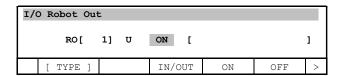
A CAUTION

After all I/O signals are set, the setting information should be saved in external storage in case the information needs to be re-loaded. Otherwise, the current setting information would be lost when it is changed.

11 To perform forced output of a signal, place the cursor on ON or OFF and press the corresponding function key.



For the forced output of a signal, see Chapter 6, Section 6.4.

⚠ WARNING

The controller uses signals to control the peripheral equipment. The forced output may adversely affect the security of the system. Check the use of signals in the system before attempting the forced output.

3.3 PERIPHERAL I/O

Peripheral I/O signals (UI/UO) are a group of specialized signals whose usage is decided by the system. These signals are connected with a remote controller and the peripheral devices via the following interfaces and I/O links and they are used to control the robot from the outside.

Refer to "3.8 SETTING AUTOMATIC OPERATION" for the setting to control the robot from outside.

Configuring I/O

When all I/O assignment is deleted and cycling power of the robot controller, the connected I/O devices are recognized and proper I/O assignment is automatically performed. In case that the configuration of I/O is set automatically, the configuration of peripheral I/O is set depending on the setting of the item "UOP auto assignment" in the system configuration screen.

There are seven types of UOP auto assignment as shown below and each type has different assignment of peripheral I/O signals (UOP).

Table 3.3 UOP auto assignment

Type UOP assignment type		I/O device to which UOP is assigned
None No assignment		None
Full (Slave) Full assignment I Full (CRMA16) Full assignment I		I/O link master interface, etc
		I/O link slave interface
		R-30 <i>i</i> B Mate main board (CRMA16)
		I/O link master interface, etc
Simple (Slave)	Simple assignment	I/O link slave interface
Simple (CRMA16)	Simple assignment	R-30iB Mate main board (CRMA16)

In default setting, the UOP auto assignment is set as follows.

- R-30*i*B : Full

R-30iB Mate LR Tool: Simple(Slave)
 R-30iB Mate LR Handling Tool: Simple(CRMA16)

Refer to "3.1 I/O" for the standard I/O assignment according to the setting of UOP auto assignment.

UOP assignment types

There are the following two types of peripheral I/O (UOP) assignment.

Full assignment

All peripheral I/O signals can be used.

Eighteen input physical signals and twenty output physical signals are assigned to peripheral I/O signals.

Simple assignment

The peripheral I/O signals that the number of signals is small can be used.

Eight input physical signals and four output physical signals are assigned to peripheral I/O signals.

In simple assignment, the number of signals that can be used for general digital I/O is increased because the number of peripheral I/O signals is decreased, but the functions of peripheral I/O signals are restricted as shown in the table below.

UI[1]	IMSTP	Always ON *4
UI[2]	HOLD	Operable
UI[3]	SFSPD	Always ON *4
UI[4]	CSTOPI	Allocated to the same
		signal as in RESET *1
UI[5]	RESET	Operable
UI[6]	START	Operable
UI[7]	HOME	No allocation
UI[8]	ENBL	Operable
UI[9]	RSR1/PNS1/STYLE1	Operable as PNS1 *3
UI[10]	RSR2/PNS2/STYLE2	Operable as PNS2 *3
UI[11]	RSR3/PNS3/STYLE3	Operable as PNS3 *3
UI[12]	RSR4/PNS4/STYLE4	Operable as PNS4 *3
UI[13]	RSR5/PNS5/STYLE5	No allocation
UI[14]	RSR6/PNS6/STYLE6	No allocation
UI[15]	RSR7/PNS7/STYLE7	No allocation
UI[16]	RSR8/PNS8/STYLE8	No allocation
UI[17]	PNSTROBE	Allocated to the same
		signal as in START *2
UI[18]	PROD_START	No allocation

UO[1]	CMDENBL	Operable
UO[2]	SYSRDY	No allocation
UO[3]	PROGRUN	No allocation
UO[4]	PAUSED	No allocation
UO[5]	HELD	No allocation
UO[6]	FAULT	Operable
UO[7]	ATPERCH	No allocation
UO[8]	TPENBL	No allocation
UO[9]	BATALM	Operable
UO[10]	BUSY	Operable
UO[11] ACK1/SNO1		No allocation
UO[12] ACK2/SNO2		No allocation
UO[13]	ACK3/SNO3	No allocation
UO[14]	ACK4/SNO4	No allocation
UO[15]	ACK5/SNO5	No allocation
UO[16]	ACK6/SNO6	No allocation
UO[17]	ACK7/SNO7	No allocation
UO[18]	ACK8/SNO8	No allocation
UO[19]	SNACK	No allocation
UO[20]	RESERVE	No allocation
mol rece	t input can forcib	ly terminate the

- *1 Since CSTOPI and RESET are allocated to the same signal, reset input can forcibly terminate the program if "CSTOPI for ABORT" is enabled.
- *2 Since PNSTROBE and START are allocated to the same signal, the program is selected at the rising edge (OFF→ON) of the START signal and the program is started at the falling edge (ON→OFF) of the START signal.
- *3 Only PNS can be used as the program selection method in simple allocation (that START and PNSTROBE are allocated to the same signal). Even if the "program selection method" other than PNS is selected on the Prog Select screen, PNS is automatically selected during power-on.
- *4 These signals are assigned to the internal I/O device (rack 35, slot 1) in which the signal is always on.
- *5 Since PROD_START is not allocated in simple allocation, when "START for CONTINUE only" item in System Config menu is TRUE, the program cannot be started by peripheral I/O. Set the "START for CONTINUE only" item FALSE in simple allocation.

*IMSTP input UI [1] (Always enabled.)

The immediate stop signal turns servo power off by the software.

The *IMSTP input is on in the normal status. When this signal is turned off, the following processing is performed:

An alarm is generated and the servo power is turned off.

• The robot operation is stopped immediately. Execution of the program is also stopped.

⚠ WARNING

The *IMSTP signal is controlled by software. Please use external emergency stop for safety-critical processing. For connection of external emergency stop signal, refer to the "FANUC Robot series R-30*i*B/R-30*i*B Plus CONTROLLER MAINTENANCE MANUAL" (B-83195EN) or the "FANUC Robot series R-30*i*B Mate/R-30*i*B Mate Plus CONTROLLER MAINTENANCE MANUAL" (B-83525EN).

*HOLD input UI [2] (Always enabled.)

The temporary stop signal specifies a temporary stop from an external device.

The *HOLD input is on in the normal status. When this signal is turned off, the following processing is performed:

- The robot is decelerated until its stops, then the program execution is halted.
- If ENABLED is specified at "Break on hold" on the general item setting screen, the robot is stopped, an alarm is generated, and the servo power is turned off.

*SFSPD input UI [3] (Always enabled.)

The safety speed signal temporarily stops the robot when the safety fence door is opened. This signal is normally connected to the safety plug of the safety fence door.

The *SFSPD input is on in the normal status. When this signal is turned off, the following processing is performed:

- The operation being executed is decelerated and stopped, and execution of the program is also stopped. At this time, the feed rate override is reduced to the value specified for \$SCR.\$FENCEOVRD.
- When the *SFSPD input is off and a program is started from the teach pendant, the feed rate override is reduced to the value specified for \$SCR.\$SFRUNOVLIM. When jog feed is executed, the feed rate override is reduced to the value specified for \$SCR.\$SFJOGOVLIM. When *SFSPD is off, the feed rate override cannot exceed these values.

⚠ WARNING

The *SFSPD signal controls deceleration and stop by software. To stop the robot immediately for safety purposes, use safety fence signal. For connection of safety fence signal, refer to the FANUC Robot series R-30*i*B/R-30*i*B Plus CONTROLLER MAINTENANCE MANUAL (B-83195EN) or the FANUC Robot series R-30*i*B Mate/R-30*i*B Mate Plus CONTROLLER MAINTENANCE MANUAL (B-83525EN).

NOTE

When the *IMSTP, *HOLD, and *SFSPD signals are not used, jumper these signal lines.

CSTOPI input UI [4] (Always enabled.)

The cycle stop signal terminates the program currently being executed. It also releases programs from the wait state by RSR.

- When FALSE is selected for "CSTOPI for ABORT" on the Config system setting screen, this signal terminates the program currently being executed as soon as execution of the program completes. It also releases (Clear) programs from the wait state by RSR. (Default)
- When TRUE is selected for "CSTOPI for ABORT" on the Config system setting screen, this signal immediately terminates the program currently being executed. It also releases (Clear) programs from the wait state by RSR.

↑ WARNING

When FALSE is selected for "CSTOPI for ABORT" on the Config system setting screen, CSTOPI does not stop the program being executed until the execution is complete.

FAULT RESET input signal, RESET, UI [5]

The RESET signal cancels an alarm. If the servo power is off, the RESET signal turns on the servo power. The alarm output is not canceled until the servo power is turned on. The alarm is canceled at the instant this signal falls in default setting.

ENBL input signal, ENBL, UI [8]

The ENBL signal allows the robot to be moved and places the robot in the ready state. When the ENBL signal is off, the system inhibits a jog feed of the robot and activation of a program including a motion (group). A program which is being executed is halted when the ENBL signal is set off.

NOTE

When the ENBL signal is not monitored, strap the signal with the ground.

RSR1 to RSR8 inputs UI [9-16] (Enabled in the remote state.)

These are robot service request signals. When one of these signals is received, the RSR program corresponding to the signal is selected and started to perform automatic operation. When another program is being executed or is stopped temporarily, the selected program is added to the queue and is started once the program being executed terminates. (→ Subsection 3.8.1, Robot Service Request (RSR))

PNS1 to PNS8 UI [9-16] PNSTROBE UI [17] (Enabled in the remote state.)

These are program number select signals and a PN strobe signal. When the PNSTROBE input is received, the PNS1 to PNS8 inputs are read to select a program to be executed. When another program is being executed or temporarily stopped, these signals are ignored. (

Subsection 3.8.2, Program Number Selection (PNS))

When the remote conditions are satisfied, program selection using the teach pendant is disabled while PNSTROBE is on.

STYLE1 to STYLE8 UI [9-16] (Enabled in the remote state.)

These are STYLE number select signals. When the start signal is received, the STYLE1 to STYLE8 inputs are read to select a program, then the selected program is executed. When another program is being executed or temporarily stopped, these signals are ignored. (→ Subsection 3.8.3, STYLE)

PROD_START input UI [18] (Enabled in the remote state.)

The automatic operation start (production start) signal starts the currently selected program from line 1. This signal functions at its falling edge when turned off after being turned on.

When this signal is used together with a PNS signal, it executes the program selected by the PNS signal starting from line 1. When this signal is used together with no PNS signal, it executes the program selected using the teach pendant starting from line 1.

When another program is being executed or temporarily stopped, this signal is ignored. (\rightarrow Subsection 3.8.2, Program Number Selection (PNS))

START input UI [6] (Enabled in the remote state.)

This is an external start signal. This signal functions at its falling edge when turned off after being turned on. When this signal is received, the following processing is performed:

When FALSE is selected for "START for CONTINUE" only on the Config system setting screen, the program selected using the teach pendant is executed from the line to which the cursor is positioned. A temporarily stopped program is also continued. (Default)

 When TRUE is selected for "START for CONTINUE" only on the Config system setting screen, a temporarily stopped program is continued. When the program is not temporarily stopped, it cannot be started.

NOTE

To start a program from a peripheral device, the RSR or PROD_START input is used. To start a temporarily stopped program, the START input is used.

CMDENBL input UO [1]

The input accept enable (command enable) signal is output when the following conditions are satisfied. This signal indicates that a program including an operation (group) can be started from the remote controllers.

- The remote conditions are satisfied.
- The operation enable conditions are satisfied.
- The mode is continuous operation (single step disable).

SYSRDY output UO [2]

SYSRDY is output while the servo power is on. This signal places the robot in the operation enable state. In the operation enable state, jog feed can be executed and a program involving an operation (group) can be started. The robot enters the operation enable state when the following operation enable conditions are satisfied:

- The ENBL input of the peripheral device I/O is on.
- The servo power is on (not in the alarm state).

PROGRUN output UO [3]

PROGRUN is output while a program is being executed. It is not output while a program is temporarily stopped.

PAUSED output UO [4]

PAUSED is output when a program is temporarily stopped and waits for restart.

HELD output UO [5]

HELD is output when the hold button is pressed. It is not output when the hold button is released. Otherwise, when the HOLD signal UI[2] is OFF from some peripheral devices, then HELD is output.

FAULT output UO [6]

FAULT is output when an alarm occurs in the system. The alarm state is released by the FAULT_RESET input. FAULT is not output when a warning (WARN alarm) occurs.

ATPERCH output UO [7]

ATPERCH is output when the robot is in a previously defined reference position.

Up to ten reference positions can be defined. This signal is output only when the robot is in the first reference position. For any other reference positions, general-purpose signals are assigned.

TPENBL output UO [8]

TPENBL is output when the enable switch of the teach pendant is set to on.

BATALM output UO [9]

BATALM indicates a low-voltage alarm for the backup battery of the controller or robot Pulsecoder. Turn the power to the controller on and replace the battery.

! CAUTION

In case that the BATALM signal is specified to include BZAL/BLAL of Pulsecoder, BATALM is output when at least one Pulsecoder of all axis of all motion group detects BZAL/BLAL. However BATALM signal excludes Process axis (Servo torch axis) which has no motion group and Slave axis of Dual drive function.

BUSY output UO [10]

BUSY is output while a program is being executed or while processing using the teach pendant is being performed. It is not output while a program is temporarily stopped.

ACK1 to ACK8 outputs UO [11-18]

When the RSR function is enabled, ACK1 to ACK8 are used together with the function. When an RSR input is accepted, a pulse of the corresponding signal is output as an acknowledgment. The pulse width can be specified. (→ Subsection 3.8.1, Robot Service Request (RSR))

SNO1 to SNO8 outputs UO [11-18]

When the PNS function is enabled, SNO1 to SNO8 are used together with the function. The currently selected program number (signal corresponding to the PNS1 to PNS8 inputs) is always output, in binary code, as confirmation. The selection of another program changes SNO1 to SNO8. (→ Subsection 3.8.2, Program Number selection (PNS))

SNACK output UO [19]

When the PNS function is enabled, SNACK is used together with the function. When the PNS inputs are accepted, a pulse of this signal is output as an acknowledgment. The pulse width can be specified. (→ Subsection 3.8.2, Program Number selection (PNS))

Procedure 3-5 Assigning Peripheral I/O

Step

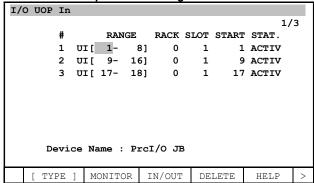
- Press the [MENU] key. The screen menu will be displayed.
- 2 Select "5 I/O".
- Press the F1 key, [TYPE]. The screen change menu will be displayed. 3
- Select "UOP".

Peripheral I/O list screen

I/O UOP In								
	#	Status	3	1/18				
JIU	1]	OFF	[*IMSTP]				
JIU	2]	OFF	[*HOLD]				
JIU	3]	OFF	[*SFSPD]				
JIU	4]	OFF	[Cycle stop]				
JIU	5]	OFF	[Fault reset]				
JIU	6]	OFF	[Start]				
JIU	7]	OFF	[Home]				
JIU	8]	OFF	[Enable]				
JIU	9]	OFF	[RSR1/PNS1/STYLE	1]				
JIU	10]	OFF	[RSR2/PNS2/STYLE	2]				
JIU	11]	OFF	[RSR3/PNS3/STYLE	3]				
Sorted by port number.								
[TYPE]	CONFIG	IN/OU	Т	>				

- To switch the input screen to the output screen, or vice versa, press the F3, "IN/OUT". 5
- To allocate I/O, press the F2, "CONFIG".

Peripheral I/O configuration screen



To return to the list screen, press F2, "MONITOR".

- 7 Manipulating the I/O assignment screen
 - a) Place the cursor on Range, and specify the range of signals to be assigned.
 - b) Line division is performed automatically according to the specified range.
 - c) Enter appropriate values for Rack, Slot, and Start point.
 - d) When the entered values are valid, abbreviation PEND is displayed in STAT. If any entered value is invalid, abbreviation INVAL is displayed in STAT.

Unnecessary lines can be deleted by pressing F4, "Delete".

The abbreviations that will appear in "STAT" mean the following:

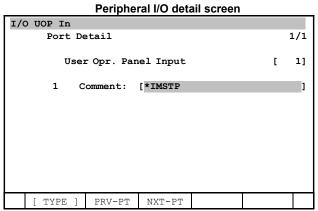
ACTIV : This assignment is now in use.

PEND : Assignment is normal. Turning the power off and on again causes the ACTIV

status to be entered.

INVAL : A specified value is invalid. UNASG : No assignment has been made.

8 To set the attribute of I/O, press the [NEXT] key of the selection screen and press F4, "DETAIL" of the next page.



To return to the configuration screen, press the [PREV] key.

- 9 To add a comment:
 - a Move the cursor to the comment line and press the [ENTER] key.
 - b Select the method of naming the comment.
 - c Press the appropriate function keys to add the comment.
 - d When you are finished, press the [ENTER] key.

NOTE

The comment of peripheral equipment I/O is written by the tool software and can be changed. Even if the comment is rewritten, the function is not changed.

- 10 To set the item, move the cursor to the setting column, and select the function key menu.
- When you are finished, press [PREV] key to return to the selection screen.
- 12 Cycle power of the controller so it can use the new information.

⚠ WARNING

Cycling power is required to make a new setting valid. Otherwise, injury or property damage would occur.

⚠ CAUTION

- 1 In the first power-up after I/O re-allocation, power failure recovery would not be executed even if it is enabled.
- 2 After all I/O signals are set, the setting information should be saved in external storage in case the information needs to be re-loaded. Otherwise, the current setting information would be lost when it is changed.

NOTE

To control the peripheral I/O (UOP) by integrated PMC (option), UOP is assigned to PMC address (F, G) by PMC internal I/O assignment. When UOP is assigned to PMC address, the mark "*" is displayed on the left of "UI" and "UO" in the peripheral I/O configuration menu. In this case, the setting of the peripheral I/O configuration menu is ignored, and the setting is not used for the assignment of UI and UO. The UI and UO are assigned to PMC address according to the setting of the PMC internal I/O assignment menu.

3.4 OPERATOR'S PANEL I/O

The operator's panel I/O means dedicated digital signals for passing data indicating the status of the buttons and LEDs on the operator's panel/box. The status of each input signal depends on whether the corresponding button on the operator's panel is on or off. Each output signal is used to turn the corresponding LED lamp on the operator's panel on or off.

For the operator's panel I/O, the signal numbers cannot be mapped (redefined). Sixteen input and sixteen output signals are defined as standard. For the definition of the signals of the operator's panel I/O, see Fig. 3.4.

When the operator's panel is enabled, the operator's panel I/O can be used to start a program. However, any signals which have a significant effect on safety are always enabled.

The operator's panel is enabled when the following operator's panel enable conditions are satisfied:

- The enable switch on the teach pendant is set to off.
- The remote signal (SI[2]) is off. (For how to turn the remote signal on and off, see the description of "Remote/Local setup" in Section 3.15, "SYSTEM CONFIG MENU".)
- The *SFSPD input of the peripheral device I/O is on.

To start a program involving operation (group), the following conditions must be satisfied:

- The ENBL input of the peripheral device I/O is on.
- The servo power is on (not in the alarm state).

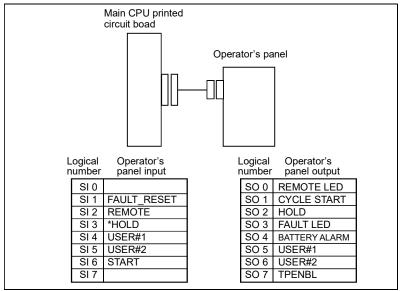


Fig. 3.4 Operator's panel I/O

Table 3.4 (a) Operator's panel input signals

	5.4 (a) Operator s paner input signals
Input signal	Description
*HOLD	The temporary stop (hold) signal specifies temporary stop of the program.
SI [3]	The *HOLD signal is on in the normal status. When this signal is turned
Always enabled.	off:
Not provided for the operator's panel.	The robot operation being executed is decelerated, then stopped.
	The program being executed is temporarily stopped.
FAULT_RESET	The alarm release (fault reset) signal releases the alarm state. When the
SI [1]	servo power is off, this signal turns on the servo power. In this case, the
Always enabled.	alarm state is not released until the servo power is turned on.
REMOTE	The remote signal (remote) switches between remote mode and local
SI [2]	mode of the system. In remote mode (SI[2] = on), when the remote
Always enabled.	conditions are satisfied, a program can be started using the peripheral
Not provided for the operator's panel.	device I/O. In local mode (SI[2] = off), when the operator's panel enable
	conditions are satisfied, a program can be started from the operator's
	panel.
	To turn the remote signal (SI[2]) on and off, set "Remote/Local setup" on
	the system config menu. For details, see Section "3.15, SYSTEM
	CONFIG MENU".
START	The start signal starts the currently selected program using the teach
SI [6]	pendant from the line to which the cursor is positioned or restarts a
Enabled in the operator's panel enable	temporarily stopped program. This signal functions at its falling edge
state.	when turned off after being turned on.

Table 3.4 (b) Operator's panel output signals

Output signal	Description
REMOTE	The remote signal is output when the remote conditions are satisfied
SO [0]	(remote conditions →Section 3.3, PERIPHERAL I/O).
Not provided for the operator's panel.	
BUSY	The busy signal is output while processing such as program execution or
SO [1]	file transfer is being performed. It is not output when a program is
Not provided for the operator's panel.	temporarily stopped.
HELD	The hold signal is output when the hold button is pressed or the HOLD
SO [2]	signal is input.
Not provided for the operator's panel.	
FAULT	The alarm (fault) signal is output when an alarm occurs in the system. The
SO [3]	alarm state is released by the FAULT_RESET input. This signal is not
	output when a warning (WARN alarm) occurs.
BATAL output	The abnormal battery (battery alarm) signal indicates a low-voltage alarm
SO [4]	for the battery in the controller or the battery of the Pulsecoder of the robot.
Not provided for the operator's panel.	While keeping the power to the controller on, replace the battery.
TPENBL output	The teach pendant enable (TP enable) signal is output when the enable
SO [7]	switch on the teach pendant is on.
Not provided for the operator's panel.	

Procedure 3-6 Displaying the operator's panel I/O

NOTE

For the operator's panel I/O, the signal numbers cannot be redefined.

Step

- 1 Press the [MENU] key to display the screen menu.
- 2 Select "5 I/O".
- 3 Press F1, [TYPE] to display the screen switching menu.
- 4 Select "SOP".

Operator's panel I/O list screen

Operator's parier i/O list screen								
I/O SOP	Out							
		#	S	TATUS			1/1	5
s] 08	0]		ON	[Remote L	ED]	
s] 08	1]		OFF	[Cycle st	art]	
s] 08	2]		OFF	[Hold]	
s] 08	3]		ON	[Fault LE	D]	
s] 08	4]		ON	[Batt ala	rm]	
s] 08	5]		OFF	[]	
s] 08	6]		OFF	[]	
s] 08	7]		ON	[TP enable	ed]	
s] 08	8]		OFF	[]	
s] 08	9]		OFF	[]	
s] 08	10]		OFF	[]	
Sorted	Sorted by port number.							
[TY	PE]			IN/OUT	ON	OFF		>

5 Press F3, "IN/OUT" to switch the display between the input and output screens.

NOTE

The input signal status can only be checked. Values cannot be changed forcibly.

3.5 I/O LINK SCREEN

The I/O link screen can be used to make settings related to FANUC I/O Unit-MODEL B and display the configuration of the I/O link units.

The I/O link screen consists of the following screens:

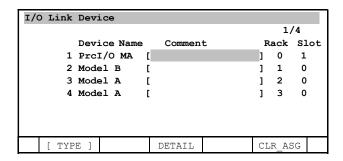
- I/O link list screen
- Model B unit list screen
- Signal count setting screen

3.5.1 I/O Link List Screen

The I/O link list screen displays a list of I/O units in slave mode that are connected to the I/O link (master mode). It also displays the rack and slot numbers of each unit.

For "I/O Unit-MODEL A/B", only the interface units are displayed. In this case, a value of "0" is displayed for the slot number.

The following figure is an example of the I/O link list screen when "process I/O board MA", one unit of "I/O Unit-MODEL B", and two units of "I/O Unit-MODEL A" are connected to the robot controller. The names of the I/O units are displayed in the order in which the units are connected to the robot controller.



To display this screen, first press MENU to display the screen menu, then select "5 I/O". Then, press F1, [TYPE] to display the screen switching menu, then select "Link Device".

The following table lists the device names displayed on the screen and the corresponding actual device names.

Word on TP	Device
PrcI/O JA	Process I/O Board JA
PrcI/O JB	Process I/O Board JB
PrcI/O KA	Process I/O Board KA
PrcI/O KB	Process I/O Board KB
PrcI/O KC	Process I/O Board KC
PrcI/O NA	Process I/O Board NA
PrcI/O MA	Process I/O Board MA
PrcI/O MB	Process I/O Board MB
Model A	I/O Unit-MODEL A
Model B	I/O Unit-MODEL B
I/O adptr	I/O link connection unit
Other	Other I/O devices except above devices

When F3, "DETAIL" is pressed, "Model B screen" or "Number of Ports Setting Screen" is displayed according to the type of the unit. When F3, DETAIL is pressed for the following units, the detail screen is displayed. When F3, "DETAIL" is pressed for other units, no screen change occurs. Each detail screen is described later.

Word on TP	Detail Screen	
Model B	Model B unit list screen	
I/O adptr	Signal count setting screen	
Other	Signal count setting screen	

On this screen, a comment can be specified for each I/O unit. Move the cursor to "Comment" and press the [ENTER] key. The screen enters comment input mode. F5, "CLR_ASG" is described later.

3.5.2 Model B Unit List Screen

The model B unit list screen displays a list of units of FANUC I/O Unit-MODEL B. FANUC I/O Unit-MODEL B does not automatically recognize the connected DI/DO units. On this screen, set the types of the DI/DO units. The address set using the DIP switch of each DI/DO unit is used as the line number on this screen. One additional unit can be connected to each DI/DO unit. This screen can also be used to specify whether to connect an additional unit and the type of additional unit.

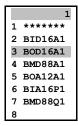
When the cursor is positioned to a "Model B" item on the I/O link list screen, press F3, "DETAIL" to display "Model B screen" as shown below:

I/O Link Device									
Model B		Rack	1 1/30						
Slot Base	Exp.	Comme	ent						
1 ******	******]						
2 *****	******]						
3 *****	******		1						
30 *****	******		1						
[TYPE]	LIS	r [CHOICE]	CLR_ASG						

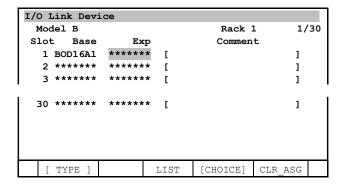
At first, nothing is set, as shown above. To use model B, set the types of the units on this screen.

When DI/DO unit "BOD16A1" is connected to the interface unit and the address is set to "1", set the unit as shown below

Position the cursor to the position shown above ("Base" column on line 1), then press F4, [CHOICE]. The options are displayed as shown below:



Select "BOD16A1" on this screen. The unit is set as shown below:



When the cursor is positioned to column "Base" and F4, [CHOICE] is pressed, a menu will be displayed. This menu contains the following items. When no unit is set, "******" is displayed. "*****" indicates that no unit is connected.

- BMD88A1
- BID16A1
- BOD16A1
- BOA12A1

When the cursor is positioned to column "Exp." and F4, [CHOICE] is pressed, a menu will be displayed. This menu contains the following items. When no unit is set, "******" is displayed. "*****" indicates that no unit is connected.

- BMD88P1
- BID16P1
- BOD16P1
- BIA16P1
- BMD88Q1

After a unit is set on this screen, the unit I/O can be used by cycling power.

When the setting of a unit is changed, processing for I/O power failures is not performed at the next power-on, even when processing for power failures is enabled.

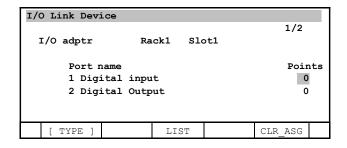
To enter a comment, press [ENTER] key with the cursor positioned to column "Comment". The comment is displayed following "PRIO-100 Model B comm fault", displayed when the DI/DO unit is disconnected from the interface unit.

When "SAVE" is selected in the menu displayed by pressing [FCTN] key on this screen, a file named DIOCFGSV.IO is saved. This file contains the contents set on the I/O link screen. It also contains the I/O assignment, comments, and other information. Such information can be saved in this file from other I/O and file screens. F5, "CLR ASG" is described later.

3.5.3 Signal Count Setting Screen

For I/O units such as the "I/O link connection unit" that cannot be used without setting the number of signals, set the number of signals on this screen.

When the cursor is positioned to "I/O adptr" on the I/O link list screen, press the F3, "DETAIL" key. Then, "Signal count setting screen" will be displayed as shown below.



Move the cursor to the number indicating the number of signals and enter a numeric value to set the number of signals.

The target I/O unit can be used by cycling power after the number of signals is set on this screen.

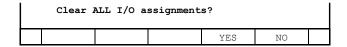
When the number of signals is changed, processing for I/O power failures is not performed at the next power-on, even when processing for power failures is enabled.

When "SAVE" is selected in the menu displayed by pressing [FCTN] key on this screen, a file named DIOCFGSV.IO is saved. This file contains the contents set on the I/O link screen. It also contains the I/O assignment, comment, and other information. Such information can be saved in this file from other I/O and file screens in the same way as normal.

Explanation of F5, "CLR ASG"

When the number of signals is set for a model-B unit or I/O unit on the I/O link screen, the I/O assignment may differ from the standard assignment according to the setting procedure. The following operation can set all I/O assignment to the standard settings. When setting the number of signals for a model-B unit or I/O unit for the first time, perform the following operation.

* When the unit is used with non-standard settings, this operation deletes the assignment information. Press F5, "CLR ASG". The following message will be displayed.



Press F4, "YES" to delete all assignment information. When cycling power, the assignment is set to the standard settings.

3.6 I/O CONNECTION FUNCTION

The I/O connection function enables the RI/DI/SI status to be output to DO/RO to report the signal input status to external devices.

The standard input/output ranges are shown below:

RI[mmm] → DO[nnn]. (1<=mmm<=8, 0<=nnn<=512)
 DI[iii] → RO[jjj]. (0<=iii<=512, 1<=jjj<=8)
 DI[kkk] → DO[lll]. (0<=kkk<=512, 0<=lll<=512)
 SI[qqq] → DO[rrr]. (0<=qqq<=15, 0<=rrr<=512)
 ES → DO[ttt]. (0<=ttt<=512)

Explanation of the function/settings

Assign signals and enable or disable each assignment on Interconnect screen in I/O menu.

The following five types of screens are available:

- DI DO connection setting screen (RI \rightarrow DO)
- DI DO connection setting screen (DI \rightarrow RO)
- DI DO connection setting screen (DI \rightarrow DO)
- DI DO connection setting screen (SI \rightarrow DO)
- DI DO connection setting screen (ES \rightarrow DO)

DI DO connection setting screen (RI \rightarrow DO)

Assign DO signal numbers to RI1 to RI8. Whether to enable or disable each assignment can also be set.

DI DO connection setting screen (DI → RO)

Assign DI signal numbers to RO1 to RO8. Whether to enable or disable each assignment can also be set.

DI DO connection setting screen (DI \rightarrow DO)

Assign a DO signal number to each DI number. Whether to enable or disable each assignment can also be set.

DI DO connection setting screen (SI \rightarrow DO)

Assign a DO signal number to SI0 to SI15. Whether to enable or disable each assignment can also be set.

DI DO connection setting screen (ES \rightarrow DO)

Assign DO signal numbers to sixteen kinds of ES (Emergency Stop) signal. Whether to enable or disable each assignment can also be set.

List of ES signals

	_		
1	[EMGOP]	SOP Emergency Stop
2	[EMGTP]	TP Emergency Stop
3	[DEADMAN]	TP Deadman release
4	[FENCE]	Fence Open
5	[ROT]	Robot Overtravel
6	[HBK]	Hand Broken
7	[EMGEX]	External Emergency Stop
8	[PPABN]	Pneumatic Pressure Abnormal (Low Air Alarm)
9	[BELTBREAK]	Belt Broken
10	[FALM]	Fan Alarm [FALM is not used nowadays]
11	[SVOFF]	SVOFF Input
12	[IMSTP]	UOP IMSTP
13	[BRKHLD]	Brake on hold
14	[USRALM]	User servo alarm
15	[SRVDSCNCT]	Servo Disconnect [SRVDSCNCT is not used nowadays]
16	[NTED]	Non Teacher Enabling Device

NOTE

- 1 Refer to the FANUC Robot series R-30*i*B/ R-30*i*B Plus CONTROLLER MAINTENANCE MANUAL (B-83195EN) or the FANUC Robot series R-30*i*B Mate/ R-30*i*B Mate Plus CONTROLLER MAINTENANCE MANUAL (B-83525EN) for more information on emergency stop signals.
- 2 USRALM indicates the occurrence of "SRVO-031 User servo alarm", not "INTP-213 UALM".

Example)

When "ENABLE DI[2] \rightarrow RO[3]" is set, the status of DI[2] is output to RO[3].

NOTE

- 1 When DI[i] → DO[j] is set and this assignment is enabled, the status of DI[i] is output to DO[j] at regular intervals. Therefore, if the contents of DO[j] are changed using the teach pendant or a program, the change is not reflected.
- 2 Whether to enable or disable each assignment can be changed only on the setting screen, described above.
- 3 When different multiple input signals are assigned to the same output signal, the status of each input signal is output. For example, assume that the following settings are made:
 - 1 ENABLE $RI[1] \rightarrow DO[1]$ 2 ENABLE $RI[2] \rightarrow DO[1]$

In this case, when the status of RI[1] is ON and the status of RI[2] is OFF, the DO[1] output will be unpredictable. (DO[1] alternately indicates ON and OFF in practice.)

Procedure 3-7 Setting the I/O connection function

Step

- 1 Press the [MENU] key to display the screen menu.
- 2 Select "5 I/O".
- 3 Press F1, [TYPE] to display the screen switching menu.
- 4 Select "Interconnect". The DI DO connection setting screen will be displayed.

DI DO connection setting screen (RI→DO)

INTERCONNE	CT					
					1/8	
No.	Enb/Disabl	L INPUT		O	UTPUT	
1	DISABLE	RI[1] ->	DO	[0]	
2	DISABLE	RI[2] ->	DO	[0]	
3	DISABLE	RI[3] ->	DO	[0]	
4	DISABLE	RI[4] ->	DO	[0]	
5	DISABLE	RI[5] ->	DO	[0]	
6	DISABLE	RI[6] ->	DO	[0]	
7	DISABLE	RI[7] ->	DO	[0]	
8	DISABLE	RI[8] ->	DO	[0]	
[TYPE]	[SELECT]	ENAB:	LE	DISABLE	

- 5 Press F3, [SELECT].
- 6 Position the cursor to the screen to be displayed and press [ENTER] key or specify the item number of the screen to be displayed using a numeric key.

DI RO connection setting screen (DI→RO)

		to comine	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,	/-	,	
INT	ERCONNE	CT					
						1/8	
	No.	Enb/Disab	l INPUT		01	UTPUT	
	1	DISABLE	DI[0] ->	RO	[1]	
	2	DISABLE	DI[0] ->	RO	[2]	
	3	DISABLE	DI[0] ->	RO	[3]	
	4	DISABLE	DI[0] ->	RO	[4]	
	5	DISABLE	DI[0] ->	RO	[5]	
	6	DISABLE	DI[0] ->	RO	[6]	
	7	DISABLE	DI[0] ->	RO	[7]	
	8	DISABLE	DI[0] ->	RO	[8]	
	[TYPE]	[SELECT]	ENAB	LE	DISABLE	

3.7 SIMULATED INPUT SKIP FUNCTION

Overview

The robot controller provides a function whereby if a wait is performed with a wait instruction on an input signal set to a simulated status, the wait is automatically canceled when a timeout is detected.

The simulated input skip function can be used with digital input signals and robot input signals. It is possible to specify whether to enable the simulated input skip function for each signal.

On the input signal list screen, a signal for which the simulated input skip function is enabled is displayed with a U/S enclosed in parentheses (), which indicates whether the signal is in a simulated status and

whether the simulated input skip function is enabled for that signal. On the screen shown in the example below, DI[1] is set up as a simulated signal and the simulated input skip function is enabled for it whereas DI[7] is not set to a simulated status but the simulated input skip function is enabled.

I/O	Digital	In						
		#	SIM	STATUS			1/512	
	DI[1]	(S)	OFF	[1	
	DI[2]	U	ON	[1	
	DI[3]	U	ON	[1	
	DI[4]	υ	OFF	[]	
	DI[5]	U	OFF	[1	
	DI[6]	U	OFF	[1	
	DI[7]	(U)	OFF	[1	
	DI[8]	U	OFF	[1	
	DI[9]	U	OFF	[1	
	DI[10]	U	OFF	[1	
	DI[11]	U	OFF	[1	
Sc	orted by	por	t num	mber.				
[TYPE]	СО	NFIG	IN/O	UT	ON	OFF	>

If the simulated input skip function is enabled, the prompt below will be displayed before the program starts. Pressing [ENTER] key causes program operation to start. This prompt will be displayed if there is at least one input signal for which the simulated input skip function is enabled.

> The Simulated Input Skip feature is enabled! WAIT instructions may time out automatically. [OK]

If a timeout occurs after a wait instruction, and the wait is automatically canceled, the warning message below will be displayed on the alarm line.

(Program, Line) WAIT will time out

The time after which a timeout is detected after a wait instruction can be set with the "Sim. Input Wait Delay" item on the system configuration menu. If this setting is changed, the change will be applied immediately.

It is possible to monitor to see if there are any input signals for which the simulated input skip function is enabled and output them as output signals. For the "Set if Sim. Skip Enabled" item on the system configuration menu, set the number of the output signal that will turn on if the simulated input skip function is enabled. To make the setting effective, turn off the power and then back on.

⚠ WARNING

Setting an input signal to a simulated status and using the simulated input skip function should only be temporary during test operation. Never do so during production line operation.

By selecting the "UNSIM ALL IO" item on the function menu, it is possible to release all signals from a simulated status.

By setting up "Set if INPUT SIMULATED" on the system configuration menu, it is possible to monitor to see if there are any input signals that are set to a simulated status and output them as output signals. For this item, set the number of the output signal that will turn on if one of digital, group, robot, and analog signals is set to a simulated status. To make the setting effective, turn off the power and then back on.

Procedure for setting up the simulated input skip function

For an input signal to be skipped if in a simulated status, enable the simulated input skip function.

- Step
- 1 Press the [MENU] key.
- 2 Select the "5 I/O" item.
- 3 Press the F1, [TYPE] key.
- 4 Select the "Digital" or "Robot".
- 5 If output signals are displayed, press F3, "IN/OUT" to switch to the input signal list screen.
- 6 Position the cursor on the signal for which the simulated input skip function is to be enabled.
- 7 Press the [NEXT] key and then the F3, "DETAIL" key.
- 8 On the input signal detail screen, position the cursor on "Skip when simulated".
- 9 Press the F4, "TRUE" key.

3.8 SETTING AUTOMATIC OPERATION

Automatic operation is the function with which the remote controller starts a program, using the peripheral I/O. The automatic operation includes the following functions:

- The robot service request (RSR) function selects and starts a program according to the robot service request signals (RSR1 to RSR8 inputs). When another program is being executed or is temporarily stopped, the selected program enters the wait state and is started once the program currently being executed terminates.
- The program number selection (PNS) function selects or examines a program, using the program number selection signals (PNS1 to PNS8 PNSTROBF) and the START signal.

 While a program is temporarily stopped or being executed, these signals are ignored.
- The automatic operation start signal (PROD_START input) starts the currently selected program from line 1. When another program is temporarily stopped or is being executed, this signal is ignored.
- The cycle stop signal (CSTOPI input) is used to terminate the program currently being executed.
 - When "FALSE" is selected for "CSTOPI for ABORT" on the system configuration menu, this signal terminates the program currently being executed once the execution is complete. It also releases programs from the wait state by RSR. (Default)
 - When "TRUE" is selected for "CSTOPI for ABORT" on the system configuration menu, this signal forcibly terminates the program currently being executed immediately. It also releases (Clear) programs from the wait state by RSR.
- The external start signal (START input) is used to start a program that is temporarily stopped.
 - When "FALSE" is selected for "START for CONTINUE only" on the system configuration menu, this signal starts the currently selected program from the current line. This signal also starts a temporarily stopped program. (Default)
 - When "TRUE" is selected for "START for CONTINUE only" on the system configuration menu, this signal starts only a temporarily stopped program. When no program is temporarily stopped, this signal is ignored.

A program can be started by entering the peripheral I/O only when the robot is in the remote state. The remote state is established when the following remote conditions are satisfied:

- The teach pendant enable switch is off.
- The remote signal (SI[2]) is on. (For how to turn the remote signal (SI[2]) on and off, see the description of "Remote/Local setup" in Section 3.15, "SYSTEM CONFIG MENU".)
- The *SFSPD signal of the peripheral I/O is set on.
- The ENBL signal of the peripheral I/O is set on.
- System variable \$RMT MASTER is set to 0 (peripheral equipment).

NOTE

The value of \$RMT_MASTER can be set to 0 (peripheral equipment), 1 (CRT/KB), 2 (host computer), or 3 (no remote equipment).

A program including a motion (group) can be started when the following ready conditions are satisfied:

- The ENBL input signal of the peripheral I/O is set on.
- The servo power is turned on (not in the alarm state).

The CMDENBL signal indicates whether the above conditions are satisfied. The CMDENBL signal is output when the following conditions are satisfied:

- The remote conditions are satisfied.
- The ready conditions are satisfied.
- The continuous operation mode is selected (the single step mode is disabled).

NOTE

If "TRUE" is specified at "START for CONTINUE only" on the system configuration screen, the START signal is effective for only a program on hold.

When the CMDENBL signal cannot be turned on, or the program cannot be started by peripheral I/O even if the CMDENBL signal is on, confirm the following items.

Item	Method to check
Check items when the CMDENBL cannot be turned on.	
- The remote conditions are satisfied.	SO[0:REMOTE] is on.
- The teach pendant enable switch is off.	SO[7:TPENBL] is off.
- The setting of Remote/Local is Remote.	SI[2:REMOTE] is on.
 The mode switch is set to AUTO mode. 	SI[8] is on, and SI[9] is on.
- UI[3:SFSPD] is on.	UI[3:SFSPD] is on.
- UI[8:ENBL] is on.	UI[8:ENBL] is on.
- \$RMT_MASTER = 0 (Peripheral equipment)	Check in the system variables screen.
- The operation enable conditions are satisfied.	
- Any alarm does not occur.	SO[3:FAULT] is off, UO[6:FAULT] is off.
- The servo power is turned on.	UO[2:SYSRDY] is on.
- The continuous operation mode is selected (the	The STEP LED on the teach pendant is off. In case that
single step mode is disabled).	the integrated PMC is enabled, INFO[1:STEP] is 0.
Check items when the program cannot be started even if	When the program is started by the peripheral I/O, if the
the CMDENBL signal is on.	alarm "SYST-011 Failed to run task" occurs, confirm the
	alarm detail code in alarm history screen.
- UI signals are enabled.	Check the setting of the system variables in the system
	variable screen.
- The PNS/RSR, PNSTROBE, PROD_START, START	Check the status of the signals in UI screen.
signals are input correctly.	Check the configuration of UI.
	In case that UI signals are displayed as "*UI", because
	the UOP signals are assigned to PMC, check the PMC
	program.
- The condition for automatic operation in the program	Check the setting in the program select screen.
select screen in setup menu are satisfied.	Example) If HOME position check is enabled, check
	whether the robot is in the home position.

Sequence of program restart by peripheral I/O

After eliminating the cause of an alarm, the program is restarted by peripheral I/O as follows.

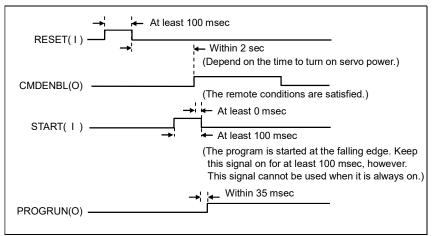


Fig. 3.8 Sequence of program restart by peripheral I/O

3.8.1 Robot Service Request (RSR)

The robot service request (RSR) starts a program from an external device. The eight robot service request signals (RSR1 to RSR8) are used for this function.

The controller uses the RSR1 to RSR8 inputs to determine whether the input RSR signal is enabled. When the signal is disabled, it is ignored.

Whether to enable or disable RSR1 to RSR8 is set in system variables \$RSR1 to \$RSR8 and can be changed on the RSR setting screen or by using the program RSR instruction.

NOTE

If the peripheral device input signal (UI) is disabled, select TRUE for "Enable UI signals" on the system configuration screen.

2 Eight RSR registration numbers can be registered for RSR. The value obtained by adding a base number to an RSR registration number is used as the program number (four digits). For example, when RSR2 is input, the following value is used as the program number:

(Program number) = (RSR2 registration number) + (base number)

The selected program is named as follows:

RSR + (program number)

NOTE

Specify the name of a program for automatic operation in "RSR" + (program number) format. Enter a 4-digit number such as RSR0121, not RSR121. If not, the robot will not operate.

The base number is set in \$SHELL_CFG.\$JOB_BASE and can be changed using "Base number" on the RSR setting screen or a program parameter instruction.

- A pulse of the RSR acknowledgment output (ACK1 to ACK8) corresponding to the RSR1 to RSR8 input is output. When the ACK1 to ACK8 signal is output, the controller accepts another RSR input.
- When a program is in the terminated state, the selected program is started. When another program is being executed or is temporarily stopped, the request (job) is entered the queue and the selected program is started when the program being executed terminates.
 - Jobs (RSR programs) are executed in the order in which they are entered the queue.

5 Waiting programs are canceled (cleared) by the cycle stop signal (CSTOPI input) or upon forced program termination.

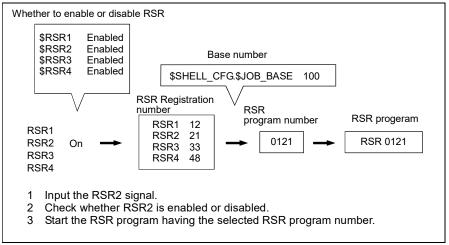


Fig. 3.8.1 (a) Robot service request

Starting a program by RSR is enabled in the remote state.

Starting a program involving operation (group) by RSR is enabled when the operation enable conditions as well as the remote conditions are satisfied.

The CMDENBL output is provided to indicate whether the above conditions are satisfied.

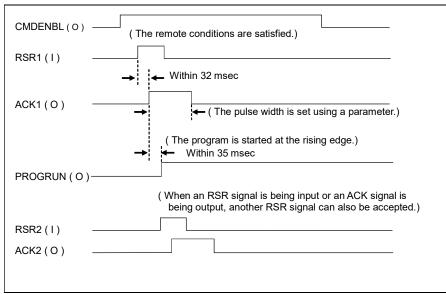


Fig. 3.8.1 (b) Sequence of automatic operation by RSR

Set RSR for SETUP RSR/PNS on the RSR setting screen.

Table 3.8.1 RSR setting items

Item	Description
RSR1 to 8 program number	Specifies whether to enable or disable RSR1 to RSR8 and the RSR registration numbers. When an RSR signal is disabled and the specified signal is input, the program is not started. Setting whether to enable or disable each RSR is stored in system variable \$RSR1 to \$RSR8.
Job prefix	Top character string of the name of the program to be started. By default, it is set to "RSR".
Base number	Added to the RSR registration number to obtain the RSR program number.
Acknowledge function	Sets whether to output RSR acknowledgment signals (ACK1 to ACK8).
Acknowledge pulse width	Sets the pulse output period (unit: msec) when the output of each RSR acknowledgment signal (ACK1 to ACK8) is enabled. (unit msec)

Procedure 3-8 Setting RSR

Step

- 1 Press the [MENU] key to display the screen menu.
- 2 Select "6 SETUP".
- 3 Press F1, [TYPE] to display the screen switching menu.
- 4 Select Prog Select. The Prog Select screen appears.
- 5 Position the cursor to "Program select mode". Press F4, [CHOICE] and select "RSR", then press F3, "DETAIL".(Prog Select Screen →3.8.4)

RSR setting screen Prog Select 1/12 RSR Setup 1 RSR1 program number [ENABLE 01 2 RSR2 program number [ENABLE 3 RSR3 program number [ENABLE 0] 1 [4 RSR4 program number [ENABLE 0] [5 RSR5 program number [ENABLE [01 6 RSR6 program number [ENABLE 7 RSR7 program number [ENABLE 0] 8 RSR8 program number [ENABLE 0] 9 Job prefix [RSR] 0] 10 Base number Γ 11 Acknowledge function [FALSE] 12 Acknowledge pulse width(msec) [400] [TYPE] ENABLE DISABLE

- 6 Position the cursor to the target item and enter a value.
- 7 After changing Program select mode, to enable the change, cycle power.



After the type of automatic operation function is changed, cycling power of the controller is required to enable the change. If not, the setting is not accepted.

3.8.2 Program Number Selection (PNS)

The remote controller uses the program number selection (PNS) function to select or collate a program. Specify a desired PNS program number with the input signals, PNS1 to PNS8.

Step

1 The controller reads the PNS1 to PNS8 input signals as a binary number by the PNSTROBE pulse input. When a program is being executed or is temporarily stopped, these signals are ignored. When the PNSTROBE pulse input is on, the selection of a program from the teach pendant is disabled.

NOTE

If the peripheral device input signal (UI) is disabled, select TRUE for "Enable UI signals" on the system configuration screen.

The data of signals PNS1 to PNS8 is converted into a decimal PNS number. The sum of the PNS number and the reference number is a PNS program number (four digits).

(Program number)=(PNS number)+(Base number)

The specified PNS+(Program number) program number is named as follows.

NOTE

Specify the name of a program for automatic operation in "PNS" + (program number) format. Enter a 4-digit number such as PNS0138, not PNS138. If not, the robot will not operate.

The base number is set in \$SHELL_CFG.\$JOB_BASE and can be changed using "Base number" on the PNS setting screen or a program parameter instruction.

When a zero is input by the PNS1 to PNS8 inputs, the following process is done depending on the UOP allocation type.

UOP allocation type is "Full":

When a zero is input by the PNS1 to PNS8 inputs, the system enters the status in which no program is selected on the teach pendant.

UOP allocation type is "Simple":

When a zero is input by the PNS1 to PNS8 inputs, or the nonexistent program number is set and PNSTROBE signal is input, nothing is done.

When START is input in this state, if no program is selected, nothing is done. If a program is selected when START signal is input, the selected program is started.

(In case that the nonexistent program number is set and PNSTROBE signal is input, or START signal is input when no program is selected, the warning is displayed.)

- 3 SNO1 to SNO8 are output to indicate a PNS number as a binary code as confirmation. An SNACK pulse is output simultaneously. If the PNS number cannot be represented as an 8-bit numeric value, SNO1 to SNO8 output a zero.
- The remote controller checks that the SNO1 to SNO8 output value is the same as the PNS1 to PNS8 input value when SNACK is output, and sends the automatic operation start input (PROD START).
- 5 The controller receives the PROD START input and starts the program.

Starting a program by PNS is enabled in the remote state.

Starting a program involving an operation (group) is enabled when the operation enable conditions as well as the remote conditions are satisfied.

The CMDENBL output is provided to indicate whether the above conditions are satisfied.

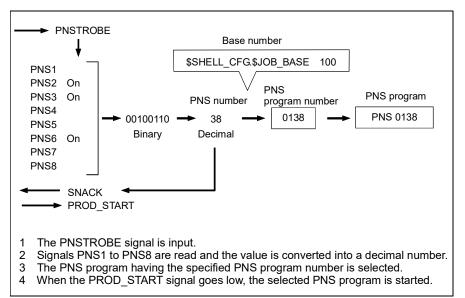


Fig. 3.8.2 (a) Program number selection

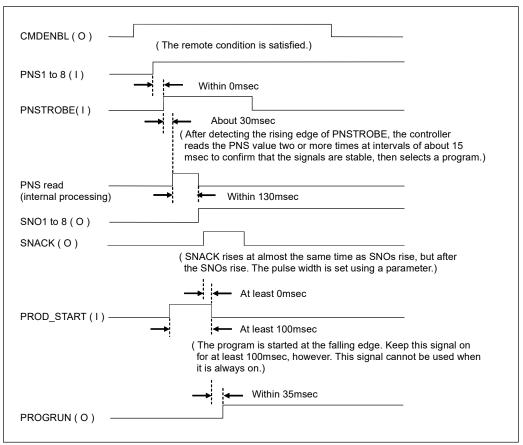


Fig. 3.8.2 (b) Sequence of automatic operation by PNS

Set the PNS function on the PNS setting screen [6 (SETUP). RSR/PNS]. Refer to Table 3.8.2.

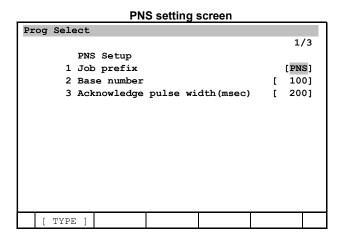
Table 3.8.2 Setting the PNS function

Items	Descriptions
Job prefix	Top character string of the name of the program selected. By default, it is set to "PNS".
Base number	The reference number is added to the PNS number to obtain a PNS program number.
Acknowledge pulse width	Sets the pulse output period (unit: msec) of the PNS acknowledgment signal
(msec)	(SNACK).

Procedure 3-9 Setting the PNS function

Step

- 1 Press the [MENU] key. The screen menu will be displayed.
- 2 Select "6 SETUP".
- 3 Press the F1, [TYPE]. The screen change menu will be displayed.
- 4 Select Prog Select. Prog Select screen will be displayed.
- 5 Position the cursor to "Program select mode". Press F4, [CHOICE] and select "PNS", then press F3, "DETAIL".(Prog Select Screen →3.8.4)



- 6 Place the cursor on a desired field and enter a value.
- 7 After changing RSR to PNS, to enable the change, cycle power of the controller.

⚠ WARNING

After the type of automatic operation function is changed, cycling power is required to enable the change. If not, the setting is not accepted.

3.8.3 STYLE

The remote controller uses STYLE function to select or collate a program. Specify a desired STYLE program number with the input signals, STYLE1 to STYLE8.

Step

- 1 STYLE function needs programs to be set to each STYLE number in advance. Then program name is not restricted as PNS and RSR. (Refer to "Procedure 3-10 Setting" the style function about setting of the program.)
- The controller reads the STYLE1 to STYLE8 input signals as a binary number. And the data of signals STYLE1 to STYLE8 is converted into a decimal STYLE number.
- From the remote controller, the start input (START or PROD_START) is sent. Then program is selected by STYLE number, and selected program is started.
- 4 SNO1 to SNO8 are output to indicate a STYLE number as a binary code as confirmation. An SNACK pulse is output simultaneously.

If the program is pausing, and the start input (Only START. PROD_START is unusable.) is sent, no program selection is made and execution is resumed.

NOTE

If the peripheral device input signal (UI) is disabled, select TRUE for "Enable UI signals" on the system configuration screen.

Starting a program by STYLE is enabled in the remote state.

Starting a program involving an operation (group) is enabled when the operation enable conditions as well as the remote conditions are satisfied.

The CMDENBL output is provided to indicate whether the above conditions are satisfied.

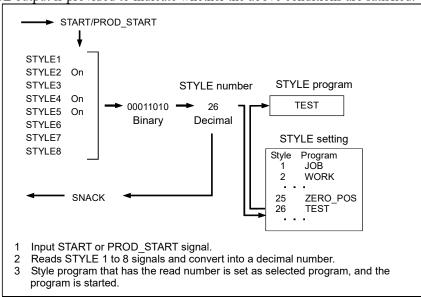


Fig. 3.8.3 (a) STYLE

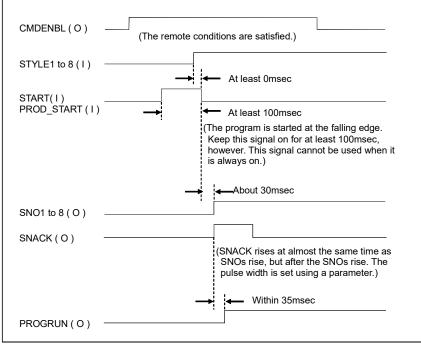


Fig. 3.8.3 (b) Sequence of automatic operation by STYLE

Set the STYLE function on the Prog Select screen [6 (SETUP). Prog Select]. Refer to Table 3.8.3.

Table 3.8.3 Setting the STYLE function

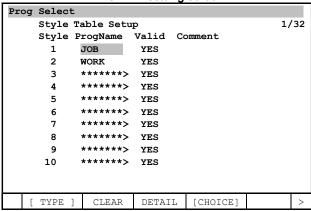
Items	Descriptions
Acknowledge function	Sets whether to output STYLE acknowledgment signals (SNO1 to SNO8 and
	SNACK). This is disabled as initial setting.
Acknowledge pulse width	Sets the pulse output period (unit: msec) of the PNS acknowledgment signal
(msec)	(SNACK).
Max number in style table	Sets the max number which is used for STYLE.

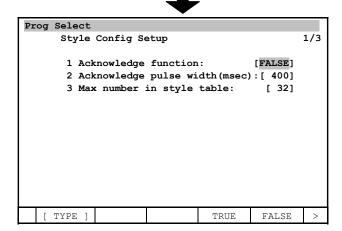
Procedure 3-10 Setting the STYLE function

Step

- 1 Press the [MENU] key. The screen menu will be displayed.
- 2 Select "6 SETUP".
- 3 Press the F1, [TYPE]. The screen change menu will be displayed.
- 4 Select "Prog Select". Prog Select screen will be displayed.
- 5 Position the cursor to "Program select mode". Press F4, [CHOICE] and select "STYLE", then press F3, "DETAIL". (Prog Select Screen →3.8.4)

STYLE setting screen





- 6 By placing the cursor on a desired field, pressing F4, [CHOICE] and selecting program, set STYLE program.
- Py pressing F3. "DETAIL" additionally, acknowledge signal can be set. (This is disabled as initial setting.)

8 After changing setting from RSR/PNS/OTHER to STYLE, to enable the change, cycle power of the controller.

⚠ WARNING

After the type of automatic operation function is changed, cycling power of the controller to enable the change. If not, the setting is not accepted.

3.8.4 Prog Select Screen

Overview

On the "Prog Select" screen, the following can be performed:

• As program selection methods, it is now possible to select, PNS, RSR, STYLE, and OTHER.

Drog coloct cores

- As program start methods, it is now possible to select UOP and OTHER.
- Various checks are performed at a program start or resumption.

	Prog select screen					
Prog Sele	Prog Select					
		1/13				
1	Program select mode:	STYLE				
2	Production start method:	UOP				
	Production checks:					
3	At home check:	ENABLE				
4	Resume position tolerance	: ENABLE				
5	Simulated I/O:	DISABLE				
6	General override < 100%:	DISABLE				
7	Prog override < 100%%:	DISABLE				
8	Machine lock:	DISABLE				
9	Single step:	DISABLE				
10	Process ready:	DISABLE				
	General controls:					
11	<pre>11 Heartbeat timing:</pre>					
12	12 Low TEMP DRAM memory:					
13	Low PERM CMOS memory:	50 KB				
[TYPE] DETAIL [CHOICE] HELP				

Program selection methods

It is now possible to select PNS, RSR, STYLE, and OTHER.

- RSR
 - See Subsection 3.8.1, "Robot Service Request (RSR)".
- PNS
 - See Subsection 3.8.2, "Program Number Selection (PNS)".
- STYLE
 - See Subsection 3.8.3, "STYLE".
- OTHER

The program specified for the system variable \$SHELL_WRK. \$CUST_NAME is selected.

A program selection is made when a program is started with the method specified by following "Automatic operation start methods", described later.

If the program is pausing, no program selection is made and execution is restarted.

Usually, do not use this function because it is for special purposes.

(The setting of the system variable \$SHELL_WRK. \$CUST_NAME is not saved in system file as backup.)

Automatic operation start methods

If the program selection method is "STYLE" or "OTHER", it is possible to select a program start method from UOP, and OTHER.

UOP

A program is started with UI[6:START] or UI[18:PROD START].

OTHER

A program is started by changing the system variable \$SHELL_WRK. \$CUST_START from FALSE to TRUE.

This method cannot be selected if the program selection method is either RSR or PNS.

Usually, do not use this function because it is for special purposes.

* If the program selection method is either STYLE or OTHER and the automatic operation start method is UOP, it is possible to select and start a program with either UI[6:START] or UI[18:PROD_START], provided that a program is terminated. In this case, the program is started at the first line.

If a program is pausing, the program can be resumed with either UI[6:START] or UI[18:PROD START]. In this case, no program selection is made.

Note that if the program selection method is either RSR or PNS, the effects of UI[6:START] and UI[18:PROD_START] are the same as those in the past.

List of program selection methods and automatic operation start methods

	List of program selection methods and automatic operation start methods				
		Automatic operation start method			
		UOP	Other		
Ф	RSR	Program selection/start : RSR1 to 8	Not available.		
on method	PNS	Program selection : PNS1 to 8, PNSTROBE Program start : UI[18:PROD_START] or UI[6:START]	Not available.		
am selection	Style	Program selection:STYLE1 to 8 Program start : UI[18:PROD_START] or UI[6:START]	Program selection:STYLE1 to 8 Program start :\$SHELL_WRK.\$CUST_START		
Program	Other	Program selection: \$SHELL_WRK.\$CUST_NAME Program start : UI[18:PROD_START] or UI[6:START]	Program selection: \$SHELL_WRK.\$CUST_NAME Program start :\$SHELL_WRK.\$CUST_START		

Automatic operation check

It is possible to specify whether to enable or disable each of the automatic operation check items on the Prog Select screen.

Check item	Explanation				
At home check	Checks to see if the robot is in its home position.				
	Home position refers to the reference position for which "Is a valid HOME" is set to ENABLE on the Reference Position Set up screen (MENU → "SETUP" → F1 [TYPE]				
	→ "Ref. Position").				
	If At home check is enabled, "Is a valid HOME" must be set to ENABLE for at least one				
	reference position of group 1.				
	REF POSN				
	Reference Position 1/13				
	Ref.Position Number: 1 1 Comment [**********]				
	1 Comment [***********] 2 Enable/Disable: DISABLE				
	3 Is a valid HOME: ENABLE				
	4 Signal definition: DO [0]				
	5 J1: 0.000 +/- 0.000				
	If "Is a valid HOME" is set to ENABLE on the Reference Position Set up screen, the "HOME IO" program will be started when the robot reaches that position. If not using				
	"HOME IO", delete all contents of the "HOME IO" program.				
	NOTE The "HOME_IO" program is configured not to accept a forced termination				
	request so that it can always be executed to the end.				
Resume position toler.	Checks to see if the robot is near the position at which the program paused.				
Simulated I/O	Suppresses a program start/resumption if I/O is simulated.				
General override < 100%	Suppresses a program start/resumption if the general override is less than 100%.				
Prog override < 100%	Suppresses a program start/resumption if \$MCR_GRP[].\$PRGOVERRIDE is less				
	than 100.				
Machine lock	Suppresses a program start/resumption if robot operation is disabled.				
Single step	Suppresses a program start/resumption in case of a single step.				
Process ready	Enables the user to check whether to make a program start/resumption depending on				
	the status of the cooling machine, cooling water, welding transformer, etc. (The				
	process ready conditions differ from one application to another). Selections are				
	displayed allowing the user to continue the program, recheck the I/O status, and stop				
	the program.				

By positioning the cursor on each item and pressing F3, "DETAIL", it is possible to make detailed settings for that check item.

For some check items, it is not possible to make some of the settings on the Detailed Setup screen.

* It is not possible to specify whether to enable or disable the Resume position toler. check item on the Prog Select screen. Specify this on the Resume tolerance check screen (MENU → "SETUP" → F1 [TYPE] → "Resume Tol.").

Automatic operation check detailed setting screen (At home check as an example)

Prog Select DETAIL	Prog Select DETAIL				
Check: At ho	1	/3			
1 Check when Check when 2 Prompt if f Post error 3 Post warnin Force condi	resume: ailure: if failur g if forc		ENABLE DISABLE DISABLE ENABLE DISABLE DISABLE		
[TYPE]		ENABLE	DISABLE		

Detailed setting	Explanation		
Check when run	Checks specified items at a program start.		
	For the Resume position toler. check, this item cannot be enabled.		
Check when resume	Checks specified items at a program resumption.		
	For the At home check, this item cannot be enabled.		
Prompt if failure	Displays a prompt message on the screen if Check when run or Check when resume is set		
	to ENABLED and the check causes a program start or resumption to be interrupted. At this		
	time, it is possible to select whether to continue or stop the program.		
	The text of the prompt message differs depending on the check item.		
Post error if failure	Generates the alarms below if Check when run or Check when resume is set to ENABLED		
	and the check causes a program start or restart to be interrupted.		
	"SYST-011 Failed to run task"		
	"SYST-079 Startup check failed"		
Post warning if forced	Effective only if Force condition is enabled. If enabled, this item displays a warning in the		
	event of Force condition.		
	The text of the warning differs depending on the check item.		
Force condition If Check when run or Check when resume is set to ENABLED, this item cause			
	item to be forcibly satisfied. This item takes precedence over all other detailed settings. For		
	the check items of At home check, Resume position toler., and Machine lock, it is not		
	possible to set Force condition to ENABLED.		
	The action performed with Force condition differs depending on the check item.		

The details of Prompt if failure, Force condition, and Post warning if forced for each check item are as follows:

- At home check

Condition	Action in the event of an error		
Prompt if failure	The prompt below appears.		
	Robot arm is not at home.		
	Jog or move robot to a home position.		
	[OK]		
Force condition			
Post warning if forced			

- Resume position toler.

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	Robot arm moved too far. ANSWERING CONTINUE WILL INITIATE MOTION. CONTINUE [STOP]
	When "CONTINUE" is selected, the program is executed with the warning "SYST-104 Resume tolerance ignored".
Force condition	
Post warning if forced	

- Simulated I/O

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	Simulated I/O ports exist (set from the I/O screens)
	CONTINUE FORCE [CANCEL]
	 When "CONTINUE" is selected, the program continues to run. If "FORCE" is selected, simulated I/O is forcibly canceled and the program is executed. When "CANCEL" is selected, the program does not start but stops.
Force condition	Simulated I/O is automatically forcibly canceled and the program runs.
Post warning if forced	Simulated I/O is automatically forcibly canceled and the program runs, and the message below appears. "SYST-084 I/O forced unsimulated"

- General override < 100%

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	General override (set from teach pendant hardkeys) is less than 100% CONTINUE FORCE [STOP]
	 When "CONTINUE" is selected, the program continues to run. When "FORCE" is selected, the program runs at an override of 100%. When "STOP" is selected, the program does not start but stops.
Force condition	The program automatically runs at an override of 100%.

- Prog override < 100%

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	Program override is less than 100%
	CONTINUE FORCE [STOP]
	 When "CONTINUE" is selected, the program continues to run. When "FORCE" is selected, the program runs by setting \$MCR_GRP[].\$PRGOVERRIDE to 100. When "STOP" is selected, the program does not start but stops.
Force condition	The program automatically runs by setting \$MCR_GRP[].\$PRGOVERRIDE to 100.
Post warning if forced	The program automatically runs by setting \$MCR_GRP[].\$PRGOVERRIDE to 100, and the message below appears. "SYST-088 Prog override forced to 100%"

- Machine lock

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	Motion is disabled
	CONTINUE [STOP]
	When "CONTINUE" is selected, the program starts with the warning below. "SYST-108 Machine lock ignored" When "STOP" is selected, the program does not start but stops.
Force condition	
Post warning if forced	

- Single step

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	Single step is enabled (set from STEP TP key)
	CONTINUE RECHECK [STOP]
	 When "CONTINUE" is selected, the program starts with the warning "SYST-109 Single step ignored". When "RECHECK" is selected, the single step check is performed again, and in case of other than a single step, the program is started. When "STOP" is selected, the program does not start but stops.
Force condition	A program start is made in the same way as when "CONTINUE" is selected and, at the same time, the single step is automatically canceled.
Post warning if forced	Single step is automatically canceled with the warning below, and the program start. "SYST-092 Single step forced off"

Process ready

Condition	Action in the event of an error
Prompt if failure	The prompt below appears.
	Application process error. Please check process peripheral equipment. CONTINUE RECHECK [STOP]
	 When "CONTINUE" is selected, the program starts with the warning "SYST-110 Process ready ignored". When "RECHECK" is selected, the process ready check is performed again, and if the conditions are met, the program is started. When "STOP" is selected, the program does not start but stops.
Force condition	
Post warning if forced	

General settings

It is possible to make general settings for program selections and starts.

- Heartbeat timing:
 - Enables the user to specify the output cycle of the heartbeat signal for cell output.
 - The heartbeat signal is an output signal that switches between ON and OFF at "n" millisecond intervals. PLC uses this signal to check that the robot is operating normally. This item specifies a heartbeat signal ON/OFF switching interval. An output signal can be allocated using the I/O cell output menu. If the timing is zero or if no input is allocated, the heartbeat signal is disabled.
- Low TEMP DRAM memory:
 - Enables the user to check the minimum temporary DRAM memory. If the memory is less than the minimum memory, a warning appears.
- Low PERM CMOS memory:
 - Enables the user to check the minimum permanent CMOS memory. If the memory is less than the minimum memory, a warning appears.

3.8.5 Cell Interface I/O

Cell interface I/O

Cell interface I/O signals are used for communication between the robot and the cell controller (PLC).

Cell interface input signals

Cell interface input signals are explained in Table 3.8.5 (a).

To configure cell interface I/O, use Procedure 3-11.

Table 3.8.5 (a) Cell interface input signals

	Table did a	
input signal	Explanation	
Tryout Mode	This signal is to be allocated if tryout mode is used.	
(Effective to the	The robot enters tryout mode under the conditions below.	
material	Signal = ON	
handling/gripper option	TP disabled	
only)	\$shell_wrk.\$isol_mode = FALSE	
	SI[REMOTE]=ON	
	If the signal is allocated and TP is disabled, it is possible to change tryout mode from the soft	
	panel.	