1309, TCFEN-906-001, 001

NACHI

Simulation tool for CFD controller
FD on Desk Light
OPERATING MANUAL

1st edition

- Before attempting to operate the robot, please read through this operating manual carefully, and comply with all the safety-related items and instructions in the text.
- The installation, operation and maintenance of this robot should be undertaken only by those individuals who have attended one of our robot course.
- When using this robot, observe the low related with industrial robot and with safety issues in each country.
- This operating manual must be given without fail to the individual who will be actually operating the robot.
- Please direct any queries about parts of this operating manual which may not be completely clear or any inquiries concerning the after-sale service of this robot to any of the service centers listed on the back cover.

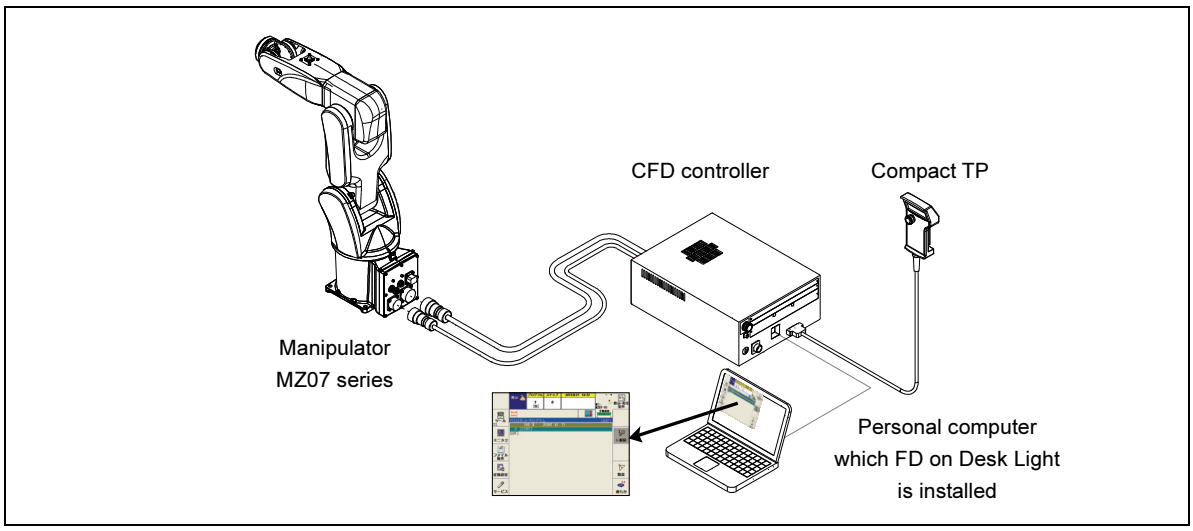
NACHI-FUJIKOSHI CORP.

Table Of Contents

Chapter 1 Outline of FD on Desk Light

1.1 Outline

"FD on DESK Light" is a free software enabling CFD robot controller operation on personal computer.
In order to compensate Compact TP operation, high performance CFD operation such as constant editing, programing and monitor operation is enabled on this software. Furthermore, cycle time simulation and offline teaching is supported.
This software can be used only for MZ07 series robot.
CFD robot controller is necessary to utilize this software. (At first time initiating of this software, CFD robot controller must be connected to personal computer. From second time, this software can be initiated without CFD robot controller.)



CFD controller and FD on Desk Light

1.1.1 FD on DESK Operational Environments

FD on Desk Light Operational Environments

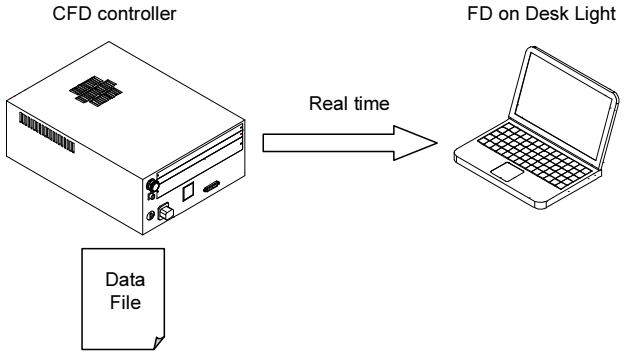
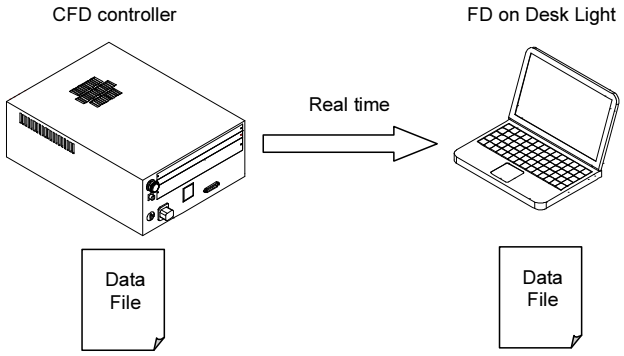
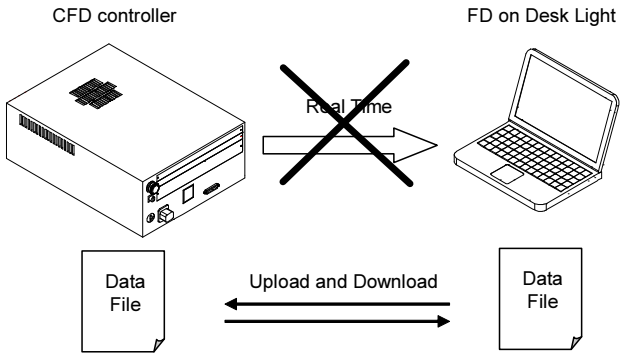
Principal bases	Specifications
Basic software	Windows ® XP, Windows ® Vista, Windows ® 7 (32bit only)
CPU	More than 1.0GHz. CPU clock
Memory	More than 1GB
Hard-disk capacity	More than 70MB spare capacity to be required
Graphic resolution	More than 1024 X 768 dots
Others	Do not use with other application software simultaneously, when performing cycle time simulation.

Note): Windows is a trademark of Microsoft Corporation registered in the US and other countries.

1.1.2 3 operation mode

FD on Desk Light has 3 operation modes. Select one mode among them for best use.

FD on Desk Light 3 operation mode

Operation mode	Specification
VIEW mode	This mode is for doing high performance operation that is not available with using Compact TP. Actual Smart TP screen is displayed on PC screen on real time. So this mode can be utilized instead of Smart TP. 
MONITOR mode	PC operation is separated from CFD controller operation, although CFD controller condition is affected to PC on real time. New monitor which is different from that of CFD controller can be opened on PC. This is a merit of this mode because operator can see more information. 
OFFLINE mode	This mode is compete separated operation from CFD controller. Main operation is done on PC side. 

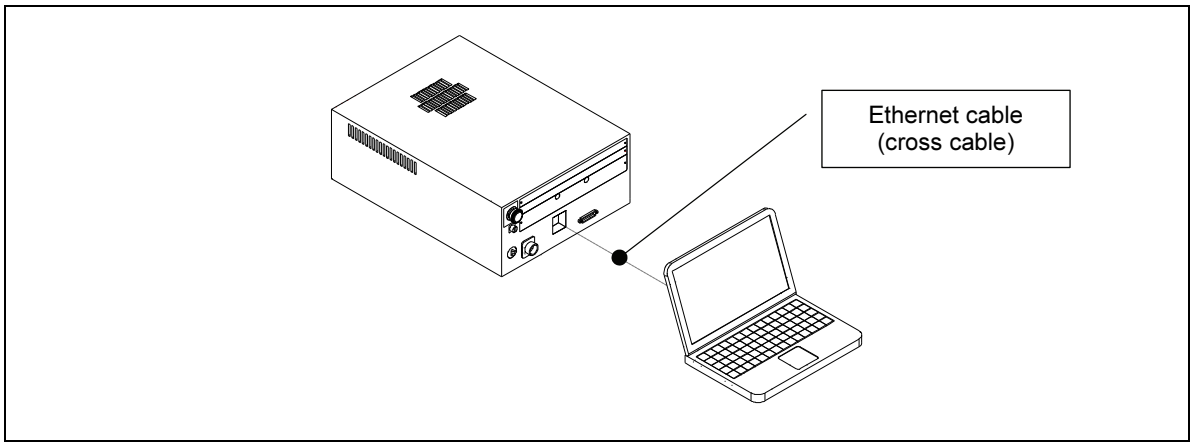
1.2 Setup

1.2.1 Installation and Version up

Please refer to the paper “How to install FD on Desk Light” attached with CD.
If FD on Desk Light already existed, existing version does not have to be uninstalled.

1.2.2 Connection with CFD controller

Please connect CFD controller with personal computer which FD on Desk Light is installed via Ethernet cable. Complete the setting of TCP/IP in CFD controller.



Connection with CFD controller via Ethernet

Please refer to instruction manual “START UP”, “3.2 Setup of the controller”.

■ **In case of uninstallation**

Please execute this operation in “Add or remove programs” of Control Panel.

IMPORTANT

Even if uninstallation is executed, the files/folders that were created or copied after installing FD on Desk Light will not be deleted.
To delete those files/folders after the uninstallation, delete them manually.

IMPORTANT

The components of [Microsoft Visual C++ 2005 Redistributable] will not be deleted even if the FD on Desk Light is uninstalled. If necessary, uninstall them in “Add or remove programs” of Control Panel.

1.3 Initiating

1 Execute “CFDonDesk online.exe”.
Following top screen is displayed.

2 Input the IP address of CFD controller.

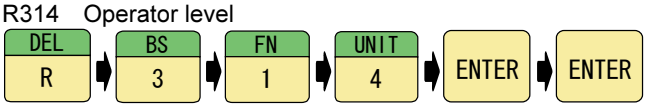
3 Following screen is displayed when connection with CFD controller is established.

4 Please start operation of desired mode following to the procedure written in next section or after.

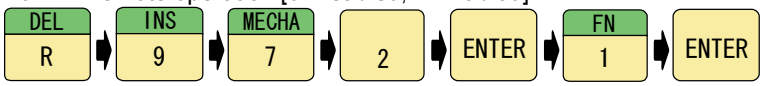
1.4 VIEW mode

1 At first, remote operation needs to be set enabled on CFD controller.
On CFD controller, utilize short-cut R972 to set remote operation enabled.
Operator level ***EXPERT*** or higher is necessary for this operation.

R314 Operator level



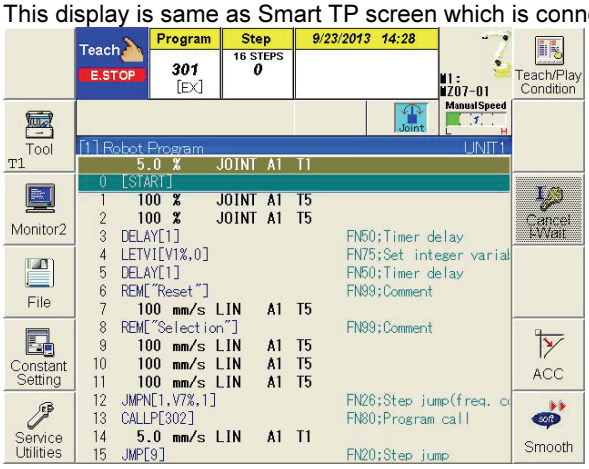
R972 Remote operation [0:Disabled, 1:Enabled]



Please refer to instruction manual “STARTUP”,”5.2.1 Using short-cuts (R code)” for detail of short-cut.

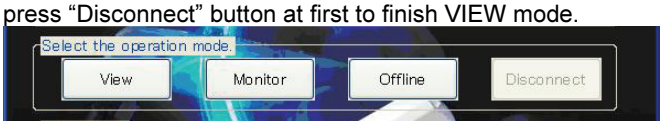
2 On PC, press “VIEW” button to initiate VIEW mode.

3 Immediately after entering VIEW mode,
actual CFD controller screen comes up at the left top corner with 640*480 area.
This display is same as Smart TP screen which is connected to CFD controller.

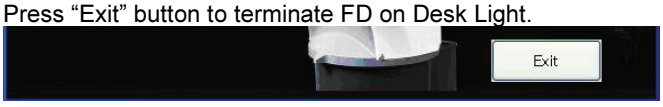


4 Now real CFD controller can be operated by PC keyboard and view window.

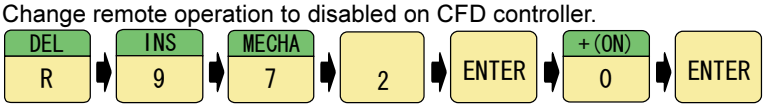
5 In order to finish operation,
press “Disconnect” button at first to finish VIEW mode.



Press “Exit” button to terminate FD on Desk Light.



6 Change remote operation to disabled on CFD controller.

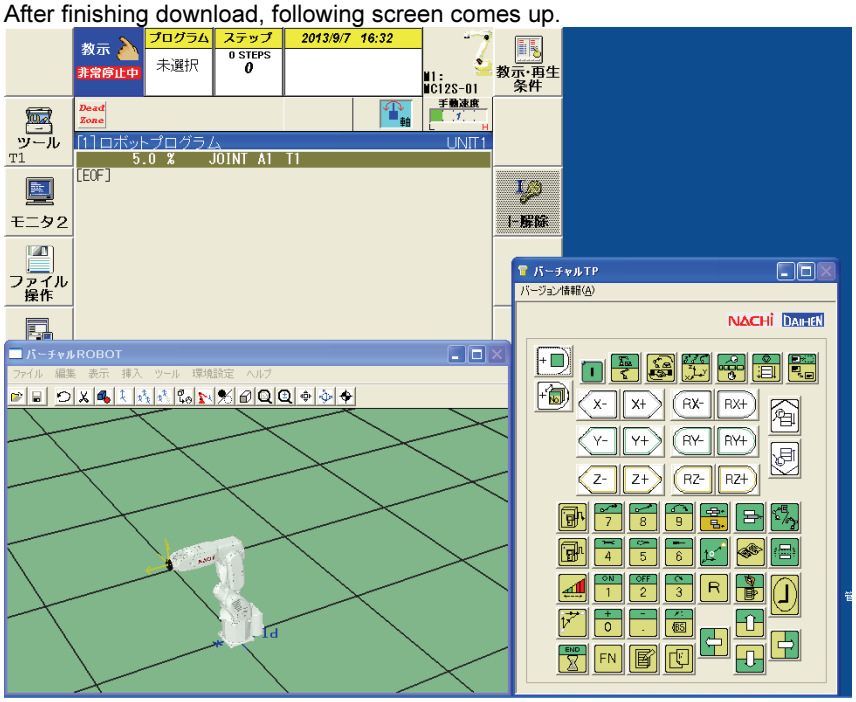


1.5 MONITOR mode

1 On PC, press “MONITOR” button to initiate MONITOR mode.

2 Immediately after entering MONITOR mode,
Following display comes up.

3 Press “OK”.
All data is downloaded from CFD controller to PC NRA2011¥WORK folder.
After finishing download, following screen comes up.



- CFD controller (left top screen)
  This is a display of Smart TP.
  Current CFD controller condition is affected to PC on real time.
- Virtual TP
  This is a key of Smart TP.
  Keys to operate robot, such as axis operation keys, is not usable.
  Operation is on this PC, not for the real connected CFD controller.
- Virtual ROBOT
  This is MZ07 series robot.
  Real robot pose is affected to PC on real time.

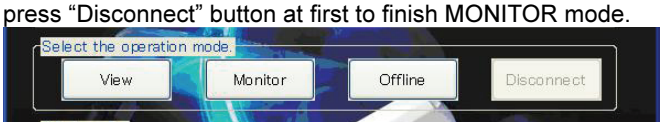
When answering “Cancel” in step 2, data file of NRA2011¥WORK folder is used.

4 Following monitor menu can be selected by operating virtual TP.

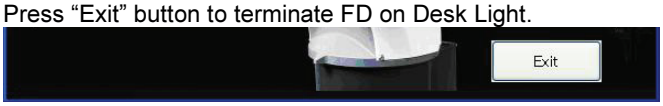
0 Monitor OFF
1 Robot Program
2 Axis Monitor
4 Error History
7 General Input Signal
8 General Output Signal
32 Built-in PLC

Real CFD controller condition is affected to PC on real time. But this operation is completely separated from real CFD controller, so CFD controller is irrelevant from PC operation.
This point is different from VIEW mode.

5 In order to finish operation,
press “Disconnect” button at first to finish MONITOR mode.



Press “Exit” button to terminate FD on Desk Light.

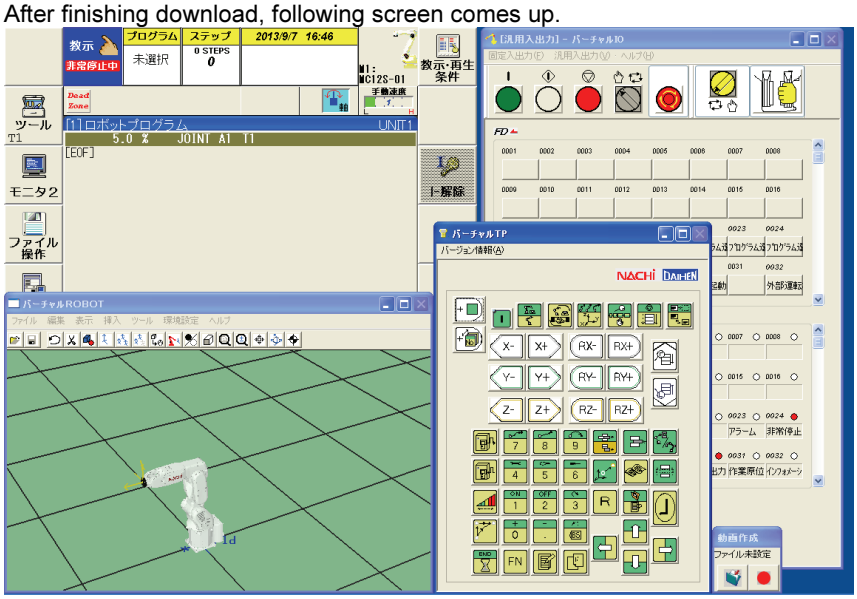


1.6 OFFLINE mode

1 On PC, press “OFFLINE” button to initiate OFFLINE mode.

2 Immediately after entering OFFLINE mode,
Following display comes up.

3 Press “OK”.
All data is downloaded from CFD controller to PC NRA2011¥WORK folder.
After finishing download, following screen comes up.

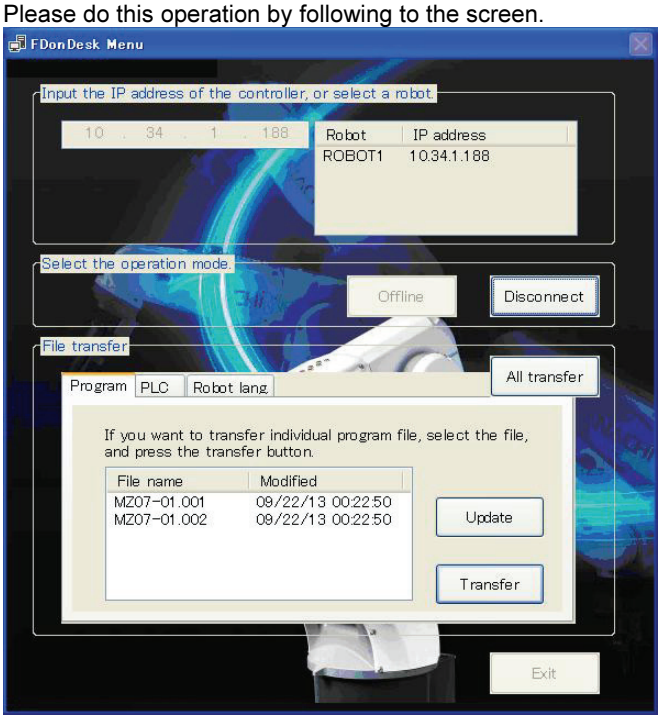


- CFD controller (left top screen)
  This is a display of Smart TP.
  This is irrelevant from real CFD controller.
- Virtual TP
  This is a key of Smart TP.
- Virtual ROBOT
  This is MZ07 series robot.
- Virtual IO
  Input and output signals are monitored and changed.

When answering “Cancel”” in step 2, data file of NRA2011¥WORK folder is used.

4 Same operation as Smart TP can be done with using virtual TP.

5 In case that robot program, PLC program, Robot language program or constant data is edited, these files can be transferred to the connected CFD controller.
Please do this operation by following to the screen.

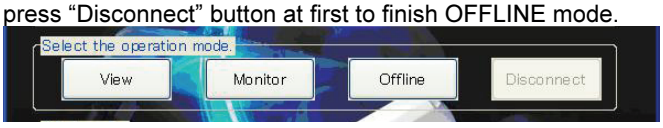


Select the file type by TAB.

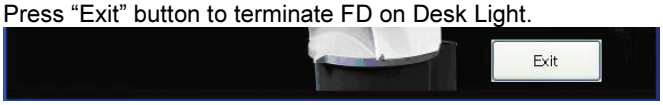
- Program — Execution robot program
- PLC — PLC ladder program
- Robot Language — ASCII format SLIM language program

Select file to be transferred from the list and press “TRANSFER” button.

6 In order to finish operation,
press “Disconnect” button at first to finish OFFLINE mode.



Press “Exit” button to terminate FD on Desk Light.



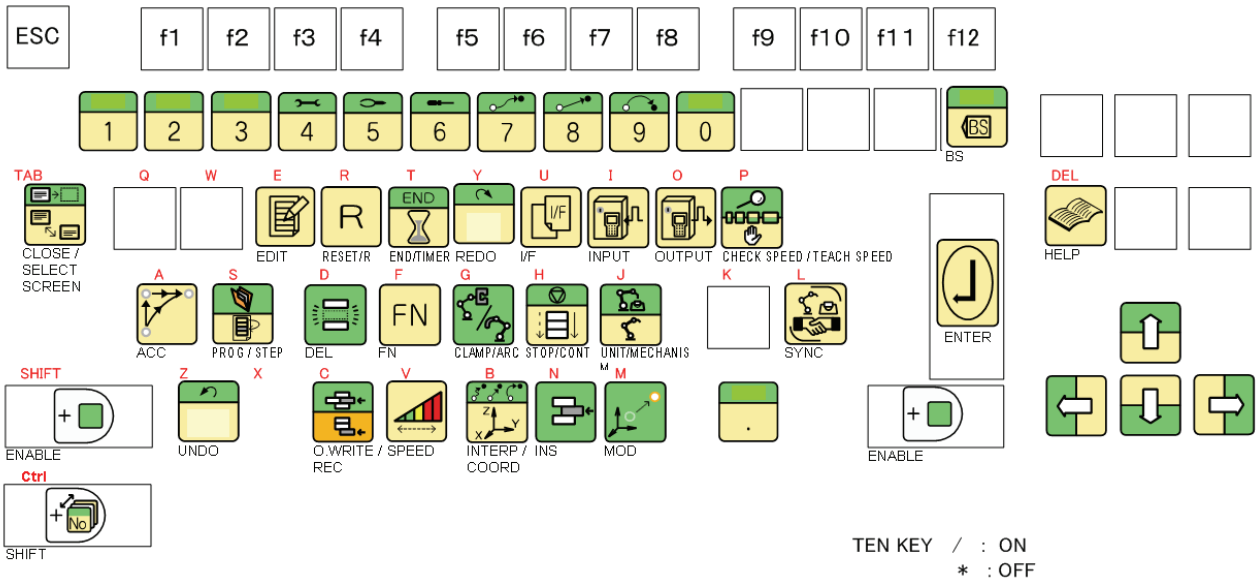
1.7 Operation of PC

1.7.1 Virtual TP

In the mode which Virtual TP is displayed, same operation as Smart TP is available.
For the keys of Smart TP, see FD controller instruction manual “BASIC OPERATIONS”.

1.7.2 Correspondence between Keyboard and Smart TP

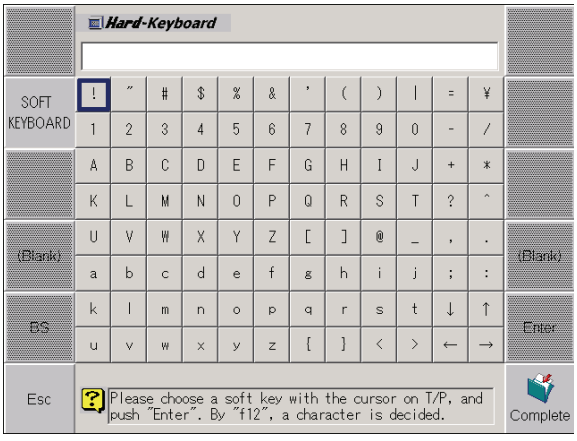
Besides clicks on Virtual TP by a mouse, direct input is also possible through the keyboard.
The correspondence between keyboard and Smart TP are shown below.



Correlation with Keyboard

1.7.3 Character Input Screen

There are two methods for inputting character line on the character input screen. Choose an appropriate method based on users’ needs. Change a keyboard by F2 key. Press [Hard Keyboard], it changed to PC keyboard, while pressing [Soft Keyboard] to the soft keyboard

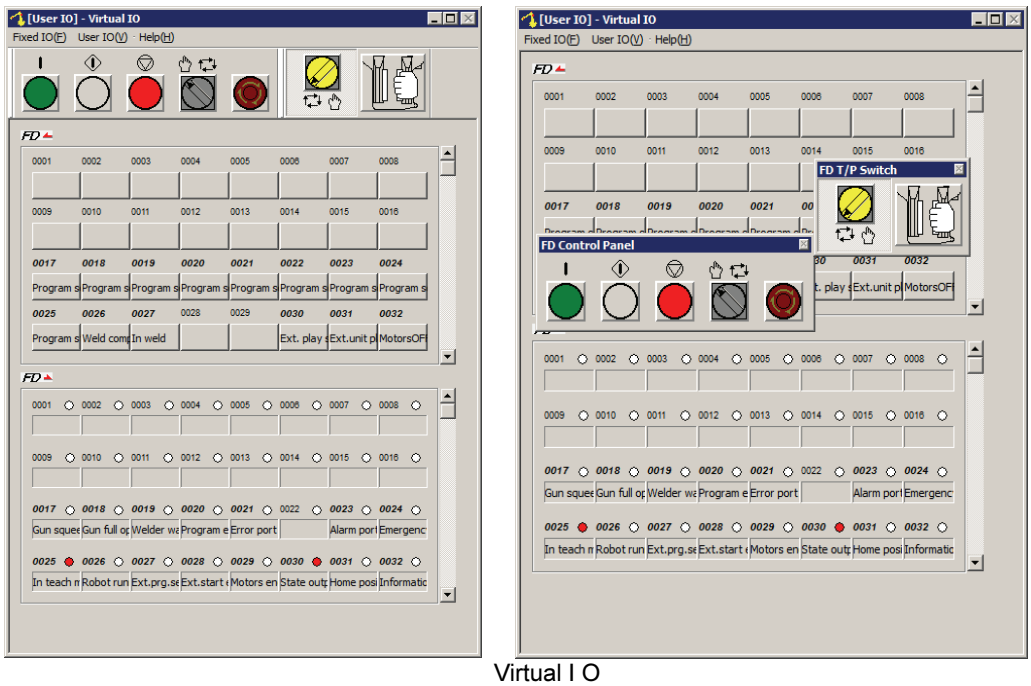


Method for inputting character

Name	Display	Method for inputting character
Soft-Keyboard	Soft-Keyboard	Characters are selected by use of arrow keys of “Virtual TP”, and they are input by pressing [Enter].
Hard-Keyboard	Hard-Keyboard	Characters are input by use of the PC keyboard.

1.7.4 Virtual IO

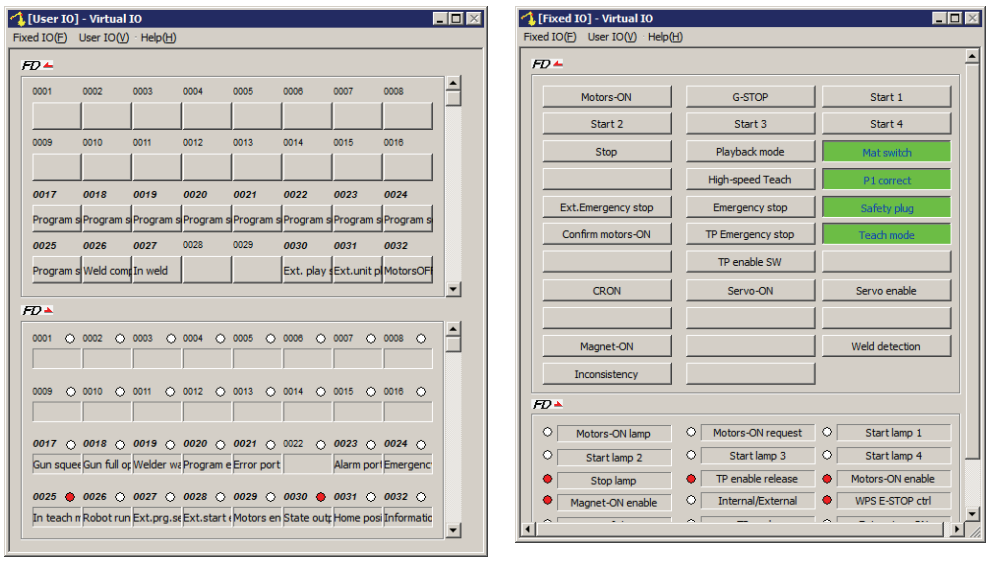
Virtual IO consists of 3 functional windows; “Virtual IO main panel”, “Operation panel” and “TP switch”. These windows can be used separately.



Virtual I O

■ **Virtual IO main panel**

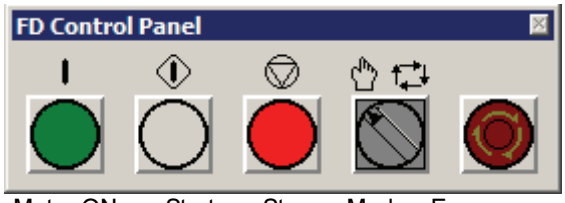
Output signal can be monitored and input signal can be operated ON/OFF manually.
If “Fixed IO” is clicked, the Fixed I/O signals can be operated. And if “User I/O” is clicked, the User I/O signals can be operated.
FD indicates input signal, while FD indicates output signal. Click on the buttons (icons) is done by a mouse. Input signal is operated by ON/OFF switch.
The scroll bar located in the right side can display signal 1~2048. The bold numbers indicate signals that are assigned to status I/O. I/O signal assignment is affected on Virtual I/O main panel.



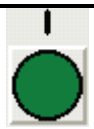
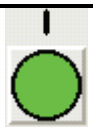
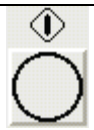
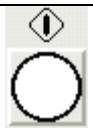
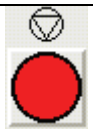
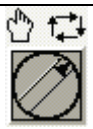
Virtual I/O main panel

■ Operation panel

Operational panel of CFD Controller is handled here.
"Motors ON", "Start" and "STOP" button does not exist on real CFD controller. So these operations are available only on PC.

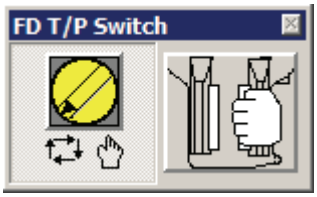


Operational Panel button

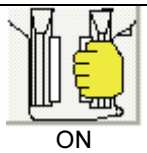
Figure		Button name	Motion
 OFF	 ON	Moto ON Button	This is used to set the motor power to ON. When it is set to ON, the robot gets ready for operation.
 OFF	 ON	Start Button	In playback mode, this starts the program which has been selected.
 OFF	 ON	Stop Button	In playback mode, this stops the program which is in running condition.
 Teach	 Playback	Mode Select Switch	This is used to select the mode. The Teach or Playback mode can be selected. This switch is used in combination with the Teach pendant "TP selector switch".
 OFF	 ON	Emergency Stop Button	When this is pressed, robot is set to emergency stop.

■ TP Switch

The operation of teach pendant "ENABLE SWITCH" can be done.



FD T/P switches

Figure		Button name	Motion
 Playback	 Teach	TP Selector Switch	This is used to switch between Teach mode and Playback mode in combination with [MODE SELECT SWITCH] on Virtual I/O main panel.
 OFF	 ON	Enable Switch	This is used to manually operate the robot in Teach mode. Only while this switch is ON, robot can be operated manually. When this switch is OFF, robot does not move.

Chapter 2 Virtual Robot

Robot model used in this section to explain operation does not concern with the robot model which is actually available in FD on Desk Light.

2.1 Outline

2.1.1 Outline of the VirtualRobot

"VirtualRobot" is application software that can display the robots with 3D graphics. This software is equipped with the following features to make it possible to check the layout of the production cell or to make a teaching program for the robot system.

- Creation and edit of simple 3D objects
- Import function for 3D model file like IGES etc.
- Interference detection between 3D models
- Creating "Tag" and robot work program creation using those tags

In this chapter, the basic operations and an example of work-cell are described. For detailed information, refer to the help of the VirtualRobot application software.

2.1.2 Available robots

Only MZ07 series is available.

2.1.3 Restriction of VirtualRobot

ViratualRobot has the following restrictions.

- The functions that requires the feedback from the real robot or mechanisms (e.g. interference detection based on the feedback from the real motor or encoder, overload detection, etc.)

- The I/O signal simulation using the "Virtual I/O" is possible, but because external hardware like PLC can not be connected, the behavior with the hardware like those cannot be simulated. For example, the waiting status with FN525 WAITI (input signal waiting function) must be released manually by using the "Virtual I/O" window.

- There are some optional functions that are not available on this software. For details, contact to our sales department when ordering the FD on DESK.

2.2 Basic operations

2.2.1 Change of the viewpoint

The viewpoint can be moved with the mouse operation.

- Zoom in/ zoom out operation
  Drag the mouse left/right with pressing the center button (wheel).

Zoom in	Drag the mouse to right side with pressing the center button. (F5 key also can be used for this operation)
Zoom out	Drag the mouse to left side with pressing the center button. (F6 key also can be used for this operation)

- Rotation
  Drag the mouse left/right with pressing the center button (wheel) and the right button.

Up/down rotation	Move the mouse up/down. Cursor keys (up/down) can be used for this operation.
Left/right rotation	Move the mouse left/right. Cursor keys (left/right) can be used for this operation.

- Parallel movement
  Drag the mouse left/right/up/down with pressing the right button.

The viewpoint change can be done in the menu of [Display] - [View].
For details, refer to the help.

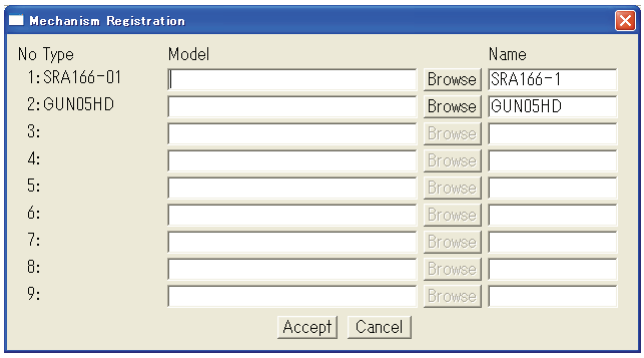
2.2.2 Assignment of the mechanism models

In this example (Robot + Servo gun), mechanism model files (*.mec) are assigned to the respective mechanisms in the virtual FD.

The loaded/assigned mechanism models will move referring to the posture of each mechanism in the Virtual FD.

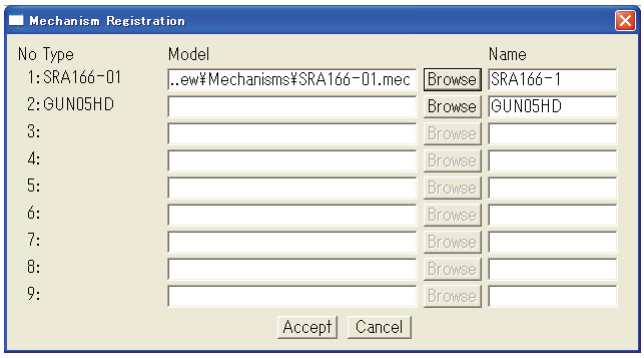
1 **Open [File] – [Mechanism Registration]**

>>The following window will be displayed.



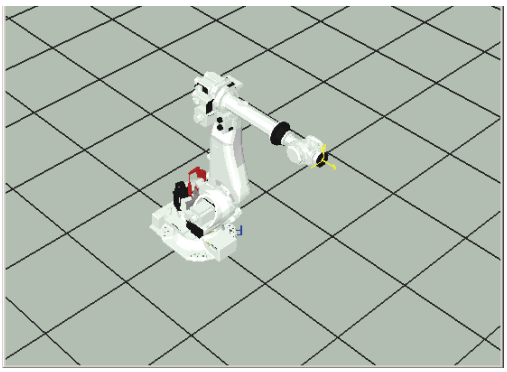
2 **Select the mechanism model file for the manipulator and other mechanisms.**

>> If [Browse] is clicked, a file selection dialog window will open. Then select the desired mechanism model file (*.mec) to be used.



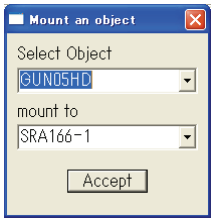
3 **Click the [OK] button.**

>> The selected mechanism model files will be loaded.

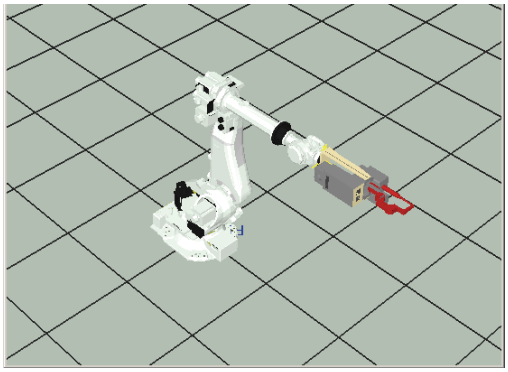


The loaded mechanism model will be placed on the origin of the world coordinate system. To change the layout, please use the menu of [Tool] - [Layout]- [Placement Editor].

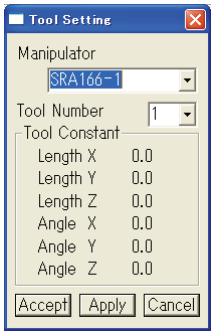
4 **Open the menu of [Tool] – [Mount].**
>>The following dialog window will be displayed.



5 **Select the "GUN05HD" for the "Select Object" and select the "SRA166-1" for the "mount to" and then click the "Accept".**
>>The servo gun will be mounted to the manipulator's wrist flange surface.



6 **Open [Tool] – [Constant Setting] – [Tool Constants].**
>>The following dialog window will be displayed.



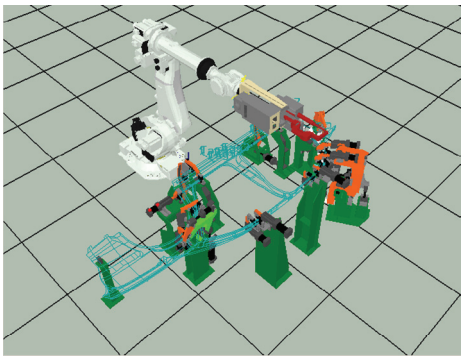
7 **After selecting the "Tool Number", click the "Accept".**
>>The tool frame will move to the position that is registered in the Virtual FD's tool constant.

2.2.3 How to import a model data

1 **Open [File] – [Open].**
>>The following dialog window will be displayed.

Available file formats are;
- VRML(*.wrl)
- Parts(*.prt)
- Mechanism (*.mec)
- Workcell(*.cel)
- IGES(*.igs)
- STEP(*.stp、*.step)
- DXF(*.dxf)
- STL(*.stl)

2 **After selecting the file type and the file name, click the [Open].**
>>The selected model file will be loaded.



The loaded model will be placed on the origin of the world coordinate system. To change the layout, please use the menu of [Tool] - [Layout]- [Placement Editor].

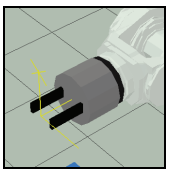
NOTE

Chapter 3 Operation example of Virtual Robot

Robot model used in this section to explain operation does not concern with the robot model which is actually available in FD on Desk Light.

3.1 System Configuration

In this example, the robot system is configured like the following.

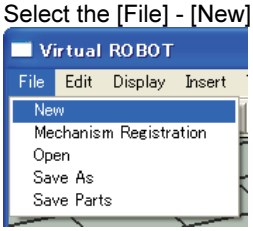
Number of UNIT	1
Number of mechanisms	1 (SRA166-01) 
Tool	Gripper Output signal O1 = ON : Clamp Output signal O1 = OFF : Unclamp Input signal I1 = ON: Clamp status Input signal I1 = OFF: Unclamp status 

To perform the memory format operation (initialization of the memory and the registration of the UNIT, mechanisms, and the robot types, etc, to the system) on the FD on DESK, refer to the instruction manual of "Memory format procedure".

3.2 Creating a workcell

3.2.1 Initialize the workcell

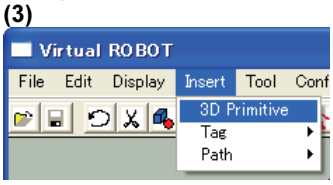
Select the [File] - [New] menu.



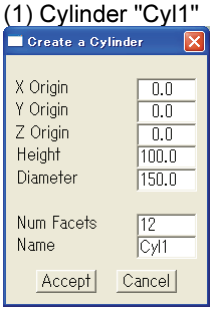
A message of "All objects are removed." will be displayed. Click [OK] to delete the all objects in the workcell.

3.2.2 Creating a tool (gripper)

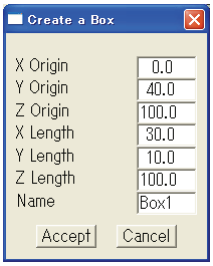
1 **Using the menu of [Insert] – [3D Primitive], create the objects of (1), (2), and (3)**



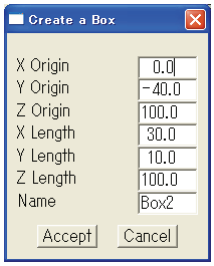
(1) Cylinder "Cyl1"

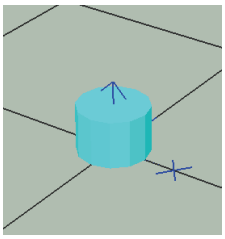


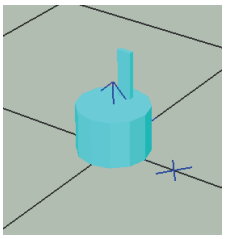
(2) Box "Box1"

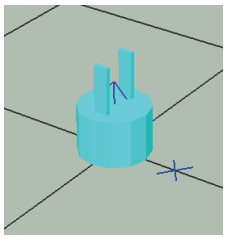


(3) Box "Box2"

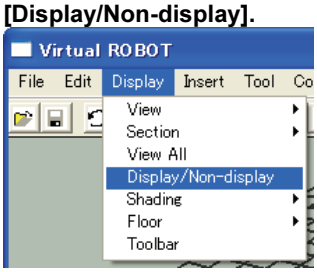




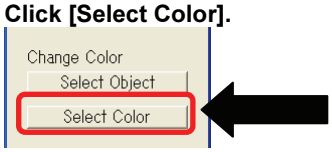




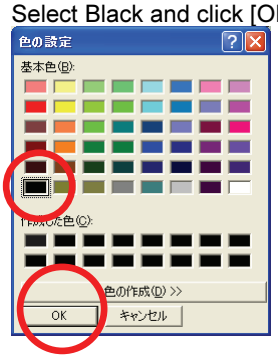
2 **Let's assign colors for the respective objects. Select [Display] – [Display/Non-display].**



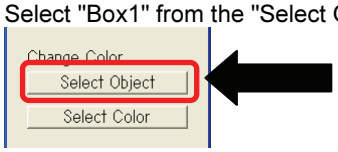
3 **Click [Select Color].**

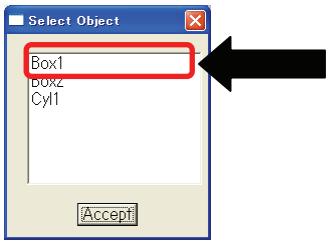


Select Black and click [OK].

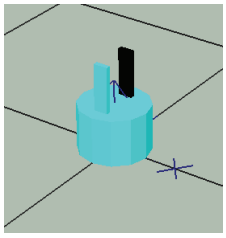


Select "Box1" from the "Select Object".

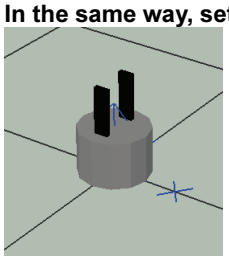




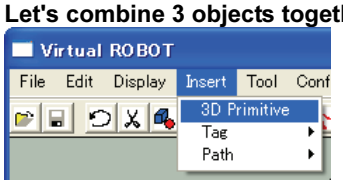
The color of "Box1" turns to black.



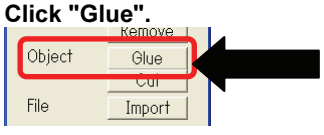
4 **In the same way, set the "Box2" to black and set the "Cyl1" to gray.**



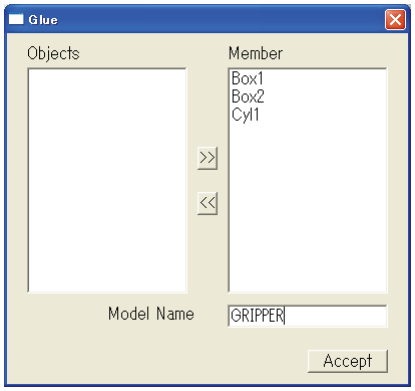
5 **Let's combine 3 objects together. Select [Insert] – [3D Primitive].**



6 **Click "Glue".**



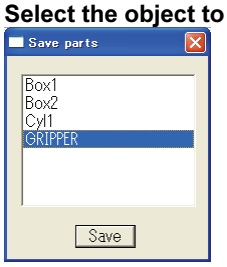
7 **Regist the all objects to "Member" using >>. And set the "Model Name" as "GRIPPER".**



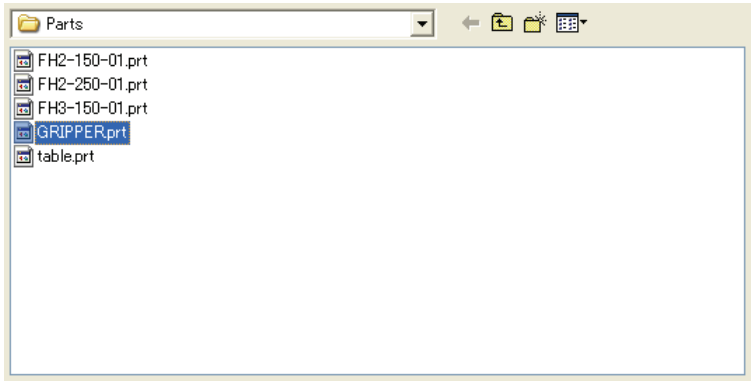
Now a 3D object that consists of "Box1", "Box2", and "Cyl1" was defined.

8 **Then export the "GIPPER" as a part. Select [File] – [Save Parts].**

9 **Select the object to be exported as a part. (Now select the "GRIPPER").**



10 **Save the object "GRIPPER" as "GRIPPER.prt" in the folder of "Parts".**



Now a shape of a gripper is created as a part "GRIPPER".

POINT

In this example, the "world corrdinate system" in the workcell where the gripper object was defined will be used as a base coordinate system of the gripper.

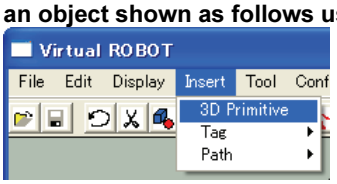
POINT

It is also possible to import a 3D model data like IGES as a tool. In that case, please pay attention to the following points;

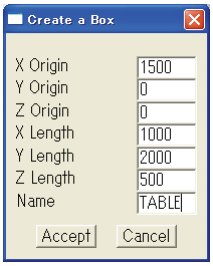
- Simplify the objects (lighten the amount of the data) as much as possible.
- Define the object so that its reference (base) coordinate system becomes the robot's wrist coordinate system.

3.2.3 Creating a work table

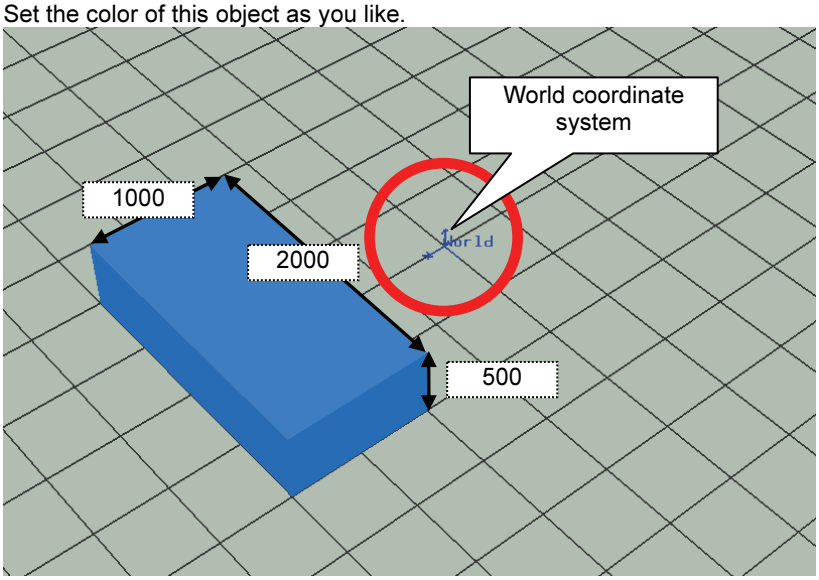
1 **After initializing the workcell referring to "3.2.1 Initialize the workcell", create an object shown as follows using the menu of [Insert] – [3D Primitive].**



Box "TABLE"



Set the color of this object as you like.

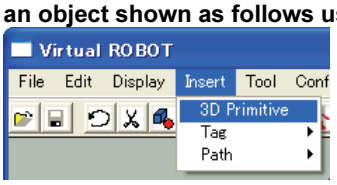


(NOTE)
- In this example, the size of a grid is 500[mm] x 500[mm].
- Because the origin of the TABLE is (1500, 0, 0), this object does not pile up on the world coordinate system.

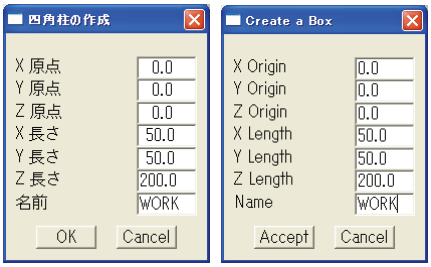
2 **Save this "TABLE" as a part "TABLE.prt" referring to "3.2.2 Creating a tool (gripper)".**

3.2.4 Creating a work-piece

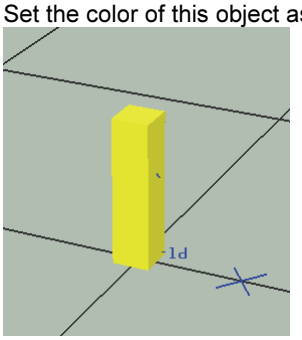
1 **After initializing the workcell referring to "3.2.1 Initialize the workcell", create an object shown as follows using the menu of [Insert] – [3D Primitive].**



Box "WORK"



Set the color of this object as you like.

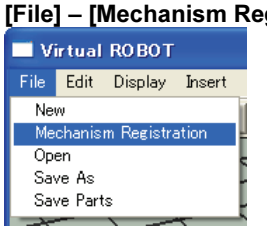


2 **Save this "WORK" as a part "WORK.prt" referring to "3.2.2 Creating a tool (gripper)".**

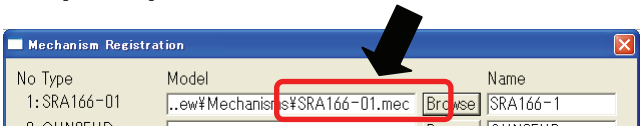
3.2.5 Placing each object in the workcell

Let's place each part and the robot in the workcell.

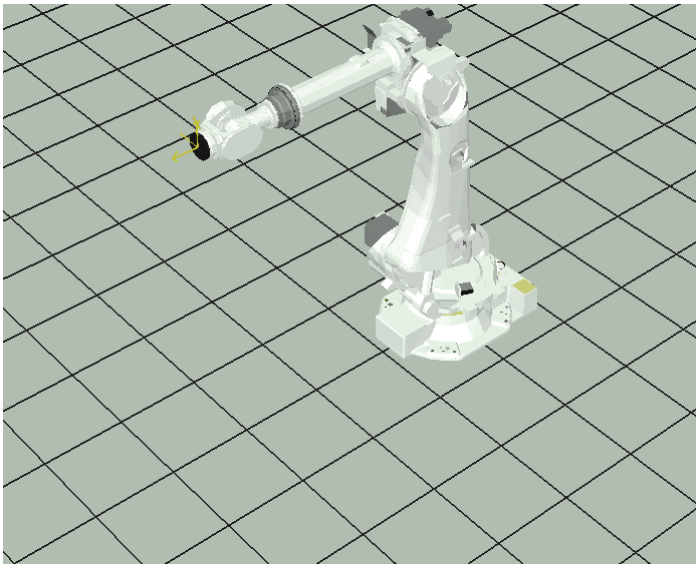
1 **After initializing the workcell referring to "3.2.1 Initialize the workcell", open [File] – [Mechanism Registration] menu.**



Click [Browse] to select the "SRA166-01.mec" in the folder of "Mechanisms".



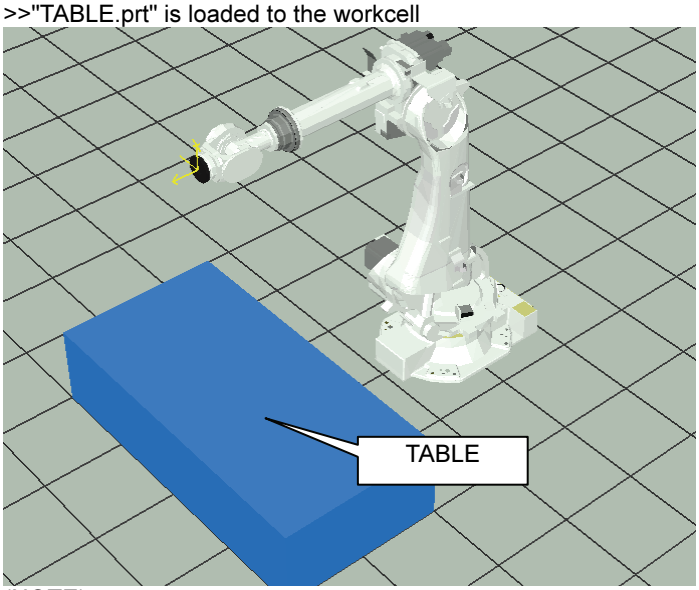
When "Accept" is clicked, a robot model "SRA166-01.mec" is loaded for the mechanism 1. In this case, the origing of the mechanism coordinate system of the robot is placed on the origin of the world coordinate system of the workcell.



POINT

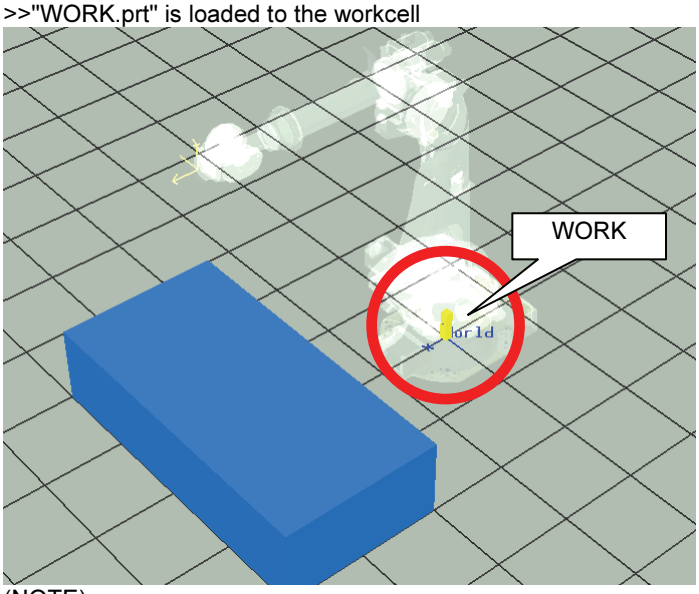
In case of single robot system, normally, the robot's mechanism coordinate system (base coordinate system) will be placed on the world coordinate system. However, in case of a system in which plural mechanisms try to make a cooperative motion, it is necessary to define the location and the angle of the respective mechanism coordinate systems correctly.

2 **Open the "TABLE.prt" in the "Parts" folder using [File] – [Open] menu.**
>>"TABLE.prt" is loaded to the workcell



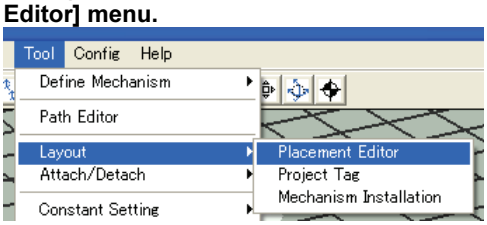
(NOTE)
Because the origin of the "TABLE" is (1500, 0, 0), this object will be placed in a position like this picture.

3 **Open the "WORK.prt" in the "Parts" folder using [File] – [Open] menu.**
>>"WORK.prt" is loaded to the workcell

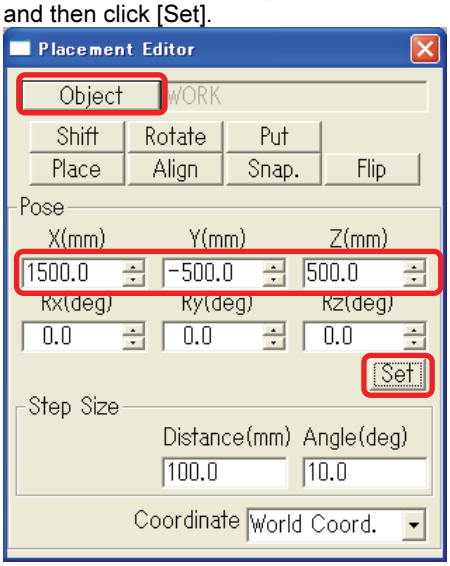


(NOTE)
- Because the origin of the "WORK" is (0, 0, 0), this object will be placed on the origin of the world coordinate system.
- In this picture, the robot color is set to transparent for the explanation.
([Display] – [Display/Non-display] – [Change Transparency])

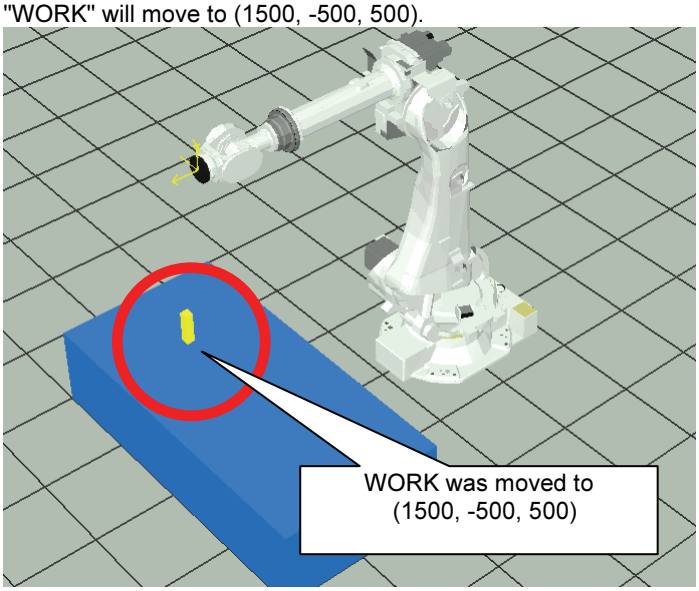
4 **Change the location of the "WORK". Select [Tool] – [Layout] – [Placement Editor] menu.**



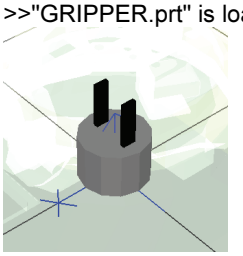
Select "WORK" with "Object" button and then enter (1500, -500, 500) for (X, Y, Z) and then click [Set].



"WORK" will move to (1500, -500, 500).



5 **Open the "GRIPPER.prt" in the "Parts" folder using [File] – [Open] menu.**
>>"GRIPPER.prt" is loaded to the workcell

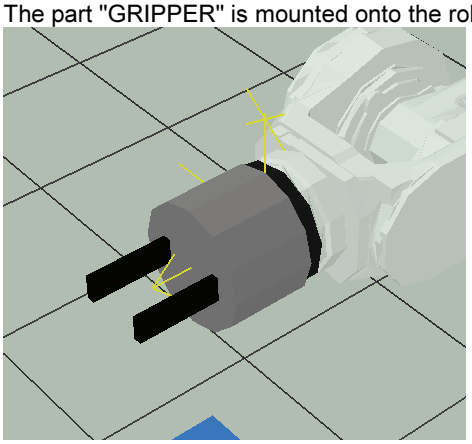


(NOTE)
- Because the origin of the "GRIPPER" is (0, 0, 0), this object will be placed on the origin of the world coordinate system.

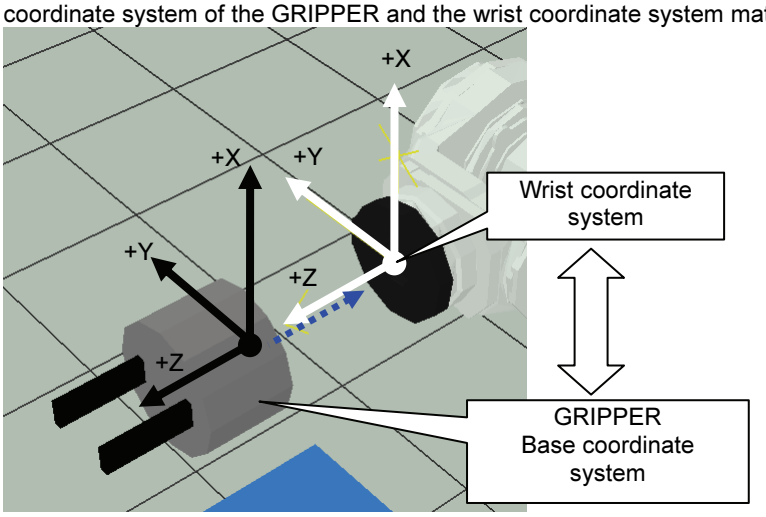
6 **Let's mount this GRIPPER to the wrist flange. Select [Tool] – [Mount] menu.**

Set as;
Select Object: GRIPPER
Mount to : SRA166-01

The part "GRIPPER" is mounted onto the robot tool flange.

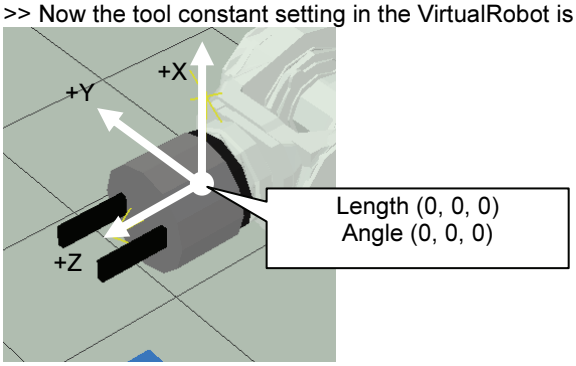


(NOTE)
When executing "Mount" menu, the placing operation is executed so that the base coordinate system of the GRIPPER and the wrist coordinate system matches.



7 **Next, set the tool constant.**

>> Now the tool constant setting in the VirtualRobot is still default setting.

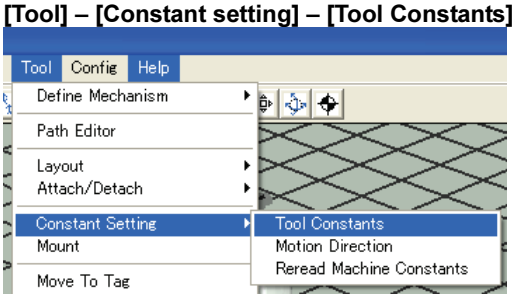


In the FD on DESK, set the tool 1 constant like the following picture.

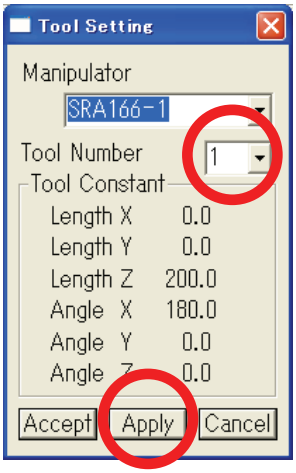
Length	(mm)	x	0.0	y	0.0	z	200.0
Angle	(deg)	x	180.0	y	0.0	z	0.0

(For the detailed operation, refer to the instruction manual "SETUP").

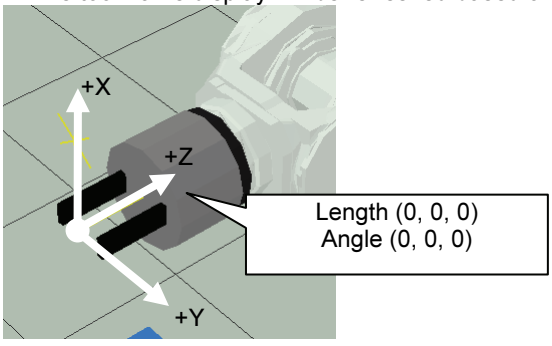
Copy the tool constant from the FD on DESK to the VirtualRobot. Select [Tool] – [Constant setting] – [Tool Constants].



After selecting "Tool Number 1", click [Apply] to load the tool constant from the FD on DESK. After confirming the values, click [Accept].



>>The tool frame display will be refreshed based on the loaded tool constant.

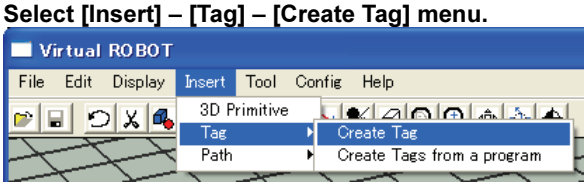


3.3 Creating a program

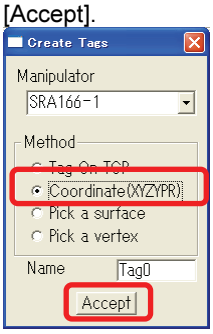
Let's create a simple program in the workcell.
Please open the program number 1 in the FD on DESK in advance.

3.3.1 Creating a teaching point using a "Tag"

1 **Select [Insert] – [Tag] – [Create Tag] menu.**

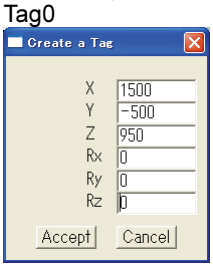


After inputting Tag name and select "Coordinate(XYZRPY)" and then click [Accept].

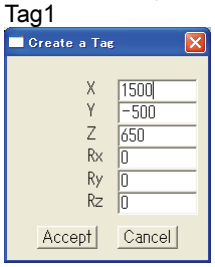


Create Tag0 and Tag1 with the following settings.

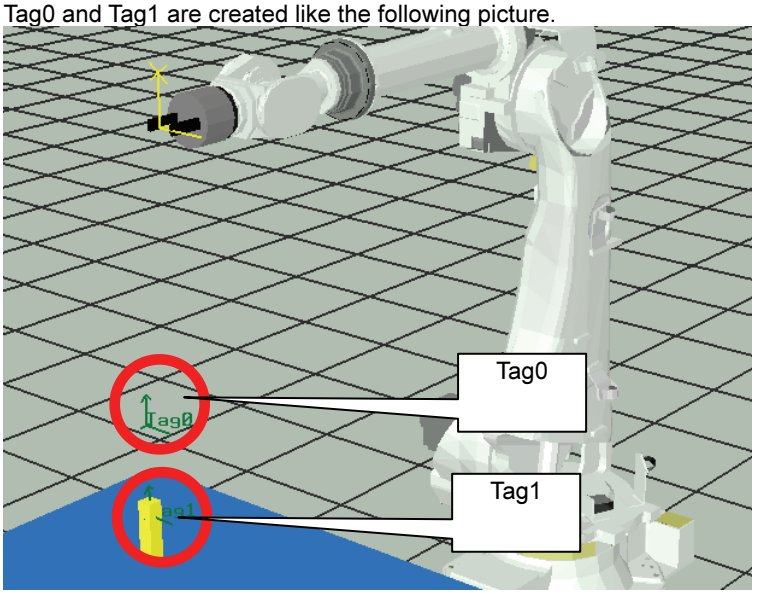
Tag0



Tag1



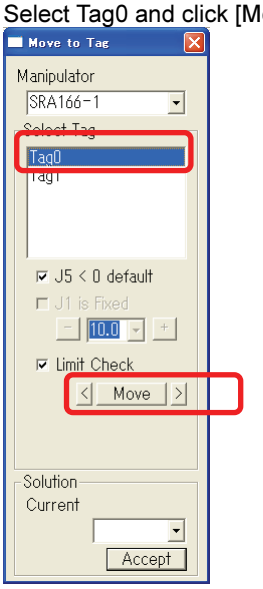
Tag0 and Tag1 are created like the following picture.



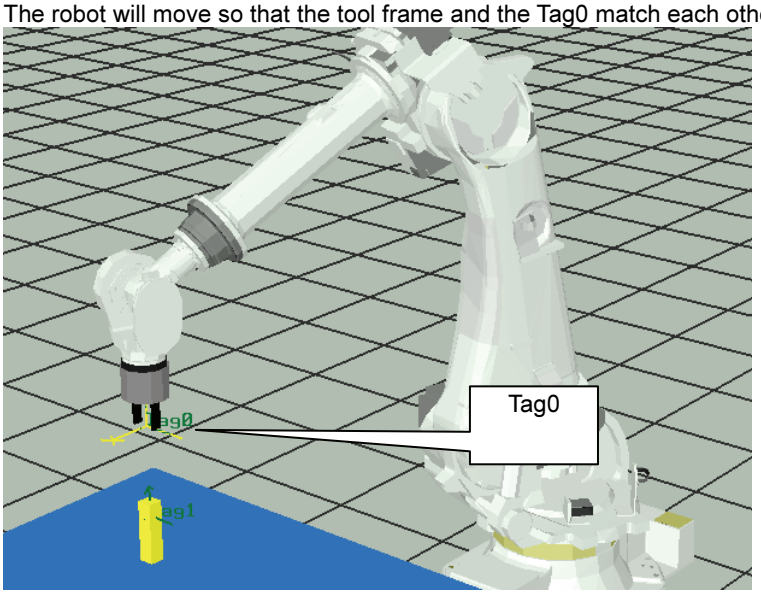
3.3.2 Move the robot to the Tag and record the position in the work program

1 **Let's move the robot to the position of Tag0.**
Select [Tool] – [Move to Tag].

Select Tag0 and click [Move].



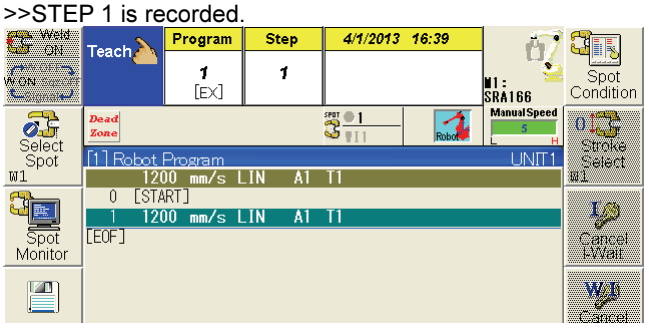
The robot will move so that the tool frame and the Tag0 match each other.



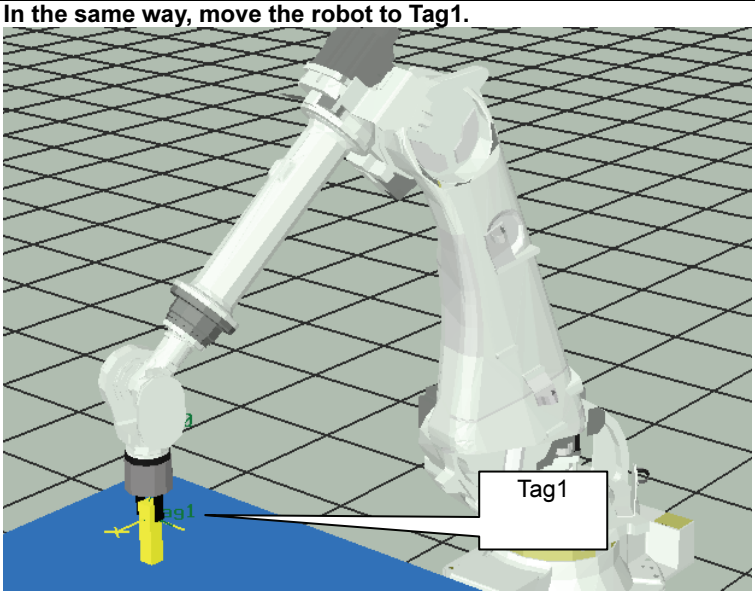
INFO.

- If the target Tag is placed on a location where the robot can not reach or placed with angle that the robot can not make, error will occur.
- There may be a case where robot can make plural sets of axis angles for 1 Tag. In that case, it is possible to designate one of them for the robot's posture.

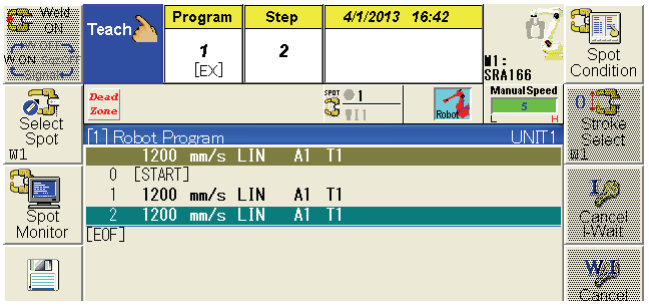
2 **Record this position as STEP 1. In the VirtualTP of the FD on DESK, click [RECORD] key. ("C" key of the keyboard can be used instead of this)**
>>STEP 1 is recorded.



3 **In the same way, move the robot to Tag1.**



4 **Record STEP 2 on the FD on DESK.**



Now 2 teaching points were created in the work program.

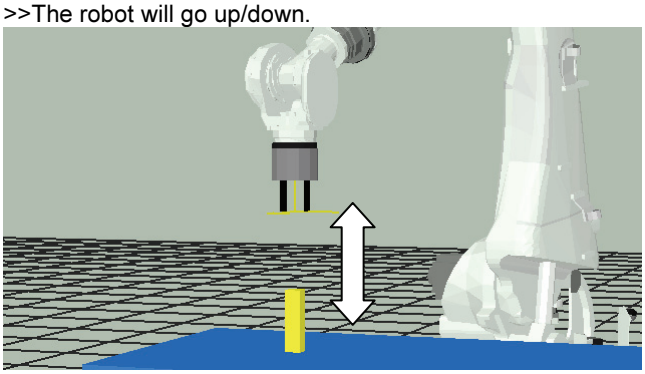
3.3.3 Finishing the program

1 **Using the 2 steps created in the previous section, make a program like the following picture. Concerning the details of operation, refer to the instruction manual "BASIC OPERATIONS MANUAL".**

```
      1200 mm/s LIN   A1  T1
  0  [START]
  1   1200 mm/s LIN   A1  T1
  2   1200 mm/s LIN   A1  T1
  3  SETM[O1,1]                  FN105;Output signal
  4  WAITI[I1]                   FN525;Wait Input cond
  5   1200 mm/s LIN   A1  T1
  6  DELAY[1]                    FN50;Timer delay
  7   1200 mm/s LIN   A1  T1
  8  SETM[O1,0]                  FN105;Output signal
  9  WAITJ[I1]                   FN526;Wait not Input c
 10   1200 mm/s LIN   A1  T1
 11  END                         FN92;End
[EOF]
```

(SUPPLEMENT)
STEP 1: Record at the position of Tag0
STEP 2: Record at the position of Tag1
STEP 5: Copy of the STEP 1
STEP 7: Copy of the STEP 2
STEP10: Copy of the STEP 1

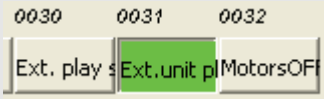
2 **Perform the CHECK GO operation on the FD on DESK.**
>>The robot will go up/down.



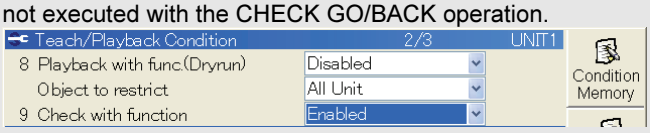
(Supplement) At the step of FN525 and the FN526, use "Cancel I-Wait" key to release the waiting condition for Input Signal.

INFO.

In the "UserI/O" of the Virtual IO window, turn ON the I31 signal (Ext. unit play stop) in advance.

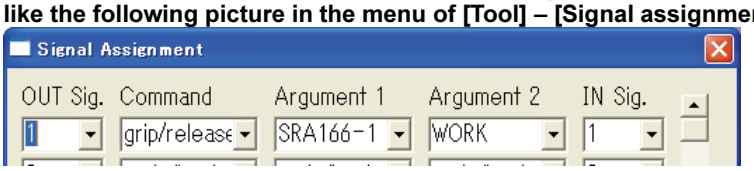


Please confirm that "9 Check with function" setting item in the screen of "Teach/Playback" is set to "Enabled". Unless the functions like SETM, DELAY etc. are not executed with the CHECK GO/BACK operation.



3.3.4 How to simulate the movement of a work-piece with I/O signal assignment

1 **If this program is played back as this is, the work-piece ("WORK") is always fixed on the table ("TABLE") and it looks strange. Therefore, make a setting like the following picture in the menu of [Tool] – [Signal assignment].**

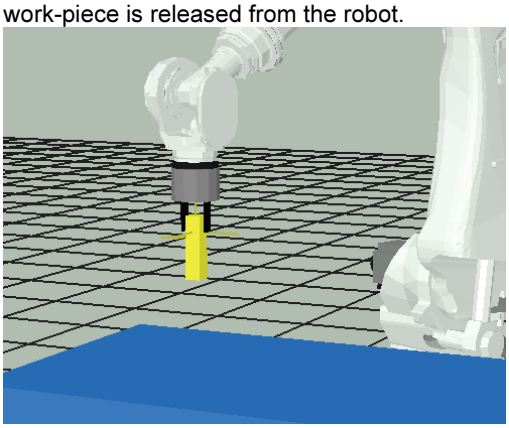


By this setting, the movement of the WORK will be set as following;

When the output signal O1 is set to ON;
The WORK is attached to the wrist of SRA166-01 robot and follows the movement of the robot. (Input signal I1 will be set to ON at the same time.)

When the output signal O1 is set to OFF;
The WORK is released from to the wrist of SRA166-01 robot and fixed to the released position. (Input signal I1 will be set to OFF at the same time.)

2 **After completing this setting, try CHECK GO/BACK operation again.**
>> When the output signal 1 (O1) turns ON, the work-piece is attached to the robot and starts to move with the robot. When the output signal 1 (O1) turns OFF, the work-piece is released from the robot.



NACHI
NACHI-FUJIKOSHI CORP.

http://www.nachi-fujikoshi.co.jp/

JAPAN MAIN OFFICE	Phone: +81-3-5568-5245	Fax: +81-3-5568-5236	Shiodome Sumitomo Bldg. 17F, 1-9-2 Higashi-Shinbashi Minato-ku, TOKYO, 105-0021 JAPAN

NACHI NORTH AMERICA ***http://www.nachirobotics.com/***

North America Headquarters	Phone: 248-305-6545	Fax: 248-305-6542	22285 Roethel Drive, Novi, Michigan 48375 U.S.A.
Greenville Service Office	Use 248-305-6545	Use 248-305-6542	South Carolina, U.S.A.
San Antonio Service Office	Use 248-305-6545	Use 248-305-6542	Texas, U.S.A.
Kentucky Branch Office	Phone: 502-695-4816	Fax: 502-695-4818	116 Collision Center Drive, Suite A, Frankfort, KY 40601 U.S.A
Training Office	Phone: 248-334-8250	Fax: 248-334-8270	22213 Roethel Drive, Novi, Michigan 48375 U.S.A.
Toronto Branch Office	Phone: 905-760-9542	Fax: 905-760-9477	89 Courtland Avenue, Unit 2, Vaughan, Ontario L4K3T4 CANADA
Mexico Branch Office	Phone : +52-555312-6556	Fax: +52-55-5312-7248	Urbina # 54, Parque Industrial Naucalpan, Naucalpan de Juarez, 53370, Estado de México, MEXICO
Saltillo Service Office	Phone : +52-844416-8053	Fax: +52-844416-8053	Canada 544 Privada Luxemburgo C. P. 25230, Saltillo, Coahuila, MEXICO

NACHI ROBOTIC EUROPE

Germany ***http://www.nachi.de/***

Nachi Europe GmbH	Phone: +49-(0)2151-65046-0	Fax: +49-(0)2151-65046-90	Bischofstrasse 99, 47809, Krefeld,GERMANY

United Kingdom ***http://www.nachi.co.uk/***

Nachi U.K. LTD.	Phone: +44-(0)121-250-1895	Fax: +44-(0)121-250-1899	Unit 7, Junction Six Industrial Estate, Electric Avenue, Birmingham B6 7JJ, U.K.

Czech Republic

Nachi Europe	Phone: + 420-255-734-000	Fax: +420-255-734-001	Prague 9, VGP Park, Czech republic

NACHI ROBOTIC ASIA

Korea ***http://www.nachi-korea.co.kr/***

Korea	Phone: +82-(0)2-469-2254	Fax: +82-(0)2-469-2264	2F Dongsan Bldg. 276-4, Sungsu 2GA-3DONG, Sungdong-ku, Seoul 133-123, KOREA

Robot Division
1-1-1, FUJIKOSHIHONMACHI, TOYAMA CITY, JAPAN 930-8511
Phone +81-76-423-5137
Fax +81-76-493-5252

Original manual is written in Japanese.