NACHI

Simulation tool for AX controller
AX on DESK
OPERATING MANUAL

6th Edition

■ This volume describes the method for introduction of AX on DESK and precautions for its operation. Please start operating after having had a thorough knowledge of this manual.

NACHI-FUJIKOSHI CORP.

1106, TAXEN-904-006, 001

PART – 1

AX on DESK

This part describes the method for introduction of a simplified simulation tool of "AX on DESK" and precautions for its operation.

Please start operating after having had a thorough knowledge of this manual.

Table of Contents

1. General Description

1.1. Outline of AX on DESK

AX on DESK is software enabling software of AX controller to operate by a PC on the desk. The distinctive features are as follows:

Table 1-1 Distinctive Features of AX on DESK

Features －1	It can be used anywhere, since an OS on the market can be operated. It does not require any special hardware. For PC operating environments, see the next section.
Features – 2	It is the most appropriate for operational training before introduction of a robot. Teaching can be provided in the exact same operation as AX Controller.
Features – 3	Off-line teaching of a working program while confirming a robot posture or I/O signal is possible. It carries the same motion engine as AX Controller, which enables it to carry a high-accuracy cycle-time simulation.
Features – 4	Setting up of various parameters for PLC programs, welding conditions and interface-panel design are possible as well as for working programs. (It can execute editing and grammar checking through PLC programs). All files are fully compatible with AX Controller, which therefore enables an easy playback of operational states of actual units on the desk.

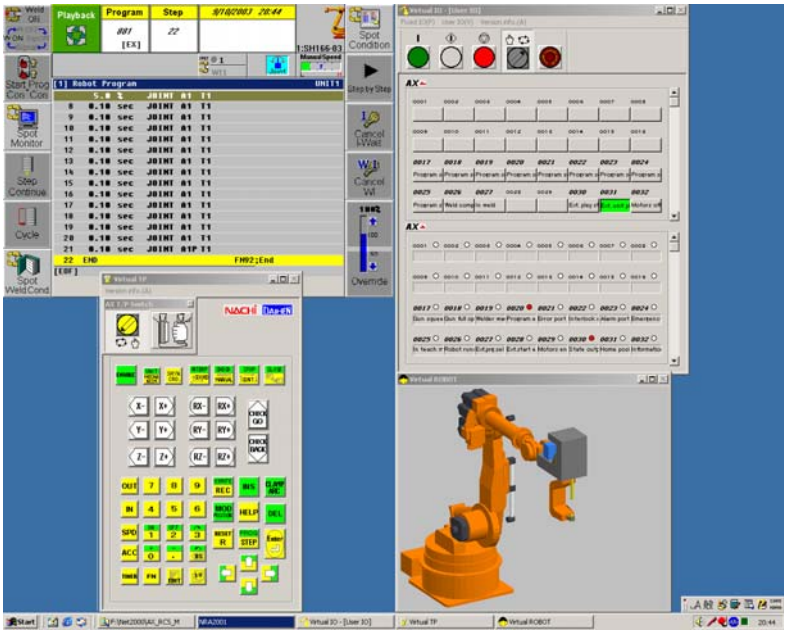


Figure 1-1 An Example Display of AX on DESK

1.2. AX on DESK Operational Environments

Table 1-2 AX on DESK Operational Environments

Principal bases	Specifications
Basic software	Windows ® 2000, Windows ® XP, Windows ® Vista, Windows ® 7 Note 1, Note 3
CPU	Intel ® –made Pentium ® of II 400MHz and more (Pentium ® of III 900 MHz and above are recommended). Note 2
Memory	More than 128MB
Hard-disk capacity	More than 70MB spare capacity to be required
Graphic resolution	More than 1024 X 768 dots
Others	- The following is necessary for license check: Dongle specifications USB port Standard specifications Ethernet LAN adaptor - Install NETBIOS Service* [1] in case of having standard specifications. - Do not use simultaneously with other application software when cycle time is inspected.

Note 1: Windows is a trademark of Microsoft Corporation registered in the US and other countries.
Note 2: Intel and Pentium are registered trademarks of Intel Corporation of the US.
Note 3: Windows Vista and Windows 7 is available at version V5.19 or after.

*1. Setting up of NETBIOS service shall be authorized by System Administrators.

Windows XP

1. Copy the Netnbf.inf File in the folder of Valueadd¥msft¥netbeui into the directory of %SYSTEMROOT%¥INF¥ after inserting CD-ROM of Windows XP.
   Copy the nbf.sys File into the folder directory of %SYSTMROOT%¥SYSTEM32|DRIVERS¥.
2. Click [Start], [Control Panel], and double click [Network Connection].
3. Right-click the connecting icon for adding NetBEUI and click [Property].
4. Click [Install] of the tab of [General].
5. Click [Protocol] and click [Addition].
6. Click [NetBEUI Protocol] and click OK button.
7. Click [Close] for closing Windows.
8. Restart PC. That is the end.

Windows 2000

1. Open the Control Panel with selecting [Control Panel] from [Setting] in the menu of [Start].
2. Double click the icon of [Network and Dial up] in the Control Panel.
3. Right-click connecting points currently under use.
4. Push the Install button after selecting the Property.
5. Push the Addition button after selecting the Protocol.
6. Select NetBEUI Protocol in the right side after selecting Microsoft.
7. Finally push the OK button, and Install starts.
8. Restart PC. That is the end.

1.3. License of AX on DESK

AX on DESK varies depending on licenses. For purchase of licenses, please contact us at our sales offices.

Table 1-3 License Method for AX on DESK

License	Authentication method	Limitation
Standard (MAC address)	MAC address authentication method	No
Dongle	USB dongle method	No
No license	No	Beginner mode at all time

Standard specification (License file)

Please give us your MAC address at our contact address in the Install CD. A license file will be issued to you by return. The license file can be used only for this notified PC.

[Attention] The following is required to be confirmed in a case when an error appears in license checking despite the fact that a license file has been copied in a proper location:

1. Confirm whether the file name is “license dat”. And pay attention to its extension.
2. Confirm that all attributes of file security are approved in NTFS file system environments.

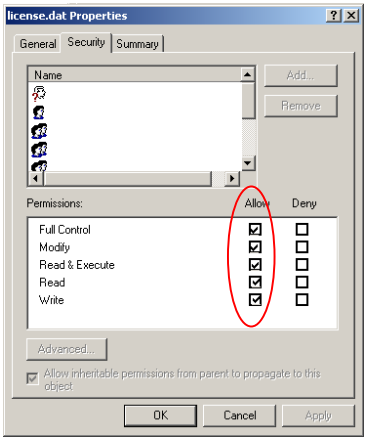


Figure 1-2 File Security

Dongle specification (Applicable to V2.00 and after)

USB dongle is necessary. Use a dongle with inserting into a USB port. Any PC carrying AX on DESK can operate if a dongle is inserted. Do not remove a dongle while AX on DESK operates.

Aladdin Japan HASP4 M1 is used as the dongle for NACHI AX on DESK. Please get the last version driver from the following URL and install it.

http://www.aladdin.co.jp/down/down02_2.html

Downloaded file : HASP4_driver_cmdline.zip

Please confirm the latest URL to Aladdin Japan Company because it may change sometimes.

How to install :

1. Extract the downloaded zip file on the adequate folder.
2. Open the command prompt screen.
3. Change to the folder of step 1.
4. Input “hinstall -i” and press ENTER.
5. Installation completed. Reboot your computer.

[Attention] Check that the LED light of a dongle is switched on after supply of power source to PC. Insert again a dongle if it is not switched on. License check can not be made, since a dongle can not be identified if it is not inserted properly.

Without the license (Applicable to V2.00 and after)

It is operated in a beginner mode with some operational limitation as an experience edition. For the beginner mode, see optional items of Chapter 6.

1.4. Composition of AX on Desk

Ax on Desk comprises four parts (programs); Virtual AX, Virtual TP, Virtual I/O and Virtual ROBOT.
When AX on Desk is started up, all of four programs are started automatically and the display is shown on its screen as in Figure 1-1 An Example Display of AX on DESK

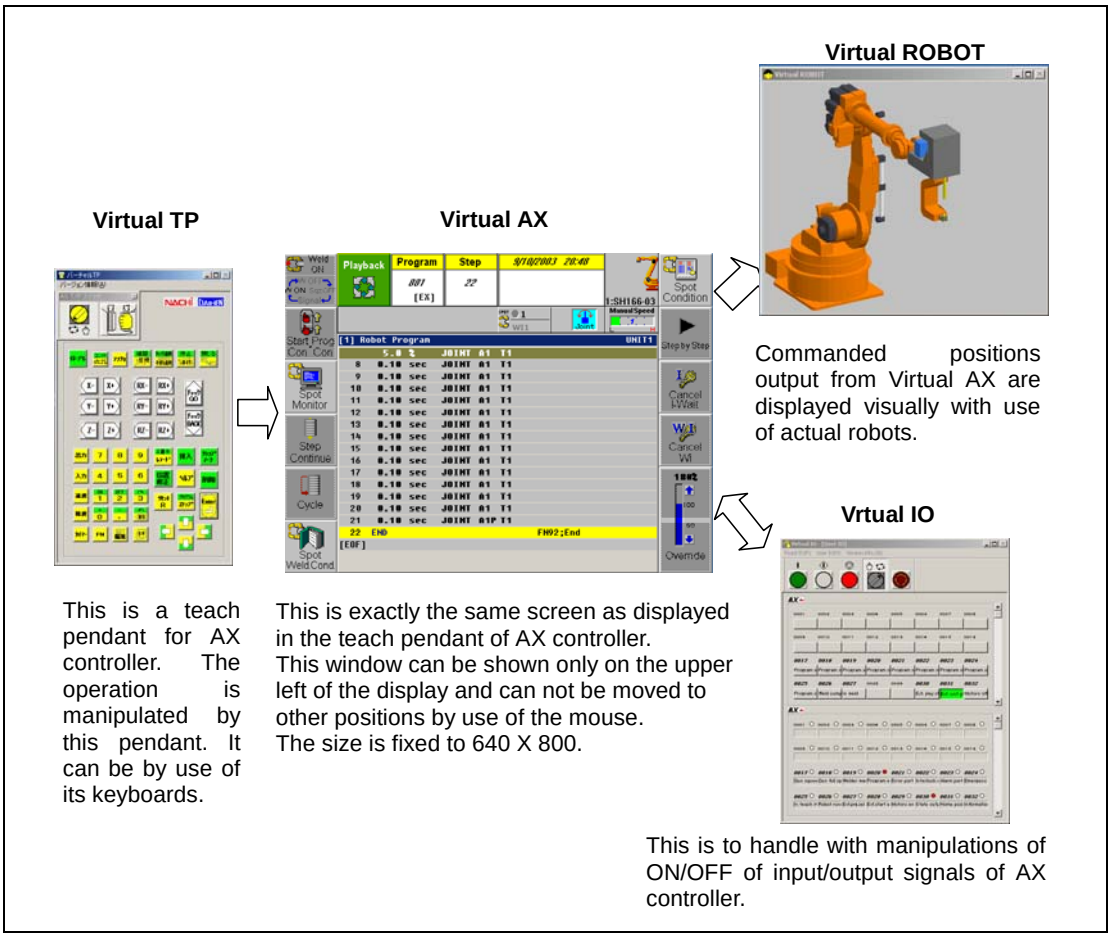


Figure 1-2 Composition of AX on DESK

1.5. Startup and Termination of AX on Desk

Startup AX on Desk

1 Click the shortcut “AXonDesk” on the desktop.
That is the end.
Four programs start automatically at the same time.

2 When it starts for the first time, Format has been made by a sample Constant File. For a robot with Constants other than the sample Constant File, Format shall be provided.
Restart it, as AX on Desk terminates processing and closes the Windows automatically after making File.
*For the detail of format operation, see the manual “Memory Format”.

3 All files are completely compatible with AX controller, which thus enables an easy playback of operational state of actual units on the desk.
Make backup data of a real AX Controller onto memory media like CF and also copy onto PC of AX on Desk by reference to 2.3 Folder Structures before startup of AX on Desk, then operation under the same conditions as a real Controller is available from the beginning upon the startup as it is.

Terminate AX on Desk

ESC

1 Click Virtual AX and press ESC key.
Four programs (Virtual AX, Virtual TP, Virtual I/O and Virtual Robot) are automatically terminated.

This volume does not describe operating procedure of AX Controller.
For its operation, see the section “Basic Operation” of Operating Manual of AX Controller or Electronic Manual attached to AX on Desk.

1.6. Limitation of AX on Desk

AX on Desk is not always able to simulate 100% of its possible movements with AX Controller. The followings are limitations to be understood;

- As hardware such as robot, I/O and others is not connected, functions caused by feedback signal (for example, detection of abnormal overload) do not work,
- Optional functions such as device net function and analog I/O function requesting special hardware do not work,
- Similarly, spot and arc welding machines are connected only through Virtual I/O with general-purpose I / O signal. If using special ways of connections, they do not work.
- Software PLC program can not be executed. AX on Desk can perform compiling and grammatical check (compile) of PLC programs.
- Virtual Robot does not support cooperative control. Some of optional functions can not be supported. Please confirm this matter when it is ordered.

2. Setup

2.1. Installation of AX on Desk

AX on Desk shall be installed referring “AX on desk installation.pdf” or “readme.txt” in installation CD.

2.2. Module Components

Table 2-1 Module Components of AX on Desk

File Name	Contents
(1) NRA2001.exe	Virtual AX the main body
(2) FDM2001.exe	AX Motion
(3) FDMAPI.dll	AX Motion API DLL
(4) IsaSys.dll	DDL 1 for ISAGRF(PLC)
(5) IsaIXL.dll	DDL 2 for ISAGRF(PLC)
(6) ResJpn.dll	DLL for AX the main body
(7) ResFunctionStringJpn.dll	DLL for AX the main body
(8) ResConsString.dll	DLL for AX the main body
(9) ResConsStringJpn.dll	DLL for AX the main body
(10) ResFunctionString.dll	DLL for AX the main body
(11) AXonDesk.ini	INI for automatic startup/termination
(12) AXonDesk.exe	Virtual IO & TP
(13) IoPnanel.ini	INI for Virtual IO
(14) ACDaihen.dll	DLL for AX the main body
(15) PuraHook.dll	DLL for AX the main body
(16) ResEng.dll	DLL for AX the main body
(17) INIPlcMoni.ini	A setting file for virtual I/O
(18) ClrFile.bat	An batch file for maintenance

Contents of AXonDesk.ini

Ver5.16 or before

```
[EXTERNAL_PROCESS]
App1=AxonDeskE.exe -EG
App2=AXonDeskE.exe -TP
App3= RobView.exe

[EXTERNAL_PROCESS_FOLDER]
App1=C:¥AX_ONDESK¥AX¥nra2001
App2=C:¥AX_ONDESK¥AX¥nra2001
App3=C:¥AX_ONDESK¥RobView

[EXTERNAL_PROCESS_TITLE]
App1= Virtual IO
App2= Virtual TP
App3= Virtual ROBOT
```

Name of external execution file

Folder of external execution file

Title of external execution file

Anything except [EXTERNAL_PROCESS_FOLDER] shall not be changed.

Ver5.17 or after

```
[EXTERNAL_PROCESS]
App1=AXonDeskJ.exe
App2=AXonDeskJ.exe -TP
App3=RobView.exe
App4=VideoForRobView.exe

[EXTERNAL_PROCESS_FOLDER]
App1=C:¥AX_ONDESK¥nra2001
App2=C:¥AX_ONDESK¥nra2001
App3=C:¥AX_ONDESK¥RobView
App4=C:¥AX_ONDESK¥RobView

[EXTERNAL_PROCESS_TITLE]
App1= Virtual IO
App2= Virtual TP
App3= Virtual ROBOT
App4=VideoForRobView
```

Name of external execution file

Folder of external execution file

Title of external execution file

Anything except [EXTERNAL_PROCESS_FOLDER] shall not be changed.

Contents of IoPnanel.ini

All is reserved with AX on Desk system. Nothing shall be changed.

Contents of shortcut “AXonDesk”

C:¥AX_ONDESK is an install folder.

Its succeeding part of [NRA2001¥NRA2001.EXE – M - A] shall not be changed.

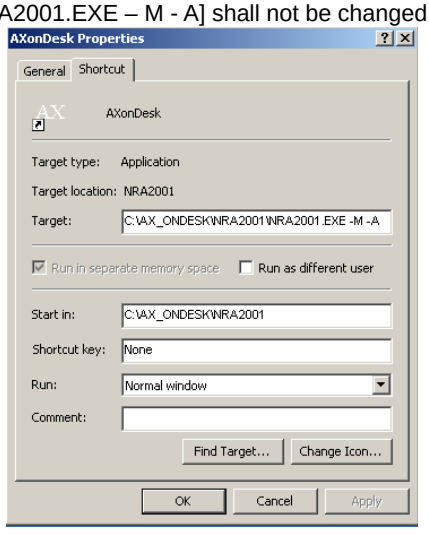


Figure2-1 Shortcut of AX on Desk

2.3. Folder Structures

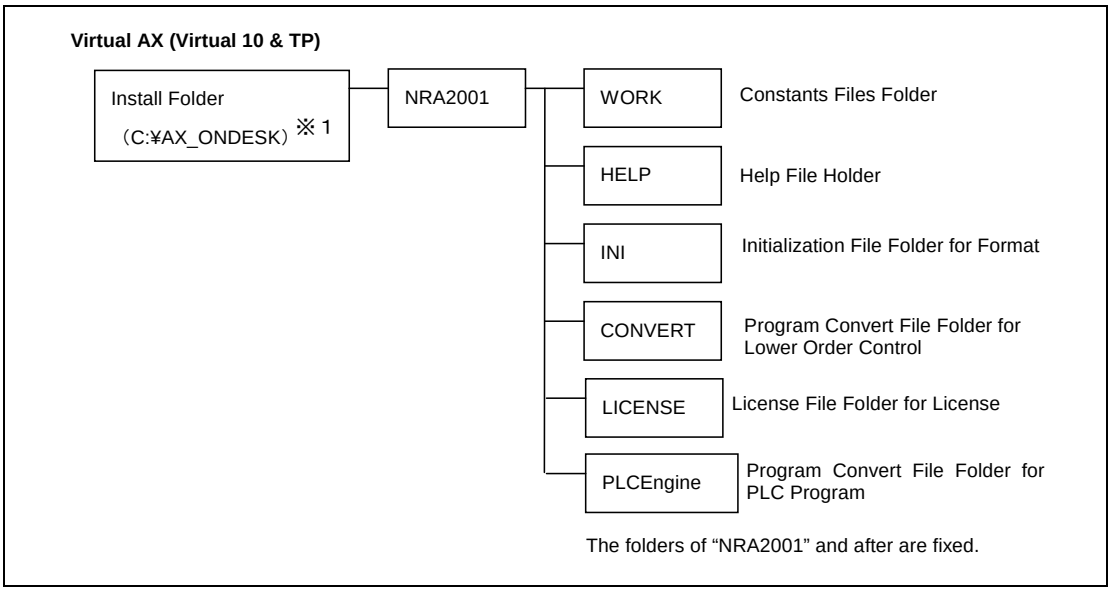


Figure2-2 Components of AX on DESK Folder

* 1. This Folder is the one which selected at the time of its installation.

3. Virtual AX

Virtual AX shows exactly the same display as in the Teach Pendant of AX Controller.
This window displays it **only on the upper left side**, and it cannot be transferred to other locations by a mouse.
The size is fixed to **640 x 800** .

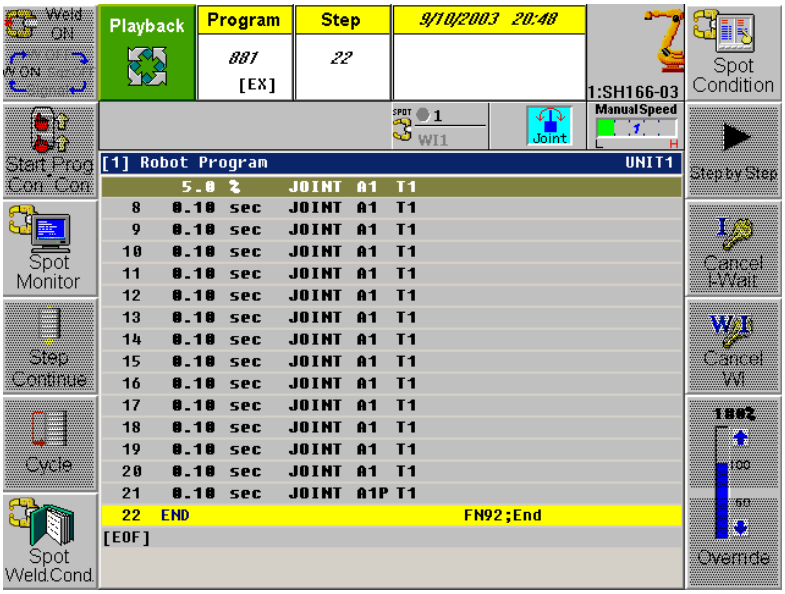


Figure 3-1 An Example of Virtual AX Display

Operation

Virtual AX is operated with “Virtual TP” or keyboard /mouse. For the operational methods, see the section “Basic Operation” and others of Operating Manual of AX Controller.

F-key operation

Press F1 to F12 on the keyboard or click by a mouse in selecting icons on the both sides.
F1 to F6 are laid out down from the upper left side while F7 to F12 from the upper right side.

Mouse operation

Clicking on icons by a mouse can be just as if it is operated by a teach pendant with touch-panel. (But it is not valid to all the screens, therefore arrow keys of “Virtual TP” and cursor keys on the keyboard shall be used)

Version

AX on Desk version is displayed on the self-diagnosis screen (progress bar indicated screen) at the startup.
For software version of AX Controller, see Service and System Environments.

If the key ESC is pressed in this window, virtual AX and all of AX on Desk as well are terminated.
Be careful that there is no display of a message confirming the termination.

4. Virtual TP

Virtual TP has the function equivalent to Teach Pendant of AX Controller.

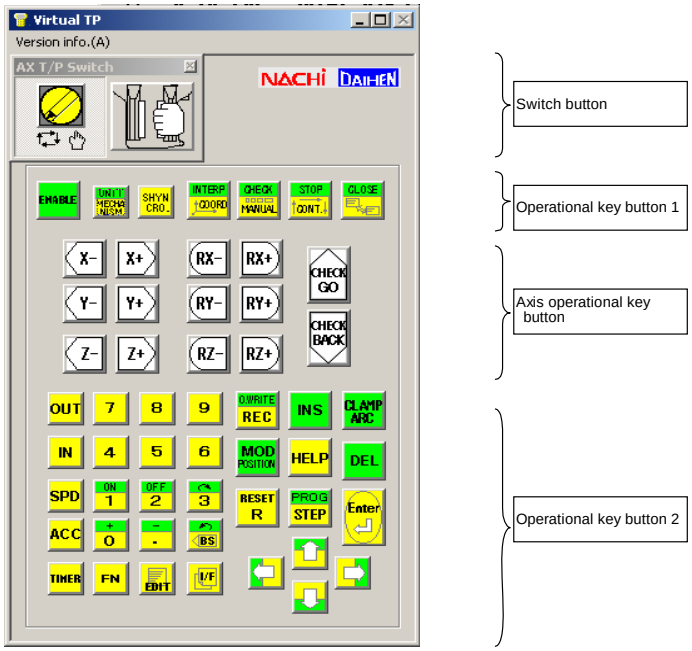


Figure 4-1 Virtual TP

Operation

Click on the button (icon) by a mouse. In the case of simultaneous press (green color) with Enable, click on the button after having pressed Enable. Click Enable, it changes to Enable valid (red color). And click again it, it reverts to Enable invalid (green color).

For its operational method, see “Basic Operation” of Operating Manual of AX Controller, and others.

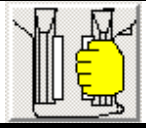
Note:

More than two-digit values can not be input through Virtual TP on Constants Set Menu and others.
Use the keyboard for input in this case, and confirm the input with Enter key after inputting figures.

4.1. Function of Switch Buttons

The switch buttons of Virtual TP have the following functions:

Table 4-1 Function of Switch Buttons

Appearance	Functions
	Teach Mode and Playback Mode are changed by turns through combination with [Mode Changeover Switch] of Virtual I O.
	It is used if a robot is moved by hand operation on Teach Mode. Hand color becomes yellow at the state of ON (Operation is ready “ON”). Hand operation of a robot is possible at the “ON”, but impossible at the “OFF”.

4.2. Function of Operational Key Buttons

For the keys of Teach Pendant, see “Basic Operation” of Operating Manual of AX Controller.

4.3. Correspondence between Keyboard and AX Teach Pendant

Besides clicks on Virtual TP by a mouse, direct input can be possible through the keyboard.
Such keys as f-keys, figure-keys and cursor-keys, in particular, are useful.
The correspondence between keyboard and AX Teach Pendant are shown in the following;

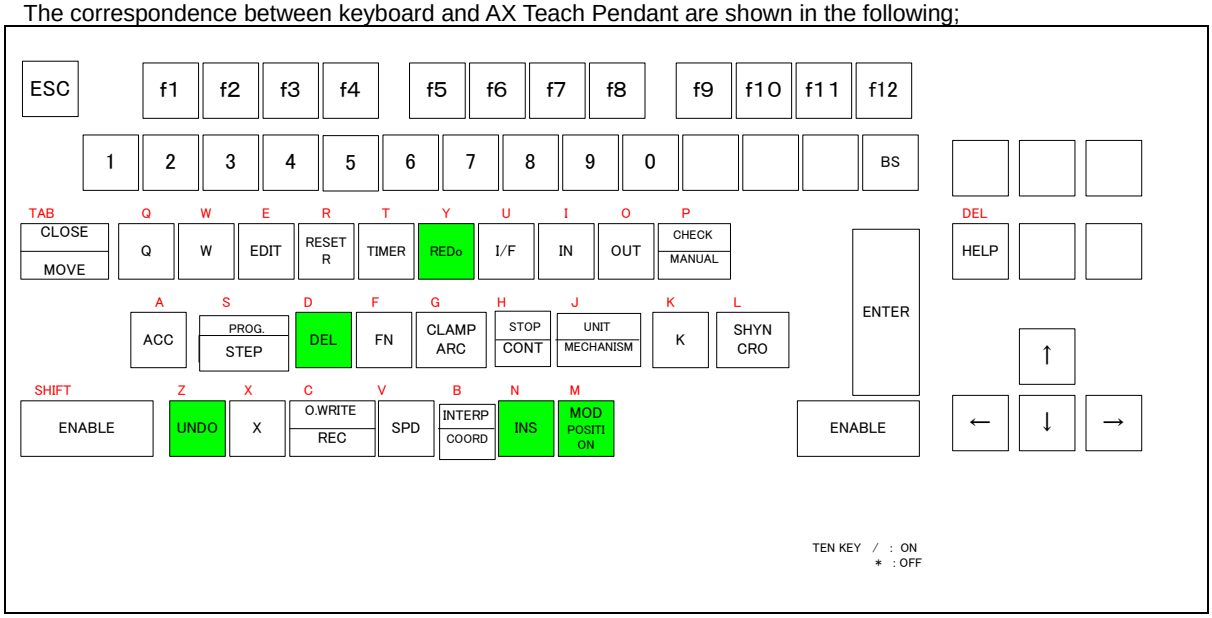


Figure 4−2 Correlation with Keyboard

4.4. Character Input Screen (Applicable V2.00 and After)

There are two methods for inputting character line on the character input screen of AX on DESK. Choose an appropriate method based on users’ needs.

1. To input character line on the soft keyboard by Virtual TP.
2. To input directly character line on the keyboard by use of PC keyboard.

Change a keyboard to be used by use of F2 key. Press [Hard Keyboard], it changed to PC keyboard, while pressing [Soft Keyboard] to the soft keyboard

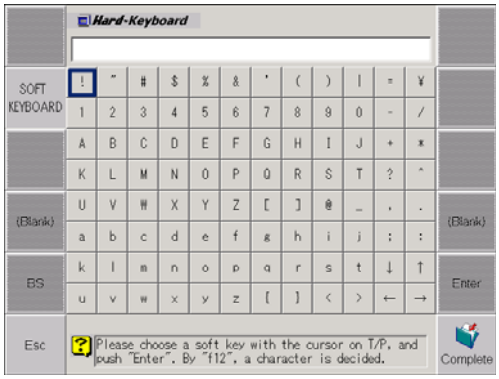


Figure 4−3 Character Input Screen

・Soft-Keyboard

is displayed on the upper left side in selecting soft-keyboards. Characters are selected by use of arrow keys of Virtual TP and they are input by pressing [Enter].

・Hard-Keyboard

is displayed on the upper left side in selecting soft-keyboards. Characters are input by use of the PC keyboard. Change of input mode for input kana, kanji and alphabet shall be changed by using kana-kanji processor (IME). Input by Virtual TP is changed to the keyboard input.

5. Virtual I O

Virtual I O does ON/OFF operation of signal attributes of AX Controller with monitor display.
It consists of three functional components; “Operational panel” always displayed on the upper side, “General-purpose signal attributes” and “Fixed signal attributes”, both of which are displayed by changes of the menu.

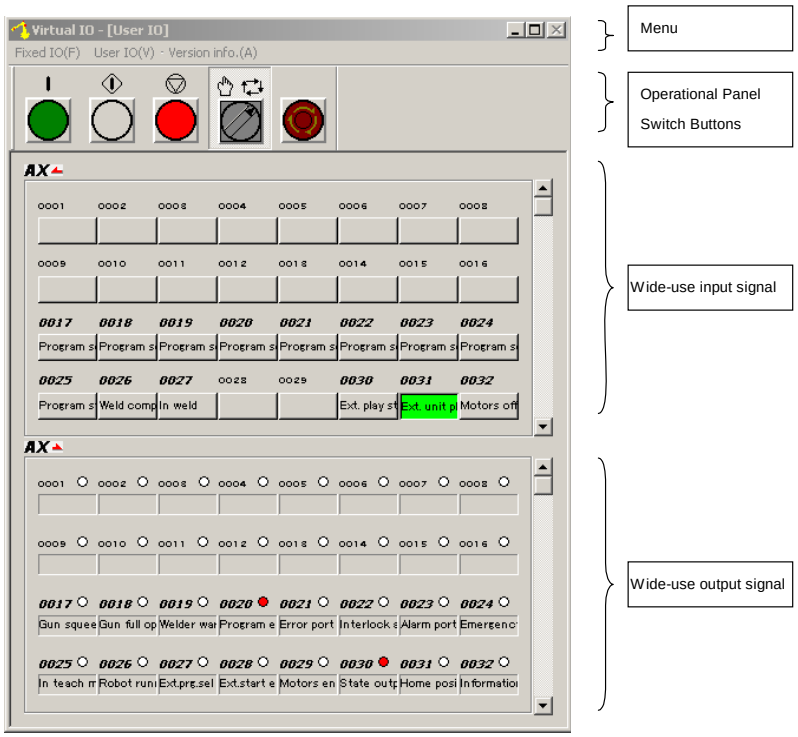


Figure 5-1 Virtual I O

5.1. Operational Panel

Operational panel located in AX Controller is handled here. It is always displayed on the window of Virtual I O.

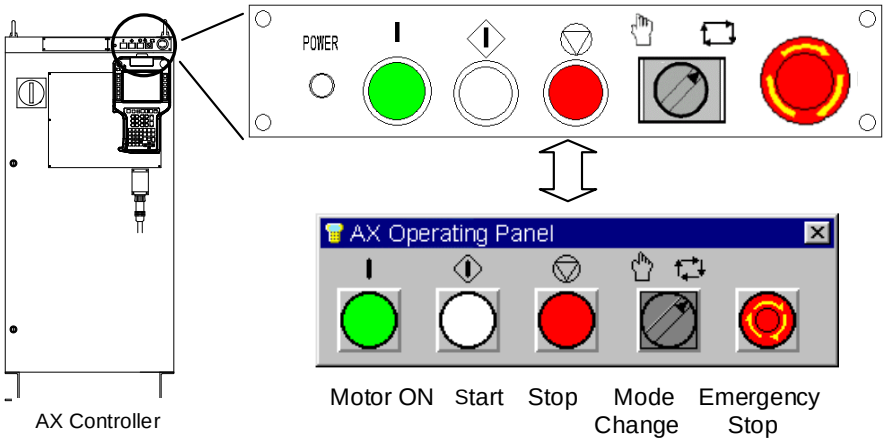


Figure 5-2 Virtual I O: Operational Panel

Operation

Click on the buttons (icons) is done by a mouse. Input signal can be operated by ON/OFF switch.
The emergency stop button is switched to Lock/ Release alternatively every time clicking on it.

5.2. General- Purpose I / O Signal

Click on the general –purpose signal attributes through menu 

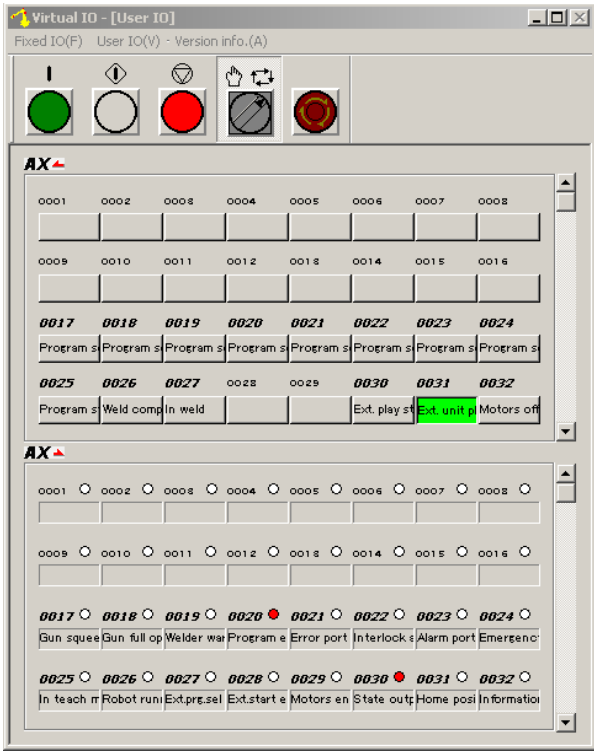


Figure 5-3 Virtual I O: General- Purpose Signal Attributes

Operation

Click on the buttons (icons) is done by a mouse. Input signal is operated by ON/OFF switch.
AX indicates input signal, while、AX indicates output signal.
The horizontal scroll bar located in the right side can display signal 1~2048.

The bold numbers indicate signals laid out in the status signals.

A guide message is displayed when the mouse is transferred to buttons or lamps.
It is very useful that I / O signal information to be laid out in Virtual AX is reflected in Virtual I O.
When the above signal information is again laid out, the display is refreshed if once the fixed I / O signal are displayed and again the general- purpose I / O signal are displayed.

5.3. Fixed I / O Signal

Click on the fixed I / O signal through Menu Fixed IO(F) User IO(V) · Version info.(A)

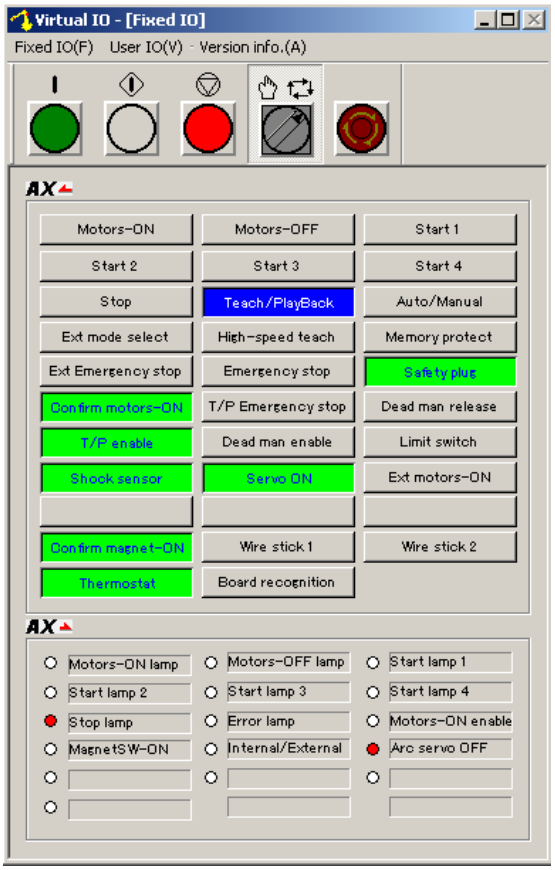


Figure 5-4 Virtual I O : Fixed Signal Attributes

Operation

Click on the buttons (icons) is done by a mouse. Input signal is operated by ON/OFF switch.

AX indicates input signal, while AX indicates output signal.

There is no need to change state of ON/OFF under usual conditions, as there are only fixed I / O signals (signals used for cabinet sequence) of AX controller.

5.4. Version Information

Click on the version information through Menu Fixed IO(F) User IO(V) · Version info.(A)

The version of AX on Desk is displayed.

6. Setup of Options

6.1. Setup of options for AX on DESK (Applicable to V2.00 and after)

Options for AX on DESK can be freely changed accordance with customers' usage. Operators shall have qualifications of *Specialists* and above. For detailed qualifications of operators, see chapter 4 of "Up to startup of a robot" of Operating Manual of AX Controller.

Qualifications of operators are:

Special functions or menus can be non-indicated or indicated oppositely in accordance with skills of robot-operators with setup of operator qualifications.

Table 6.1 Category of Operator Qualifications

Qualifications of Operators	Applicable Operators	Contents
Beginner	Beginners' class Operators	It is set for beginners of robots or operators who operate only for start-up of robots in a factory.
User	Average class operators	It is set for operators who operate robots to a certain extent.
Expert	Expert operators	It is set for operators who are in charge of maintaining robots.
Specialist	Senior expert operators	It is set for only a part of special operators among *Expert* operators.

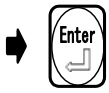
Table 6.2 Limited Functions by Categorical Qualifications

Operator Qualification / Limited functions	*Beginner*	*User*	*Expert*	*Specialist*
General operation	○	○	○	○
Constants setting	×	△	○	○
Functions and maintenance works calling for specialty knowledge	×	×	○	○
Setting of optional functions	×	×	×	○

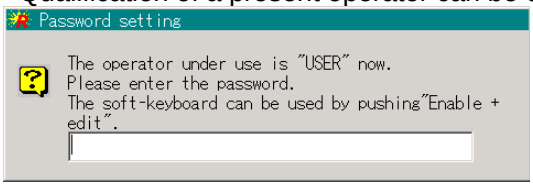
○ : Possible × : Impossible △ : Partly non-indication

Change of operators' qualifications

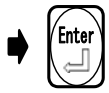
1 Press [Reset/R]
>> List of shortcut code is displayed.

314 

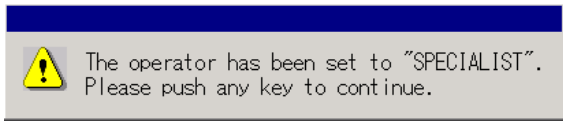
2 Input "314" with numerical input keys and press [Enter].
>> Password input screen is displayed.
Qualification of a present operator can be confirmed on this screen.



3 Input a password for *Specialist* and press [Enter].
For example, press "1 2 3 4 5" [Enter] in the case of initial password of Specialist.

Pass-word 

>> Qualification of the operator is changed.

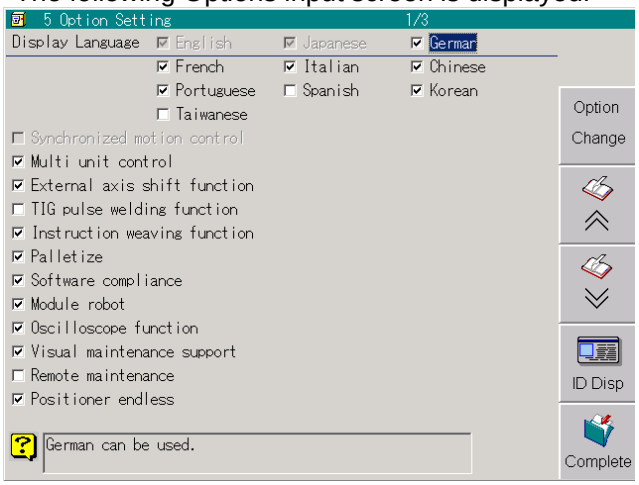


If any key is pressed, the previous screen is reverted.

Operational procedure of setting up of Options

1 Select the teaching mode.

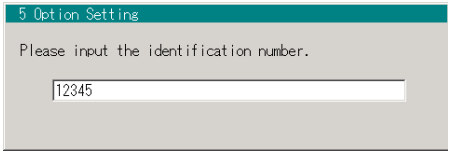
2 Select [Constants] and press [1 Control Environments] → [5 Options].
>> The following Options input screen is displayed.



3 3. Press [Option Change].

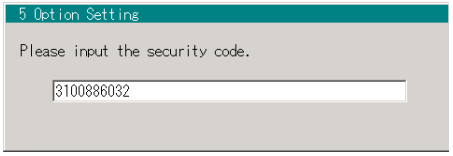
12345

4 **Input numerical values of [12345] and press [Enter], since the following dialog is displayed.**

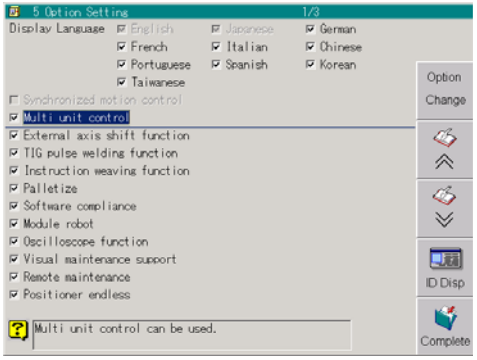


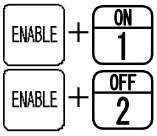
31008
86032

5 **Next, input numerical values of [3100886032] and press [Enter], since the following dialog is displayed.**



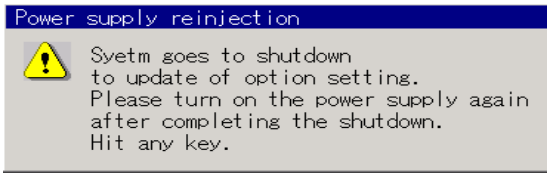
6 >> The following Option Input screen is displayed.





7 **Move the cursor to the Option to be desired and enable the setting to be valid with the key of [Enable + ON] and to be invalid with the key of [Enable + OFF].**
On DESK

8 **Press [Complete] after completing the setting. The following dialog is displayed and the Option is set up.**



9 **Press [Reset] and go back to the constants screen. Setting up of the option is finished as above.**

Important

Optional setting of AX controller is applied if the registry is restored in AXONDESK with back-up by AX controller.
The registry set up AXONDESK can not be restored in AX controller.
An option of display language can not be corresponded.

7 . Printing function of PLC program

7.1. Printing Function of PLC Program (Applicable to V2.00 and After)

In the case of AX on DESK, PLC program prepared can be printed by a printer in use. For editing operation of PLC program and program preparation, see “Software PLC” of Operating Manual of AX Controller.

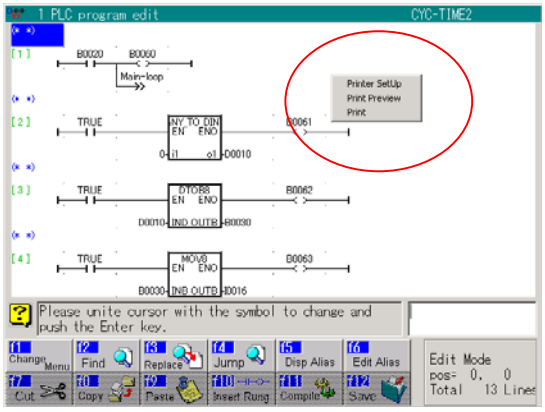
Operational procedure for printing PLC program

1 **Select teaching mode**

2 **Select [Service] and press [14 PLC Program]→[1 PLC Program Editing].**

3 **Select a file which is desired to be printed.**

4 **Right-click the mouse on the window where ladders are displayed on the editing screen. The following dialog appears.**



5 **Select the menu with the mouse.**

Setting up of a printer	**A printer is set up.**
Print preview	**Print preview is displayed,**
Printing	To be output into the printer having set up for printing.

Important

More than one PLC programs can not be displayed or printed simultaneously.
Print images and print previews can be different according to models of printers.

8. Interface Panel Function

8.1. Interface Panel Function (Applicable to V2.00 and after)

The interface panel function is intended to support interlocks with line controllers or controls of peripheral units with push buttons or lamps laid out in touch panel teaching pendants. Arrangement of manipulation switches or display lamps, of which functions have been performed with hardware circuits, in touch panel teaching pendants can contribute to cost reductions. For the on-DESK, interface panels can be edited and checked. For its details, see “Interface Panel Functions” of Operating Manual of AX Controller.

* Touch panel teaching pendant is an option.

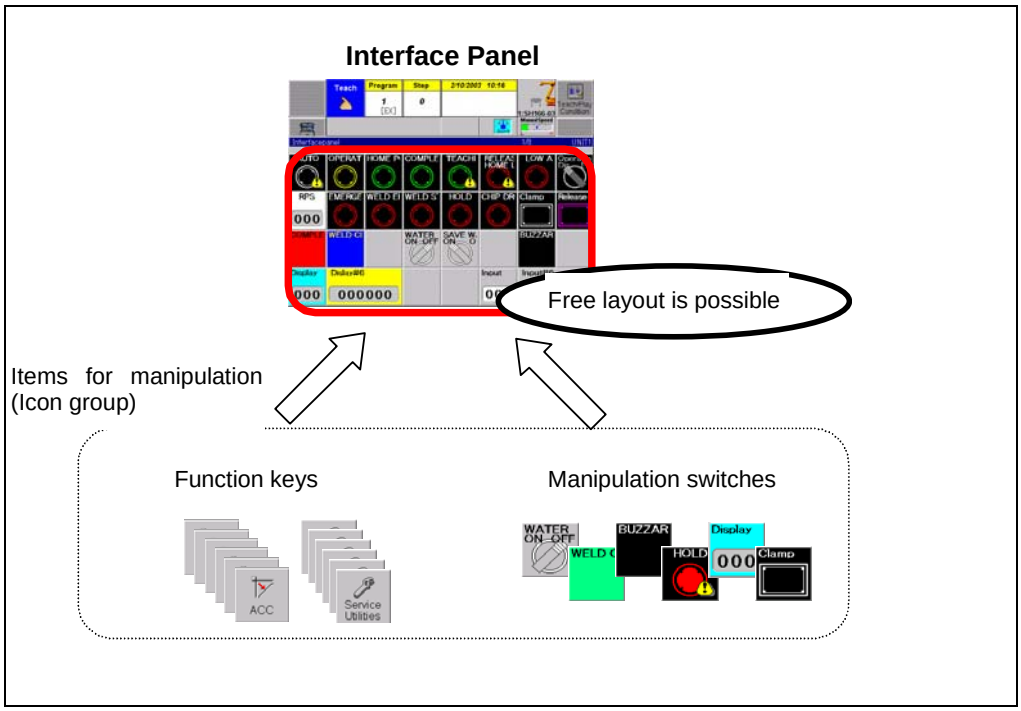
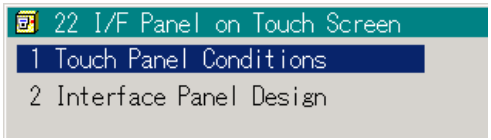


Figure 8.1 Outline of Interface Panel Functions

Basic operation of designing manipulation switches (Applicable to V2.00 and after)

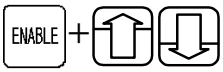
A method for laying out manipulation switches to be designed one by one on the interface panel screen

1 **Set Constants setting by teaching mode.**
Select "22 Interface Panel Conditions Setting" from the displayed menu.
>> Constants menu for Interface Panel is displayed.



2 **Select "2 Interface Panel Design"**
>> The following screen of designing manipulation switches (at-sight screen) is displayed (This example of display indicates that some settings is already finished. All keys are set to "without function" at initial states).

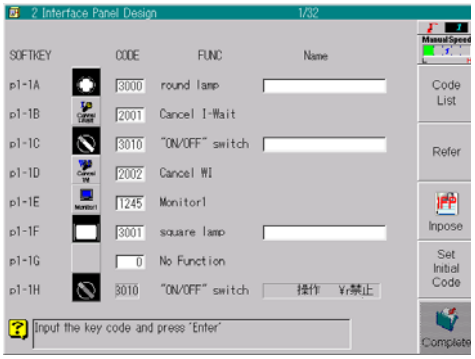
Key layout numbers are displayed in Page No. - Position No. on the left side, and main data like outward appearance and names, are displayed on the right side.
Detailed setting can not be displayed on this screen.



3 **A list covering (P1 - 1A) on the upper left side of the first screen to (P8 - 4H) on the lower right side can be changed with the keys of [Enable] + "Up and Down Cursor".**

Numerical Value

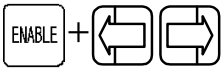
4 **First set the cursor to "Code" and input types of manipulation switches to be laid out in these positions (lamps, push buttons or functions keys) by numerical values.**
For code numbers to be input, see a code list of the Operating Manual.
"0" is Without Function (only dark background color is displayed).
>> If inputting, its title appears on the "Function" column of the right side.



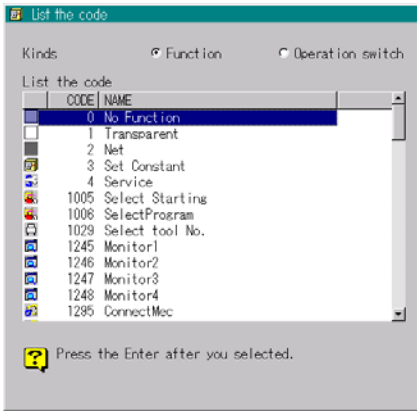
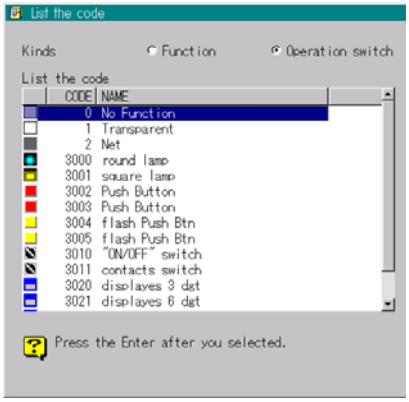
5 **Push the f 8 key of [Code List] if a code number to be input is not known.**

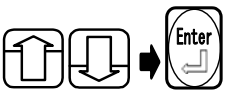
There are two types of code list: one is a group of “manipulation switches” such as lamps and push buttons and the other is a group of “functions” which are arranged on the both sides of mode screen.

They can be laid out on the interface panel screen with either type of keys for AX controller.



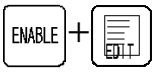
Displayed lists can be changed with radio buttons on the upper part to be changed through keys of [Enable] + [Right and Left Cursor].

Types=Types of functions=Functions	Types=Types of manipulation switches= Manipulation switches
F keys on the both side of mode screen	Lamps or push buttons
	



Select code numbers to be desired with the key of [UP and Down Cursor] and push [Enter] key. Code numbers having selected are input.

The previous set screen can be reverted if [Reset] key is pressed.



6 **Move the cursor to “Names (standard)” and input names to be displayed.**

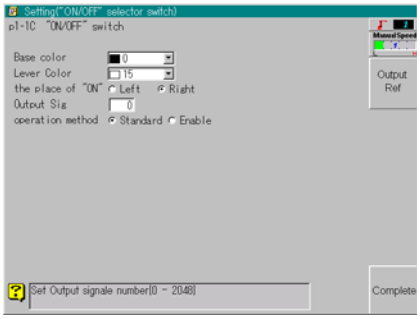
Keyboards can start up with [Enable] + [Edit].

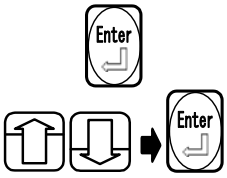
>> Names which can be registered less than 16 full-size characters and 32 half-size characters respectively.≫

7 **Next set up detailed dada except names or character sizes.**

Move the cursor to the line desired and press the f 9 [Refer] key.

>> The following detailed setup screen of manipulation switches is displayed.





8 **Move the cursor to “Colors” and press [Enter] key.**
Alternatives of 16 colors for choosing are displayed. Select desired colors among these alternatives with [Up and Down Cursor] and press [Enter].
Set up colors for ON and OFF respectively for a round type of lamps.

Table 0.1 List of Colors

Color No.	Color Name	Color No.	Color Name
0	Black	8	Medium gray
1	Dark red	9	Red
2	Dark green	10	Green
3	Dark yellow	11	Yellow
4	Dark blue	12	Blue
5	Dark magenta	13	Magenta
6	Dark cyanogens	14	Cyanogens
7	Light gray	15	White

Numerical Value

9 **Next signal attributes are set up.**
Move the cursor to “Input Signal to be Displayed” or “Output Signal to be Displayed” and input signal numbers.
Theoretically logical input signals are laid out in IF panel inputs like lamps or displays, while logical output signals are laid out in the IF panel inputs like push buttons or select switches.

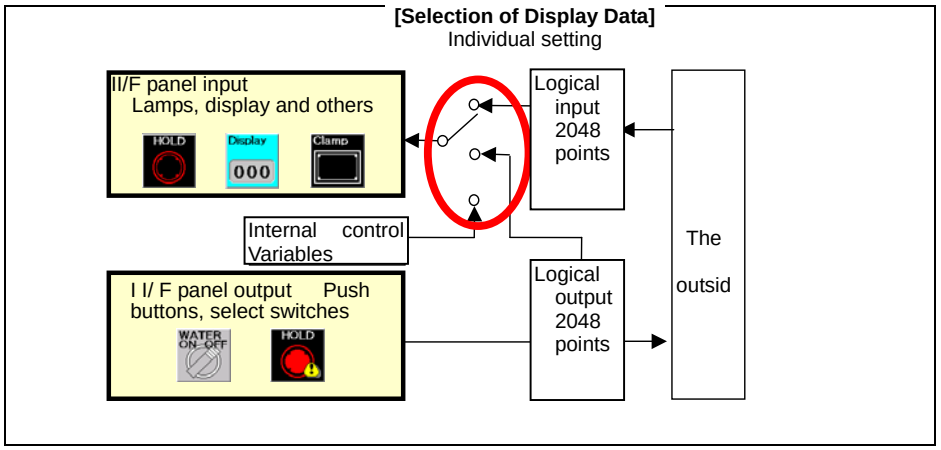
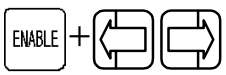


Figure 8.2 Concept of Interface Panel Signal Attributes

If “0” are set to signal number, input/output are not executed (only display of manipulation switches).



10 **Move the cursor to the final “! Mark Display” and specify a method for “! Mark Display”.**
This is a convenient function of interface panel applicable only to part of IF panel inputs.
For example, operators can distinguish at sight what switch is different from a switch with normal states if “! Mark” is displayed in case of opposite states of OFF under the condition that a state of normal operation is ON.

Setting	Contents
No-display	! Mark is not displayed.

ON	At the time signal attributes to be displayed are ON, “! Mark” is displayed.
OFF	At the time signal attributes to be displayed are OFF, “! Mark” is displayed.

11 **Press f 12 key of [Complete] if setting is finished.**
>> Reverting to the above **4** of at-sight display screen.
Contents having been set on the detailed setting screen have been reflected and they are not yet stored in files.

12 **All manipulation switches for all screens desired to be used are set up in the same procedure.**

And the position of top right side of all pages is laid out fixedly for permit /prohibit select switches.
Deleting and changing are not possible.

13 **Press the f 12 key of [Complete] after completion of setting.**
The contents of the setting are written in constants files (I/O constants files SSIGL.CON and controller general constants files **CTRL.CON).**
(Press [Reset] key in the case of suspension of editing work halfway)

The following contents are checked at the time of writing.
If being compatible to either of the following cases, the respective message is displayed and the contents of the setting are not stored in files. Revise the setup contents and store again them.

- A case where despite selecting the item to use more than one soft-key areas, other item has been set in the respective area,

- A case where an icon with a condition of occupying two blocks in the horizontal direction is tried to be laid out in the H row (the rightmost row).

9. Work folder selecting function

When AX on desk is started by the click of shortcut on desk top, AX on desk will use the constant files stored in NRA2001¥WORK folder under the install folder.

This function can change the constant files to be used by AX on desk. In order to select the constant files, just drop the work folder to the shortcut of AX on desk.

Fig 9.1 Selecting the WORK folder

If selected folder name was not “WORK”, then following message will appear.

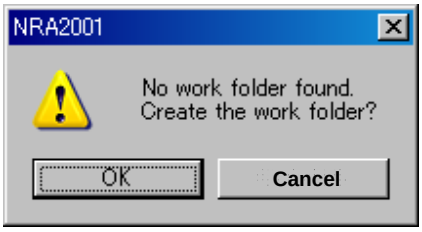


Fig 9.2 WORK folder creating Dialog

Select “OK” to create the new folder in the dropped folder. Proceed to format while format.

Select “cancel” to abort AX on desk.

10. Troubleshooting

No.	Phenomenon	Countermeasure
1	License error occurs while start up. “License.dat file does not exist.”	Copy “license.dat” file in License folder.
2	License error occurs while start up. “Licensed.dat file does not exist.”	Copy “license.dat” file in License folder. Note) Both “license.dat” file and “licensed.dat” file is necessary in License folder.
3	License error occurs while start up. “No license, or LAN device not found.”	<Version V4.09 or before> Re-connect the LAN cable to the computer and re-start AX on desk. Offered MAC address may be different from that of active LAN adapter. Offer the correct MAC address of active LAN adapter to get the license again. <Version V4.10 or later> Check whether offered MAC address is correct or not.
4	AX on desk never started on Windows XP HOME edition. At the start up procedure, diagnosis bar stops in the middle.	Access for the files under NRA2001 folder may not be permitted. Take the access account, or update the software version to V4.08 or later.
5	AX on desk never started. At the start up procedure, diagnosis bar stops in the middle.	If RTCONST2001 file exists in NRA2001 folder, execute ClrFile.bat in NRA2001 folder to delete this file.
6	“E0959 Communication board is not found” occurs when start up.	Change the setting of fieldbus to “not used” and restart AX on desk. Menu: Constant->Communication->Fieldbus
7	When trying the motor on after error, alarm ”A2002 Error occurs when input playbk command while it is executing the motor-off sequence.” occurs.	Push the emergency stop button of virtual I/O and motor on again.
8	Small window of AX T/P switch disappeared.	Renew the files following next procedure, and restart AX on desk. (1) Open “IoPnanel.ini” file in NRA2001 folder using text editor. (2) Delete 3 lines as followed. [TOWINDOW] left=640 <- delete top=480 <- delete dock=0 <- delete (Note) Never delete other lines. (3) Overwrite this file. (4) Restart AX on desk. Click the virtual I/O window, then AX T/P switch will appear on the left.

PART – 2

Virtual Robot

This part describes the method for introduction of “Virtual Robot” to conducting robot simulation in liaison with AX on DESK and precautions for its operation. Please start operating after having had a thorough knowledge of this manual.

Table of Contents

1. General Description

1.1. Outline of Virtual Robot

Virtual Robot is software enabling a robot to simulate movement by a PC on the desk in liaison with Virtual AX (AX on DESK). There are the following types of Virtual Robot with respective distinctive features:

1.2. Robots Corresponding with Viewers

For robots corresponding to viewers, see a table of corresponding robots attached to Install CD.

1.3. Composition of Virtual Robot and AX on Desk

Ax on Desk comprises four parts (programs); Virtual AX, Virtual TP, Virtual I/O and Virtual Robot.
When AX on Desk is started up, all of four programs are started automatically.

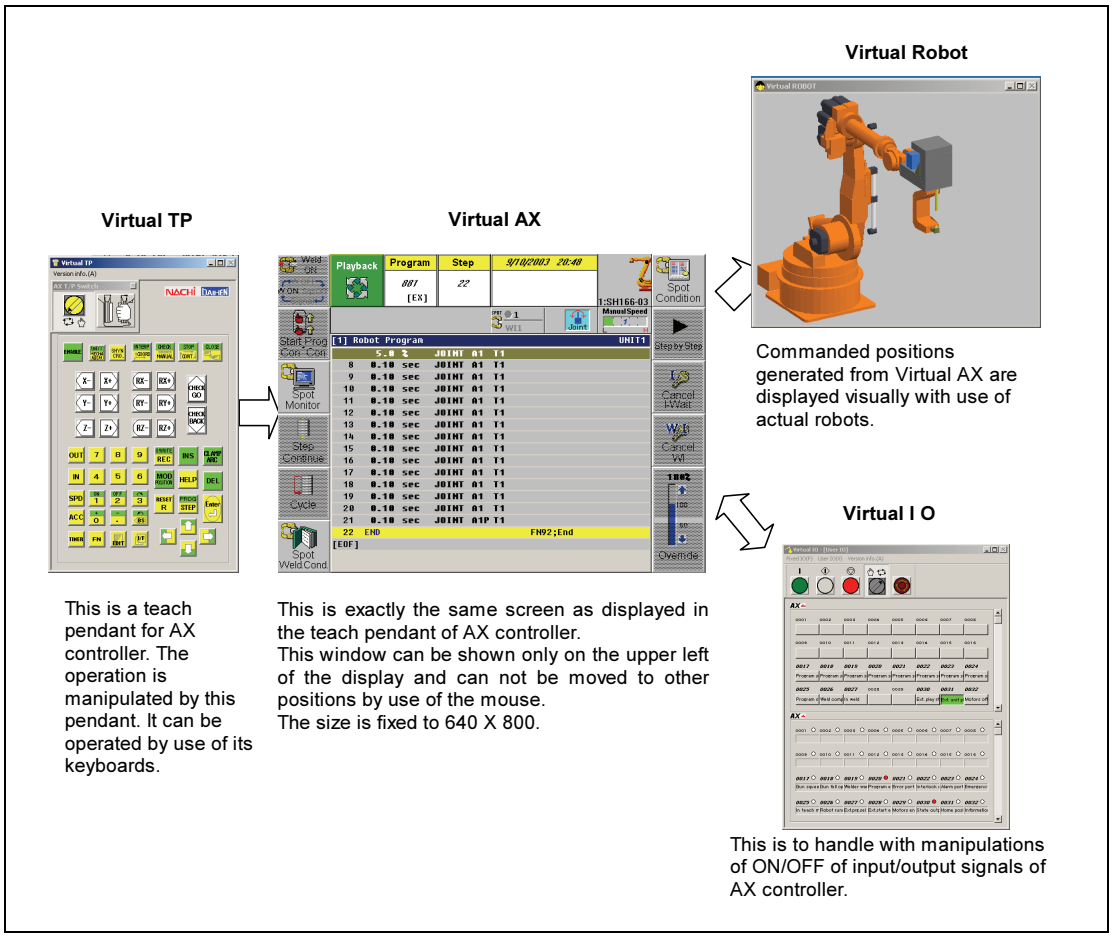


Figure 1-1 Composition of AX on DESK

1.4. Startup and Termination of Virtual Robot and AX on Desk

Start up Virtual Robot (AX on Desk)

1 Click the shortcut “AXonDesk” on the desktop.
That is the end.
Four programs including Virtual Robot start automatically.

2 When it starts for the first time, setting up of the Robot is necessary.
See “Chapter 3 Method for Operation of Kenta Viewer” and “Chapter 4 Method for Operation of Rob Viewer” for a choice of your robot in use.

Terminate Virtual Robot (AX on Desk)

1 Click Virtual AX and press ESC key.
Four programs (Virtual AX, Virtual TP, Virtual I/O and Virtual Robot) are automatically terminated.

This volume does not describe operating procedure of AX Controller.
For its operation, see the section “Basic Operation” of Operating Manual of AX Controller or Electronic Manual attached to AX on Desk.

1.5. Limitation of Virtual Robot

Virtual Robot is not always able to simulate 100% of its possible movements with AX Controller. The followings are limitations to be understood;

- As hardware such as robot, I/O and others is not connected, functions caused by feedback signal (for example, detection of abnormal overload) do not work,
- Virtual Robot does not support cooperative control. Some of optional functions can not be supported. Please confirm this matter when it is placed an order for.

2. Setup

2.1. Installation of Virtual Robot

Virtual Robot (Rob Viewer)is automatically installed by installing AX on desk.

2.2. Module Components

・Rob Viewer

Table 2-1　Module Components of Robot Viewer

File Name	Contents
(1) RobView.exe	Virtual Robot
(2) ax2viewerdll.dll	DLL for Virtual Robot
(3) FDMAPI.dll	DLL for Virtual Robot
(4) RobConsDll.dll	DDL for Virtual Robot
(5) RobView.ini	Setting file for Virtual Robot
(6) Help.chm	Help file for Virtual Robot
(7) Vrml2Prt.dll	DLL file for Virtual Robot (for Ver5.17 or after)
(8) mcalc.dll	DLL file for Virtual Robot (for Ver5.17 or after)
(9) VideoForRobView.exe	A program for movie creation (for Ver5.17 or after)

2.3. Folder Structures

・Rob Viewer

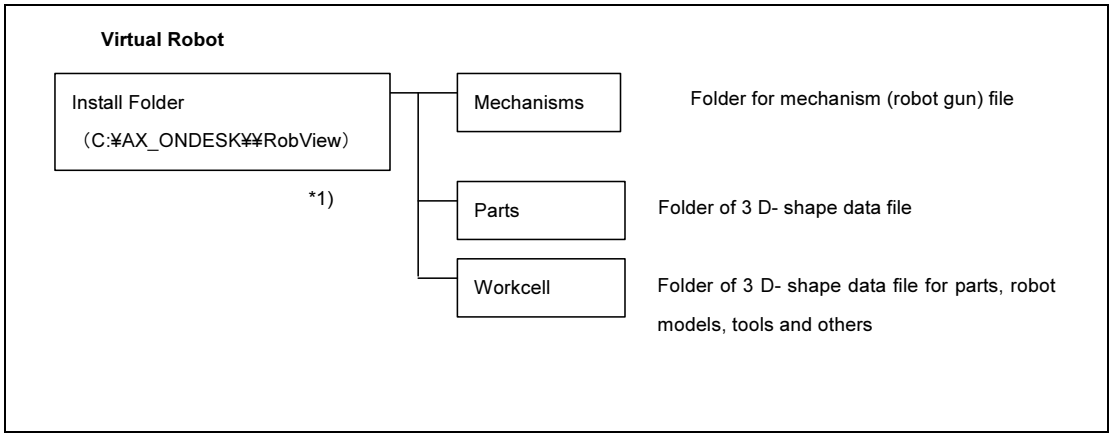


Figure 2-1 Folder Structure of Rob Viewer

*1. This Folder is the one which selected at the time of its installation.

3. Rob Viewer

Rob Viewer displays visually an instructed location generated by Virtual AX with a real robot.
It displays the same position as joint angles displayed on the Service, Monitor and Axis Monitor of Virtual AX.

- Input / preparation of 3D shape data
  A function to draw up 3D Primitive (columns, square pillars, sphere and others),
  A function to input shape data prepared by CAD (DXF and VRML forms: corresponding to reading in part of shape elements).
- Layout function for robots and 3D shape data
- A function to prepare Target Position:
  Reachability is examined and reachable range of placement for a robot is searched.

For their corresponding robots, see corresponding types of robot. pdf attached to the Install CD.
This Operating Manual describes basic operation, process up to Program Playback, this Viewer's features: function of Target Position Preparation and Collision Detection function. For other items like Menu, see Help Menu of software in use.

Figure 4-1 Example of Rob Viewer

This volume does not describe all operating procedures of Rob Viewer.
For others like Menu, see the attached Electronic Manual (Help Menu).

3.1. Basic Operation with Mouse

Please use a 3- button mouse or a 2- button mouse with a wheel. Views (screen) can be changed in the following operation with the window to be clicked.

- **Enlarge/ Reduce operation**
  Move the mouth to the left or right direction while pressing its central button (wheel).
  Enlarged: Move the mouth to the right direction, and the display is enlarged.
  Reduced: Move the mouth to the left direction, and the display is reduced.

- **Rotary operation**
  Move the mouth around a flat circular while pressing the central button (wheel) and the right button.
  Change of view to vertical direction (latitude): move the mouth to the front and the rear.
  It is also possible with movement of arrow keys in the vertical direction: ↑ ↓.
  Change of view to longitudinal direction (longitude): Move the mouse in the left or right direction.
  It is also possible with movement of arrow keys in the longitudinal direction: ← →.

▪ **Parallel movement**

Move the mouse in the vertical or longitudinal direction while pressing the central button (wheel).
Longitudinal movement: Move the mouse in the left and right directions.
Vertical movement: Move the mouse in the up and down directions.

3.2. Basic Operation up to Program Playback

The outline of procedures for operation up to program playback is shown with a simple example.

(1) Operation of reading manipulators, guns and works,
(2) Manual operation of manipulators,
(3) Program playback

(1) Operation of reading manipulators, guns and works

1. If AX on DESK is started up, the Viewer is also started up with the following display.

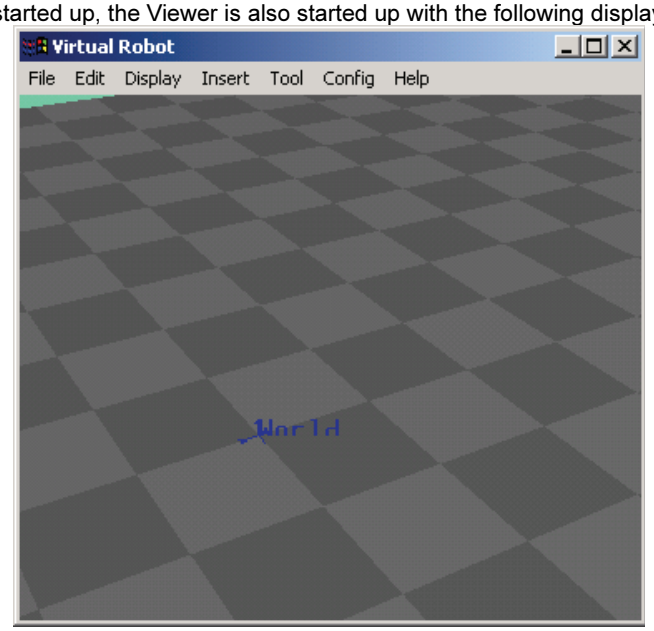


Figure 4-2 Rob Viewer

2. Read in Manipulator. Select [File] – [Open] in the Menu.

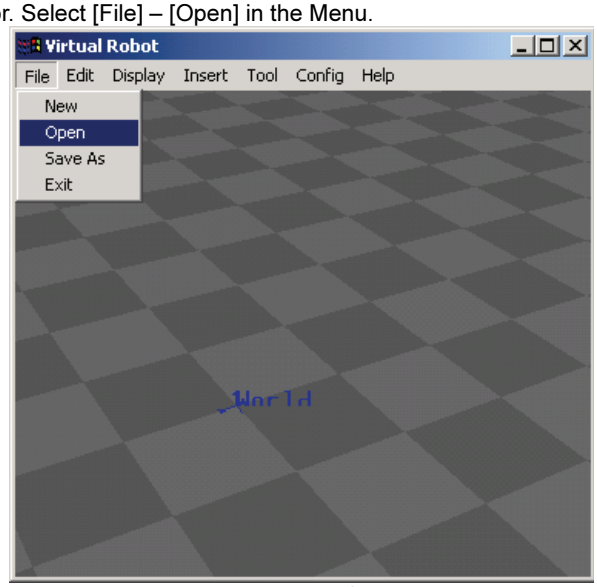


Figure 4-3 Opening the Menu

Select a model to be used among a list of files. For robots to be corresponded, see corresponding models of robots,pdf attached to the Install CD.

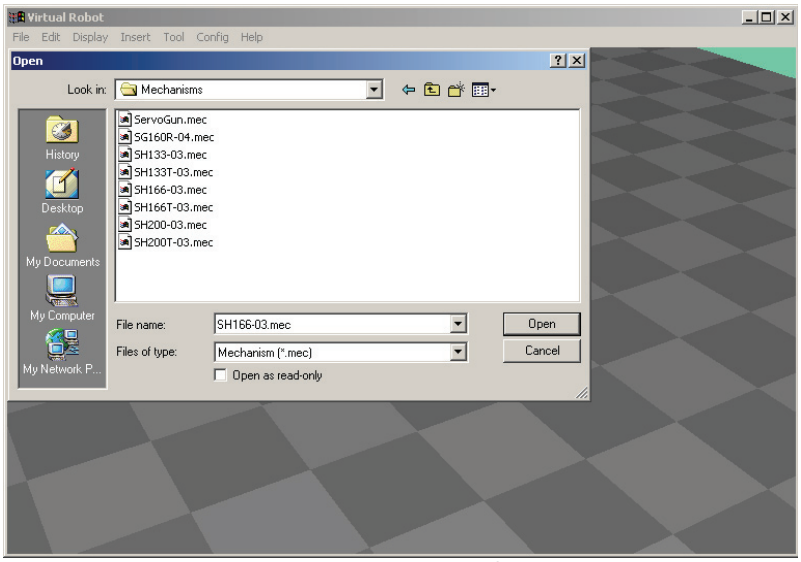


Figure 4-4 Robot Selection

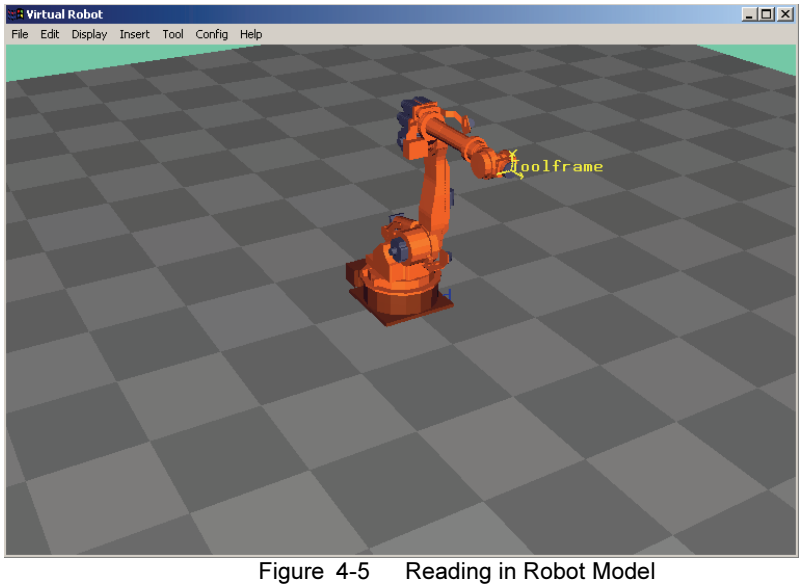


Figure 4-5 Reading in Robot Model

3. Read in Gun.

Select [File] – [Open] in the Menu in the same way as Robot model, and select a gun to be used.

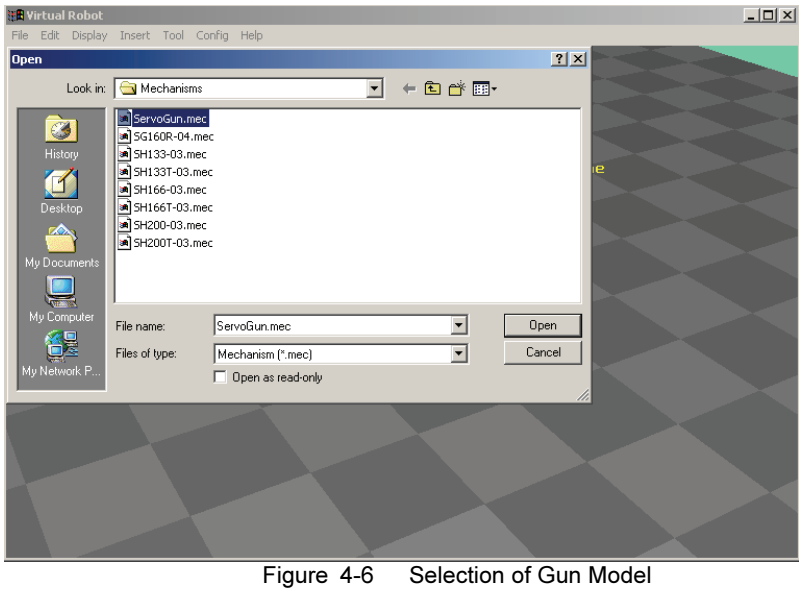


Figure 4-6 Selection of Gun Model

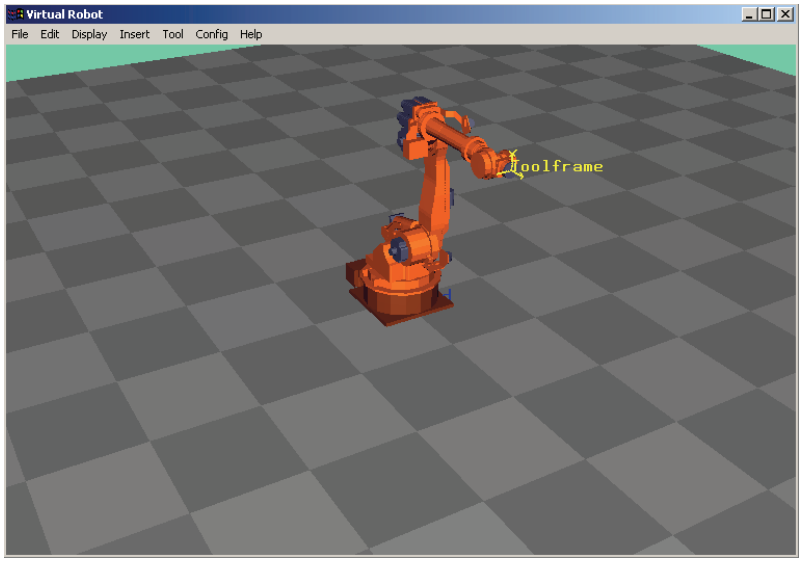


Figure 4-7 Reading in Gun Model

An object which has been read is laid out so that its origin may the origin of the world.
The servo gun can not be seen behind the manipulator in this example.

4. Install a servo gun in the manipulator. Select [Tool]—[Tool (Gun) Installation].

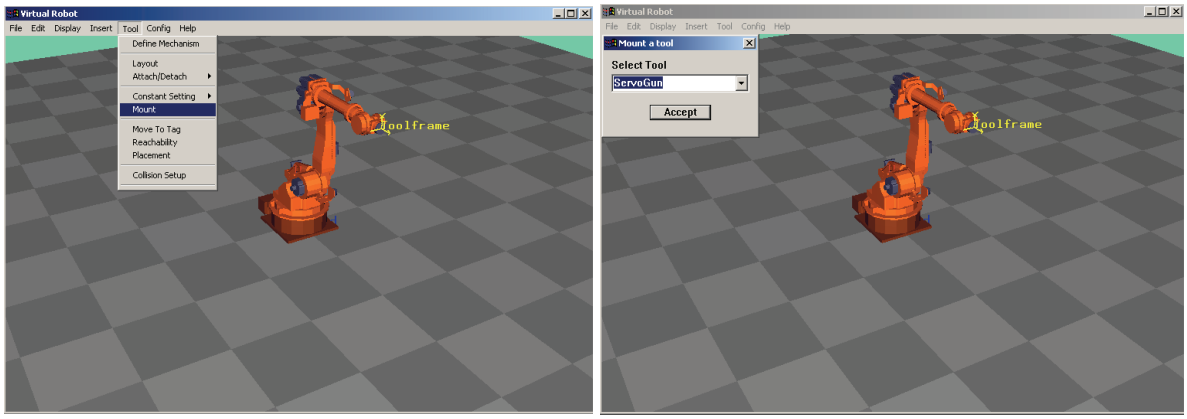
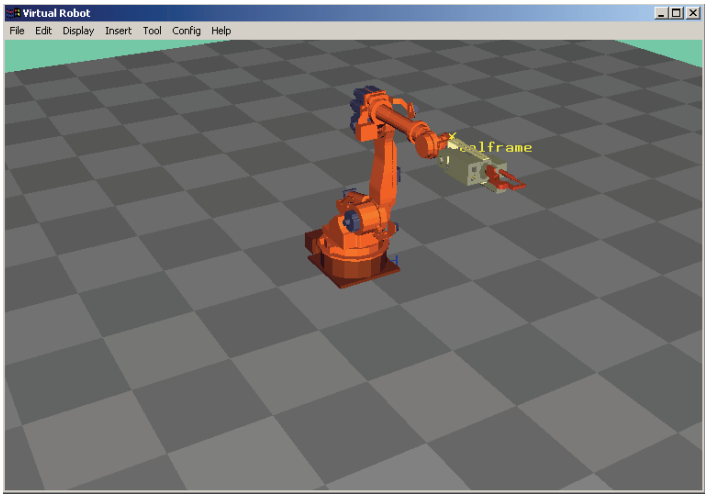


Figure 4-8 Tool Installation

Put [ServoGun] in Tool Selection and click [Install]. The servo gun is installed in the flange surface of the robot.

Figure 4-9 Robot Model with Servo Gun Specifications



5. Read in Work. Select [File] – [Open] in the Menu in the same way as Robot model, and select data of the work to be used.

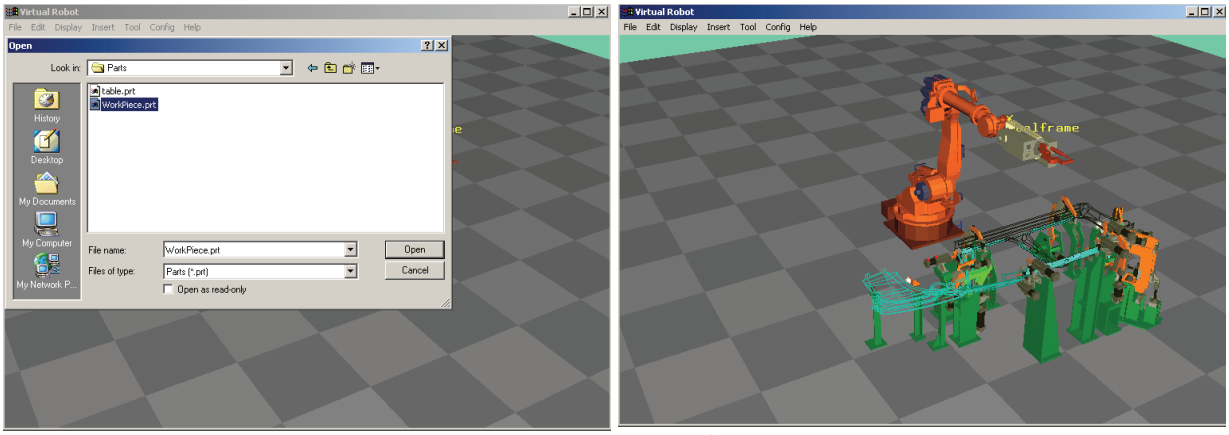


Figure 4-10 Work Setup

6. Reflect Tool Constants of AX on DESK in Viewer. Select [Tool]—[Constant Setting]— [Tool Setting] and then select Tool number. If the setting is finished off, the position of Tool Frame is changed to Tool Point selected.

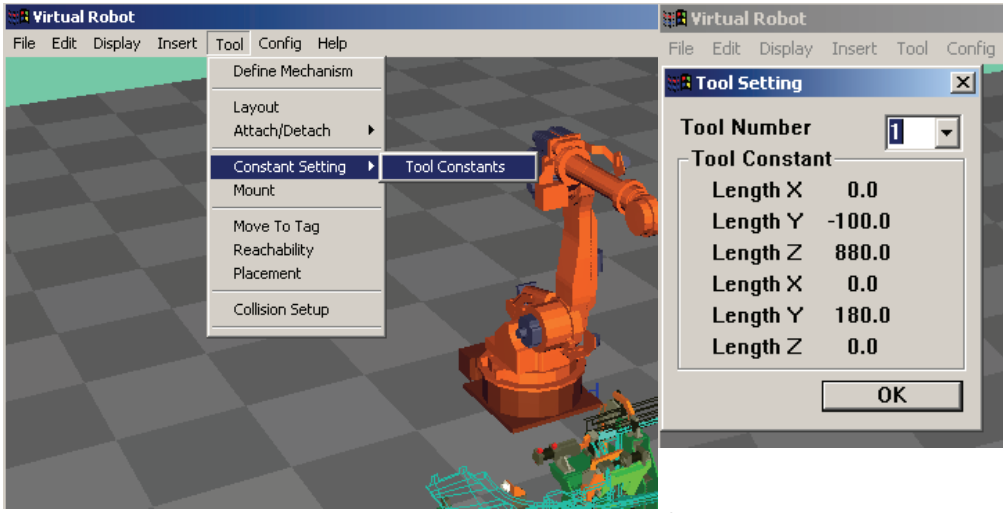


Figure 4-11 Tool Setting

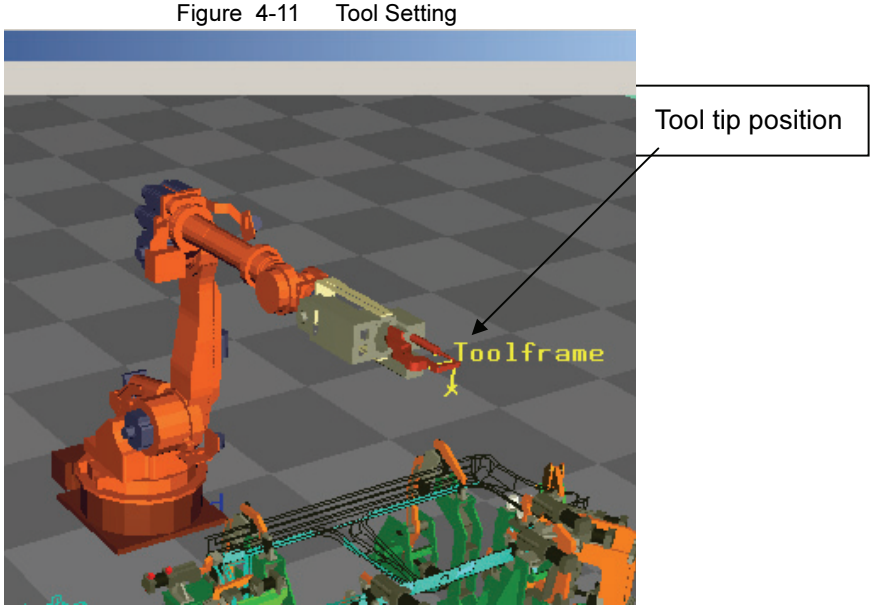


Figure 4-12 Completion of Tool Setting

(2) Manual operation of manipulators.
Operate manually the robot with AX on DESK. The manipulator displayed in the Viewer starts to move.

(3) Program playback.
Start up the robot with AX on DESK. The manipulator displayed in the Viewer starts to move.

3.3. Applied Operation: Target Position (Tag) / Path Function

3.3.1 Preparation of Target Position (Tag)

Description of the Menu

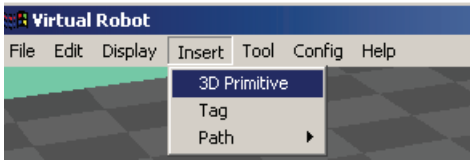


Figure 4-13 Inserted Menu

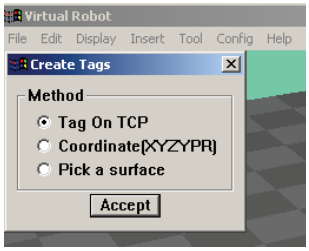


Figure4-14 Tag Menu

(1) Select [Target Position (Tag)] from the above Menu.
There are three methods for preparation of Tag.

Table 4-1 Method for Preparation of Tag

	Method	Outline
1	Tool Point (TCP)	To prepare Target Position (Tag) at the location of Tool Point.
2	Input of coordinates values (XYZYPR)	To prepare Target Position (Tag) with specifying the location of Target Position (Tag) (XYZ) and Posture (YPR).
3	Picking a surface by Mouse	To prepare Target Position by a mouth –picking an object (3D shape). Although an exact position can not be specified with this method, this can be used when examining by use of approximate position. Tool Posture can be changed by use of Layout Tool.

(2) Select a method desired among above three methods.

- **Tag on TCP**

Operational procedure

1. Assume a desired posture of a robot with manipulation of Virtual TP.
2. Select [Tool Point (TCP)] from the above Menu.
3. Click [Setting] button.

Target Position (Tag) is prepared at the location of TCP.

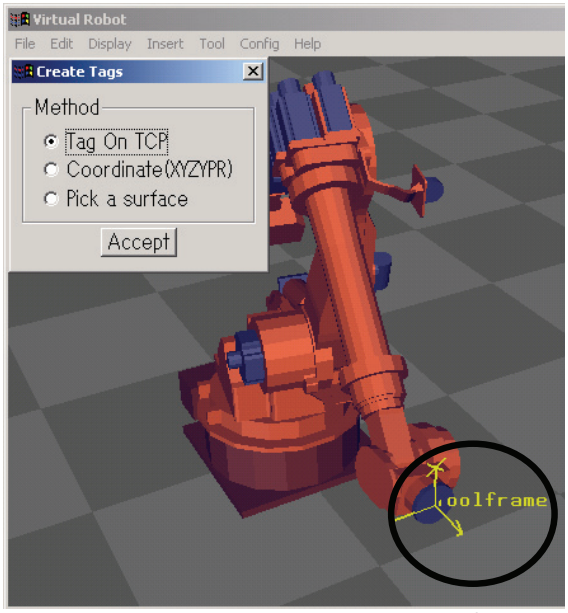


Figure 4-15 Preparing Tag at TCP

This example shows that light blue Target Position (Tag) named Tag0 is prepared at the location of TCP indicated as yellow-colored Toolframe.

- **Input of coordinate values (XYZYPR)**

Operational procedure

1. Select [Coordinate Value Input] from Tag Menu.
2. Click [Setting] button.
   The following Menu is displayed.

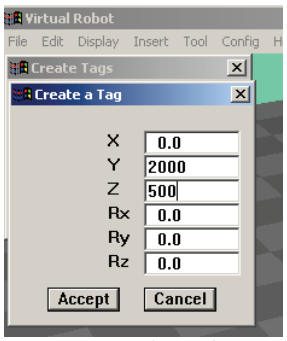


Figure 4-16 Menu of Tag Coordinate Value Input

3. Click [OK] after having input proper values (Note: Values in the world coordinate system) in X, Y, Z, Rx, Ry and Rz.

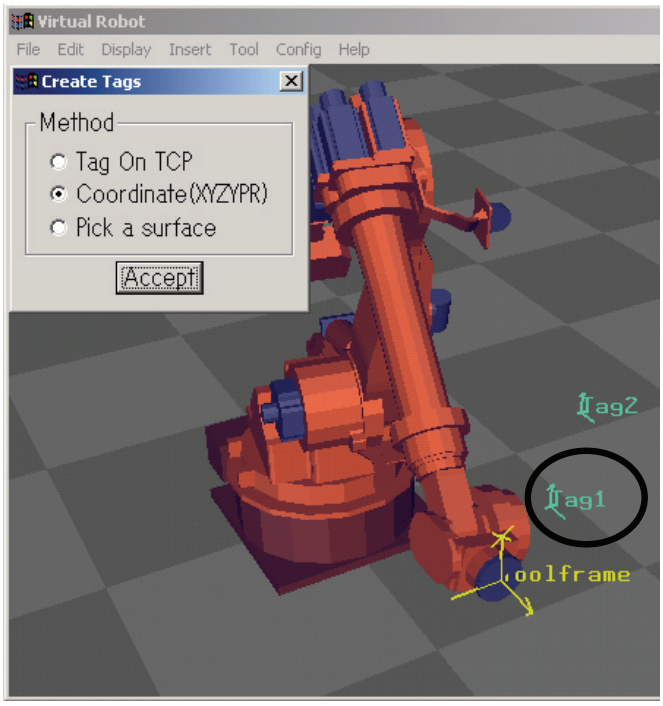


Figure 4-17 Preparation of Tag in Coordinate Input Values

This example shows that Tag 2 is prepared for Target Position (Tag).

- **Pick a surface by Mouth**

Operational procedure
1. Select [Pick a Surface] from the above Menu.
2. Select [Pick a Surface] from the above Menu.
3. Click [Setting] of the above Menu.
4. Mouth-click on the desired location as Target Position of 3-D objective to prepare Target Position. Target Position (Tag) is prepared in the location where the mouth has been clicked.

Note: Target Position (Tag) is prepared on the surface of 3-D objective. The posture of Target Position (Tag) can not be specified. Change the posture with Layout Tool at need.

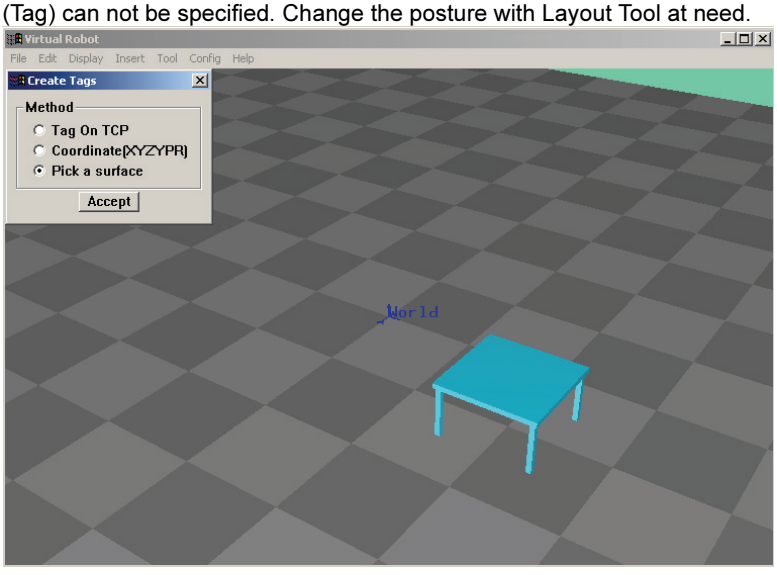


Figure4-18 Tag Prepared Where Having Been Clicked

This example shows that Tag 3 is the prepared Target Position (Tag).

3. 3. 2 Path Preparation

A set of Target Position (Tag) is called Path. Path is used for conducting the following operation.

Table 4-2 Purpose of Path

	Menu	Purpose
1	Tool : Checking reachability	Checking Layout
2	Tool : Searching for possible placement range	
3	Mirror copy	Preparing mirror copy of Path

Select the following Menu for creating newly Path.

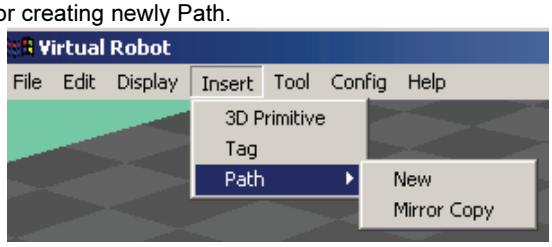


Figure 4-19 Path Preparation Menu

The following dialog is displayed:

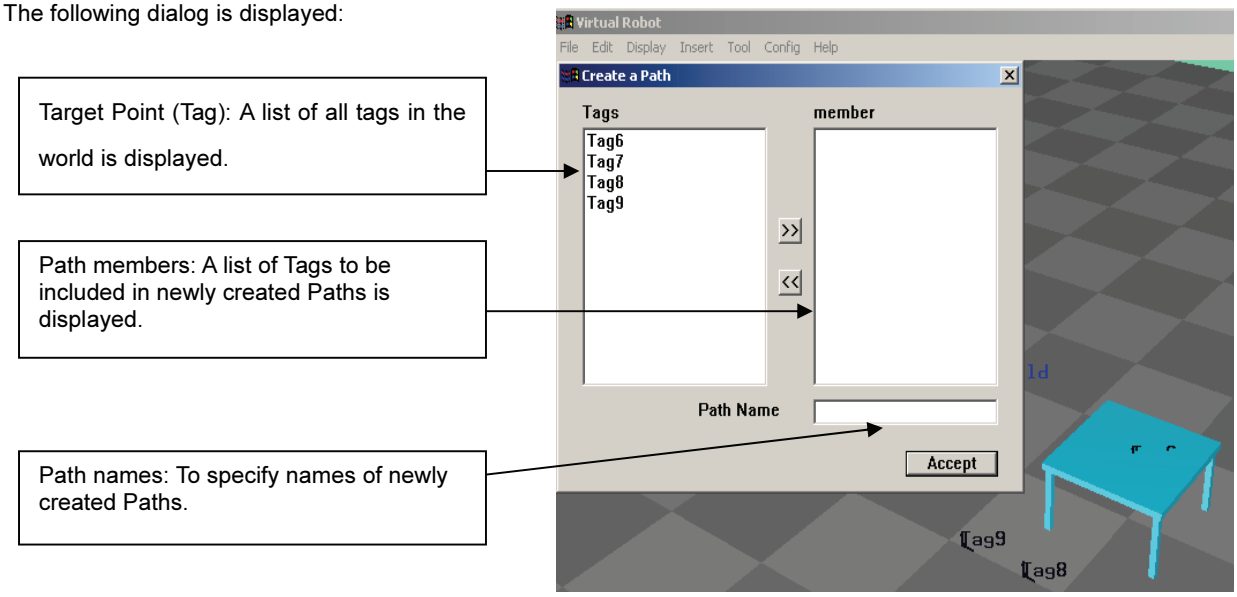


Figure 4-20 Path Preparation Menu

Registration procedure:

1. Select Target Point (Tag) to be included in Paths from Target Point (Tag).
2. Input Path names by keys.
3. Click [OK] button.
4. If pressing [OK] button, the dialog disappears and Target Point (Tag) indicated in yellow color is displayed in previous color.

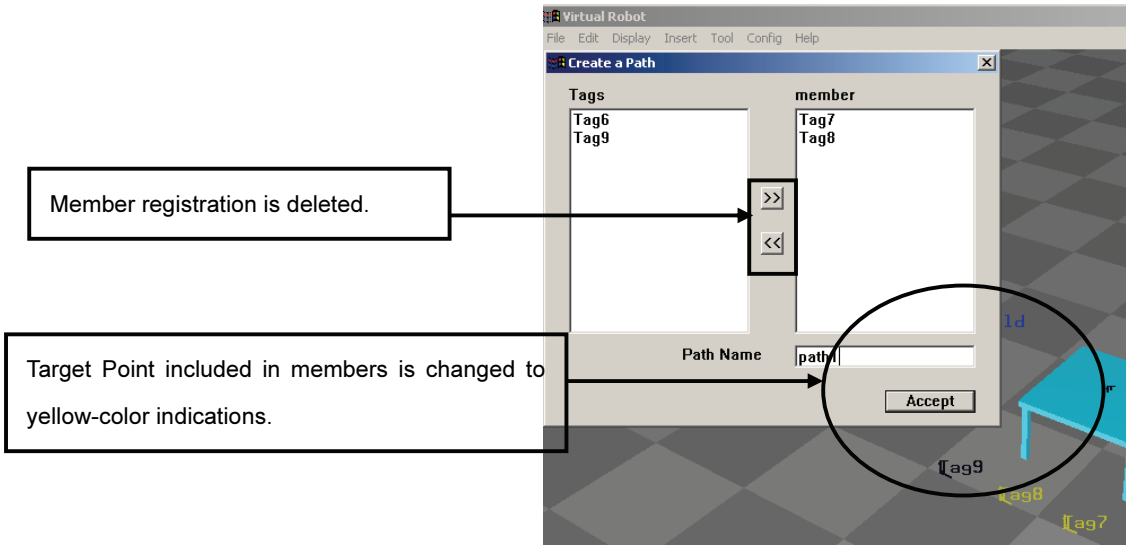


Figure 4-21 Path Registration

3.4. Applied Operation: Collision Detection Function

This is a function to detect collision of Tool (gun) installed in the manipulator. Select [Tool] — [Collision Setup].

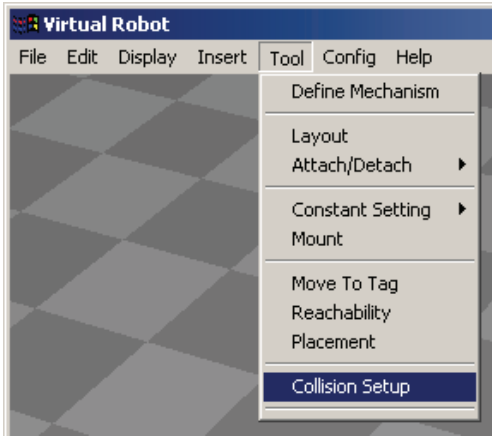


Figure 4-22 Collision Setup Menu

Operational procedure:

1. Read in manipulators or works in advance.
2. Select [Collision Detection] from the above Menu.
3. Click [On/Off] button and switch on Collision Detection.

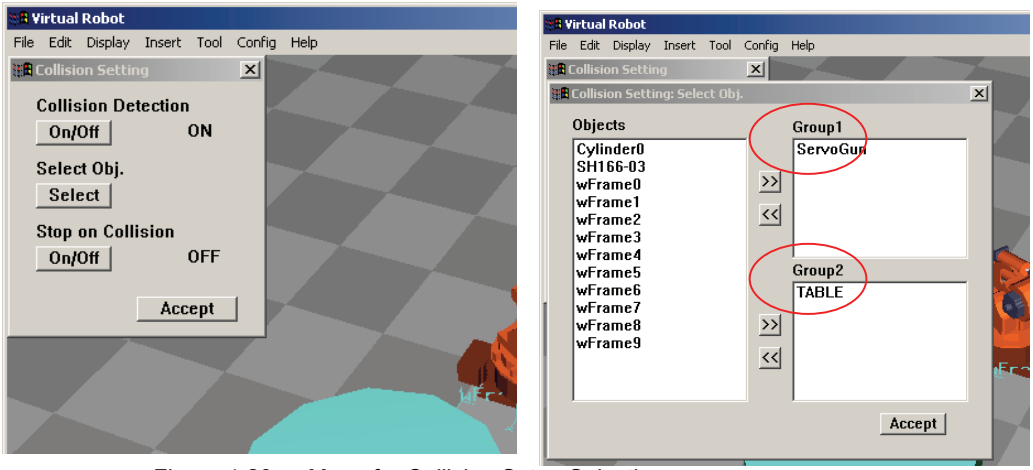


Figure 4-23 Menu for Collision Setup Selection

4. Specify what collisions to be checked. Click [Selection] button of Menu. It is possible to check collisions with objects of group 1 and 2. The above example shows that collisions with Servogun and TABLE can be seen. Input Servogun into group 1 and TABLE into group 2 respectively with use of [>>] and [<<] buttons. Click [OK] button.

5. In the case of suspending program playback when being interfered during program playback, click [On/Off] button for robot suspension at the time of interference, and switch it on.

6. Click [OK] button after completion of setting.

[Remarks]

- When interference is detected, interfering parts are indicated in purple color.

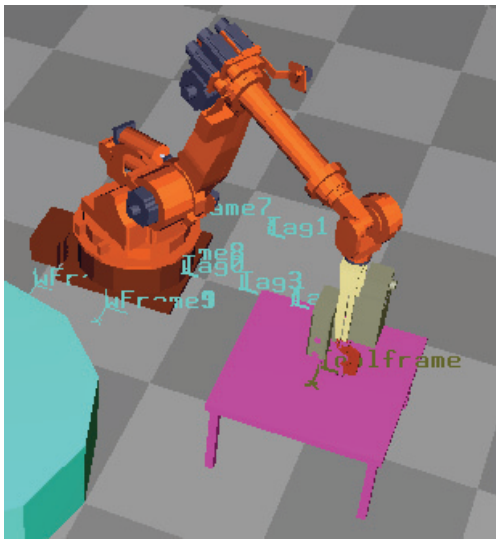


Figure 4-24 Interference Setup

- Interference is detected at the time of:
  Manual operation of manipulator, and
  program playback of manipulator.

- Interference detection is limited only to polygon. Interference to wire frame can not be detected.
- If Interference Setup is turned on, there arises sluggish response at the time of manual operation, since much more processing time is required. A time interval of display on the screen during program playback gets rough. The more complicated shapes of objects from which interference to be checked are, the more time for processing is required.
- In the case that a manipulator is specified for its interference check, interference of only its wrist part is checked. (Interference check for all unit of a manipulator is not carried).

NOTE

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