Flying probe tester APT-9411 series

Coaxial Scanner Board COX-9500 Operator's Guide



Preface

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

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

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

(NOTE)

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

Here lists the Safety symbols used in this Operator's guide. The users should give much attention to the 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.

General introduction

By integrating the Coaxial Scanner Board COX-9500 (hereinafter called "COX-9500") into the APT-9411 Series and the sister models, the user can hook external instruments (Function generator, Frequency counter, other measuring instruments, so on) up to the UUT in order to output the measuring signals and conduct various functional measurements

The COX-9500 is capable of outputting the measuring signals from Terminal 13~24 where are hooked to the external instruments to the Terminal 1~12. Because the relays on the COX-9500 are arranged in matrix state as shown in Fig.4, it's possible to output the measuring signals to any of the Terminal 1~12. The user should use the coaxial cables to hook the Terminal 1~12 up to the Tray in the tester. The wiring from the Tray to the UUT should be prepared by the user. (ex. Bottom probes, Connector)

System configuration

Hardware

The COX-9500 consists of following parts.

PCB TAKAYA TVX-12M	×1 рс
Measuring cable TAKAYA LS-442-03	imes 12 pcs
Measuring cable TAKAYA HS-623-1 ~ 12	imes 12 pcs



Fig.1 Overview of connection



Fig.2







Software

The APT-9411 system software supports the COX-9500 and the executive I/O command (IO/U) is available to use when it is installed in the tester. Prior to use the COX-9500, please configure the APT system software properly. (Refer to "Option mode setup" in Page 6).

Specifications

Input terminal (Terminal 13-24)	6×2 ch (Sig. and Sens.) for External instruments
Output terminal (Terminal 1-12)	6×2 ch (Sig. and Sens.) for Bottom probes or Connector
Max rated value/circuit	Voltage : DC80V / AC100Vrms with resistance load Current : 2A (DC30V / AC100Vrms), 0.3A (DC80V) with resistance load
Cable impedance	50 ohm

The COX-9500 bases on our specifications below.

(NOTE) The wiring from the Tray to the UUT should be prepared by the user. (ex. Bottom probes, Connector)

Option mode setup

When the COX-9500 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 procedures

1. Choose [Tool] > [Mode Setting] > [Option mode] to open Option mode screen (Refer to Fig.5)



[Fig.5] Option mode

 Click on Input / Output function of I/O step and select the box "Input / Output Function of I/O step". (Refer to Fig.6)

Option Mode	×
RS-232C port no. Camera system Inline application Signal tower setting -Serial number / Auto data loading -Stamp Input / Output function of I/O step DDE communication IC Open Menu customize -PCB Support Jigs - Vacuum unit	 ✓ Input / Output Function of I/O Step ✓ Jump all I/O steps following a failed step Eailed step number to jump I/O step 1 1 1255[step(s)] □ Jump I/O steps when OP step judged SHORT ✓ Jump I/O steps following this group □ Specify output step number for jumped I/O step(s) 1 2 0265[step(s)] □ Use I/O-9500 option (TVX-07 board) □ Use Power Relay Board Standard Scanner User Definition Terminal 1 Unregistered Terminal 2 Unregistered Terminal 4 Unregistered Terminal 4 Unregistered Terminal 4 Unregistered Terminal 5 Unregistered
▲ Previous Next ▶	
□ Workstation Mode	✓ <u>O</u> K X Cancel

[Fig.6] 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.

4. Select the following boxes as needed.

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

Fill the box to use IO/O and IO/I command when the Takaya I/O board (TVX-07) is installed as well.

Use Power Relay Board

Fill the box when the Power Relay Board (PRL-9500G) is installed as well.

5. Click the OK button to close Option mode menu.

Simple function test

To implement simple function test, you should select either "I/O Function" or "Viewable Setup of Function steps" from Tool menu to configure the I/O steps.



[Fig.7] Input / Output function of I/O step

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

You should use the IO/U command when he wants to perform a simple function test by using the COX-9500.

You can connect the signal from more than one external instrument plugged into the Input terminal 13-24 to the Terminal 1-12 and the Bottom probes (standard). But it's not possible to connect to the Flying probes.

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

You don'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. You can recognize the reality of whole connection with ease.

You can connect the signal from more than one external instrument plugged into the Input terminal 13-24 to the Terminal 1-12, the Bottom probes (standard) and the Flying probes.

Basic precautions of I/O steps



The I/O step may cause serious damage to the PC boards and/or the measuring unit if you misuse it (ex. wrong location, polarity so on). The use of the I/O commands must be carried out under your responsibility.



Mentioned below are very important things to know. Be sure to read through them to fully understand in advance.

- 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 use 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, you 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. You should input the reference value in the Step Review menu
- 10. The I/O steps will be not implemented at Data average function. As such, the reference value of the measurement step that uses the I/O command will be not average correctly. If you want to average the test program including the I/O steps, you are recommended to specify the rage of test steps to be averaged while excluding the I/O steps.
- 11. You are not allowed to change "Loc" in the IO/U steps on Change Step Data menu.
- 12. You are not allowed to change "Loc" in the IO/U steps on Group Addition menu.
- 13. You are not allowed to change "Loc" in the IO/U steps on Auto Location Set menu.
- 14. Any I/O step will be not implemented if normal step judged fail while retesting the board.
- 15. The signal input will be suspended under condition below;
 - * when it came to the step where the IO/U command is terminated.
 - * when the test completed.
 - * when any command of IO/M, IO/T, IO/V, IO/C, IO/U or IO/X was implemented.
- 16. When a step using the Bottom probes is changed to IO/U step, the Bottom probes will be released.
- 17. The flying probes cannot apply any signal.
- 18. The wiring from the Tray to the UUT should be prepared by you. (ex. Bottom probes, Connector)

I/O Function

This chapter describes the IO/U command that should be used in a simple function test using the COX-9500.

You can connect the signal from more than one external instrument plugged into the Input terminal 13-24 to the Terminal 1-12 and the Bottom probes (standard).



[Fig.8] I/O Function

Basic knowledge of programming IO/U step

The programming method is no different between the Teaching system and the Point system.

Setup procedure to apply signal

- 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 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.9) In addition, specify the Parts field as needed. Otherwise there will be substituted by asterisk (default).



[Fig.9] Step Edit list

4. Move to Tool > I/O function and click on "I/O Step Set". (Refer to Fig.10)



- 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.11)

I/O Command Generation	×
I/O Command Select	
I/O Command Select толт	
[IO/T Step]	
This is I/O command to measure with internal measuring unit while applying voltage or signal from external equipment connected to terminals.	
✓ Back Next ► X Cance	

[Fig.11] I/O Command Select

- 7. Select "IO/U" from the right pull-down menu and click the Next button.
- 8. As Select Terminal Number screen appears, specify Input terminals ("Device side") where you want to connect the external instrument and Output terminals ("Tray side") that should be connected to the Tray in the tester. (Refer to [Fig.12]).

1/O Command Generation			X
Select Terminal Num	ıber		
Device side	Tray side	Device side	Tray side
✓ Terminal 13	1 111	□ Terminal 19	1 🛉 111
✓ Terminal 14	2 212	□ Terminal 20	2 212
✓ Terminal 15	3 🌲 111	□ Terminal 21	1 📫 111
✓ Terminal 16	4 212	□ Terminal 22	2 212
□ Terminal 17	1 🔹 111	□ Terminal 23	1 📫 111
Terminal 18	2 212	□ Terminal 24	2 212
			Next ► X <u>×</u> Cancel
[Fig.1	12] Select 7	erminal N	umber



If the Input terminal ("Device side") was specified by odd number, you are allowed to specify the Output terminals ("Tray side") with odd number only. On the other hand, If the Input terminal ("Device side") was specified by even number, you are allowed to specify the Output terminals ("Tray side") with even number only.

In addition, the Output terminals ("Tray side") cannot be specified by the same number redundantly.

9. Click the Next button, so it shows the next screen. (Refer to [Fig.13])



[Fig.13] Wait time set

- 10. Specify the wait time (0.0 sec ~ 25.5 sec) and click the OK button.
- It goes back to the Step Edit list. (Refer to [Fig.14]) It indicates "IO/U" in both [AUX.] and [Loc.] field and "ON/W" in [Value] field. (the "ON/W" means the starting step for applying the signal)

Edit Sear	ch <u>M</u> ove	e <u>T</u> ool <u>V</u> iew						
File Mode	Edit	Optimization Too	ol Reference	Test Total	Coordinate	Self-dia	g. Co	nvert
Edit Lia	France	Search Change					Drint	6
Stop Jur	Darta	Search Change	Pin coor. Pin cr.	D.EOC D.PA	U.Set	A.Gen.	Print	- 010
000001:	R902	47KO	*		*	-pin i	* 10	10
000002:	R912	00	*		*	* 5	SH 10	10
000003:	R913	00	*		*	* 5	SH 10	10
000004:	R923	470	*		*	* *	* 10	10
000005:	R922	470	*		*	* *	* 10	10
000006:	C914	102	*		*	* *	* 30	30
000007:	C913	102	*		*	* *	* 30	30
000008:IO/U	COX1-2	ON/W	*		*	* *	* 10	10

[Fig.14] Step Edit list

The next step after the IO/U step (Step #00008) needs to be configure by an optional measurement that will be implemented while power up the UUT. The capital letter in Parts field should be specified according to the component categories listed below.

Component categories	Capital letter
Resistors	R
Capacitors	С
Inductors	L
VF measurement (Ex. Diode) and DC measurement	D



If the capital letter was mistaken, there is the possibility that an unintended reference value would be substituted in Step data review.

(Refer to APT-9411 User's guide for further information on the data programming)

How to terminate signal output

- 1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
- 2. It displays "Enter step number (1 ? x)". Use the keyboard to specify the number of test step that terminates the signal output and click the OK button.
- 3. The cursor is flickering on the assigned step. Specify the Parts field as needed. Otherwise there will be substituted by asterisk (default).

📃 Edit 🛛 Searc	h <u>M</u> ove	<u>T</u> ool <u>V</u> iew						
File Mode	Edit	Optimization Too	I Reference	Test Total	Coordinate	Self-dia	g. Cor	nvert I
		1 H		l 🥏 🖞	47		<u> </u>	ก
Edit List	Erase	Search Change	Pin coor. Pin Er.	D.Edit D.Pir	n D.Set	A.Gen.	Print	Un
Step :Aux.	Parts	Value	Comment		H-pin i	L-pin F	. +%	- %
000001:	R902	47KO	*		*	* *	* 10	10
000002:	R912	00	*		*	* S	H 10	10
000003:	R913	00	¥		*	* S	H 10	10
000004:	R923	470	*		*	* *	* 10	10
000005:	R922	470	*		*	* *	* 10	10
000006:	C914	102	*		*	* *	* 30	30
000007:	C913	102	*		*	* *	* 30	30
000008:IO/U	COX1-2	ON/W	*		*	* *	* 10	10
000009:	CHECK1	*	*		*	* *	* 10	10
000010:	CHECK2	*	*		*	* *	* 10	10
000011:	CCX1-2							

[Fig.15] Step Edit list

4. Move to Tool > I/O function and click on "I/O Step Set". (Refer to Fig.16)



[Fig.16] Set IO Step

- 5. As "Use board ref. point and aux. ref. point for alignment?" window appear, select the No button.
- 6. It displays I/O Command Select screen. (Refer to Fig.17)

/O Command Generation
I/O Command Select
I/O Command Select IOπ
[IO/T Step]
This is I/O command to measure with internal measuring unit while applying voltage or signal from external equipment connected to terminals.

[Fig.17] I/O Command Select

7. Select "IO/U" from the right pull-down menu and click the Next button.

8. It displays the Select Terminal Number screen. Uncheck all of Input terminals ("Device side") and click the OK button. (Refer to [Fig.18]).

I/O Command Generation				×
Select Terminal Num	ber			
Device side		Tray side	Device side	Tray side
Terminal 13	1	111	Terminal 19	1 📫 111
□ Terminal 14	2	212	□ Terminal 20	2 212
□ Terminal 15	1	111	□ Terminal 21	1 📫 111
□ Terminal 16	2	212	Terminal 22	2 212
□ Terminal 17	1	111	Terminal 23	1 🔹 111
□ Terminal 18	2	212	Terminal 24	2 212
			<u>∎ack</u>	<u>∕O</u> K <u>×C</u> ancel

[Fig.18] Select Terminal Number

9. It goes back to Step Edit list. Now you can see "OFF" in [Value] field. (Refer to [Fig.19]) (The "OFF means that the step terminates the signal output)

Edit	Searc	h <u>M</u> ove	Tool	⊻iew									
File	Mode	Edit C)ptimizat	ion Too	I Refe	rence	Test	Total	Coordinate	Self-d	ag.	Cor	ivert
		-	4		<u> </u> <u> </u> <u> </u> <u> </u> _ <u> </u> _	.		H	47				1
Edit	List	Erase	Search	Change	Pin coor.	Pin Er.			D.Set	A.Gen		Print	
Step	Aux.	Parts	1	/alue	C	omment			H-pin	L-pin	F.	+8	-8
000001	:	R902	4	7KO	*				*	*	**	10	10
000002		R912	0	00	×				*	×	SH	10	10
000003		R913	0	00	*				*	*	SH	10	10
000004		R923	4	170	*				*	*	**	10	10
000005	:	R922	4	170	*				*	*	**	10	10
000006	:	C914	1	.02	*				*	*	**	30	30
000007		C913	1	02	*				*	*	**	30	30
000008	:IO/U	COX1-2	0	DN/W	*				*	*	**	10	10
000009		CHECK1	,	r i	*				*	*	**	10	10
000010		CHECK2		r I	*				*	*	**	10	10
000011	:IO/U	COX1-2	C	OFF	*				*	*	**	10	10
000012	:												

[Fig.19] Step Edit list

Setup procedures to release IO/U command

- 1. Click on Step Edit (or Step List) from Edit menu on the Menu bar.
- 2. It displays "Enter step number (1 ? x)". Use the keyboard to specify the number of IO/U step that should be released and click the OK button.
- 3. The cursor is flickering on the assigned step. (Refer to Fig.20)

Edit Searc	ch <u>M</u> ove	e <u>T</u> ool <u>V</u> iew						
File Mode	Edit	Optimization Too	Reference	Test Total	Coordinate	Self-diag	. Cor	nvert
		1 H		l 🥏 🛱	· 🐢	8 8	<u> </u>	F
Edit List	Erase	Search Change	Pin coor. Pin Er.	D.Edit D.Pin	i D.Set	A.Gen.	Print	Un
Step :Aux.	Parts	Value	Comment		H-pin L	-pin F	. +%	- 8
000001:	R902	47KO	*		*	* *	* 10	10
000002:	R912	00	*		*	* SI	H 10	10
000003:	R913	00	*		*	* SI	H 10	10
000004:	R923	470	*		*	* *	* 10	10
000005:	R922	470	*		*	* *	* 10	10
000006:	C914	102	*		*	* *	* 30	30
000007:	C913	102	*		*	* *	* 30	30
000008:IO/U	COX1-2	ON/W	*		*	* *	* 10	10



4. Move to Tool > I/O function and click on "I/O Step Clear". (Refer to Fig.21)

File Mode	Edit Op	<u>C</u> oordinates Map F1	te	Self-di	ag. Cor	nvert H
Edit List	Erase S	Jet Comb Measurements	•	A.Gen.	Print	f) Und
Step :Aux. 000001: 000002: 000003: 000004: 000005: 000006:	Parts R902 R912 R913 R923 R922 C914	Generation Ground Bottom probe Cluster Function	.	L-pin * * * *	F. +% ** 10 SH 10 SH 10 ** 10 ** 10 ** 30	-% 10 10 10 10 10 30
000007: 000008:IO/U	C913 COX1-2	I/O Function	>	I/O	Step <u>S</u> e	ət
000009: 000010:	CHECK1 CHECK2	Viewable Setup of Function steps F4	L	I/O	Step <u>C</u>	lear
000011:IO/U 000012:	COX1-2	Coordinates input Lato Generation Change Step Data Ctrl+C Select Revise Area Mode High-fly / No-contact-zone Shift+Ctrl+H	*	•	** 10	10

[Fig.21] I/O Step Clear

5. It goes back to Step Edit list. (Refer to [Fig.22])

Edit	Searc	h <u>M</u> ov	e <u>T</u> ool	⊻iew									
File	Mode	Edit	Optimizat	ion Too	Refe	rence	Test	Total	Coordinate	Self-d	iag.	Cor	nvert
Edit	List	Erase	Search	Change	BL Pin coor.	Pin Er.	0.Edi		D.Set	A.Gen		Print	4
Step	Aux.	Parts	v	alue	C	omment			H-pin	L-pin	F.	+%	-%
000001		R902	4	7KO	*				*	*	**	10	10
000002		R912	0	0	*				*	*	SH	10	10
000003		R913	0	0	*				*	*	SH	10	10
000004		R923	4	70	*				*	*	**	10	10
000005		R922	4	70	*				*	*	**	10	10
000006		C914	1	.02	*				*	*	**	30	30
000007		C913	1	.02	*				*	*	**	30	30
000008		COX1-	2 0	N/W	*				*	*	**	10	10

[Fig.22] Step Edit list

Now you can no longer see "IO/U" in both [AUX.] and [Loc.] field.

IO/U step at Step data review

The IO/U command step on the Step data review is displayed as follows.



[Fig.23] Step data review

Followings are items displayed on the IO/U command step only.

Wait Time

You can specify the Wait time (0 - 25.5s) from outputting the signal to shifting to the next step.

IO/U edit

Click this button, and it shows [Fig.12] and [Fig.13] where you can change the terminal numbers and the Wait time as needed. But even if the terminal number at either Device side or Tray side was changed on the display, you won't change the terminal connection right away. The terminal connection will be not changed until you move to any other step and return to this step again.

Terminal connecting status

Here indicates the terminal connecting status between Device side and Tray side.

Reference input

As the IO/U step isn't performed at the time of Auto. reference input, any signal is output. Means, at the test step to measure while performing the IO/U step, the reference value will not be input correctly even if the Auto. reference input is performed. Therefore, the reference value has to be input in the Step data review.

Reference value input method

First open the IO/U step in the Step data review, so you can see Device side and Tray side are connected after the IO/U step was performed. Use [+] key on your keyboard to move to the step to measure while performing the IO/U step.

In prior to input the reference value, make sure that the capital letter of the Parts suits for the UUT. Then click the Auto Input button to input the reference value when you are going to measure other than the DC voltage. The Temp. Value column indicates the value. You can change "Function" and "Measure Time" as needed. Clicking the Store button can save the Temp. Value to the Reference value.

When you are going to measure the DC voltage, specify the Element to "Diode" and the Measure Mode to "DC-VM". Click the Input button when you want to input the reference value. (Refer to Fig.24) The Temp. Value column indicates the value. Clicking the Store button can save the Temp. Value to the Reference value.



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 you misuse it (ex. wrong location, Outport so on). The use of the I/O commands must be carried out under your responsibility.



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.

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.

Examine	E LCR me	ter					
Step	9					START	
Debu	ig status						
-						•	
F	Parts	Va	alue Comment				
CHECK	(1	*		*			
Loc	Elerr	nent	Fi	unction		Temp.Value	
*	DIODE	-	BLANK	(**)	-		
Measu	Ire Mode	A	uto Range	Range Measure Time			
DC-VI	• N	AUTO		• 0	.0 ms	sec	
+%	-% +L	imit 🚺 -	Limit				
10	10 ***	*** **	* * * *				
speed	pos P1	P2 P3	3 P4	Auto Pola	rity		
0 -	H • 0 •	0 - 0	- 0 - ((+,N,N,-)		•	
Data		Guard		Search		Measure	
Auto	Input	Input		Part name	3	Polarity check	
In	put	Delet		Value		Sampling	
Sto	ore	Searc	h) (Pin numbe	er	A.Input / Store	

[Fig.24] Step data review

Viewable Setup of Function steps

You can connect the signals from more than one external instrument plugged into the Input terminal 13-24 to the Terminal 1-12, the Bottom probes (standard) and the Flying probes.



[Fig.25] Viewable Setup of Function steps

Basic knowledge of programming IO/U step

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.

Setup procedures to apply signal

- 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 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.26)

Edit	Searc	h <u>M</u> ove	e <u>T</u> ool	<u>⊻</u> iew			
File	Mode	Edit	Optimizati	on Too	I Refe	rence	Test
			21	U.	H	Ц.	
Edit	List	Erase	Search	Change	Pin coor.	Pin Er.	D.Ed
Step	:Aux.	Parts	V	alue	Co	omment	
000001	:	R902	4	7KO	*		
000002	:	R912	0	0	*		
000003	:	R913	0	0	*		
000004	:	R923	4	70	*		
000005	:	R922	4	70	*		
000006	:	C914	1	02	*		
000007	:	C913	1	02	*		
000008	:						

[Fig.26] Step Edit list

4. Click "Viewable setup of Function steps" on the Tool menu. (Refer to Fig.27)



[Fig.27] 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.28). Click "Set IO/F" button to activate each function on the screen. (Refer to the right of Fig.28)

Viewable Setup of Function steps	Viewable Satup of Function ateps
Probe - 1 Probe - 2 Probe - 3 Probe - 4 Bottom - 1 Bottom - 2 Step No. 3 + Aux.	Probe - 1 Probe - 2 Probe - 3 Probe - 4 Bottom - 1 Bottom - 2 Step No. 3 + Aux.
Pin No. 0 Parts	Pin No. 0 Parts *
X Coordinates +000.0000 +000.0000 Value 1	X Coordinates +000.0000 +000.0000 Value *
Y Coordinates +000 0000 +000 0000 Comment.	Y Coordinates +000 0000 +000 0000
Location *	Location *
Measuring unit	Measuring unit BLANK (**)
High Pin Wat time 0.0 26 6(sec)	High-Pin 0.0 25.5[sec]
Low Pin Standard Scanner Board	Low-Pin Standard Scanner Board
1] Unregistered	11 Unregistered
Unregistered	T3 Unregistered
10 Unregistered	T4 Urregistered
	T13
	113
TTT	T17
T18	T18
	120
T27	121
110	T23
12	1724
Ext. device Tray side	Ext. device Tray side
Clear Set IO/F VOK K Cancel Apply	>>> Clear VCK X Cancel Apply

[Fig.28] Viewable setup of Function steps

- 7. Select the terminal to be used from [T13] ~ [T24] at Coaxial Scanner Board. Then the specified terminal is flashing in green.
- 8. [T1] ~ [T12], [Probe-1] ~ [Probe-4] and [Bottom-1] ~ [Bottom-2] on the screen are flashing in yellow.
- Click any of the output, and the terminal will be connected to the output with a blue line. (Refer to Fig.29)

Viewable Setup of Function step	IS			
Probe	Probe - 1	Probe - 2 Probe - 3	Probe - 4	Bottom - 1 Bottom - 2
Pin No.	0	ò i	i i	
X Coordinates	+000.0000 +	000.0000	+000.0000	
Y Coordinates	+000.0000 +	000.0000	+000.0000	
Measuring unit				
High-Pin	i	•••••		
Low-Pin			•••••••••••••••••••••••••••••••••••••••	
		••••• •••••		
		•••••	••••••	
	_ [_	
Coaxial Scanner Board	T13		Ļ	<u>11</u>
	T15			12
	T16			T4
	<u></u>		·····[T5
	T18	••••••	•••••••	<u>T6</u>
	T20			17 T8
	T21			T9
	T22			T10
	T23			T11
	124			112
	Ext device		TD	ay side

[Fig.29] Viewable setup of Function steps

 Configure other connections between the terminals ([T13] ~ [T24]) and the output ([T1] ~ [T12], [Probe-1] ~ [Probe-4] and [Bottom-1] ~ [Bottom-2]) as needed. (Refer to Fig.30)



[Fig.30] Viewable setup of Function steps



When an odd number of the terminal at Ext. device (COX-9500) is selected, it will be the only odd number of terminal at Tray side that you can connect. The same goes for an even number of the terminal.

11. Fig.30 indicates that [T13] and [T14] of the COX-9500 are connected to [Probe-2] and [Probe-3] and that the measurement is performed by [Probe-1] and [Probe-4].

How to change the destination of the Measuring unit:

For example, if you want to change the destination of [High-Pin], click [High-Pin] of Measuring unit, and [Probe-1] ~ [Probe-3] and [Bottom-1] ~ [Bottom-2] are flashing in yellow. Then click the new destination, and [High-Pin] will be connected to there in a blue line.

12. After the destination was specified, click the Property button, and it will display the Measuring unit screen. (Refer to Fig.31) User you keyboard to fill in the Parts column. In addition, enter the Value, the Comment and the Location column as needed.

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

Parts infor	mation						
	<u>P</u> arts :	*				(11 characters))
	<u>∨</u> alue :	*				(11 characters)	
	Comment :	*				(20 characters)	
	Location :	*				(4 characters)	
	Eunction :	BLANK	(**)	<u> </u>			
	Element :	AUTO		<u> </u>			
Me	ea <u>s</u> ure Mode :	AUTO		Ŧ			

[Fig.31] Measuring unit

13. Click the Next button, and it will display the Coordinate set screen. (Refer to Fig.32)

000003:* *	* Pin No.	* X coor
High - Din	Pin No.	X coor Y coor
Low - Pin Coaxial Scanner T13 Coaxial Scanner T14	: 0	+000.0000 +000.0000 >000 +000.0000 >000 +000.0000 +000.0000 +000.0000 >000 +000.0000 >000 +000.0000 >000 +000.0000
Coavial Scanner T13 Coavial Scanner T14	: Unregistered : Unregistered	Coordinates input
		■ Back ✓ OK ¥ Cance
	Coaxial Scanner T14 Coaxial Scanner T13 Coaxial Scanner T14	Coavial Scanner T14 : 0 [] 0.320

(Teaching system)

(Point system)

[Fig.32] Coordinate set

On the Coordinate set screen, enter the coordinates (In Teaching system) or the pin numbers (in Point system) for [High-Pin], [Low-Pin], [T13] and [T14] as requested by the menu.



14. Click the OK button, and it goes back to the Viewable setup of Function steps screen. (Refer to Fig.34)



[Fig.34] 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".

🗎 Edit Search <u>N</u>	<u>A</u> ove <u>T</u> ool <u>V</u> iew			🗎 Edit Search M	<u>t</u> ove <u>T</u> ool ⊻iew				
File Mode Edit	Optimization Too	Reference Test	Total Coordinate	File Mode Edit	Optimization To	ol Reference Test	Total Co	ordinate Sel	diag. Conv
Edit List Er	ase Search Change	D.Edit D.Set	en. Print Undo	Edit List Er	ase Search Change	Pin coor. Pin Er. D.Ed	n ∰. t. D.Pin	D Set	en. Print
Step :Aux.	Parts	Value	Comment	Step :Aux.	Parts	Value	H-pin	L-pin (Comment
000001:	R902	47KO	*	000001:	R902	47KO	11	15 7	7
000002:	R912	00	*	000002:	R912	00	3	10 3	t
000003:	R913	00	*	000003:	R913	00	4	6 7	t
000004:	R923	470	*	000004:	R923	470	11	10 7	
000005:	R922	470	*	000005:	R922	470	8	3 7	
000006:	C914	102	*	000006:	C914	102	7	6 7	•
000007:	C913	102	*	000007:	C913	102	5	10	
000008:IO/F	COX1-2	ON	*	000008:IO/F	COX1-2	ON	1	2 7	*
	(Teac	hing syste	m)		(Point syste	m)		

[Fig.35] Step/Edit list

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

Setup procedures to terminate signal

When the COX-9500 connects the external instruments to the Flying probes ([Probe-1] ~ [Probe-4]), the connection will be released automatically when step moved to the next one.

On the other hand, when the COX-9500 connects the external instruments to the bottom pins ([Bottom-1] ~ [Bottom-2]) and/or the Tray ([T1] ~ [T12]), the connection won't be released until "OFF Step" is performed.

- 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 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.36)

📕 Edit Search	Move <u>T</u> ool ⊻i	ew	1 1
File Mode Edit	t Optimization	Tool Reference	Test Total Coordinate
Edit List E	rase Search Cha	inge D.Edit D.Set	A.Gen. Print Undo
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	COX1-2	ON	*
000009:	CHECK1	*	*
000010:	CHECK2	*	*
000011:			

[Fig.36] Step/Edit list

4. Click "Viewable setup of Function steps" on the Tool menu. (Refer to Fig.37)

🗎 Edit Search I	<u>M</u> ove <u>T</u> ool	<u>V</u> iew	
File Mode Edit	Op	Coordinates Map F1	te
Edit List E	rase s	Set Comb Measurements Clear Comb Measurements	0
Step :Aux. 000001:	Pa:	Generation •	
000002:	R9:	Ground +	
000003:	R9:	Bottom probe	
000004:	R91	Cluster Function	
000005:	R9:		
000006:	C9:	I/O Function	1
000007:	C91	Viewable Setup of Function steps F4	
000008:IO/F	CO2		
000009:	CHI	Auto Generation	
000010:	CHI 🖳	Change Step Data Ctrl+C	
000011:		Select <u>R</u> evise Area Mode	
		High-fly / No-contact-zone Shift+Ctrl+H	

[Fig.37] 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.38). Click "Set IO/F" button to activate each function on the screen. (Refer to the right of Fig.38)



[Fig.38] Viewable setup of Function steps

7. Click the Clear button to release the connection of the COX-9500 and the measuring unit. (Refer to Fig.39)



[Fig.39] Viewable setup of Function steps

8. Click the OK button, and it goes back to the Step edit list (Refer to Fig.40)

Edit Search Mode Edit	ove <u>T</u> ool ⊻ Optimization	(iew Tool Reference 1	est Total Coord
Edit List Er	ase Search Ch	ange D.Edit D.Set	A.Gen. Print
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	COX1-2	ON	*
000009:	CHECK1	*	*
000010:	CHECK2	*	*
000011:IO/F	*	*	*

[Fig.40] Step/Edit list

It will be useful to input any information on the test contents in the column "Parts" and "Value" as shown in Fig.41.

🗎 Edit Search 📐	love <u>T</u> ool <u>)</u>	⊻iew	
File Mode Edit	Optimization	n Tool Reference 1	Fest Total Coordi
Edit List Er	ase Search Cl	hange D.Edit D.Set	A.Gen. Print
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	COX1-2	ON	*
000009:	CHECK1	*	*
000010:	CHECK2	*	*
000011:IO/F	COX1-2	OFF	*

[Fig.41] Step/Edit list

Step data review

You should input the reference value on the Step data review screen. It is also possible to modify the IO step as needed. A great deal of thought should be given to these operations.



[Fig.42] Step data review (Teaching system)

Examine LCR meter			
Step 8	START	est	
Debug status	1	C Accepted	
-	- 2	4096	
Parts Value Co	omment Jg		
COX1-2 ON *	Refer	ence	
Loc Element Function	Temp.Value 10.00	00	
* RESISTOR V BLANK (**) V	10.00 O Pola	rity 2048	
Measure Mode Measure Range	Measure Time +		
DC-CC • 4- 400 (Range2) • 1.0 m	sec		
+% -% +Limit _Limit	Wait Time Read	ding	
10 10 11.00 O 9.00 O	0.0 sec 2		
speed pos P1 P2 P3 P4 Probe Access	3	0 0.9	5 1.0
0 • H • 0 • 0 • 0 • 0 • (S1,S2,+,-)	• 4	Probe 2 S2	Probe 3 +
Data	Measure	+000.0000,+000.0000 +0	000.0000,+000.0000
Auto Input Part name	Polarity check Max	Probe 1 S1	Probe 4 -
Input Value	Sampling Av	+000.0000,+000.0000[+0	038.5975,+028.9475
Store Pin number	A.Input / Store IO/F	edit	
High-Pin (+) 1 + ID.Net *			
Low-Pin (-) 2 ID.Net *			
Coaxial scanner S1 11 D.Net *			
Coaxial scanner S2 12 JD.Net *			

[Fig.43] Step data review (Point system)

Here lists the key functions available in the Step data review screen.

(1) Element

Element column is substituted by type of component to be measured.RESISTOR--> ResistorsCAPACITOR--> CapacitorsCOIL--> InductorsDIODE--> VF measurement / DC voltage measurement

(2) Function

Function column is substituted by the Measuring function.

(3) 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.

(4) Measure Mode

Measure Mode column is substituted by the measuring signal.

(5) Measure Range Measure Range column is substituted by the Measuring range.

(6) Measure Time

Measure Time column is substituted by the Measuring time (1~999msec).

(7) Wait Time

Wait Time indicates the time from applying the signal to start moving the next step. Click to change the Wait time as needed.

(8) 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 (-)
- S1 --> Signal of T13 of the COX-9500
- S2 --> Signal of T14 of the COX-9500

List 1 below indicates the Terminal numbers and the Probe access name.

Terminal number	Probe access name
T13	S1
T14	S2
T15	S3
T16	S4
T17	S5
T18	S6
T19	S7
T20	S8
T21	S9
T22	S10
T23	S11
T24	S12
[L	.ist 1]

(9) Set IO/F

This enables to activate each function on the Viewable setup of Function steps screen.



[Fig.44] Viewable setup of Function steps

Reference input

As the IO function step isn't performed at the time of Auto. reference input, any signal is output. Means, at the test step to measure while performing the IO function step, the reference value will not be input correctly even if the Auto. reference input is performed. Therefore, the reference value has to be input in the Step data review.

Reference value input method

Open the IO function step in the Step data review, and you will see that Device side and Tray side are connected after the IO function step was performed.

In prior to input the reference value, make sure that the capital letter of the Parts suits for the UUT. Then click the Auto Input button to input the reference value when you are going to measure other than the DC voltage. The Temp. Value column indicates the value. You can change "Function" and "Measure Time" as needed. Clicking the Store button can save the Temp. Value to the Reference value.

When you are going to measure the DC voltage, specify the Element to "Diode" and the Measure Mode to "DC-VM". Click the Input button when you want to input the reference value. (Refer to Fig.45) The Temp. Value column indicates the value. Clicking the Store button can save the Temp. Value to the Reference value.



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 you misuse it (ex. wrong location, Outport so on). The use of the I/O commands must be carried out under your responsibility.



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.

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.

Examine LCR meter	Examine LCR meter	
Step 143 START	Test Step 143	START Test
Debug status 1	Debug status	1
-	PASS Dette Value C	Jg PASS
Parts Value Comment ⁶⁹	eference COX1-2 ON *	Reference
Loc Element Function Temp Value	0.00 0	Temp.Value 10.00 O
* RESISTOR V BLANK (**) VI0.00.0	* RESISTOR V BLANK (**)	10.00 O Polarity
Measure Mode Measure Range Measure Time	Polarity Measure Mode Measure Range	Measure Time -
DC-CC • 4- 400 (Range2) • 1.0 msec +	+% -% +Limit -Limit	Wait Time Reading
+% -% +Limit -Limit Wait Time	10 10 11.00 O 9.00 O	5.0 sec 1
10 10 11.00 0 9.00 0 5.0 sec	Reading speed pos P1 P2 P3 P4 Auto Polarity	3
speed pos P1 P2 P3 P4 Auto Polarity 1	$0 \bullet H \bullet 0 \bullet 0 \bullet 0 \bullet 0 \bullet (+,-,S1,S2)$	• 4
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Data Search	Measure Min
4	Input Value	Sampling Av
Data Search Measure 5	Store Pin number	A.Input / Store
Auto Input Part name Polarity check	High-Pin (+) 1 1 ID Net *	
Input Value Sampling Av	Low-Pin (-) 5 \$ ID.Net *	
Store Pin number A.Input / Store	O/F edit Coaxial scanner S1 10 1 ID.Net *	
	Coaxial scanner S2 20 ID.Net *	
(Teaching system)	(Point	system)

[Fig.45] Step data review

Maintenance

"Coaxial Scanner Board (12pin)" in Self-diagnosis menu makes the diagnosis of the relays on the TVX-12M PCB and the cable connection up to the Tray terminals.



[Fig.46] Self diagnosis

Relay check

 If you click "Coaxial Scanner Board (12pin)" (Tool > Self Diagnosis), it shows the message window below. As described, you are now allowed to connect any external instrument to the TVX-12M PCB when the relays are diagnosed. Otherwise the relay and/or the measuring unit may get serious damages.

T-94	4XX
!	If some external equipment is connected to Terminal 13-24 of Coaxial scanner board, be sure to disconnect them prior to the relay diagnosis. Otherwise either or both of the Coaxial scanner board and the measuring unit will impair.
	OK ▲ Cancel

- 2. Click the OK button, and it will display Fig.19.
- 3. Click the Execute button, and it starts diagnosing the relays on TVX-12M PCB.

If some relays were judged fail during the ON test, they are highlighted in blue and the failure information is displayed in the "On test" window. If some relays were judged fail during the OFF test, they are highlighted in red and the failure information is displayed in the "Off test" window.

Elle Edit Reference Test Teo File Mode Edit Optimization Te	l ∑lew ∐elo Iol Reference Test Total	Coordinate Self-diag. Convert Help	
		P.Seff ICOnen Sam	
	0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000 0 2000000 2000000		On Test OK!!
			Off Test RL49 3.24 O
Januari Januari Januari Januari Januari Januari Januari Januari Januari Januari Januari Januari			
Common Relay			✓ Execute OClose

[Fig.48] Coaxial Scanner Board (12pin)

Pin search

1. Click on Pin search on the Tool menu, and it will display the left screen in Fig.49.

Bottom Probe Search 🔀		Bottom Probe Search	×
Board Name		Board Name	-
		Coaxial Scanner	
		Board (12pin)	
Pin No.		Pin No.	
		$\mathbf{\wedge}$	
		9	
<u>S</u> Close		<u> </u>	
	>>>		

[Fig.49] Pin serach

2. To ensure the cable connections up to the Tray terminals, plug a tester lead cable into the tester terminal (+ pin) provided on the APT-9411 and then connect another tip of the tester lead cable to the objective terminal. With this, the terminal number is displayed as shown in the right screen in Fig.49.



The Pin search screen will be closed automatically after it passed over 1 minute without displaying any pin number.

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TAKAYA CORP.