify the voltage to output by 10mV. The output range at the right will be set automatically according to the external power supply specified by the user.

### Limit value of current

This can specify the current to output by 1mA. The output range at the right will be set automatically according to the external power supply specified by the user. When the step is performed, if it exceeds this value, the error message will appear. At the same time, the output from the external power supply will be terminated automatically to suspend the test accordingly.

### Output

This appears only when the dual-out type of the Agilent external power supply is selected. Select either OUTPUT1 or OUTPUT2 from the right pull-down menu.



### Check for current limit over

When the box is selected, the test will be suspended if it exceeds the current limit.

### Stop testing with current measurement

When the box is selected, the test will be suspended if it goes off the preset current on the step.

### Reference current value

This is the standard current value and must be set smaller than "Limit value of current". Max. current value differs according to the external power supply models and is configurable by 1mA.

### Judgment +% tolerance

This is the upper limit of the current value shown by %.

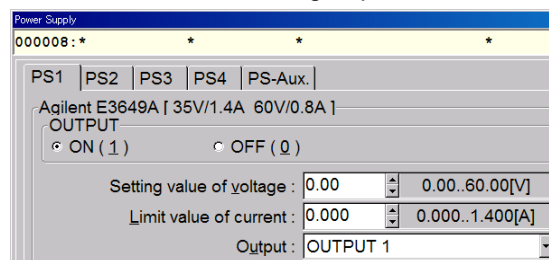
### Judgment -% tolerance

This is the lower limit of the current value shown by %.

### Zener measurement by power supply

When the box is selected, the user can use the external power supplies to measure the Zener voltage. After the box was selected, it displays Fig.169.

The APT-9411 is able to measure the Zener diodes up to 40V as standard, but the measuring range differs according to the specifications of the external power supplies. For instance, the Agilent E3649A model enables to measure the Zener voltage up to 60V.



[ Fig.169 ] Power Supply

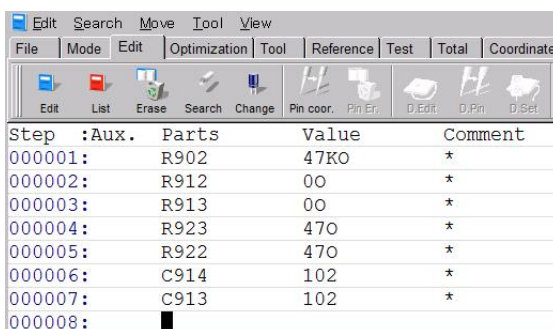
CASE 1 ~ 4 are programmable in the way herein after prescribed.

### CASE 1

This is the case you want to control the external power supplies (Voltage / Current / Output ON/OFF) without using the PRL-9500G.

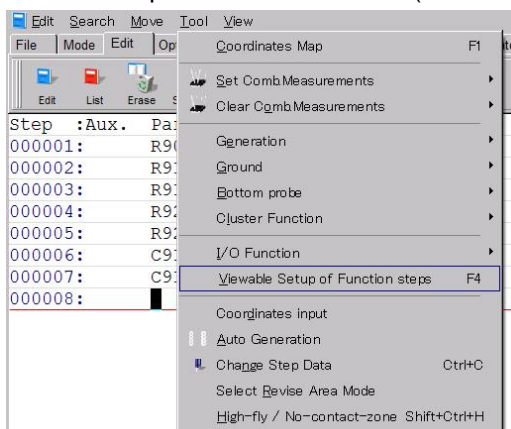
#### How to apply voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 ? x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.170)



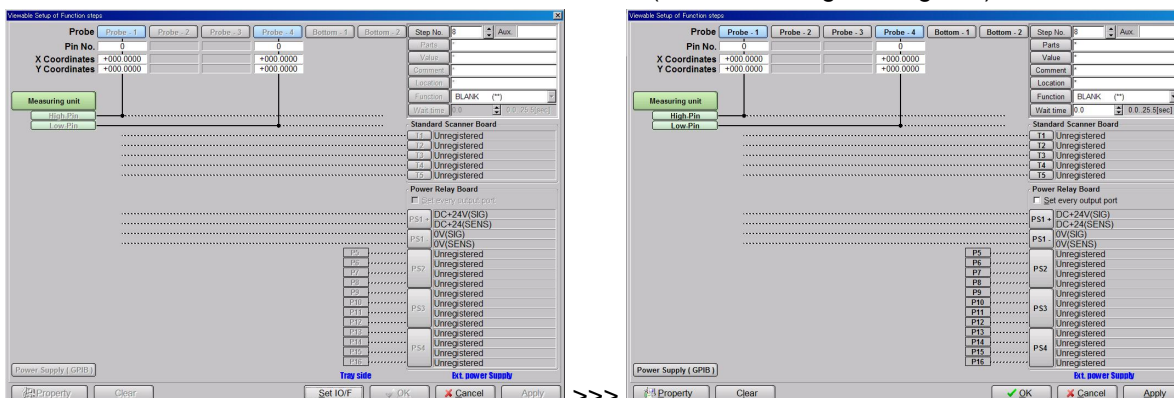
[ Fig.170 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.171)



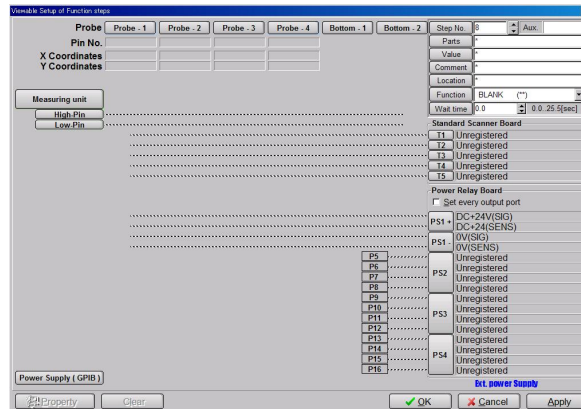
[ Fig.171 ] Viewable setup of Function steps

5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.172). Click “Set I/O/F” button to activate each function on the screen. (Refer to the right of Fig.172)



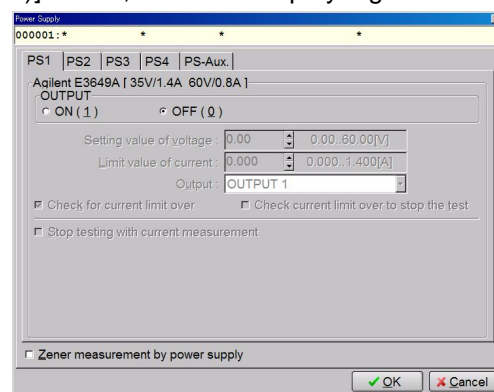
[ Fig.172 ] Viewable setup of Function steps

- Click [Clear] button to release the connection of High-pin/Low-pin of the Measuring unit. (Refer to Fig.173.)



[ Fig.173 ] Viewable setup of Function steps

- Click [Power Supply (GPIB)] button, and it will display Fig.174.



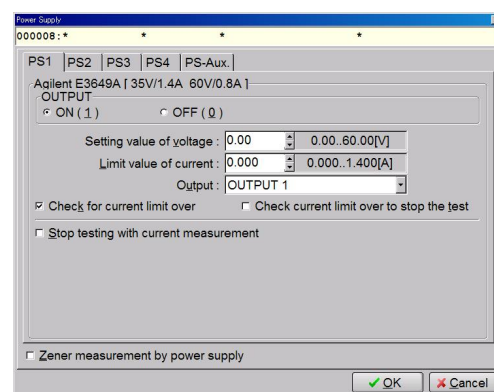
[ Fig.174 ] Power Supply

### PS-1 ~ PS-Aux

Select the external power supplies from PS1 ~ PS-Aux.

### OUTPUT

Select ON, and it will display Fig.175.



[ Fig.175 ] Power Supply

### Setting value of voltage

This can specify the voltage to output by 10mV. The output range at the right will be set automatically according to the external power supply specified by the user.

### Limit value of current

This can specify the current to output by 1mA. The output range at the right will be set automatically according to the external power supply specified by the user. When the step is performed, if it exceeds this value, the error message will appear. At the same time, the output from the external power supply will be terminated automatically to suspend the test accordingly.

**Output**

This appears only when the dual-out type of the Agilent external power supply is selected. Select either OUTPUT1 or OUTPUT2 from the right pull-down menu.

**Check for current limit over**

When the box is selected, the test will be suspended if it exceeds the current limit. Select the box as needed.

**Stop testing with current measurement**

When the box is selected, the test will be suspended if it goes off the preset current on the step.

**Reference current value**

This is the standard current value and must be set smaller than “Limit value of current”. Max. current value differs according to the external power supply models and is configurable by 1mA.

**Judgment +% tolerance**

This is the upper limit of the current value shown by %.

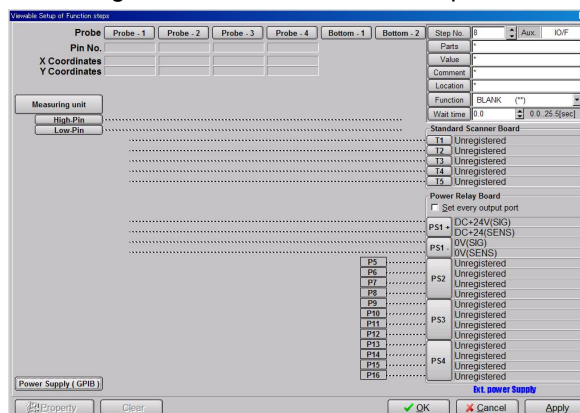
**Judgment -% tolerance**

This is the lower limit of the current value shown by %.

**Zener measurement by power supply**

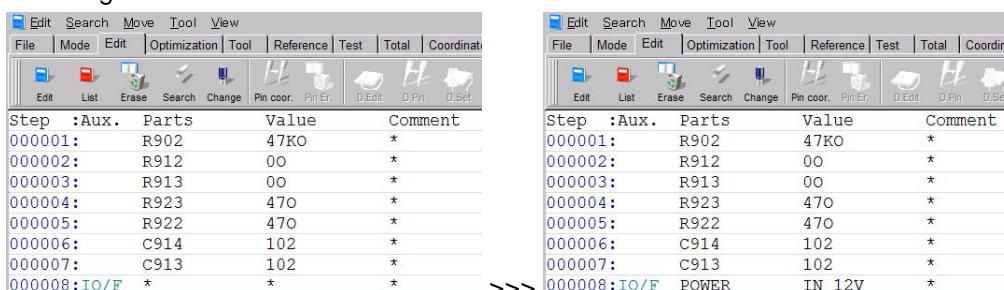
Uncheck the box.

- Click the OK button, and it will go back to the Viewable setup of Function steps screen.



[ Fig.176 ] Viewable setup of Function steps

- Click the OK button, and it goes back to the Step edit list. (the left screen of Fig.177). It will be useful to input any information on the test contents in the column “Parts” and “Value” as shown in the right screen of Fig.177.



[ Fig.177 ] Step edit list

- Now the external power supplies start outputting the voltage. It's not possible to apply the voltage to the UUT through the flying probes and the bottom probes. The user must think of the way of applying voltage to the UUT. The output of the voltage will be kept until the step to suspend the output is executed.
- Program the step to measure the output at the next step.

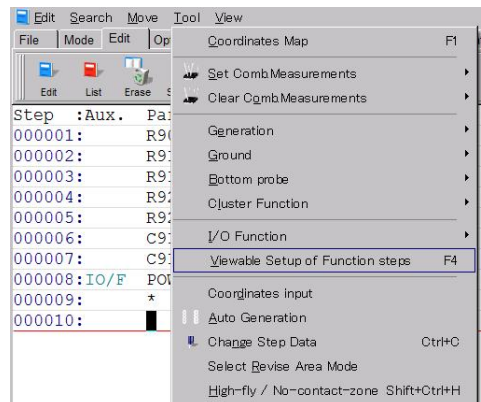
## How to terminate voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to specify the step which should be terminated and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.178)

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/F	POWER	IN 12V	*
000009:	*		OUT 5.0V	*
000010:				

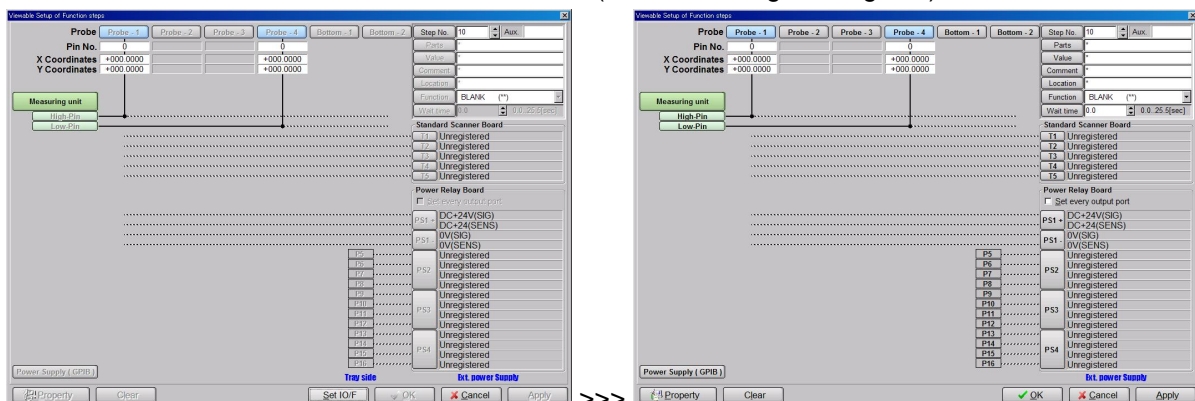
[ Fig.178 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.179)



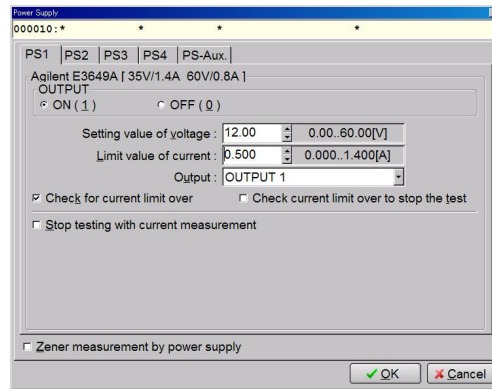
[ Fig.179 ] Viewable setup of Function steps

5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.180) Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.180)



[ Fig.180 ] Viewable setup of Function steps

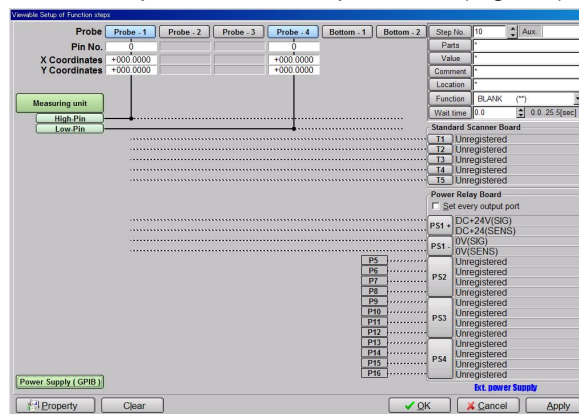
7. Click [Power Supply] button, and it will display Fig.181.



[ Fig.181 ] Power Supply

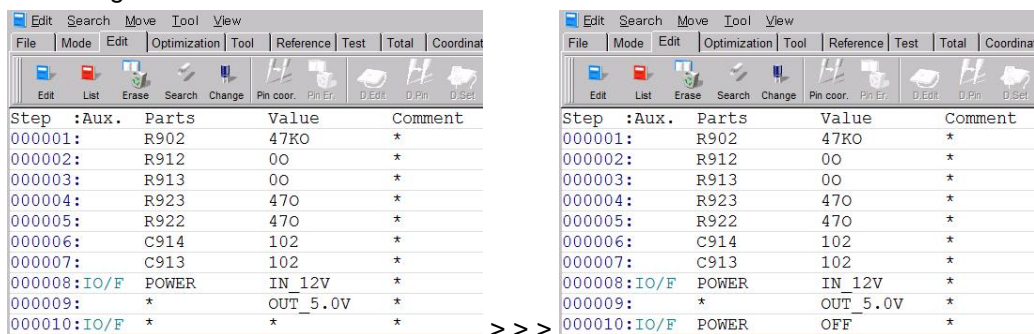
8. Select OFF at OUTPUT column and click the OK button.

9. It goes back to the Viewable setup of Function steps screen (Fig.182).



[ Fig.182 ] Viewable setup of Function steps

10. Click the OK button, and it goes back to the Step edit list. (the left screen of Fig.183). It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in the right screen of Fig.183.



[ Fig.183 ] Step edit list



## CASE 2

This is the case you want to control the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the bottom probes or the connector at the Tray. Therefore, more than one step will be measured until the step to terminate the output is executed.

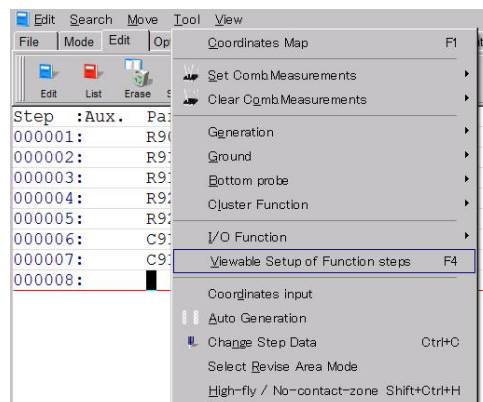
### How to apply voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 ? x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.184)

Step	Parts	Value	Comment
000001:	R902	47KO	*
000002:	R912	00	*
000003:	R913	00	*
000004:	R923	470	*
000005:	R922	470	*
000006:	C914	102	*
000007:	C913	102	*
000008:			

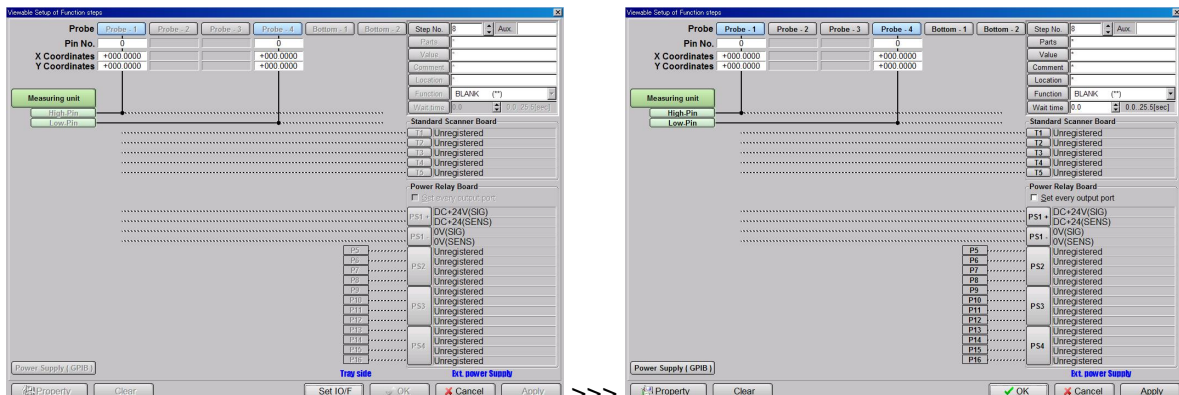
[ Fig.184 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.185)



[ Fig.185 ] Viewable setup of Function steps

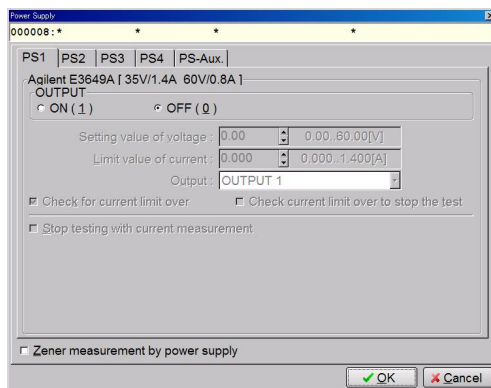
5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.186). Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.186)



[ Fig.186 ] Viewable setup of Function steps



7. Click [Power Supply (GPIB)] button, and it will display Fig.187.



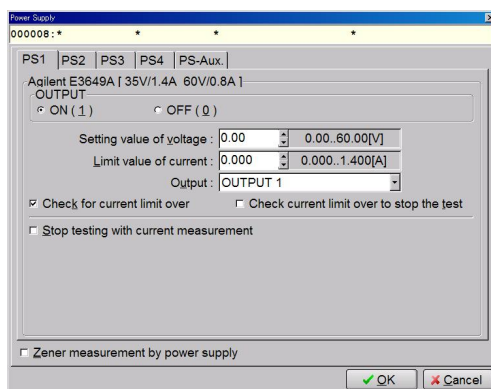
[ Fig.187 ] Power Supply

### PS-1 ~ PS-Aux

Select the external power supplies from PS1 ~ PS-Aux.

### OUTPUT

Select ON, and it will display Fig.188.



[ Fig.188 ] Power Supply

### Setting value of voltage

This can specify the voltage to output by 10mV. The output range at the right will be set automatically according to the external power supply specified by the user.

### Limit value of current

This can specify the current to output by 1mA. The output range at the right will be set automatically according to the external power supply specified by the user. When the step is performed, if it exceeds this value, the error message will appear. At the same time, the output from the external power supply will be terminated automatically to suspend the test accordingly.

### Output

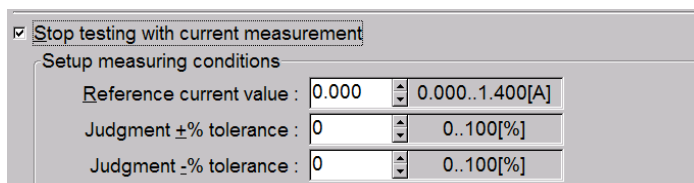
This appears only when the dual-out type of the Agilent external power supply is selected. Select either OUTPUT1 or OUTPUT2 from the right pull-down menu.

### Check for current limit over

When the box is selected, the test will be suspended if it exceeds the current limit. Select the box as needed.

### Stop testing with current measurement

When the box is selected, the test will be suspended if it goes off the preset current on the step.



[ Fig.189 ] Power Supply

**Reference current value**

This is the standard current value and must be set smaller than “Limit value of current”. Max. current value differs according to the external power supply models and is configurable by 1mA.

**Judgment +% tolerance**

This is the upper limit of the current value shown by %.

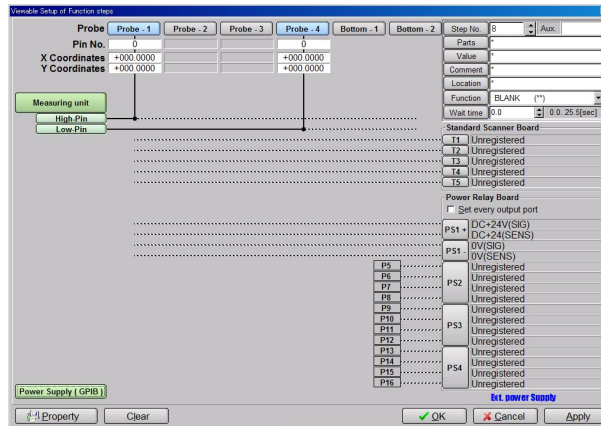
**Judgment -% tolerance**

This is the lower limit of the current value shown by %.

**Zener measurement by power supply**

Uncheck the box.

- Click the OK button, and it will go back to the Viewable setup of Function steps screen.



[ Fig.190 ] Viewable setup of Function steps

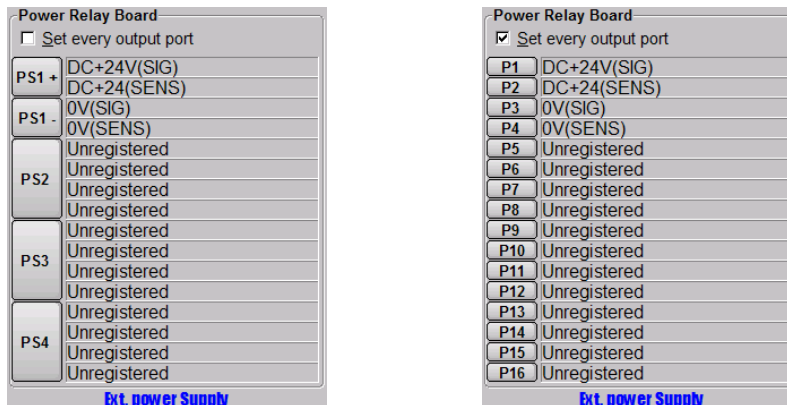
- Here you can specify the output from the external power supplies. Because you are going to measure more than one step while applying the voltage, [Bottom-1], [Bottom-2] or [Connector at the Tray] must be specified. Let's specify [Bottom-1] and [Bottom-2] as an example. (When [Connector at the Tray] is specified, the user must think of the way of applying voltage to the UUT)

Select “Set every output port” at Power Relay Board.

When the box is unchecked, you will get to 4-terminal connection. (Refer to the left of Fig.191)

When the box is checked, you will get to 2-terminal connection. (Refer to the right of Fig.191)

Configure it on the basis of the specification of your external power supplies. We will hereinafter explain the process while assuming that the box is unchecked.



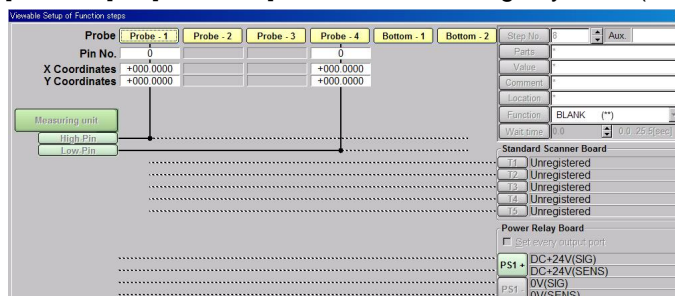
when Set every output port is unchecked      when Set every output port is selected

[ Fig.191 ] Viewable setup of Function steps



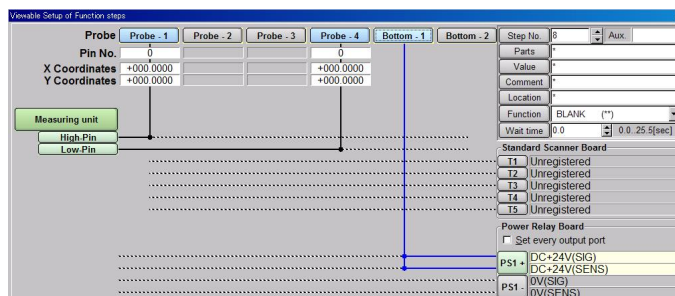
Signal name (ex. DC+24V, 0V) on Fig.191 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) “Unregistered” means that signal name is not registered yet.

10. Click [PS1+], and [Probe-1] to [Bottom-2] buttons are flashing in yellow. (Refer to Fig.192)



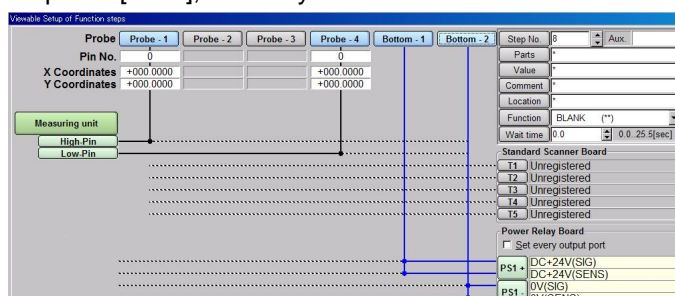
[ Fig.192 ] Viewable setup of Function steps

Specify [Bottom-1] as the output of [PS1+], and they will be connected with a blue line. (Refer to Fig.193)



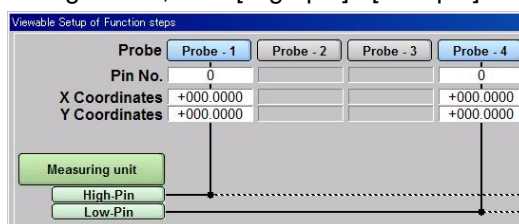
[ Fig.193 ] Viewable setup of Function steps

11. Click [PS1-] to specify the output, and [Probe1] to [Bottom-2] are flashing in yellow. Specify [Bottom-2] as the output of [PS1-], and they will be connected with a blue line. (Refer to Fig.194)



[ Fig.194 ] Viewable setup of Function steps

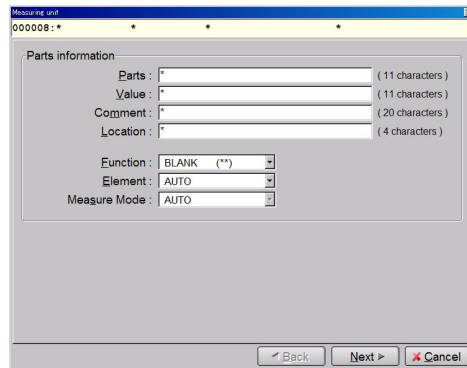
12. The two probes used to measure after powered up the UUT are already set to [Probe-1] and [Probe-4]. If you want to change them, click [High-pin] / [Low-pin] to select other probes.



[ Fig.195 ] Viewable setup of Function steps

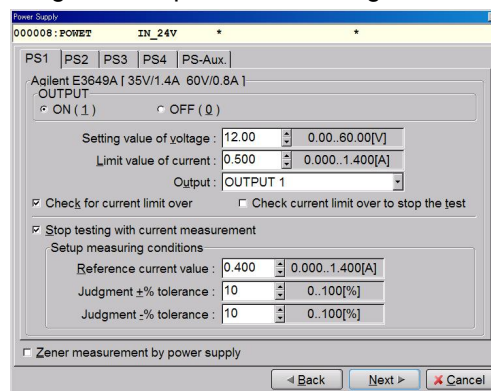
The color of the lines connecting [PS1+] [PS1-] to the output mean maximum current value, for example; [ blue ] → 3A

- Click the Property button, and it will display the Measuring unit screen. (Refer to Fig.196) Use your keyboard to fill in the Parts column. In addition, enter the Value, Comment and Location column as needed.  
Fill in the Function, Element and Measure Mode column if the measurement content is already determined as they will assist in inputting the reference value.



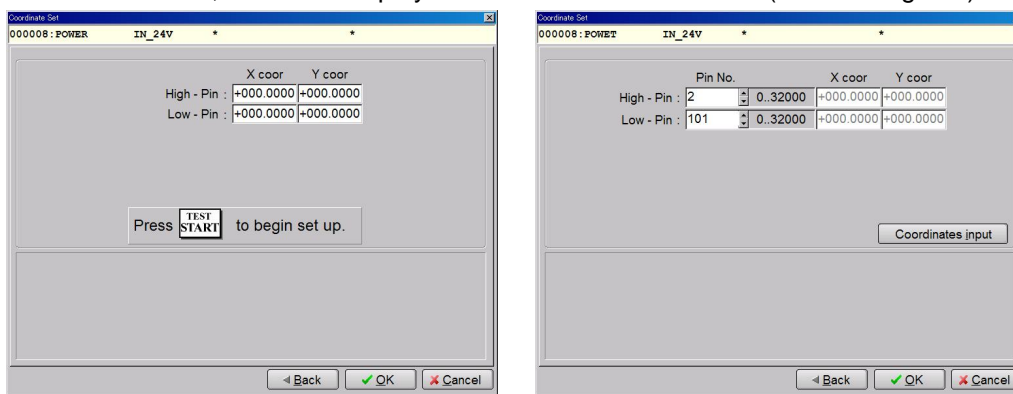
[ Fig.196 ] Measuring unit

- Click the Next button, and it will displays the Coordinate set screen. (Refer to Fig.197) This is the same screen as Fig.188. It's possible to change the contents.



[ Fig.197 ] Power Supply

- Click the Next button, and it will displays the Coordinate set screen. (Refer to Fig.198)



(Teaching system)

(Point system)

[ Fig.198 ] Coordinate set

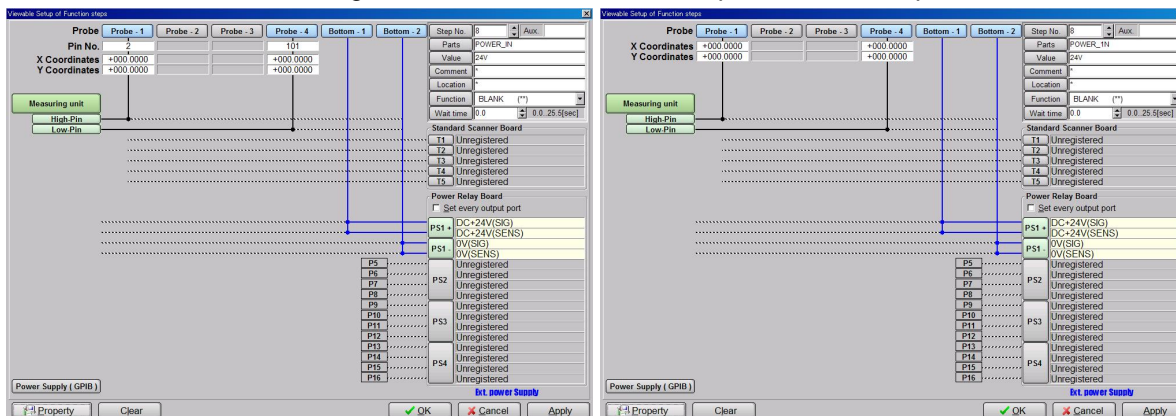
On the Coordinate set screen, enter the coordinates of High-pin and Low-pin (in Teaching system) or the pin numbers (in Point system).

**HINT**

In Point system, when any new pin number was added, click the Coordinates input button so that it displays Fig.199 where the user can enter the coordinates.

[ Fig.199 ] Coordinate input

16. Click the OK button, and it goes back to the Viewable setup of Function steps screen.



(Teaching system)

(Point system)

[ Fig.200 ] Viewable setup of Function steps

17. Click the OK button, and it goes back to the Step edit list. Now you can see the AUX. column is substituted by "IO/F".

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/F	POWER	IN 24V	*

(Teaching system)

(Point system)

[ Fig.201 ] Step edit list

18. Program the step to measure the output at the next step.



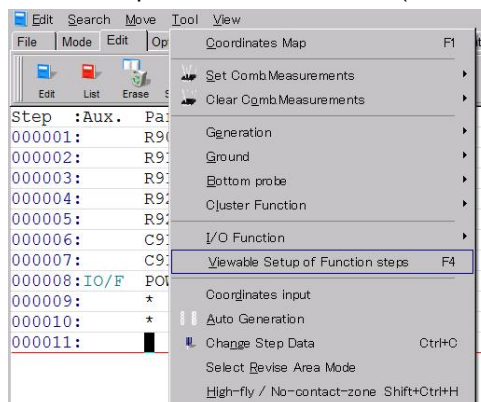
## How to terminate voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 – x)”. Let’s put a new step on the last step. Use the keyboard to specify the step which should be terminated and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.202)

Step	Parts	Value	Comment
000001:	R902	47KO	*
000002:	R912	00	*
000003:	R913	00	*
000004:	R923	47O	*
000005:	R922	47O	*
000006:	C914	102	*
000007:	C913	102	*
000008:	IO/F POWER	IN_24V	*
000009:	*	OUT_12V	*
000010:	*	OUT_5.0V	*
000011:			

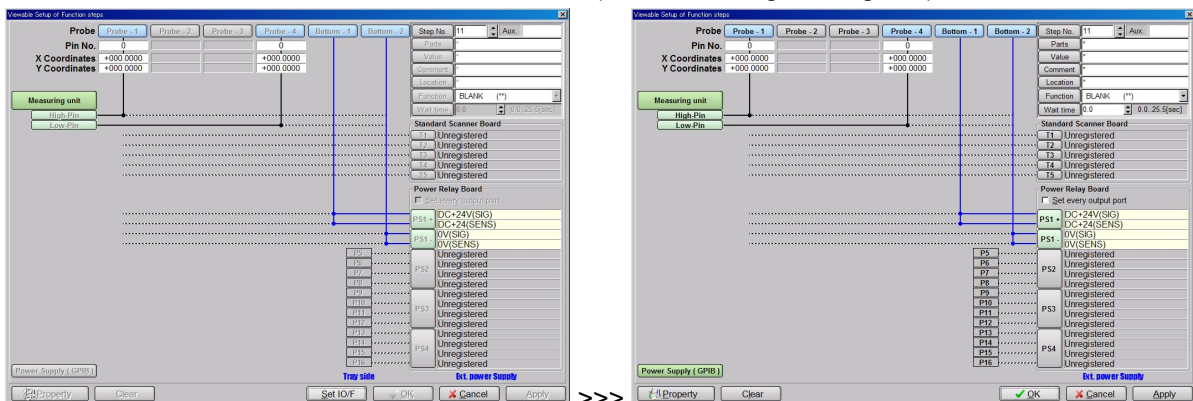
[ Fig.202 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.203)



[ Fig.203 ] Viewable setup of Function steps

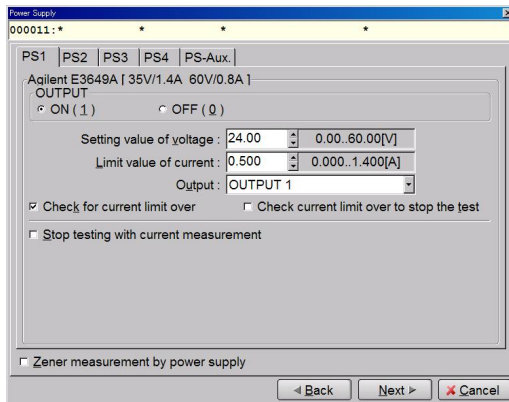
5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.204) Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.204)



[ Fig.204 ] Viewable setup of Function steps

7. Click [Clear] button, and the connecting lines from [PS+], [PS-] and [Measuring unit] will be released.

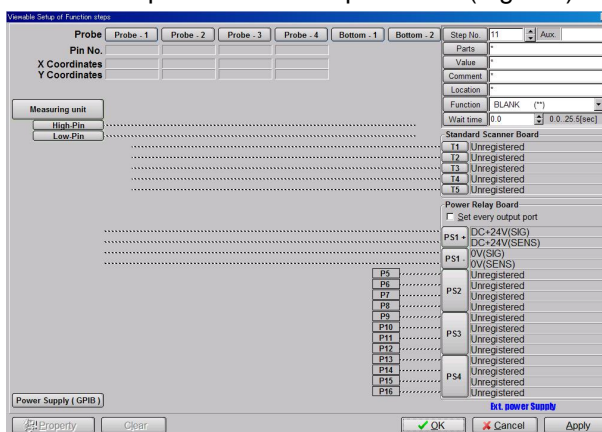
8. Click [Power Supply] button, and it will display Fig.205.



[ Fig.205 ] Power Supply

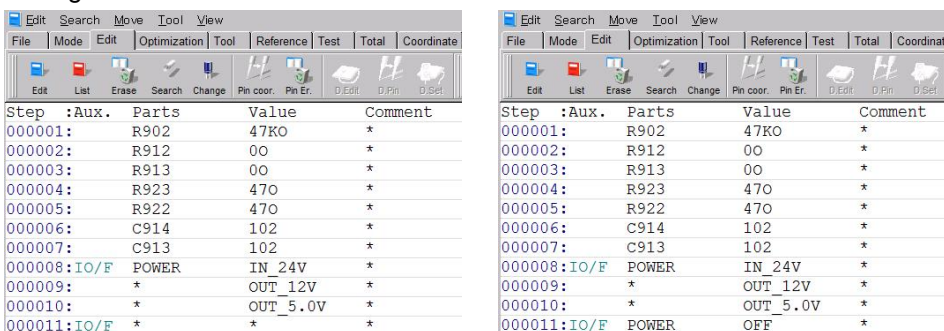
9. Select OFF at OUTPUT column and click the OK button.

10. It goes back to the Viewable setup of Function steps screen (Fig.206).



[ Fig.206 ] Viewable setup of Function steps

11. Click the OK button, and it goes back to the Step edit list. (the left screen of Fig.207). It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in the right screen of Fig.207.



[ Fig.207 ] Step edit list

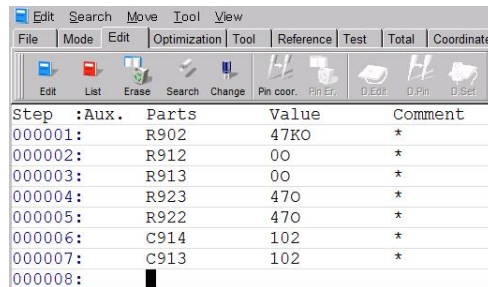


### CASE 3

This is the case you want to control the external power supplies (Voltage / Current / Output ON/OFF) while using the PRL-9500G. The voltage is applied to the UUT through the flying probes. The measurement is performed by the APT-9411. After the step finished applying voltage through the flying probes, the output to the UUT will be terminated automatically.

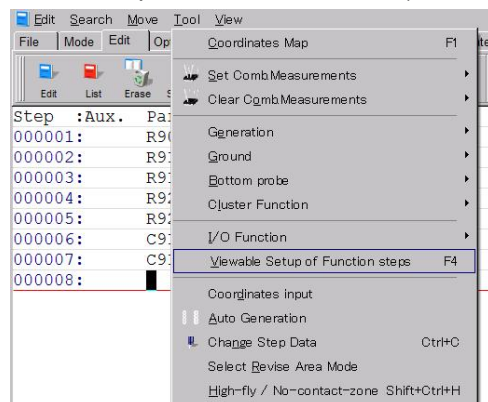
### How to apply voltage

1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 ? x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.208)



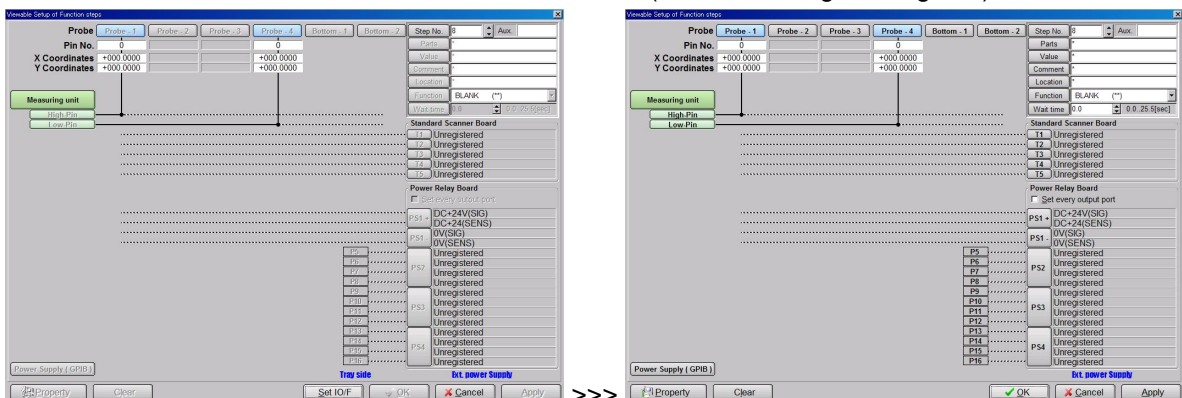
[ Fig.208 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.209)



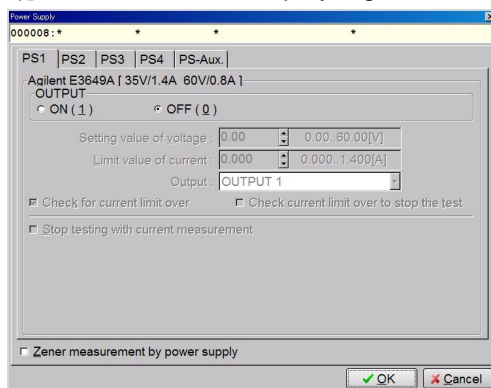
[ Fig.209 ] Viewable setup of Function steps

5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.210). Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.210)



[ Fig.210 ] Viewable setup of Function steps

7. Click [Power Supply (GPIB)] button, and it will display Fig.211.



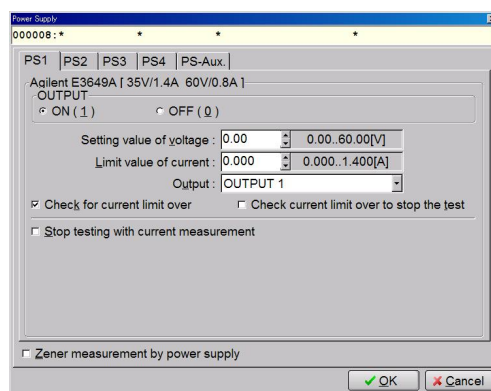
[ Fig.211 ] Power Supply

### PS-1 ~ PS-Aux

Select the external power supplies from PS1 ~ PS-Aux.

### OUTPUT

Select ON, and it will display Fig.212.



[ Fig.212 ] Power Supply

### Setting value of voltage

This can specify the voltage to output by 10mV. The output range at the right will be set automatically according to the external power supply specified by the user.

### Limit value of current

This can specify the current to output by 1mA. The output range at the right will be set automatically according to the external power supply specified by the user. When the step is performed, if it exceeds this value, the error message will appear. At the same time, the output from the external power supply will be terminated automatically to suspend the test accordingly.

### Output

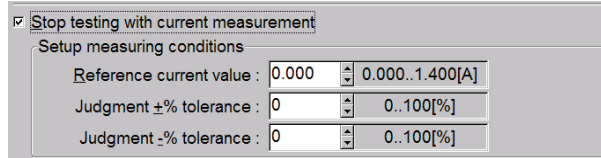
This appears only when the dual-out type of the Agilent external power supply is selected. Select either OUTPUT1 or OUTPUT2 from the right pull-down menu.

### Check for current limit over

When the box is selected, the test will be suspended if it exceeds the current limit. Select the box as needed.

**Stop testing with current measurement**

When the box is selected, the test will be suspended if it goes off the preset current on the step.



[ Fig.213 ] Power Supply

**Reference current value**

This is the standard current value and must be set smaller than “Limit value of current”. Max. current value differs according to the external power supply models and is configurable by 1mA.

**Judgment +% tolerance**

This is the upper limit of the current value shown by %.

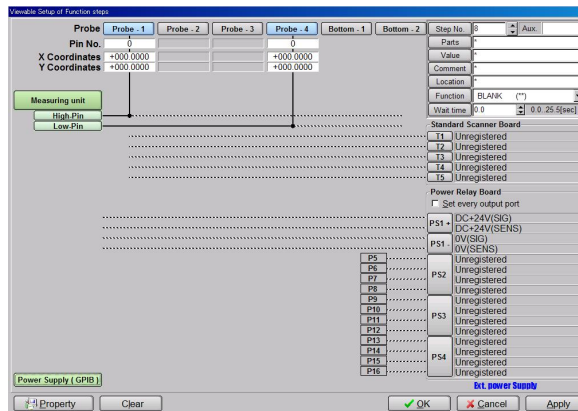
**Judgment -% tolerance**

This is the lower limit of the current value shown by %.

**Zener measurement by power supply**

Uncheck the box.

- Click the OK button, and it will go back to the Viewable setup of Function steps screen.



[ Fig.214 ] Viewable setup of Function steps

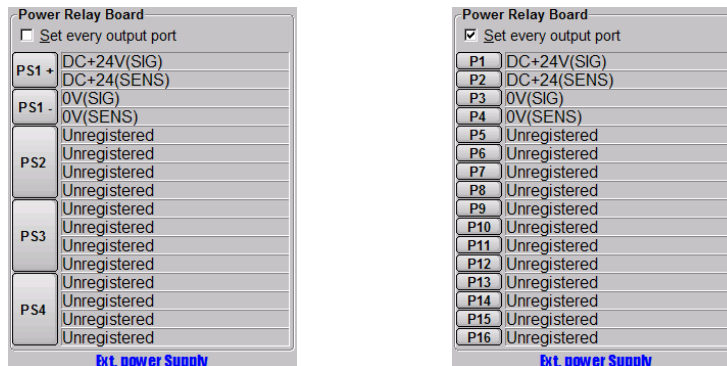
- Here you can specify the output from the external power supplies. Let's specify the flying probe as an example.

Select “Set every output port” at Power Relay Board.

When the box is unchecked, you will get to 4-terminal connection. (Refer to the left of Fig.215)

When the box is checked, you will get to 2-terminal connection. (Refer to the right of Fig.215)

Configure it on the basis of the specification of your external power supplies. We will hereinafter explain the process while assuming that the box is unchecked.



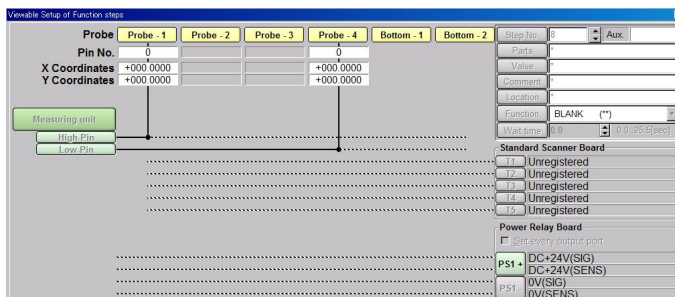
when Set every output port is unchecked    when Set every output port is selected

[ Fig.215 ] Viewable setup of Function steps



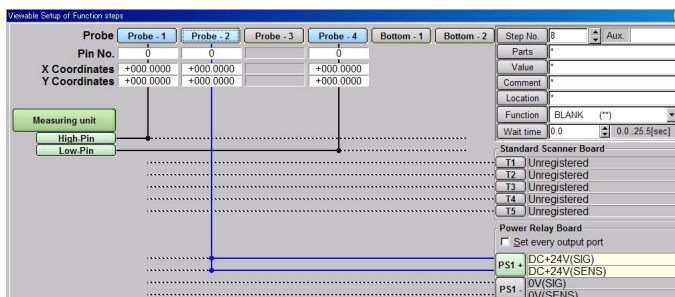
Signal name (ex. DC+24V, 0V) on Fig.215 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) “Unregistered” means that signal name is not registered yet.

10. Click [PS1+], and [Probe-1] to [Bottom-2] buttons are flashing in yellow. (Refer to Fig.216)



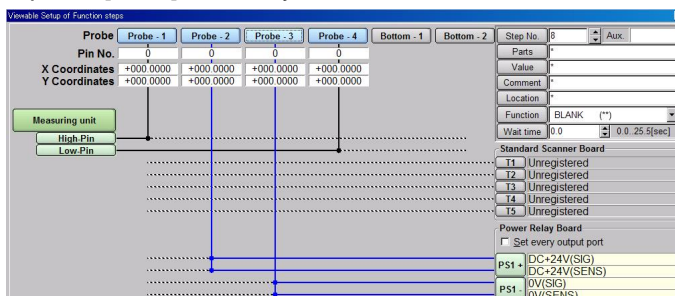
[ Fig.216 ] Viewable setup of Function steps

Specify [Probe-2] as the output of [PS1+], and they will be connected with a blue line. (Refer to Fig.217)



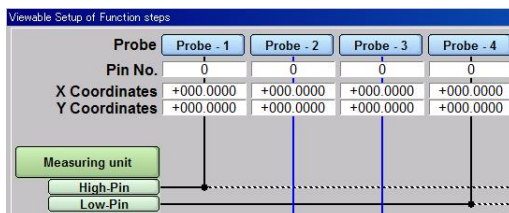
[ Fig.217 ] Viewable setup of Function steps

11. Click [PS1-] to specify the output, and [Probe1] to [Bottom-2] are flashing in yellow. Specify [Probe-3] as the output of [PS1-], and they will be connected with a blue line. (Refer to Fig.218)



[ Fig.218 ] Viewable setup of Function steps

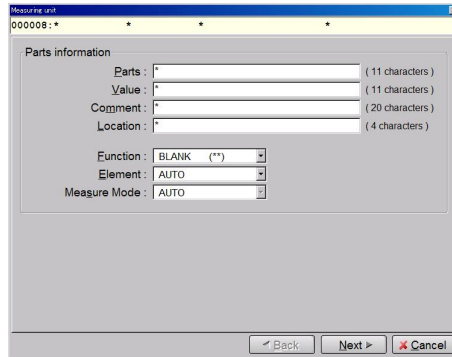
12. The two probes used to measure after powered up the UUT are already set to [Probe-1] and [Probe-4]. If you want to change them, click [High-pin] / [Low-pin] to select other probes.



[ Fig.219 ] Viewable setup of Function steps

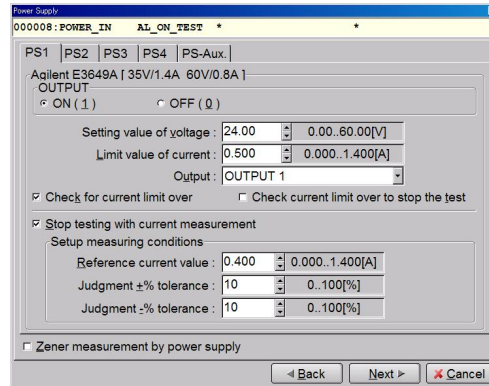
	<p>The color of the lines connecting [Probe-2] [Probe-3] to the output mean maximum current value, for example; [ blue ] → 3A</p> <p>Fig.218 indicates that [Probe-2] and [Probe-3] are connected to the external power supplies and that [Probe-1] and [Probe-4] are to the measuring unit of the APT-9411, but these connection may change according to the coordinates of the contact points.</p>
--	--

13. Click the Property button, and it will display the Measuring unit screen. (Refer to Fig.220) Use your keyboard to fill in the Parts column. In addition, enter the Value, Comment and Location column as needed.  
Fill in the Function, Element and Measure Mode column if the measurement content is already determined as they will assist in inputting the reference value.



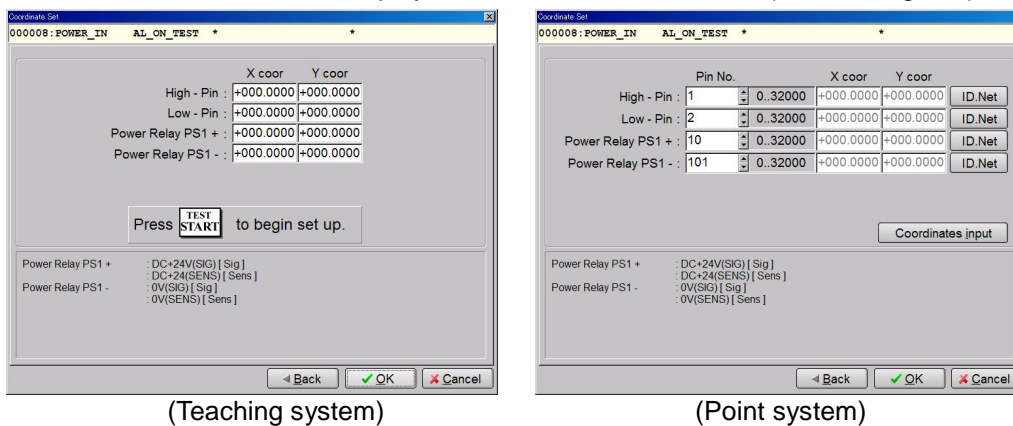
[ Fig.220 ] Measuring unit

14. Click the Next button, and it will displays the Coordinate set screen. (Refer to Fig.221) This is the same screen as Fig.212. It's possible to change the contents.



[ Fig.221 ] Power Supply

15. Click the Next button, and it will displays the Coordinate set screen. (Refer to Fig.222)



(Teaching system)

(Point system)

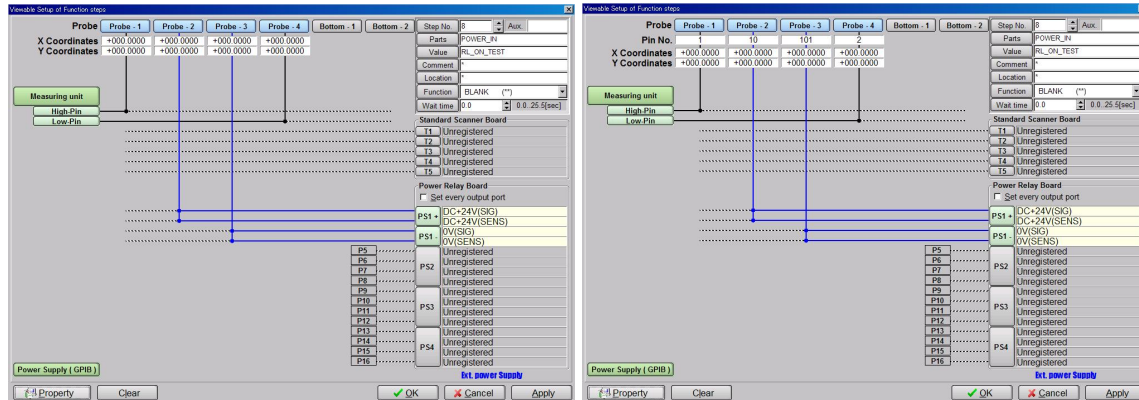
[ Fig.222 ] Coordinate set

On the Coordinate set screen, enter the coordinates of High-pin and Low-pin (in Teaching system) or the pin numbers (in Point system).

In Point system, when any new pin was added, click the Coordinates input button so that it displays Fig.223 where the user can enter the coordinates.

[ Fig.223 ] Coordinate input

16. Click the OK button, and it goes back to the Viewable setup of Function steps screen.



(Teaching system)

(Point system)

[ Fig.224 ] Viewable setup of Function steps

17. Click the OK button, and it goes back to the Step edit list. Now you can see the AUX. column is substituted by "IO/F".

Step	Aux.	Parts	Value	Comment
000001:		R902	47K0	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/F	POWER IN	AL ON TEST	*

(Teaching system)

Step	Aux.	Parts	Value	H-pin	L-pin
000001:		R902	47K0	11	15
000002:		R912	00	3	10
000003:		R913	00	4	6
000004:		R923	470	11	10
000005:		R922	470	8	3
000006:		C914	102	7	6
000007:		C913	102	5	10
000008:	IO/F	POWER IN	AL ON TEST	1	2

(Point system)

[ Fig.225 ] Step edit list

18. Move to Step data review to input the reference value.



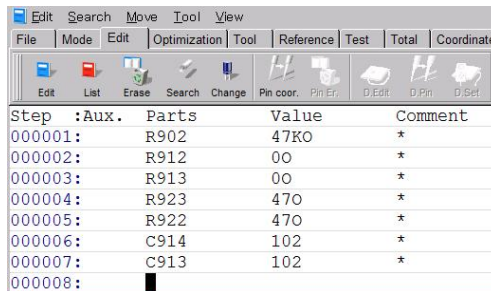
## CASE 4

This is the case you want to control the external power supplies to measure the Zener diodes. Usually, the APT-9411 is able to measure the Zener diodes up to 40V but the measuring range differs according to the specifications of the external power supplies.

To measure the Zener diodes, the user should connect the external power supply to “PS1” of the PRL-9500G. Otherwise you cannot measure the Zener diodes.

### How to apply voltage

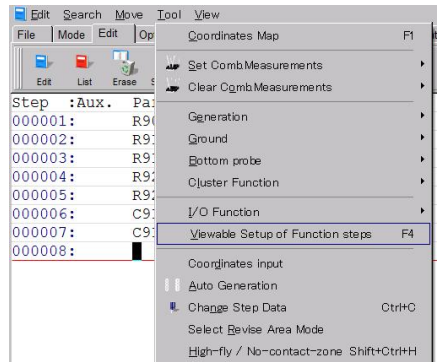
1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
2. It displays “Enter step number (1 ? x)”. Let’s put a new step on the last step. Use the keyboard to enter the last step number and click on the OK button.
3. The cursor is flickering on the last step. Use the down-arrow key to move the cursor to the next step. (Refer to Fig.226)



Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:				

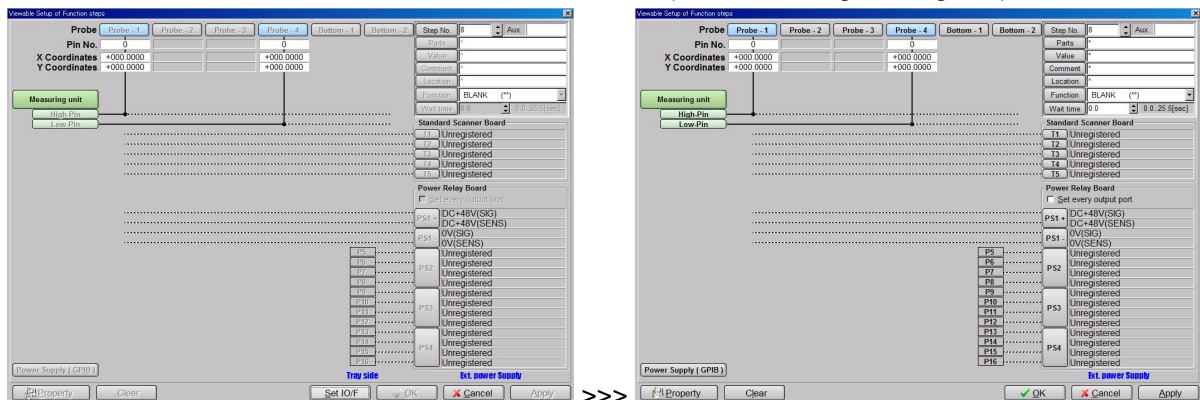
[ Fig.226 ] Step edit list

4. Click “Viewable setup of Function steps” on the Tool menu. (Refer to Fig.227)



[ Fig.227 ] Viewable setup of Function steps

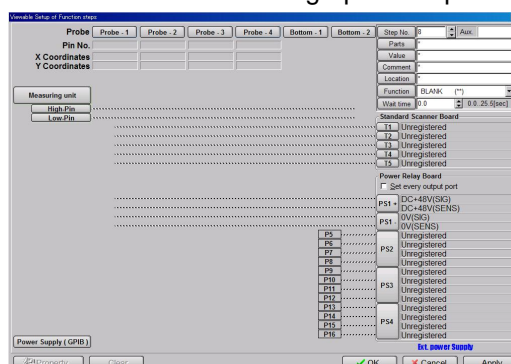
5. It displays “Use board ref.point and aux.ref.point for alignment?”. Select Yes or No.
6. It displays the Viewable setup of Function steps screen. (Refer to the left of Fig.228). Click “Set IO/F” button to activate each function on the screen. (Refer to the right of Fig.228)




[ Fig.228 ] Viewable setup of Function steps



- Click [Clear] button to release the connection of High-pin/Low-pin of the Measuring unit.



[ Fig.229 ] Viewable setup of Function steps



**HINT**

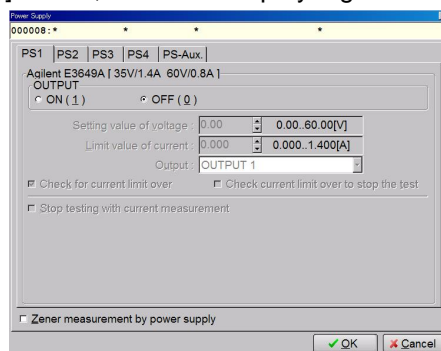
If the box of "Zener measurement by power supply" on Fig.231 is selected while High-pin/Low-pin of the Measuring unit are connected, an error (Fig.230) will pop-up to alert the user for inability of the Zener measurement.

**Warning**

This function is not configurable as the Measurement unit is designate to use. OK

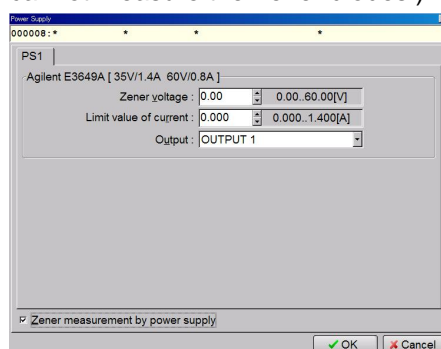
[ Fig.230 ]

- Click [Power Supply (GPIB)] button, and it will display Fig.231.



[ Fig.231 ] Power Supply

- Select the box "Zener measurement by power supply", and it will specify [PS1] automatically. (To measure the Zener diodes, the user should connect the external power supply to "PS1" of the PRL-9500G. Otherwise you cannot measure the Zener diodes.)



[ Fig.232 ] Power Supply

**Zener measurement by power supply**

This can specify the Zener voltage to be measured.

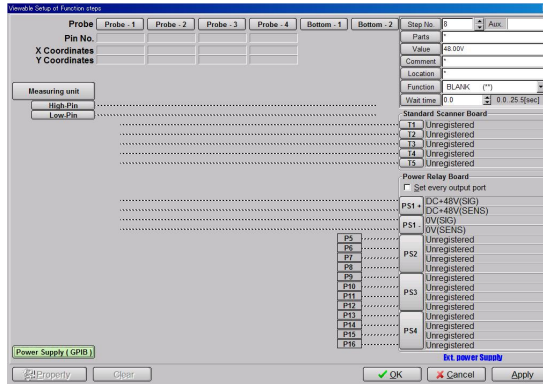
**Limit value of current**

This can specify the current to output by 1mA. The output range at the right will be set automatically according to the external power supply specified by the user. When the step is performed, if it exceeds this value, the error message will appear. At the same time, the output from the external power supply will be terminated automatically to suspend the test accordingly.

**Output**

This appears only when the dual-out type of the Agilent external power supply is selected. Select either OUTPUT1 or OUTPUT2 from the right pull-down menu.

10. Click the OK button, and it will go back to the Viewable setup of Function steps screen.

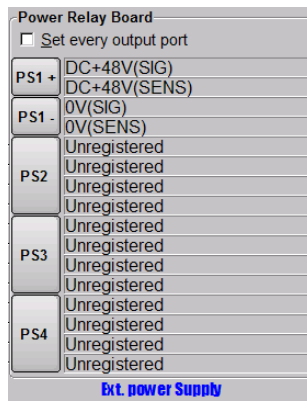


[ Fig.233 ] Viewable setup of Function steps

11. Here you can specify the output from the external power supplies.

Let's specify [Probe-1] and [Probe-4] as an example.

Don't select "Set every output port" at Power Relay Board. (Refer to Fig.234)

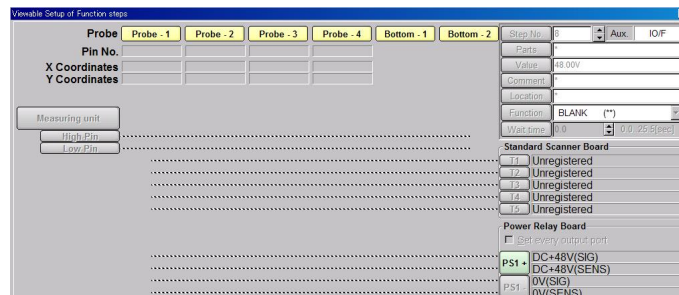


[ Fig.234 ] Viewable setup of Function steps



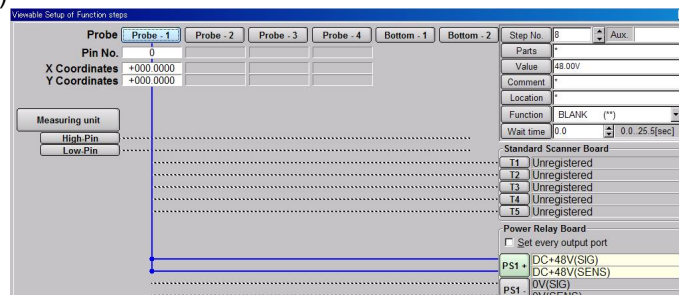
Signal name (ex. DC+48V, 0V) on Fig.234 is assignable on Input / output function of I/O step in Option mode. (Refer to Page 6) "Unregistered" means that signal name is not registered yet.

12. Click [PS1+], and [Probe-1] to [Bottom-2] buttons are flashing in yellow. (Refer to Fig.235)



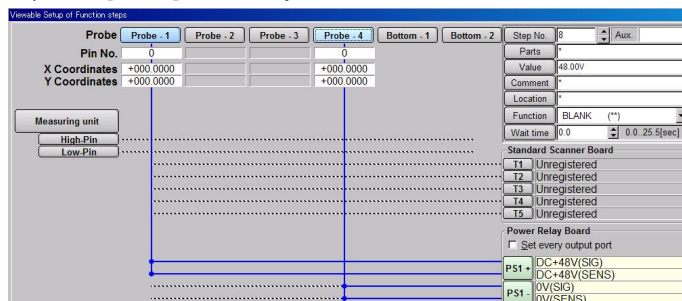
[ Fig.235 ] Viewable setup of Function steps

Specify [Probe-1] as the output of [PS1+], and they will be connected with a blue line. (Refer to Fig.236)



[ Fig.236 ] Viewable setup of Function steps

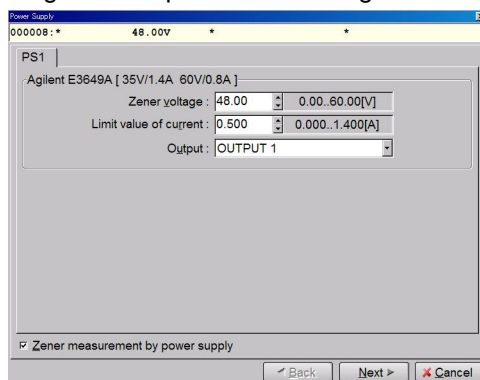
13. Click [PS1-] to specify the output, and [Probe1] to [Bottom-2] are flashing in yellow. Specify [Probe-4] as the output of [PS1-], and they will be connected with a blue line. (Refer to Fig.237)



[ Fig.237 ] Viewable setup of Function steps

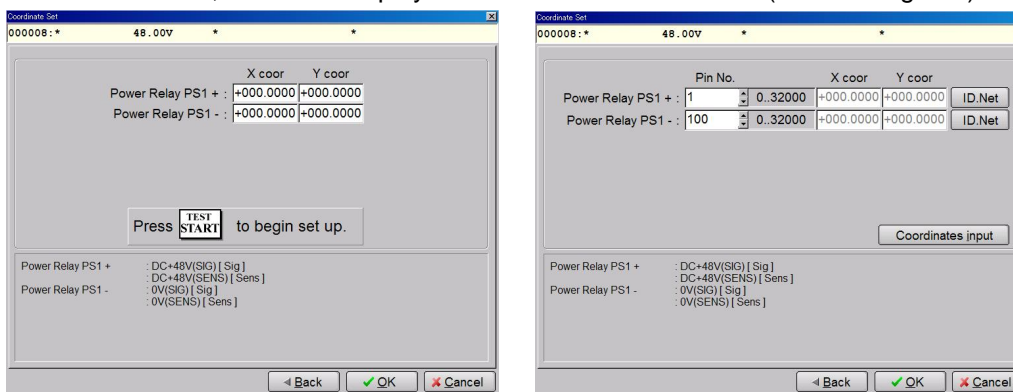
The color of the lines connecting [Probe-1] [Probe-4] to the output mean maximum current value, for example; [ blue ] → 3A

14. Click the Property button, and it will display the Measuring unit screen. (Refer to Fig.238)  
This is the same screen as Fig.232. It's possible to change the contents.



[ Fig.238 ] Measuring unit

15. Click the Next button, and it will displays the Coordinate set screen. (Refer to Fig.239)



(Teaching system)

(Point system)

[ Fig.239 ] Coordinate set

On the Coordinate set screen, enter the coordinates of High-pin and Low-pin (in Teaching system) or the pin numbers (in Point system).

In Point system, when any new pin number was added, click the Coordinates input button so that it displays Fig.240 where the user can enter the coordinates.

Coordinates input  
000008: \* 24.00V \*

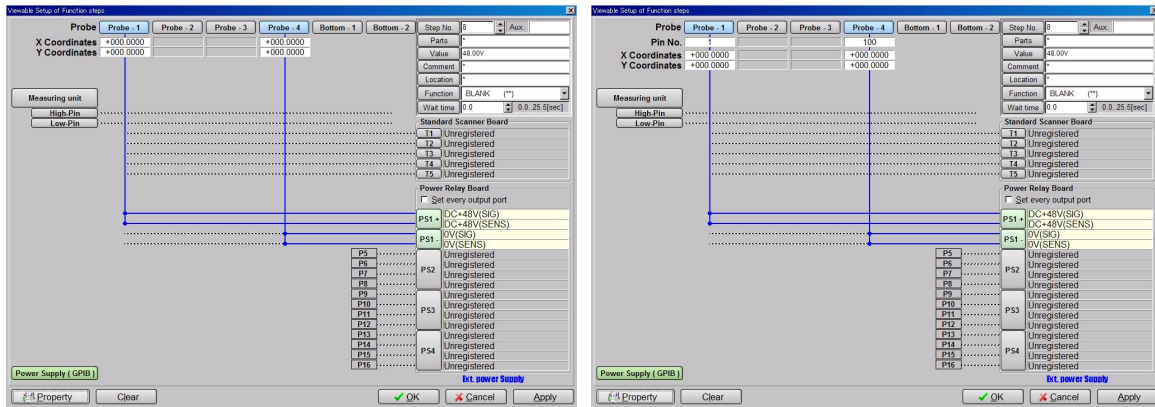
Press [ ENTER ] SW to set the coordinates.

	Pin No.	Net Name	X coor	Y coor
Power Relay PS1 +	1	*	[+000.0000, +000.0000]	
Power Relay PS1 -	100	*	[+000.0000, +000.0000]	

OK Cancel

[ Fig.240 ] Coordinate input

16. Click the OK button, and it goes back to the Viewable setup of Function steps screen.



(Teaching system)

(Point system)

[ Fig.241 ] Viewable setup of Function steps

17. Click the OK button, and it goes back to the Step edit list. Now you can see the AUX. column is substituted by "IO/F" and the Value column is by the Zener voltage.

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/F	*	48.00V	*

(Teaching system)

Step	Aux.	Parts	Value	H-pin	L-pin
000001:		R902	47KO	11	15
000002:		R912	00	3	10
000003:		R913	00	4	6
000004:		R923	470	11	10
000005:		R922	470	8	3
000006:		C914	102	7	6
000007:		C913	102	5	10
000008:	IO/F	*	48.00V	1	100

(Point system)

[ Fig.242 ] Step edit list

As shown in Fig.243, it will be useful to input any information on the test contents in the column "Parts".

Step	Aux.	Parts	Value	Comment
000001:		R902	47KO	*
000002:		R912	00	*
000003:		R913	00	*
000004:		R923	470	*
000005:		R922	470	*
000006:		C914	102	*
000007:		C913	102	*
000008:	IO/F	D120	48.00V	*

(Teaching system)

Step	Aux.	Parts	Value	H-pin	L-pin
000001:		R902	47KO	11	15
000002:		R912	00	3	10
000003:		R913	00	4	6
000004:		R923	470	11	10
000005:		R922	470	8	3
000006:		C914	102	7	6
000007:		C913	102	5	10
000008:	IO/F	D120	48.00V	1	100

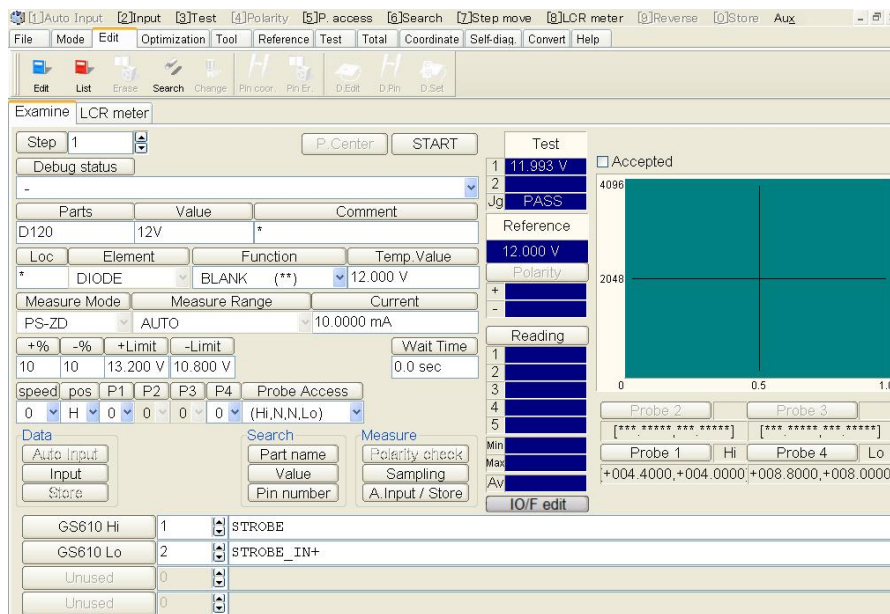
(Point system)

[ Fig.243 ] Step edit list

18. Move to Step data review to input the reference value.

## Reference input

Move the Step data review to input the reference value.



[ Fig.244 ] Step data review

[Measure mode] indicates “PSZD” which is an executive mode for the Zener measurement that uses the external power supply.

Click the Input button to input the reference value. In addition, following functions are useless on the Step data review.

< Menu bar >


- [1] Auto Input
- [4] Polarity
- [9] Reverse

[Etc]

- [F1] Graphic Guard Search
- [D] Look Value
- [I] Image Point Set
- [K] Combination clear
- [N] Copy measuring condition
- [Q] Pin double search
- [R] +%,-% Range
- [W] Discharge

< Buttons >

- Data > Auto Input
- Guard > Input, Delete, Search
- Measure > Polarity check

	<p>When the Value is changed on the Step edit list or the Step data review, the Zener voltage will change accordingly. In addition, if you want to change the Value on the Step edit list or the Step data review, be sure to add “V” next to the value. Otherwise “0V” will be substituted automatically.</p>
---	--



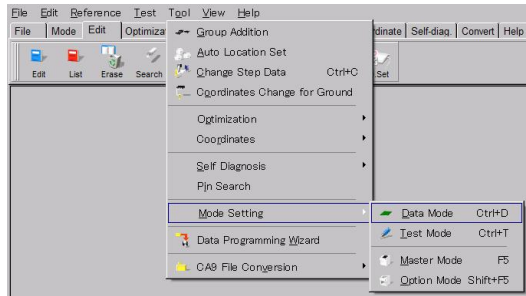
# Bottom probes setting

This chapter describes the method for utilization of the bottom probes in case they are used to apply the voltages to the UUT and measure the output.

It will be rather simple to install the bottom probes when the contact point is large and near to the edge of the PC board. On the other hand, this will be quite difficult when the contact point is small and near to the center of the PC board. If such is the case, you should go through the following process to install the bottom probes.

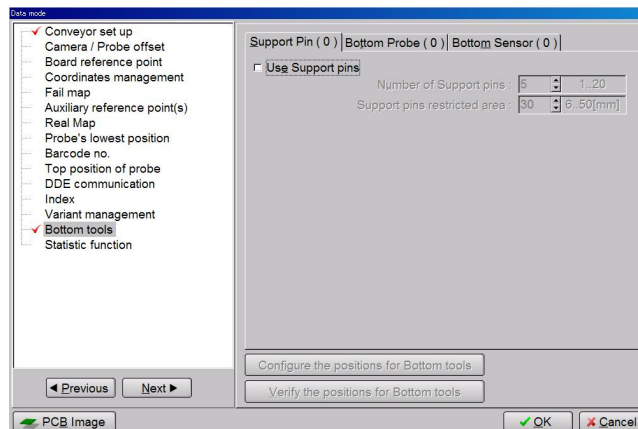
## Coordinates Input

1. Click on Data Mode from Mode Setting on the Tool menu, and it will display the Data mode screen.



[ Fig.245 ] Data mode

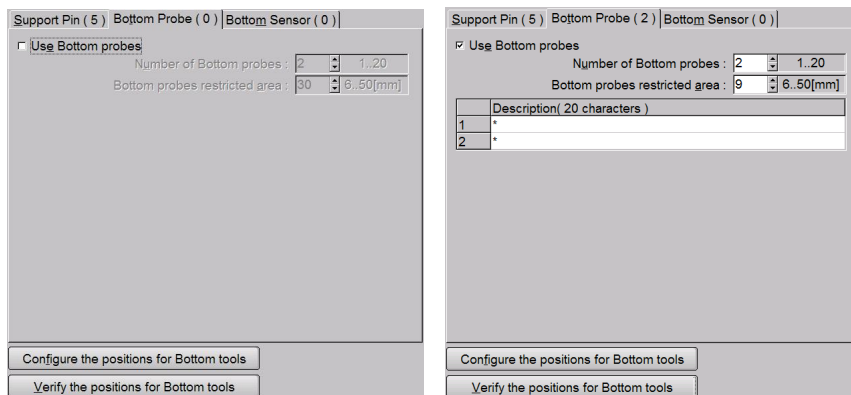
2. Select Bottom tools. (Refer to Fig.246)



[ Fig.246 ] Bottom tools

Select [Bottom Probe]. (Refer to the left screen in Fig.247)

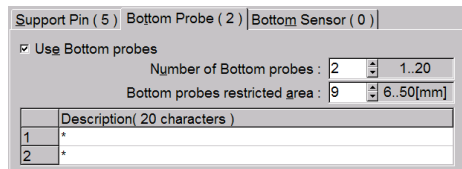
Then select the box "Use Bottom probes". (Refer to the right screen in Fig.247)



[ Fig.247 ] Bottom Probe

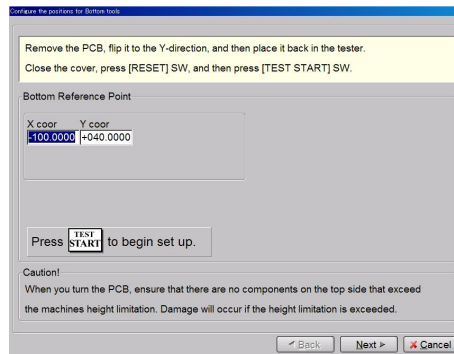
- Specify [Number of Bottom probes] and [Bottom probe's restricted area] and fill in the Description column as needed.

After all the settings were completed, click the Configure the positions for Bottom tools button to input the coordinates of the bottom probes.



[ Fig.248 ] Bottom probe

- It displays Fig. 249.

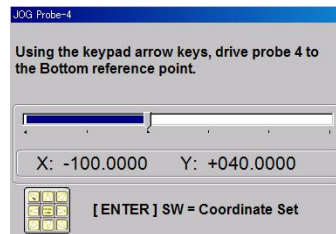


[ Fig.249 ] Configure the positions for Bottom tools

To start with inputting of the reference point for the bottom probes, turn the PC board in Y-direction so that the probing side faces downward.

The camera and the probe hit the tall components!  
Be sure to use the bare board (with no components loaded)

- Depress the TEST START SW on the operation panel, and it will display Fig.250 and Probe-4 moves to the Board reference point.

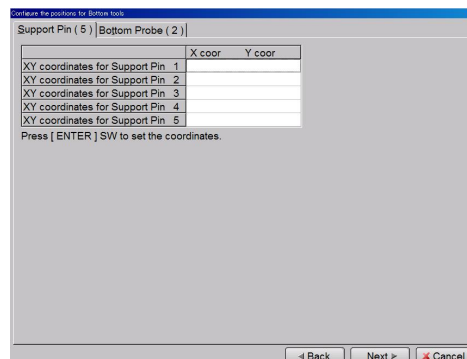


[ Fig.250 ]

The reference point for the bottom probes must be set on the point which is identifiable from both the top side and the bottom side. (ex. Through holes)

Use the keypad arrow keys to set the cross-hair pointer on the reference point for the bottom probes and depress the ENTER SW on the operation panel. The Probe-4 goes back to the home position and it displays Fig.249.

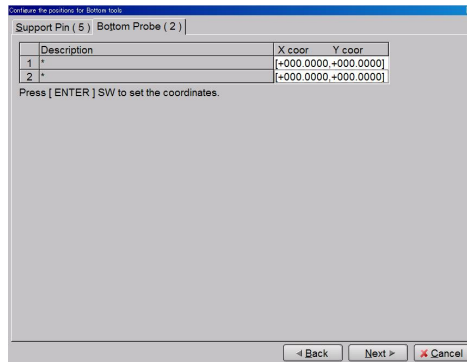
- Click the Next button, and it will display Fig.251.



[ Fig.251 ] Coordinates input



Click [Bottom probe], and it will display Fig.252.

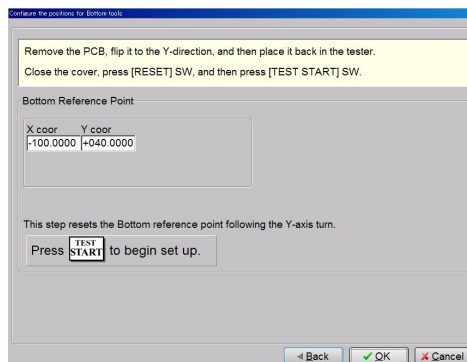


[ Fig.252 ] Coordinates input

Depress the ENTER SW on the operation panel, and Probe-4 moves to the reference point for the bottom probes. Use the keypad arrow keys to move to the coordinates for Bottom probe 1. Depress the ENTER SW to determine the coordinates.

Depress the ENTER SW, and it will display the coordinates input screen for Bottom probe 2. Use the keypad arrow keys to move to the coordinates for Bottom probe 2. Depress the ENTER SW to determine the coordinates. It goes back to Fig.252. Then click the Next button.

7. It displays Fig. 253.

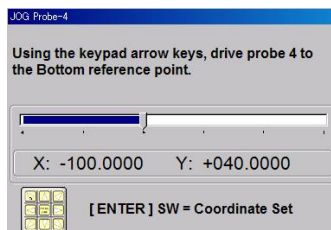


[ Fig.253 ] Configure the positions for Bottom tools

Specify again the reference point for the bottom probes from the probing side.

Open the lid and turn the PC board in Y-direction so that the probing side faces upward. Then close the lid and depress the RESET SW on the operation panel.

8. Depress the START SW on the operation panel, and Probe-4 moves to the reference point for the bottom probes. And it displays Fig.254.



[ Fig.254 ]

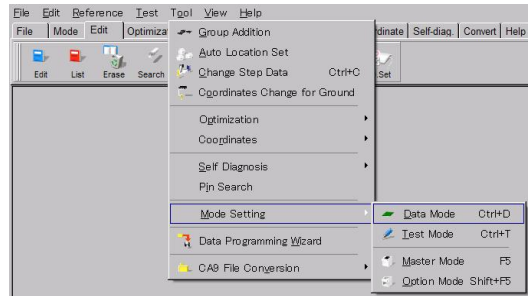
Use the keypad arrow keys to move to the reference point for the bottom probes. Depress the ENTER SW to determine the reference point for the bottom probes.

It goes back to Fig.253. Click the OK button, and it will go back to Fig.246.

## Installation

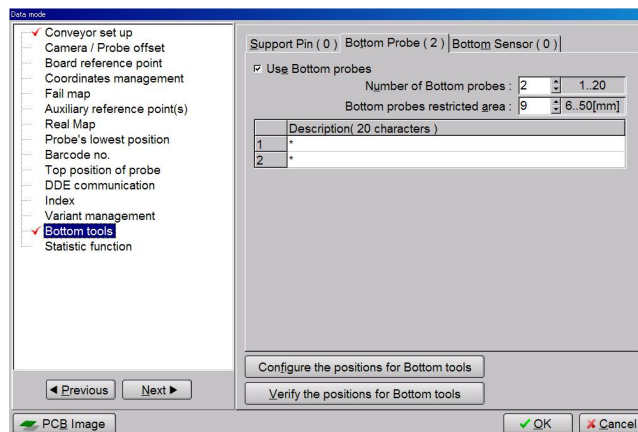
Go through the following steps to put your PC board on the tester.

1. Click on Data Mode from Mode Setting on the Tool menu, and it will display the Data mode screen.



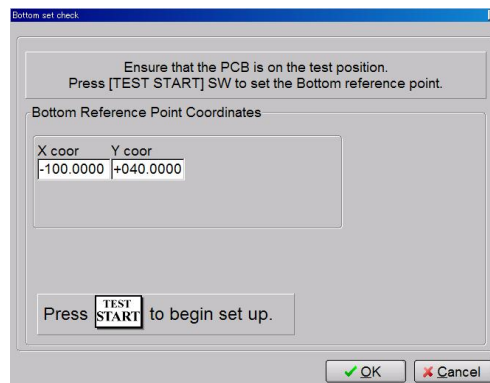
[ Fig.255 ] Data mode

2. Select Bottom tools > [Bottom Probe]. (Refer to Fig.256)



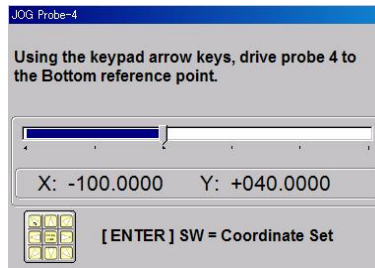
[ Fig.256 ] Bottom Probe

3. Click the Verify the positions for Bottom tools button to specify the reference point for the bottom probes. (Refer to Fig.257) After verified that the PC board is set on the tester, depress the TEST START SW.



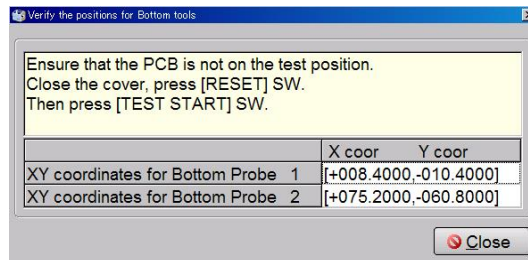
[ Fig.257 ] Bottom set check

- It displays Fig.258 and Probe-4 moves to the front side. Use the keypad arrow keys to set the cross-hair pointer on the reference point for the bottom probes and depress the ENTER SW on the operation panel.



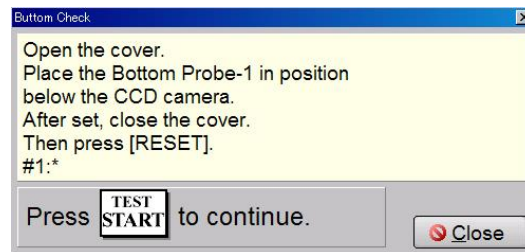
[ Fig.258 ]

- It displays Fig.259. Open the lid and take the PC board out of the tester. Close the lid and depress the RESET SW. Then depress the TEST START SW.



[ Fig.259 ] Verify the positions for Bottom tools

- It displays Fig.260.



[ Fig.260 ] Bottom check

Open the lid and place the bottom probe 1 under the cross-hair pointer displayed on the monitor. And close the lid and depress the RESET SW. Then depress the TEST START SW.

Next you can set the bottom probe 2. Open the lid and place the bottom probe 2 under the cross-hair pointer displayed on the monitor. And close the lid and depress the RESET SW. Then depress the TEST START SW.

Now the bottom probe 1,2 were installed properly.

 <b>WARNING</b>	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.
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 <b>HINT</b>	When the box "Use Bottom probes" was selected and the test program was saved in the disk, it will display Fig. 260 automatically after the test program was loaded and the Board reference point was set.
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