FANUC Series 30*i*/31*i*/32*i*/35*i*-MODEL B
FANUC Power Motion *i*-MODEL A
FANUC Series 0*i*-MODEL F

PMC Supplemental Programming Manual

Type of applied technical documents

| Name | FANUC Series 30*i*/31*i*/32*i*/35*i*-MODEL B<br>FANUC Power Motion *i*-MODEL A<br>FANUC Series 0*i*-MODEL F<br>PMC Programming Manual |
|---|---|
| Spec. No. /Ed. | B-64513EN/04 |

Summary of Change

| Group | Name/Outline | New, Add, Correct, Delete | Applied Date |
|---|---|---|---|
| Basic Function | ・ Improvement of the PMC trace function<br>・ Improvement of the window function for reading diagnoses data<br>・ Adding device names for I/O Link *i*<br>・ Expansion of sub-program of DCSPMC | Add | Aug. 2017 |
| Optional Function | | | |
| Unit | | | |
| Maintenance Parts | | | |
| Notice | | | |
| Correction | | | |
| Another | | | |

| | | | | FANUC Series 30*i*/31*i*/32*i*/35*i*-MODEL B<br>FANUC Power Motion *i*-MODEL A<br>FANUC Series 0*i*-MODEL F<br>PMC Supplemental Programming Manual | | |
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| 01 | 2017.8.3 | N.Nagashima | New registration | DRAW. NO. : B-64513EN/04-1 | | |
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# FANUC Series 30$i$/31$i$/32$i$/35$i$-MODEL B
# FANUC Power Motion $i$-MODEL A
# FANUC Series 0$i$-MODEL F
# PMC Supplemental Programming Manual

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# **1** SUMMARY

The following functions have been added.

- On the PMC function, the start trigger has been supported.
- On the window function of reading diagnosis data, the cumulative feedback has been supported.
- I/O device name "OPERATORS PANEL" has been supported for I/O Link *i*.
- The number of subprograms of DCSPMC has been expanded.

This document is a supplemental manual for the above.
Please refer to the following manual about existing functions and operations.

| Manual | Spec. |
|---|---|
| FANUC Series 30*i*/31*i*/32*i*/35*i*-MODEL B<br>FANUC Power Motion *i*-MODEL A<br>FANUC Series 0*i*-MODEL F<br>PMC Programming Manual | B-64513EN / 04 |

In this document, the following abbreviations are used.

| Name | Abbreviation |
|---|---|
| FANUC Series 30*i*/31*i*/32*i*/35*i*-MODEL B | 30*i*/31*i*/32*i*/35*i*-B |
| FANUC Power Motion *i*-MODEL A | Power Motion *i*-A |
| FANUC Series 0*i*-MODEL F | 0*i*-F |

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# 2 APPLIED SOFTWARE

The new features will be applied to the following software.

## PMC System software

| Name | Series | Edition |
|---|---|---|
| Series 30*i*/31*i*/32*i*/35*i*-MODEL B PMC | 40A5 | 28 or later |
| Power Motion *i*-MODEL A PMC (A02B-0323-H580#xxxx) | 40A7 | 01 or later |
| Series 0*i*-MODEL F PMC | 40B2 | 10 or later |
| (A02B-0339-H580#xxxx) | 40B3 | 01 or later |

## CNC System software

- Improvement of the PMC trace function
- Adding device names for I/O Link *i*
- Expansion of sub-program of DCSPMC

| Name | Series | Edition |
|---|---|---|
| Series 30*i*-MODEL B (A02B-0323-H501#xxxx) | G301, G311, G321, G331, G351 | 98 or later (plan) |
| | G303, G313, G323, G333, G353, G3L3, G3M3 | 01 or later (plan) |
| Series 31*i*-MODEL B5 (A02B-0326-H501#xxxx) | G421, G431 | 98 or later (plan) |
| | G422, G481 | 18 or later (plan) |
| | G423, G424, G433, G483, G4H3, G4N3, G4P3 | 01 or later (plan) |
| Series 31*i*-MODEL B (A02B-0327-H501#xxxx) | G401, G411 | 98 or later (plan) |
| | G402, G451 | 18 or later (plan) |
| | G403, G404, G413, G453, G4G3, G4L3, G4M3 | 01 or later (plan) |
| Series 32*i*-MODEL B (A02B-0328-H501#xxxx) | G501, G511 | 98 or later (plan) |
| | G521 | 18 or later (plan) |
| | G503, G513, G523, G5L3 | 01 or later (plan) |
| Series 0*i*-MODEL TF (A02B-0339-H501#xxxx) | D6G1 | 36 or later (plan) |
| | D6G2, D7G2 | 01 or later (plan) |
| Series 0*i*-MODEL MF (A02B-0340-H501#xxxx) | D4G1 | 36 or later (plan) |
| | D4G2, D5G2 | 01 or later (plan) |

| | | | | FANUC Series 30*i*/31*i*/32*i*/35*i*-MODEL B<br>FANUC Power Motion *i*-MODEL A<br>FANUC Series 0*i*-MODEL F<br>PMC Supplemental Programming Manual | |
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- Improvement of the window function for reading diagnoses data

| Name | Series | Edition |
|---|---|---|
| Series 30*i*-MODEL B (A02B-0323-H501#xxxx) | G303, G313, G323, G333, G353, G3L3, G3M3 | 02 or later (plan) |
| Series 31*i*-MODEL B5 (A02B-0326-H501#xxxx) | G422, G481 | 19 or later (plan) |
| | G423, G424, G433, G483, G4H3, G4N3, G4P3 | 02 or later (plan) |
| Series 31*i*-MODEL B (A02B-0327-H501#xxxx) | G402, G451 | 19 or later (plan) |
| | G403, G404, G413, G453, G4G3, G4L3, G4M3 | 02 or later (plan) |
| Series 32*i*-MODEL B (A02B-0328-H501#xxxx) | G521 | 19 or later (plan) |
| | G503, G513, G523, G5L3 | 02 or later (plan) |
| Series 0*i*-MODEL TF (A02B-0339-H501#xxxx) | D6G1 | 37 or later (plan) |
| | D6G2, D7G2 | 02 or later (plan) |
| Series 0*i*-MODEL MF (A02B-0340-H501#xxxx) | D4G1 | 37 or later (plan) |
| | D4G2, D5G2 | 02 or later (plan) |

## FANUC LADDER-III

| Name | Drawing number | Edition |
|---|---|---|
| FANUC LADDER-III | A08B-9210-J505 | 8.20 or later |
| FANUC LADDER-III (10 users) | A08B-9210-J541 | 8.20 or later |
| FANUC LADDER-III (20 users) | A08B-9210-J542 | 8.20 or later |
| FANUC LADDER-III (Site license) | A08B-9210-J543 | 8.20 or later |
| FANUC LADDER-III (Update) | A08B-9210-J544 | 8.20 or later |

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# 3 PMC SPECIFICATIONS

## 3.1 SPECIFICATIONS

### 3.1.1 Basic Specifications

*Change the table "2.1.1" as follows.*

**Table 2.1.1 (b) Basic specifications of each PMC Memory Type**

| Function | 1st to 5th PMC | | | | 0*i*-F PMC/L | DCSPMC (Note 1) |
| | PMC Memory-A | PMC Memory-B | PMC Memory-C | PMC Memory-D PMC Memory-E (Note2) | | |
|---|---|---|---|---|---|---|
| *** omitted the middle *** | | | | | | |
| • Labels (LBL) | 9,999 pieces | 9,999 pieces | 9,999 pieces | 9,999 pieces | 9,999 pieces | 9,999 pieces |
| • Subprograms (SP) | 512 pieces | 5,000 pieces | 5,000 pieces | 5,000 pieces | 512 pieces | 512 pieces or 2,000 pieces (note) |

*Add the following note.*

> **NOTE**
> To use 2,000 pieces of subprograms in DCSPMC, set 1 to the CNC parameter No.11933#2.

### 3.1.2 PMC Addresses

*Change the table "2.1.6" as follows.*

**Table 2.1.6 (c) PMC Address list (0*i*-F PMC/L, DCSPMC)**

| Signals | Symbol | 0*i*-F PMC/L | DCSPMC (Note 1) |
|---|---|---|---|
| *** omitted the middle *** | | | |
| Label | L | L1 ~ L9999 | L1 ~ L9999 |
| Subprogram | P | P1 ~ P512 | P1 ~ P512 or P1 ~ P2000 (note) |
| Step number (Step sequence) | S | (none) | (none) |

*Add the following note.*

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> **NOTE**
> To use 2,000 pieces of subprograms in DCSPMC, set 1 to the CNC parameter No.11933#2.

# 3.2 PMC SIGNAL ADDRESSES

## 3.2.1 Subprogram Number Addresses (P)

*Change the table "2.2.14" as follows.*

**Table 2.2.14 Address of Subprogram number**

| Data kind | 1st to 5th path PMC | | | | 0*i*-F PMC/L | DCSPMC |
|---|---|---|---|---|---|---|
| | PMC Memory-A | PMC Memory-B | PMC Memory-C | PMC Memory-D, E | | |
| Subprogram number | P1 to P512 | P1 to P5000 | P1 to P5000 | P1 to P5000 | P1 to P512 | P1 to P512 or P1 to P2000 |

*Add the following note.*

> **NOTE**
> To use 2,000 pieces of subprograms in DCSPMC, set 1 to the CNC parameter No.11933#2.

# 3.3 PARAMETERS FOR THE PMC SYSTEM

## 3.3.1 CNC Parameters Related to the PMCs

*Add the parameter in the "2.4.3" as follows.*

**Table 2.4.3 (a) Summary of the CNC parameters related to the PMC**

| No. | Use | Remarks |
|---|---|---|
| *** omitted the middle *** | | |
| 11933#0,#1 | I/O Link communication method | Channel 1, 2 |
| 11933#2 | Subprogram expansion of DCSPMC | |
| 11933#5 | Running/stopping of ladder program when updating | |
| *** omitted below *** | | |

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| | | #7 | #6 | #5 | #4 | #3 | #2 | #1 | #0 |
|---|---|---|---|---|---|---|---|---|---|
| 11933 | | | | SRL | | | XDP | C2T | C1T |

[Input type] Parameter input
[Data type] Bit

> **NOTE**
> Once these parameters are re-set, it is necessary to turn the power off and on again.

**#0**    **C1T**   Specifies the communication method of channel 1.
       0 : I/O Link is used.
       1 : I/O Link *i* is used.

**#1**    **C2T**   Specifies the communication method of channel 2.
       0 : I/O Link is used.
       1 : I/O Link *i* is used.

> **NOTE**
> 1   When you set the channel to "use I/O Link", set the parameter no.11910 to 11912, also.
> 2   For the series 0*i*-F and 0*i*-F PMC/L, the default value of these parameters is "1".
> 3   The parameter C2T(No.11933#1) is unavailable for 0*i*-F PMC/L.

**#2**    **XDP**   The subprogram expansion of DCSPMC:
       0 : Disable. (P1 to P512)
       1 : Enable. (P1 to P2000)

**#5**    **SRL**   When reading a ladder program in the I/O screen or by other operations:
       0 : The execution of the ladder program is stopped automatically.
       1 : The execution of the ladder program is not stopped. The ladder program is exchanged and
          running continuously after the completion of reading of the ladder program.

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# 4    LADDER LANGUAGE

## 4.1    PROGRAM CONTROL

### 4.1.1    SP (Subprogram: SUB 71)

*Change the table of (a) Parameters of "4.13.10" as follows.*

### Parameters

(a) Subprogram number

Specify the subprogram number of a subprogram to be coded following this instruction. The subprogram number must be specified in the P address form.

| 1st to 5th path PMC | | | | DCSPMC |
|---|---|---|---|---|
| **PMC Memory-A** | **PMC Memory-B** | **PMC Memory-C** | **PMC Memory-D PMC Memory-E** | |
| P1 to P512 | P1 to P5000 | P1 to P5000 | P1 to P5000 | P1 to P512 or P1 to P2000 |

*Add the following note.*

> **NOTE**
> To use 2,000 pieces of subprograms in DCSPMC, set 1 to the CNC parameter No.11933#2.

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|---|---|---|---|---|---|
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# 5 WINDOW FUNCTIONS

## 5.1 CNC INFORMATION

### 5.1.1 Reading Diagnosis Data (High-speed Response)

The specific data displayed on the diagnosis data screen can be read with high-speed response.
Supported numbers of diagnosis data are as follows. When specified other than the following numbers, 3 is returned as a Completion code.

*Change the table of "5.4.21" as follows.*

| Number | Data |
|--------|------|
| 0 | CNC internal state 1 |
| 308 | Servo motor temperature |
| 309 | Pulsecoder temperature |
| 363 | Cumulative feedback |
| 403 | Temperature of spindle motor |
| 445 | Spindle position data |
| 712 | Spindle warning state |
| 720 | Spindle diagnosis data 1          *Note2 |
| 722 | Spindle diagnosis data 2          *Note2 |
| 750 | OVC level |
| 752 | DC link voltage information |
| 761 | Effective current value |
| 1580 | Spindle duration time |
| 1581 | Spindle load max (Current) |
| 4900 | Total of current actual power consumption of all axes |

**NOTE**
1. As for a type, a unit and a range of each data, refer to "1.3 DIAGNOSIS FUNCTION" of the MAINTENANCE MANUAL and "13.1 DIAGNOSIS FUNCTION" of the OPERATION AND MAINTENANCE HANDBOOK.
2. The contents of the diagnosis numbers 720 and 722 depend on the setting of CNC parameter No.4532. For details, refer to the MAINTENANCE MANUAL and the PARAMETER MANUAL of AC spindle motor.

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## Input data structure

| | | |
|---|---|---|
| Top Address +0 | (Function code)<br>156 | |
| +2 | (Completion code)<br>-<br>(Need not to be set) | |
| +4 | (Data length L)<br>-<br>(Need not to be set) | |
| +6 | (Data number N)<br>Diagnosis number | |
| +8 | (Data attribute M)<br>Axis number | M=0: No axis<br>M=1 to n: axis number<br>M=-1: All axes |
| +10 | (Data area)<br>-<br>(Need not to be set) | |

## Completion codes

0    Diagnosis data has been read from the CNC normally.
3    The specified diagnosis data number is invalid.
4    The data specified as the data attribute is invalid because it is neither 0, -1, nor a value from 1 to n (n is the number of axes).

## Output data structure

(1)   In the case of bit, byte, word or double word type data

| | | |
|---|---|---|
| Top Address +0 | (Function code)<br>156 | |
| +2 | (Completion code)<br>?<br>(See above description) | |
| +4 | (Data length L)<br>L<br>(L = 1, 2, 4, 1 × n, 2 × n, 4 × n) | When no axis or one axis is specified<br>L=1: Bit or byte data<br>L=2: Word data<br>L=4: Double word data<br>When all axes are specified<br>L=1 × n: Bit or byte data<br>L=2 × n: Word data<br>L=4 × n: Double word data |
| +6 | (Data number N)<br>Diagnosis number<br>(Same as input data) | |
| +8 | (Data attribute M)<br>Axis number<br>(Same as input data) | |
| +10 | Diagnosis data<br><br>(1, 2, 4 bytes) | Data - dependent form |

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(2) In the case of Floating point type data

| Top Address +0 | (Function code) 156 | When no axis or one axis is specified L=6: Floating point type data When all axes are specified L=6×n: Floating point type data |
|---|---|---|
| +2 | (Completion code) ? (See above description) | |
| +4 | (Data length L) L (L = 6, 6 × n) | |
| +6 | (Data number N) Diagnosis number (Same as input data) | |
| +8 | (Data attribute M) Axis number (Same as input data) | |
| +10 | Decimal point (2 bytes) | |
| +12 | Diagnosis data | |
| +15 | (4 bytes) | |

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# 6 OPERATING THE PMC SCREEN

## 6.1 DISPLAY AND OPERATION CONDITIONS FOR SCREENS

### 6.1.1 Partial Protection Function for Ladder Program

*Add the note of "6.2.4" as follows.*

#### Setting method

On FANUC LADDER-III, you should set the edit permission password which has "#" character at the beginning of string (Up to 16 characters including "#")

(Ex.)　　　The edit permission password　　　#1425

The subprograms from P1500 to P5000 can be edited regardless of the password protection. Even if you set the display permission password, the display of subprograms from P1500 to P5000 is not protected owing to this function.

**Table 6.1.1　The protection status of each program for partial protection function**

| Program type | | Protected/not protected |
|---|---|---|
| Main programs | Level 1 | The editing functions are protected by each password. |
| | Level 2 | |
| | Level 3 | |
| Sub programs | P1 to P1499 | |
| | P1500 to P5000 | You can edit the subprograms without password. |

> **NOTE**
> 1　This function cannot be used for PMC memory A and DCSPMC.
> 2　To be effective this function in the DCSPMC, set 1 to the NC parameter 11933#2. For details, refer to "2.4.3".

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# 7 PMC DIAGNOSIS AND MAINTENANCE SCREENS ([PMC MAINTE])

## 7.1 DATA INPUT/OUTPUT ([I/O] SCREEN)

### 7.1.1 Inputting Trace Setting Data from the Memory Card or the USB Memory

*Add the caution and the note of "6.4.34" as follows.*

A trace setting data can be input from the memory card or the USB memory to a PMC. To use this function, perform the operation described below on the I/O screen.

> **NOTE**
> This operation can be performed only when the operation condition allows trace setting data input. For details, see Section 6.2.

(1) On the I/O screen, make the following settings with the query selection cursor and option selection cursor:

| Query | Setting |
|---|---|
| DEVICE | MEMORY CARD or USB MEMORY |
| FUNCTION | READ |

(2) Specify an input trace setting data by performing the following operations:
- Move the query selection cursor to FILE NO., then key in an input target file number. At this time, the FILE NAME field displays the file name corresponding to the entered file number.
- Move the query selection cursor to FILE NAME, then key in the input target file name.
- Switch the screen display to the list screen, and then select the input target file.
  For the list screen, see Subsection 7.4.3.

> **NOTE**
> If a value is set in the FILE NO. field, and a file name not corresponding to the file number is entered in the FILE NAME field when FILE NO. and FILE NAME are displayed at the same time, the value set in the FILE NO. field is erased, and the setting in the FILE NAME field becomes valid.

(3) Press the [EXEC] soft key.
Before the reading of the file is started, the following message is displayed to check if read processing may be executed:
    "READING TRACE SETTING"
    *ARE YOU SURE YOU WANT TO READ THIS FILE?
Press the [EXEC] soft key to continue the operation. Press the [CANCEL] soft key to stop the operation.

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**NOTE**

1. For the supported memory card/USB memory, see Subsection 7.4.1.
2. When the format of a specified file cannot be recognized, the read operation is terminated abnormally with the following message:
   "UNKNOWN FILE FORMAT"
3. A folder cannot be specified for an input subject.
4. When the specified name is a folder name, the following message is display by pressing the [EXEC] soft key.
   "FOLDER NAME CANNOT BE SPECIFIED"
5. In case of the USB memory, "FORFANUC" cannot be used for the first 8 characters of the file name.
6. When reading the trace setting file which has unsupported trace setting, the following message is displayed but existing settings are read correctly.
   "UNKNOWN SETTING WAS SKIPPED (LINE xx)"

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## 7.2 CNC DISPLAYING I/O DEVICES CONNECTION STATUS ([I/ODEVICE] SCREEN)

*Change "table 7.5(b)" of "7.5" as follows.*

**Table 7.5(b)   Displayed type of I/O Units (for I/O Link *i*)**

| ID | Displayed I/O Unit |
|---|---|
| 01 | OP. PANEL (CABINET) I/O B |
| 04 | MACHINE OPERATORS PANEL |
| 08 | DISPLAY FOR AUTOMOTIVE |
| 0A | I/O MODULE TYPE-2 |
| 0B | I/O FOR PWR MAGNETICS CAB |
| 0C | FRC PIF |
| 0D | FRC DIF |
| 0E | FRC MIF |
| 14 | I/O BOARD SLAVE0 |
| 15 | I/O BOARD SLAVE1 |
| 17 | TERMINAL I/O MODULE |
| 1C | OPERATORS PANEL |
| 1E | OPERATORS PANEL |
| 20 | RELOCATION DETECTION UNIT |
| 21 | MACHINE OPERATORS PANEL |
| 26 | I/O FOR OPERATOR PANEL C1 |
| 2C | FRC PIF (DCS) |
| 2D | SMALL MACHINE OP. PANEL |
| 30 | HANDY MACHINE OP. PANEL |
| 32 | SAFETY M.O.P. |
| 3F | Unit name same as name of previous group (I/O device composed of plural groups) |
| 4A | I/O Link BETA |
| 53 | OPERATORS PANEL I/F BOARD |
| 56 | R-30iB |
| 57 | R-30iB Mate |
| 6B | OPERATORS PANEL I/F BOARD |
| 77 | I/O Link AS-i CONVERTER |
| 82 | OP. PANEL CONNECTION UNIT |
| 96 | CONNECTION UNIT |
| A9 | I/O FOR CONNECTOR PANEL |
| AA | I/O FOR OPERATOR PANEL A1 |
| AB | MULTISENSOR UNIT |
| AE | I/O FOR OPERATOR PANEL A3 |
| B2 | I/O CARD |
| B8 | LASER OSCILLATOR |
| C6 | I/O FOR OP. PANEL (DCS) |
| C7 | I/O FOR OP. PANEL (DCS)_S |
| C8 | SAFETY IO UNIT |
| CA | MEASUREMENT I/F |
| D0 | I/O UNIT-MODEL A |
| D8 | I/O UNIT-MODEL B |

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| ID | Displayed I/O Unit |
|---|---|
| E0 | TERMINAL I/O MODULE(DCS) |

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# 7.3 TRACING AND DISPLAYING PMC SIGNAL STATUS

## 7.3.1 Setting of Trace Parameter ([TRACE SETING] Screen)

*Change the section of " 7.6.2" as follows.*

On the trace parameter setting screen, a sampling condition can be set. The screen consists of two pages. Use the page keys to switch between the pages.

> **NOTE**
> Even if you set a trace parameter during executing of trace, the modification of the parameter does not influence the trace execution.



**Trace parameter setting screen (first page)**

(1) SAMPLING/ MODE
Determines the sampling mode.
- TIME CYCLE: Samples at every specified cycle time.
- SIGNAL TRANSITION: Monitors the signal at a set cycle and samples when the signal makes a transition.

(2) SAMPLING/ RESOLUTION
The resolution of sampling is inputted. The default value is the minimum sampling resolution (msec), which varies depending on the CNC.
Setting range: Minimum sampling resolution to 1000 (msec)
An input value is rounded off to a multiple of the minimum sampling resolution (msec) which is closest to but not greater than the input value.

(3) SAMPLING/ TIME
This parameter is displayed when "TIME CYCLE" is set on "SAMPLING/ MODE". The execution time of trace is inputted. The value of "SAMPLING/ RESOLUTION" or the number of specified signal address changes the range of the value that is able to input. The range is displayed on the right side.

(4) SAMPLING/ FRAME

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This parameter is displayed when "SIGNAL TRANSITION" is set on SAMPLING/ MODE". The number of sampling is inputted. The value of "SAMPLING/ RESOLUTION" or the number of specified signal addresses changes the range of the value that is able to input. The range is displayed on the right side.

(5) STOP CONDITION
Determines the condition to stop the trace.
- NONE: Does not stop the tracing automatically.
- BUFFER FULL: Stops the tracing when the buffer becomes full.
- TRIGGER: Stops the tracing by trigger.

(6) STOP CONDITION/ TRIGGER/ ADDRESS
When "TRIGGER" is set on "STOP CONDITION", this parameter is enabled. Input signal address or symbol name as stop trigger.
A PMC number can be set for a trigger address by entering the PMC number at the time of address setting.
  Example: "2:R9200.1" + Input key
A setting can be made by entering "PMC number" + ":" + "address" as indicated above.

---

**NOTE**
1  For the PMC numbers, see Section 1.6.
2  If there is not ":" key on your keyboard, use ";" or "/" instead.

---

(7) STOP CONDITION/ TRIGGER/ MODE
When "TRIGGER" is set on "STOP CONDITION", this parameter is enabled. Determine the trigger mode when the trace is stopped.
- RISING EDGE: Stops the tracing automatically by rising up of the trigger signal.
- FALLING EDGE: Stops the tracing automatically by falling down of the trigger signal.
- BOTH EDGE: Stops the tracing automatically by rising up or falling down of the trigger signal.

(8) STOP CONDITION/ TRIGGER/ POSITION
When "TRIGGER" is set on "STOP CONDITION", this parameter is enabled. Input the ratio (%) of the sampling time or number which specifies the position where specified trigger condition is on. If you would like to examine the transitions of the signal before the trigger condition, you should set a big value in this parameter. If you would like to examine the transitions of the signal after the trigger condition, you should set a small value in this parameter.
Example:
  The case that sampling time is 10 seconds and trigger position is set as "10%".
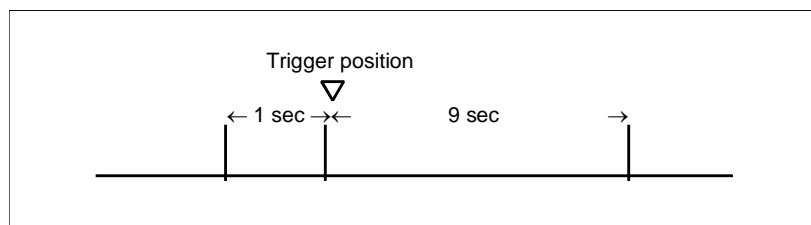


(9) SAMPLING CONDITION
When "SIGNAL TRANSITION" is set on "TRACE MODE", this parameter is enabled.
Determine the sampling condition.

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- TRIGGER: Samples the status of specified signals when the specified sampling condition is on.
- ANY CHANGE: Samples the status of specified signals when the signals change.

(10) SAMPLING CONDITION/ TRIGGER/ ADDRESS

When "SIGNAL TRANSITION" is set on "TRACE MODE", and "TRIGGER" is set on "SAMPLING CONDITION", this parameter is enabled. Input signal address or symbol name as sampling trigger.

A PMC number can be set for a trigger address by entering the PMC number at the time of address setting.

Example: "2:R9200.1" + Input key

A setting can be made by entering "PMC number" + ":" + "address" as indicated above.

> **NOTE**
> 1 For the PMC numbers, see Section 1.6.
> 2 If there is not ":" key on your keyboard, use ";" or "/" instead.

(11) SAMPLING CONDITION/ TRIGGER/ MODE

When "SIGNAL TRANSITION" is set on "TRACE MODE", and "TRIGGER" is set on "SAMPLING CONDITION", this parameter is enabled. Input trigger mode that determines the condition of specified trigger.

- RISING EDGE: Samples the status of specified signals by rising up of the trigger signal.
- FALLING EDGE: Samples the status of specified signals by falling down of the trigger signal.
- BOTH EDGE: Samples the status of specified signals by rising up or falling down of the trigger signal.
- ON: Samples the status of specified signals during the trigger signal is on.
- OFF: Samples the status of specified signals during the trigger signal is off.

(12) START TRIGGER

The start trigger of the trace is set.
- DISABLE: The trace execution starts by pressing the soft key [START].
- ENABLE : The trace execution starts by the trigger of a signal.

(13) START TRIGGER/TRIGGER/ADDRESS

Input a trigger address for starting trace execution. It can be input when the setting of "START TRIGGER" is set to "ENABLE".

A PMC number can be set for a trigger address by entering the PMC number at the time of address setting.

Example: "2:R9200.1" + Input key

A setting can be made by entering "PMC number" + ":" + "address" as indicated above.

> **NOTE**
> 1 For the PMC numbers, see Section 1.6.
> 2 If there is not ":" key on your keyboard, use ";" or "/" instead.

(14) START TRIGGER/TRIGGER/MODE

When "START TRIGGER" is set on "ENABLE", this parameter is enabled. Input the trigger mode for starting the trace execution.

- RISING EDGE: Samples the status of specified signals by rising up of the trigger signal.
- FALLING EDGE: Samples the status of specified signals by falling down of the trigger signal.
- BOTH EDGE: Samples the status of specified signals by rising up or falling down of the trigger signal.

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## Page 2 of the PARAMETER SETTING screen

You can set the addresses or symbols that should be sampled.



**Trace parameter setting screen (second page)**

(1) Setting addresses

*** *omitted* ***

(2) Soft keys
Soft keys on the setting screen of sampling address are as follows
(a) [DELETE]
Clears the value of the edit box on the cursor.
(b) [SYMBOL]/[ADDRESS]
Changes the address display to the symbol display. However, display of the address that is not defined the symbol does not change. This soft key also changes to "ADDRESS".
(c) [MOVE UP]
Exchanges the signal indicated the cursor for the signal above one line.
(d) [MOVE DOWN]
Exchanges the signal indicated the cursor for the signal below one line.
(e) [DELETE ALL]
Clears all of the value of the edit box.
(f) [READ]
Reads the trace setting file from the device displayed in the indicator window. There are two kinds of the devices i.e. "memory card" and "USB memory".

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> ⚠️ **CAUTION**
> In the CNC that has not the setting of the start trigger in the trace parameter setting screen, do not read the trace setting data in which the start trigger is set to enable. If reading the trace setting data, the signal trace may not execute. In this case, the signal trace can be executed by changing any parameter in the trace parameter setting screen manually.

> **NOTE**
> 1 When not specifying the file name, the file name of a trace setting data which can be read is "PMC_TRS.000". When specifying the file name, a trace setting data of the file name can be read.
> 2 When reading the trace setting file which has unsupported trace setting, the following message is displayed but existing settings are read correctly.
> "UNKNOWN SETTING WAS SKIPPED (LINE xx)"

    (g)  [I/O DEVICE]
        Selects input device of the trace setting file and output device of the trace result data. Pressing the soft-key switches "memory card" or "USB memory" alternately. Selected device name is displayed in the indicator window on the trace result screen and the trace setting screen.

> **NOTE**
> Selected device information is not initialized by the soft key [INIT] in the page 1 of the trace parameter setting screen. The clearing operation of PMC parameter (Power on with pressing "O" key and "Z" key) initializes the information. The Initial setting is "memory card".

(3)  Trigger setting

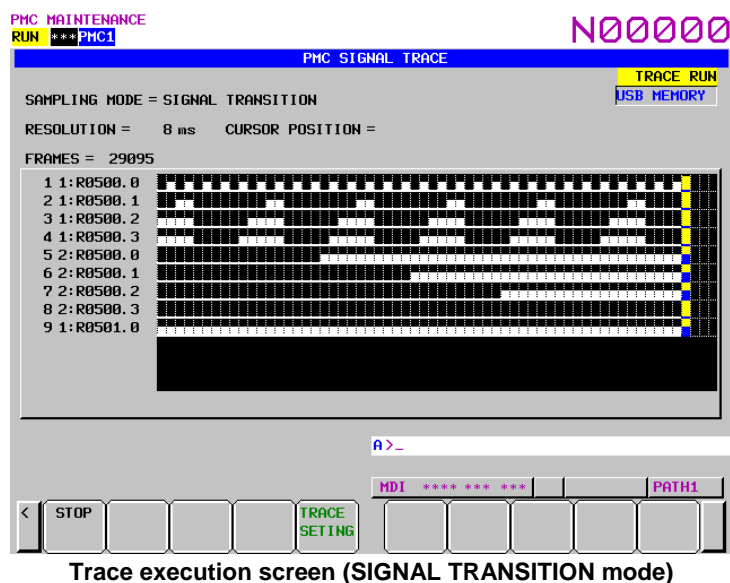*** *omitted* ***

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## 7.3.2　Execution of Trace

*Add the sub chapters in " 7.6.3" as follows.*

## 7.3.2.1　Execution of trace by manual

In case that the "START TRIGGER" is set to "DISABLE", a trace operation can be started by pressing the [(OPRT)] soft key and the [START] soft key on the SIGNAL TRACE screen. The following is the screen examples of the trace execution by "TIME CYCLE" mode and "SIGNAL TRANSITION" mode.



**Trace execution screen (TIME CYCLE mode)**



**Trace execution screen (SIGNAL TRANSITION mode)**

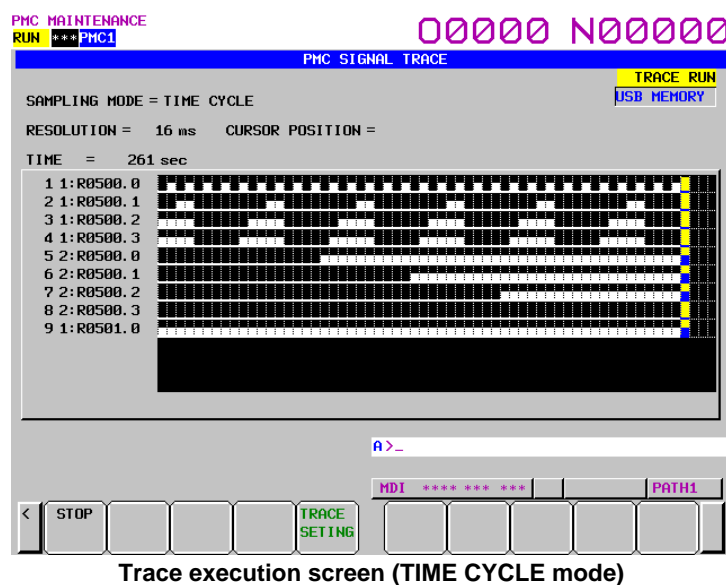The result of trace is immediately displayed during execution of the trace.

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When the stop conditions that is set in parameter setting screen is satisfied the execution is finished. Pressing the [STOP] soft key aborts the execution. In "SIGNAL TRANSITION" mode, graphic display is not refreshed until any signal for sampling trigger changes.

> **NOTE**
> When executing the trace function, the execution timing of ladder program changes. There is a possibility that update timing of signals changes compared to the execution of ladder program in which the trace function is not executed.

## 7.3.2.2    Execution of trace by trigger

By pressing the soft key "START" after setting the "START TRIGGER" set to "ENABLE", the trace screen becomes the waiting status of start trigger that detects whether the trigger condition satisfies or not.
The trace execution starts when the trigger condition that has been set in the trace parameter screen satisfies,.
The trace by the start trigger executes as follows.

### Operation procedure
Starting trace execution
 (1) If executing the trace, press the soft key [STOP].
 (2) Set the "START TRIGGER" to "ENABLE" in the trace parameter setting screen.
 (3) Set the "TRIGGER ADDRESS" and "TRIGGER MODE" in the screen.
 (4) Press the soft key [(OPRT)] in the trace screen.
 (5) Press the soft key [START].
   The status becomes the waiting of start trigger by pressing the soft key [START].
   When the trigger condition set in (3) satisfies, the trace execution starts.
 (6) When the stop condition (trigger or buffer full) satisfies during execution of trace, the status returns to the waiting of start trigger.
   When the trigger condition set in (3) satisfies, the trace execution starts again.

Stopping trace execution
 (1) Press the soft key [(OPRT)] in the trace screen.
 (2) Press the soft key [STOP] in the screen.
   When pressing the key, the trace execution stops.

> **NOTE**
> When the setting "TRACE START" is set to "AUTO" in the PMC setting screen [SETING], the trace execution does not start automatically after power-on and the status becomes the waiting of trace execution. By pressing the soft key "STOP", the status changes to the trace stop.

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## Example of trace execution by start trigger

The settings in the PMC trace parameter setting screen
:

| | | |
|---|---|---|
| STOP CONDITION | = | TRIGGER |
| TRIGGER ADDRESS | = | R1000.1 |
| MODE | = | RISING EDGE |

:

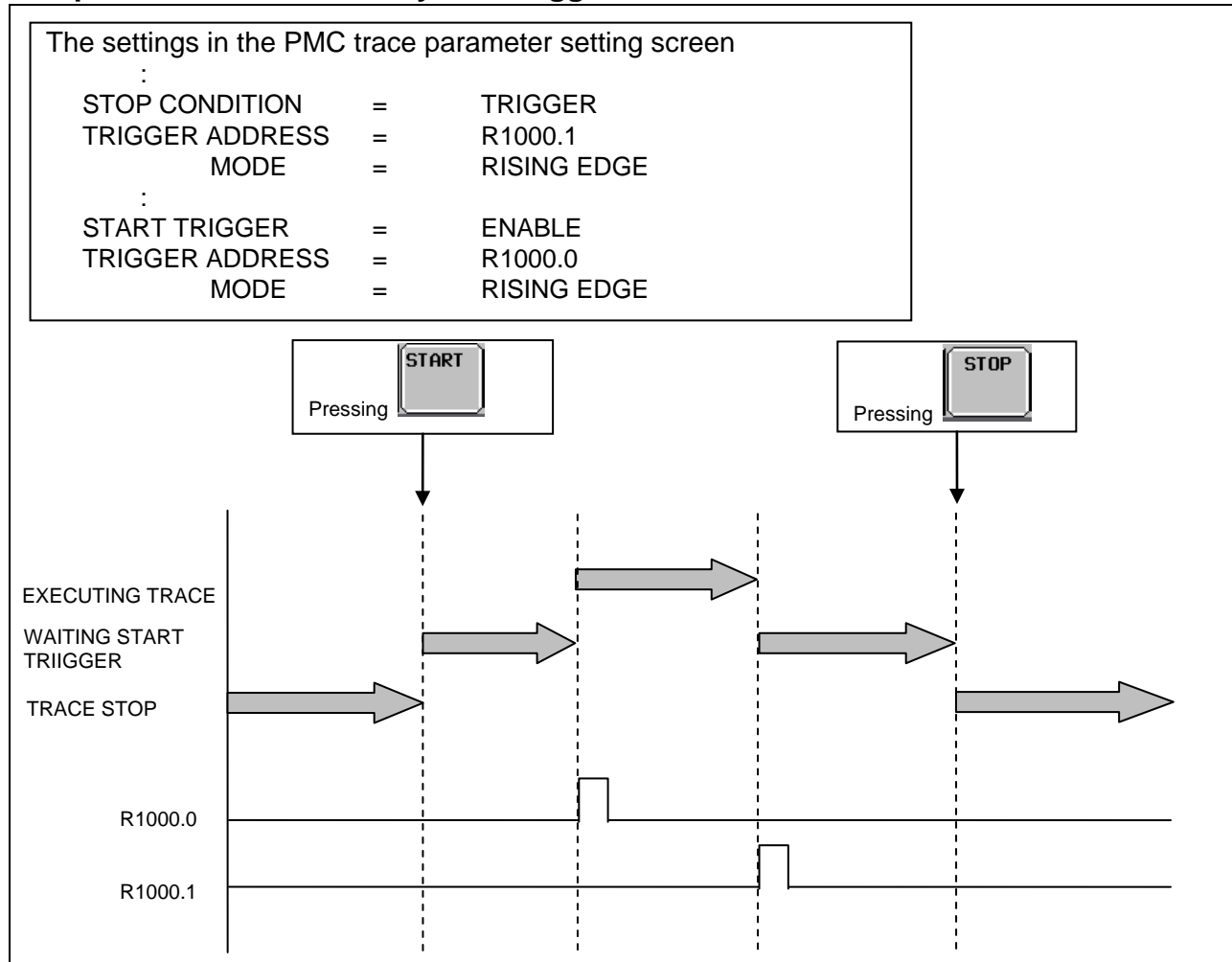| | | |
|---|---|---|
| START TRIGGER | = | ENABLE |
| TRIGGER ADDRESS | = | R1000.0 |
| MODE | = | RISING EDGE |

**Fig. 3.2.2(a) The example of trace execution by start trigger**

## Example of trace execution when automatic output of trace data is enable

When the automatic output function of trace result data is enable, the trace result data can be output serially.
The trace result data is output automatically just after the stop condition satisfies. And the status returns to the waiting of start trigger again.
As for the automatic output of trace result data, refer to the programming manual "7.6.7".

| | | | | | |
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(1) The case that Trigger mode is "RISING EDGE"

The automatic output function of trace result data is enable (K907.1 = 1)

The settings in the PMC trace parameter setting screen
:
STOP CONDITION        =        TRIGGER
TRIGGER ADDRESS       =        R1000.1
            MODE          =        RISING EDGE
:
START TRIGGER         =        ENABLE
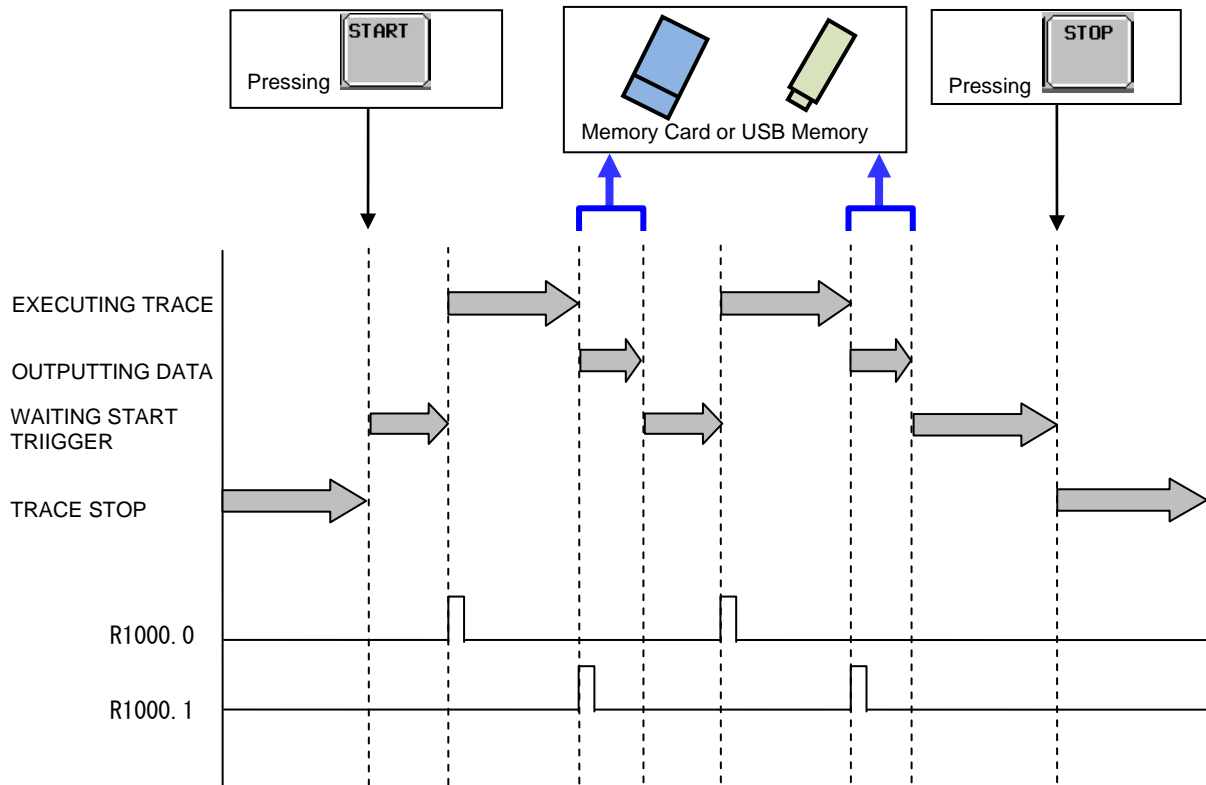TRIGGER ADDRESS       =        R1000.0
            MODE          =        RISING EDGE



**Fig. 3.2.2(b) The example of trace execution when enabling automatic output. (Trigger mode is Rising edge)**

**NOTE**
1  Even if the start trigger condition satisfies during outputting the trace result, the trace execution does not started and automatic output takes priority.
2  If pressing the soft key [CANCEL] or automatic output is failed, the status of waiting of start trigger changes to the status of trace stop.
3  When pressing the soft key [STOP] on the status of waiting of start trigger, the trace result does not output automatically.

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(2) The case that Trigger mode is "ON"

In case that the trigger mode is "ON", the trace can be executed continuously after outputting the trace data by holding the signal of the trigger address to "ON".

The automatic output function of trace result data is enable (K907.1 = 1)

The settings in the PMC trace parameter setting screen

```
        :
STOP CONDITION      =      TRIGGER
TRIGGER ADDRESS     =      R1000.1
        MODE        =      RISING EDGE
        :
START TRIGGER       =      ENABLE
TRIGGER ADDRESS     =      R1000.0
        MODE        =      ON
```
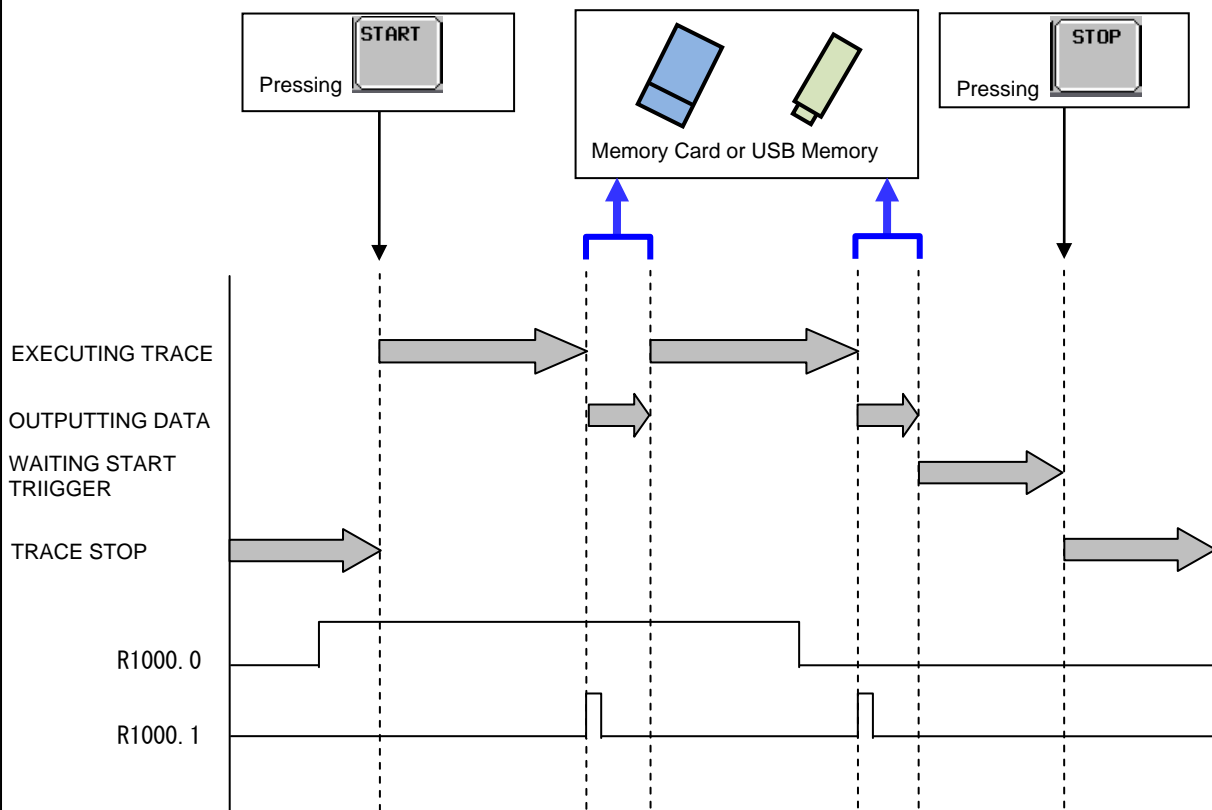


Fig. 3.2.2(c) The example of trace execution when enabling automatic output. (Trigger mode is ON)

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## 7.3.3     Automatic Start of Trace Setting

*Add the note of " 7.6.5" as follows.*

Trace execution is automatically started after power-on by setting a PMC setting data.

-      TRACE START = MANUAL/AUTO

> **NOTE**
> 1  For details of the method of setting PMC setting data, see Section 9.5.
> 2  When the setting "START TRIGGER" in the PMC trace parameter setting screen is set to "ENABLE", the trace execution does not start automatically after power-on and the status becomes the waiting of trace execution. For details, refer to "7.3.2.2".

## 7.3.4     Manual Output of Trace Data

*Change " 7.6.6" as follows.*

If trace result data is present when a trace operation has been executed, the data can be output to the memory card or the USB memory by manual operation.   Output trace result data can be input to application software such as spreadsheet software run on the personal computer.   For the method of input, refer to the relevant manual of application software.

> **NOTE**
> When 128 or more files exist in the root directory of the memory card or the USB memory, the trace result data does not output. Decrease the number of files to 127 or less.

(1)  Operation
     Press the [OUTPUT] soft key.   The soft key display changes to [EXEC] and [CANCEL].   Press the [EXEC] soft key to start output.   Upon completion of output, the soft key display returns to the initial status on the signal trace result screen.

(2)  File name
     The name of an output file is PMCTRACE.000.   If a file with the same name exists on the memory card, the extension is incremented to PMCTRACE.001, PMCTRACE.002, and so on (up to PMCTRACE.999).

(3)  Output format
     Trace result data is output in the text format.   Character string data items such as item names and setting names are enclosed in quotation marks (').
     Output data is divided into four major blocks: a header, data of the first parameter setting page, data of the second parameter setting page, and trace result data.
     (a)  Header
         At the start of data, an identifier representing the type of data and edition information are output.
         Identifier:                   ('PMC TRACE DATA')
         Edition information:    ('Edition', 1)

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(b) Data of the first parameter setting page
identifier, , ,
setting-number, setting-item-name, setting, setting-character-string
setting-number, setting-item-name, setting, setting-character-string
setting-number, setting-item-name, setting, setting-character-string
setting-number, setting-item-name, setting, setting-character-string
:
:

- identifier                Character string data
  The character string 'Setting' is output.

- setting-number          Numeric data
  The numbers (starting with 1) assigned to setting items in ascending order are output.

- setting-item-name       Character string data
  The character string of each setting item is output.

- setting                  Numeric data
  A value that is originally numeric, such as a resolution value, is directly output.   Numbers (starting with 1) are assigned from left to right to options from which a choice is to be made, such as TIME CYCLE/SIGNAL TRANSITION, and the number assigned to a selected option is output.

- setting-character-string      Character string data
  For a setting that is numeric data, its unit, if used, is output.
  For an option that is converted to a number in the item of "setting" mentioned above, the original character string data is output.   In other cases, a blank is output in this column.

**Table of data of the first parameter setting page**

| Item | Setting number | Setting item name | Setting | Setting character string |
|---|---|---|---|---|
| Sampling mode | 1 | 'Sampling mode' | 1 | 'TIME CYCLE' |
|  |  |  | 2 | 'SIGNAL TRANSITION' |
| Sampling resolution | 2 | 'Sampling resolution' | Numeric value | 'MSEC' |
| Sampling time / Sampling frame | 3 | 'Sampling time' / 'Sampling frame' | Numeric value | 'SEC' |
| Stop condition | 4 | 'Stop condition' | 1 | 'NONE' |
|  |  |  | 2 | 'BUFFER FULL' |
|  |  |  | 3 | 'TRIGGER' |
| Stop trigger address | 5 | 'Stop trigger address' | Address | Symbol |
| Stop trigger mode | 6 | 'Stop trigger mode' | 1 | 'RISING EDGE' |
|  |  |  | 2 | 'FALLING EDGE' |
|  |  |  | 3 | 'BOTH EDGE' |
| Stop position | 7 | 'Stop trigger position' | Numeric value | % |
| Sampling condition | 8 | 'Sampling condition' | 1 | 'TRIGGER' |
|  |  |  | 2 | 'ANY CHANGE' |

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| Sampling trigger address | 9 | 'Sampling trigger address' | | Address | Symbol |
|---|---|---|---|---|---|
| Sampling trigger mode | 10 | 'Sampling trigger mode' | | 1 | 'RISING EDGE' |
| | | | | 2 | 'FALLING EDGE' |
| | | | | 3 | 'BOTH EDGE' |
| | | | | 4 | 'ON' |
| | | | | 5 | 'OFF' |
| Start trigger | 11 | 'Start trigger' | | 1 | 'DISABLE' |
| | | | | 2 | 'ENABLE' |
| Start trigger address | 12 | 'Start trigger address' | | Address | Symbol |
| Start trigger mode | 13 | 'Start trigger mode' | | 1 | 'RISING EDGE' |
| | | | | 2 | 'FALLING EDGE' |
| | | | | 3 | 'BOTH EDGE' |
| | | | | 4 | 'ON' |
| | | | | 5 | 'OFF' |

---

**NOTE**

1 For an item name that changes according to the setting of another item, the item name displayed according to the setting is displayed. (Example: Sampling time/Sampling frame dependent on the selection of a Sampling mode option)

2 For a sampling stop trigger address, a sampling trigger address and a start trigger address, an address is output in the setting column, and a symbol is output in the setting character string column. When no symbol is set, an address is output in the setting character string column as well.

3 For a sampling stop trigger position (successful trigger position/sampling frame count) is output after "%". (This is because a frame position is internally held, so that an error can occur at the time of conversion to a percentage value.)

---

    (c)   Data of the second parameter setting page
        identifier-1, data-1, data-2, data-3, . . . . .
        identifier-2, data-1, data-2, data-3, . . . . .
        identifier-3, data-1, data-2, data-3, . . . . .
        identifier-4, data-1, data-2, data-3, . . . . .

- identifier    Character string data
  'Address':    Sampling address
  'Symbol':    Symbol defined for a sampling address
  'Comment':    Comment defined for a sampling address
  'Check':    Indicates whether a check is made to see if each signal is used to trigger sampling when SAMPLING CONDITION = ANY CHANGE.
- data
  'Address':    Address character string
  'Symbol':    Symbol character string
  'Comment':    Comment character string
  'Check':    With check = 1/without check = 0

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    (d)  Trace result data
identifier, sampling-address-1, sampling-address-2, . . . . .
frame-count, data-1, data-2, data-3. . . . .
:
- identifier    Character string data
  The character string 'Data' is output.
- frame-count        Numeric value
  The position where the frame count is 0 is a position where triggering is performed successfully. If triggering is unsuccessful, the frame count is 0 at the point where sampling stopped.
- data            Numeric data
  The value 0 or 1 is output.
  It is assumed that data is output until an EOF (end of file) appears.   Information such as data size is not set.

(4)  Example of trace result output (The contents of the following example is rearranged for easy understanding. The actual may be different.)

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```
'PMC TRACE DATA'
'Edition', 1

'Setting', , ,
1,'Sampling mode',              2,                  'SIGNAL TRANSITION'
2,'Sampling resolution',        8,                  'MSEC'
3,'Sampling time',              2000,
4,'Stop condition',             3,                  'TRIGGER'
5,'Stop trigger address',       'X10.0',            'SYMBOL1'
6,'Stop trigger mode',          1,                  'RISING EDGE'
7,'Stop trigger position',      50(1250/2500),      '%'
8,'Sampling condition',         1,                  'TRIGGER'
9,'Sampling trigger address',   'X10.1',            'SYMBOL2'
10,'Sampling trigger mode',     3,                  'BOTH EDGE'
11,'Start trigger',             2,                  'ENABLE'
12,'Start trigger address',     'R20.0',            'SYMBOL3'
13,'Start trigger mode',        1,                  'RISING EDGE'
'Address','R0000.0', 'R0000.1', 'R0000.2', 'R0000.3', 'R0000.4', 'R0000.5', 'R0000.6', 'R0000.7',
'R0001.0', 'R0002.0'
'Symbol', 'ZRN_M' , , , '*SPA1' , '*SPA2', 'MX-RD','RSTN', 'RSTMA', 'MO1X', 'MO2X'
'Comment', 'ZRN MODE', 'TIME CNT.AUX1(MEM)' , , , , 'READ STROBE', 'NORMAL RESET PB',
'INIT_M&RSTM (RST->MACRO)', 'OPTIONAL STOP1','OPTIONAL STOP2'
'Check', 0, 1, 1, 1, 1, 1, 0, 1, 1, 1

'Data','R0000.0', 'R0000.1', 'R0000.2', 'R0000.3', 'R0000.4', 'R0000.5',
'R0000.6', 'R0000.7', 'R0001.0', 'R0002.0'
-6, 1,0,0,0,0,0,0,0,0,0
-5, 0,0,0,0,0,1,1,1,1,1
-4, 1,1,1,1,1,0,0,0,0,0
-3, 0,1,0,1,0,1,0,1,0,1
-2, 0,0,1,1,0,0,1,1,0,0
```

Note1
Note2

---

**NOTE**
1  With the multi-PMC system, this data is output in the format: "PMC number" + ":"
   + "address".
   Example:    '2:R0000.0'
2  In case of the extended symbol mode, a program name is added in front of the
   local symbol.
   Example: '1:P1.ZRN_M'    (PMC path=1, Local symbol in P1)
3  When using the ladder dividing management function, the symbols and
   comments defined in the main ladder program are output to trace result and
   setting data.

---

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# 8 PMC ALARM MESSAGES AND ACTIONS TO TAKE

## 8.1 ALARM MESSAGE LIST

### 8.1.1 Operation Errors

*Add the error message of "12.1.3" as follows.*

## Error messages that may be displayed on the trace setting screen

| Message | Faulty location/corrective action | Contents |
|---|---|---|
| INPUT INVALID | Enter a numerical value that is within the specified data range of the relevant trace parameter. | A nonnumeric value or an out-of-range parameter value was entered. |
| SYMBOL UNDEFINED | Enter a defined symbol or bit address. | An undefined symbol character string was entered. |
| BIT ADDRESS IS REQUIRED | Specify a bit address as the stop or sampling trigger address. | A byte address was specified as the stop or sampling trigger address. |
| INVALID START TRIGGER ADDRESS | Enter a PMC signal address that can be used as the start trigger address. | The bit address entered as the start trigger address is invalid. |
| INVALID STOP TRIGGER ADDRESS | Enter a PMC signal address that can be used as the stop trigger address. | The bit address entered as the stop trigger address is invalid. |
| *** omitted below *** | | |

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