Yaskawa Customer Support

- 24-hour Telephone Number: **(937) 847-3200**
  Use for urgent or emergency needs for technical support, service and/or replacement parts
- Routine Technical Inquiries: *techsupport@motoman.com*
  Allow up to 36 hours for response

YASKAWA

DX200 OPTIONS INSTRUCTIONS

FOR INFORM LANGUAGE

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN-□□□ INSTRUCTIONS
DX200 INSTRUCTIONS
DX200 OPERATOR'S MANUAL (for each purpose)
DX200 MAINTENANCE MANUAL

Please have the following information available when contacting Yaskawa Customer Support:

- System
- Primary Application
- Software Version *(Located on Programming Pendant by selecting: {Main Menu} - {System Info} - {Version})*
  Robot Serial Number *(Located on robot data plate)*
  Robot Sales Order Number *(Located on controller data plate)*

Part Number: 165301-1CD
Revision: 2

MANUAL NO. RE-CKI-A464 ⑤

MANDATORY

- This manual explains the INFORM language of the DX200 system. Read this manual carefully and be sure to understand its contents before handling the DX200.
- General items related to safety are listed in the Chapter 1: Safety of the DX200 Instructions. To ensure correct and safe operation, carefully read the DX200 Instructions before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications. If such modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

NOTES FOR SAFE OPERATION

Read this manual carefully before installation, operation, maintenance, or inspection of the DX200.

In this manual, the Notes for Safe Operation are classified as “DANGER”, “WARNING”, “CAUTION”, “MANDATORY”, or “PROHIBITED”.

 DANGER	Indicates an imminent hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
 MANDATORY	Always be sure to follow explicitly the items listed under this heading.
 PROHIBITED	Must never be performed.

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as “DANGER”, "WARNING" and "CAUTION".

WARNING

- Before operating the manipulator, check that servo power is turned OFF when the emergency stop buttons on the front door of the DX200 and programming pendant are pressed.
  When the servo power is turned OFF, the SERVO ON LED on the programming pendant is turned OFF.

Injury or damage to machinery may result if the emergency stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the emergency stop buttons do not function.

Fig. : Emergency Stop Button

- Once the emergency stop button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn the servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Fig. : Release of Emergency Stop

- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  - Be sure to use a lockout device to the safeguarding when going inside.
    Also, display the sign that the operation is being performed inside the safeguarding and make sure no one closes the safeguarding.
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Keep in mind the emergency response measures against the manipulator's unexpected motion toward you.
  - Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  - Turning ON the DX200 power
  - Moving the manipulator with the programming pendant
  - Running the system in the check mode
  - Performing automatic operations

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an emergency stop button immediately if there is a problem. The emergency stop buttons are located on the right of the front door of the DX200 and the programming pendant.

CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately, and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the programming pendant to the hook on the DX200 cabinet after use.

The programming pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of the Warning Labels in the DX200 Instructions before operating the manipulator.

Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

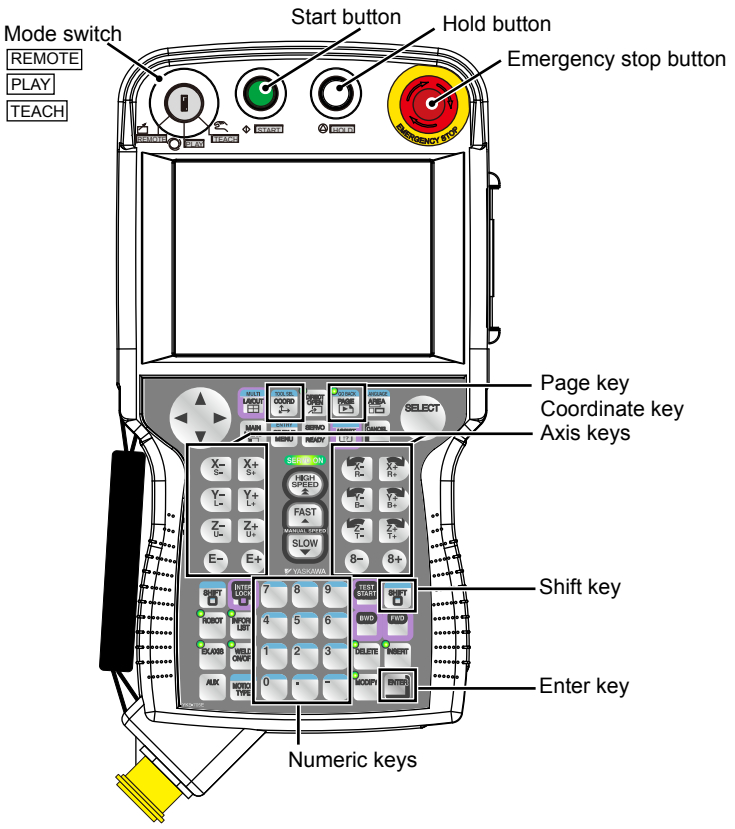
The MOTOMAN usually consists of the manipulator, the controller, the programming pendant, and manipulator cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
DX200 Controller	DX200
DX200 Programming Pendant	Programming Pendant
Cable between the manipulator and the controller	Manipulator Cable

Descriptions of the programming pendant keys, buttons, and displays are shown as follows:

Equipment		Manual Designation
Programming Pendant	Character Keys /Symbol Keys	The keys which have characters or symbols printed on them are denoted with [ ]. e.g. [ENTER]
	Axis Keys /Numeric Keys	[Axis Key] and [Numeric Key] are generic names for the keys for axis operation and number input.
	Keys pressed simultaneously	When two keys are to be pressed simultaneously, the keys are shown with a “+” sign between them, e.g. [SHIFT]+[COORD].
	Mode Switch	Mode Switch can select three kinds of modes that are denoted as follows: REMOTE, PLAY or TEACH.
	Button	The three buttons on the upper side of the programming pendant are denoted as follows: START, HOLD, or EMERGENCY STOP.
	Displays	The menu displayed in the programming pendant is denoted with { }. e.g. {JOB}



Description of the Operation Procedure

In the explanation of the operation procedure, the expression "Select • • • " means that the cursor is moved to the object item and [SELECT] is pressed.

Registered Trademark

In this manual, names of companies, corporations, or products are trademarks, registered trademarks, or brand names for each company or corporation. The indications of (R) and TM are omitted.

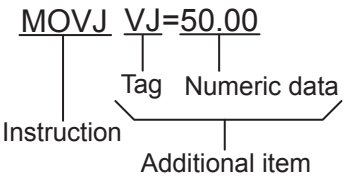
Contents

1 Outline of INFORM

1.1 About INFORM

1.1.1 INFORM III

The robot programming language used with DX200 is called INFORM III. INFORM III is composed of the instruction and the additional item (tag and numeric data).



- Instruction: It is used to execute the operation and processing. In the case of a move instruction, when a position is taught, the move instruction is automatically displayed according to the interpolation method.
- Additional item: The speed, time, etc. are set according to the type of instruction. Numeric data and character data are added to the tag that specifies the condition as necessary.

1.1.2 Type of Instruction

The instruction is divided into several types in terms of each process and operation.

Type	Content	Instruction Example
I/O Instruction	It is the instruction used to control the I/O.	DOUT, WAIT
Control Instruction	It is the instruction used to control the processing and operation.	JUMP, TIMER
Operating Instruction	It is the instruction by which the variables, etc. are used and operated.	ADD, SET
Move Instruction	It is an instruction concerning the movement and the speed.	MOVJ, REFP
Shift Instruction	It is an instruction used when a present teaching position is shifted.	SFTON, SFTOF
Instruction which adheres to instruction	It is an instruction which adheres to the instruction.	IF, UNTIL
Work Instruction	It is an instruction concerning work, such as arc welding and handling.	ARCON, WVON
Optional Instruction	It is an instruction concerning optional functions. It can only be used when the function is available.	-

1.1.3 Instruction Set

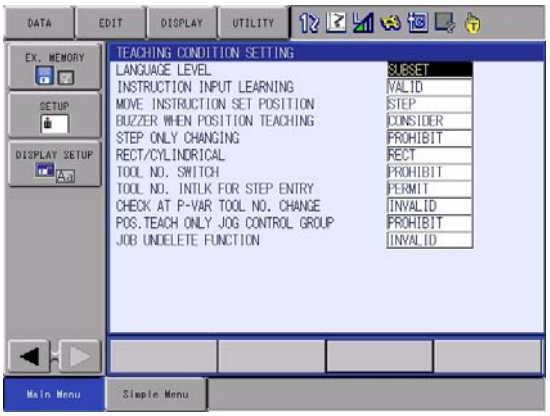
To improve operation efficiency, the number of instructions to be registered is limited. All instructions are executed, regardless of the instruction set during playback, etc.

- Subset Instruction Set
  Only high instructions which are used frequently are in the subset instruction set. The number of instructions is small, which allows for easier selecting and input.
- Standard Instruction Set / Expanded Instruction Set
  All INFORM III instructions can be registered. For these two sets, the number of additional items which can be used by each instruction is different. The following function cannot be used with a standard instruction set, but operation is easier because the number of data decreases when the instruction is registered.
  - Local Variable, Use of Array Variable
  - Use of Variable to Additional Item (Ex.: MOVJ VJ=I000)

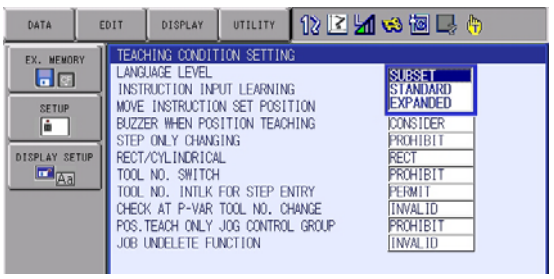
1.1.3.1 Selecting Instruction Set

Select an instruction set in the teaching condition window.

1. Select {SETUP} under the main menu
2. Select {TEACHING COND.}
   – The teaching condition setting window appears.

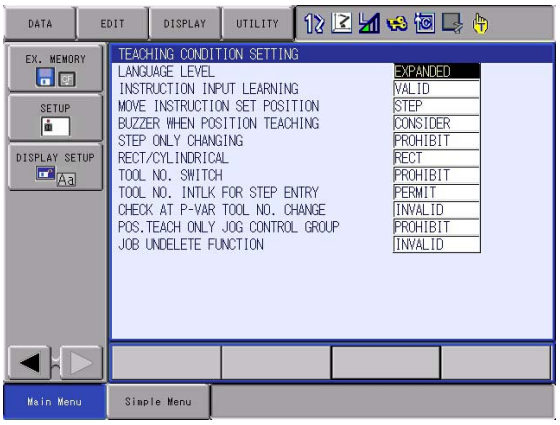


3. Select “LANGUAGE LEVEL”
   – The instruction set selection dialog box appears.



4. Select the language level (instruction set)

   – The language level is selected.



1.1.4 Variables to be Used in Instructions

Variables can be used as numeric data for the additional item of the instructions in the standard and expanded instruction sets.

Also, the instructions in the expanded instruction set can use local variables and array variables.

NOTE

- The applicable variable differs depending on the additional item.
- The number of local variables to be used must be set in the job header display. For setting the number of local variables, refer to the DX200 Operator's Manual "Editing Local Variables".

1.1.4.1 Set Value of Variable and Numeric Data

The unit of the numeric data for the additional item of the instruction decides the set value of variable and the value of the additional item at execution.

< Example >

TIMER tag (T=)

TIMER T=I000

When a variable is used for the numeric data of the TIMER tag, the unit of numeric data is 0.01 seconds.

When 1000 is set for I000, the value when the instruction is executed is 10.00 seconds.

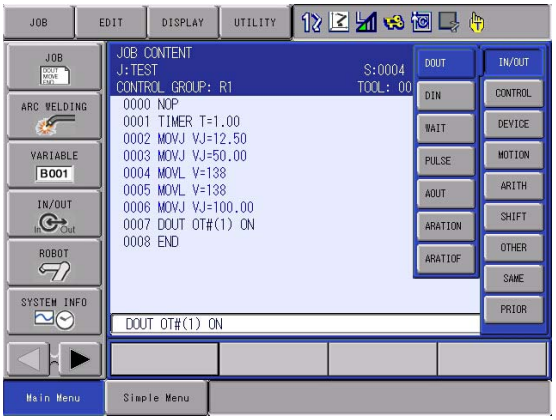
1.2 Registration of Instructions

1.2.1 Registration

Press [INFORM LIST] (INFORM LIST). while the job content window is shown to register instructions.

1. Select {JOB} under the main menu
2. Select {JOB}
   – The job content window appears.
3. Press [INFORM LIST]
   – The job instruction group list dialog box appears.

4. Select the desired instruction group
   – The job instruction group list dialog box appears.



5. Select the desired instruction
   – The instruction is displayed in the input buffer line.
6. Press [ENTER]
   – The instruction displayed in the input buffer line is registered in the job.
   Also, if the instruction must be registered during the job, press [INSERT] before pressing [ENTER].

> (SUPPLE-MENT) Refer to the Operator's Manual " Editing Instructions" for more details on editing instructions.

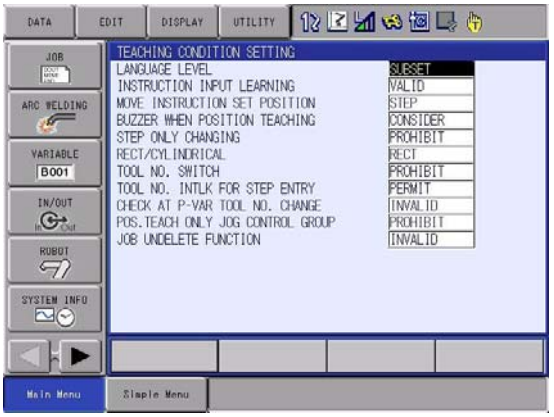
1.2.2 Learning Function

With the learning function, an instruction can be registered with the same additional items as those previously registered with the instruction.

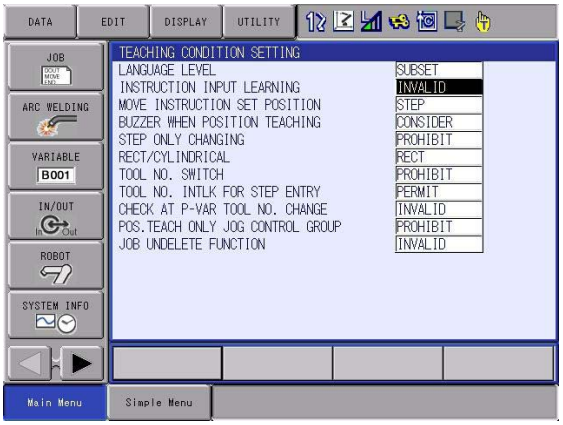
Validate the learning function to minimize the number of instruction registries.

Set the learning function to valid or invalid in the teaching condition window.

1. Select {SETUP} under the main menu
2. Select {TEACHING COND.}
   – The teaching condition setting window appears.



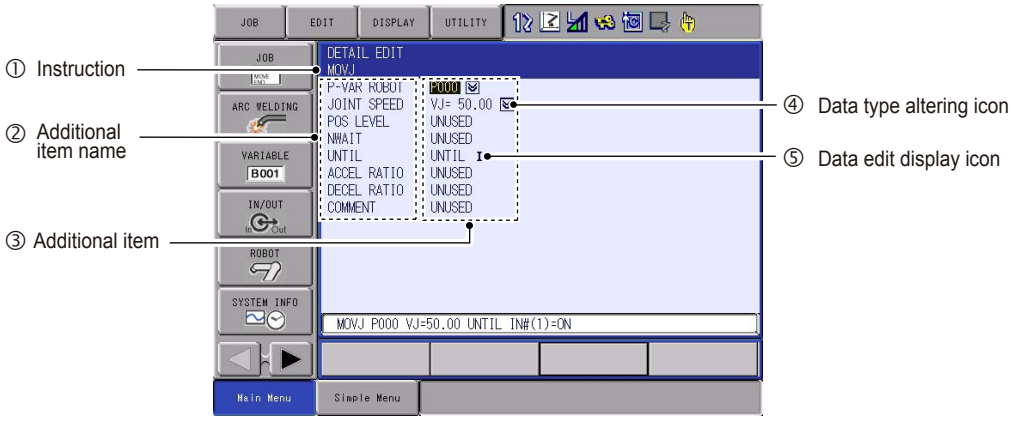
3. Move the cursor to “INSTRUCTION INPUT LEARNING”.
   – The condition “VALID” or “INVALID” is switched each time [SELECT] is pressed.



1.3 Detail Edit Window

All instructions have a detail edit window.

The detail edit window is used for adding, modifying, and deleting additional items in the instruction.



①Instructions

Indicates the instruction.

②Additional Item Name

Indicates the name of the additional item (type).

③Additional Item

Indicates the additional item.

The tag selection dialog box appears when the cursor is on the additional item and [SELECT] is pressed.

When “NOT USED” is selected, the tag is omitted (if it can be omitted).

④Data Type Altering Icon

Alters the type of numeric data.

For example, if the 50.00 of VJ=50.00 (constant type) is changed to I000 (integer-type variable), it becomes VJ=I000.

⑤Detail Edit Display Icon

Indicates the detail edit display is shown.

1.4 Registration of Expression

1.4.1 Expression

With INFORM III, an expression can be added to the SET instruction.

< Example >

SET B000 (B001 + B002) / B003 - (B004 + B005) * B006

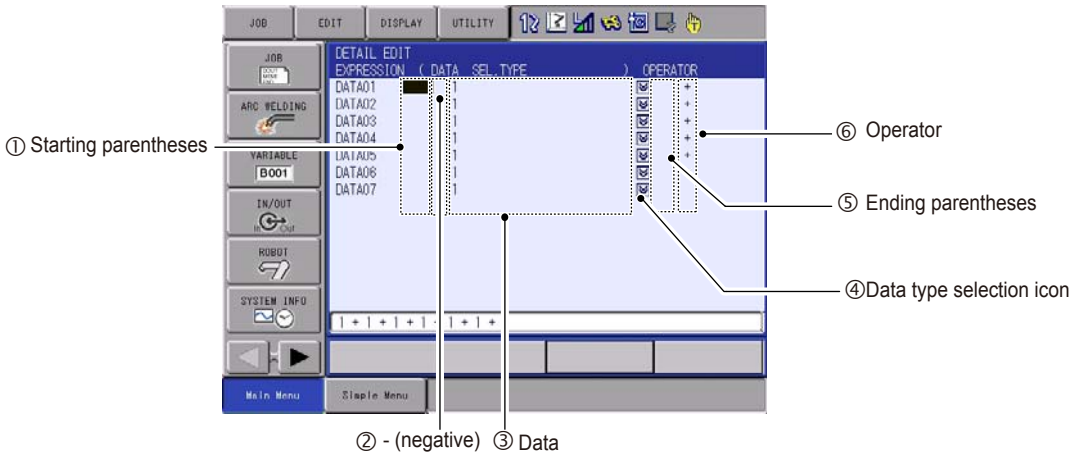
Result stored destination — Expression

Register an expression in the DETAIL EDIT window.

SUPPLE -MENT

Expressions can be registered only when “STANDARD” or “EXPANDED” has been selected for the language level (instruction set).

The DETAIL EDIT window for expression is shown below.



①Starting parentheses

Move the cursor to the parentheses, and press [SELECT]. Each time [SELECT] is pressed, three types of parentheses show up in the following order.

(→ ((→ (((→ –(→ –((→ –(((

②- (negative)

Move the cursor to the desired position, and press [SELECT]. Each time [SELECT] is pressed, the negative is alternately added and omitted and vice versa.

③Data

The data type of the expression is indicated. The following types of data can be registered.

- Constant (byte type, integer type, double-precision type, and real-number type)
- Byte type variable (B, B[], LB, and LB[])
- Integer type variable (I, I[], LI, and LI[])
- Double-precision type variable (D, D[], LD, and LD[])
- Real-number type variable (R, R[], LR, and LR[])

Move the cursor to the desired position, and press [SELECT] to enter the numeric value input status. Change the numeric value of the constant data and the variable number.
Change the data type by using the mData type selection icon.

④Data type selection icon

Change the data type in the following manner.
Move the cursor to the data type to be changed, and press [SELECT]. A dialog box with the selectable data types is displayed. Move the cursor to the data type to be selected and press [SELECT].

⑤Ending parentheses

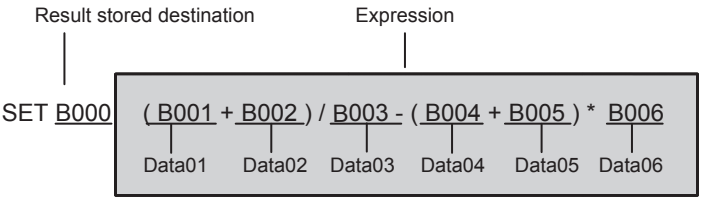
Move the cursor to the parentheses and press [SELECT]. Each time [SELECT] is pressed, three types of parentheses show up in the following order.

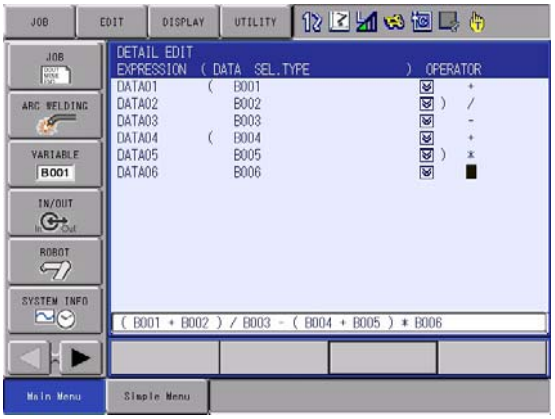
) →)) →)))

⑥Operator

Move the cursor to the operator to be changed and press [SELECT]. The operator selection dialog box is displayed. Move the cursor to the operator to be selected and press [SELECT].

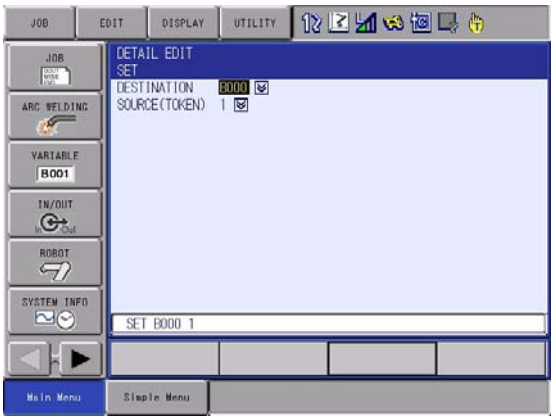
< Example of the DETAIL EDIT display for expression >



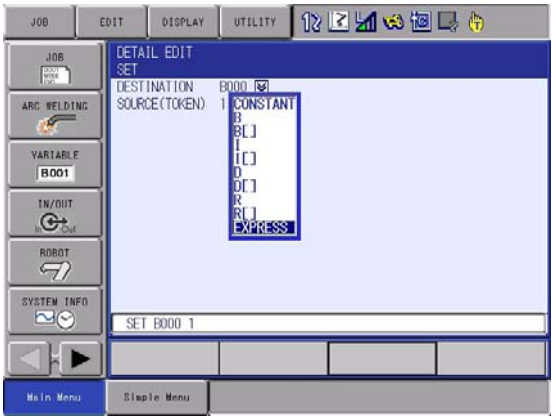


1.4.2 Registration

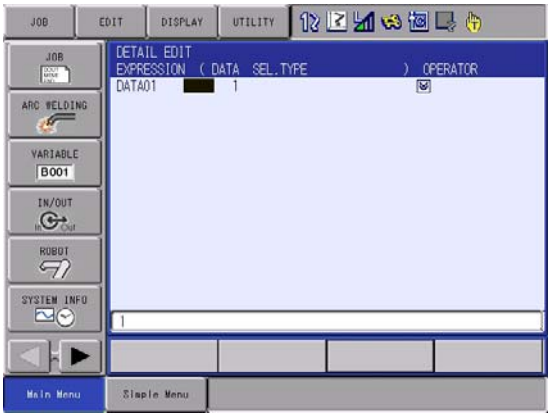
1. Select {JOB} under the main menu
2. Select {JOB}
3. Press [INFORM LIST]
4. Select “ARITH”
5. Select “SET”
6. Press [SELECT]
   – The DETAIL EDIT window for the SET instruction appears.



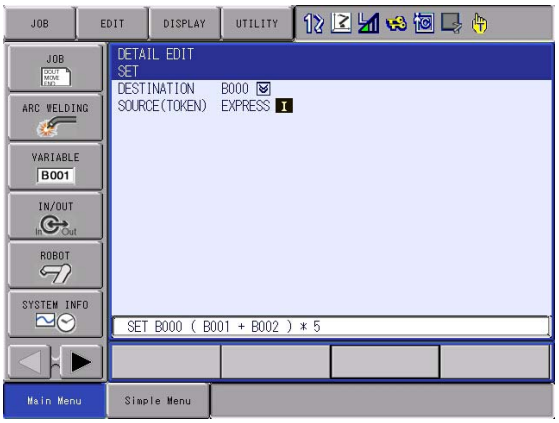
7. Move the cursor to the button  beside “SOURCE(TOKEN)”
   – The selection dialog box appears.



8. Select “EXPRESS”
   – The DETAIL EDIT window for expression appears.



9. Enter the expression and press [ENTER]
   – The DETAIL EDIT window for the SET instruction appears.



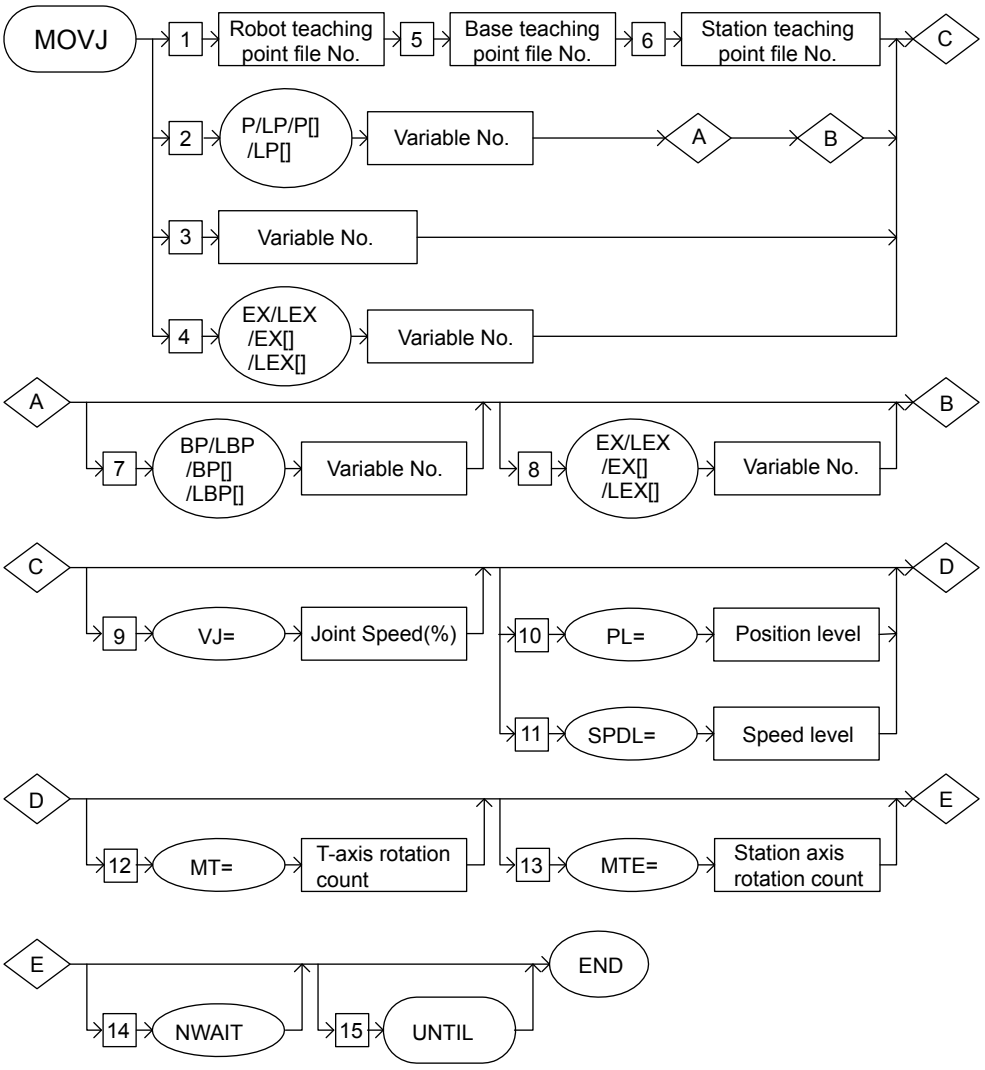
10. Press [ENTER]
    – The JOB CONTENT window appears.
11. Press [ENTER]
    – The SET instruction indicated in the input buffer line is registered.

1.5 INFORM Structure

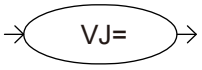
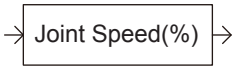
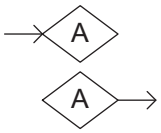
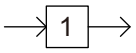
An example of the INFORM structure is shown in the following structure flowchart.

The INFORM structure chart is composed of the structure elements (instruction, tag, and data). The order of the rows is shown with the numbers and arrows.

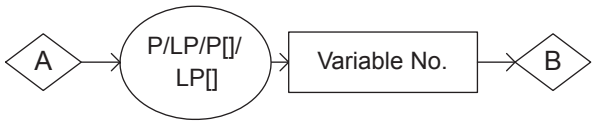
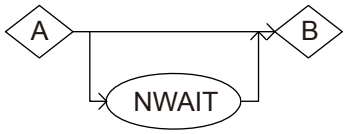
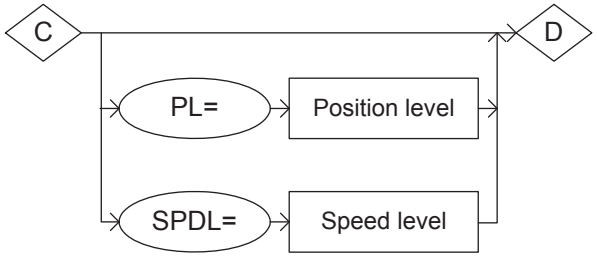
1.5.0.1 Example of Structure



1.5.0.2 INFORM Structure Elements

INFORM Structure Element	Explanation	Note
	Indicates the instruction.	In this example, the “MOVJ" instruction is indicated.
	Indicates the tag.	In this example, the "VJ=" instruction is indicated.
	Indicates the numeric data.	In this example, "Joint speed" is set with the unit %.
	Indicates the end of the instruction.	
	Indicates the connection.	
	Indicates the tag order.	

1.5.0.3 Meaning of INFORM Structure

INFORM Structure	Meaning
	This is an indispensable tag. In this example, it is necessary to add a tag from [P Variable /LP Variable /P Array /LP Array].
	This is a tag that can be omitted. In this example, the NWAIT tag can be omitted.
	This is a tag that can be selected. In this example, either PL= tag or SPDL= tag can be selected.

1.5.0.4 Explanation Table

The explanation table in this manual can be described as follows.

No	Tag	Explanation	Note
1	OT # (Output number)	Specifies the output number signal.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.

- NO.
  Indicates the tag number. Corresponds to the number in the INFORM structure.

- Tag
  Indicates the surface description of the tag.

- Explanation
  Provides an explanation of the tag.

1.6 The Structured Language

The structured language of which basic structure such as sequential execution, selection execution and repetition execution is added as INFORM command in order to make simplified to write and read the program regarding the job edit.

All these executions are classified the control instruction. As for a format of the each instruction, refer to Chap2.2.

1.6.1 The Type of the Structured Language

1. Selection Processing
   SWITH to CASE to DEFAILT to ENDSWITCH
2. Repetition Processing
   WHILE to ENDWHILE
   FOR to NEXT
3. Sequential Processing
   IFTHEN to ELSIF to ELSE to ENDIF

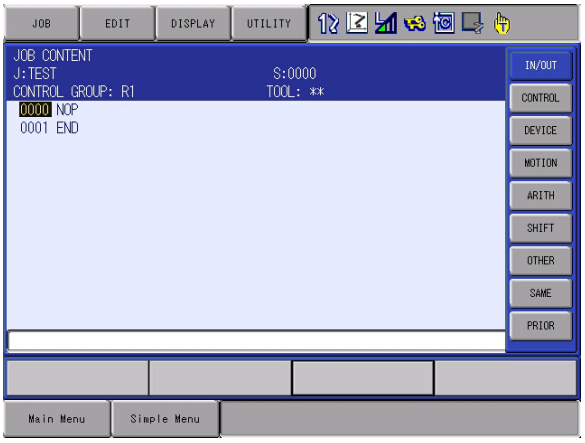
NOTE

- When use the structured language, the total number of the job lines to be added in the job will be decreased.
- The following instructions can be registered with a space of a specified structured language.
  • ELSIF,ELSE · · · a space between IFTHEN and ENDIF
  • CASE, DEFAULT · · · a space between SWITCH and ENDSWITCH
- If the contents of the structured language are edited, the unedited lines of the instruction will be changed in some cases.
  Refer to *chapter 1.6.2 "Register, Edit and Delete of the Structured Language"* for more details.
- If save the job into the external device, the format appears different from the job content window in some cases.
  Refer to *chapter 1.6.4 "Changes in the Format when Save the data to the External Device"* for more details.

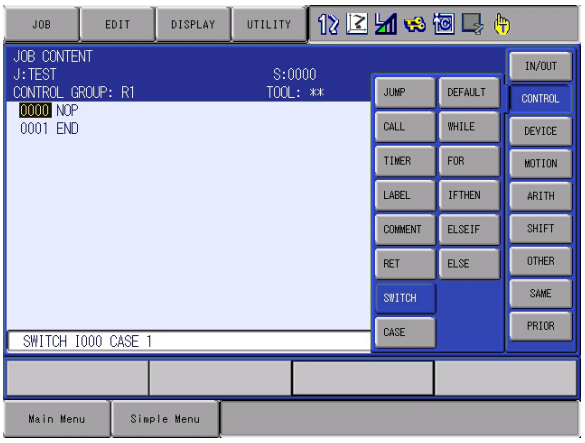
1.6.2 Register, Edit and Delete of the Structured Language

New Registration

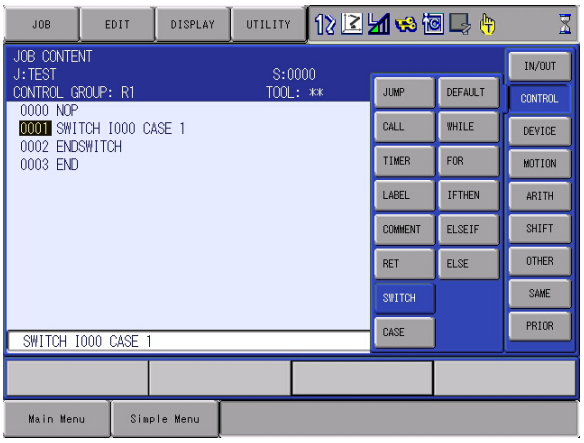
1. Display the instruction group list in the JOB CONTENT window.



2. Select {CONTROL} in the instruction group.
   – The structured language appears in the instruction list.



3. Select the desired structured language, and press {ENTER}.
   – The displayed instruction in the input buffer line is registered into the job.



Structured Language	The motion when register the instruction
SWITCH	ENDSWITCH is also registered at the same time.
CASE	Cannot be registered in the following cases. · NOT a space between SWITCH and ENDSWITCH · DEFAULT instruction is located prior to the adding position in a some point of between SWITCH and ENDSWITCH.
DEFAULT	Cannot be registered in the following cases. · NOT a space between SWITCH and ENDSWITCH · CASE instruction is located behind from the adding position in some point of between SWITCH and ENDSWITCH.
ENDSWITCH	This instruction is not displayed in the instruction list.
WHILE	ENDWHILE is also registered at the same time.
ENDWHILE	This instruction is not displayed in the instruction list.
FOR	NEXT is also registered at the same time.
NEXT	This instruction is not displayed in the instruction list.
IFTHEN	ENDIF is also registered at the same time.
ELSEIF	Cannot be registered in the following cases. · NOT a space between IFTHEN and ENDIF. · ELSE instruction is located prior to the adding position in a some point of between IFTHEN and ENDIF.
ELSE	Cannot be registered in the following cases. · NOT a space between IFTHEN and ENDIF. · ELSEIF instruction is located behind from the adding position in a some point of between IFTHEN and ENDIF.
ENDIF	This instruction is not displayed in the instruction list.

Edit the registered instruction

Similar to the other instructions, it is able to edit the contents by selecting the registered instruction.

However, cannot edit the instruction without edit element. Also, as for the instruction from FOR to NEXT, the edited contents are reflected to the another unedited instruction.

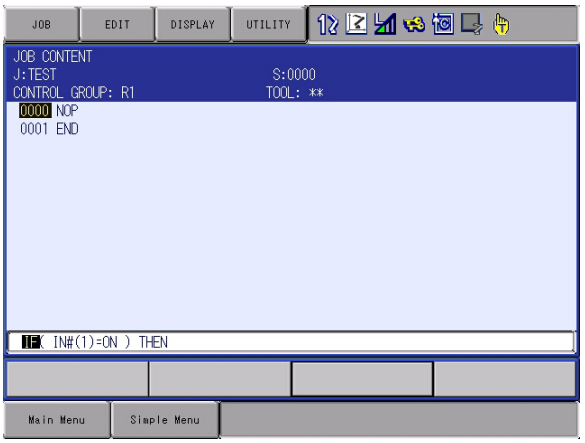
Structured Language	The motion when register the instruction
SWITCH	The edited contents are reflected.
CASE	The edited contents are reflected.
DEFAULT	Cannot edit the contents of this instruction.
ENDSWITCH	Cannot edit the contents of this instruction.
WHILE	The edited contents are reflected.
ENDWHILE	Cannot edit the contents of this instruction.
FOR	The contents of the I variable of the NEXT instruction making a pair are reflected at the same time.
NEXT	The contents of the I variable of the FOR instruction making a pair are reflected at the same time
IFTHEN	The edited contents are reflected.
ELSEIF	The edited contents are reflected.
ELSE	Cannot edit the contents of this instruction.
ENDIF	Cannot edit the contents of this instruction.

Edit a Conditional Judgement Statement

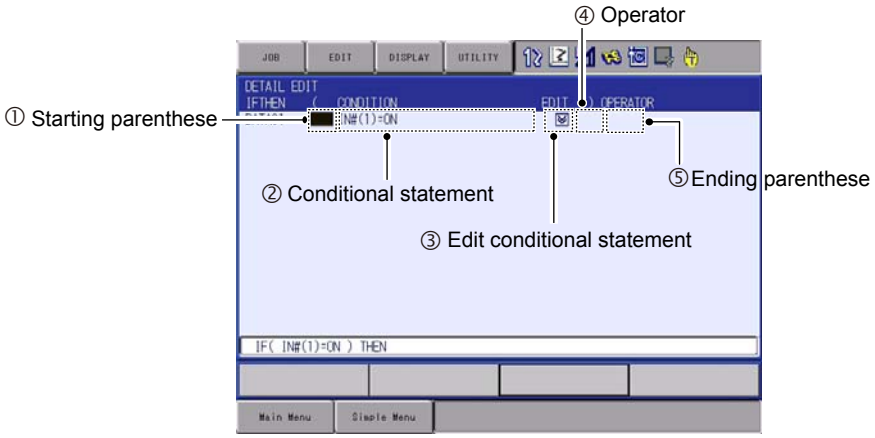
The instruction, such as IFTHEN, ELSEIF and WHILE can be added the conditional judgement statement.

Able to add the multiple conditional judgment statement, and also able to set the OR, AND or judgment order of the statement.

1. Select the one of the instructions from IFTHEN, ELSEIF or WHILE in the JOB CONTENT window.
   – The selected instruction appears.



2. Press {SELECT} key, while the cursor of the input buffer is in the selected instruction.
   – The DETAIL EDIT window of the conditional judgment statement appears.



①Starting parentheses, ending parentheses → Set the parentheses to set the priority of the judgement.

NOTE

If the set parentheses do not affect the priority of the judgment, the set parentheses will be deleted.

e.g.1 Set as “IF((IN#(1)=ON AND B000=0) AND I000=0) THEN”.

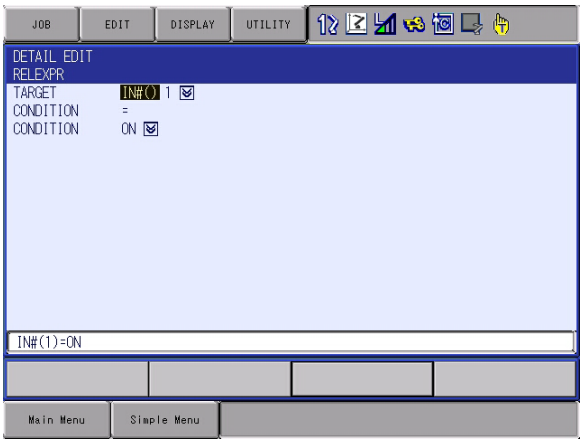
– The parentheses do not affect the priority of the judgment, the parentheses will be deleted and registered as follows.
“IF(IN#(1)=ON AND B000=0 AND I000=0) THEN”

e.g.2 Set as “IF((IN#(1)=ON OR B000=0) AND I000=0) THEN”.

– The parentheses affect the priority of the judgment, and the parentheses are set according to the setting.

②③ Conditional statement → The conditional statement is displayed by each item. To edit the statement, move the cursor to ③ , and press {SELECT}.

The DETAIL EDIT window of the each conditional statement appears.

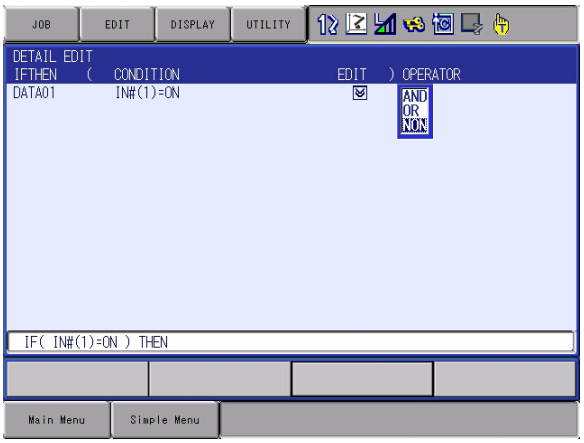


Object · · · Able to select from IN#(), IG#(), B, I, D, R, S, LB, LI, LD, LR, LS.

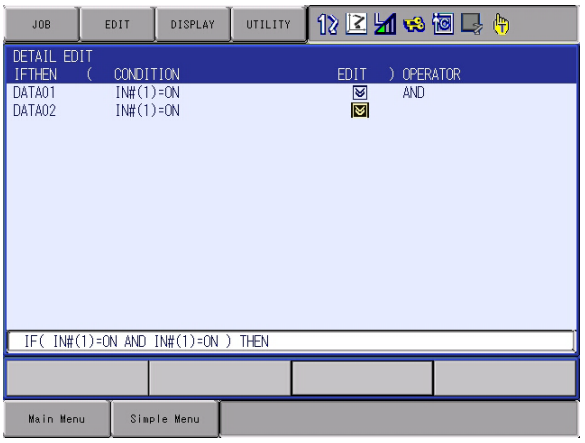
Condition (Operator) · · · Able to select from =,<>, <,<=, >,>=.

④ Operator

Add (OR connection, AND connection) or delete the conditional judgment statement.



Select OR or AND. The statement is added in the next line, and it connects between the statements by OR or AND.



Select NON · · · Delete the all statement lines below the selected position.

NOTE Able to add 15 conditional judgment statements.

Delete the registered instruction

To perform {DELETE} → {ENTER}, the instructions are deleted.

However, unlike the other instructions, the multiple lines might be deleted at the same time in some cases.

Structured Language	The motion when edit the instruction
SWITCH	The all instructions between SWITCH and ENDSWITCH are deleted.
CASE	The only CASE instruction is deleted.
DEFAULT	The only DEFAULT instruction is deleted.
ENDSWITCH	Cannot delete in this line of the instruction.
WHILE	The all instructions between WHILE and ENDWHILE are deleted.
ENDWHILE	Cannot delete in this line of the instruction.
FOR	The all instructions between FOR and NEXT are deleted.
NEXT	Cannot delete in this line of the instruction.
IFTHEN	The all instructions between IFTHEN and ENDIF are deleted.
ELSEIF	The only ELSEIF instruction is deleted.
ELSE	The only ELSE instruction is deleted.
ENDIF	Cannot delete in this line of the instruction.

Copy or cut

Some of the instructions cannot copy or cut the structured language without selecting the another instruction making a pair.

Structured Language	The motion when copy/cut the instruction
SWITCH	Cannot copy/cut when the both SWITCH and ENDSWITCH making a pair are selected at the same time.
CASE	Able to copy/cut by itself.
DEFAULT	Able to copy/cut by itself.
ENDSWITCH	Cannot copy/cut when the both ENDSWITCH and SWITCH making a pair are selected at the same time.
WHILE	Cannot copy/cut when the both WHILE and ENDWHILE making a pair are selected at the same time.
ENDWHILE	Cannot copy/cut when the both ENDWHILE and WHILE making a pair are selected at the same time.
FOR	Cannot copy/cut when the both FOR and NEXT making a pair are selected at the same time.
NEXT	Cannot copy/cut when the both NEXT and FOR making a pair are selected at the same time.
IFTHEN	Cannot copy/cut when the both IFTHEN and ENDIF making a pair are selected at the same time.
ELSEIF	Cannot copy/cut by itself. Able to copy/cut when the all instructions between IFTHEN and ENDIF are selected.
ELSE	Cannot copy/cut by itself. Able to copy/cut when the all instructions between IFTHEN and ENDIF are selected.
ENDIF	Cannot copy/cut when the both ENDIF and IFTHEN making a pair are selected at the same time.

Comment out

Some of the instructions cannot comment out the structured language without selecting the another instruction making a pair. The edit lock has no limitation.

Structured Language	The motion when comment out the instruction
SWITCH	Cannot be commented out if the ENDSWITCH instruction which makes a pair with the selected SWITCH instruction is not selected at the same time.
CASE	Able to comment out by itself.
DEFAULT	Able to comment out by itself.
ENDSWITCH	Cannot be commented out if the SWITCH instruction which makes a pair with the selected ENDSWITCH instruction is not selected at the same time.
WHILE	The ENDWHILE instruction which makes a pair with the selected WHILE instruction is commented out at the same time.
ENDWHILE	The WHILE instruction which makes a pair with the selected ENDWHILE instruction is commented out at the same time.
FOR	The NEXT instruction which makes a pair with the selected FOR instruction is commented out at the same time.
NEXT	The FOR instruction which makes a pair with the selected NEXT instruction is commented out at the same time.
IFTHEN	Cannot be commented out if the ENDIF instruction which makes a pair with the selected IFTHEN instruction is not selected at the same time.
ELSEIF	Able to comment out by itself.
ELSE	Able to comment out by itself.
ENDIF	Cannot be commented out if the IFTHEN instruction which makes a pair with the selected ENDIF instruction is not selected at the same time.

1.6.3 Multiplexing of the Structured Language

It is able to add a different structured language into the some space of the structured language.

In the following example, the processing in the dotted line (repeating the 20 times of I001=1 to 20) performs the numbers of the solid line (repeating 10 times of I000=1 to 10). Therefore, “INC B000” is performed 200 times by 20×10=200.

```
NOP
SET B000 0
FOR I000=1 TO 10
  FOR I001=1 TO 20
    INC B000
  NEXT I001
NEXT I000
END
```

To set the level of the multiplexing structured language is set by the following parameter.

Parameter	Description	Initial value
S2C694	Structured language Multiplexing max value 1 to 20 ・・・ able to be multiplexing level 1 to 20 Except above ・・・ able to be multiplexing till level 10	0

The following error appears, if attempt to process the multiplexing beyond the setting level above.

Error2271: Nesting level limit over

Error sub-code: Multiplexing level max value +1

The added instruction is displayed with the indent. Thus, able to confirm the difference of the level. The indent length per 1 level can be set by the following parameter.

Parameter	Description	Initial value
S2C693	Structured language Number of the indent character when process the multiplexing of the structured language. 1 to 4 ・・・ the length of the indent 1 to 4 bytes 0 ・・・ the length of the indent 1 byte	0

The length of the indent 1 byte

```
0000 NOP
0001 FOR I000 = 1 TO 10
0002  INC B000
0003 NEXT I000
0004 END
```

The length of the indent 4 bytes

```
0000 NOP
0001 FOR I000 = 1 TO 10
0002     INC B000
0003 NEXT I000
0004 END
```

1.6.4 Changes in the Format when Save the data to the External Device

If save the job into the external device, the format appears different from the job content window in some cases.

IF ~ ELSEIF ~ ELSE ~ ENDIF statement (single condition)

Format in the JOB CONTENT window

```
IF( IN#(1)     = ON ) THEN
   DOUT OT#(1) ON
ELSEIF( B000=1 ) THEN
   DOUT OT#(2) ON
ELSE
   DOUT OT#(3) ON
ENDIF
```

Format when save into the external device

```
IFTHENEXP IN#(1)=ON
   DOUT OT#(1) ON
ELSEIFEXP B000=1
   DOUT OT#(2) ON
ELSE
   DOUT OT#(3) ON
ENDIF
```

IF ~ ELSEIF ~ ELSE ~ ENDIF statement (multiple condition)

Format in the JOB CONTENT window

```
IF( IN#(1)    = ON AND B000=0 ) THEN
   DOUT OT#(1) ON
ELSEIF( B000=1 AND ( I000=2 OR D000=3 ) ) THEN
   DOUT OT#(2) ON
 ELSE
   DOUT OT#(3) ON
 ENDIF
```

Format when save into the external device

```
IFTHENEXP IN#(1)=ON ANDEXP B000=0
   DOUT OT#(1) ON
ELSEIFEXP B000=1 ANDEXP ( I000=2 OREXP D000=3 )
   DOUT OT#(2) ON
ELSE
   DOUT OT#(3) ON
ENDIF
```

WHILE ~ ENDWHILE statement

*The multiple condition is divided by operator ANDEXP and OREXP as well as IFTHEN ~ ENDIF statement.

Format in the JOB CONTENT window	Format when save into the external device

WHILE (IN#(1) =ON)
DOUT OT#(1) ON
ENDWHILE
	WHILEEXP IN#(1)=ON
	DOUT OT#(1) ON
	ENDWHILE

SWITCH ~ CASE ~ DEFAULT ~ ENDSWITCH statement

The format does not change.

FOR ~ NEXT statement

The format does not change.

2 INFORM Explanation

2.1 I/O Instructions

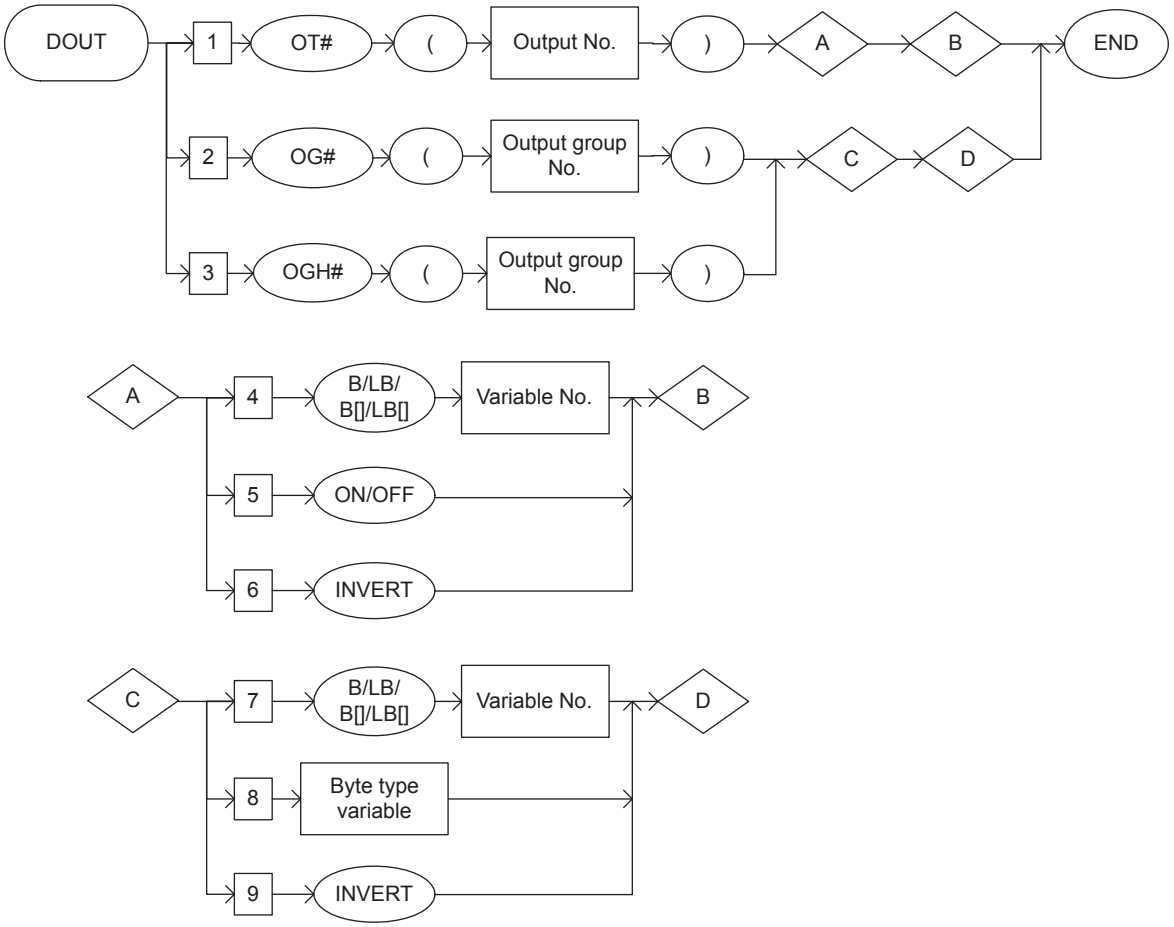
DOUT

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Turns the general output signal on and off.

Construction



Explanation

1. OT# (Output number) /OG# (Output group number) / OGH# (Output group number)

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	OT#(Output number)	Specifies the output number signal.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	OG#(Output group number)	Specifies the output number group signal (1group 8 points).	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
3	OGH#(Output group number)	Specifies the output number group signal (1group 4 points).	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.

SUPPLE-MENT

Output signal

Output signal OT#(xx) is 1 point, OGH#(xx) is 1 group 4 points, and OG#(xx) is 1 group 8 points.

OT#(8)	OT#(7)	OT#(6)	OT#(5)	OT#(4)	OT#(3)	OT#(2)	OT#(1)
OGH#(2)				OGH#(1)			
OG#(1)							

2. OT# (Output number) /OG# (Output group number) / OGH# (Output group number)

When OT# (output number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
4	B Variable number/ LB Variable number / B [Array number]/ LB [Array number]	The least significant bit of the specified byte type variable specifies on/off of the output signal.	Least significant bit: 0: OFF 1: ON
5	ON/OFF	Specifies on/off of the output signal.	
6	INVERT	Refers the current signal status to output OFF when the status is ON, and output ON when the status is OFF.	

3. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When OG# (Output group number) or OGH# (Output group number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
7	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies on/off of the output signal by the specified bit value byte type variable.	bit: 0: OFF 1: ON
8	Byte type constant	When the constant byte type is expressed in bit form, the corresponding on/off output signal is specified. Specifies on/off of the output signal by bit value.	
9	INVERT	Refers the current signal status to output OFF when the status is ON, and output ON when the status is OFF.	

Example

(1) DOUT OT#(12) ON
General output signal no. 12 is turned on.

(2) SET B000 24
DOUT OG#(3) B000
B000=24(Decimal)= 00011000(Binary)

OT#(24)	OT#(23)	OT#(22)	OT#(21)	OT#(20)	OT#(19)	OT#(18)	OT#(17)
OG#(3)							

ON

General output signals nos. 20 and 21 are turned on.

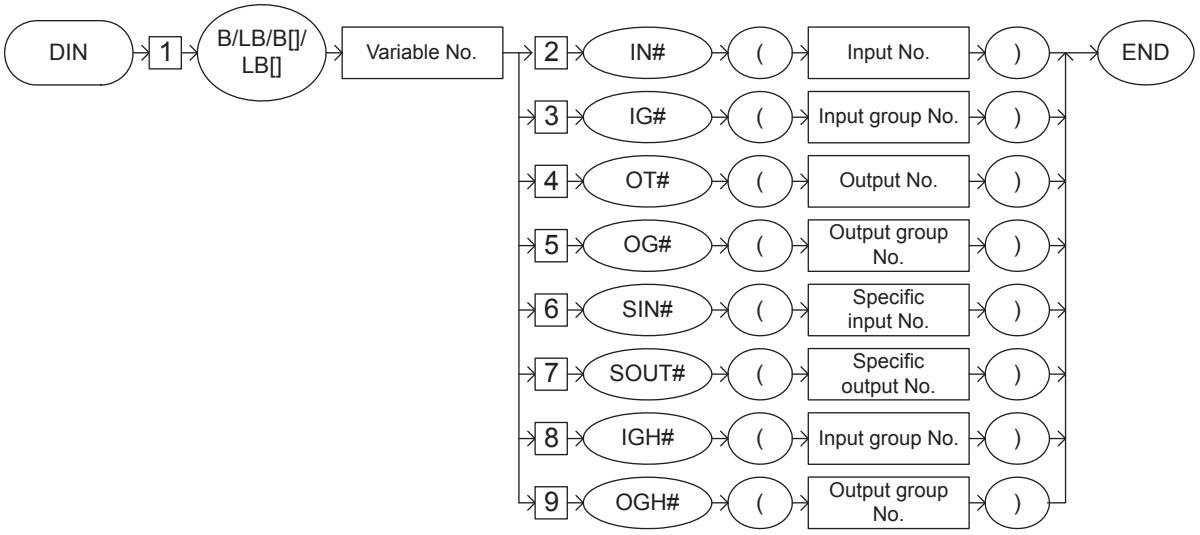
DIN

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Refers to the byte type variable for the status of the signal.

Construction



Explanation

1. B Variable Number / LB Variable Number / B [Array Number] / LB [Array Number]

Add the following tag.

No	Tag	Explanation	Note
1	B Variable Number/ LB Variable Number/ B [Array Number]/ LB [Array Number]	Specifies the number of byte type variable for the signal.	

2. IN#(Input number) / IG#(Input group number) / OT#(Output number) /OG#(Output group number) / SIN#(Specific input number) / SOUT#(Specific output number) / IGH#(Input group number) / OGH#(Output group number)

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	IN#(Input number)	Specifies the general input signal number which shows the signal status.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
3	IG#(Input group number)	Specifies the general input group signal number (1 group 8 points) which shows the signal status.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
4	OT#(Output number)	Specifies the general output signal number which shows the signal status.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
5	OG#(Output group number)	Specifies the general output group signal number (1 group 8 points) which shows the signal status.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	SIN#(Specific input number)	Specifies the specific input signal number which shows the signal status.	No:1 to 1280 Variable B/I/D/LB/LI/LD can be used.
7	SOUT#(Specific output number)	Specifies the specific output signal number which shows the signal status.	No:1 to 2400 Variable B/I/D/LB/LI/LD can be used.
8	IGH#(Input group number)	Specifies the general input group number (1 group 4 points) signal which shows the signal status.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
9	OGH#(Output group number)	Specifies the number of general output group (1 group 4 points) signal which shows the signal status.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.

Input signal

Input signal IN#(xx) is 1 point, IGH#(xx) is 1 group 4 points, and IG#(xx) is 1group 8 points.

IN#(8)	IN#(7)	IN#(6)	IN#(5)	IN#(4)	IN#(3)	IN#(2)	IN#(1)
IGH#(2)				IGH#(1)			
IG#(1)							

SUPPLE -MENT

When confirming information from multiple signals at the same time at a conditional branch of a job in the system where I/O is externally controlled, retrieve signal status using DIN and perform conditional branching of the job using the values of the signal status that have been retrieved.

Signal information will not be affected by external factors when information from multiple signals is retrieved at one time using DIN.

If signal information is retrieved for each signal separately, external controls during intervals between retrievals may change the information.

Example

(1) DIN B016 IN#(12)
The on/off status of general input signal no.12 is shown in byte type variable No.16. When the general input signal No.12 is on, the status of the general input signal is B016=1 (decimal)=00000001(binary).

(2) DIN B002 OG#(8)
The on/off status of general output signal nos. 57-64 is shown in byte type variable No.2.
In the following cases, the status of the general output signal is B002=150 (decimal)= 10010110 (binary).

OT#(64)	OT#(63)	OT#(62)	OT#(61)	OT#(60)	OT#(59)	OT#(58)	OT#(57)
OG#(8)							

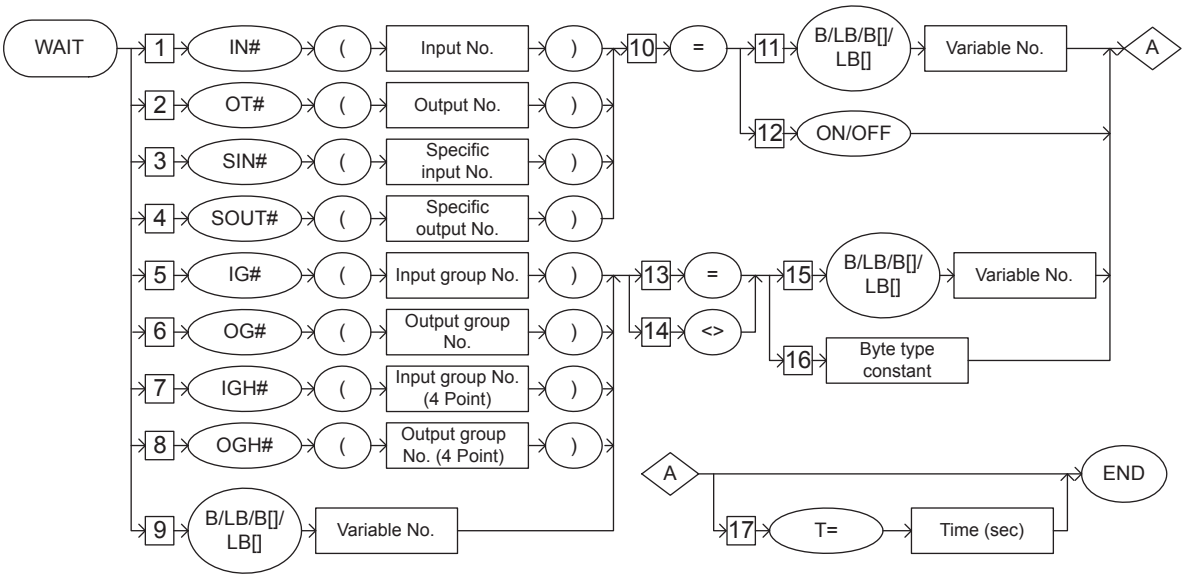
ON

WAIT

Function

Waits until the status of the external signal or byte type variable is the same as the specified status.

Construction



Explanation

1. IN#(Input number) / OT#(Output number) / SIN#(Specific input number) /SOUT#(Specific output number) / IG#(Input group number) / OG#(Output group number) / IGH#(Input group number) / OGH#(Output group number) / B Variable Number / LB Variable Number / B [Array Number] / LB [Array Number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	IN# (Input number)	Specifies the number of the general input signal for the waiting condition.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	OT# (Output number)	Specifies the number of the general output signal for the waiting condition.	No:1 to 4096 Variable B/I/D/LB/LI/LD can be used.
3	SIN# (Specific input number)	Specifies the number of the specific input signal for the waiting condition.	No:1 to 1280 Variable B/I/D/LB/LI/LD can be used.
4	SOUT# (Specific output number)	Specifies the number of the specific output signal for the waiting condition.	No:1 to 2400 Variable B/I/D/LB/LI/LD can be used.

No	Tag	Explanation	Note
5	IG#(Input group number)	Specifies the number of general input group (1 group 8 points) signal for the waiting condition.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	OG#(Output group number)	Specifies the number of general output group (1 group 8 points) signal for the waiting condition.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
7	IGH#(Input group number)	Specifies the number of general input group (1 group 4 points) signal for the waiting condition.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
8	OGH#(Output group number)	Specifies the number of general output group (1 group4 points) signal for the waiting condition.	No:1 to 1024 Variable B/I/D/LB/LI/LD can be used.
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable for the waiting condition.	

2. =

When an IN# (input number), OT# (output number), SIN# (specific input number), or SOUT# (specific output number) is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
10	=	It is equal.	

3. B Variable number /LB Variable number / B [Array number] / LB [Array number] / ON / OFF

When an IN# (input number), OT#(output number), SIN# (specific input number), or
SOUT# (specific output number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
11	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies byte type variable which becomes a waiting condition.	Least significant bit: 0:OFF 1:ON
12	ON/OFF	Specifies on/off of the waiting condition.	

4. =/<>

When an IG# (input group number), OG# (output group number), IGH# (input group number), OGH# (output group number), B variable number, LB variable number, B [array number], or LB [array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
13	=	It is equal.	
14	<>	It is not equal.	

5. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When an IG# (input group number), OG# (output group number), IGH# (input group number), OGH# (output group number), B variable number, LB variable number, B [array number], or LB [array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
15	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies byte type variable which becomes a waiting condition.	
16	Byte type constant	The waiting condition is specified by byte type constant.	

6. T=time

The following tag can be added or omitted.

No	Tag	Explanation	Note
17	T=time	Specify the waiting time. When the time specified here ends, if the status and the condition are not the same, the next instruction is executed.	Time: 0.01 to 655.35 seconds It is possible to specify at time by the I/LI/I/LI variable (Units: 0.01 seconds).

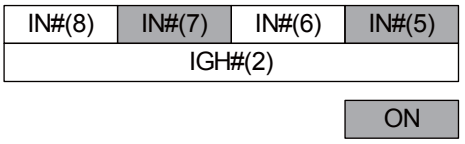
Example

(1) WAIT IN#(12)=ON
Waits until general input signal no.12 is turned on.

(2) SET B000 5
SET B002 16
WAIT SIN#(B000)=B002 T=3.0

B002=16 (Decimal)=00010000 (Binary)
Waits until specific input signal no.5 is turned off.
However, after three seconds, even if the signal is not turned off, the next instruction is executed.

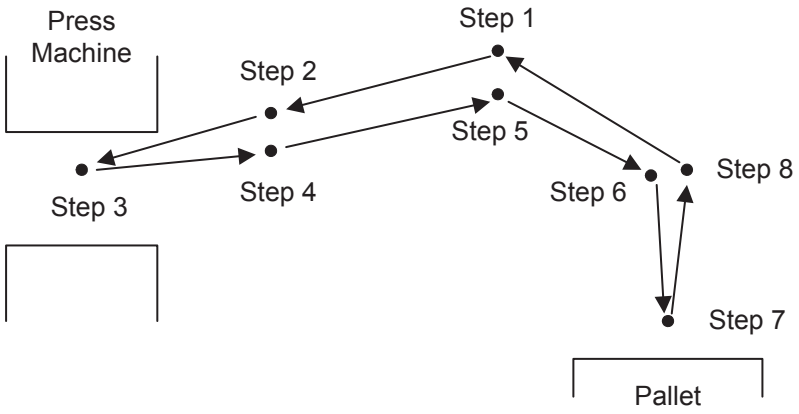
(3) WAIT IGH#(2)<>5
5 (Decimal)=0101 (Binary)



Waits until general input signal nos.5 and 7 are turned off and general input signal nos. 6 and 8 are turned on.

(4) Example of press machine handling.

```
000 NOP
001 MOVJ VJ=100.0
002 MOVJ VJ=100.0
    WAIT IN#(1)=ON
003 MOVJ VJ=100.0
004 MOVJ VJ=100.0
005 MOVJ VJ=100.0
006 MOVJ VJ=100.0
007 MOVJ VJ=100.0
008 MOVJ VJ=100.0
009 END
```



The robot cannot be moved to step 3 while the press is closed.
Open/close of the press machine (Open: ON, Shut: OFF) is allocated to general input signal No.1.
The robot waits until general input signal No.1 turns on at step 2.

PULSE

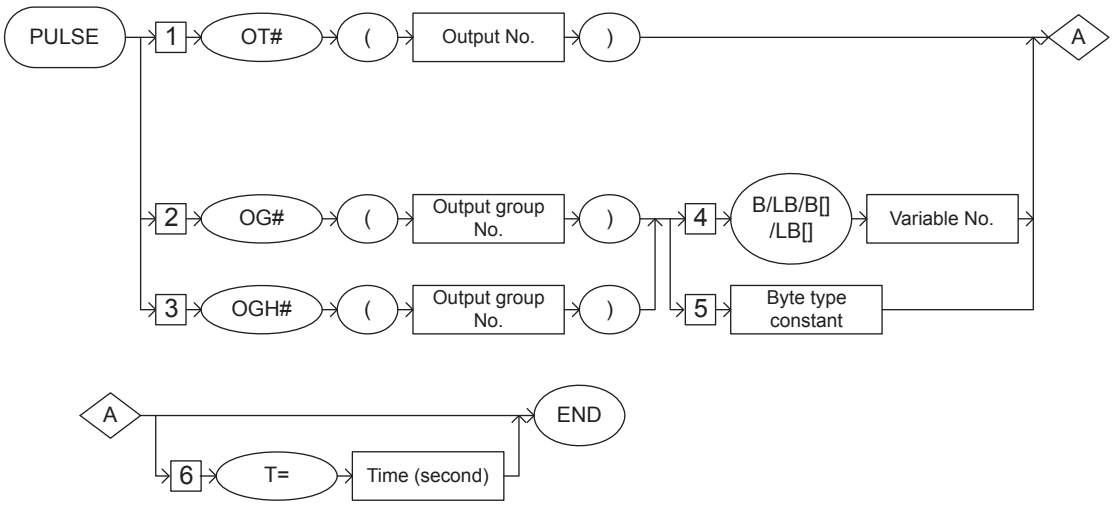
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

The pulse signal is output to the general output signal only for the specified time.

The PULSE instruction, without waiting for completion of the instruction, executes the next one.

Construction



Explanation

1. OT# (output number) / OG# (output group number) / OGH# (output group number)

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	OT# (Output No.)	Specifies the number of the signal to which the pulse signal is output.	No.: 1 to 4096 Variable B/I/D/LB/LI/ LD can be used.
2	OG# (Output group No.)	Specifies the group number of the signal (1 group 8 points) to which the pulse signal is output.	No.: 1 to 512 Variable B/I/D/LB/LI/ LD can be used.
3	OGH# (Output group No.)	Specifies the group number of the signal (1 group 4 points) to which the pulse signal is output.	No.: 1 to 1024 Variable B/I/D/LB/LI/ LD can be used.

2. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When OG# (output group number) or OGH# (output group number) in the above table is selected, choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	B Variable number/ LB Variable number/ B [Array Number] / LB [Array Number]	Specifies the number of the corresponding pulse output signal when the contents of the specified byte type variable is expressed in bits.	Bit: 0: OFF 1: ON
5	Byte type constant	Specifies the number of the corresponding pulse output signal when the specified byte type constant is expressed in bits.	

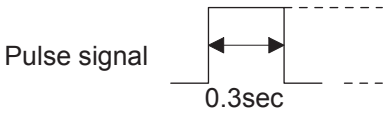
3. T=Time

The following tag can be added or omitted.

No.	Tag	Explanation	Note
6	T=Time	Specifies the time during which the pulse signal is output. The pulse signal is output during the specified time T.	Units: seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds) When the time is not specified, the pulse signal is output during 0.30 seconds.

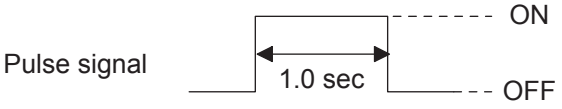
Example

(1) PULSE OT#(128)
The pulse signal is output for 0.30 seconds to general output signal No.128.



(2) SET B000 5
PULSE OT#(B000) T=1.0

The pulse signal is output for 1.0 seconds to general output signal No.5.



(3) SET B000 24
PULSE OG#(3) B000

B000=24 (Decimal)=00011000 (Binary)

OT#(24)	OT#(23)	OT#(22)	OT#(21)	OT#(20)	OT#(19)	OT#(18)	OT#(17)
OG#(3)							
			ON	ON			

The pulse signal is output for 0.30 seconds to the general output signal No.'s 20 and 21.

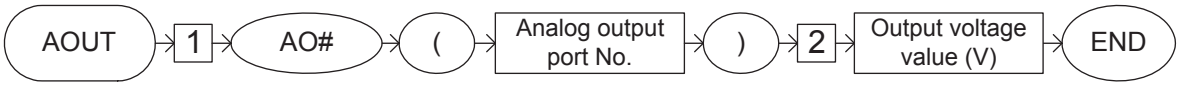
AOUT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Outputs the set voltage value to the general-purpose analog output port.

Construction



Explanation

1. AO# (Analog output port number)

Add the following tag.

No	Tag	Explanation	Note
1	AO# (Analog output port number)	Specifies the number of the analog output port to which the set voltage value is output.	No.: 1 to 40 Variable B/I/D/LB/LI/LD can be used.

2. Output voltage value

Add the following tag.

No.	Tag	Explanation	Note
2	Output voltage value	Specifies the output voltage value.	Voltage value: -14.00 to +14.00 Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

Example

(1) SET I000 1270
AOUT AO#(1) I000
The voltage of 12.7 V is output to the analog output port No. 1.

ARATION

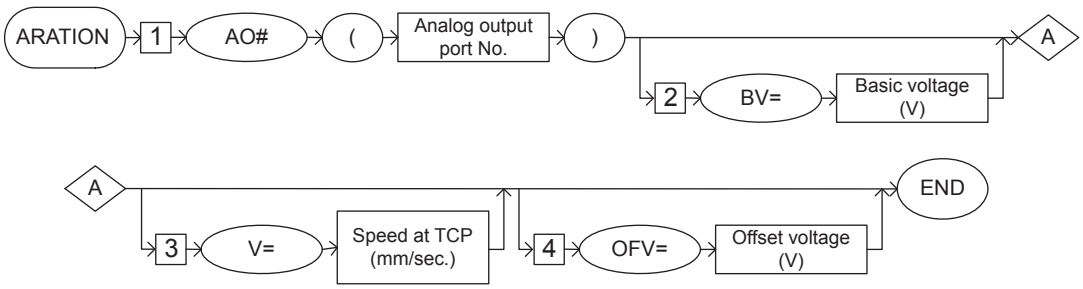
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Starts the analog output corresponding to the speed.

ARATION is valid during linear interpolation, circular interpolation, and spline interpolation. ARTION is carried out during playback or FWD operation, but not while operating an axis.

Construction



Explanation

1. AO# (Analog output port number)

Add the following tag.

No.	Tag	Explanation	Note
1	AO# (Analog output port number)	Specifies the number of the analog output port that outputs the voltage corresponding to the speed.	No.: 1 to 40 Variable B/I/D/LB/LI/LD can be used.

2. BV=Basic voltage

The following tag can be added or omitted.

No.	Tag	Explanation	Note
2	BV=Basic voltage	Specifies the voltage to be output when running at the speed set in part 3 of this Explanation.	Voltage value: -14.00 to +14.00 V Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

3. V=Basic speed

The following tag can be added or omitted.

No.	Tag	Explanation	Note
3	V=Basic speed	Specifies the speed at which the set voltage value is output.	Speed: 0.1 to 1500.0 mm/s. Variable B/LB/B[]/LB[]/I/LI/I[]/LI[]/D/LD/D[]/LD[] can be used. (Units: 0.1 mm/s.)

4. OFV=Offset voltage

The following tag can be added or omitted.

No.	Tag	Explanation	Note
4	OFV=Offset voltage	Specifies the analog voltage to be output at the motion speed “0”.	Voltage value: -14.00 to +14.00 V Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

SUPPLE -MENT

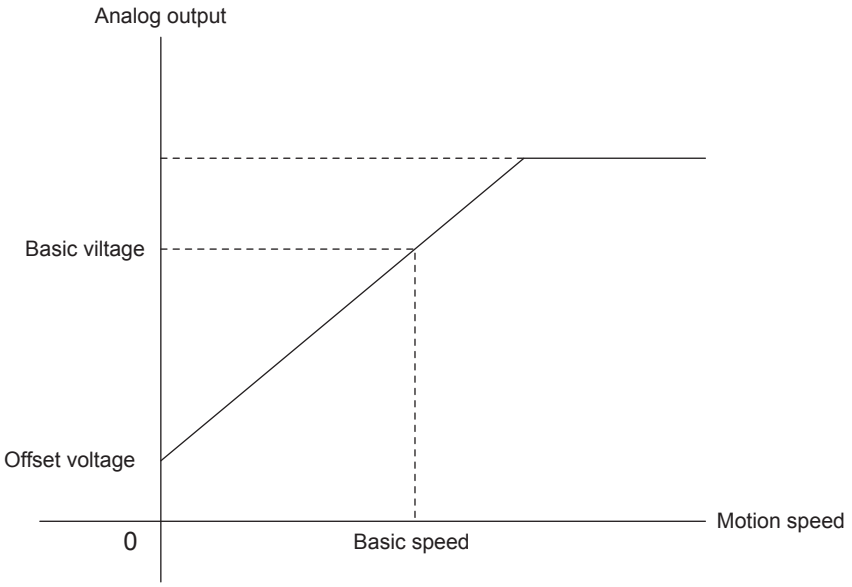
Analog output function corresponding to the speed

To regulate the thickness of the sealing or paint, etc. when sealing and painting, the amount of discharged material should be adjusted according to the motion speed of the manipulator.

The analog output function corresponding to the speed automatically changes the analog output value according to the manipulator's motion speed.

ARATION and ARTIOF instructions are used to carry out this function.

On the base of the set value for the ARATION instruction, the output characteristic, which decides the relation between the motion speed and the analog voltage, is calculated. The analog output corresponding to speed is output according to this output characteristic.

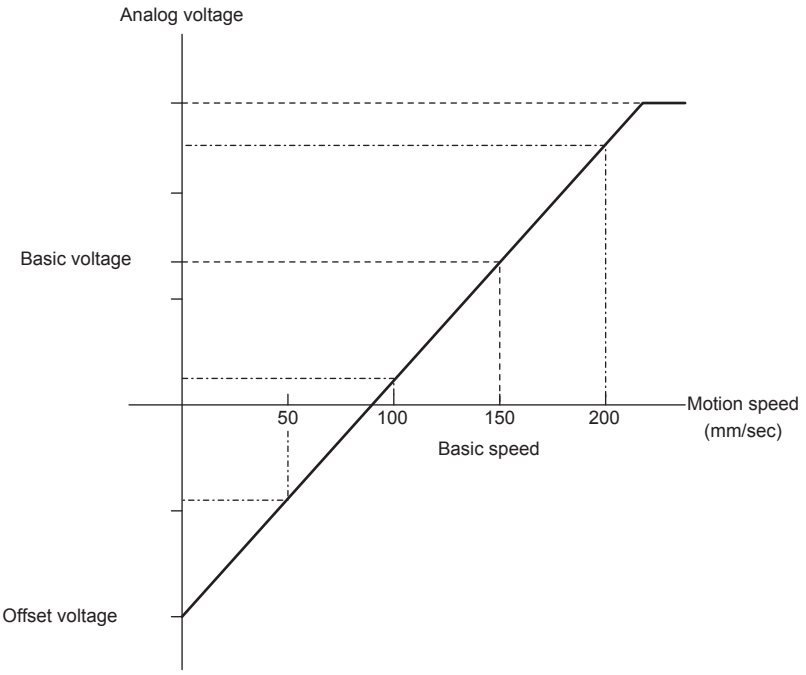


Example

(1)

MOVJ VJ=50.00	Output voltage (V)
ARATION AO#(1) BV=7.00 V=150.0 OFV=-10.0	7.00
MOVL V=50.0	4.33
MOVC V=100.0	1.33
MOVC V=100.0	1.33
MOVC V=100.0	1.33
MOVL V=200.0	12.67

When the basic voltage is 7.00 V at a motion speed of 150.0 mm/sec for the analog output port number 1, an offset voltage of -10.0 V is output.


Analog voltage
Basic voltage
Offset voltage
50
100
150
200
Basic speed
Motion speed
(mm/sec)

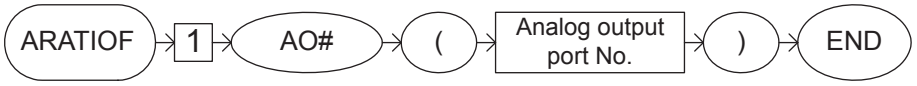
ARATIOF

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Cancels the analog output corresponding to the speed.

Construction



Explanation

1. AO# (Analog output port number)

Add the following tag.

No.	Tag	Explanation	Note
1	AO# (Analog output port number)	Specifies the number of the general-purpose analog output port for which the analog output corresponding to speed is to be cancelled.	No.: 1 to 40 Variable B/I/D/LB/LI/LD can be used.

Example

(1) ARATIOF AO#(1)
The analog output corresponding to the speed at the analog output port number 1 is cancelled.

ANTOUT

The ANTOUT instruction can be used only with parameter S4C008.

SUBSET	STANDARD	EXPANDED	Parameter
Not available	Available	Available	S2C646

Function

Carries out the anticipation output function to adjust the timing of the signal output.

SUPPLE-MENT

Anticipation output function

The anticipation output function is a signal output timing adjustment function to advance or delay the ON/OFF timing of 32 general-purpose outputs and 16 general-purpose output groups. The signal can be output before or after the manipulator reaches the step.

This function corrects work timing errors due to delays in the motions of a peripheral device and/or the manipulator.

Setting the time to a negative value (-) advances the signal output.

This can be used to correct work timing errors due to delays in the motions of a peripheral device.

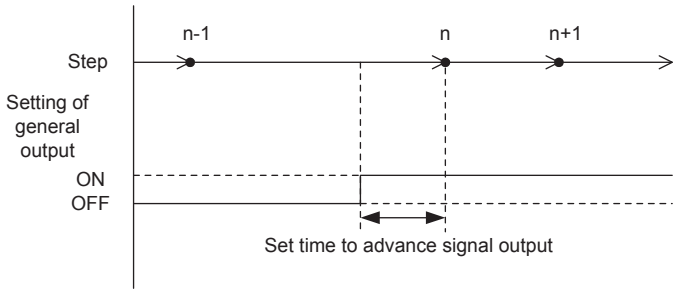
Setting the time to a positive value (+) delays the signal output.

This can be used to correct work timing errors due to delays in the motions of the manipulator.

<Advanced signal output>

The signal is output before the manipulator reaches the step.

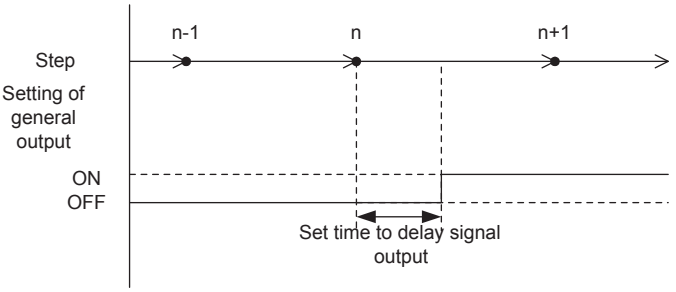
Step	Instructions
n-1	MOVL
n	MOVL NWAIT
	ANTOUT AT#(1) ON
n+1	MOVL



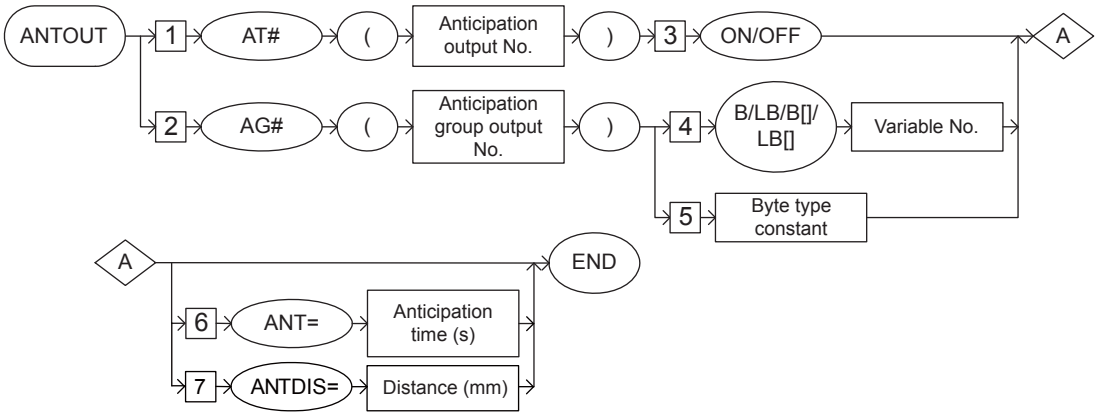
<Delayed signal output>

The signal is output after the manipulator reaches the step.

Step	Instructions
n-1	MOVL
n	MOVL NWAIT
	ANTOUT AT#(2) ON
n+1	MOVL



Construction



Explanation

1. AT# (Anticipation output number) / AG# (Anticipation group output number)

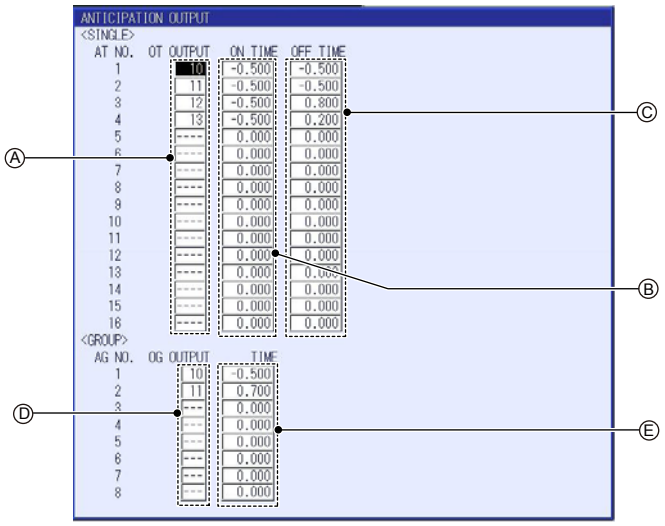
Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	AT# (Anticipation output number)	Specifies the number of the signal whose timing is adjusted.	No.: 1 to 32 Variable B/I/D/LB/LI/LD can be used.
2	AG# (Anticipation group output number)	Specifies the group number of the signal whose timing is adjusted.	No.: 1 or 16 Variable B/I/D/LB/LI/LD can be used.

SUPPLE-MENT

Settings for the anticipation output signal

Set the number of the output signal for the anticipation output in the ANTICIPATION OUTPUT display.



A. OT OUTPUT (Setting range: 1 to 4096)
Allocate the number of the general-purpose output whose signal timing is to be adjusted to AT NO. 1 to 32.

B. ON TIME (Setting range: -327.68 to 327.67 seconds)
Set the delay/advance time for turning ON the signal.

C. OFF TIME (Setting range: -327.68 to 327.67 seconds)
Set the delay/advance time for turning OFF the signal.

D. OG OUTPUT (Setting range: 1 to 512)
Allocate the group number of the general-purpose output whose signal timing is to be adjusted to AG NO. 1 and 16.

E. TIME (Setting range: -327.68 to 327.67 seconds)
Set the delay/advance time for carrying out the group output.

2. ON/OFF

When an AT# (anticipation output number) is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
3	ON/OFF	Specifies the ON/OFF status of the signal whose output timing is adjusted.	

3. B Variable number / LB Variable number / B [Array number] / LB [Array number] / Byte type constant

When an AG# (anticipation group output number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the ON/OFF status of the output signal corresponding to each bit when the contents of the specified byte type variable is expressed in bits.	Bit: 0: OFF 1: ON
5	Byte type constant	Specifies the ON/OFF status of the output signal corresponding to each bit when the contents of the specified byte type variable is expressed in bits.	

4. ANT=Anticipation time

The following tag can be added or omitted.

No.	Tag	Explanation	Note
6	ANT=Anticipation time	Specifies the timing of the anticipation time for the output signal timing.	Units: seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds) When the time is not specified, the time set in the anticipation file is applied.

5. ANTDIS=Distance

The following tag can be added or omitted.

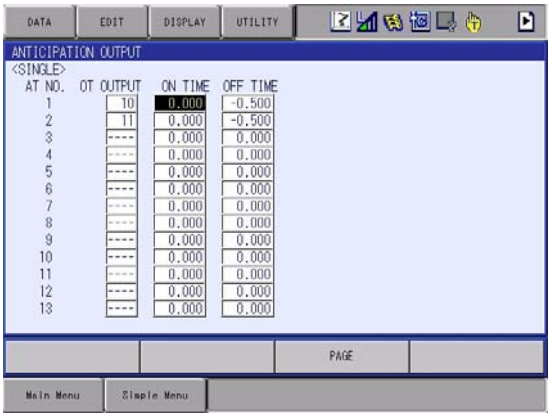
No.	Tag	Explanation	Note
7	ANTDIS=Distance	Specifies the anticipation distance for the output signal timing.	Units: mm Variable I/LI/I[]/LI[] can be used. (Units: 0.01 mm) When the distance is not specified, the time set in the anticipation file is applied.

Example

(1)

Step	Instructions
n-1	MOVL V=100
n	MOVL V=100 NWAIT
	ANTOUT AT#(1) ON
n+1	MOVL V=100

Turns ON the general-purpose signal number 10 0.5 seconds before the manipulator reaches the step.(Advanced signal output)



2.2 Control Instruction

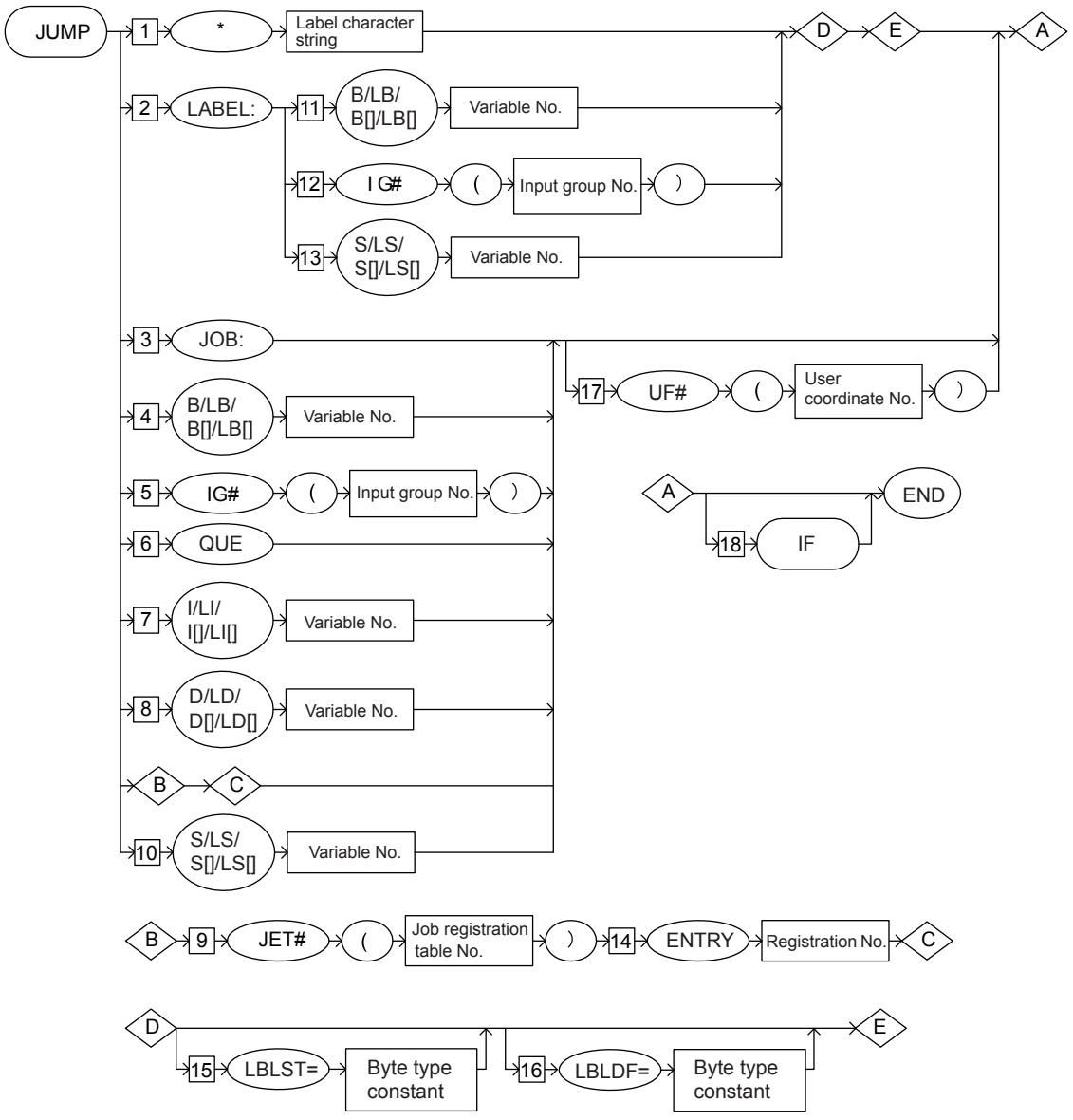
JUMP

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Functi51o

Jumps to specified label or job.

Construction



Explanation

1. *Label character string /LABEL:/JOB:/B Variable number /LB Variable number /B [Array number] /LB [Array number] /IG# (Input group number) / QUE/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/ D [Array number]/LD [Array number]/ JET# (Job registration table number)/S Variable number/LS Variable number/ S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	*Label strings	Specifies the label string.	String: eight characters
2	LABEL:	The numerical value specified by byte type variable or input group number is considered a label.	
3	JOB:	Specifies the job.	
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	The numerical value specified by byte type variable is considered to be a job.	
5	IG#(Input group number)	The numerical value specified by the input group number is considered to be a job.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
6	QUE	Jumps to the job stored in the queue.	Available only in the queue function (option: S2C641).
7	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	The numerical value specified by the integer type variable is considered to be the job.	
8	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	The numerical value specified by the double-precision type variable is considered to be the job.	
9	JET# (Job registration table number)	Specifies the job registration table number. The job of the jump destination can be registered in the job registration table.	No.: 1 to 3 Variable B/I/D/LB/LI/LD can be used. Available only with the job registration table function (option: S2C443)
10	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	The character string specified by the character string type variable is considered to be the job.	

2. B Variable number / LB Variable number / B [Array number] / LB [Array number] / IG# (Input group number)/S Variable number / LS Variable number / S [Array number] / LS [Array number]

When a LABEL: is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
11	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable in which the numerical value for the label is set.	
12	IG#(Input group number)	Specifies the input group number of the numerical value for the label.	No:1 to 512 B/I/D/LB/LI/LD Variable can be used.
13	SVariable number/ LSVariable number/ S [Array number]/ LS [Array number]	Specifies the character string type variable in which the character string for the label is set.	

3. ENTRY=Registration number

When a JET#(job registration table number) is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
14	ENTRY=Registration number	Specifies the registration number of the job registered in the specified job registration table.	No.: 1 to 1024 Variable B/B[]/LB/LB[]/I/ I[] can be used.

4. LBLST=Search starting position

When a *label character string “LABEL” is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
15	LBLST=Search starting position	Specifies the search position of the label.	No.: 0 to 2 0: Job tip 1: Current position (Default) 2: End

5. LBLDF=Search direction

When a *label character string “LABEL” is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
16	LBLDF=Search dorection	Specifies the search direction number of the label.	No.: 0 to 1 0: Search forward (Default) 1: Search backward

6. UF# (User coordinate number)

When JOB:, B variable number, LB variable number, B [Array number], LB [Array number], IG# (Input group number), QUE, I Variable number, LI Variable number, I [Array number], LI [Array number], D Variable number, LD Variable number, D [Array number], LD [Array number], or JET# (Job registration table number) is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
17	UF# (User coordinate number)	Specifies the coordinates of the job.	Available only in the relative job function.

7. IF

The following tag can be added or omitted.

No	Tag	Explanation	Note
18	IF	Specifies the IF instruction.	Refer to *chapter 2.6 “Instruction Which Adheres to an Instruction”* .

Example

(1) JUMP *1
Jumps to *1.

(2) JUMP JOB:TEST1 UF#(2)
Jumps to the job named TEST1. TEST1 works in user coordinate system No.2.

(3) SET B000 1
JUMP B000 IF IN#(14)=ON
If input signal no.14 is on, it jumps to job “1”.

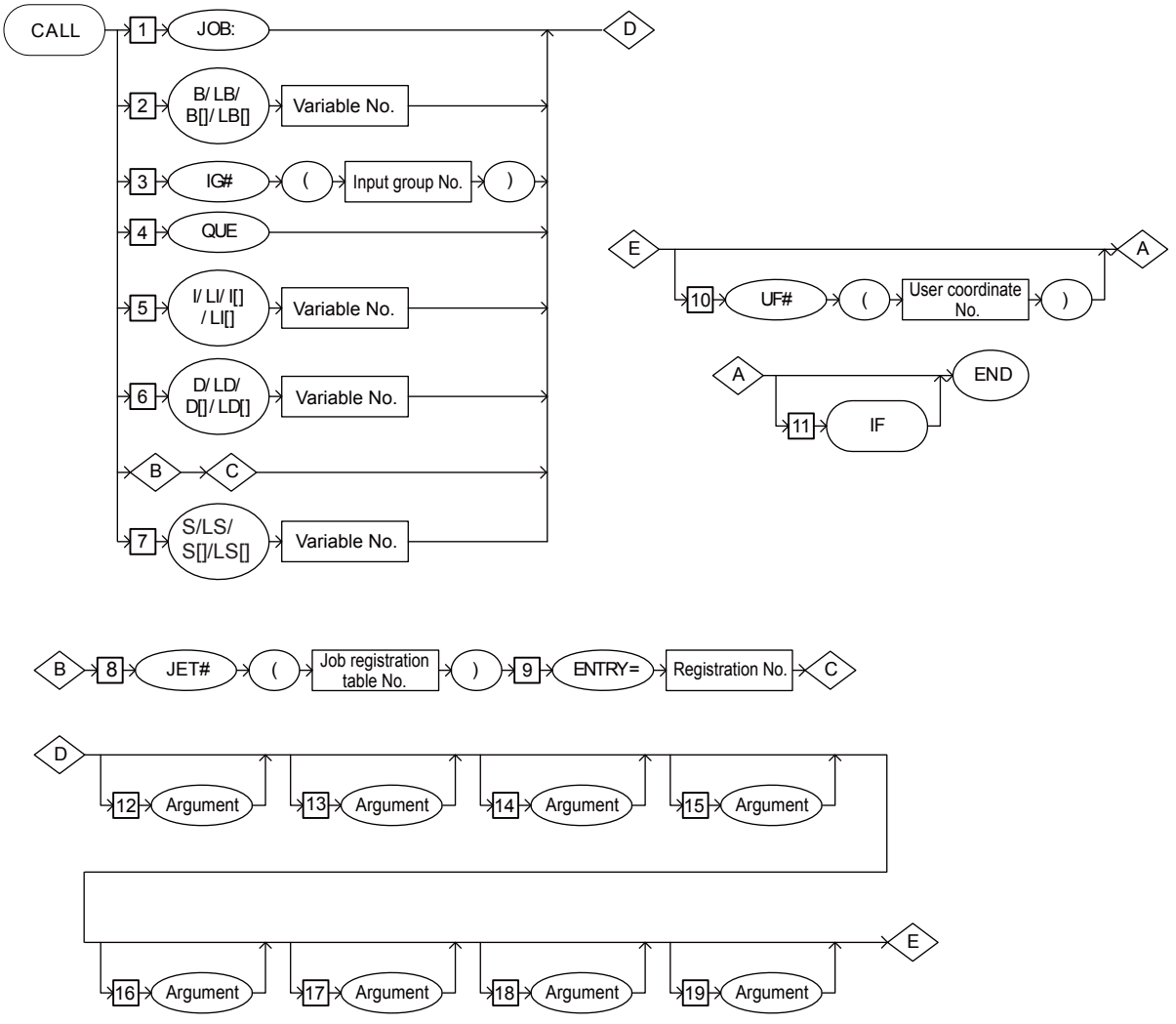
CALL

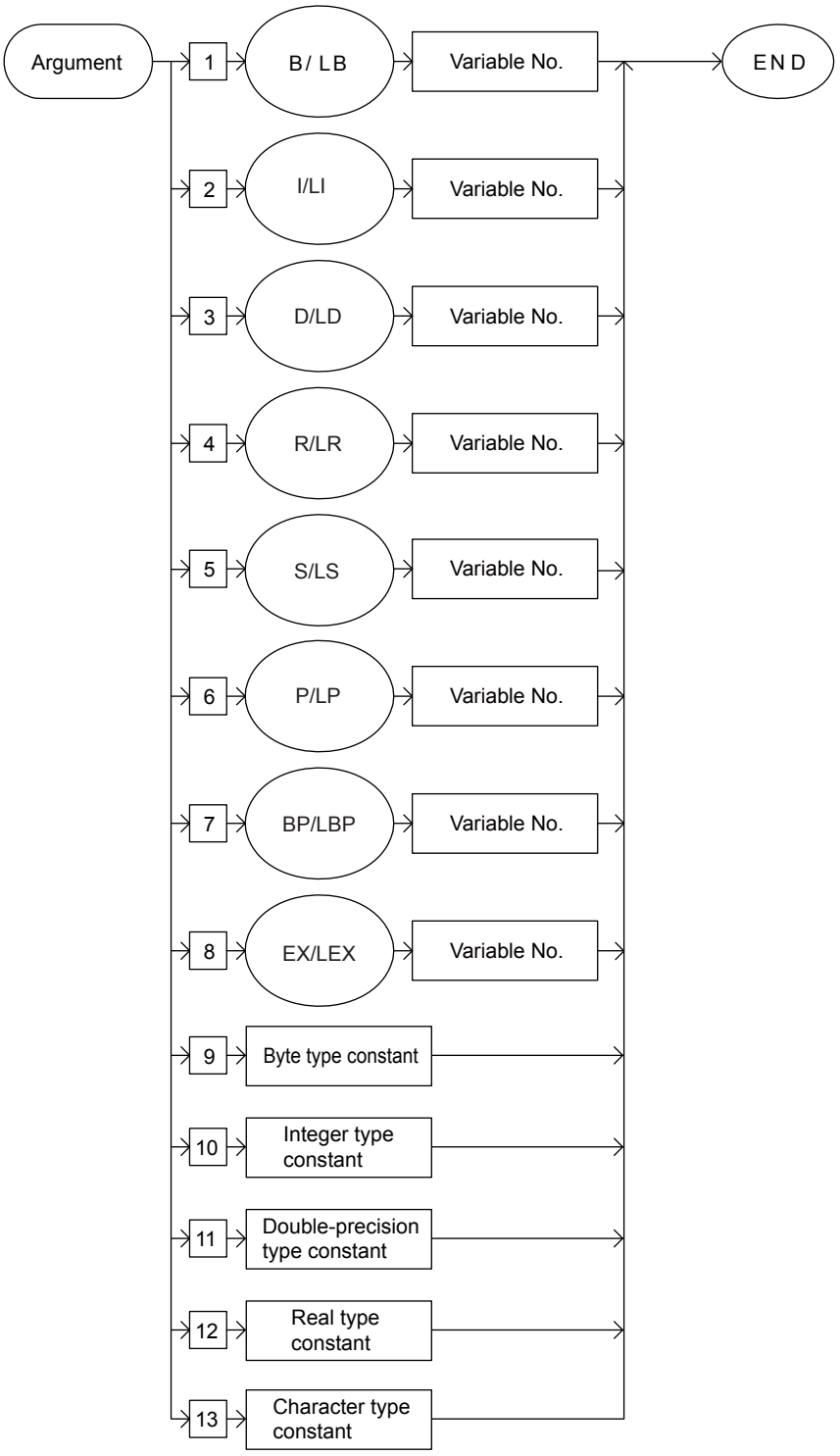
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Calls the specified job.

Construction




Argument
1
B/ LB
Variable No.
END
2
I/LI
Variable No.
3
D/LD
Variable No.
4
R/LR
Variable No.
5
S/LS
Variable No.
6
P/LP
Variable No.
7
BP/LBP
Variable No.
8
EX/LEX
Variable No.
9
Byte type constant
10
Integer type constant
11
Double-precision type constant
12
Real type constant
13
Character type constant

Explanation

1. JOB: / B Variable number / LB Variable number / B [Array number] / LB [Array number] / IG#(Input group number) / QUE/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/ D [Array number]/ LD [Array number]/ JET# (Job registration table number)/S Variable number/LS Variable number/ S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	JOB:	Specifies a job to be called.	
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	The numerical value specified by the byte type variable is considered as the job to be called.	
3	IG# (Input group number)	The numerical value specified by the input group number is considered as the job to be called.	No:1 to 512 Variable B/I/D/LB/LI/LD can be used.
4	QUE	The job stored in the queue is called.	Available only in the queue function (option: S2C641).
5	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	The numerical value specified by the integer type variable is considered as the job to be called.	
6	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	The numerical value specified by the double-precision type variable is considered as the job to be called.	
7	JET# (Job registration table number)	Specifies the table number of the job registration. The job to be called can be registered in the job registration table.	No.: 1 to 3 Variable B/I/D/LB/LI/LD can be used. Available only in the job registration table function (option: S2C443)
8	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	The character string specified by the character string type variable is considered to be the job.	

2. ENTRY=Registration number

When a JET#(job registration table number) is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
9	ENTRY=Registration number	Specifies the registration number of the job registered in the specified job registration table.	No.: 1 to 1024 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[] can be used.

3. UF# (User coordinate number)

The following tag can be added or omitted.

No	Tag	Explanation	Note
10	UF# (User coordinate number)	Specifies the user coordinate system of the job to be called.	Available only in the relative job function.

4. IF

The following tag can be added or omitted.

No	Tag	Explanation	Note
11	IF	Specifies the IF instruction.	Refer to *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

5. Argument

The following tag can be added or omitted.

No	Tag	Explanation	Note
12 to 19	Argument (all types of variables and constants)	Eight arguments (from 12 to 19) can be passed to the job to be called. All types of variables and constants can be used as arguments.	

Example

(1) CALL JOB:TEST1
The job named TEST1 is called.

(2) SET B000 1
CALL B000 IF IN#(14)=ON
If input signal No.14 is on, it calls the job “1”.

5. 1 Outline (CALL Instruction with Argument)

The CALL can pass 8 arguments to the called job. Also, the RET instruction can return the one return value to the calling job. This enables the transfer of information without using the global variable to pass information. Thus, it makes the management of information easier, the number of lines of the calling job fewer, and the process simpler.

(1) CALL Instruction with Argument

For example, when creating the job which only waits for incoming in order to wait for the incoming of I/Os, the input number’s incoming to be waited for had to be set to the global variable, and the information had to be passed from the calling job to the called job. For example, the case when the input of specified three points are IN#(1), IN#(5), and IN#(7) is as follows:

<Calling Job>

NOP

SET B000 1

SET B001 5

SET B002 7

CALL JOB: WAIT_INPUT

:

<Called Job>

Job name: WAIT_INPUT

NOP

WAIT IN#(B000) ON

WAIT IN#(B001) ON

WAIT IN#(B002) ON

RET

This makes the calling job program long, and the global variable will be used only for this information transfer.

By using the CALL instruction with argument, the above can be described as follows:

<Calling Job>

NOP

CALL JOB: WAIT_INPUT (1, 5, 7)

:

<Called Job>

Job name: WAIT_INPUT

NOP

GETARG LB000, IARG#(1)// INPUT NUMBER 1 (receiving the argument 1)

GETARG LB001, IARG#(2)// INPUT NUMBER 2 (receiving the argument 1)

GETARG LB002, IARG#(3)// INPUT NUMBER 3 (receiving the argument 1)

WAIT IN#(LB000) ON

WAIT IN#(LB001) ON

WAIT IN#(LB002) ON

RET

This makes the calling job program only one-line long. Also, the called job can be made by using only the local variable.

(2) RET Instruction with Return Value

For example, to create the job which adds any two register values, the register number had to be passed from the calling job, and in the called job, the calculation result had to be entered in any of the global variable, then the calling job has to refer to that. This can be described as follows:

<Calling Job>

```
NOP
SET B000 1
SET B001 2
CALL JOB: ADD_REG
GET I0100   I099        ; Returns the calculation result to I099
```

<Called Job>

Job name: ADD_REG

```
NOP
GETREG I000 MREG#(B000)
GETREG I099 MREG#(B001)
ADD I099 I000
RET
```

By using the CALL instruction with argument and the RET instruction with return value, the above can be described as follows:

<Calling Job>

```
NOP
CALL JOB: ADD_REG (1, 2)
GETS I001 $RV        ; Receives the addition result as the return value at $RV
```

<Called Job>

Job name: ADD_REG

```
NOP
GETARG   LB000   IARG#(1)// Register 1
GETARG   LB001   IARG#(2)// Register 2
GETREG LI000 MREG#(LB000)
GETREG LI001 MREG#(LB001)
ADD LI001 I000
RET LI001        ; Returns the addition result as the return value
```

Thus, the global variable to receive and pass the answer is no longer necessary.

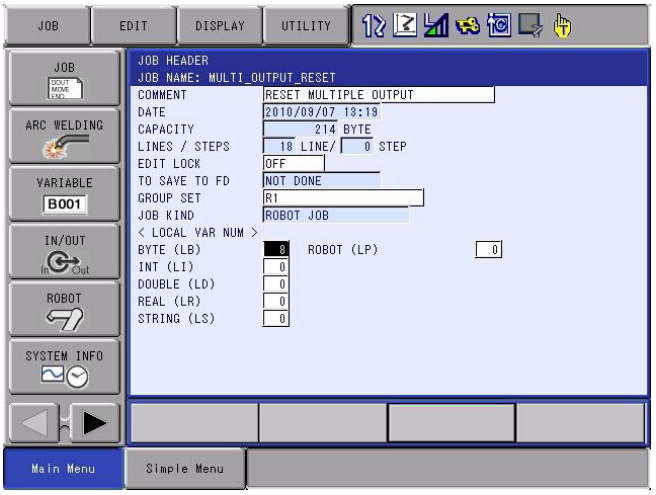
5. 2 Operating Procedure

(1) Addition of Argument to CALL Instruction

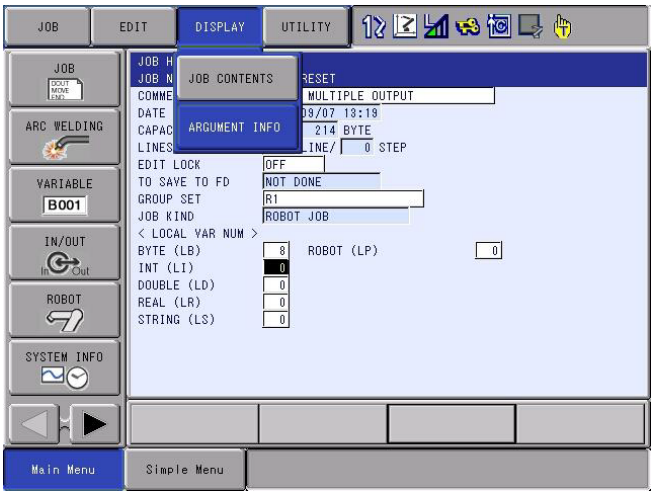
1) Creating a Called Job

As an example, the job which resets 8 I/Os specified by arguments is created as follows:

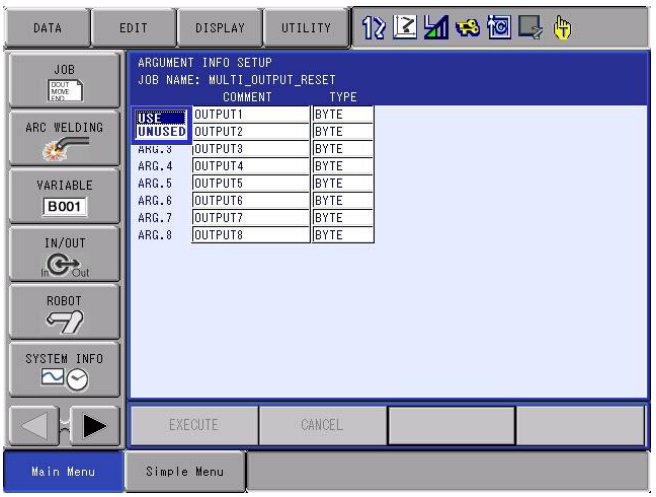
1. Create a job.
   As the example below, the job “MULTI_OUTPUT_RESET” is created.
2. Register local variables.
   Arguments will be received by local variables. Thus, at least, the local variables to receive arguments must be defined. In the example, 8 byte-type variables are defined.
   Open “JOB HEADER” and make the setting of <LOCAL VAR NUM>.



3. Define arguments.
   As shown below, select the pull-down menu {DISPLAY}, then {ARGUMENT INFO}.

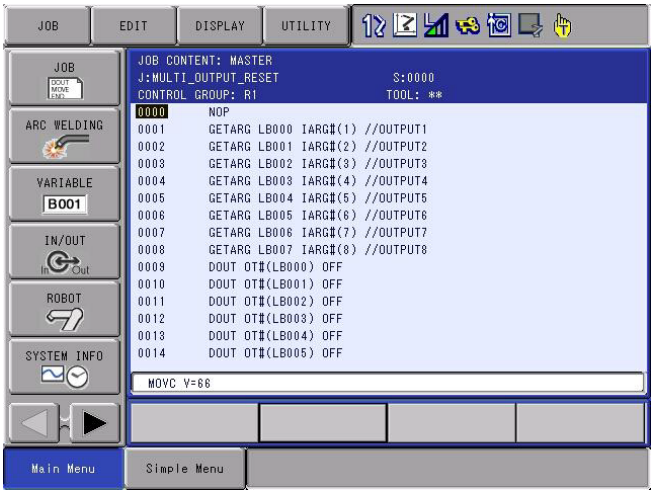


The following display appears. Then, make the setting of arguments. Set “ARG. 1 to 8” on the left to “USE”, set “OUTPUT1 to 8” as “COMMENT”, then select “BYTE” as “TYPE”. Select {EXECUTE} to complete the registration of arguments.



4. Describe the job content.

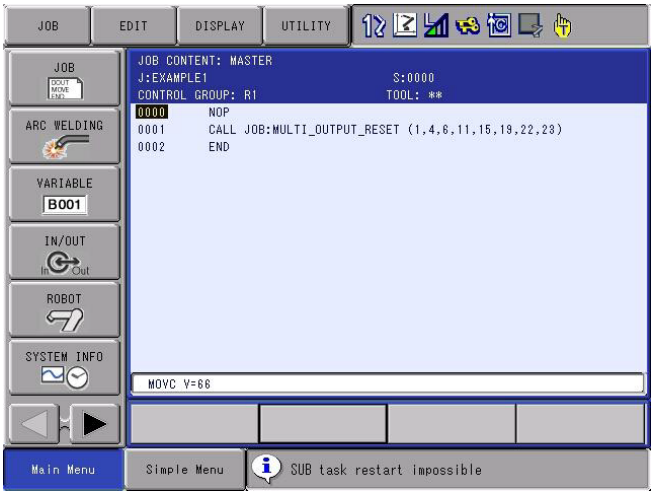
(1) Describe lines to receive arguments.
Press [INFORM LIST], and select {CONTROL}, then “GETARG” to register instructions to receive arguments. (To register the GETARG instruction, select {Main Menu}, {SETUP}, then {TEACHING COND.}, and set “LANGUAGE LEVEL” to “EXPANDED”.) In this case, the above-mentioned COMMENT will be automatically displayed as the comments on the line of GETARG instructions as shown below. Note that arguments must be received by the local variable.



(2) The job content is as follows:

```
NOP
GETARG LB000 IARG#(1)   //OUTPUT1
GETARG LB000 IARG#(2)   //OUTPUT2
GETARG LB000 IARG#(3)   //OUTPUT3
GETARG LB000 IARG#(4)   //OUTPUT4
GETARG LB000 IARG#(5)   //OUTPUT5
GETARG LB000 IARG#(6)   //OUTPUT6
GETARG LB000 IARG#(7)   //OUTPUT7
GETARG LB000 IARG#(8)   //OUTPUT8
DOUT OT#(LB000) OFF
DOUT OT#(LB001) OFF
DOUT OT#(LB002) OFF
DOUT OT#(LB003) OFF
DOUT OT#(LB004) OFF
DOUT OT#(LB005) OFF
DOUT OT#(LB006) OFF
DOUT OT#(LB007) OFF
RET
```

(3) Describe the calling job.
As shown below, call “MULTI_OUTPUT_RESET” in the job.
In this case, if the called job has 8 arguments, 8 arguments must be listed here. If the numbers are not the same, “Alarm 4608: WRONG EXECUTION OF GETARG INST” occurs at execution.



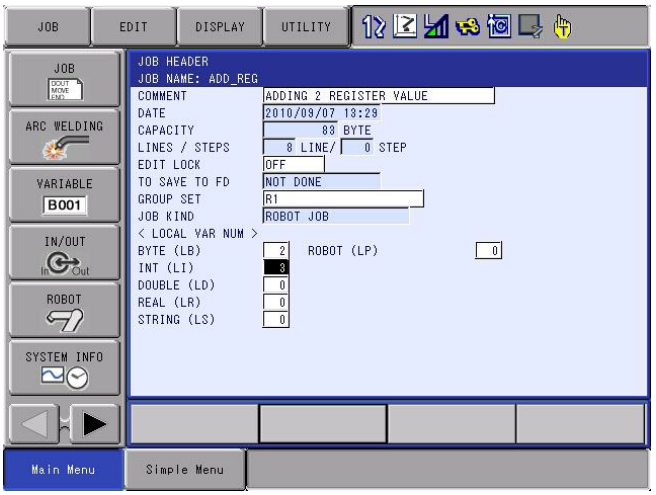
(2) RET Instruction with Return Value

1) Creating a Called Job

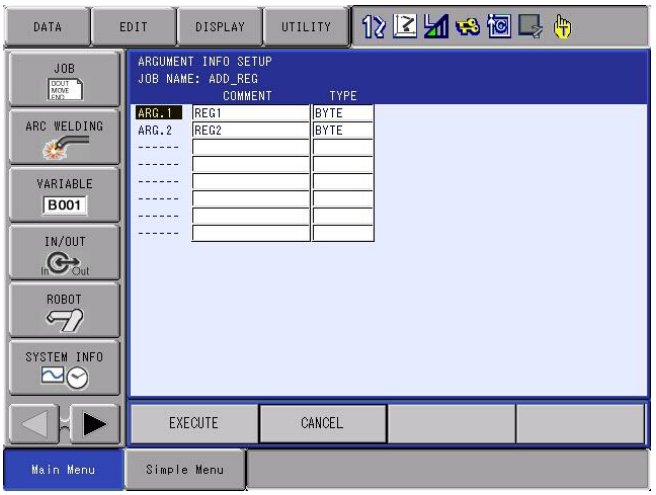
As an example, the job which returns 2 specified register values as the return value is created as follows:

1. Create a job.
   As the example below, the job “ADD_REG” is created.

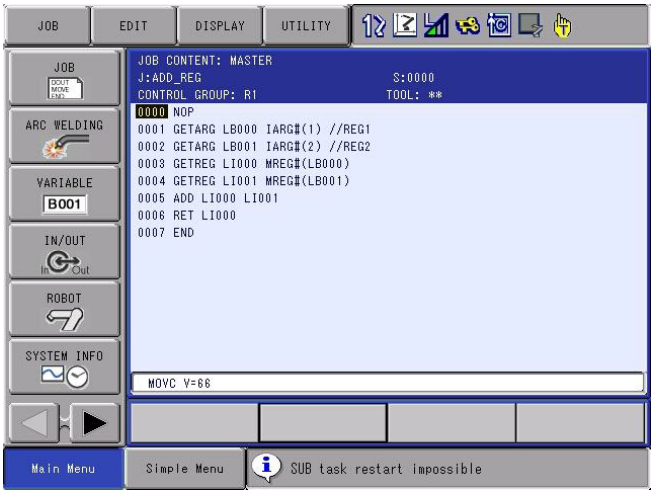
2. Register local variables.
   Register 2 byte-type variables and 3 integer-type variables.



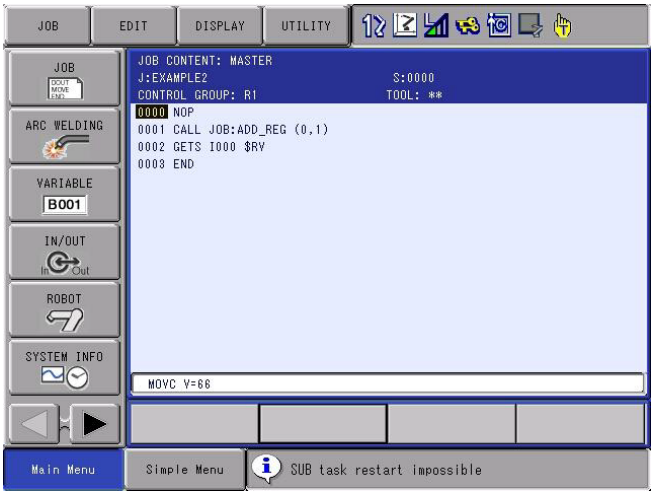
3. Define arguments.
   As shown below, define 2 arguments.



4. Describe the job content.
   Describe the job content as shown below. LI000 is added as the return value at the RET instruction. Thus, the addition result will be returned as the return value.

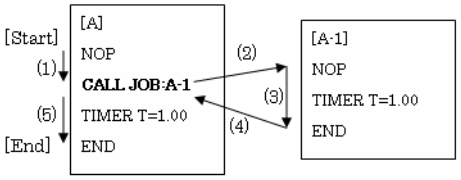


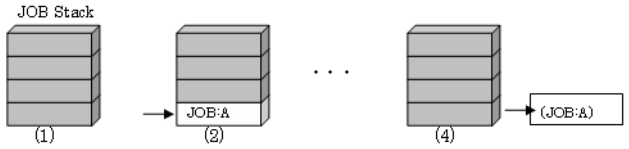
(1) Describe the calling job.
As shown below, describe the calling job. The register numbers to specify are the registers 0 and 1 as “CALL JOB: ADD_REG (0, 1)” shows.
The return value is received at GETS I000 $RV. Thus, the addition result will be returned to I000.



JOB Stack

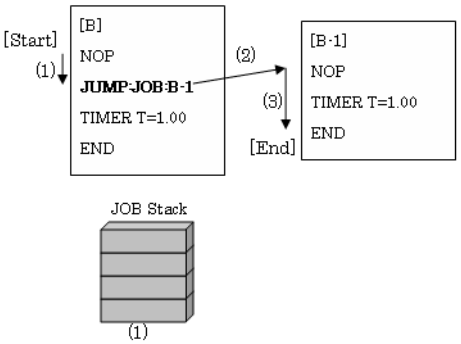
When CALL instruction is executed, a specified job is called up and the information of the calling job is stored in the JOB stack. By executing END or RET instruction, the job execution goes back to the calling job, referring to the information in the JOB stack.



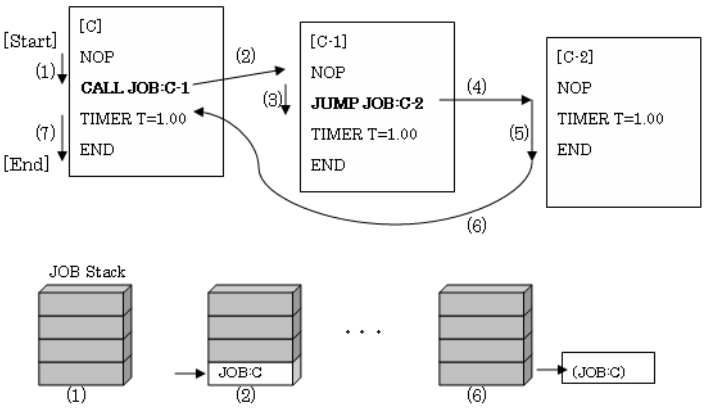


NOTE

The JUMP:JOB instruction calls up a specified job, however, the information of the calling job isn't stored in the JOB stack, so the job execution doesn't go back to the calling job.

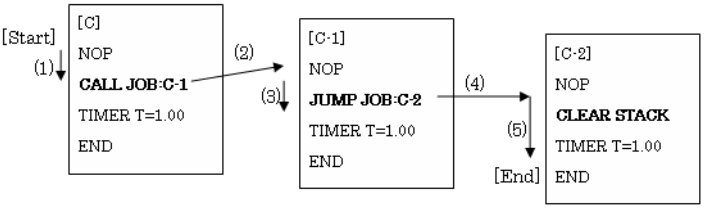


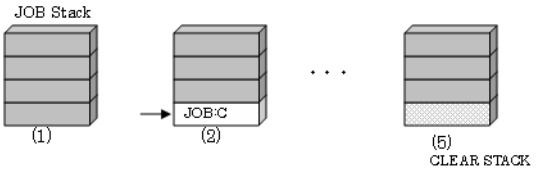
Even when executing JUMP:JOB instruction in the job called by CALL instruction, the job execution goes back to the calling job by executing END or RET instruction after that, referring to the content of the JOB stack.



NOTE

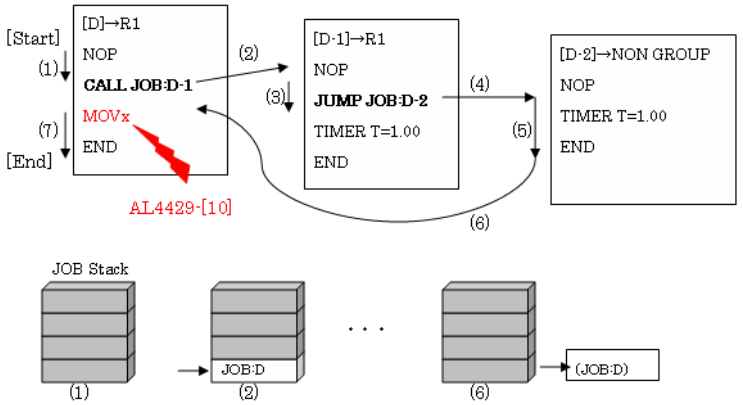
At this time, the control goes back without going through the job which JUMP:JOB instruction is executed, so the manipulator may make an unintentional motion. If there isn't any special reasons, use CLEAR STACK instruction before or after the JUMP:JOB instruction to clear the JOB stack.





NOTE

This is the case that CALL instruction is executed in a job with control groups ([D] in the figure below) to call a job with control groups ([D-1]), and JUMP:JOB instruction is executed in the job ([D-1]) to call a job without control groups. When the job execution turns back to the job with control groups ([D]) from the job without control groups ([D-2]) by executing END or RET instruction and a move instruction is executed after that, “AL4429: WRONG SPECIFIED CONTROL GROUP [10]” occurs and the move instruction is prohibited from executing.
Also in this case, as mentioned above, use CLEAR STACK instruction before or after executing JUMP:JOB instruction to clear the JOB stack.



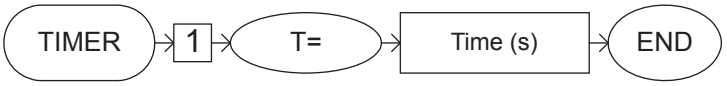
TIMER

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Stops for the specified time.

Construction



Explanation

1. T=timer

Add the following tag.

No	Tag	Explanation	Note
1	T=timer	Specifies the stopping time.	Timer: 0.01 to 655.35 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)

Example

(1) TIMER T=12.50
Stops for 12.5 seconds.

(2) SET I002 5
TIMER T=I002
Stops for 0.05 seconds.

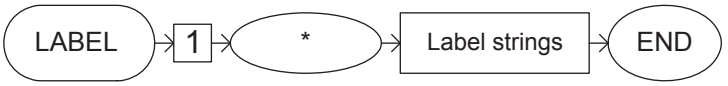
*(LABEL)

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Specifies the label for the jump.

Construction



Explanation

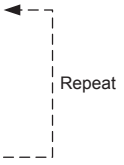
1. *Label strings

Add the following tag.

No	Tag	Explanation	Note
1	*Label strings	Specifies the label strings.	String: 8 characters

Example

(1) NOP
*1
JUMP JOB:1 IF IN#(1)=ON
JUMP JOB:2 IF IN#(2)=ON
JUMP *1
END



IF general input signal No.1 and No.2 are off, if loops infinitely between “*1" and “JUMP *1".

NOTE The label is effective only in the same job. It does not jump to the same label in other jobs.

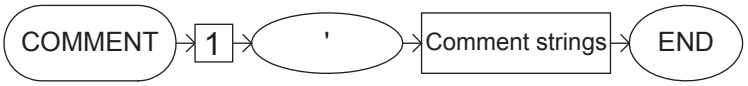
’(COMMENT)

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Specifies the comment.

Construction



Explanation

1. 'Comment strings

Add the following tag.

No	Tag	Explanation	Note
1	'Comment strings	Specifies the comment.	String: 32 characters

Example

(1) NOP
'Waiting Position
MOVJ VJ=100.00
MOVJ VJ=100.00
MOVJ VJ=25.00
'Welding Start
ARCON ASF#(1)
MOVL V=138
'Welding end
ARCOF
MOVJ VJ=25.00
'Waiting Position
MOVJ VJ=100.00
END
The comment clarifies the job content.

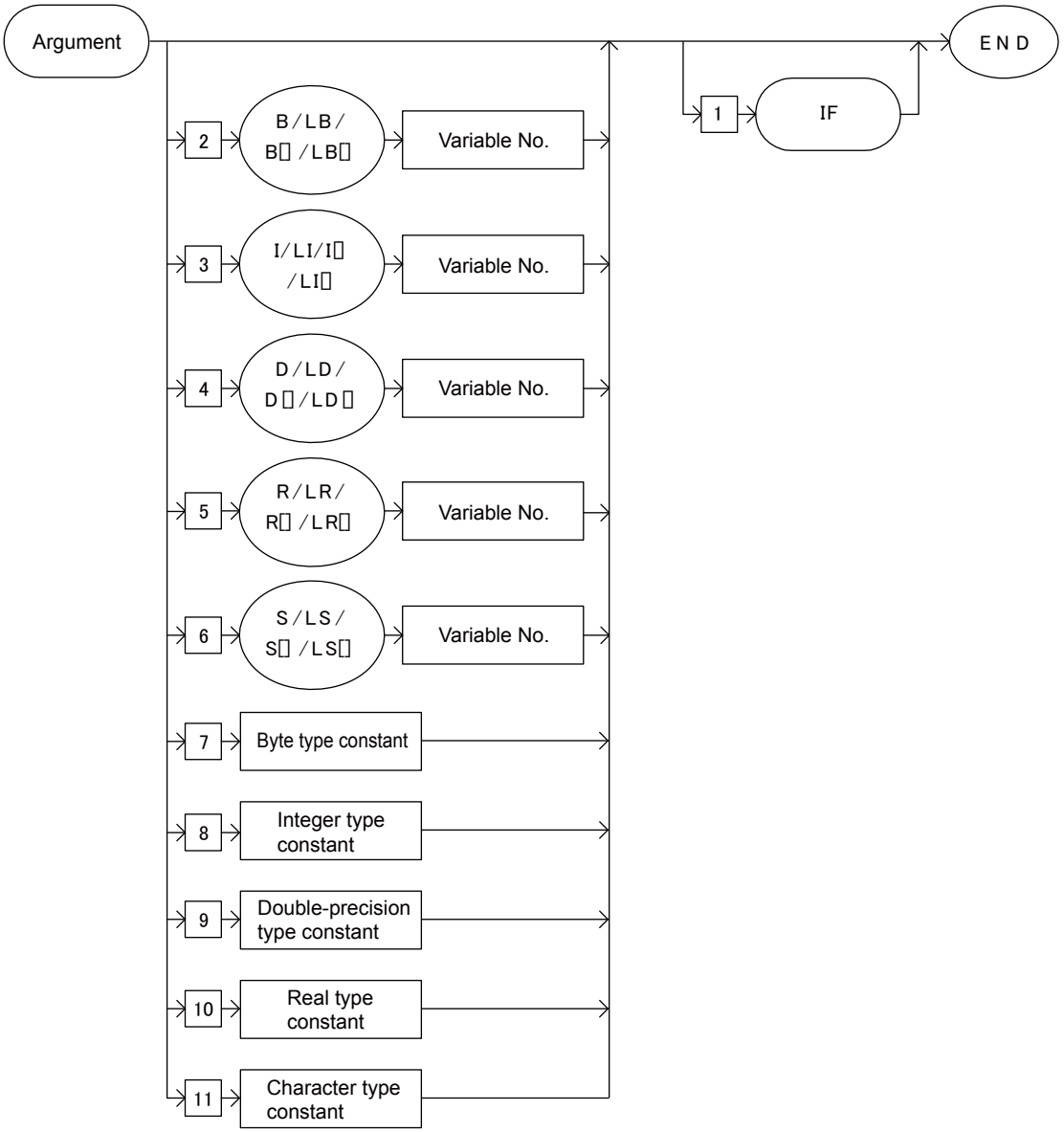
RET

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Returns from the called job to the calling job.

Construction



Explanation

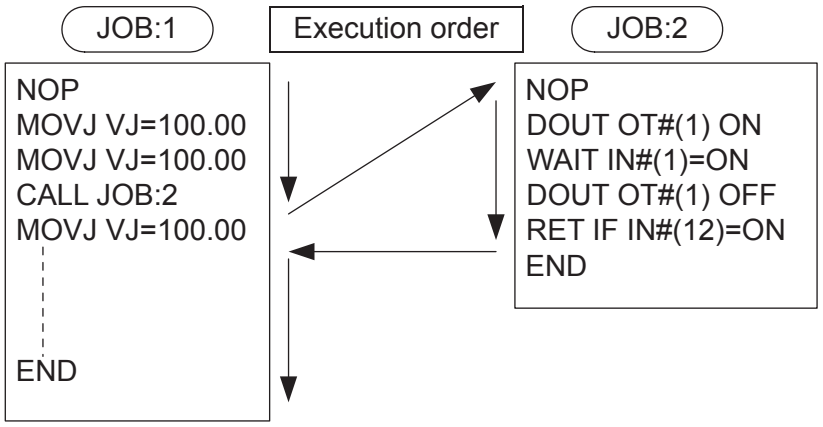
1. IF

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	IF	Specifies the IF instruction.	Refer to *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

Example

(1) RET IF IN#(12)=ON
If general input signal No.12 is on, it returns to the job of the call origin.



2. Return Value

The following tag can be added or omitted.

No	Tag	Explanation	Note
2 to 10	Variables other than position type variables and constants	Can return the return value to the call-origin job.	

Arguments can be added to the CALL instruction, and the return value can be returned with the RET instruction. Variables other than the position type variables (P variable, BP variable, EX variable, and PX variable) and constants can be returned as the return value.

At the call-origin job, the return value is received by the GETS instruction. For details, refer to "5. Argument (page 2-32)" in the explanation of the CALL instruction.

Example

The following example is the case when the value returned from JOB: SAMPLE is received by I000.

```
CALL   JOB: SAMPLE
GETS I000 $RV
```

In this case, at JOB: SAMPLE, the argument must be added to RET as follows:

```
NOP
       :
RET   LI000
END
```

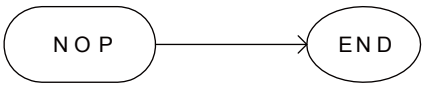
NOP

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out no operation.

Construction



Example

(1) NOP
END

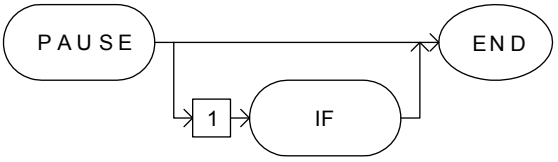
PAUSE

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stops the job temporarily.

Construction



Explanation

1. IF

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	IF	Specifies the IF instruction.	Refer to *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

Example

(1) PAUSE IF IN#(12)=ON
Stops the job temporarily if general-purpose input signal number 12 is ON.

CWAIT

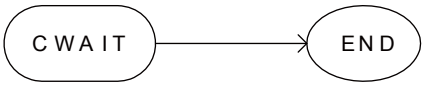
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Releases the NWAIT execution (which simultaneously executes the manipulator operation and instructions excluding the move instruction) and waits for the next instruction line to be carried out.

CWAIT is used with the NWAIT tag, an additional item of a move instruction.

Construction



Example

(1)

<Step>	<Instructions>
n-1	MOVL V=100
n	MOVL V=100 NWAIT
	DOUT OT#(1) ON
	CWAIT
	DOUT OT#(1) OFF
n+1	MOVL V=100

Turns ON the general-purpose output signal number 1 when the manipulator starts moving from the step n-1 to the step n, and turns it OFF when the manipulator reaches the step n.

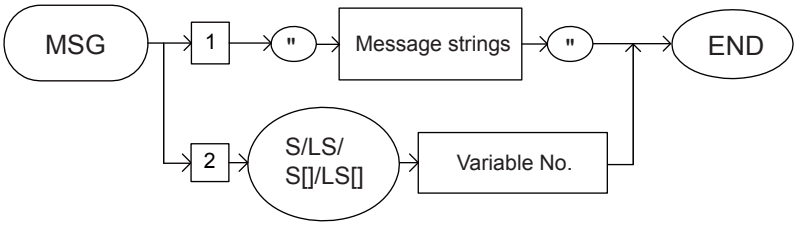
MSG

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Displays the message.

Construction



Explanation

1. "Message strings"/S Variable number/LS Variable number/ S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	'Comment strings	Specifies the comment.	String: 32 characters
2	S Variable number/ LS Variable number/ LS [Array number] S [Array number]	Specifies the character type variable number.	

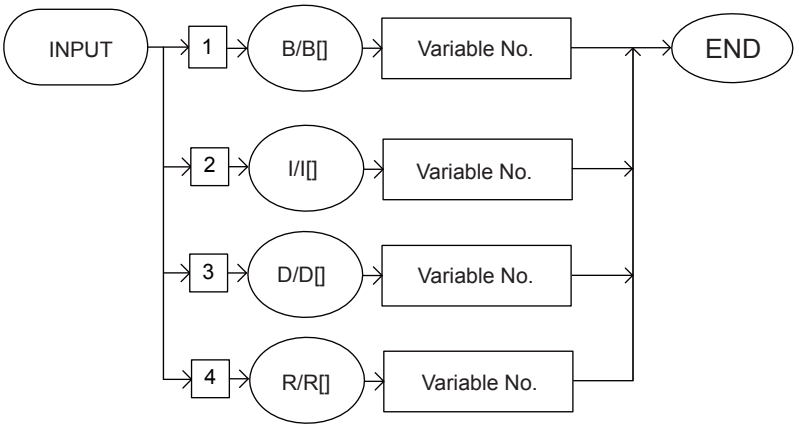
INPUT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Displays the value input window accordance with the specified variable.

Construction



Explanation

1. B Variable number/ B [Array number] /I Variable number/ I [Array number]/D Variable number/ D [Array number]/R Variable number/ R [Array number]

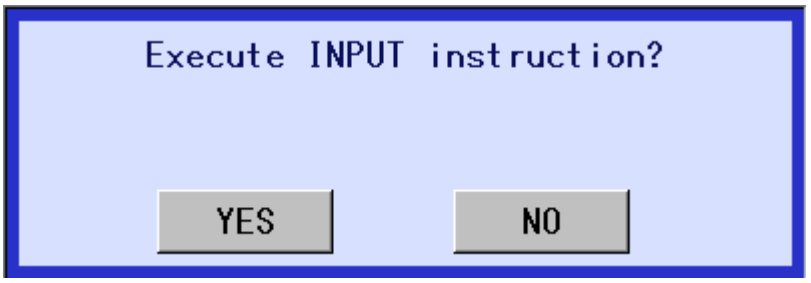
Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	B Variable number/ B [Array number]	Specifies the byte type variable number to set value by numeric value input.	
2	I Variable number/ I [Array number]	Specifies the integer type variable number to set value by numeric value input.	
3	D Variable number/ D [Array number]	Specifies the double-precision integer type variable number to set value by numeric value input.	
4	R Variable number/ R [Array number]	Specifies the real type variable number to set value by numeric value input.	

Example

(1) INPUT B000

The following dialog appears when execute the instruction.



When select {NO}, INPUT instruction is ended.

When select {YES}, the following input window appears.
Input “100” and press {ENTER}. “100” is stored into B000, and INPUT instruction is ended.

ADVINIT

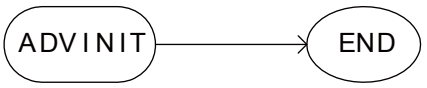
SUBSET	STANDARD	EXPANDED
Not available	Not available	Available

Function

When the same variable is used for multiple systems in the optional independent control function, ADVINIT controls the timing to change the variable data among the systems.

ADVINIT is an instruction used to control DX200 internal processing, therefore, executing this instruction does not affect the job.

Construction



ADVSTOP

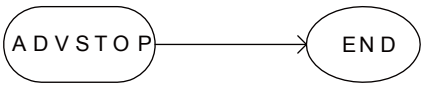
SUBSET	STANDARD	EXPANDED
Not available	Not available	Available

Function

When the same variable is used for multiple systems in the optional independent control function, ADVSTOP controls the access timing of the variable data among the systems.

ADVSTOP is an instruction used to control DX200 internal processing, therefore, executing this instruction does not affect the job.

Construction



PRINT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

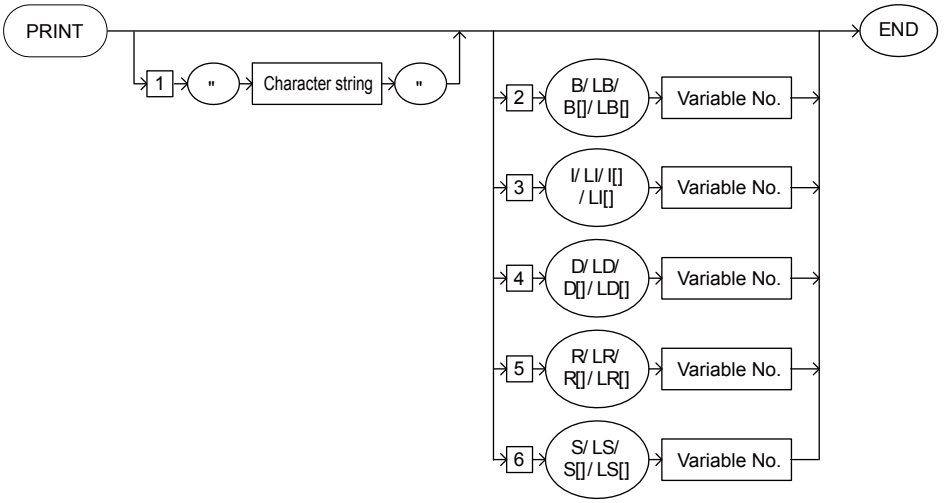
Shows the specified character string and variable on the terminal display.

* Terminal display: Select {Main Menu}, {IN/OUT}, then {TERMINAL} to show it.

If the independent control function is enabled, the page is different for each task.

Construction

PRINT <Data 1> <Data 2>



Explanation

1. Character string: Shows the specified character string on the terminal display.

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	Character string	Specifies the character string to be shown on the terminal display.	<Data 1> String: 32 characters

2. B Variable number / LB Variable number / B [Array number] / LB [Array number] / I Variable number / LI Variable number / I [Array number] / LI [Array number] / D Variable number / LD Variable number / D [Array number] / LD [Array number] / R Variable number / LR Variable number / R [Array number] / LR [Array number] / S Variable number / LS Variable number / S [Array number] / LS [Array number]

Select one of the above 2. to add or omit.

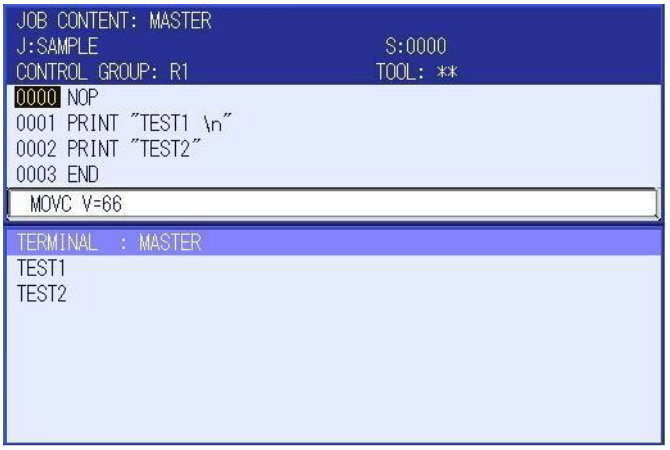
* To show the character string and variable on the terminal display, specify “character string%*” as the character string tag of the above 1. (%x (hexadecimal),%o (octal),%d (decimal),%s (character string),%f (real number),%e (exponent))

No	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number.	<Data 2>
3	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the integer type variable number.	<Data 2>
4	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the double-precision type variable number.	<Data 2>
5	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the real type variable number.	<Data 2>
6	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the character type variable number.	<Data 2>

Example

(1) PRINT “TEST”
Show TEST on the terminal display.

(2) PRINT “TEST\n”
Show TEST on the terminal display, and start a new line.



(3) PRINT “TEST%d” B001
Show TEST on the terminal display, and display the value of B001 in decimal notation.

(4) PRINT B001
Show the value of B001 on the terminal display.

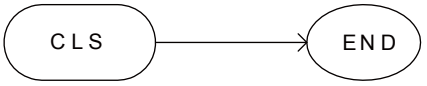
CLS

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Deletes the character string shown on the terminal display.

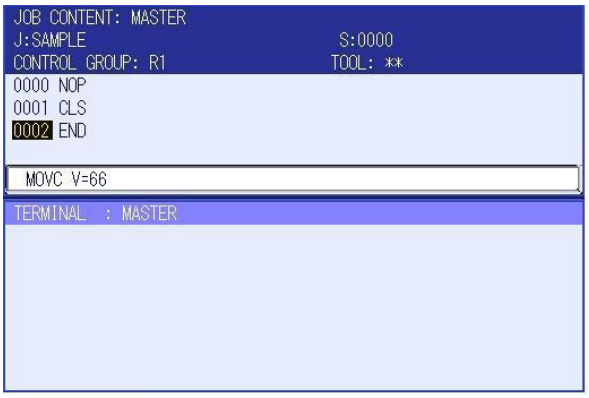
Construction



Example

(1) CLS
Deletes the character string shown on the terminal display.

<Before executing CLS instruction>



<After executing CLS instruction>

ABORT

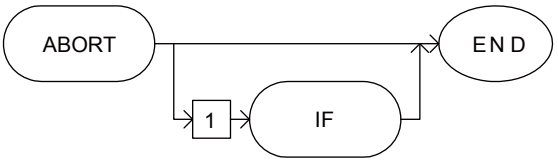
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Suspends playback, and shows “Robot is stopped by execution ABORT command.” on the human interface display area.

After the playback is suspended by ABORT instruction, it will not restart until the job is reselected on the JOB SELECT window.

Construction



Explanation

1. IF

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	IF	Specifies the IF instruction.	Refer to *chapter 2.6 “Instruction Which Adheres to an Instruction”* .

Example

(1) ABORT
Stops the playback of job, and displays the message “Robot is stopped by execution ABORT command.”

(2) ABORT IF B000=1
Stops the playback of job when B000 is 1, and displays the message “Robot is stopped by execution ABORT command.”

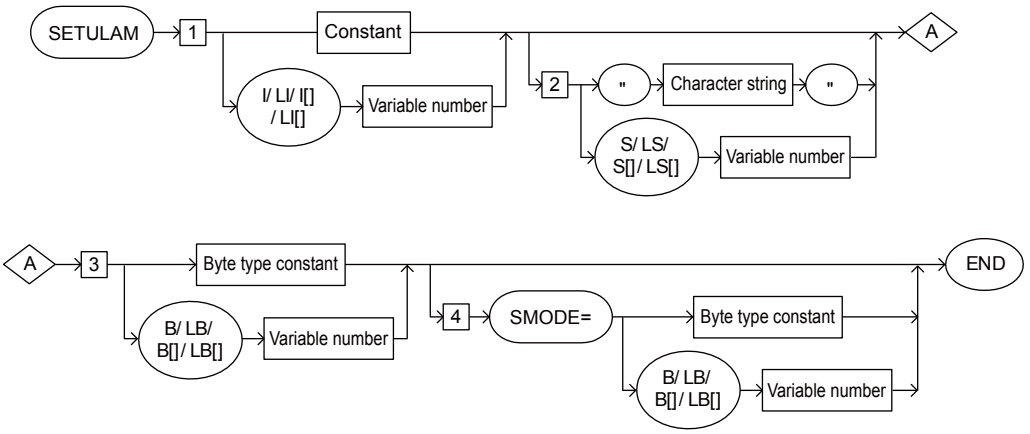
SETUALM

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Generates an alarm with any given number, name and subcode.

Construction



Explanation

1. Alarm Code

Add the following tag.

No	Tag	Explanation	Note
1	I Variable number/ LI Variable number/ I [Variable number]/ LI [Variable number]/ [Constant]	Specifies the integer type variable number.	Number: 8000 to 8999

2. Alarm Name

The following tag can be added or omitted.

No	Tag	Explanation	Note
2	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]/ [Character string]	Specifies the alarm name.	String: 32 characters S variable: 16 characters

3. Subcode

Add the following tag.

No	Tag	Explanation	Note
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]/ [Byte type constant]	Specifies the byte type variable number.	Number: 0 to 255

4. SMODE (Operation Stop Mode)

The following tag can be added or omitted.

No	Tag	Explanation	Note
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]/ [Byte type constant]	Specifies SMODE (operation stop mode).	Number: 0: All Tasks Job Stop 1: No Job Stop 2: Each Task Job Stop

Example

(1) SETUALM 8000 0
The alarm with the alarm number 8000 and subcode 0 occurs.

(2) SETUALM 8000 “ALM” 0 SMODE=1
The alarm with the alarm number 8000, alarm name ALM, and subcode 0 occurs.
If SMODE is 1, the job does not stop.

By this instruction, the execution of job is stopped according to SMODE after the alarm occurs.

It does not guarantee that the execution of job stops immediately after the instruction is executed.

DIALOG

SUBSET	STANDARD	EXPANDED	PARAMETER
Not available	Available	Available	S2C400

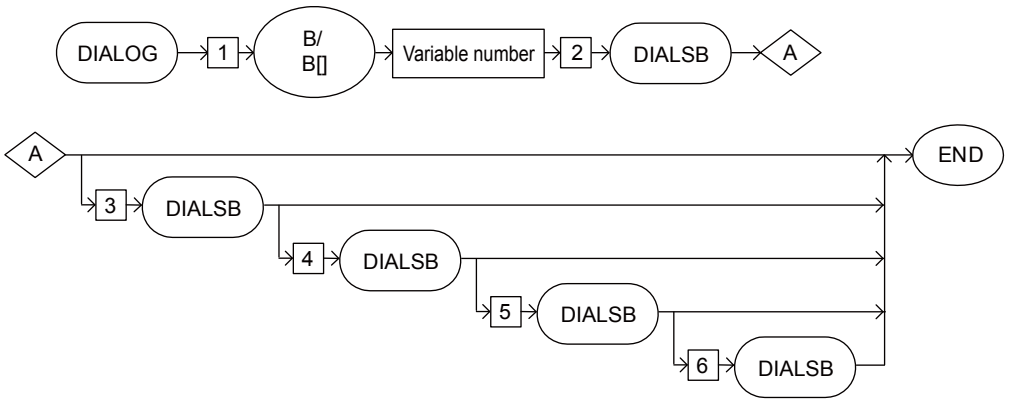
Function

Shows the dialog during the execution of job.

If the current display is not the PLAYBACK window, the PLAYBACK window is displayed when the dialog is shown by the execution of DIALOG instruction.

The job does not proceed while the dialog is shown (waiting for button input).

Construction



Explanation

1. B Variable number / B [Array number]: Selection result

Select the first, second, third, fourth, and fifth button to store 1, 2, 3, 4, and 5 in the specified B variable respectively.

Make sure to add the following tag.

No	Tag	Explanation	Note
1	B Variable number/ B [Array number]	Specifies the byte type variable number.	

Make sure to add the following tag for the first DIALSB in the DIALOG instruction.

2. DIALSB (First)

Shows a message and one button in the dialog.
For details, refer to “DIALSB”.

Make sure to add the following tag.

No	Tag	Explanation	Note
2	DIALSB	Select the button shown by this instruction to store 1 in the selection result.	

3. DIALSB (Second and after)

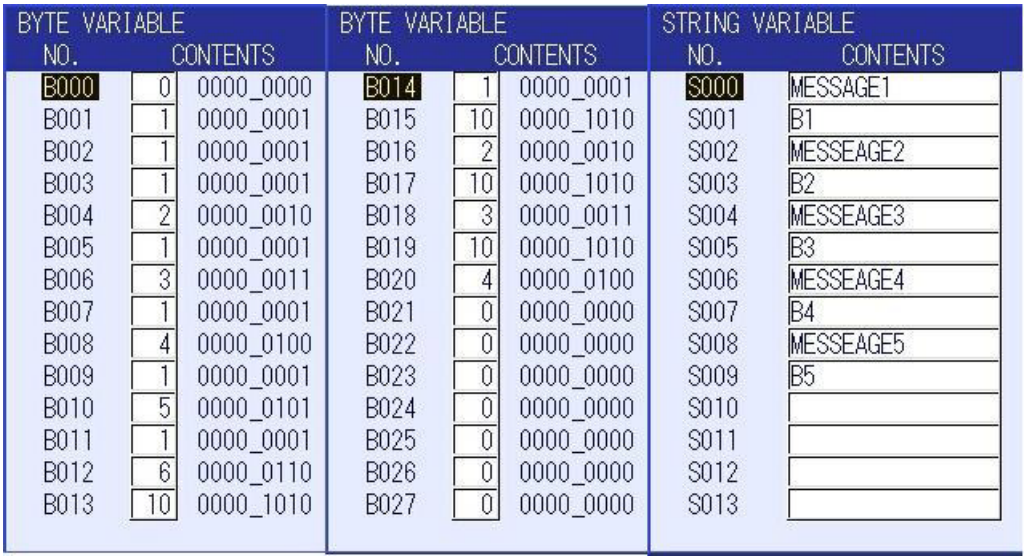
Adds a message and one button in the dialog.
For details, refer to “DIALSB”.

The following tag can be added or omitted.

No	Tag	Explanation	Note
3	DIALSB	Select the button shown by this instruction to store 2 in the selection result.	
4	DIALSB	Select the button shown by this instruction to store 3 in the selection result.	
5	DIALSB	Select the button shown by this instruction to store 4 in the selection result.	
6	DIALSB	Select the button shown by this instruction to store 5 in the selection result.	

Example

The variable settings are shown below.



BYTE VARIABLE

NO.	CONTENTS	
B000	0	0000_0000
B001	1	0000_0001
B002	1	0000_0001
B003	1	0000_0001
B004	2	0000_0010
B005	1	0000_0001
B006	3	0000_0011
B007	1	0000_0001
B008	4	0000_0100
B009	1	0000_0001
B010	5	0000_0101
B011	1	0000_0001
B012	6	0000_0110
B013	10	0000_1010

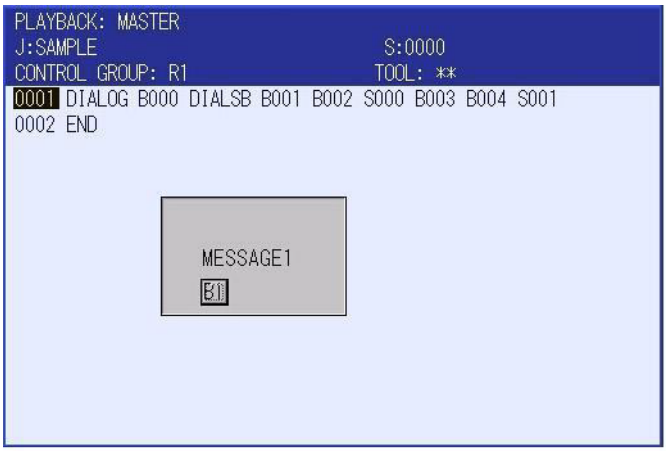
BYTE VARIABLE

NO.	CONTENTS	
B014	1	0000_0001
B015	10	0000_1010
B016	2	0000_0010
B017	10	0000_1010
B018	3	0000_0011
B019	10	0000_1010
B020	4	0000_0100
B021	0	0000_0000
B022	0	0000_0000
B023	0	0000_0000
B024	0	0000_0000
B025	0	0000_0000
B026	0	0000_0000
B027	0	0000_0000

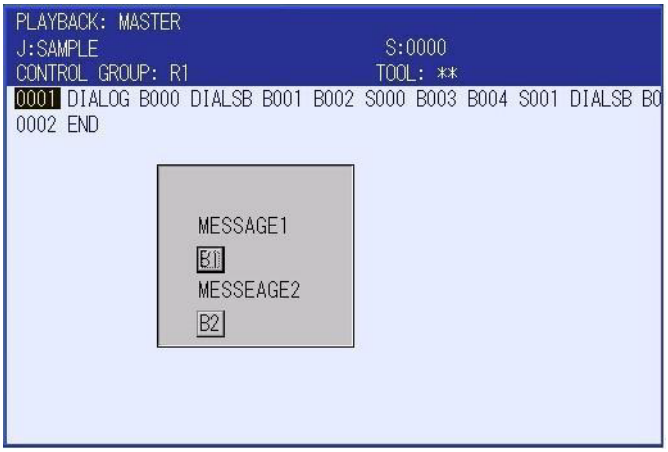
STRING VARIABLE

NO.	CONTENTS
S000	MESSAGE1
S001	B1
S002	MESSEAGE2
S003	B2
S004	MESSEAGE3
S005	B3
S006	MESSEAGE4
S007	B4
S008	MESSEAGE5
S009	B5
S010	
S011	
S012	
S013	

(1) DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
Shows the message of S000 at coordinates (B001, B002), and shows the button with the name of S001 at coordinates (B003, B004).
When the button is clicked, the result is stored in B000.

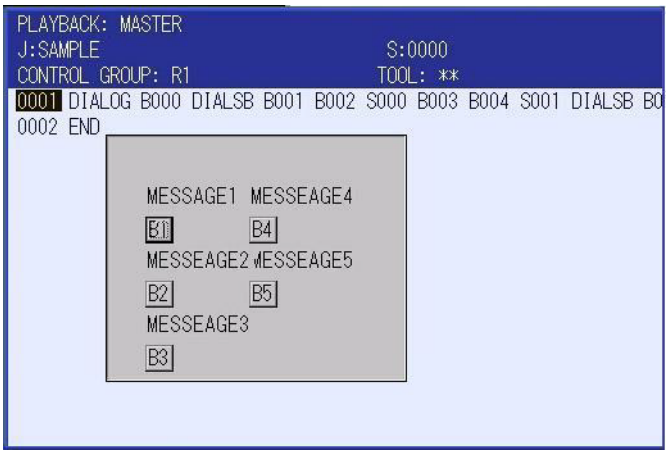


(2) DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
DIALSB B005 B006 S002 B007 B008 S003
Shows the message of S000 at coordinates (B001, B002), and shows the button with the name of S001 at coordinates (B003, B004).
Shows the message of S002 at coordinates (B005, B006), and shows the button with the name of S003 at coordinates (B007, B008).
When the button is clicked, the result is stored in B000.
(With B1, 1 is stored. With B2, 2 is stored.)



(3) DIALOG B000 DIALSB B001 B002 S000 B003 B004 S001
DIALSB B005 B006 S002 B007 B008 S003
DIALSB B009 B010 S004 B011 B012 S005
DIALSB B013 B014 S006 B015 B016 S007
DIALSB B017 B018 S008 B019 B020 S009

Shows the message of S000 at coordinates (B001, B002), and shows the button with the name of S001 at coordinates (B003, B004).
Shows the message of S002 at coordinates (B005, B006), and shows the button with the name of S003 at coordinates (B007, B008).
Shows the message of S004 at coordinates (B009, B010), and shows the button with the name of S005 at coordinates (B011, B012).
Shows the message of S006 at coordinates (B013, B014), and shows the button with the name of S007 at coordinates (B015, B016).
Shows the message of S008 at coordinates (B017, B018), and shows the button with the name of S009 at coordinates (B019, B020).
When the button is clicked, the result is stored in B000.
(1, 2, 3, 4, and 5 is stored with B1, B2, B3, B4, and B5, respectively.)



SWITCH

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction refers to the specified variable, and determines the next instruction to perform.

Combining the CASE instruction or the DEFAULT instruction enables to branch the more than three directions.

This instruction is a structured language.

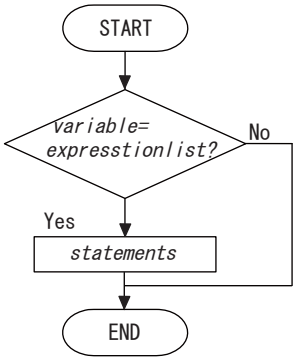
Construction

SWITCH *variable* CASE *expressionlist*

[*statements*]

ENDSWITCH

Specified item	Contents
variable	Indicates the variable to use the conditional branch. I variable or LI variable can be specified.
expresstionlist	The branch destination of *variable.* Must be specified.
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*



CASE

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction adds a branch of the next instruction for the SWITCH instruction.

This instruction can be registered between SWITCH and ENDSWITCH. The multiple CASE instructions can be registered within range.

This instruction is a structured language.

Construction

SWITCH *variable* CASE *expressionlist*

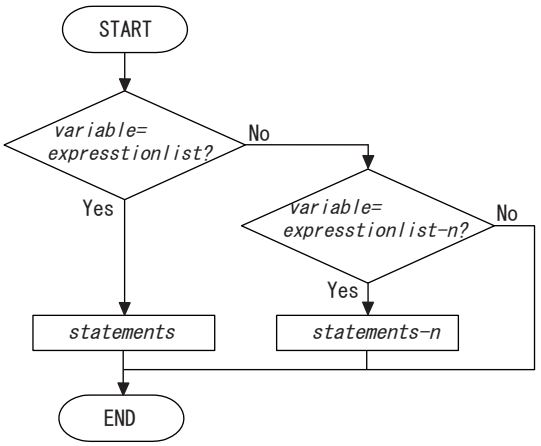
[*statements*]

CASE *expressionlist-n*

[*statements-n*]

ENDSWITCH

Specified item	Contents
variable	Indicates the variable to use the conditional branch. I variable or LI variable can be specified.
expresstionlist	This is the first branch destination of *variable.* Must be specified.
expresstionlist-n	This is a branch destination of *variable after second branch.*
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*
statements-n	The series of processing to be executed when *variable* value is equal to *expresstionlist-n.*


START
variable=
expresstionlist?
No
Yes
variable=
expresstionlist-n?
No
Yes
statements
statements-n
END

DEFAULT

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction determines a location to execute the instruction when the instruction does not corresponded to the any branches of the SWITCH.

This construction can be only registered between SWITCH and ENDSWITCH.

Able to register only one instruction within a range.

This instruction is a structured language.

Construction

SWITCH *variable* CASE *expresstionlist*

[*statements*]

CASE *expresstionlist-n*

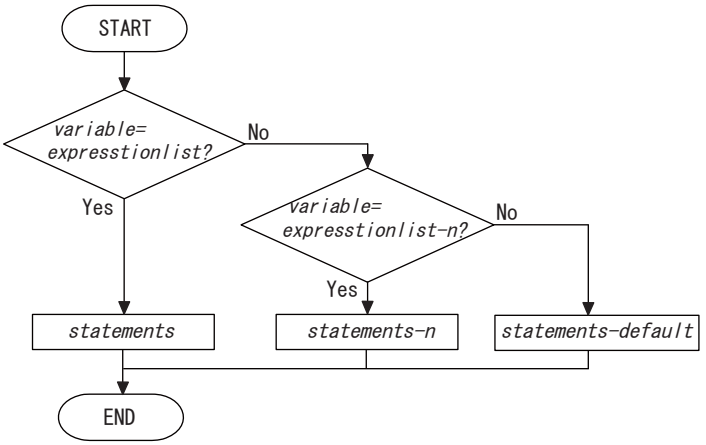
[*statements-n*]

DEFAULT

[*statements-default*]

ENDSWITCH

Specified item	Contents
variable	Indicates the variable to use the conditional branch. I variable or LI variable can be specified.
expresstionlist	This is the first branch destination of *variable.* Must be specified.
expresstionlist-n	This is a branch destination of *variable after second branch.*
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*
statements-n	The series of processing to be executed when *variable* value is equal to *expresstionlist-n.*
statements-default	The series of processing to be executed when *variable* value and *expresstionlist* or *expressionlist-n* does not correspond.


START
variable=
expresstionlist?
No
Yes
variable=
expresstionlist-n?
No
Yes
statements
statements-n
statements-default
END

WHILE

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Determines true or false of the added conditional expression, and execute the series of instructions within a range when it is true.

Repeats the instruction as long as the conditional expression is true.

This instruction is a structured language.

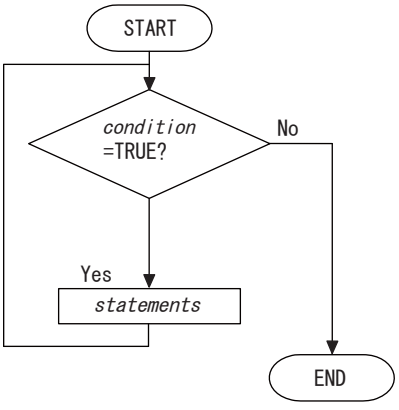
Construction

WHILE (*condition*)

[*statements*]

ENDWHILE

Specified item	Contents
condition	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the “AND”, “OR” and brackets “()”.
statements	The series of processing to be executed when *variable* value is equal to *expresstionlist.*



FOR

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Executes the repetition of the series of the instructions for specified number of times within a range.

This instruction is a structured language.

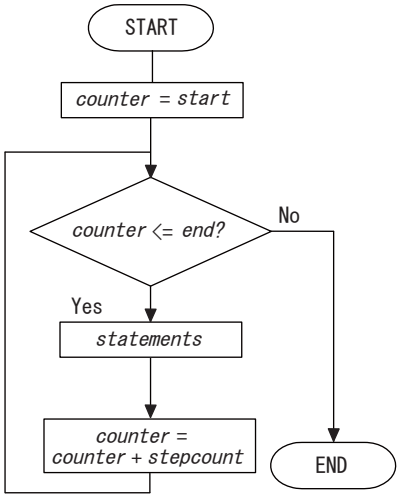
Construction

FOR *counter*=*start* TO *end* STEP *stepcount*

[*statements*]

ENDSWITCH

Specified item	Contents
counter	Specifies the variable to use the loop counter. Able to specify the I variable or LI variable.
start	Specifies the initial value of the argument counter.
end	Specifies the end value of the argument counter.
stepcount	Specifies the add value to the argument counter by each loop. When omitted, it is added by one value.
statements	The series of processing to be executed within the loop.



IFTHEN

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Determines true or false of the added conditional expression, and then execute the next instruction.

Enables to operate the sequential processing by combining the ELSEIF instruction and ELSE instruction.

This instruction is a structured language.

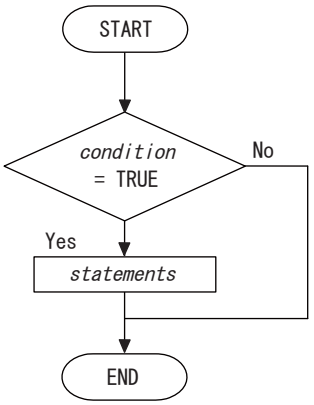
Construction

IF (*condition*)THEN

[*statements*]

ENDIF

Specified item	Contents
condition	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the “AND”, “OR” and brackets “()”.
statements	The series of processing to be executed when the argument *condition* is true.



ELSEIF

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Executes the new conditional expression if the conditional expression of the IFTHEN instruction or the ELSEIF instruction is false.

This instruction can be registered only between IFTHEN and ENDIF. The multiple ELSIF instructions can be registered within a range.

This instruction is a structured language.

Construction

IF (*condition*)THEN

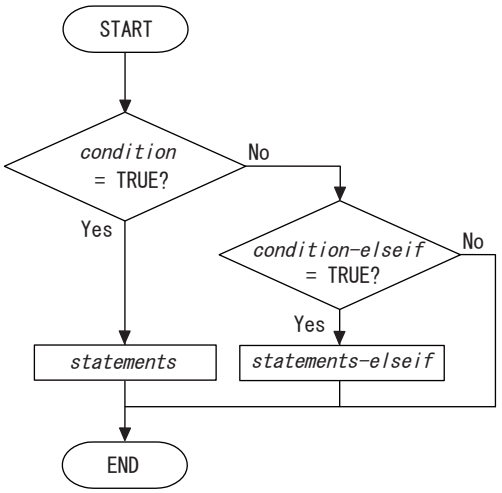
[*statements*]

ELSEIF(*condition-elseif*)THEN

[*statements-elseif*]

ENDIF

Specified item	Contents
condition *condition-elseif*	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the “AND”, “OR” and brackets “()”.
statements	The series of processing to be executed when the argument *condition* is true.
statements-elseif	The series of processing to be executed when the argument *condition-elseif* is true.


START
condition
= TRUE?
No
Yes
condition-elseif
= TRUE?
No
Yes
statements
statements-elseif
END

ELSE

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

This instruction determines a location to execute the instruction when the all instructions do not corresponded to the any branches of the SWITCH.

This instruction can be registered only between SWITCH and ENDSWITCH.

Able to register only one instruction within a range.

This instruction is a structured language.

Construction

IF (*condition*)THEN

[*statements*]

ELSEIF(*condition-elseif*)THEN

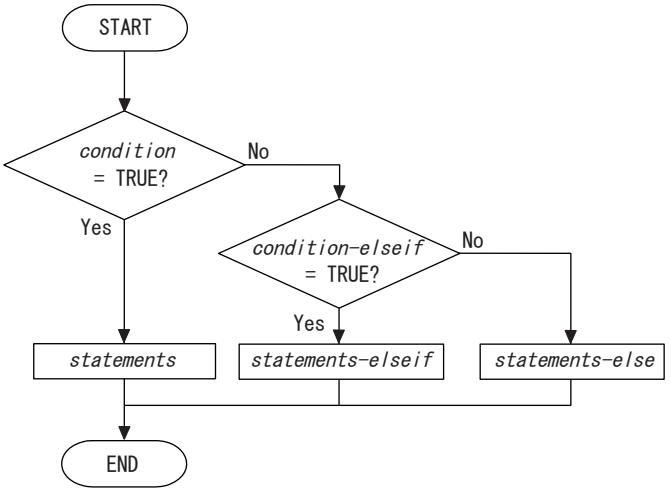
[*statements-elseif*]

ELSE

[*statements-else*]

ENDIF

Specified item	Contents
condition *condition-elseif*	The conditional expression to determine true or false. Able to specify up to six conditional expressions by using the “AND”, “OR” and brackets “()”.
statements	The series of processing to be executed when the argument *condition* is true.
statements-elseif	The series of processing to be executed when the argument *condition-elseif* is true.
statements-else	The series of processing to be executed when all of the defined conditional expressions before ELSE instruction are false.


START
condition
= TRUE?
No
Yes
condition-elseif
= TRUE?
No
Yes
statements
statements-elseif
statements-else
END

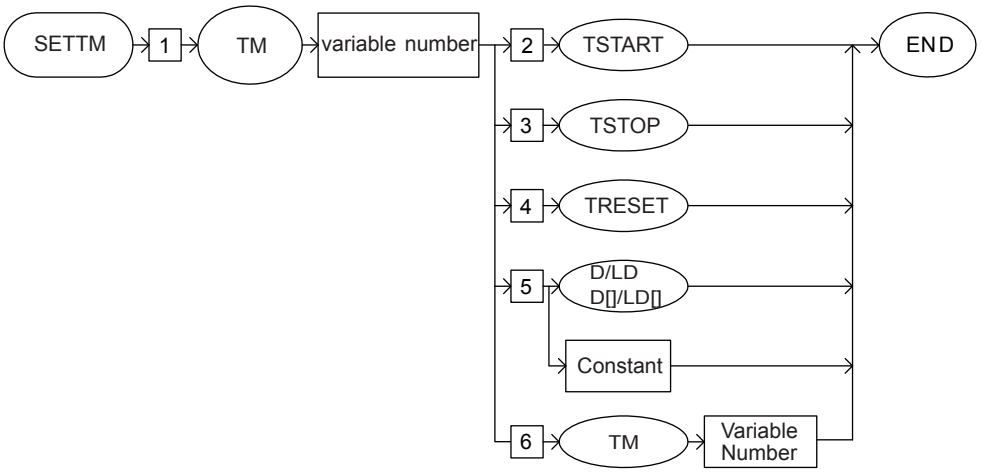
SETTM

SUBSET	STANDARD	EXPANDED
Not Available	Available	Available

Function

Execute these function, such as to start measuring, to end, to reset, and to set the time.

Construction



Explanation

1. TM variable number

Add the following tag.

No	Tag	Explanation	Note
1	TM variable number	Specifies the TM variable number for the measurement time writing.	Number: 0 to 59

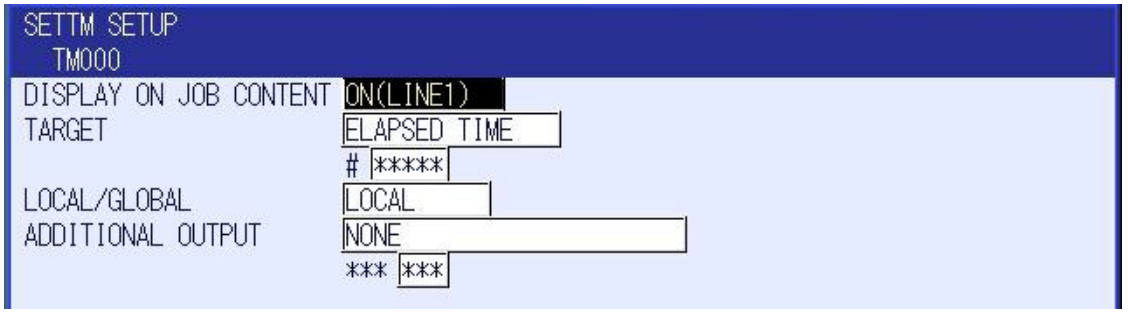
2. TMSTART/TSTOP/TRESET/D Variable number/LD Variable number/D [Arrangement number]/LD [Arrangement number]/Constant/TM Variable number

Select one of them shown in the table below.

No	Tag	Explanation	Note
2	TSTART	Specifies to start the time measurement.	
3	TSTOP	Specifies to finish the time measurement.	
4	TRESET	Specifies to reset the time measurement.	
5	D Variable number / LD Variable number / D [Arrangement number]/ LD [Arrangement number]/ [Constant]	Specifies the time measurement by the integer type variable.	Number: -2147483648 to 2147483647
6	TM variable number	Specifies the time measurement by timer variable.	Number: 0 to 59

Example

The motion setting of SETTM is shown below.



(1) SETTM TM000 TSTART
Starts measuring and sets the measurement time on TM000.

(2) SETTM TM000 TSTOP
Finishes measuring and sets the measurement time on TM000.

(3) SETTM TM000 TRESET
Sets 0 for the measurement time of TM000.

(4) SETTM TM000 1000
Sets 1000 for the measurement time of TM000, and starts measuring at the same time.

(5) SETTM TM000 TM001
Sets TM001 for measuring time of TM000, and starts measuring at the same time.

2.3 Operating Instruction

CLEAR

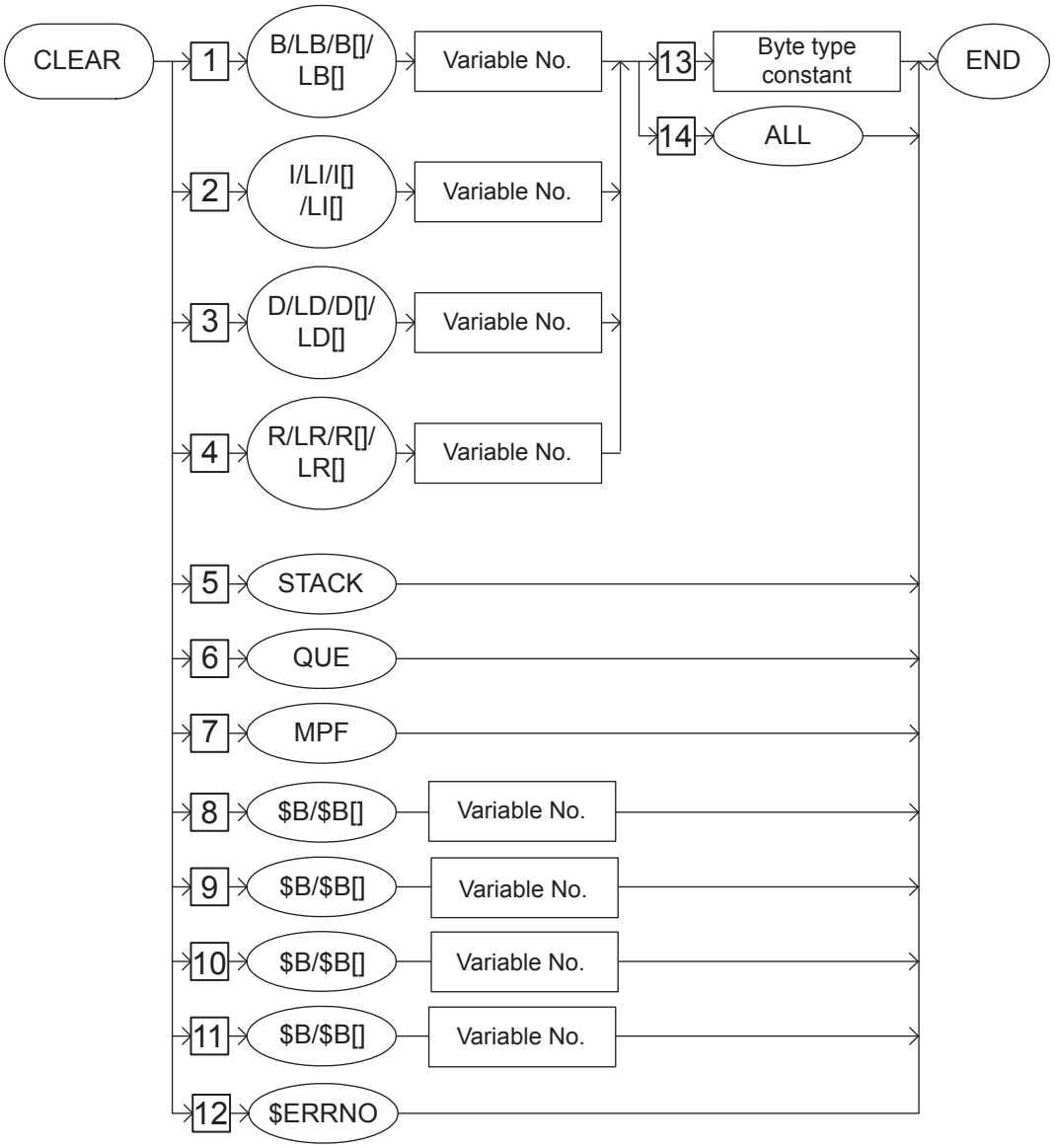
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

In Data 1, the variable content from the specified number on, is cleared to 0 only by the amount specified in Data 2.

Construction

CLEAR <Data 1> <Data 2>



Explanation

1. B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number/ LR Variable number /R [Array number] /LR [Array number] /STACK/QUE/MPF/$B Variable number /$B [Array number] /$I Variable number /$I [Array number] /$D Variable number /$D [Array number] /$R Variable number /$R [Array number] / $ERRNO

Choose one of the tags from the following table.

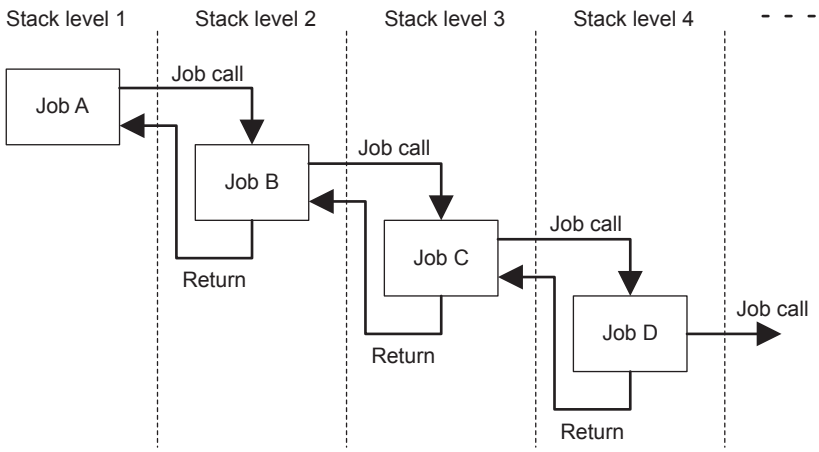
No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be cleared.	< Data 1 >
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be cleared.	< Data 1 >
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to be cleared.	< Data 1 >
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable to be cleared.	< Data 1 >
5	STACK	There are eight stacks, and they store the called position.	< Data 1 >
6	QUE	Clears all the job queues.	<Data 1> Available only with the job queue function (option: S2C641)
7	MPF	Clears all the contents of the memo play file.	<Data 1> Available only with the optional memo play function.
8	$B Variable number/ $B [Array number]	Specifies the byte type system variable to clear.	<Data 1>
9	$I Variable number/ $I[Array number]	Specifies the integer type system variable to clear.	<Data 1>

No	Tag	Explanation	Note
10	$D Variable number/ $D [Array number]	Specifies the double precision type system variable to clear.	<Data 1>
11	$R Variable number/ $R [Array number]	Specifies the real type system variable to clear.	<Data 1>
12	$ERRNO	Clear the all error status.	<Data 1> Available only with the optional system job function

SUPPLE -MENT

About the job call stack

There are eight stacks, and they store the called position.



2. Byte type constant /ALL

When a B Variable number, LB Variable number, B [Array number], LB [Array number], I Variable number, LI Variable number, I [Array number], LI [Array number], D Variable number, LD Variable number, D [Array number], LD [Array number], R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

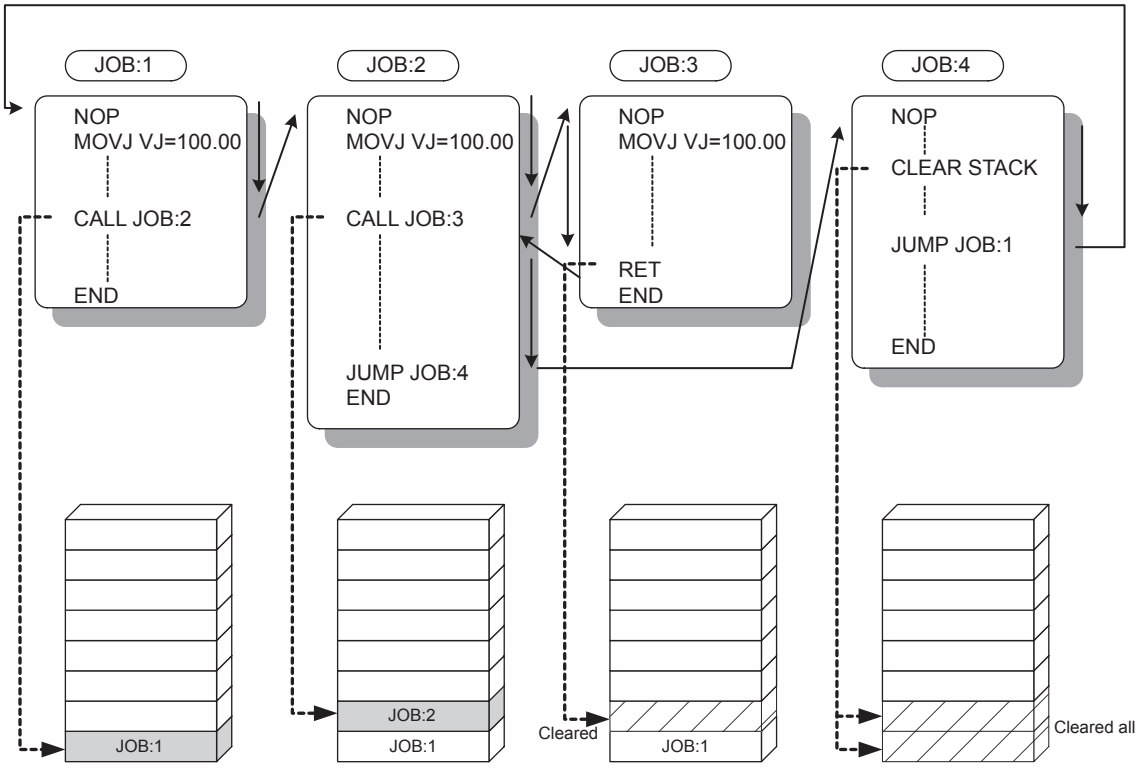
No	Tag	Explanation	Note
13	Byte type constant	Specifies the number cleared starting from the number of the specified variable.	
14	ALL	All variables starting from the number of the specified variable are cleared.	

Example

(1) CLEAR B003 10
The content of the variables from B003 to B0012 are cleared to 0.

(2) CLEAR D010 ALL
The content of all the double precision type variables is cleared to 0 starting from D010.

(3) CLEAR STACK
All the job call stacks are cleared.



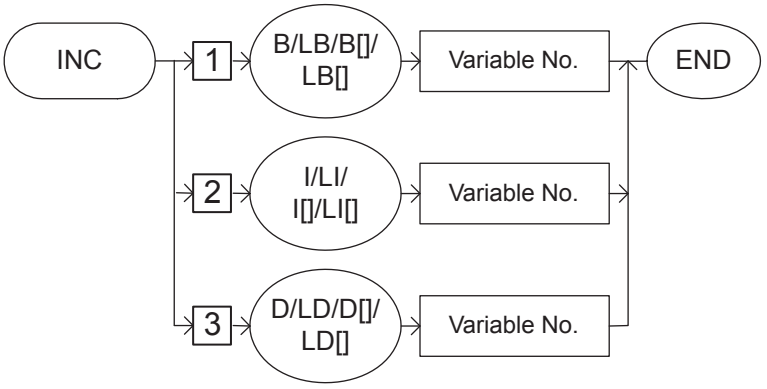
INC

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Adds one to the content of the specified variable.

Construction



Explanation

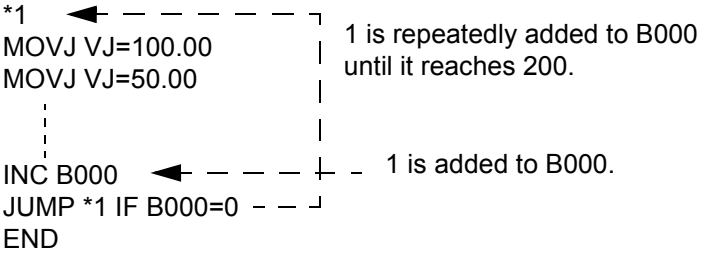
1. B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number/ LI Variable number /I [Array number] /LI [Array number] /D Variable number/ LD Variable number /D [Array number] /LD [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable.	
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable.	
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable.	

Example

(1)
```
NOP
SET B000 200
*1
MOVJ VJ=100.00
MOVJ VJ=50.00
INC B000
JUMP *1 IF B000=0
END
```



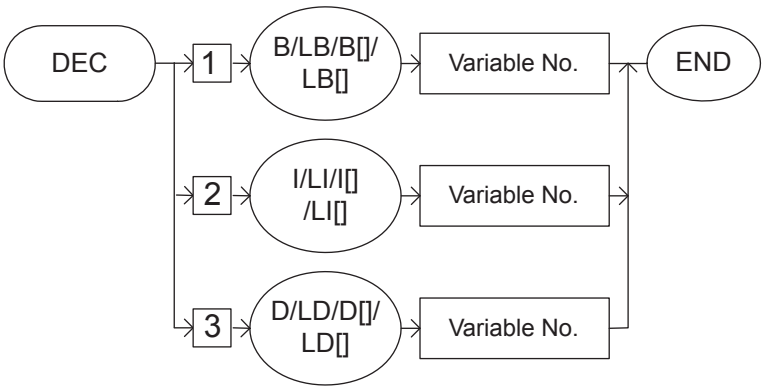
DEC

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Subtracts 1 from a specified variable.

Construction



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable from which 1 is subtracted.	
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable from which 1 is subtracted.	
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable from which 1 is subtracted.	

Example

(1)
```
NOP
SET B000 200
*1
MOVJ VJ=100.00
MOVJ VJ=50.00
DEC B000
JUMP *1 IF B000=0
END
```

1 is repeatedly subtracted from B000 until it reaches 0.

1 is subtracted from B000.

SET

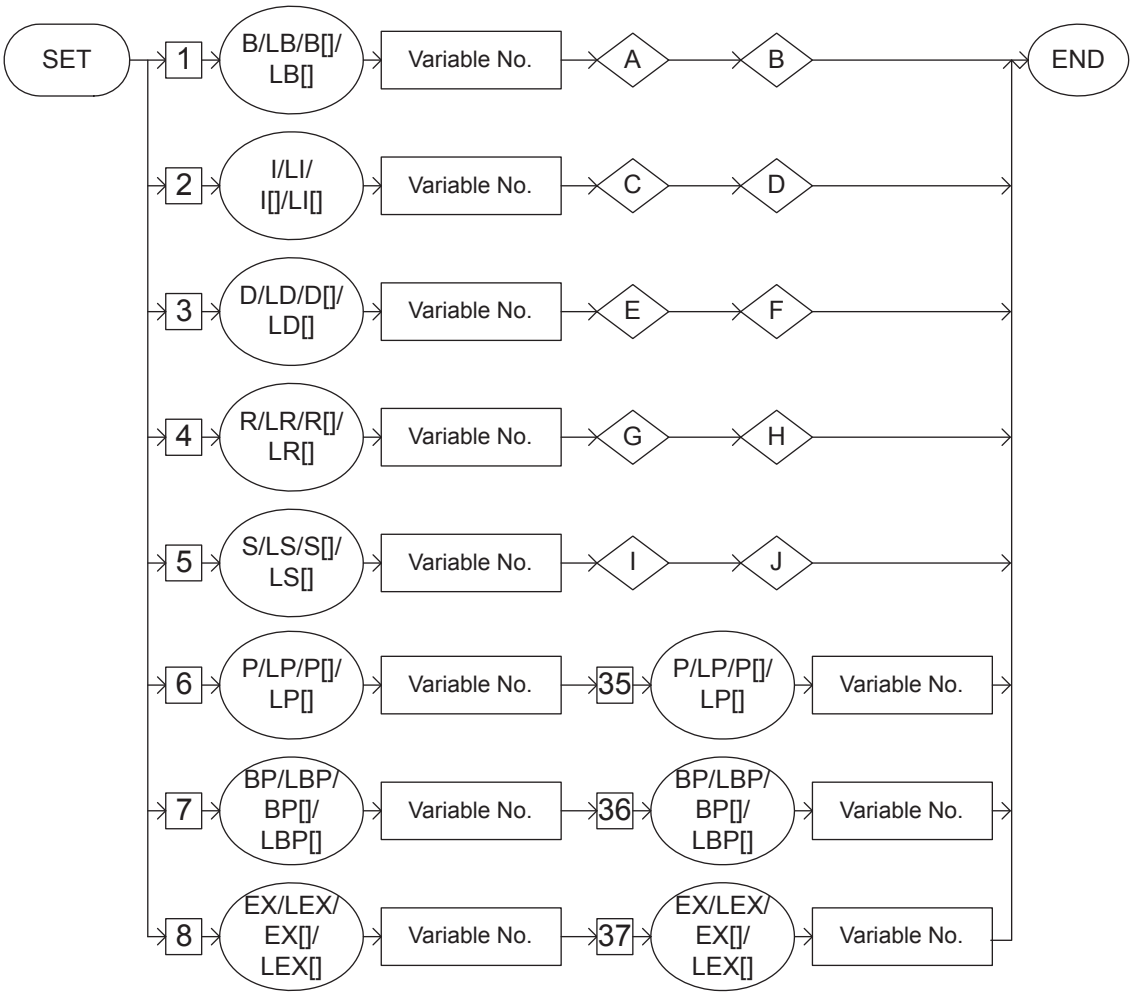
SUBSET	STANDARD	EXPANDED
Available	Available	Available

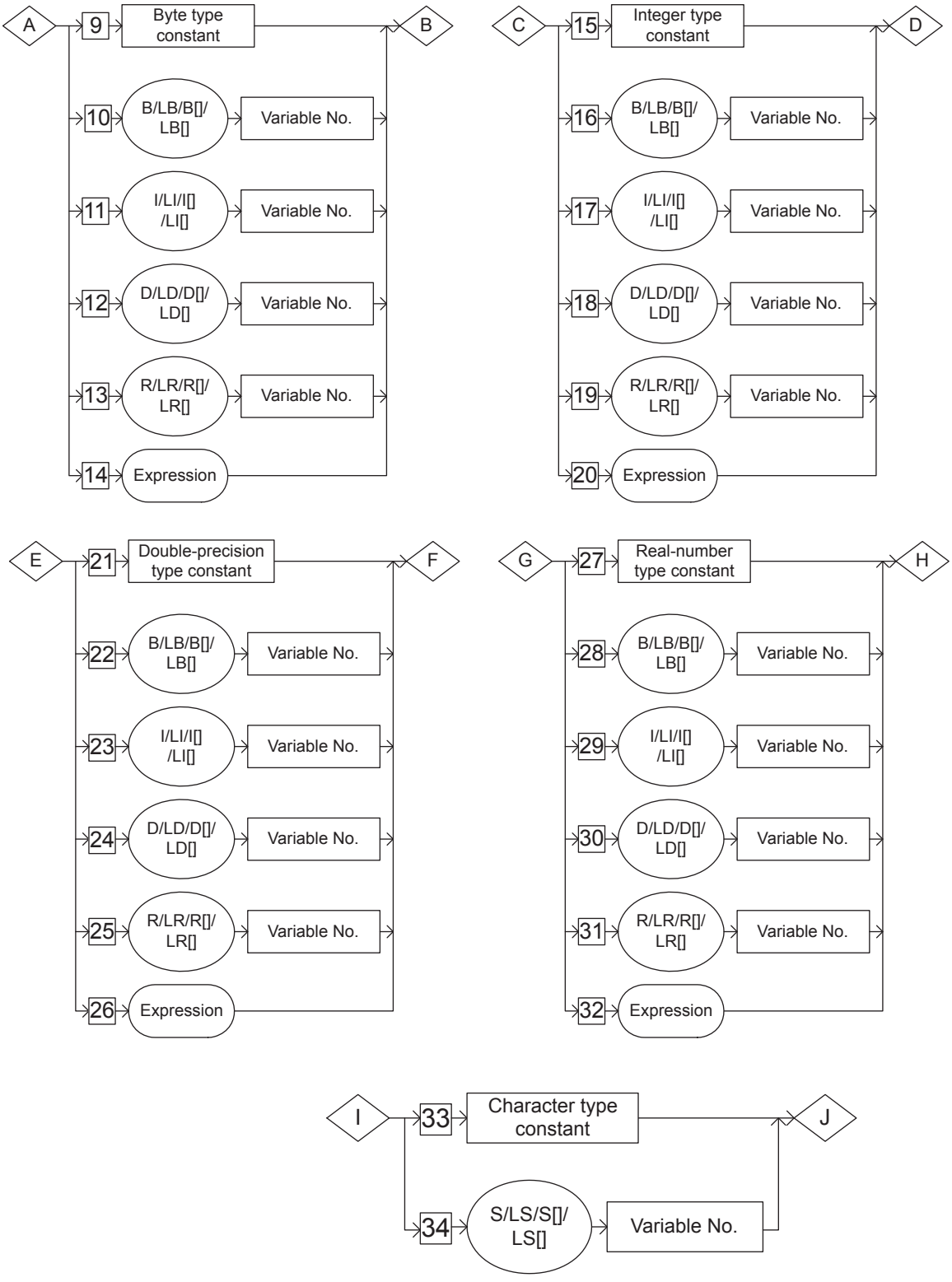
Function

Sets Data 2 to Data 1.

Construction

SET <Data 1> <Data 2>




A
9
Byte type constant
B
10
B/LB/B[]/ LB[]
Variable No.
11
I/LI/I[] /LI[]
Variable No.
12
D/LD/D[]/ LD[]
Variable No.
13
R/LR/R[]/ LR[]
Variable No.
14
Expression
C
15
Integer type constant
D
16
B/LB/B[]/ LB[]
Variable No.
17
I/LI/I[] /LI[]
Variable No.
18
D/LD/D[]/ LD[]
Variable No.
19
R/LR/R[]/ LR[]
Variable No.
20
Expression
E
21
Double-precision type constant
F
22
B/LB/B[]/ LB[]
Variable No.
23
I/LI/I[] /LI[]
Variable No.
24
D/LD/D[]/ LD[]
Variable No.
25
R/LR/R[]/ LR[]
Variable No.
26
Expression
G
27
Real-number type constant
H
28
B/LB/B[]/ LB[]
Variable No.
29
I/LI/I[] /LI[]
Variable No.
30
D/LD/D[]/ LD[]
Variable No.
31
R/LR/R[]/ LR[]
Variable No.
32
Expression
I
33
Character type constant
J
34
S/LS/S[]/ LS[]
Variable No.

Explanation

1. B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number] /S Variable number /LS Variable number /S [Array number] /LS [Array number] /P Variable number /LP Variable number /P [Array number] /LP [Array number] /BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number] /EX Variable number /LEX Variable number / EX [Array number] /LEX [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to which data is set.	< Data1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to which data is set.	< Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to which data is set.	< Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable to which data is set.	< Data 1>
5	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to which data is set.	< Data 1>
6	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis positional variable to which data is set.	< Data 1>
7	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis positional variable to which data is set.	< Data 1>
8	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis positional variable to which data is set.	< Data 1>

2. Byte type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]/Expression

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
9	Byte type constant	Specifies the byte type constant.	< Data 2>
10	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable.	< Data 2>
11	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable.	< Data 2>
12	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable.	< Data 2>
13	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable.	< Data 2>
14	Expression	Specifies the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

3. Integer type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] / R Variable number /LR Variable number /R [Array number] /LR [Array number]/Expression

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
15	Integer type constant	Specifies the integer type constant.	< Data 2>
16	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable.	< Data 2>
17	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable.	< Data 2>
18	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable.	< Data 2>
19	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable.	< Data 2>
20	Expression	Specifies the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

4. Double precision type constant /B Variable number / LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]/ Expression

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
21	Double precision type constant	Specifies the double precision type constant.	< Data 2>
22	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable.	< Data 2>
23	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable.	< Data 2>
24	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable.	< Data 2>
25	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable.	< Data 2>
26	Expression	Specifies the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 “Registration of Expression”* .

5. Real type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]/Expression

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
27	Real type constant	Specifies the real type constant.	< Data 2>
28	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable.	< Data2>
29	I Variable number/ LI Variable numb er/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable.	< Data 2>
30	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable.	< Data 2>
31	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable.	< Data 2>
32	Expression	Specifies the expression.	<Data 2> For details of setting the expression, refer to *chapter 1.4 "Registration of Expression"* .

6. Character type constant /S Variable number /LS Variable number /S [Array number] /LS [Array number]

When an S Variable number, LS Variable number, S [Array number], or LS [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
33	Character type constant	Specifies the character type data.	< Data 2>
34	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable.	< Data 2>

7. P Variable number /LP Variable number /P [Array number] /LP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
35	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position variable.	< Data 2>

8. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a BP Variable number, LBP Variable number, BP [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
36	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [[Array number]	Specifies the number of the base axis position variable.	< Data 2>

9. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When an EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
37	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position variable.	< Data 2>

Example

(1) SET B000 0
0 is set in B000.

(2) SET P000 P001
The content of P001 is set in P000.

ADD

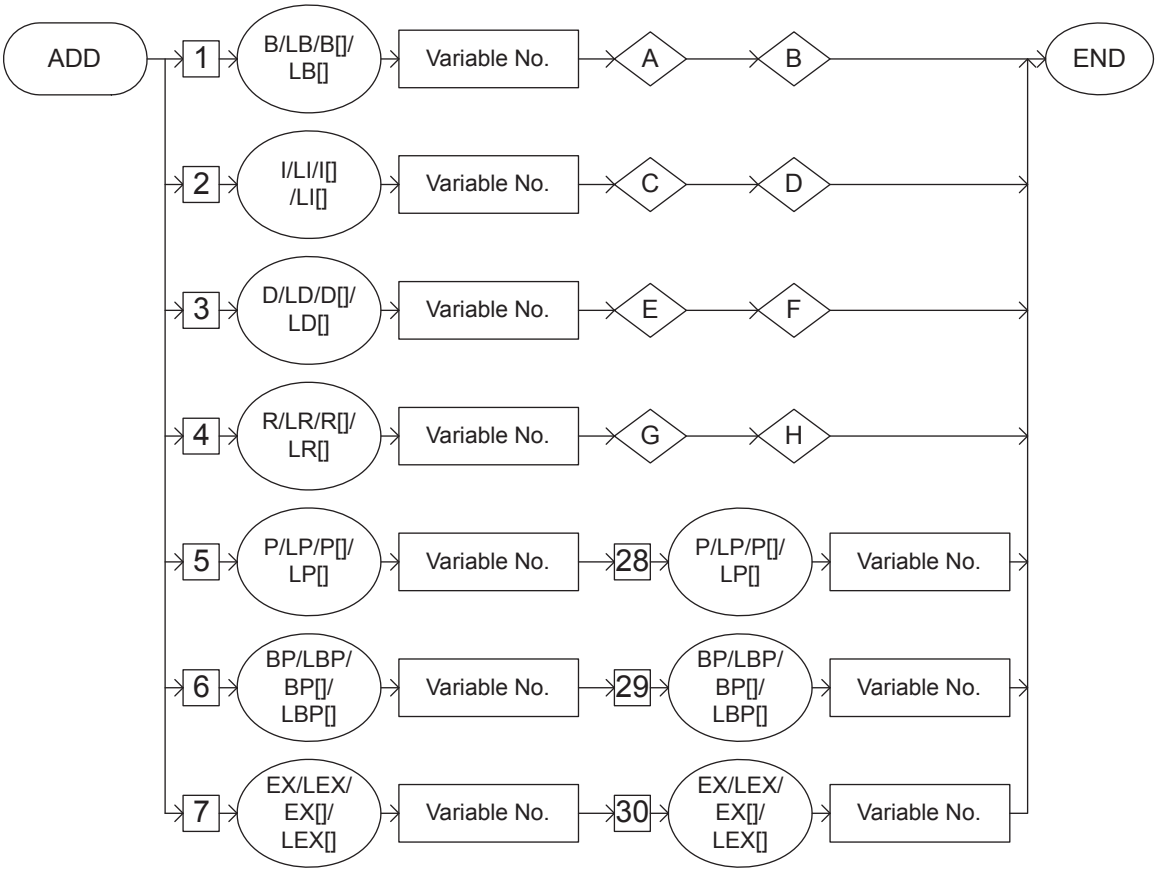
SUBSET	STANDARD	EXPANDED
Available	Available	Available

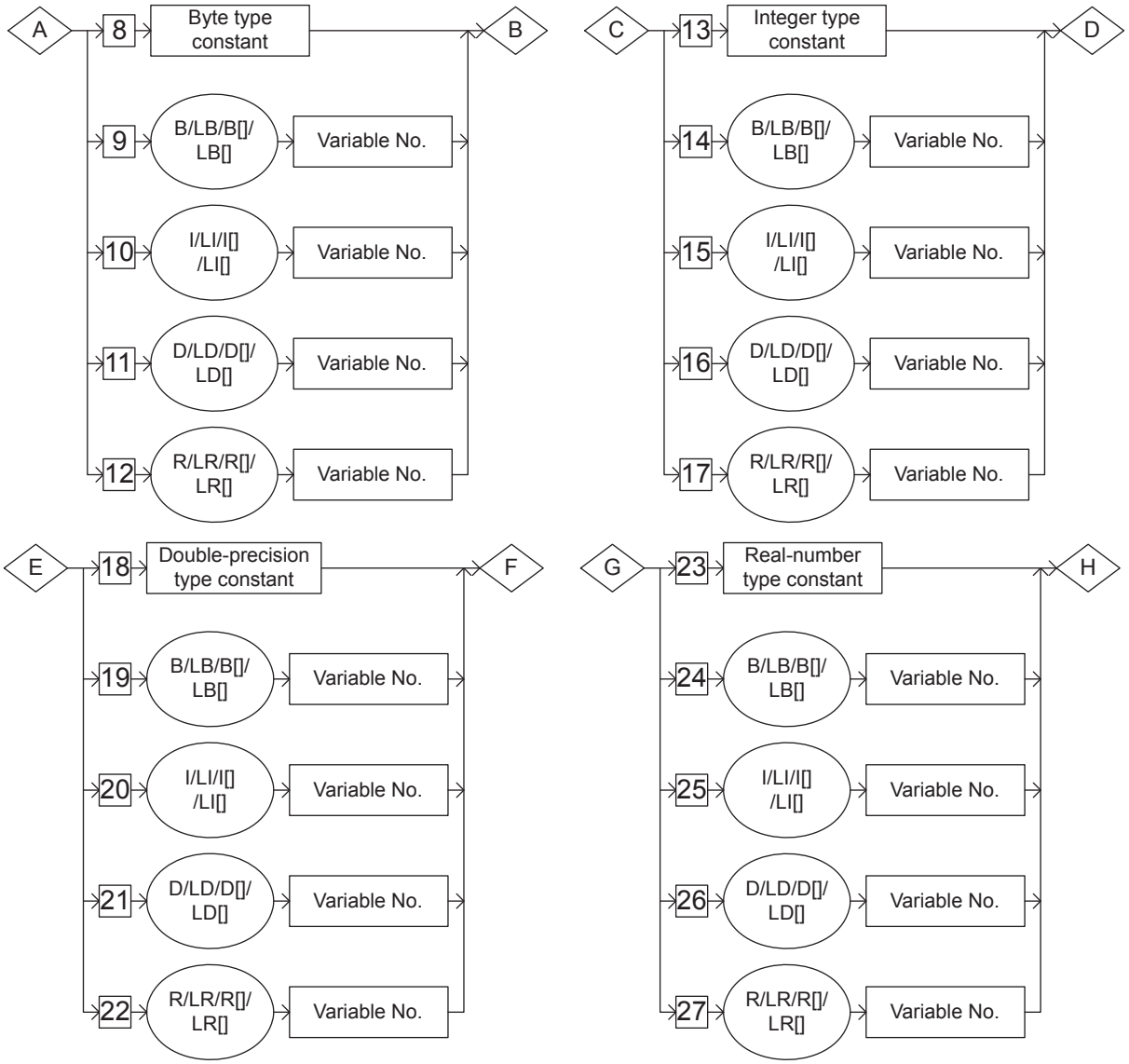
Function

Adds Data 1 and Data 2, and stores the result in Data 1.

Construction

Add <Data 1> <Data 2>




A
8
Byte type constant
B
9
B/LB/B[]/ LB[]
Variable No.
10
I/LI/I[] /LI[]
Variable No.
11
D/LD/D[]/ LD[]
Variable No.
12
R/LR/R[]/ LR[]
Variable No.
C
13
Integer type constant
D
14
B/LB/B[]/ LB[]
Variable No.
15
I/LI/I[] /LI[]
Variable No.
16
D/LD/D[]/ LD[]
Variable No.
17
R/LR/R[]/ LR[]
Variable No.
E
18
Double-precision type constant
F
19
B/LB/B[]/ LB[]
Variable No.
20
I/LI/I[] /LI[]
Variable No.
21
D/LD/D[]/ LD[]
Variable No.
22
R/LR/R[]/ LR[]
Variable No.
G
23
Real-number type constant
H
24
B/LB/B[]/ LB[]
Variable No.
25
I/LI/I[] /LI[]
Variable No.
26
D/LD/D[]/ LD[]
Variable No.
27
R/LR/R[]/ LR[]
Variable No.

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be added.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be added.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be added.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be added.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable to be added.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be added.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be added.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specifies the byte type data to be added.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be added.	<Data 2>
10	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be added.	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be added.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be added.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specifies the integer type data to be added.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte-type variable to be added.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be added.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specified the number of the double-precision type variable to be added.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be added.	<Data 2>

4. Double-precision type constant/B Variable number/ LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specifies the double-precision type data to be added.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be added.	<Data 2>
20	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be added.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be added.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be added.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number]. or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specifies the real-number type data to be added.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be added.	<Data 2>
25	I Variable number/LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be added.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be added.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be added.	<Data 2>

6. P Variable number/LP Variable number/P [Array number]/LP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
28	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable to be added.	<Data 2>

7. BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]

When a BP Variable number, LBP Variable number, BP [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
29	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be added.	<Data 2>

8. EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

When an EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
30	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be added.	<Data 2>

Example

(1) ADD B000 10
Adds 10 to B000, and stores the result in B000.

(2) ADD I000 I001
Adds I001 to I000, and stores the result in I000.

(3) ADD P000 P001
Adds P001 to P000, and stores the result in P000.

SUB

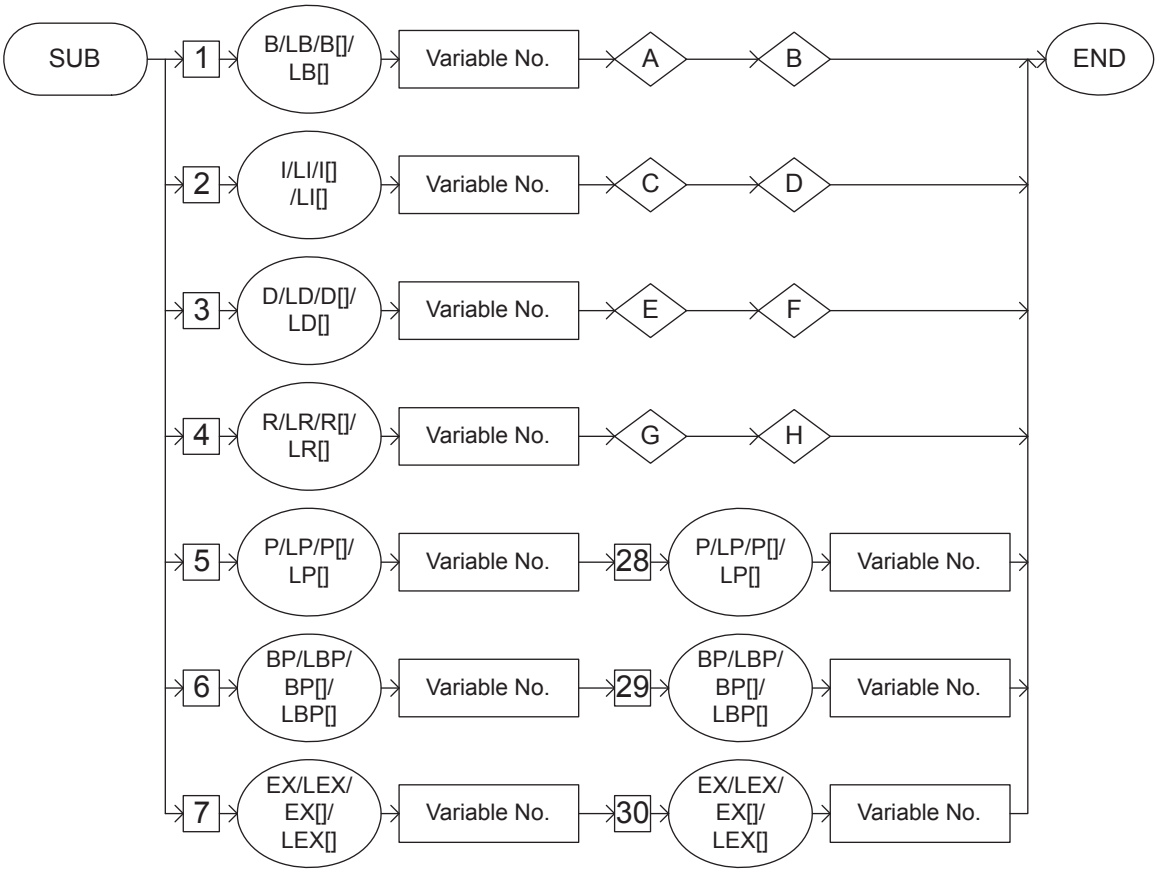
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

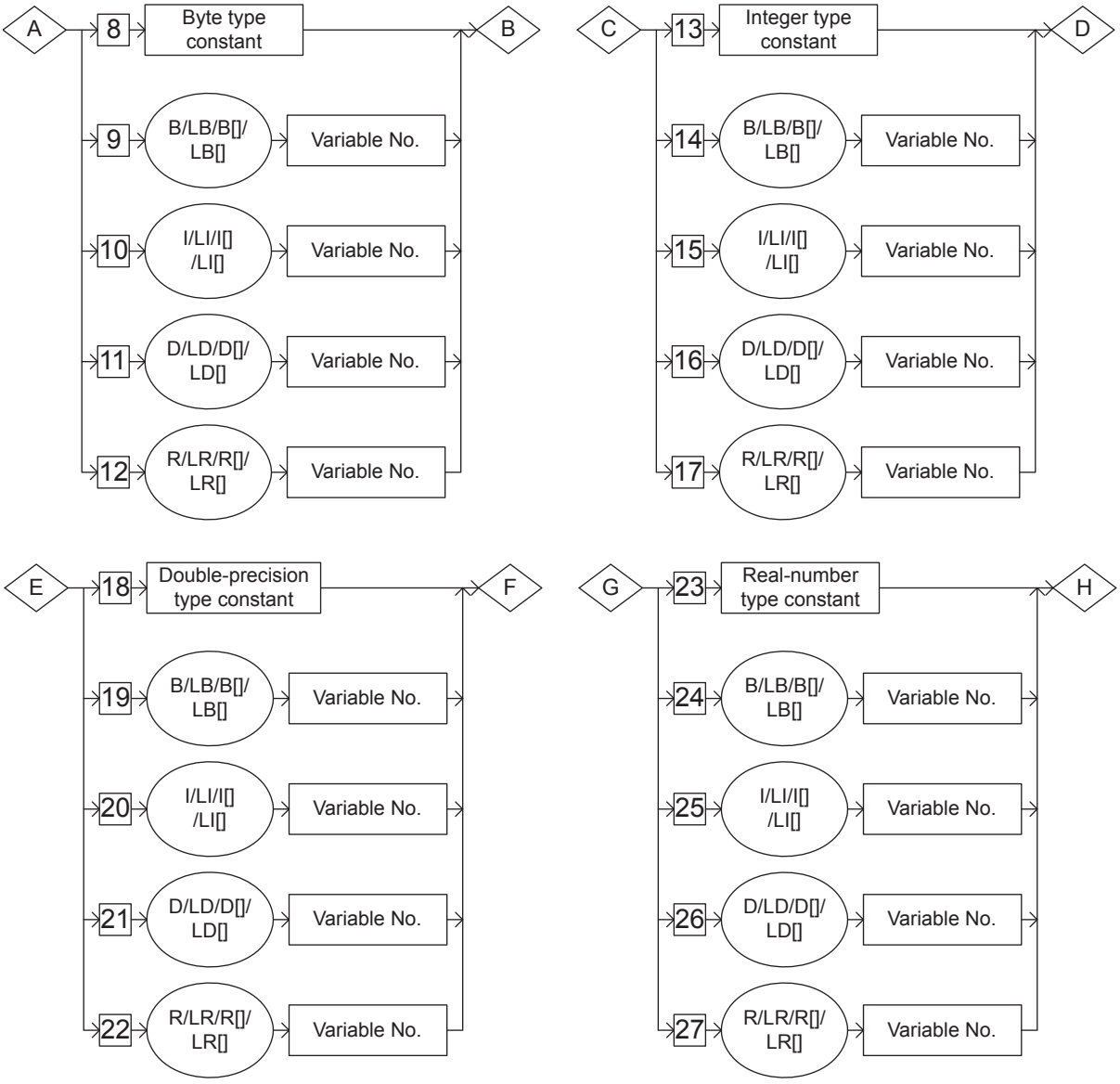
Function

Subtracts Data 2 from Data 1, and stores the result in Data 1.

Construction

SUB <Data 1> <Data 2>




A
8
Byte type constant
B
9
B/LB/B[]/ LB[]
Variable No.
10
I/LI/I[] /LI[]
Variable No.
11
D/LD/D[]/ LD[]
Variable No.
12
R/LR/R[]/ LR[]
Variable No.
C
13
Integer type constant
D
14
B/LB/B[]/ LB[]
Variable No.
15
I/LI/I[] /LI[]
Variable No.
16
D/LD/D[]/ LD[]
Variable No.
17
R/LR/R[]/ LR[]
Variable No.
E
18
Double-precision type constant
F
19
B/LB/B[]/ LB[]
Variable No.
20
I/LI/I[] /LI[]
Variable No.
21
D/LD/D[]/ LD[]
Variable No.
22
R/LR/R[]/ LR[]
Variable No.
G
23
Real-number type constant
H
24
B/LB/B[]/ LB[]
Variable No.
25
I/LI/I[] /LI[]
Variable No.
26
D/LD/D[]/ LD[]
Variable No.
27
R/LR/R[]/ LR[]
Variable No.

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be subtracted.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be subtracted.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be subtracted.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be subtracted.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable to be subtracted.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be subtracted.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be subtracted.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specifies the byte type data to be subtracted.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be subtracted.	<Data 2>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be subtracted.	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be subtracted.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be subtracted.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specifies the integer type data to be subtracted.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be subtracted.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be subtracted.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be subtracted.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be subtracted.	<Data 2>

4. Double-precision type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specifies the double-precision type data to be subtracted.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be subtracted.	<Data 2>
20	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be subtracted.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be subtracted.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be subtracted.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specifies the real-number type data to be subtracted.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be subtracted.	<Data 2>
25	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be subtracted.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be subtracted.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be subtracted.	<Data 2>

6. P Variable number/LP Variable number/P [Array number]/LP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
28	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable to be subtracted.	<Data 2>

7. BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]

When a BP Variable number, LBP Variable number, BP [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
29	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be subtracted.	<Data 2>

8. EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

When an EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
30	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be subtracted.	<Data 2>

Example

(1) SUB B000 10
Subtracts 10 from B000, and stores the result in B000.

(2) SUB I000 I001
Subtracts I001 from I000, and stores the result in I000.

(3) SUB P000 P001
Subtracts P001 from P000, and stores the result in P000.

MUL

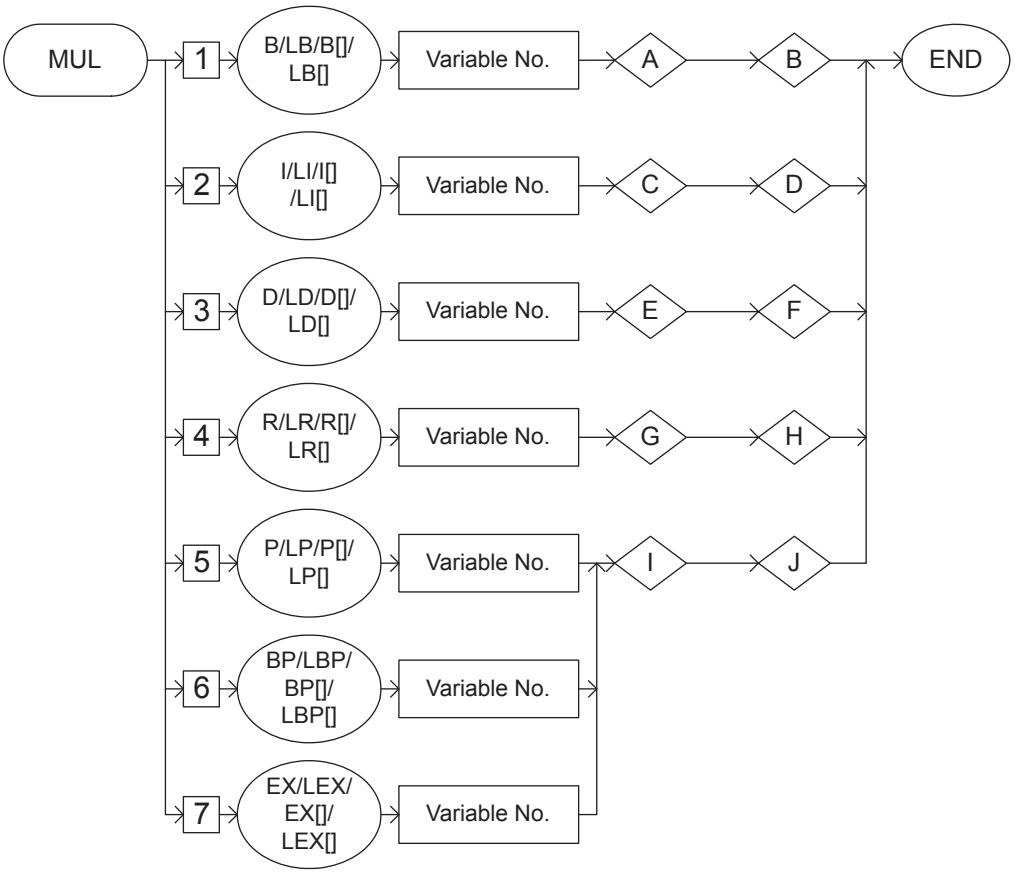
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

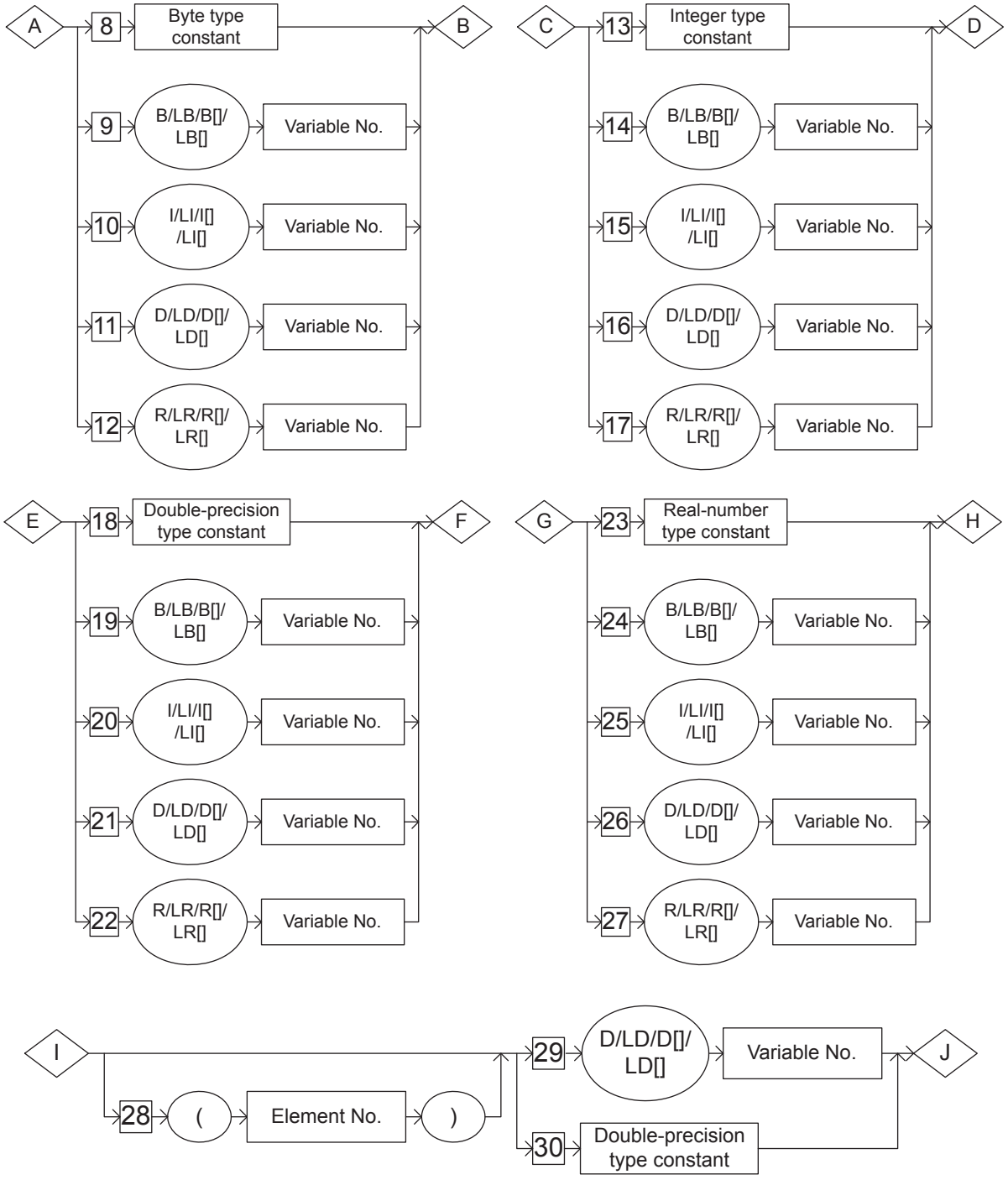
Function

Multiplies Data 1 by Data 2, and stores the result in Data 1.

Construction

MUL <Data 1> <Data 2>




A
8
Byte type constant
B
9
B/LB/B[]/ LB[]
Variable No.
10
I/LI/I[] /LI[]
Variable No.
11
D/LD/D[]/ LD[]
Variable No.
12
R/LR/R[]/ LR[]
Variable No.
C
13
Integer type constant
D
14
B/LB/B[]/ LB[]
Variable No.
15
I/LI/I[] /LI[]
Variable No.
16
D/LD/D[]/ LD[]
Variable No.
17
R/LR/R[]/ LR[]
Variable No.
E
18
Double-precision type constant
F
19
B/LB/B[]/ LB[]
Variable No.
20
I/LI/I[] /LI[]
Variable No.
21
D/LD/D[]/ LD[]
Variable No.
22
R/LR/R[]/ LR[]
Variable No.
G
23
Real-number type constant
H
24
B/LB/B[]/ LB[]
Variable No.
25
I/LI/I[] /LI[]
Variable No.
26
D/LD/D[]/ LD[]
Variable No.
27
R/LR/R[]/ LR[]
Variable No.
I
28
(
Element No.
)
29
D/LD/D[]/ LD[]
Variable No.
J
30
Double-precision type constant

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be multiplied.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be multiplied.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be multiplied.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be multiplied.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable to be multiplied.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be multiplied.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be multiplied.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specifies the byte type data to be multiplied.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be multiplied.	<Data 2>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be multiplied	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be multiplied.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be multiplied.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specifies the integer type data to be multiplied.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be multiplied.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be multiplied.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be multiplied.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be multiplied.	<Data 2>

4. Double-precision type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specifies the double-precision type data to be multiplied.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be multiplied.	<Data 2>
20	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be multiplied.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be multiplied.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be multiplied.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specifies the real-number type data to be multiplied.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be multiplied.	<Data 2>
25	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be multiplied.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be multiplied.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be multiplied.	<Data 2>

6. (Element number)

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No.	Tag	Explanation	Note
28	(Element number)	Specifies the element of the position type variable to be multiplied. If omitted, all the elements of the position type variable are specified.	Element number: 1 to 255 Variable B/LB can be used.

SUPPLE -MENT

Element of position type variable

The element of position type variable differs depending on the type of variable as follows.

• Robot axis position type variable

<Pulse type>

(1): 1st axis data, (2): 2nd axis data, (3): 3rd axis data, (4) 4th axis data, (5): 5th axis data, (6) 6th axis data, (7): 7th axis data, (8): 8th axis data

<XYZ type>

(1): X axis data, (2): Y axis data, (3) Z axis data,
(4): Rx axis data
(5): Ry axis data, (6): Rz axis data, (7): Re axis data

• Base axis position type variable

(1): 1st axis data, (2): 2nd axis data...

• Station axis position type variable

(1): 1st axis data, (2): 2nd axis data...

7. D Variable number/LD Variable number/D [Array number]/LD [Array number]/ Double-precision type constant

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after (Element number) of 6.

No.	Tag	Explanation	Note
29	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision variable by which the element of position type variable is multiplied.	<Data 2>
30	Double-precision type constant	Specifies the double-precision type data by which the element of position type variable is multiplied.	<Data 2>

Example

(1) MUL B000 10
Multiplies B000 by 10, and stores the result in B000.

(2) MUL I000 I001
Multiplies I000 by I001, and stores the result in I000.

(3) SET D000 2
MUL P000 (3) D000
Multiplies the Z axis data of P000 by D000 (D000=2), and stores the result in P000.

DIV

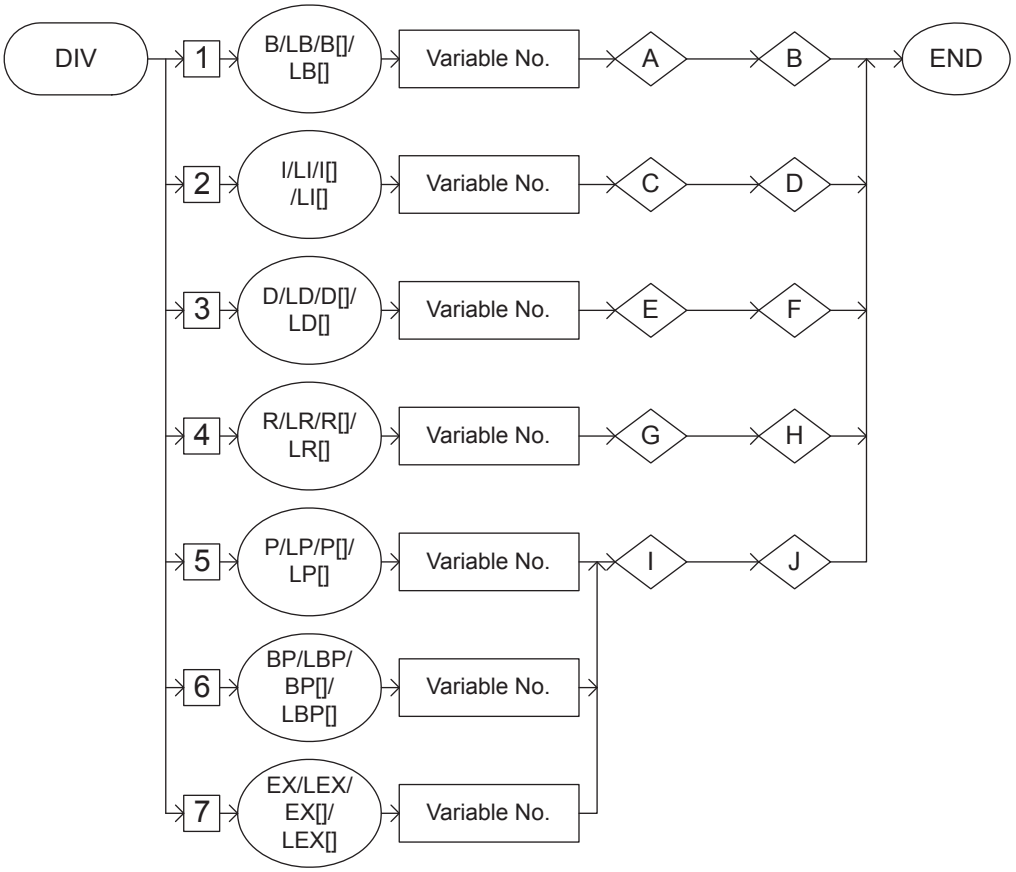
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

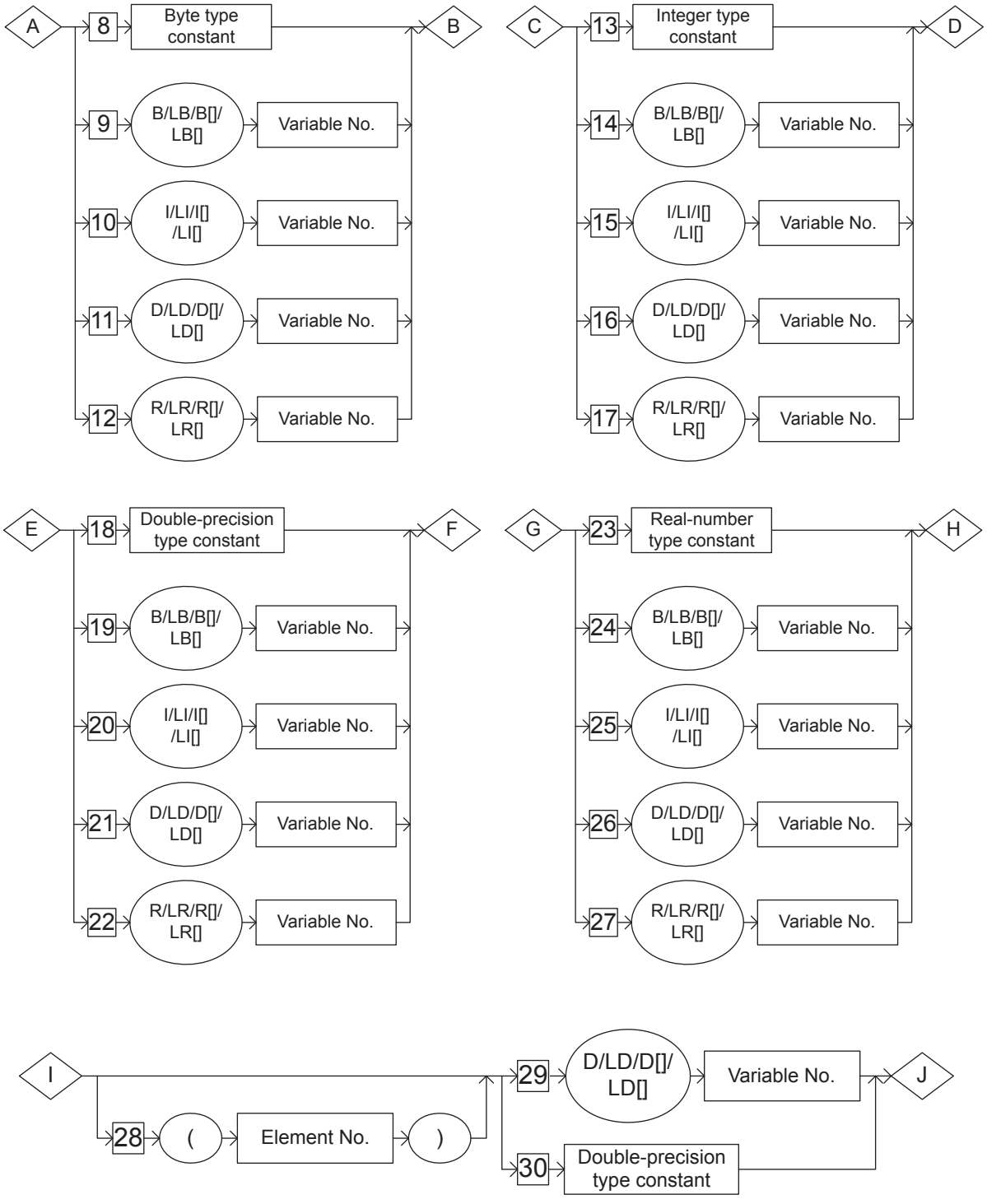
Function

Divides Data 1 by Data 2, and stores the result in Data 1.

Construction

DIV <Data 1> <Data 2>




A
8
Byte type constant
B
9
B/LB/B[]/ LB[]
Variable No.
10
I/LI/I[] /LI[]
Variable No.
11
D/LD/D[]/ LD[]
Variable No.
12
R/LR/R[]/ LR[]
Variable No.
C
13
Integer type constant
D
14
B/LB/B[]/ LB[]
Variable No.
15
I/LI/I[] /LI[]
Variable No.
16
D/LD/D[]/ LD[]
Variable No.
17
R/LR/R[]/ LR[]
Variable No.
E
18
Double-precision type constant
F
19
B/LB/B[]/ LB[]
Variable No.
20
I/LI/I[] /LI[]
Variable No.
21
D/LD/D[]/ LD[]
Variable No.
22
R/LR/R[]/ LR[]
Variable No.
G
23
Real-number type constant
H
24
B/LB/B[]/ LB[]
Variable No.
25
I/LI/I[] /LI[]
Variable No.
26
D/LD/D[]/ LD[]
Variable No.
27
R/LR/R[]/ LR[]
Variable No.
I
28
(
Element No.
)
29
D/LD/D[]/ LD[]
Variable No.
30
Double-precision type constant
J

Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be divided.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be divided.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be divided.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to be divided.	<Data 1>
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable to be divided.	<Data 1>
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be divided.	<Data 1>
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be divided.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specifies the byte type data by which Data 1 is divided.	<Data 2>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable by which Data 1 is divided.	<Data 2>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable by which Data 1 is divided.	<Data 2>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
12	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable by which Data 1 is divided.	<Data 2>

3. Integer type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
13	Integer type constant	Specifies the integer type data by which Data 1 is divided.	<Data 2>
14	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable by which Data 1 is divided.	<Data 2>

No.	Tag	Explanation	Note
15	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable by which Data 1 is divided.	<Data 2>
16	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
17	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable by which Data 1 is divided.	<Data 2>

4. Double-precision type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
18	Double-precision type constant	Specifies the double-precision type data by which Data 1 is divided.	<Data 2>
19	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable by which Data 1 is divided.	<Data 2>
20	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable by which Data 1 is divided.	<Data 2>
21	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
22	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable by which Data 1 is divided.	<Data 2>

5. Real-number type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No.	Tag	Explanation	Note
23	Real-number type constant	Specifies the real-number type data by which Data 1 is divided.	<Data 2>
24	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable by which Data 1 is divided.	<Data 2>
25	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable by which Data 1 is divided.	<Data 2>
26	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable by which Data 1 is divided.	<Data 2>
27	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable by which Data 1 is divided.	<Data 2>

6. (Element number)

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No.	Tag	Explanation	Note
28	(Element number)	Specifies the element of the position type variable by which Data 1 is divided. If omitted, all the elements of the position type variable are specified.	Element number: 1 to 255 Variable B/LB can be used.

7. D Variable number/LD Variable number/D [Array number]/LD [Array number]/Double-precision type constant

When a P Variable number, LP Variable number, P [Array number], LP [Array number], BP Variable number, LBP Variable number, BP [Array number], LBP [Array number], EX Variable number, LEX Variable number, EX [Array number], or LEX [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after (Element number) of 6.

No.	Tag	Explanation	Note
29	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision variable by which the element of the position type variable is divided.	<Data 2>
30	Double-precision type constant	Specifies the double-precision type data by which the element of the position type variable is divided.	<Data 2>

Example

(1) DIV B000 10
Divides B000 by 10, and stores the result in B000.

(2) DIV I000 I001
Divides I000 by I001, and stores the result in I000.

(3) SET D000 2
DIV P000 (3) D000
Divides the Z axis data by D000 (D000=2), and stores the result in P000.

CNVRT

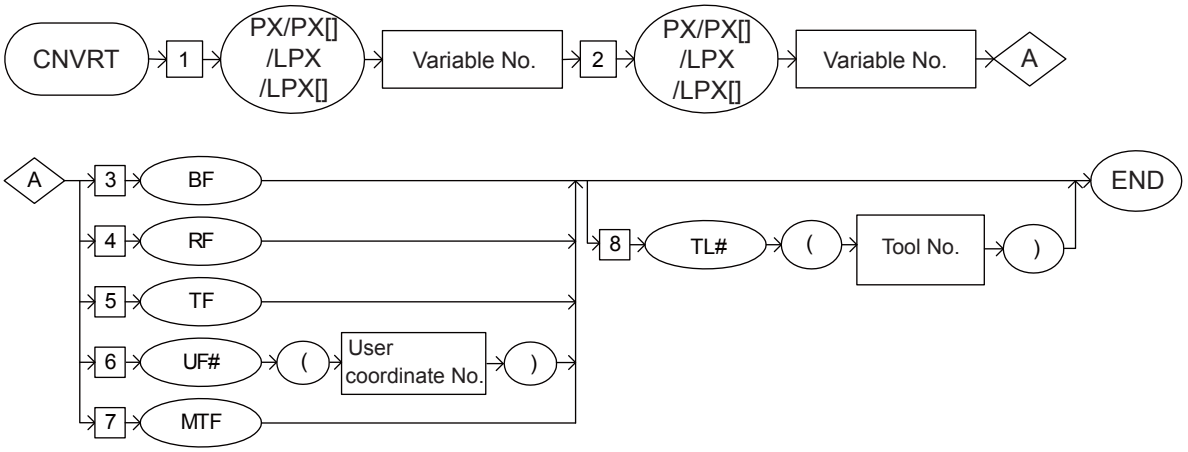
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Converts the pulse type position type variable of Data 2 to the XYZ type position type variable in the specified coordinate system, and stores the result in Data 1.

Construction

CNVRT <Data 1> <Data 2> Coordinate system designation



Explanation

1. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position type variable where the converted data is stored.	<Data 1>

Expanded position type variables

The expanded position type variable is a position type variable that depends on the control group in the job.

<Example>

- When the control group is R1:
  PX000 indicates P000.
- When the control group is R1 + B1:
  PX000 indicates P000 and BP000.
- When the control group is R1 + B1 + ST1:
  PX000 indicates P000 + BP000 + EX000.
- When the control group is R1 + R2 + B1 + B2 + ST1 in the coordinated job (master R1 + B1):
  PX000 indicates the following:
  P000: R2 (slave), P001: R1 (master)
  BP000: B2 (slave), BP001: B1 (master)
  EX000: ST1

2. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
2	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position type variable to be converted.	<Data 2>

3. BF/RF/TF/UF# (User coordinate number)/MTF

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
3	BF	Specifies the conversion in the base coordinate system.	
4	RF	Specifies the conversion in the robot coordinate system.	
5	TF	Specifies the conversion in the tool coordinate system.	
6	UF# (User coordinate number)	Specifies the conversion in the user coordinate system.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.
7	MTF	Specifies the conversion on the master tool coordinate system. On the master tool coordinate system, the data is converted to a position relative to the master manipulator.	Available only with the optional independent coordinate function.

4. TL# (Tool Number)

The following tag can be added or omitted.

No.	Tag	Explanation	Note
8	TL# (Tool number)	Specifies the tool number.	No.: 0 to 63 Variable B/I/D/LB/LI/LD can be used.

Example

(1) CNVRT PX000 PX001 BF

For the job R1, the pulse type position data of P001 is converted to the XYZ type position data in the base coordinate system and stores the converted data in P000.

AND

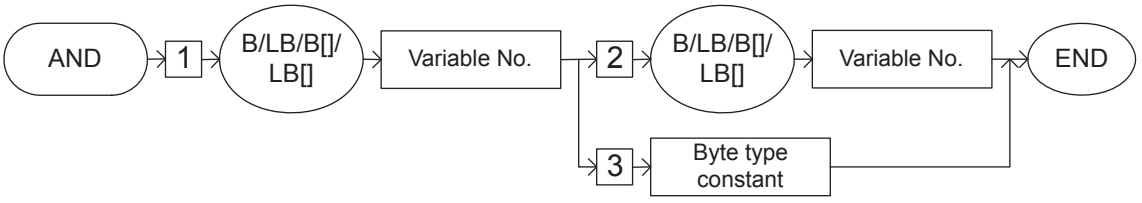
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out logical multiplication of Data 1 and Data 2, and stores the result in Data 1.

Construction

AND <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the logical multiplication is carried out.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the logical multiplication is carried out.	<Data 2>
3	Byte type constant	Specifies the byte type data for which the logical multiplication is carried out.	<Data 2>

Example

(1) SET B000 5
SET B010 1
AND B000 B010

Carries out the logical multiplication of B000 (0000 0101) and B010 (0000 0001), and stores the result (0000 0001=1) in B000.

OR

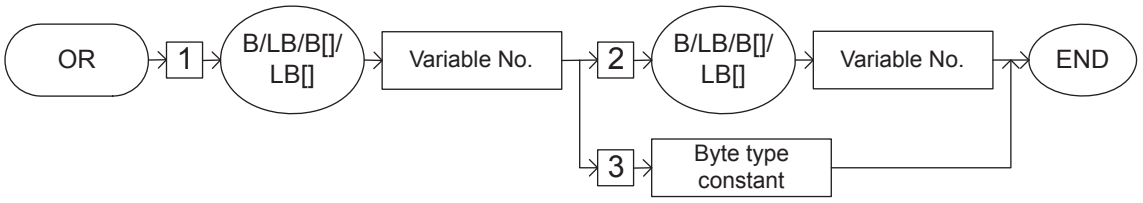
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out the logical sum of Data 1 and Data 2, and stores the result in Data 1.

Construction

OR <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the logical sum is carried out.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the logical sum is carried out.	<Data 2>
3	Byte type constant	Specifies the byte type data for which the logical sum is carried out.	<Data 2>

Example

(1) SET B000 5
SET B010 10
OR B000 B010

Carries out the logical sum of B000 (0000 0101) and B010 (0000 1010), and stores the result (0000 1111=15) in B000.

NOT

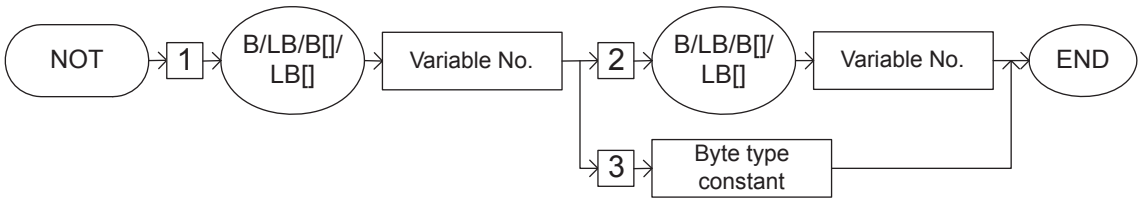
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out the logical negation of Data 2, and stores the result in Data 1.

Construction

NOT <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to store the result of logical negation.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the logical negation is carried out.	<Data 2>
3	Byte type constant	Specifies the byte type data for which the logical negation is carried out.	<Data 2>

Example

(1) SET B000 0
SET B010 1
NOT B000 B010

Carries out the logical negation of B010 (0000 0001), and stores the result (1111 1110=254) in B000.

XOR

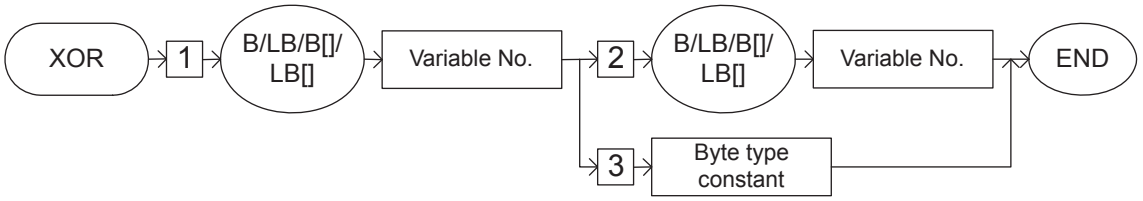
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Carries out the logical exclusive OR of Data 1 and Data 2, and stores the result in Data 1.

Construction

XOR <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the exclusive OR is carried out.	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/Byte type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable for which the exclusive OR is carried out.	<Data 2>
3	Byte type constant	Specifies the byte type data for which the exclusive OR is carried out.	<Data 2>

Example

(1) SET B000 1
SET B010 5
XOR B000 B010

Carries out the exclusive OR of B000 (0000 0001) and B010 (0000 0101), and stores the result (0000 0100=4) in B000.

MFRAME

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

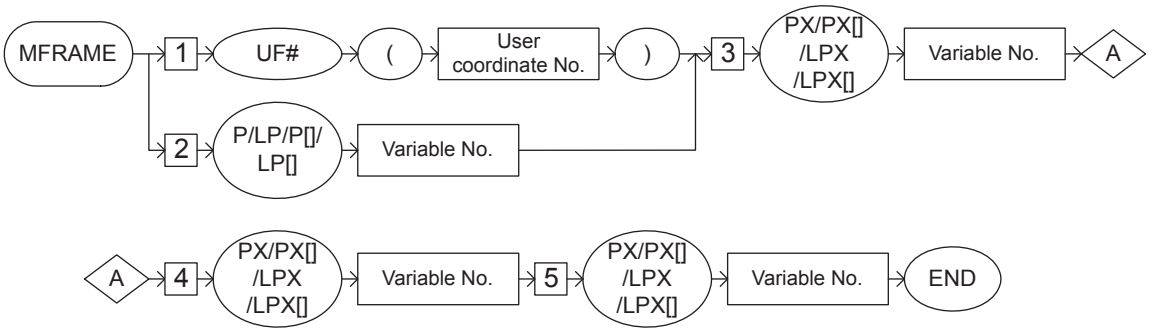
Function

Creates the user coordinates according to three types of position data; Data 1, Data 2, and Data 3.

Data 1 indicates the position data of the defined point ORG; Data 2 indicates the position data of the defined point XX; and Data 3 indicates the position data of the defined point XY.

Construction

MFRAME User coordinate designation <Data 1> <Data 2> <Data 3>



Explanation

1. UF# (User coordinate number)/P Variable number/LP Variable number/P [Array number]/LP [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	UF# (User coordinate number)	Allocates the number for the user coordinate to be created.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the position type variable where the coordinate values of the user coordinate to be created is stored.	

2. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
3	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position type variable where the position data of the user coordinate's defined point ORG has been stored.	<Data 1>

3. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
4	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position type variable where the position data of the user coordinate's defined point XX has been stored.	<Data 2>

4. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No	Tag	Explanation	Note
5	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position type variable where the position data of the user coordinate's defined point XY has been stored.	<Data 3>

Example

(1) MFRAME UF#(1) PX000 PX001 PX002

For the job R1, the user coordinate number 1 is created according to three types of position data; P000, P001, and P002 of the user coordinate system.

SETE

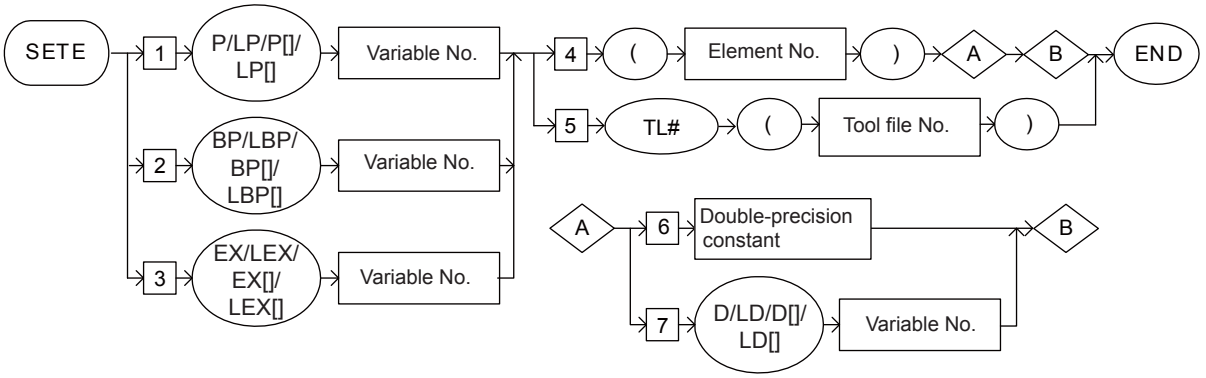
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Sets Data 2 in the element of position type variable of Data 1.

Construction

SETE <Data 1> <Data 2>



Explanation

1. P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the robot axis position type variable where Data 2 is set as an element.	<Data 1>
2	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable where Data 2 is set as an element.	<Data 1>
3	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable where Data 2 is set as an element.	<Data 1>

2. (Element number)/TL# (Tool file number)

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	(Element number)	Specifies the element of the position type variable to be set.	<Data 2> Element No.: 1 to 255 Variable B/LB can be used.
5	TL# (Tool file number)	Specifies the tool file number to be set. Unable to set to the base axis position type variable and the station axis type variable. When the tool number tab is locked in the teaching condition window, only tool No. “0” is able to be set.	<Data 2> No.: 0 to 63

Element of position type variable

The element of position type variable differs depending on the type of variable as follows.

• Robot axis position type variable

<Pulse type>

(1): 1st axis data, (2): 2nd axis data, (3): 3rd axis data, (4) 4th axis data, (5): 5th axis data, (6) 6th axis data, (7): 7th axis data, (8): 8th axis data

SUPPLE -MENT

<XYZ type>

(1): X axis data, (2): Y axis data, (3) Z axis data,
(4): Rx axis data
(5): Ry axis data, (6): Rz axis data, (7): Re axis data

• Base axis position type variable

(1): 1st axis data, (2): 2nd axis data...

• Station axis position type variable

(1): 1st axis data, (2): 2nd axis data...

3. Double-precision type constant/D Variable number/ LD Variable number/D [Array number]/LD [Array number]

When an element number is selected from the table in part 2 above, choose one of the tags from the following table.

No.	Tag	Explanation	Note
6	Double-precision type constant	Specifies the double-precision type data to be set.	
7	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to be set.	

Example

(1) SETE P000 (3) 2000

2000 is set in the Z axis data of P000.

(2) SETE P000 TL#(1)

1 is set in the tool data of P000.

GETE

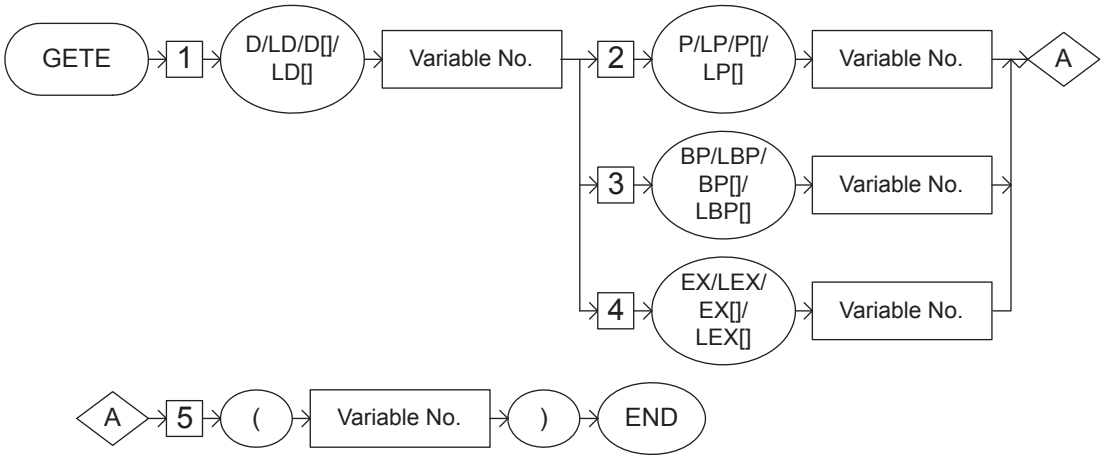
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the element of position type variable of Data 2 in Data 1.

Construction

GETE <Data 1> <Data 2> (Element number)



Explanation

1. D Variable number/LD Variable number/D [Array number]/LD [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable where the element of position type variable is stored.	<Data 1>

2. P Variable number/LP Variable number/P [Array number]/LP [Array number]/BP Variable number/LBP Variable number/BP [Array number]/LBP [Array number]/EX Variable number/LEX Variable number/EX [Array number]/LEX [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number	Specifies the number of the robot axis position type variable to be stored.	<Data 2>
3	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the number of the base axis position type variable to be stored.	<Data 2>
4	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the number of the station axis position type variable to be stored.	<Data 2>

3. (Element number)

Add the following tag.

No.	Tag	Explanation	Note
5	(Element number)	Specified the number of the of the position type variable element to be stored.	Element No.: 1 to 255 Variable B/LB can be used.

Element of position type variable

The element of position type variable differs depending on the type of variable as follows.

• Robot axis position type variable

<Pulse type>

(1): 1st axis data, (2): 2nd axis data, (3): 3rd axis data, (4) 4th axis data, (5): 5th axis data, (6) 6th axis data, (7): 7th axis data, (8): 8th axis data

SUPPLE -MENT

<XYZ type>

(1): X axis data, (2): Y axis data, (3) Z axis data,
(4): Rx axis data
(5): Ry axis data, (6): Rz axis data, (7): Re axis data

• Base axis position type variable

(1): 1st axis data, (2): 2nd axis data...

• Station axis position type variable

(1): 1st axis data, (2): 2nd axis data...

Example

(1) GETE D000 P000 (3)

The Z axis data of P000 is stored in D000.

GETS

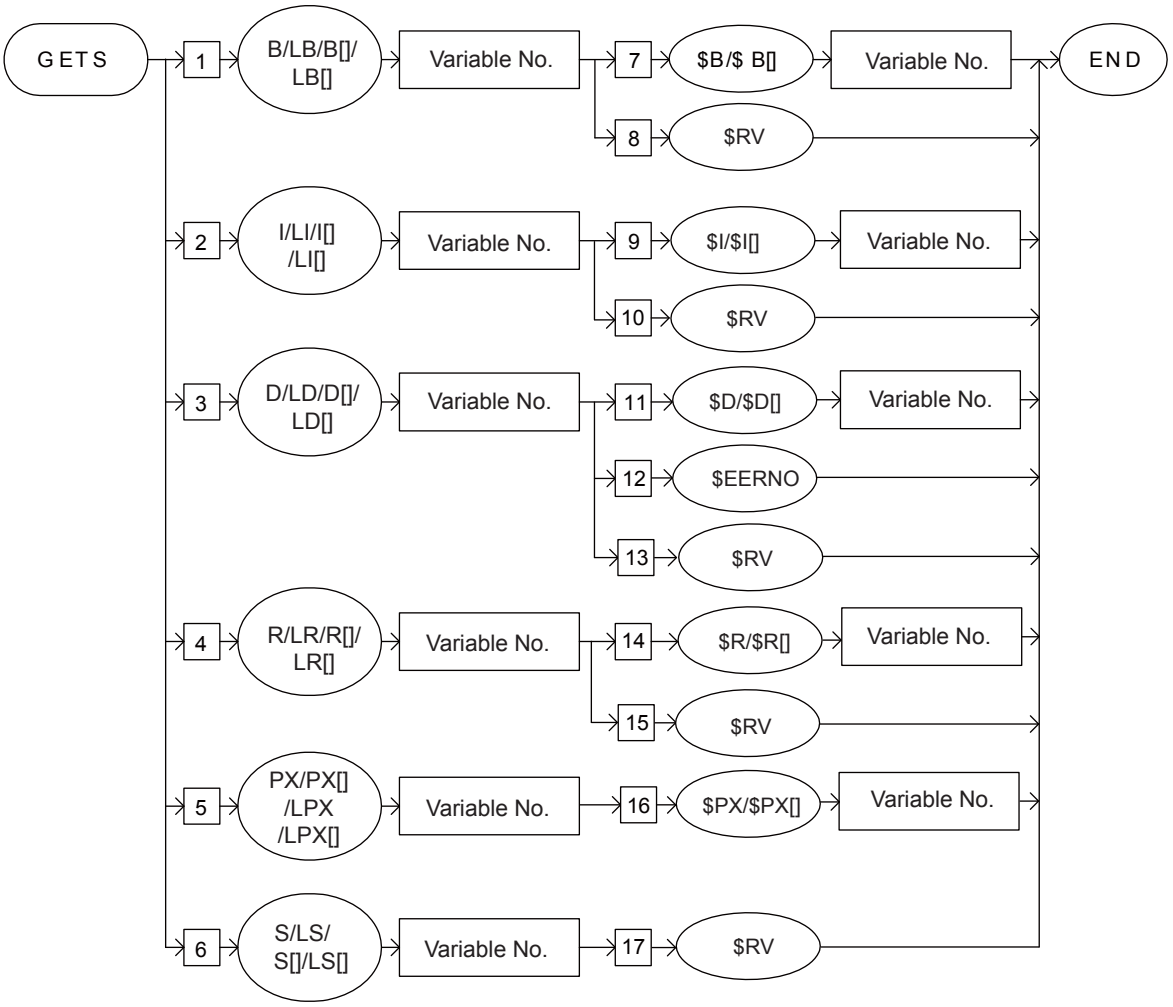
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the system variable of Data 2 in Data 1.

Construction

GETS <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]/PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to store the system variable.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to store the system variable.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to store the system variable.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to store the system variable.	<Data1>
5	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position type variable to store the system variable.	<Data 1>
6	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character string type variable to store the system variable.	<Data 1>

SUPPLE -MENT

System variable

The system variables are written by the controller system and can be referred only by a GETS instruction. The following system variables are available.

System Variable	Type	No.	Explanation
$B type variable	Byte type	$B001	Execution series number (0 to 17)
		$B002	Detected /Not detected by the optional SRCH/ NSRCH instruction 0: Not detected, 1: Detected
		$B008	Result of the optional SYSTART instruction 1: Normal termination, 0: Abnormal termination
		$B009	Result of the SETFILE/GETFILE instruction 0: Normal termination, Other than 0: Abnormal termination
		$B014	Result of the optional HSEN instruction 1: Setting status completed, 0: Others
		$B016	The number of RIN#(1)s detected by the optional NSRCH instruction
		$B017	The number of RIN#(2)s detected by the optional NSRCH instruction
		$B018	The number of RIN#(3)s detected by the optional NSRCH instruction
		$B019	The number of RIN#(4)s detected by the optional NSRCH instruction
		$B020	The number of RIN#(5)s detected by the optional NSRCH instruction
		$B021	The number of RIN#(6)s detected by the optional NSRCH instruction
$PX type variable	Expanded position type	$PX000	Current value (pulse type)
		$PX001	Current value (XYZ type)
		$PX002	Position detected by the optional SRCH instruction (pulse type)
		$PX003	Position detected by the optional STCH instruction (XYZ type)
		$PX004	Current value excluding the shift amount (XYZ type)
		$PX005	Teaching position (pulse type)
		$PX006	Operation target position (pulse type)

Continued

SUPPLE -MENT

Continued

System Variable	Type	No.	Explanation
$PX type variable	Expanded position type	$PX007	Current position excluding the shift amount and profiling amount (XYZ type)
		$PX008	F/B pulse → current value (XYZ type)
		$PX009	The unit vector (XYZ type) of the travel direction excluding the real time correction amount
		$PX0010	F/B pulse
		$PX040	Path correction amount (available only with the optional COMARC function)
		$PX041	Base coordinate shift amount
		$PX042	Robot coordinate shift amount
		$PX043	Tool coordinate shift amount
		$PX044	User coordinate shift amount
		$PX045	3D shift amount
		$PX050	Each axis torque command position
		$PX100 to $PX149	RIN#(1)’s detected position by the optional NSRCH instruction (pulse type)
		$PX150 to $PX199	RIN#(1)’s detected position by the optional NSRCH instruction (XYZ type)
		$PX200 to $PX249	RIN#(2)’s detected position by the optional NSRCH instruction (pulse type)
		$PX250 to $PX299	RIN#(2)’s detected position by the optional NSRCH instruction (XYZ type)
		$PX300 to $PX349	RIN#(3)’s detected position by the optional NSRCH instruction (pulse type)
		$PX350 to $PX399	RIN#(3)’s detected position by the optional NSRCH instruction (XYZ type)

Continued

SUPPLE -MENT

Continued

System Variable	Type	No.	Explanation
$PX type variable	Expanded position type	$PX400 to $PX449	RIN#(4)'s detected position by the optional NSRCH instruction (pulse type)
		$PX450 to $PX499	RIN#(4)'s detected position by the optional NSRCH instruction (XYZ type)
		$PX500 to $PX549	RIN#(5)'s detected position by the optional NSRCH instruction (pulse type)
		$PX550 to $PX599	RIN#(5)'s detected position by the optional NSRCH instruction (XYZ type)
		$PX600 to $PX649	RIN#(6)'s detected position by the optional NSRCH instruction (pulse type)
		$PX650 to $PX699	RIN#(6)'s detected position by the optional NSRCH instruction (XYZ type)

2. $B Variable number/$B [Array number]/$RV

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
7	$B Variable number/ $B [Array number]	Specifies the number of the byte type system variable to be stored.	<Data 2>
8	$RV	Receives the returned value of the job	<Data 2>

3. $I Variable number/$I [Array number]/$RV

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
9	$I Variable number/ $I [Array number]	Specifies the number of the integer type system variable to be stored.	<Data 2>
10	$RV	Receives the returned value of the job	<Data 2>

4. $D Variable number/$D [Array number]/$ERRNO /$RV

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
11	$D Variable number/ $D [Array number]	Specifies the number of the double-precision type system variable to be stored.	<Data 2>
12	$ERRNO	Specifies the error status	<Data 2>
13	$RV	Receives the returned value of the job	<Data 2>

5. $R Variable number/$R [Array number]/$RV

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
14	$R Variable number/ $R [Array number]	Specifies the number of the real-number type system variable to be stored.	<Data 2>
15	$RV	Receives the returned value of the job	<Data 2>

6. $PX Variable number/$PX [Array number]

When a PX Variable number, LPX Variable number, PX [Array number], or LPX [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
16	$PX Variable number/ $PX [Array number]	Specifies the number of the expanded position type system variable to be stored.	<Data 2>

7. $RV

When a S Variable number, LS Variable number, S [Array number], or LS [Array number] is selected from the table in part 1 of this Explanation, add the following tag.

No.	Tag	Explanation	Note
17	$RV	Receives the returned value of the job	<Data 2>

Example

(1) GETS B000 $B002

The result of the SRCH instruction is stored in B000.

(2) GETS PX000 $PX000

For the job R1, the pulse type current value is stored in P000.

SQRT

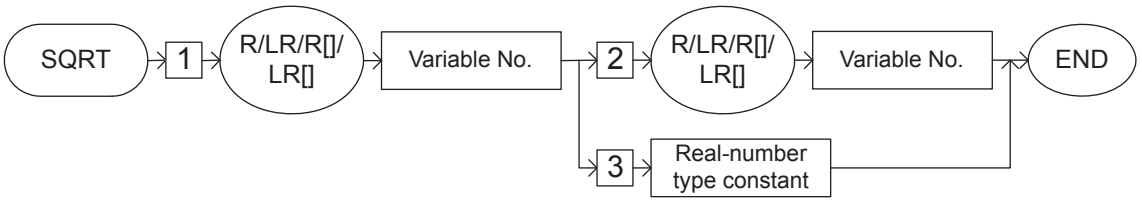
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the square root of Data 2, and stores the result in Data 1.

Construction

SQRT <Data 1> <Data 2>



Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable whose square root is calculated.	<Data 2>
3	Real-number type constant	Specifies the real-number type data whose square root is calculated.	<Data 2>

Example

(1) SQRT R000 2

1.414214E + 00 is stored in R000.

SIN

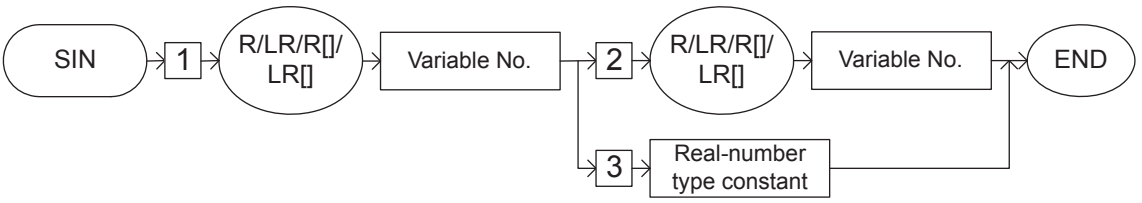
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the sine of Data 2, and stores the result in Data 1.

Construction

SIN <Data 1> <Data 2>



Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable whose sine is calculated.	<Data 2>
3	Real-number type constant	Specifies the real-number type data whose sine is calculated.	<Data 2>

Example

(1) SIN R000 60

8.660254E - 01 is stored in R000.

COS

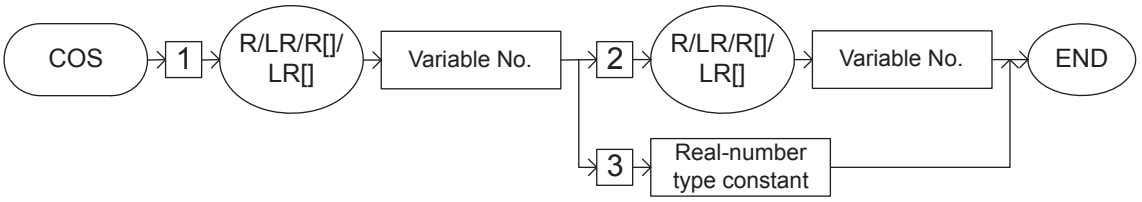
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the cosine of Data 2, and stores the result in Data 1.

Construction

COS <Data 1> <Data 2>



Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable whose cosine is calculated.	<Data 2>
3	Real-number type constant	Specifies the real-number type data whose cosine is calculated.	<Data 2>

Example

(1) COS R000 60

5.000000E - 01 is stored in R000.

ATAN

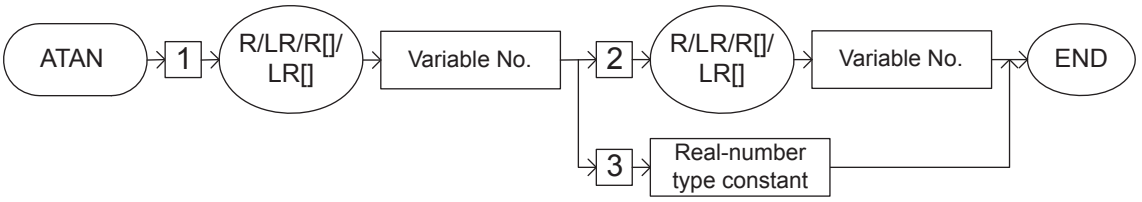
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the arc tangent of Data 2, and stores the result in Data 1.

Construction

ATAN <Data 1> <Data 2>



Explanation

1. R Variable number/LR Variable number/R [Array number]/LR [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable to store the result.	<Data 1>

2. R Variable number/LR Variable number/R [Array number]/LR [Array number]/Real-number type constant

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real-number type variable whose arc tangent is calculated.	<Data 2>
3	Real-number type constant	Specifies the real-number type data whose arc tangent is calculated.	<Data 2>

Example

(1) ATAN R000 60

8.904516E + 01 is stored in R000.

MULMAT

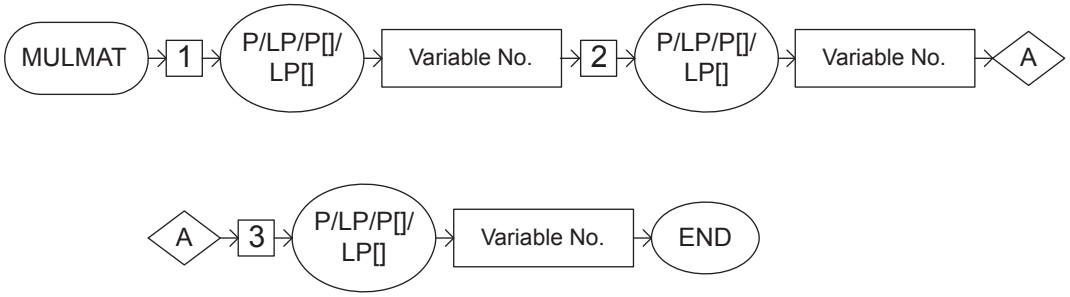
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the matrix multiplication of Data 2 and Data 3, and stores the result in Data 1.

Construction

MULMAT <Data 1> <Data 2> <Data 3>



Explanation

1. P Variable number/LP Variable number/P [Array number]/LP [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the position type variable to store the result.	<Data 1>

2. P Variable number/LP Variable number/P [Array number]/LP [Array number]

Add the following tag.

No.	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the position type variable for which the matrix multiplication is calculated.	<Data 2>

3. P Variable number/LP Variable number/P [Array number]/LP [Array number]

Add the following tag.

No.	Tag	Explanation	Note
3	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specified the number of the position type variable for which the matrix multiplication is calculated.	<Data 3>

Example

MULMAT and INVMAT instructions

The amount of shift for a three-dimensional shift can be obtained by using the MULMAT and INVMAT instructions.

The instructions, exclusive to the DX200, to obtain the shift amount are used for the optional three-dimensional shift function. However, the amount of the three-dimensional shift can be also obtained by using the standard instructions, MULMAT and INVMAT.

The target value for a three-dimensional shift can be calculated by the following equation.

$$Pnew=P3d \times Pold$$

Where Pnew: Target position after a three-dimensional shift

P3d: Three-dimensional shift amount

Pold: Taught position

The amount of a three-dimensional shift can be obtained as follows:

$$P3d=Pnew \times Pold^{-1}$$

(1) MOVL P010 V=500
GETS PX020 $PX001 Stores the current XYZ type value in P020.
INVMAT P021 P010 Calculates the inverse matrix of the taught position.
MULMAT P023 P020 P021 The amount of the three-dimensional

INVMAT

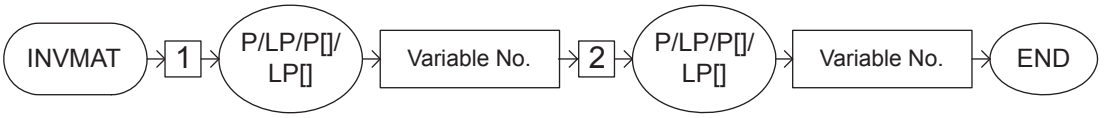
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Calculates the inverse matrix of Data 2, and stores the result in Data 1.

Construction

INVMAT <Data 1> <Data 2>



Explanation

1. P Variable number/LP Variable number/P [Array number]/LP [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the position type variable to store the result.	<Data 1>

2. P Variable number/LP Variable number/P [Array number]/LP [Array number]

Add the following tag.

No.	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the number of the position type variable for which the inverse matrix is calculated.	<Data 2>

Example

(1) MOVL P010 V=500
GETS PX020 $PX001 Stores the current XYZ type value in P020.
INVMAT P021 P010 Calculates the inverse matrix of the taught position.
MULMAT P023 P020 P021 The amount of the three-dimensional

GETPOS

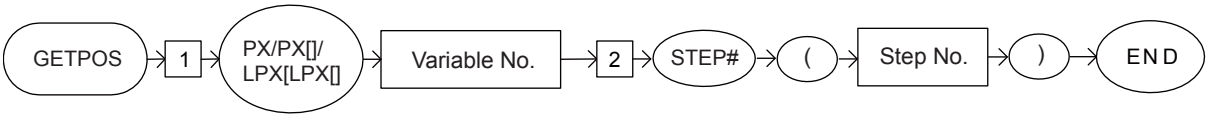
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the position data of the data2 (step number) in Data 1.

Construction

GETPOS <Data 1> <Data 2>



Explanation

1. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the expanded position type variable to store the teaching position data.	<Data 1>

2. STEP# (Step number)

Add the following tag.

No.	Tag	Explanation	Note
2	STEP# (Step number)	Specifies the step number of the teaching position data to store.	<Data 2> No.: 1 to 999

Example

(1) GETPOS PX000 STEP# (1)

In case of R1 job, stores the teaching position data of the first step in P000.

VAL

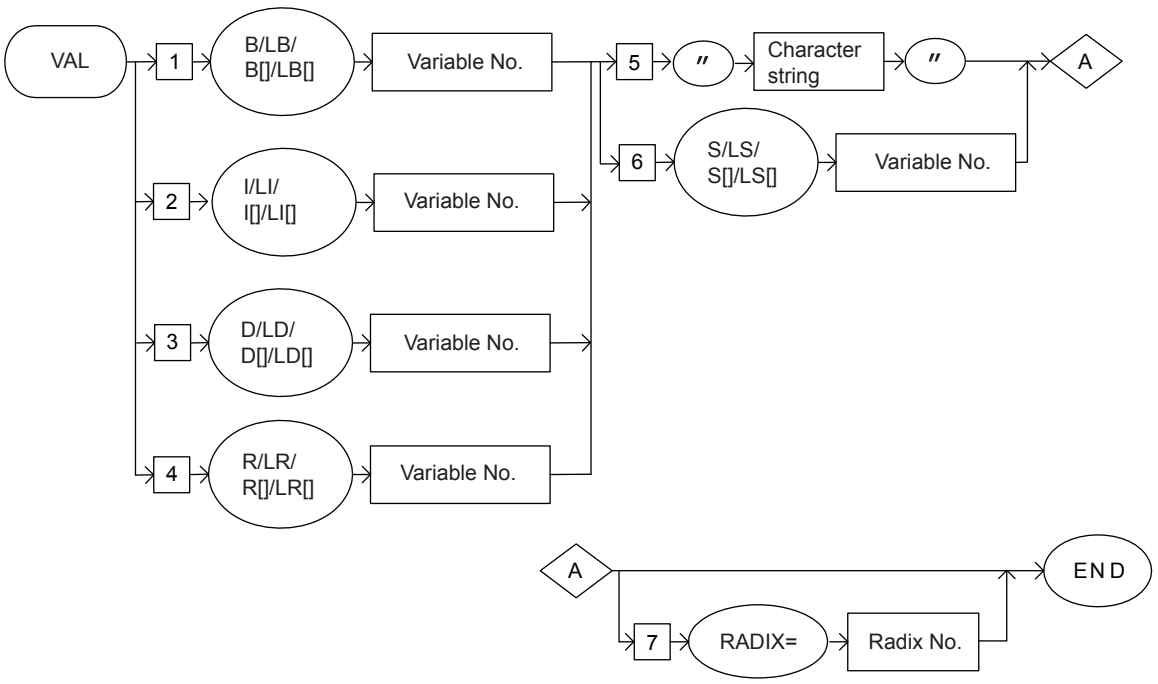
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Converts the numeric values of the character string (ASCII) in the data2 into the real value, and stores the result in data1.

Construction

VAL <Data 1> <Data 2> radix number



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to store the converted value.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to store the converted value.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to store the converted value.	<Data 1>
4	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable to store the converted value.	<Data 1>

2. Character string/ S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table

No.	Tag	Explanation	Note
5	Character string	Specifies the character string to convert	<Data 2>
6	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to convert the character string	<Data 2>

3. RADIX=radix number

The following tag can be added or omitted

No.	Tag	Explanation	Note
7	RADIX=radix number	Specifies the radix number to convert the value	

Example

(1) LEN B000 “123”

123 is stored in B000.

(2) LEN B000 “111” RADIX=2

7 is stored in B000.

VAL2STR

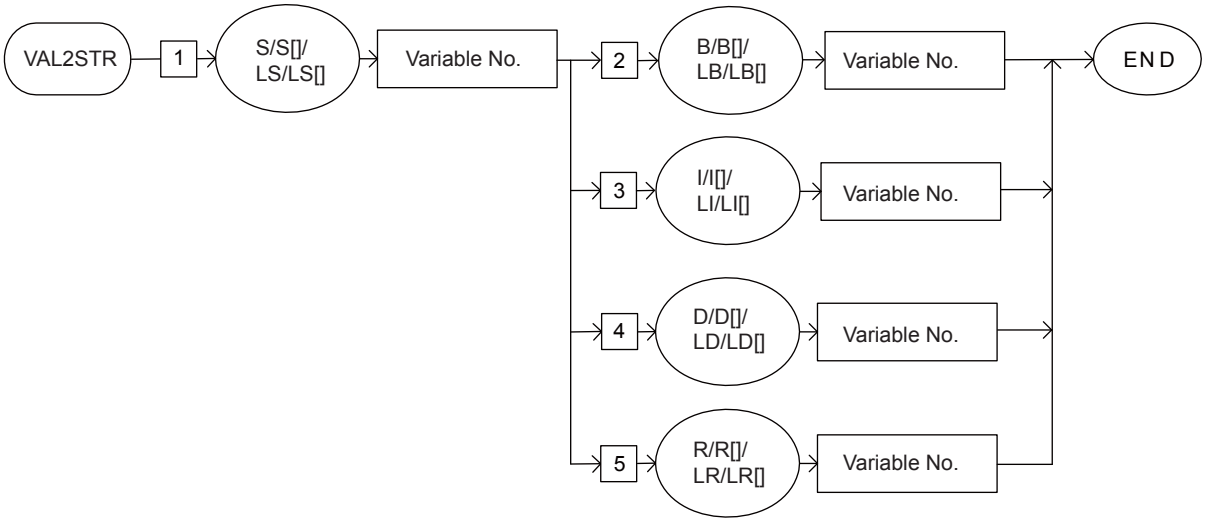
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

The data2 value, which is converted into the character, is stored in the data1.

Construction

VAL2STR <Data 1> <Data 2>



Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to store the data	<Data 1>

2. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/ D Variable number/LD Variable number/D [Array number]/LD [Array number]/R Variable number/LR Variable number/R [Array number]/LR [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to covert into the character string.	<Data 2>
3	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to covert into the character string.	<Data 2>
4	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to covert into the character string.	<Data 2>
5	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable to covert into the character string.	<Data 2>

Example

(1) VAL2STR S000 B000

The character string “255” i stored in S000 when [255] is stored in B000.

ASC

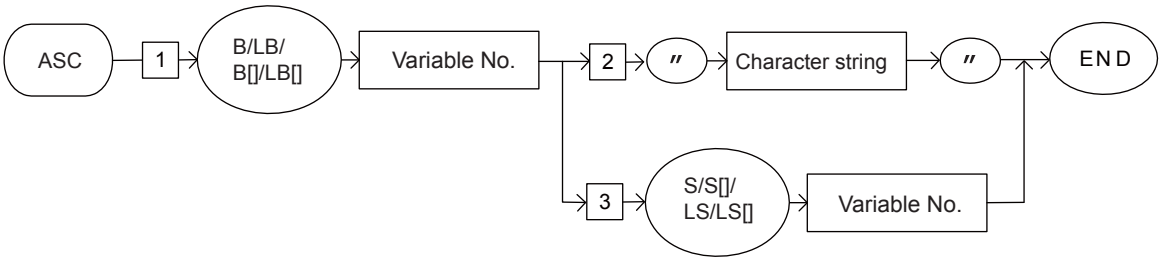
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Retrieves the first character code of the character string (ASCII) of the data2, and stores it in Data 1.

Construction

ASC <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to store the character code.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	Character string	Specifies the character string to retrieve the character code.	<Data 2>
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable stored the character string to retrieve the character code.	<Data 2>

Example

(1) ASC B000 “ABC”

The first character code “A” from the character string “ABC” is stored in B000.

CHR$

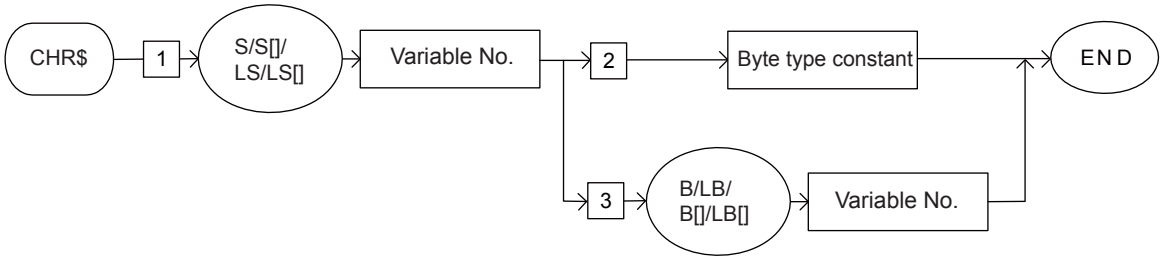
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

The character (ASCII), which contains the character code of the data2 is retrieved, and it is stored in Data 1.

Construction

CHR$ <Data 1> <Data 2>



Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the byte type variable to store the retrieved character from the character code.	<Data 1>

2. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	Byte type constant	Specifies the character code to retrieve the character code.	<Data 2>
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable stored the character code to retrieve the character.	<Data 2>

Example

(1) ASC S000 65

The letter “A” ,which is the character code 65, is stored in S000.

MID$

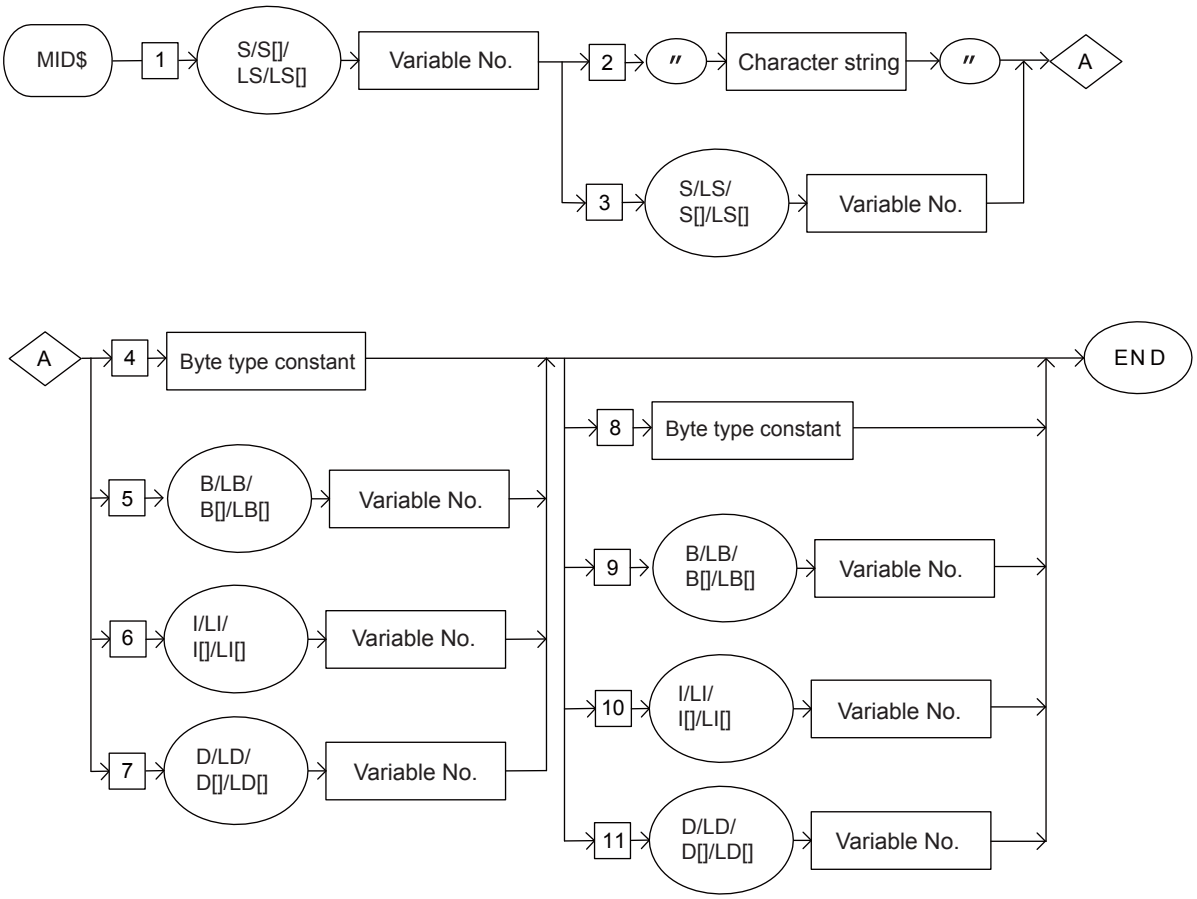
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Extracts the any length (data 3, 4) of the character string (ASCII) from the character strings (ASCII) in the data2, and stores the result in Data 1.

Construction

MID$ <Data 1> <Data 2> <Data 3> <Data 4>



Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to store the extracted character string.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	Character string	Specifies the character string to extract.	<Data 2>
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable stored the character string to extract.	<Data 2>

3. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	Byte type constant	Specifies the starting position to extract.	<Data 3>
5	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable stored the starting position to extract.	<Data 3>
6	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable stored the starting position to extract.	<Data 3>
7	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable stored the starting position to extract.	<Data 3>

4. Byte type constant/B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
8	Byte type constant	Specifies the length to extract.	<Data 4>
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable stored the length to extract.	<Data 4>
10	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable stored the length to extract.	<Data 4>
11	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable stored the length to extract.	<Data 4>

Example

(1) MID$ S000 “123ABC456” 4 3

Extracts 3 characters from the 4th character in the character string “123ABC456” , and stores it in S000.

LEN

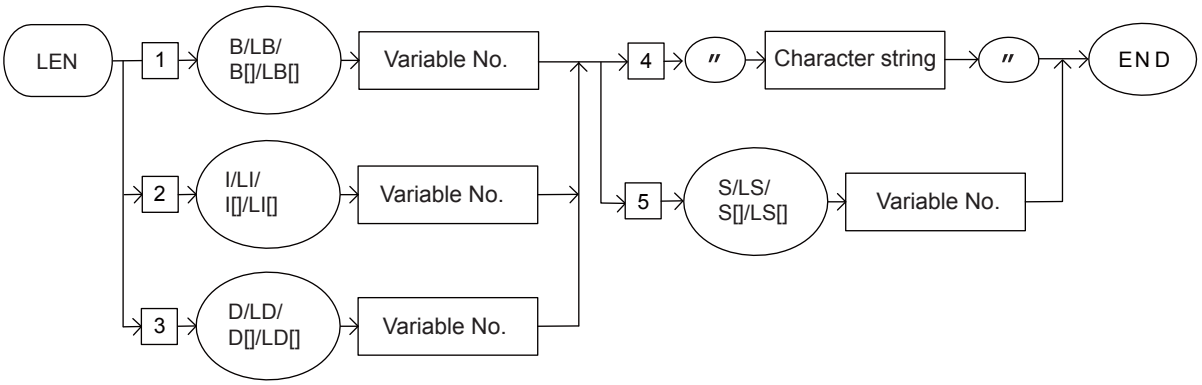
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Retrieves the total number of the character string (ASCII) of the data2, and stores the result in Data 1.

Construction

LEN <Data 1> <Data 2>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]/I Variable number/LI Variable number/I [Array number]/LI [Array number]/D Variable number/LD Variable number/D [Array number]/LD [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to store the total byte number.	<Data 1>
2	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to store the total byte number.	<Data 1>
3	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to store the total byte number.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	Character string	Specifies the character string to retrieve the total byte number.	<Data 2>
5	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable stored the character string to retrieve the total byte number.	<Data 2>

Example

(1) LEN B000 “ABCDEF”

The total byte number of the character string “ABCDEF” is stored in B000.

CAT$

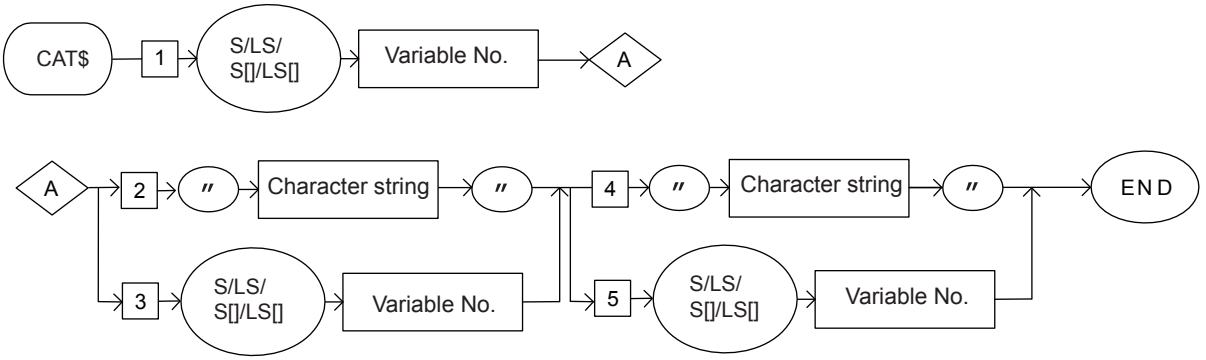
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Combines the character strings (ASCII) from the data2 and the data3, and stores the result in Data1.

Construction

CAT$ <Data 1> <Data 2> <Data 3>



Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to store the combined character.	<Data 1>

2. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	Character string	Specifies the character strings to combine.	<Data 2>
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable stored the characters to combine.	<Data 2>

3. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	Character string	Specifies the character strings to combine.	<Data 3>
5	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable stored the characters to combine.	<Data 3>

Example

(1) CAT$ S000 “ABC” “DEF”

The combined character string “ABCDEF” from the character string “ABC” and “DEF” is stored in S000.

STRSTR

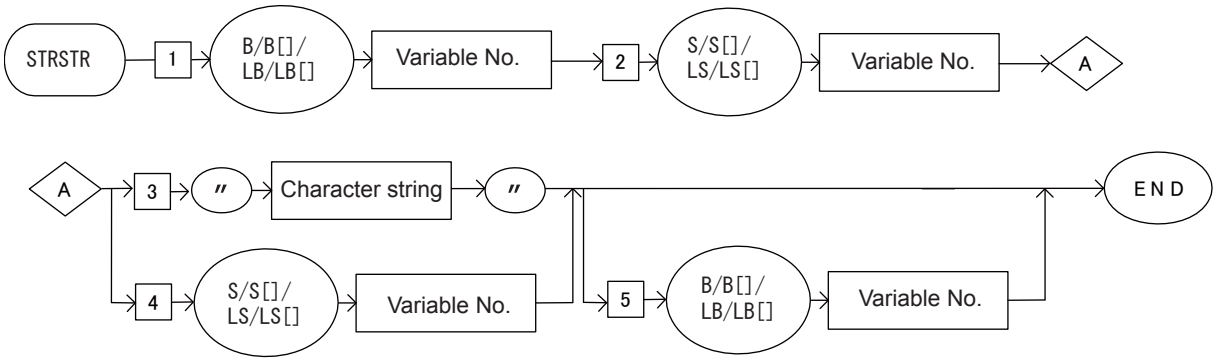
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

The first position where the same character string as the data2 appears in the data3 is stored into the data1.

Construction

STRSTR <Data 1> <Data 2> <Data 3>



Explanation

1. B Variable number/LB Variable number/B [Array number]/LB [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the character type variable to store the appearance position.	<Data 1>

2. S Variable number/LS Variable number/S [Array number]/LS [Array number]

Add the following tag.

No.	Tag	Explanation	Note
2	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable where the character string to search the character string.	<Data 2>

3. Character string/S Variable number/LS Variable number/S [Array number]/LS [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
3	Character string	Specifies the character strings to search.	<Data 3>
4	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable stored the character string to search.	<Data 3>

4. B Variable number/LB Variable number/B [Array number]/LB [Array number]

The following tag can be added or omitted.

No.	Tag	Explanation	Note
5	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the character type variable to store the search start position data of the search character string <data2> .	

Example

(1) STRSTR B000 S000 “DEF”

Stores “4” into B000 when “ABCDEFGHI” is stored in S000.

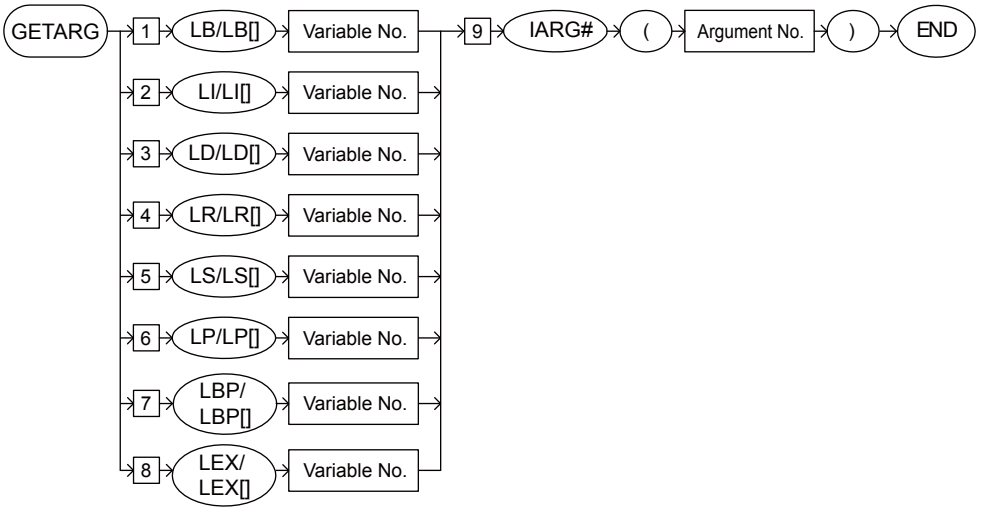
GETARG

SUBSET	STANDARD	EXPANDED
Not available	Not available	Available

Function

This is the instruction to receive arguments for the CALL instruction and macro instruction. When the instruction is executed, the argument data added to the CALL instruction or macro instruction is retrieved, then stored in the local variable specified to be used in the CALL job or macro job.

Construction



Explanation

1. LB Variable number/LB [Array number]/ LI Variable number/LI [Array number]/ LD Variable number/LD [Array number]/ LR Variable number/LR [Array number]/ LS Variable number/LS [Array number]/LP Variable number/LP [Array number]/LBP Variable number/LBP [Array number]/ LEX Variable number/ LEX [Array number]/

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	LB Variable number LB [Array number]	Specifies the local byte type variable which stores the argument.	
2	LI Variable number LI [Array number]	Specifies the local integer type variable which stores the argument.	
3	LD Variable number LD [Array number]	Specifies the local double precision type variable which stores the argument.	
4	LR Variable number LR [Array number]	Specifies the local real type variable which stores the argument.	
5	LS Variable number LS [Array number]	Specifies the local character type variable which stores the argument.	
6	LP Variable number LP [Array number]	Specifies the local robot axis position type variable which stores the argument.	
7	LBP Variable number LBP [Array number]	Specifies the local base axis position type variable which stores the argument.	
8	LEX Variable number LEX [Array number]	Specifies the local station axis position type variable which stores the argument.	

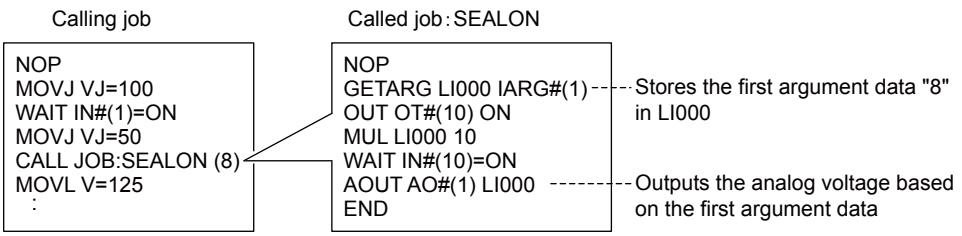
2. IARG# (Argument No.)

Add the following tag.

No.	Tag	Explanation	Note
9	IARG# (Argument No.)	Specifies the argument number to be stored in the local variable.	Variable B/I/D/LB/LI/LD can be used.

Example

(1) An example is shown below.



GETNAME

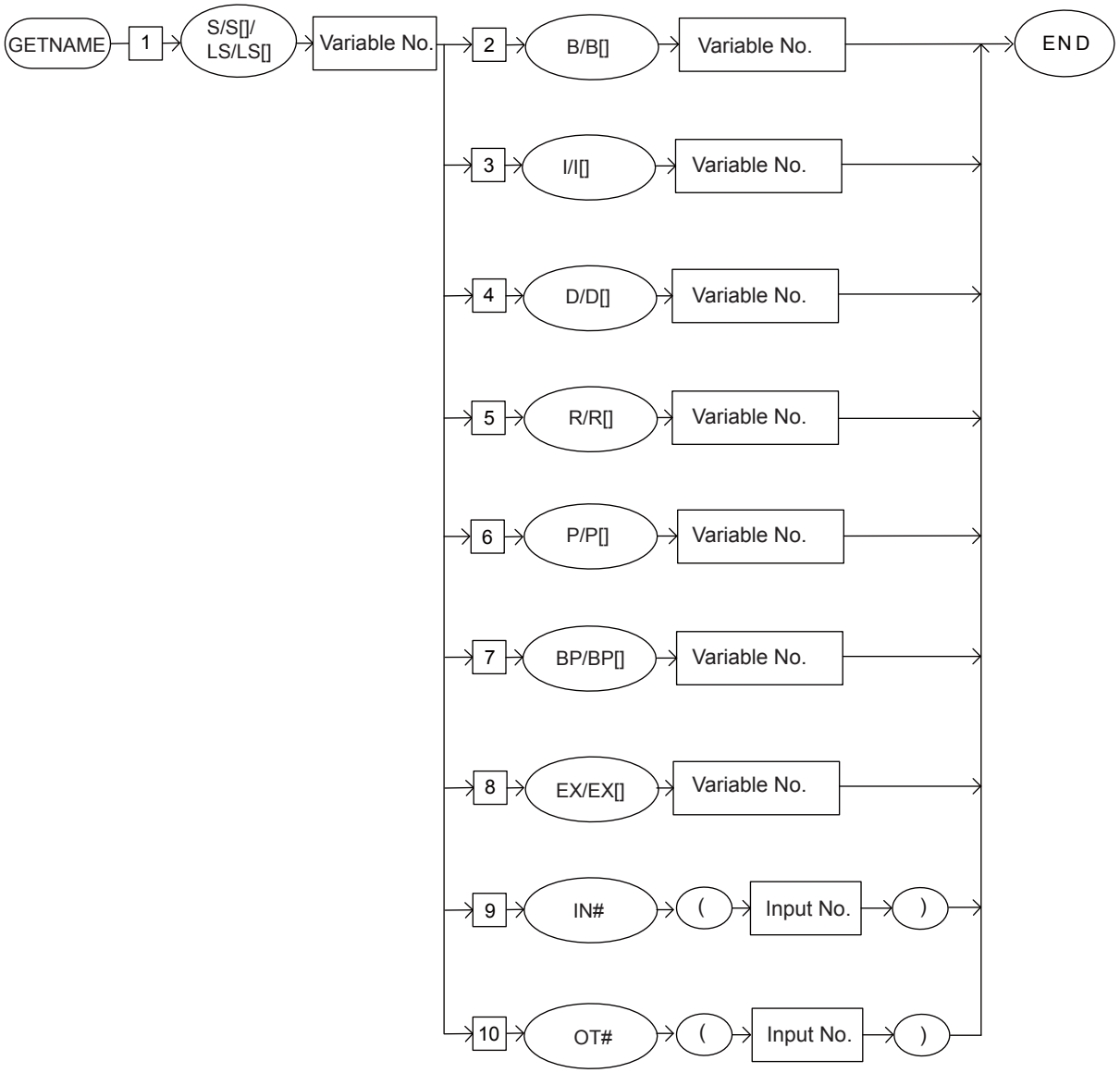
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the name data of the data2 into data1.

Construction

GETNAME <Data 1> <Data 2>



Explanation

1. S Variable number/LS Variable number/S [Array number]/LS [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to store the data.	<Data 1>

1. B Variable number/B [Array number]/I Variable number/I [Array number]/D Variable number/D [Array number]/R Variable number/R [Array number]/P Variable number/P [Array number]/BP Variable number/BP [Array number]/EX Variable number/EX [Array number]/IN# (input number)/OT# (output number)

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	B Variable number/ B [Array number]/	Specifies the number of the byte type variable to obtain the name.	<Data 2>
3	I Variable number/ I [Array number]/	Specifies the number of the integer type variable to obtain the name.	<Data 2>
4	D Variable number/ D [Array number]/	Specifies the number of the double precision type variable to obtain the name.	<Data 2>
5	R Variable number/ R [Array number]/	Specifies the number of the real type variable to obtain the name.	<Data 2>
6	P Variable number/ P [Array number]/	Specifies the number of the robot axis position type variable to obtain the name.	<Data 2>
7	BP Variable number/ BP [Array number]/	Specifies the number of the base axis position type variable to obtain the name.	<Data 2>
8	EX Variable number/ EX [Array number]/	Specifies the number of the station axis position type variable to obtain the name.	<Data 2>
9	IN(#) input number	Specifies the user input number to obtain the name.	<Data 2>
10	OT(#) output number	Specifies the user output number to obtain the name.	<Data 2>

Example

(1) GETNAME S000 B000

If the “COUNT” in stored by a name of B000, “COUNT” is stored in S000.

SETFILE

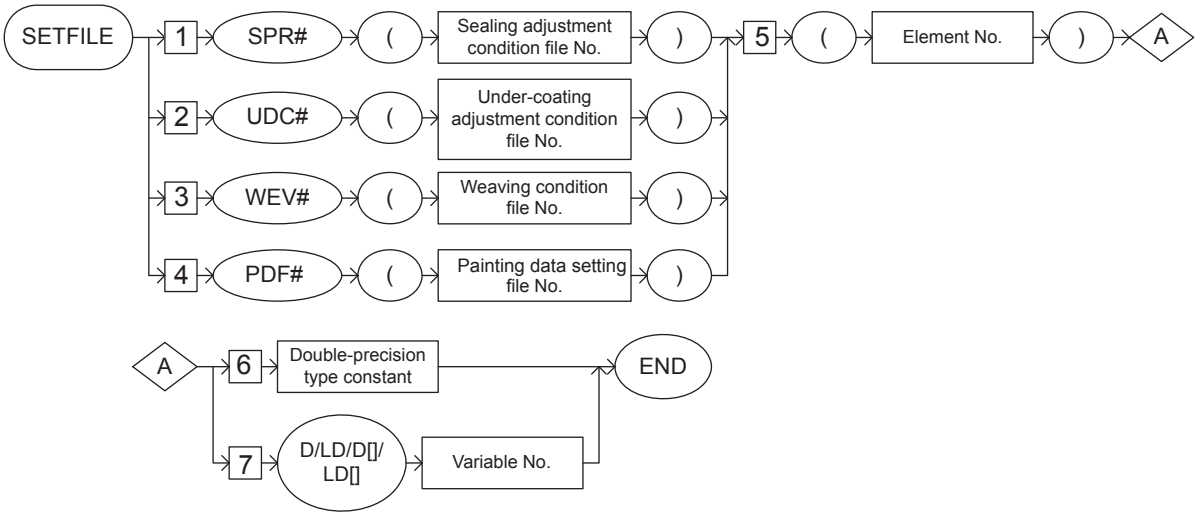
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Changes the specified data of the specified condition file to the numeric data of Data 1.
Specify the data of the condition file to be changed by its element number.

Construction

SETFILE Condition file specification (Element number) <Data 1>



Explanation

1. SPR# (Sealing adjustment condition file number)/ UDC# (Under-coating adjustment condition file number)/WEV# (Weaving condition file number)/PDF# (Painting data setting file number)

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	SPR# (Sealing adjustment condition file number)	Specifies the number of the sealing (spray) adjustment condition file.	No.: 1 Variable B/I/D/LB/LI/LD can be used. Available only with the optional servo sealing gun function.

No.	Tag	Explanation	Note
2	UDC# (Under-coating adjustment condition file number)	Specifies the number of the number of the under-coating adjustment condition file.	No.: 1 Variable B/I/D/LB/LI/LD can be used. Available only with the optional under-coating function.
3	WEV# (Weaving condition file number)	Specifies the number of the weaving condition file.	No.: 1 to 255 Variable B/I/D/LB/LI/LD can be used.
4	PDF# (Painting data setting file number)	Specifies the painting data setting file number.	No.: 1 Variable B/I/D/LB/LI/LD can be used.

2. (Element number)

Add the following tag.

No.	Tag	Explanation	Note
5	(Element number)	Specifies the element number of the condition file data to be changed.	Element No.: 1 to 255 Variable B/LB can be used.

3. Double-precision type constant/D Variable number/ LD Variable number/D [Array number]/LD [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
6	Double-precision type constant	Specifies the double-precision type data to be changed.	<Data 1>
7	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable of the data to be changed.	<Data 1>

Element number of each condition file

The element number of each item in the condition file is shown below.

<Weaving condition file>

Element No.	Item	Units	Remarks
1	MODE		
2	SMOOTHING		
3	SPEED		
4	FREQUENCY	0.1 Hz	
5	AMPLITUDE (ACTIVE IN	0.001	
6	PATTERN VERTICAL	0.001	
7	PATTERN HORIZONTAL	0.001	
8	PATTERN ANGLE	0.01 deg.	
9	ANGLE	0.01 deg.	
10	TIMER MODE (SECT 1 to 4)		Stop positions 1 to 4 (SECT 1 to 4) designated by bit data
11 to14	MOVING TIME	0.1 sec.	Sections 1 to 4
15 to18	TIMER (timer count)	0.1 sec.	Duration of a pause
19	HOVER WEAVING SET		Optional
20	HOVER WEAVING TIME	0.01 sec.	Optional
21	HOVER WEAVING INPUT		Optional

For details of the weaving condition file, refer to “Chapter 11.10 Weaving Condition File” in DX200 OPERATOR’S MANUAL FOR ARC WELDING (RE-CSO-A031).

Example

(1) SETFILE WEV#(1) (5) 3500

Changes the amplitude setting in the weaving condition file number 1 to 3.500 mm.

GETFILE

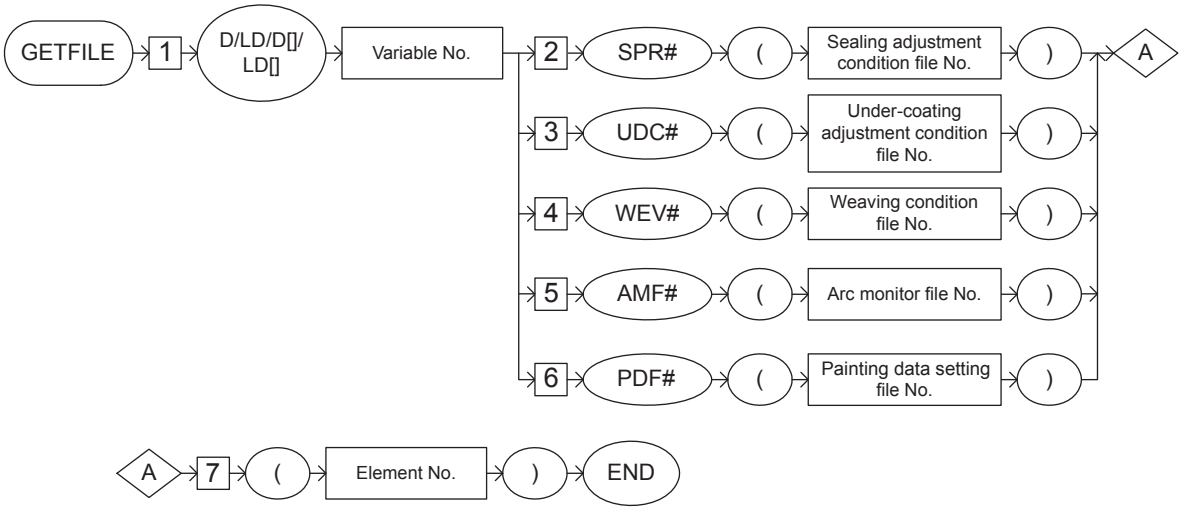
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the data of the specified condition file in Data 1.
Specify the data of the condition file to be obtained by its element number.

Construction

GETFILE <Data 1> Condition file designation (Element number)



Explanation

1. D Variable number/LD Variable number/D [Array number]/LD [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double-precision type variable to store the data.	<Data 1>

2. SPR# (Sealing adjustment condition file number)/ UDC# (Under-coating adjustment condition file number)/WEV# (Weaving condition file number)/AMF# (Arc monitor file number)/PDF# (Painting data setting file number)

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	SPR# (Sealing adjustment condition file number)	Specifies the number of the sealing (spray) adjustment condition file.	No.: 1 Variable B/I/D/LB/LI/LD can be used. Available only with the optional servo sealing gun function.
3	UDC# (Under-coating adjustment condition file number)	Specifies the number of the under-coating adjustment condition file.	No.: 1 Variable B/I/D/LB/LI/LD can be used. Available only with the optional under-coating function.
4	WEV# (Weaving condition file number)	Specifies the number of the weaving condition file.	No.: 1 to 255 Variable B/I/D/LB/LI/LD can be used.
5	AMF# (Arc monitor file number)	Specifies the number of the arc monitor file.	No.: 1 to 100 Variable B/I/D/LB/LI/LD can be used. Available only with the optional arc monitor function.
6	PDF# (Painting data setting file number)	Specifies the number of the painting data setting file.	No.: 1 Variable B/I/D/LB/LI/LD can be used.

3. (Element number)

Add the following tag.

No.	Tag	Explanation	Note
7	(Element number)	Specifies the element number of the condition file to obtain the data.	Element No.: 1 to 255 Variable B/LB can be used.

Example

(1) GETFILE D000 WEV#(1) (6)

Stores the vertical distance (PATTERN VERTICAL) in the weaving condition file number 1 in D000.

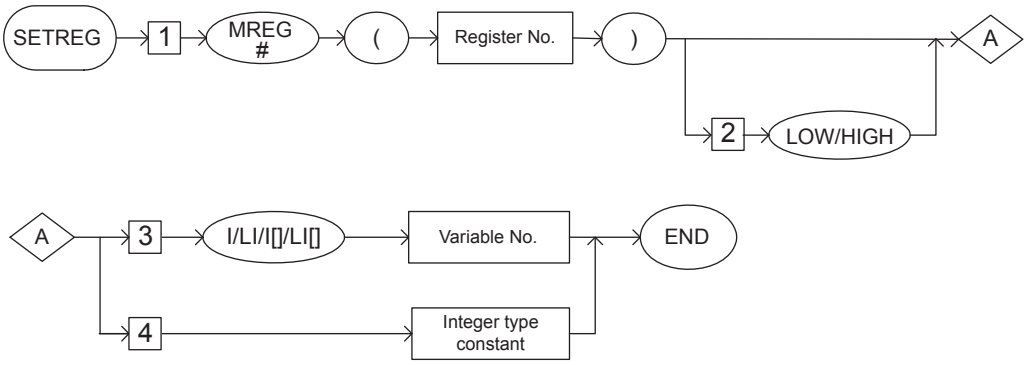
SETREG

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Copies the specified integer type variable data into the register.

Construction



Explanation

1. MREG# (Register number)

Add the following tag.

No.	Tag	Explanation	Note
1	MREG# (Register number)	Specifies the register number to save the data.	No.: 0 to 599 Variable B/I/D/LB/LI/LD can be used.

2. LOW/HIGH

The following tag can be added or omitted.

No.	Tag	Explanation	Note
2	LOW/HIGH	Specifies when copying the data into the lower/higher 8 bits of the register.	

3. I Variable number/LI Variable number/I [Array number]/LI [Array number]

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
3	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the data number to be saved in the register.	
4	Integer type variable	Input the data to be saved in the register.	

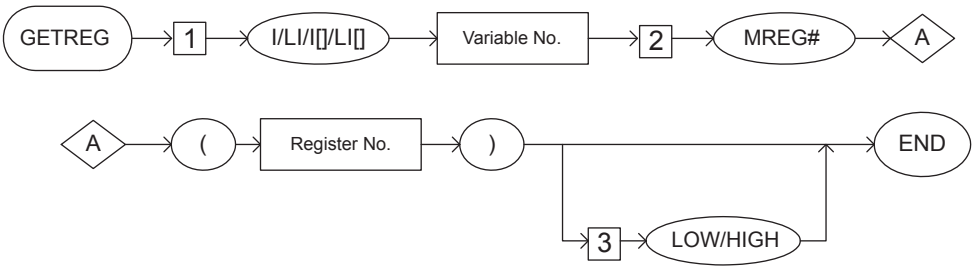
GETREG

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Copies the specified register data into the integer type variable.

Construction



Explanation

1. I Variable number/LI Variable number/I [Array number]/LI [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to save the register data.	

2. MREG# (Register number).

Add the following tag.

No.	Tag	Explanation	Note
2	MREG# (Register number)	Specifies the desired register number to be saved into the integer type variable.	No.: 0 to 999 Variable B/I/D/LB/LI/LD can be used.

3. LOW/HIGH

The following tag can be added or omitted.

No.	Tag	Explanation	Note
3	LOW/HIGH	Specifies when saving the lower/higher 8 bits out of 16 bits register.	

GETPRM

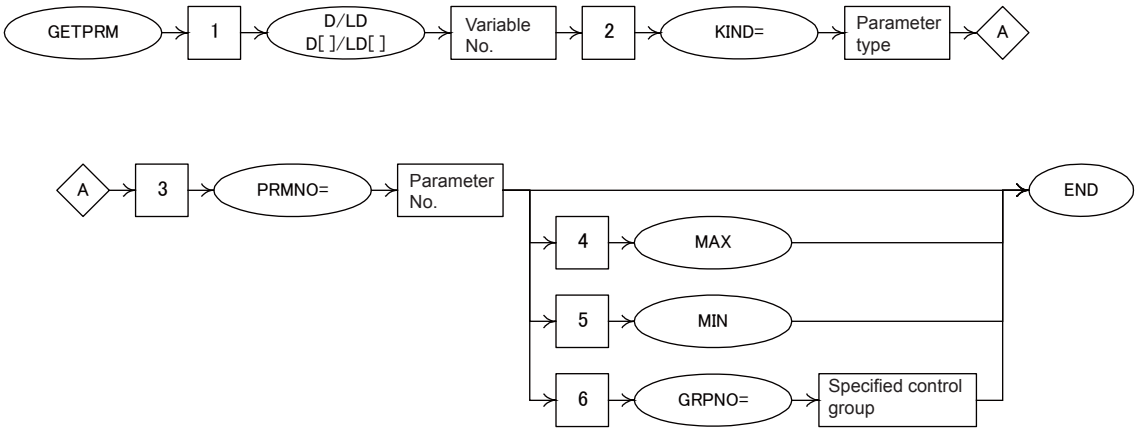
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Stores the specified parameter into the specified variable.
It can be only used at the macro job when the macro command (optional) is valid.

Construction

GETPRM <Data1> <Data2> <Data3> <Data4>



Explanation

1. D Variable number /LD Variable number /D [Array number] /LD [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to store the data.	<Data1>

2. KIND=Parameter type

Add the following tag.

No.	Tag	Explanation	Note
2	KIND=parameter type	Specifies the parameter type. 4: S1CxG 5: S2C 6: S3C 7: S4C	<Data2> No.: 4 to 7 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. PRMNO=Parameter No.

Add the following tag.

No.	Tag	Explanation	Note
3	PRMNO=parameter No.	Specifies the parameter No.	<Data3> Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. MAX (Specifying the maximum value) MIN (Specifying the minimum value) GRPNO=Specifying the control group

The following tag can be added or omitted. However, one of the following tags must be selected when KIND=4(S1CxG) is specified.

No.	Tag	Explanation	Note
4	MAX	Specifies the largest specified parameter value in the control group which is included the job to operate the GETPRM command. The job without control group which operates the GETPRM command cannot retrieve the parameter value.	<Data4>
5	MIN	Specifies the smallest specified parameter value in the control group which is included the job to operate the GETPRM command. The job without control group which operates the GETPRM command cannot retrieve the parameter value.	<Data4>
6	GRPNP=Specifies control group	Specifies the control group	<Data4> Control group: 1 to 16 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

Example

GETPRM D000 KIND=4 PRMNO=400 GRPNO=1

Stores the soft limit values (+) of the Robot 1to D000.

SETPRM

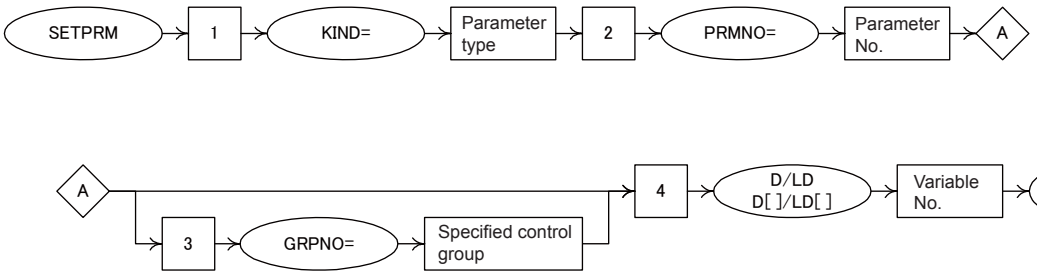
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Changes the specified parameter into the specified variable.
It can be only used at the macro job when the macro command (optional) is valid.

Construction

SETPRM <Data1> <Data2> <Data3> <Data4>



Explanation

1. KIND=Parameter type

Add the following tag.

No.	Tag	Explanation	Note
1	KIND=parameter type	Specifies the parameter type. 5: S2C 6: S3C	<Data1> Type: 5 to 6 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

2. PRMNO=Parameter No.

Add the following tag.

No.	Tag	Explanation	Note
2	PRMNO=Parameter No.	Specifies the parameter number. The parameter range varies by specifying KIND=parameter type. KIND=5(S2C) : 3 to 194 KIND=6(S3C) : 64 to 1087	<Data2> No.: 4 to 7 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. GRPNO=Specifies control group

The following tag can be added or omitted.

No.	Tag	Explanation	Note
3	GRPNO=Specifies control group	Specifies the control group No. Tag is not used at this time for future use.	<Data3> Control group: 1 to 16 Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. D Variable number/ LD Variable number /D [Array number]/ LD [Array number]

Add he following tag.

No.	Tag	Explanation	Note
4	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to store the data.	<Data4>

Example

In case of executing SETPRM KIND=5 PRMNO=67 D000 when D000 is 2, the signal method can be switched to the robot coordinate from cubic/ axis interference.

2.4 Move Instruction

MOVJ

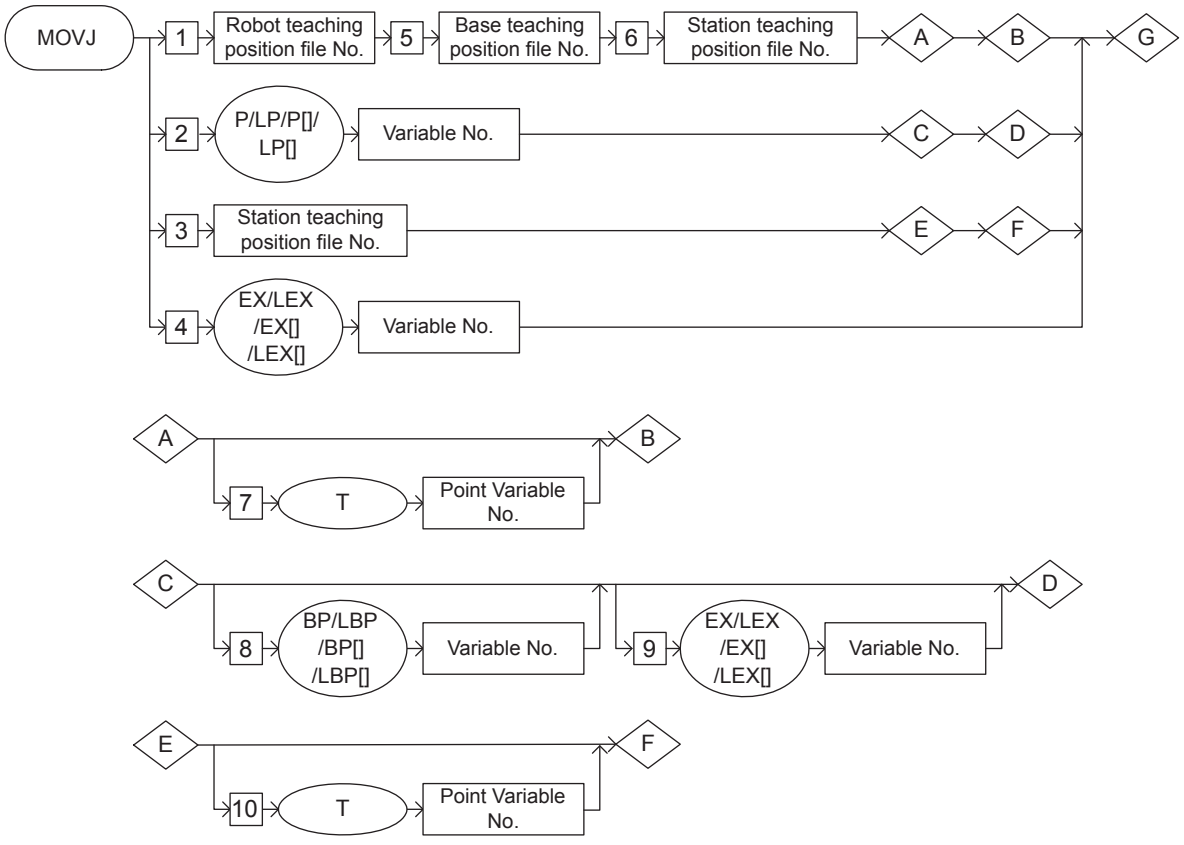
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by joint interpolation.

Construction

The tag which can be used is limited by the type of the job.



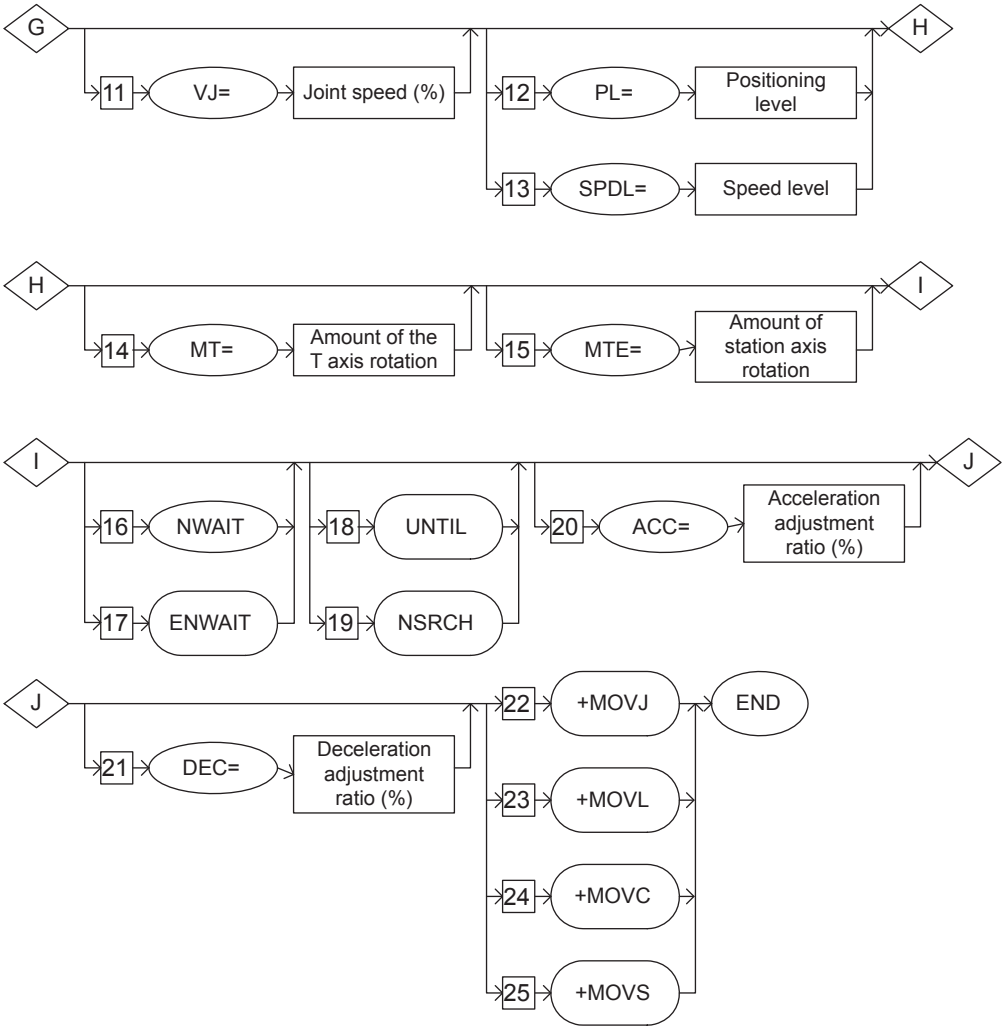


Table 2-1: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Station axis only	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional

Table 2-2: Availability of Each Tag

No	Tag	Control Group							Note
		1	2	3	4	5	6	7	
1	Robot teaching position file number	●	●	●	●	×	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	×	●	●	
3	Station teaching position file number	×	×	×	×	●	×	×	
4	EX/LEX/EX[]/LEX[]	×	×	×	×	●	×	×	
5	Base axis teaching position file number	×	●	×	●	×	×	×	
6	Station teaching position file number	×	×	●	●	×	×	×	
7	T	○	○	○	○	×	○	○	Optional
8	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	
9	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	
10	T	×	×	×	×	○	×	×	Optional
11	VJ=	●	●	●	●	●	●	●	
12	PL=	●	●	●	●	●	●	●	
13	SPDL=	○	○	○	○	×	○	○	Optional
14	MT=	○	○	○	○	×	×	×	Optional
15	MTE=	×	×	○	○	○	×	×	Optional
16	NWAIT	●	●	●	●	●	●	●	
17	ENWAIT	○	○	○	○	○	○	○	Optional
18	UNTIL	●	●	●	●	●	●	●	
19	NSRCH	○	○	○	○	○	○	○	Optional
20	ACC=	●	●	●	●	●	●	●	
21	DEC=	●	●	●	●	●	●	●	
22	+MOVJ	×	×	×	×	×	○	○	Optional
23	+MOVL	×	×	×	×	×	○	○	Optional
24	+MOVC	×	×	×	×	×	○	○	Optional
25	+MOVS	×	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number] /Station teaching position file number /EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127
3	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
4	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

Position Variables

There are the following three kinds of position variables.

Robot axis : P000-P127

Base axis : BP000-BP127

Station axis : EX000-EX127

A position variable can store the position data as pulse type or XYZ type.

Local Variables and Arrangement Variables

Local variables and arrangement variables are available only for the expanded instruction set.

P000 and P[0] show the same one.

2. Base Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
5	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
6	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
7	T Point Variable number	Specifies the number of the point variable. The point variable manages the teaching positions registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LBP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
8	BP Variable number/ LBP Variable number/ BP [Array number] / LBP [Array number]	Specifies the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
9	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. T Point Variable number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
10	T Point Variable number	Specifies the number of the point variable. The point variable manages the teaching positions registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

8. VJ=Joint speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
11	VJ=Joint speed	Specifies the joint speed. The joint speed is shown in the ratio to the highest speed. When the joint speed is omitted, the operation is performed at the speed decided beforehand.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01%)

9. PL=Position level /SPDL=Speed level

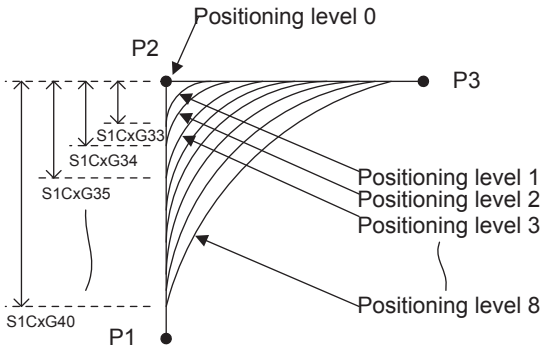
Choose one of the tags from the following table.

No	Tag	Explanation	Note
12	PL=Position level	Specifies the position level. The approach level when the manipulator passes the position where the teaching procedure was performed is called a positioning level.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
13	SPDL=Speed level	Specifies the speed level. The speed level is the tag for the robot to end the execution of the move instruction in the state of servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have stopped.	Level: Only 0 Available only with the optional servo-float function. Refer to the servo-float function for details.

SUPPLE-MENT

Position level

The approach level when the manipulator passes the position where the teaching procedure was performed is called a position level.



The approach level is set by the following parameters. (position zone)

Position level 1: S1CxG33(μm)

Position level 2: S1CxG34(μm)

Position level 3: S1CxG35(μm)

Position level 4: S1CxG36(μm)

Position level 5: SICxG37 (μm)

Position level 6: SICxG38 (μm)

Position level 7: SICxG39 (μm)

Position level 8: SICxG40 (μm)

10. MT=Amount of the T axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
14	MT=Amount of the T axis rotation	Specifies the amount of the T axis rotation. The amount of the T axis rotation specifies the amount of movement of T axis by the number of rotations.	Amount of rotation: -32768 to 32767 Available only with the optional axis endless function. Refer to the axis endless function for details.

11. MTE= Amount of the station axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
15	MTE= Amount of the station axis rotation	Specifies the amount of the station axis rotation. The operation of the station axis can be specified by the number of rotations.	Amount of rotation: -32768 to 32767 Available only with the optional axis endless function.

12. NWAIT/ENWAIT

Choose one of the tags from the following table.

No	Tag	Explanation	Note
16	NWAIT	Specifies the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same time as the manipulator is carrying out that step.	
17	ENWAIT	Specifies the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function (option: S2C714) Refer to ENWAIT of *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

13. UNTIL/NSRCH

Choose one of the tags from the following table.

No	Tag	Explanation	Note
18	UNTIL	Specifies the UNTIL instruction. The UNTIL instruction is a tag instruction by which the condition of the input signal is evaluated during operation. When the condition of the input signal is full, the robot executes the next instruction.	Refer to UNTIL of *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
19	NSRCH	Specifies the NSRCH instruction. The NSRCH instruction carries out the position detection without stopping the manipulator's motion.	Available only with the optional search-in-motion function.

14. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
20	ACC=Acceleration adjustment ratio	Specifies the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

15. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

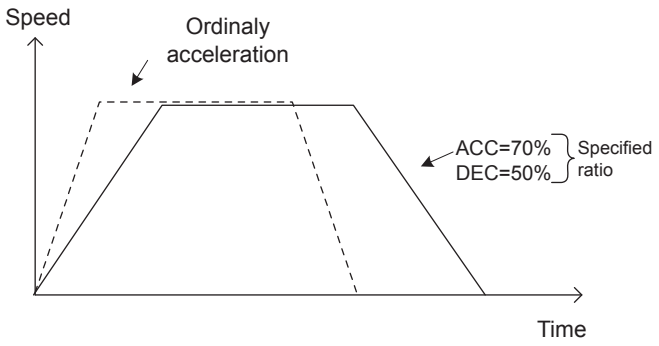
No	Tag	Explanation	Note
21	DEC=Deceleration adjustment ratio	Specifies the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

SUPPLE -MENT

Acceleration adjustment ratio

The acceleration adjustment ratio (ACC) reduces the amount of acceleration in the specified ratio.

Using this function can reduce the load inertia on the tool and the workpiece.



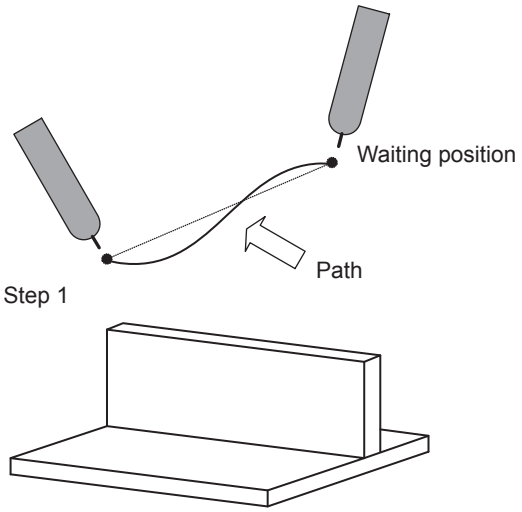
16. +MOVJ/+MOVL/+MOVC/+MOVS

Choose one of the tags from the following table.

No	Tag	Explanation	Note
22	+MOVJ	Specifies the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
23	+MOVL	Specifies the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
24	+MOVC	Specifies the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
25	+MOVS	Specifies the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.

Example

(1) MOVJ P000 VJ=50.00
Move from the manipulator's waiting position to step 1. Move by joint interpolation at a speed of 50%.
The position in Step 1 is registered to the P variable no. 0.
The path during movement is not specified. Be careful of interference.



MOVL

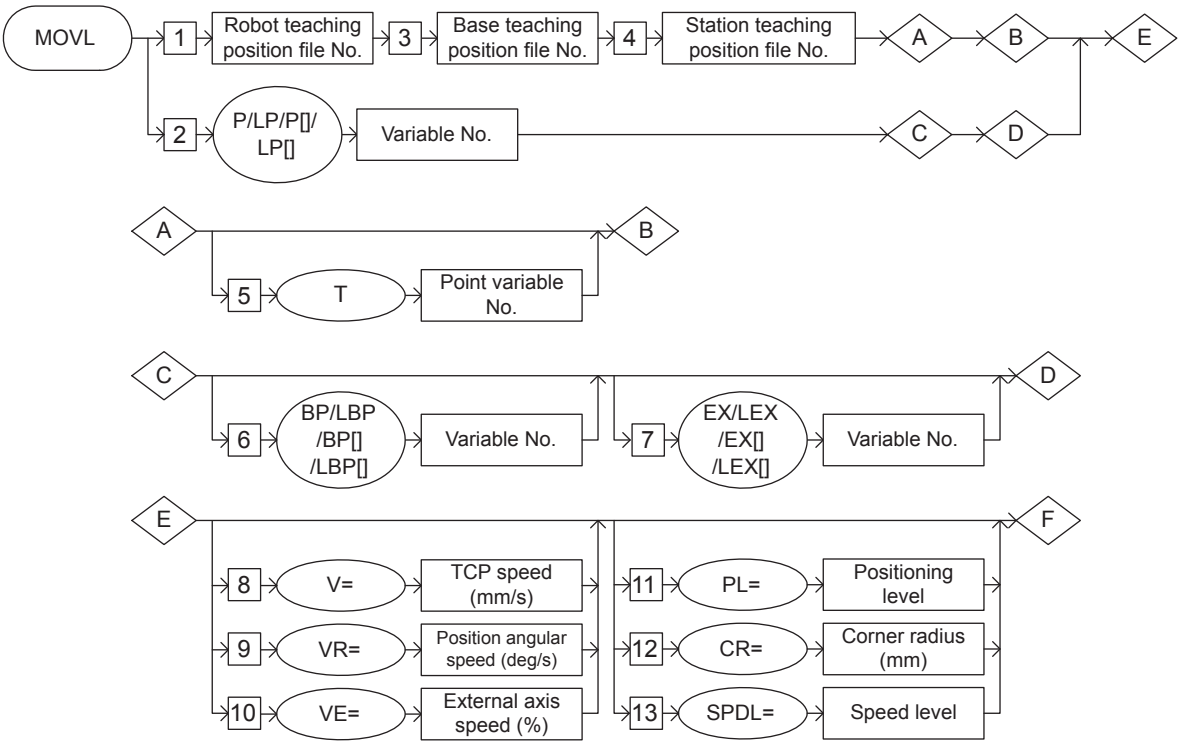
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by linear interpolation.

Construction

The tag which can be used is limited by the type of the job.



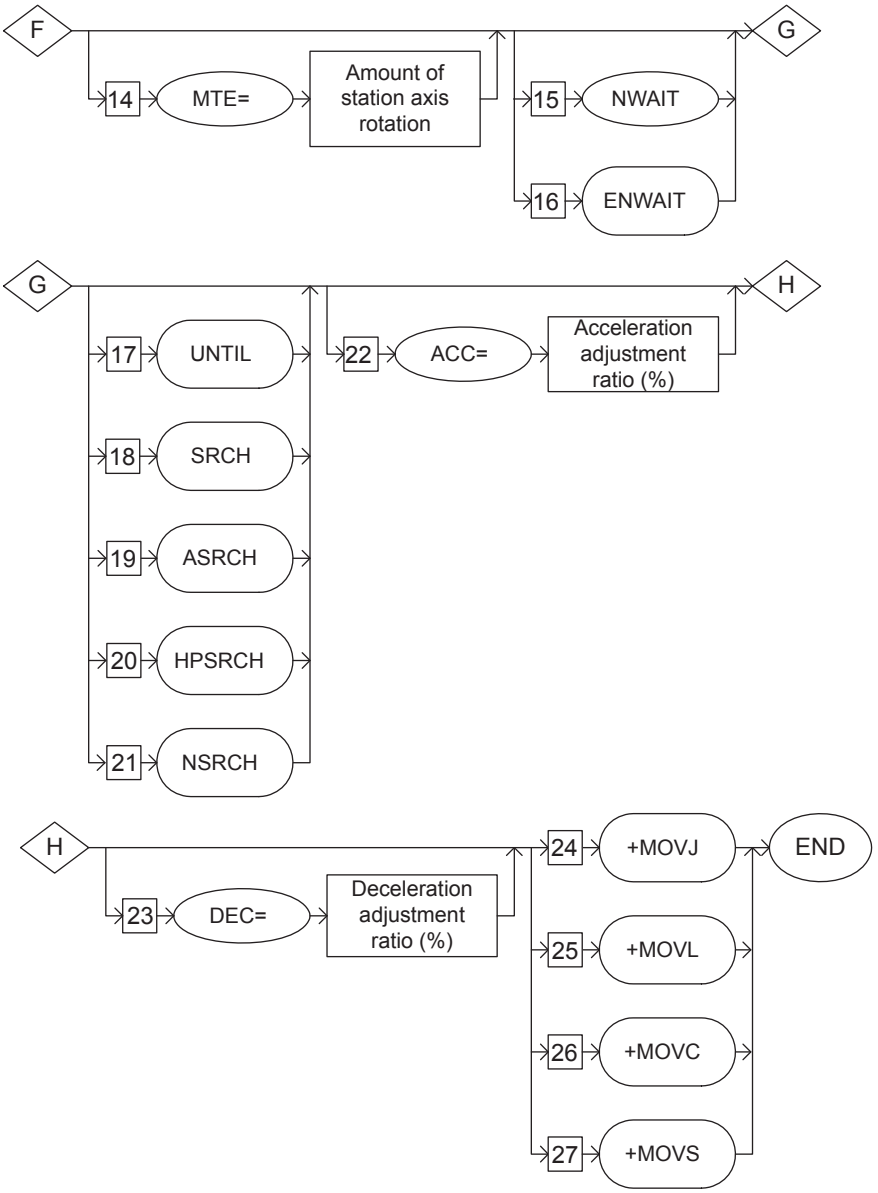


Table 2-3: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Coordinated	Two manipulators	Optional
6	Coordinated	Two manipulators with base axis	Optional

Table 2-4: Availability of Each Tag

No	Tag	Control Group						Note
		1	2	3	4	5	6	
1	Robot teaching position file number	●	●	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	●	●	
3	Base axis teaching position file number	×	●	×	●	×	●	
4	Station teaching position file number	×	×	●	●	×	×	
5	T	○	○	○	○	○	○	Optional
6	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	
7	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	
8	V=	●	●	●	●	●	●	
9	VR=	●	●	●	●	●	●	
10	VE=	×	×	●	●	×	×	
11	PL=	●	●	●	●	●	●	
12	CR=	●	●	●	●	●	●	
13	SPDL=	○	○	○	○	○	○	Optional
14	MTE=	×	×	○	○	×	×	Optional
15	NWAIT	●	●	●	●	●	●	
16	ENWAIT	○	○	○	○	○	○	Optional
17	UNTIL	●	●	●	●	●	●	
18	SRCH	○	○	○	○	○	○	Optional
19	ASRCH	○	○	○	○	○	○	Optional
20	HPSRCH	○	○	○	○	○	○	Optional
21	NSRCH	○	○	○	○	○	○	Optional
22	ACC=	●	●	●	●	●	●	
23	DEC=	●	●	●	●	●	●	
24	+MOVJ	×	×	×	×	○	○	Optional
25	+MOVL	×	×	×	×	○	○	Optional
26	+MOVC	×	×	×	×	○	○	Optional
27	+MOVS	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

2. Base Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
3	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
4	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When the robot teaching position file number is selected from the table in part 1 of this Explanation, the following can be added or omitted.

No	Tag	Explanation	Note
5	T Point Variable number	Specifies the point variable number. The point variable manages the teaching position registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

Choose one of the tags from the following table.

No	Tag	Explanation	Note
8	V=Tool center point speed	Specifies the tool center point speed. Specifies the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
9	VR=Position angular speed	Specifies the position angular speed.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg./s)
10	VE=External axis speed	Specifies the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01 %)

8. PL=Position level /CR=Corner radius /SPDL=Speed level

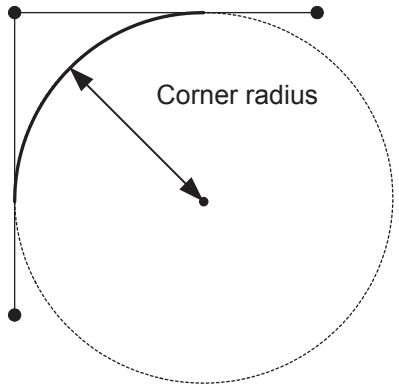
Choose one of the tags from the following table.

No	Tag	Explanation	Note
11	PL=Position level	Specifies the position level. The position level is a level of the approach when the manipulator passes the position where the teaching procedure was performed.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
12	CR=Corner radius	Specifies the corner radius. The manipulator operates by circular interpolation in which the corner radius is specified.	Radius: 0.1mm to 6553.5 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm)
13	SPDL=Speed level	Specifies the speed level. The speed level is the tag for the robot to end the execution of the move instruction in the state of the servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have been stopped.	Level: Only 0 Available only with the optional servo-float function. Refer to the servo-float function for details.

SUPPLE-MENT

Corner radius

The manipulator operates by circular interpolation in which the corner radius is specified.



9. MTE= Amount of station axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
14	MTE=Amount of station axis rotation	Specifies the amount of station axis rotation. The operation of the station axis can be specified by the number of rotations.	Amount of rotation: -32768 to 32767 Available only with the optional axis endless function. Refer to the axis endless function for details.

10. NWAIT/ENWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
15	NWAIT	Specifies the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same as time the manipulator is carrying out that step.	
16	ENWAIT	Specifies the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function. (option: S2C714) Refer to ENWAIT of *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

11. SRCH/UNTIL/ASRCH/HPSRCH/NSRCH

Choose one of the tags from the following table.

No	Tag	Explanation	Note
17	SRCH	Specifies the SRCH instruction. The SRCH instruction is a tag which detects the start point.	Available only with the optional start point searching function. Refer to *chapter 2.6 "Instruction Which Adheres to an Instruction"* .
18	UNTIL	Specifies the UNTIL instruction. The UNTIL instruction is a tag by which the conditions of the input signal are evaluated during operation. When the condition of the input signal is full, the robot executes the next instruction.	Refer to *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

No	Tag	Explanation	Note
19	ASRCH	Specifies the ASRCH instruction. The ASRCH instruction detects input signal's voltage.	Available only with the optional general-purpose sensor function. Refer to General-purpose Sensor function for details.
20	HPSRCH	Specifies the HPSRCH instruction. The HPSRCH instruction detects the position of the zero-point.	Available only with the optional zero-point position detection function. Refer to the Zero-point Position Detection function for details.
21	NSRCH	Specifies the NSRCH instruction. The NSRCH instruction detects a position without stopping the motion.	Available only with the optional search-in-motion function.

12. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
22	ACC=Acceleration adjustment ratio	Specifies the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

13. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
23	DEC=Deceleration adjustment ratio	Specifies the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

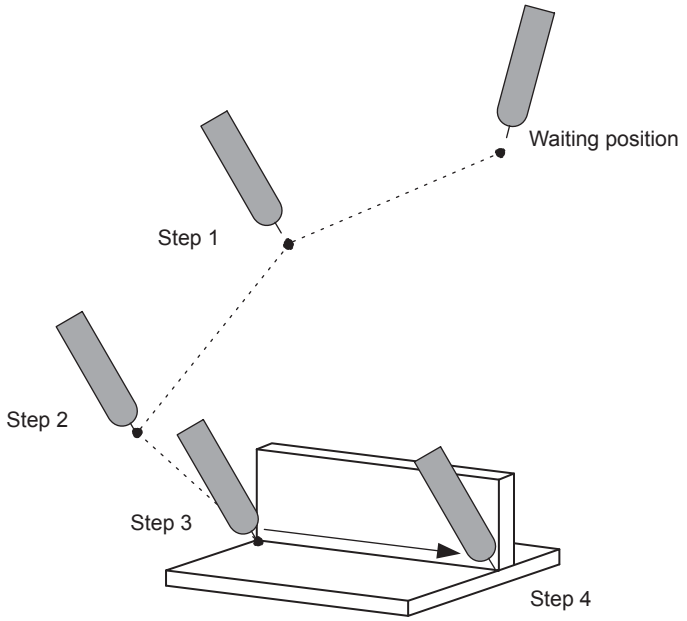
14. +MOVJ/+MOVL/+MOVC/+MOVS

Choose one of the tags from the following table.

No	Tag	Explanation	Note
24	+MOVJ	Specifies the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
25	+MOVL	Specifies the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
26	+MOVC	Specifies the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
27	+MOVS	Specifies the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.

Example

(1) NOP
MOVJ VJ=50.00
MOVJ VJ=25.00
MOVJ VJ=12.50 ♦♦♦ Step 3
MOVL V=138 ♦♦♦ Step 4
Moves from Step 3 to Step 4 by the linear interpolation at a rate of 138cm/min.



MOVC

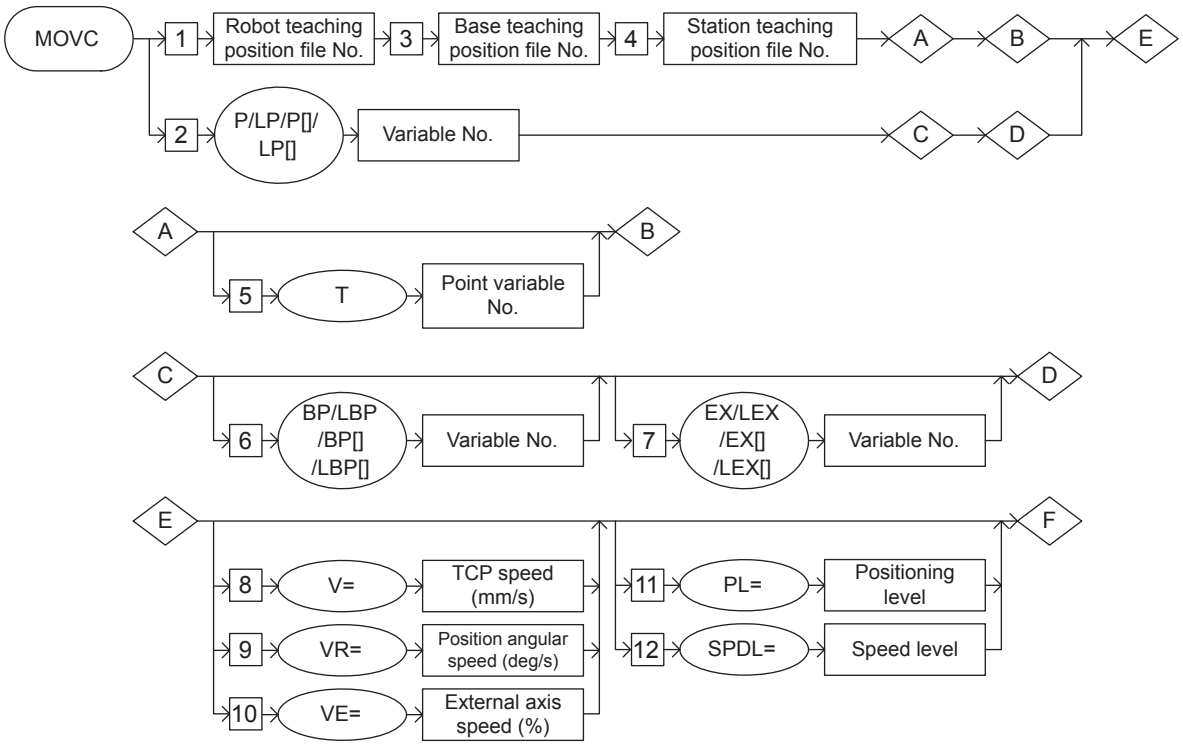
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by circular interpolation.

Construction

The tag which can be used is limited by the type of the job.



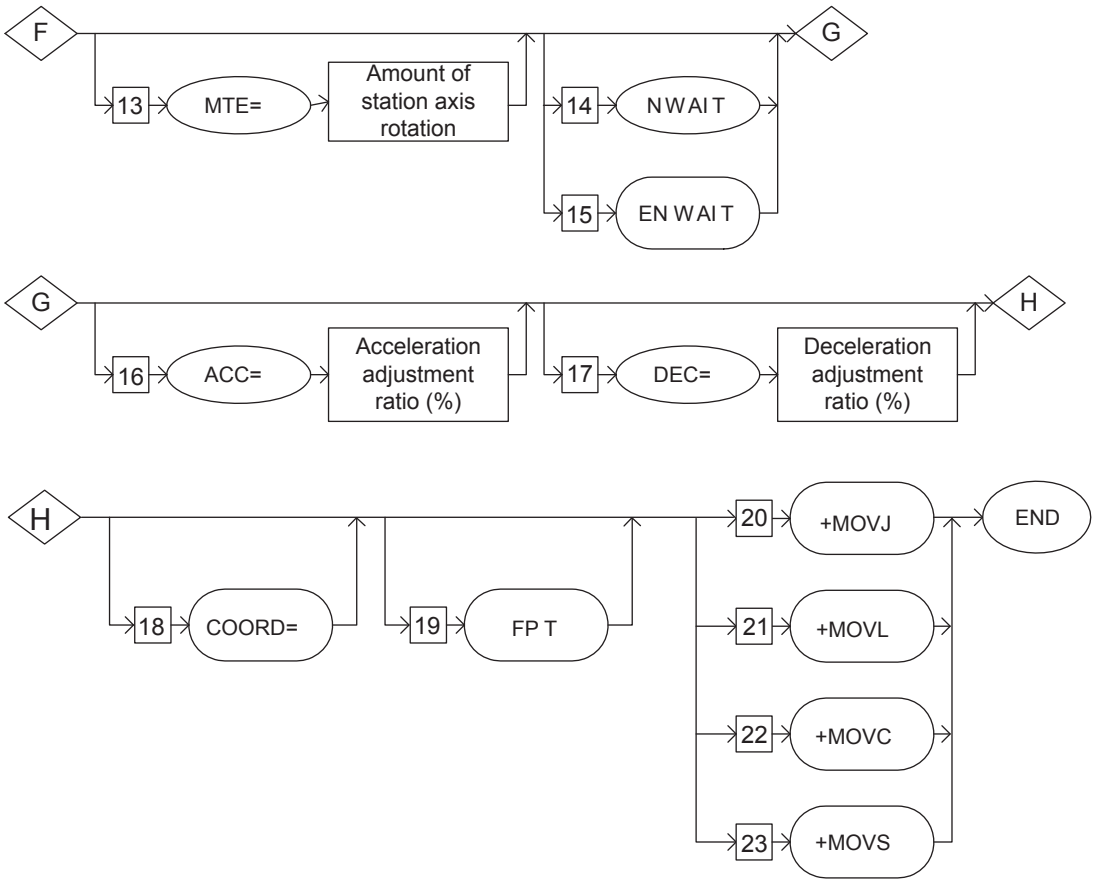


Table 2-5: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Coordinated	Two manipulators	Optional
6	Coordinated	Two manipulators with base axis	Optional

Table 2-6: Availability of Each Tag

No	Tag	Control Group						Note
		1	2	3	4	5	6	
1	Robot teaching position file number	●	●	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	●	●	
3	Base teaching position file number	×	●	×	●	×	●	
4	Station teaching position file number	×	×	●	●	×	×	
5	T	○	○	○	○	○	○	Optional
6	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	
7	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	
8	V=	●	●	●	●	●	●	
9	VR=	●	●	●	●	●	●	
10	VE=	×	×	●	●	×	×	
11	PL=	●	●	●	●	●	●	
12	SPDL=	○	○	○	○	○	○	Optional
13	MTE=	×	×	○	○	×	×	Optional
14	NWAIT	●	●	●	●	●	●	
15	ENWAIT	○	○	○	○	○	○	Optional
16	ACC=	●	●	●	●	●	●	
17	DEC=	●	●	●	●	●	●	
18	COORD=	●	●	●	●	●	●	
19	FPT	●	●	●	●	●	●	
20	+MOVJ	×	×	×	×	○	○	Optional
21	+MOVL	×	×	×	×	○	○	Optional
22	+MOVC	×	×	×	×	○	○	Optional
23	+MOVS	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Example

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

2. Base Teaching Position File Number

When a base teaching position file number is selected from the table in part 1 of this Explanation, added the following tag.

No	Tag	Explanation	Note
3	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a base teaching position file number is selected from the table in part 1 of this Explanation, added the following tag.

No	Tag	Explanation	Note
4	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When the robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
5	T Point Variable number	Specifies the point variable number. The point variable manages the teaching position registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
7	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

Choose one of the tags from the following table.

No	Tag	Explanation	Note
8	V=Tool center point speed	Specifies the tool center point speed. Specifies the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
9	VR=Position angular speed	Specifies the position angular speed.	Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)
10	VE=External axis speed	Specifies the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/ I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

8. PL=Position level /SPDL=Speed level

Choose one of the tags from the following table.

No	Tag	Explanation	Note
11	PL=Position level	Specifies the position level. The position level is a level of the approach when the manipulator passes the position where the teaching procedure was performed.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
12	SPDL=Speed level	Specifies the speed level. The speed level is a tag for the robot to end the execution of the move instruction in the state of servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have been stopped.	Level: Only 0 Available only with the optional servo-float function.

9. MTE=Amount of station axis rotation

The following tag can be added or omitted.

No	Tag	Explanation	Note
13	MTE=Amount of station axis rotation	Specifies the amount of station axis rotation. The operation of the station axis can be specified by the number of rotations.	Amount of rotation: -100 to 100 Available only with the optional axis endless function.

10. NWAIT/ENWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
14	NWAIT	Specifies the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same time as the manipulator is carrying out that step.	
15	ENWAIT	Specifies the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function. (option: S2C714) Refer to ENWAIT of *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

11. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
16	ACC=Acceleration adjustment ratio	Specifies the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

12. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
17	DEC=Deceleration adjustment ratio	Specifies the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

13. COORD=Arc attitude control specification

The following tag can be added or omitted.

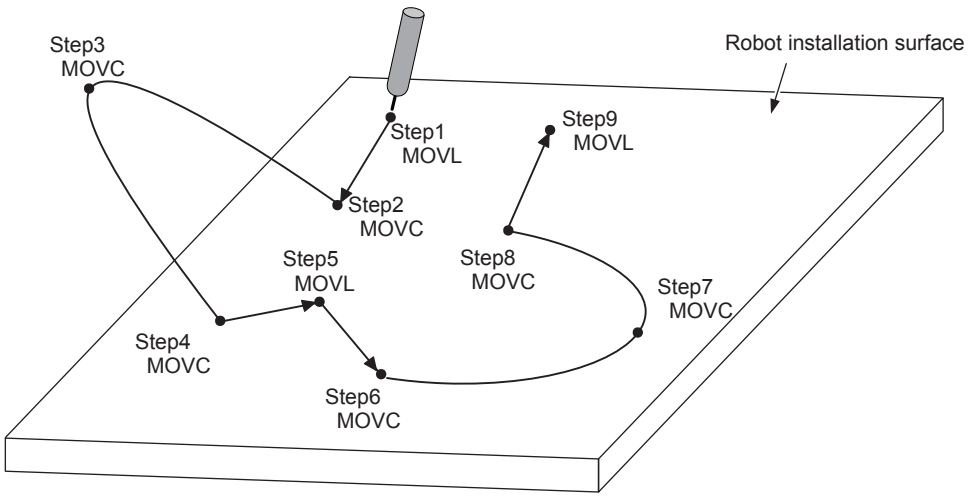
No	Tag	Explanation	Note
18	COORD=Arc attitude control specification	Specifies the attitude control of arc. This is not usually needed, but depending on teaching, the intended circular motion may not be performed. In this case, specify as follows. When the circular surface is parallel with the robot installation surface, specify as COORD = 0. When the circular surface is not parallel with the robot installation surface, specify as COORD = 1.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used to specify the attitude control.

Example

```
NOP
MOVL V=138
MOVC V=138  COORD=1        ♦♦♦Step 2
MOVC V=138  COORD=1        ♦♦♦Step 3
MOVC V=138  COORD=1        ♦♦♦Step 4
MOVL V=138
MOVC V=138  COORD=0        ♦♦♦Step 6
MOVC V=138  COORD=0        ♦♦♦Step 7
MOVC V=138  COORD=0        ♦♦♦Step 8
MOVL V=138
END
```

Step 2 to 4 performs the attitude control based on the circular surface.

Step 6 to 7 performs the attitude control based on the robot installation surface.



14. FPT=Arc end-point setting

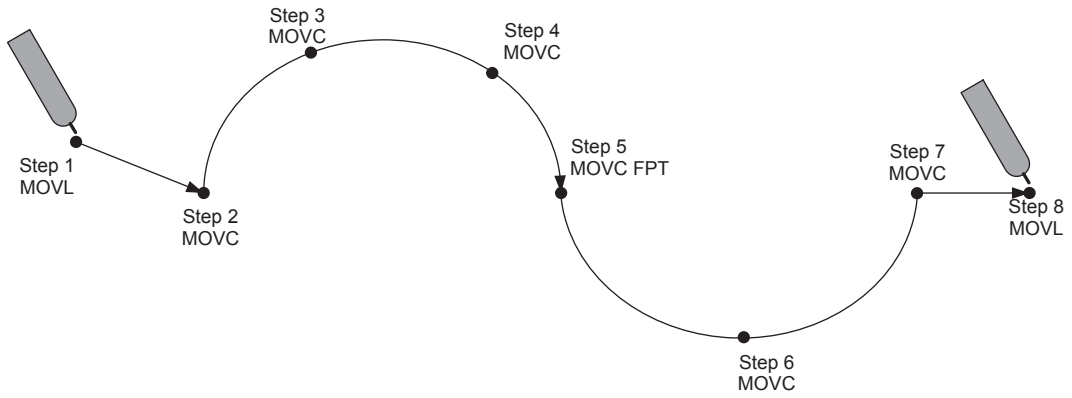
The following tag can be added or omitted.

No	Tag	Explanation	Note
22	FPT=Arc end-point setting	Specifies the end-point of the arc (the point at which the curvature of the arc is to be changed).	

Example

(1) NOP
MOVL V=138
MOVC V=138 ♦♦♦Step 2
MOVC V=138 ♦♦♦Step 3
MOVC V=138 ♦♦♦Step 4
MOVC FPT V=138 ♦♦♦Step 5
MOVC V=138 ♦♦♦Step 6
MOVC V=138 ♦♦♦Step 7
MOVL V=138
END

Moves from Step 2 to Step 7 by circular interpolation at a rate of 138 cm/min.
Moves to Step 3 in a circular arc formed with the teaching points in Steps 2, 3, and 4.
Moves to Step 4 in a circular arc formed with the teaching points in Steps 3, 4, and 5.
Moves to Step 5 in a circular arc formed with the teaching points in Steps 3, 4, and 5.
Moves to Step 6 in a circular arc formed with the teaching points in Steps 5, 6, and 7.
Moves to Step 7 in a circular arc formed with the teaching points in Steps 5, 6, and 7.



15. +MOVJ/+MOVL/+MOVC/+MOVS

Choose one of the tags from the following table.

No	Tag	Explanation	Note
18	+MOVJ	Specifies the joint interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
19	+MOVL	Specifies the linear interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
20	+MOVC	Specifies the circular interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
21	+MOVS	Specifies the spline interpolation motion instruction on the master manipulator's side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.

MOVS

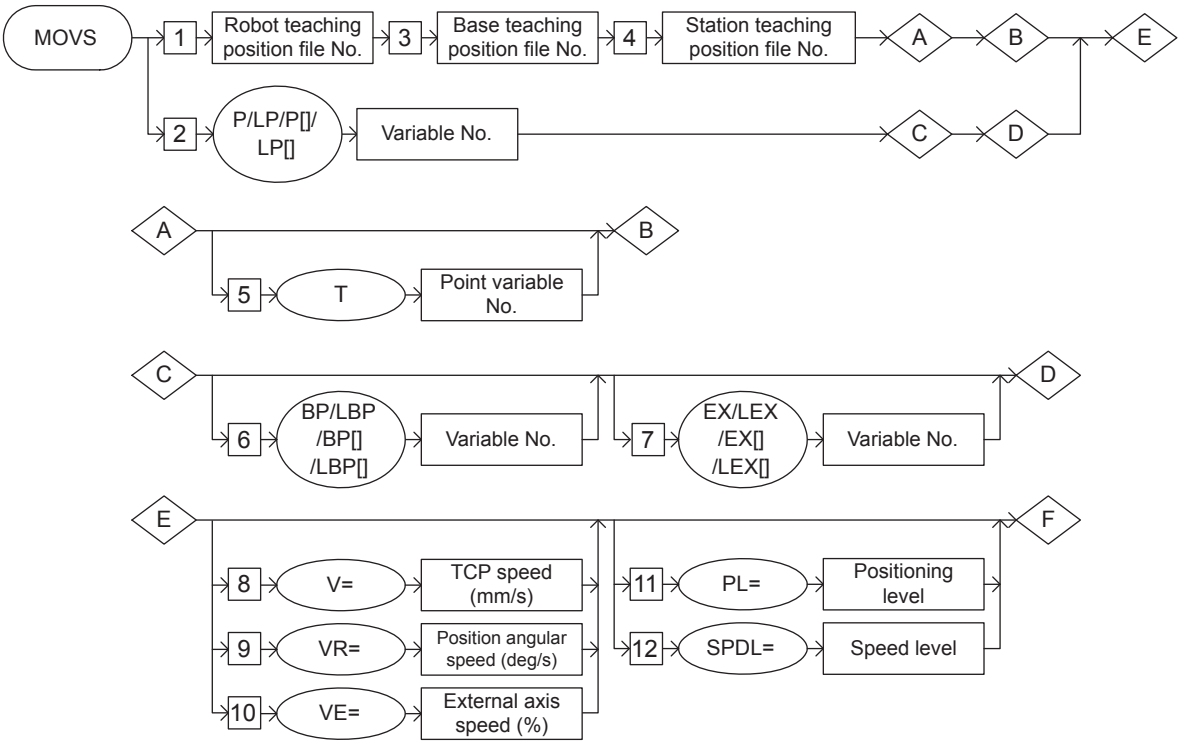
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves to the teaching position by spline interpolation.

Construction

The tag which can be used is limited by the type of the job.



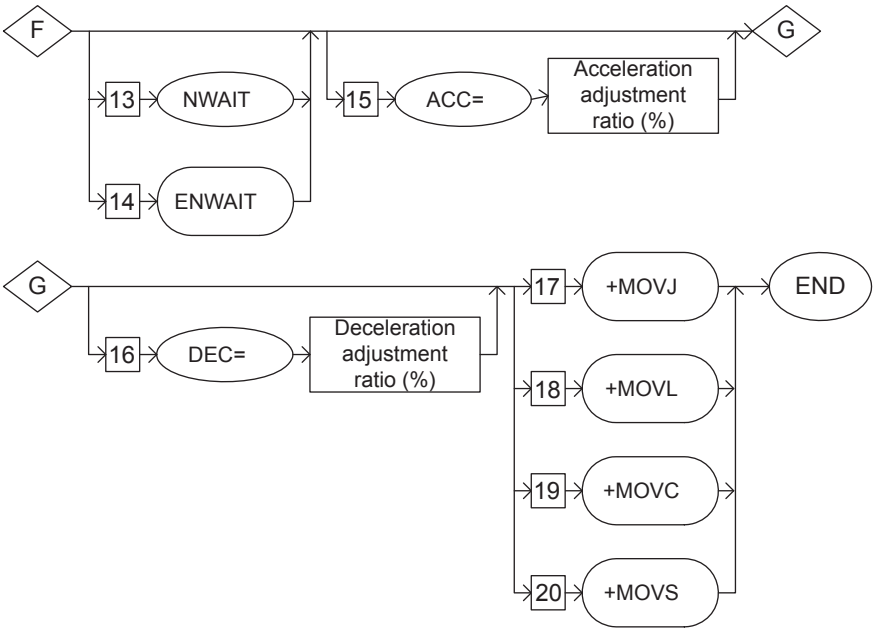


Table 2-7: Job Type and Control Group

No.	Job type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Coordinated	Two manipulators	Optional
6	Coordinated	Two manipulators with base axis	Optional

Table 2-8: Availability of Each Tag

No	Tag	Control Group						Note
		1	2	3	4	5	6	
1	Robot teaching position file number	●	●	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	●	●	
3	Base teaching position file number	×	●	×	●	×	●	
4	Station teaching position file number	×	×	●	●	×	×	
5	T	○	○	○	○	○	○	Optional
6	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	
7	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	
8	V=	●	●	●	●	●	●	
9	VR=	●	●	●	●	●	●	
10	VE=	×	×	●	●	×	×	
11	PL=	●	●	●	●	●	●	
12	SPDL=	○	○	○	○	○	○	Optional
14	NWAIT	●	●	●	●	●	●	
15	ENWAIT	○	○	○	○	○	○	Optional
16	ACC=	●	●	●	●	●	●	
17	DEC=	●	●	●	●	●	●	
18	+MOVJ	×	×	×	×	○	○	Optional
19	+MOVL	×	×	×	×	○	○	Optional
20	+MOVC	×	×	×	×	○	○	Optional
21	+MOVS	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	Robot teaching position file number	The robot axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
2	P Variable number / LP Variable number / P [Array number]/ LP [Array number]	Specifies the position variable number of the robot axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

2. Base Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
3	Base teaching position file number	The base axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

3. Station Teaching Position File Number

When a robot teaching position file number is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
4	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.

4. T Point Variable number

When the robot teaching position file number is selected from the table in part 1 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
5	T Point Variable number	Specifies the point variable number. The point variable manages the teaching position registered in the job, and is used to move the manipulator to the same position several times in one job.	Available only with the optional point variable function.

5. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	BP Variable number / LBP Variable number / BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

6. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
7	EX Variable number / LEX Variable number / EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves to the position data set in the variable of the specified number.	Variable number: 000 to 127

7. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

Choose one of the tags from the following table.

No	Tag	Explanation	Note
8	V=Tool center point speed	Specifies the tool center point speed. Specifies the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
9	VR=Position angular speed	Specifies the position angular speed.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)
10	VE=External axis speed	Specifies the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

8. PL=Position level /SPDL=Speed level

Choose one of the tags from the following table.

No	Tag	Explanation	Note
11	PL=Position level	Specifies the position level. The position level is a level of the approach when the manipulator passes the position where the teaching procedure was done.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.
12	SPDL=Speed level	Specifies the speed level. The speed level is a tag for the robot to end the execution of the move instruction in the state of servo float control, and to confirm the state which has stopped. The operation ends when the speed feedback pulse of all axes goes below a constant value, and the manipulator is considered to have been stopped.	Level: Only 0 Available only with the optional servo-float function.

9. NWAIT/ENWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
13	NWAIT	Specifies the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same time as the manipulator is carrying out that step.	
14	ENWAIT	Specifies the ENWAIT instruction. The ENWAIT instruction carries out the instructions excluding the move instructions from that step on, before reaching the next step.	Available only with the conditional NWAIT function. (option: S2C714) Refer to ENWAIT of *chapter 2.6 "Instruction Which Adheres to an Instruction"* .

10. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
15	ACC=Acceleration adjustment ratio	Specifies the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

11. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
16	DEC=Deceleration adjustment ratio	Specifies the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

12. +MOVJ/+MOVL/+MOVC/+MOVS

Choose one of the tags from the following table.

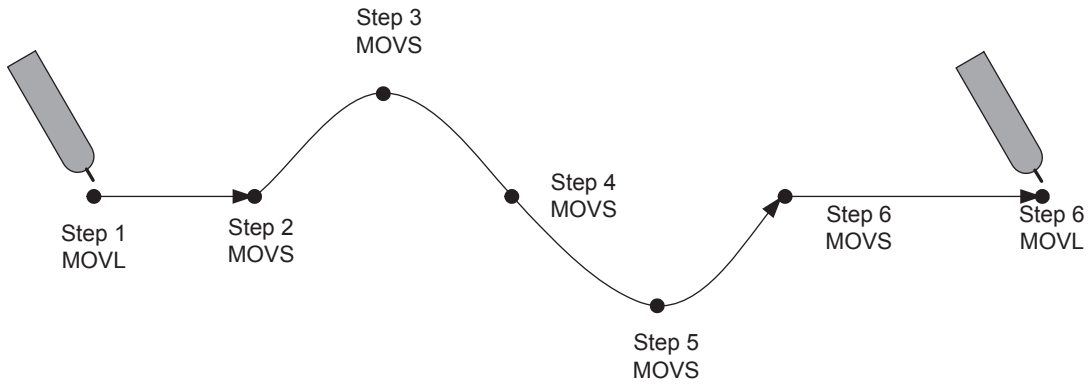
No	Tag	Explanation	Note
17	+MOVJ	Specifies the joint interpolation motion instruction on the master manipulator’s side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
18	+MOVL	Specifies the linear interpolation motion instruction on the master manipulator’s side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
19	+MOVC	Specifies the circular interpolation motion instruction on the master manipulator’s side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.
20	+MOVS	Specifies the spline interpolation motion instruction on the master manipulator’s side.	Available only with the optional coordinate function. Refer to the independent/coordinated function.

Example

(1) NOP

```
MOVL V=138
MOVS V=138   ♦♦♦ Step 2
MOVS V=138   ♦♦♦ Step 3
MOVS V=138   ♦♦♦ Step 4
MOVS V=138   ♦♦♦ Step 5
MOVS V=138   ♦♦♦ Step 6
MOVL V=138
END
```

Moves from Step 2 to Step 6 by spline interpolation at a rate of 138cm/min.
Moves to Step 3 by spline interpolation defined by the teaching points in Steps 2, 3, and 4.
Moves to Step 4 by synchronized spline interpolation defined by the teaching points in Steps 2, 3, 4 and by the synchronized spline interpolation defined by the teaching points in Steps 3, 4, and 5.
Moves to Step 5 by synchronized spline interpolation defined by the teaching points in Steps 3, 4,5 and by synchronized spline interpolation defined by the teaching points in Steps 4, 5, and 6.
Moves to Step 6 by spline interpolation defined by the teaching points in Steps 4, 5, and 6.



IMOV

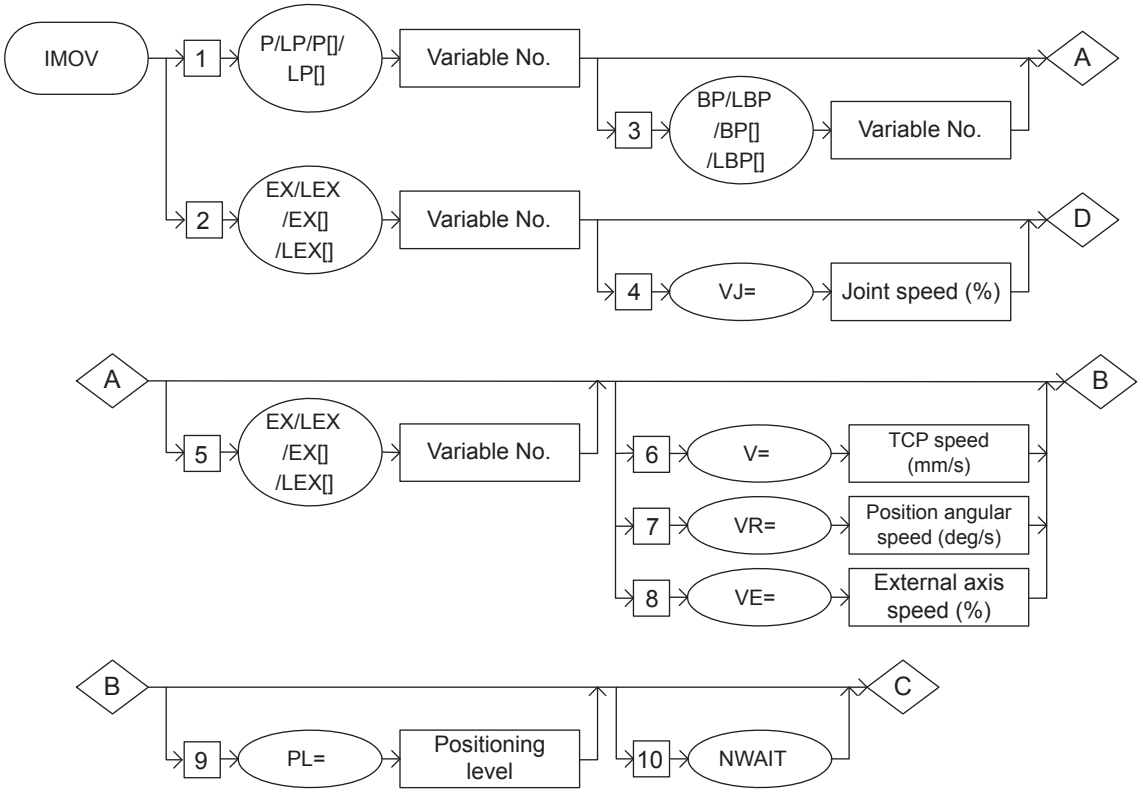
SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Moves by linear interpolation from the current position for the specified incremental value.

Construction

The tag which can be used is limited by the type of the job.



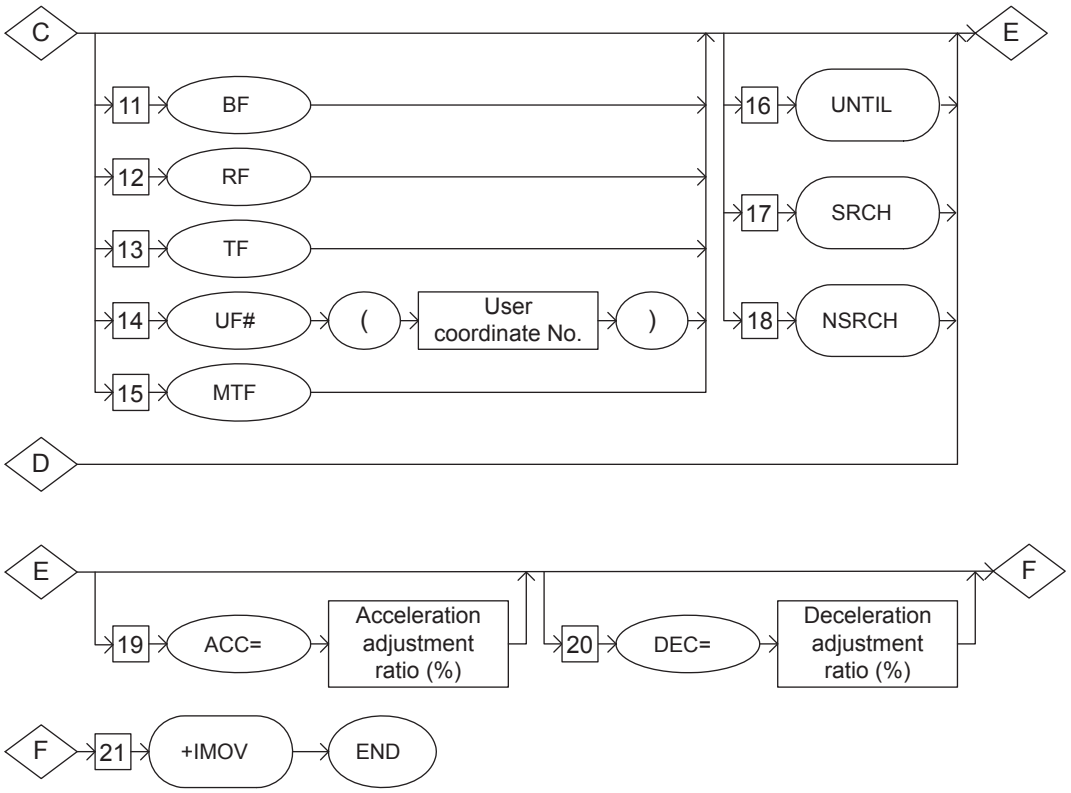


Table 2-9: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Only station axis	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional

Table 2-10: Availability of Each Tag

No	Tag	Control Group							Note
		1	2	3	4	5	6	7	
1	P/LP/P[]/LP[]	●	●	●	●	×	●	●	
2	EX/LEX/EX[]/LEX[]	×	×	×	×	●	×	×	
3	BP/LBP/BP[]/LBP[]	×	●	×	●	×	●	×	
4	VJ=	×	×	×	×	●	×	×	
5	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	
6	V=	●	●	●	●	×	●	●	
7	VR=	●	●	●	●	×	●	●	
8	VE=	×	×	●	●	×	×	×	
9	PL=	●	●	●	●	×	●	●	
10	NWAIT	●	●	●	●	×	●	●	
11	BF	●	●	●	●	×	●	●	
12	RF	●	●	●	●	×	●	●	
13	TF	●	●	●	●	×	●	●	
14	UF#()	●	●	●	●	×	●	●	
15	MTF	×	×	×	×	×	●	●	
16	UNTIL	●	●	●	●	×	●	●	
17	SRCH	○	○	○	○	×	○	○	Optional
18	NSRCH	○	○	○	○	×	○	○	Optional
19	ACC=	●	●	●	●	●	●	●	
20	DEC=	●	●	●	●	●	●	●	
21	+IMOV	×	×	×	×	×	○	○	Optional

●: Available
○: Available only with optional function enabled
×: Not available

Explanation

1. P Variable number /LP Variable number /P [Array number] /LP [Array number] /EX Variable number / LEX Variable number /EX [Array number] /LEX [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	P Variable number / LP Variable number / P [Array number]/ LP [Array number]	Specifies the position variable number of the manipulator axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127
2	EX Variable number / LEX Variable number / EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127

2. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
3	BP Variable number / LBP Variable number / BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127

3. VJ=Joint speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
4	VJ=Joint speed	Specifies the joint speed. The joint speed in a ratio to the highest speed. Operates at the speed decided beforehand when the joint speed is omitted.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01 %)

4. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 1 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
5	EX Variable number / LEX Variable number / EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. Moves the axis according to the position data set in the specified variable number.	Variable number: 000 to 127

5. V=Tool center point speed /VR=Position angular speed /VE=External axis speed

Choose one of the tags from the following table.

No	Tag	Explanation	Note
6	V=Tool center point speed	Specifies the tool center point speed. Specifies the unit of rate using the operation condition setting screen.	Speed: 0.1 mm to 1500.0 mm/s The units can be changed by setting the parameter S2C173. Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)
7	VR=Position angular speed	Specifies the position angular speed.	Speed: 0.1 degrees to 180.0 degrees/s Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)
8	VE=External axis speed	Specifies the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

6. PL=Position level

The following tag can be added or omitted.

No	Tag	Explanation	Note
9	PL=Position level	Specifies the position level. The positioning level is a level of the approach when the manipulator passes the position where the teaching procedure was done.	Level: 0 to 8 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

7. NWAIT

The following tag can be added or omitted.

No	Tag	Explanation	Note
10	NWAIT	Specifies the NWAIT instruction. The NWAIT instruction carries out the instructions excluding the move instruction from that step on, at the same as time the manipulator is carrying out that step.	

8. BF/RF/TF/UF# (User coordinate number)

Choose one of the tags from the following table.

No	Tag	Explanation	Note
11	BF	Specifies the increment value in the base coordinate system.	
12	RF	Specifies the increment value in the robot coordinate system.	
13	TF	Specifies the increment value in the tool coordinate system.	
14	UF#(User coordinate number)	Specifies the increment value in the user coordinate system.	No: 1 to 24 Variable B/I/D/LB/LI/LD can be used.
15	MTF	Specifies the incremental value in the master tool coordinate system. In the master tool coordinate system, position data is converted to positions relative to the master manipulator.	Available only with the optional independent/ coordinated function.

9. UNTIL/SRCH/NSRCH

Choose one of the tags from the following table.

No	Tag	Explanation	Note
16	UNTIL	Specifies the UNTIL instruction. The UNTIL instruction is a tag by which the conditions of the input signal are evaluated during operation. When the condition of the input signal is full, the robot executes the next instruction.	Refer to *chapter 2.6 “Instruction Which Adheres to an Instruction”* .
17	SRCH	Specifies the SRCH instruction. The SRCH instruction is a tag which detects the start point.	Available only with the optional start point searching function.
18	NSRCH	Specifies the NSRCH instruction. The NSRCH instruction detects a position without stopping the motion.	Available only with the optional search-in-motion function.

10. ACC=Acceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
19	ACC=Acceleration adjustment ratio	Specifies the acceleration adjustment ratio. The ACC instruction reduces the amount of acceleration in the specified ratio.	Acceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

11. DEC=Deceleration adjustment ratio

The following tag can be added or omitted.

No	Tag	Explanation	Note
20	DEC=Deceleration adjustment ratio	Specifies the deceleration adjustment ratio. The DEC instruction reduces the amount of deceleration in the specified ratio.	Deceleration adjustment ratio: 20% to 100% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.

12. +IMOV

Add the following tag.

No	Tag	Explanation	Note
22	+IMOV	Specifies the move instruction for an incremental value of the master manipulator.	Available only with the optional coordinate function. Refer to the independent/coordinated function for details.

Example

(1) IMOV P000 V=138 RF
Moves from the current position at a rate of 138cm/min for the incremental value specified in P000 in the robot coordinate system.

SPEED

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Sets the playback speed. The manipulator operates at the speed specified in the SPEED instruction when the speed is not specified in the move instruction.

Construction

The tag which can be used is limited by the type of the job.

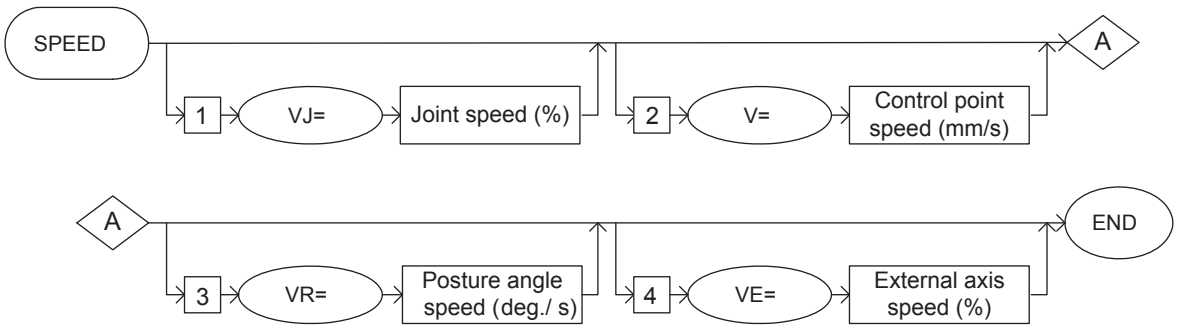


Table 2-11: Job Type and Control Group

No.	Job Type	Control group	Remarks
1	-	One manipulator (standard)	
2	-	One manipulator with station axis	
3	-	Station axis only	

Table 2-12: Availability of Each Tag

No	Tag	Control Group			Note
		1	2	3	
1	VJ=	●	●	●	
2	V=	●	●	×	
3	VR=	●	●	×	
4	VE=	×	●	×	

●: Available
×: Not available

Explanation

1. VJ=Joint speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
1	VJ=Joint speed	Specifies the joint speed. The joint speed is shown in the ratio to the highest speed. Operates at the speed decided beforehand when the joint speed is omitted.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.01 %)

2. V=Tool center point speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
2	V=Tool center point speed	Specifies the tool center point speed. Specifies the unit of rate using the operation condition setting screen.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 mm/s)

3. VR=Position angular speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
3	VR=Position angular speed	Specifies the position angular speed.	Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 0.1 deg/s)

4. VE=External axis speed

The following tag can be added or omitted.

No	Tag	Explanation	Note
4	VE=External axis speed	Specifies the external axis speed.	Speed: 0.01% to 100.00% Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used.(Units: 0.01 %)

Example

(1)

```
NOP
MOVJ VJ=100.00
MOVL V=138

SPEED VJ=50.00 V=276 VR=30.0
MOVJ
MOVL

 MOVL VR=60.0

END
```

Moves at the joint speed 100.00%.
♦♦♦Moves at the control point speed 138cm/min.
♦♦♦Moves at the joint speed 50.00%.
♦♦♦Moves at the control point speed 276 cm/min.
♦♦♦Moves at the position angular speed 60.0 degree/s.

REFP

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

It is an instruction which has the position data by which a supplementary point of the wall point, etc. for weaving is set.

Construction

The tag which can be used is limited by the type of the job.

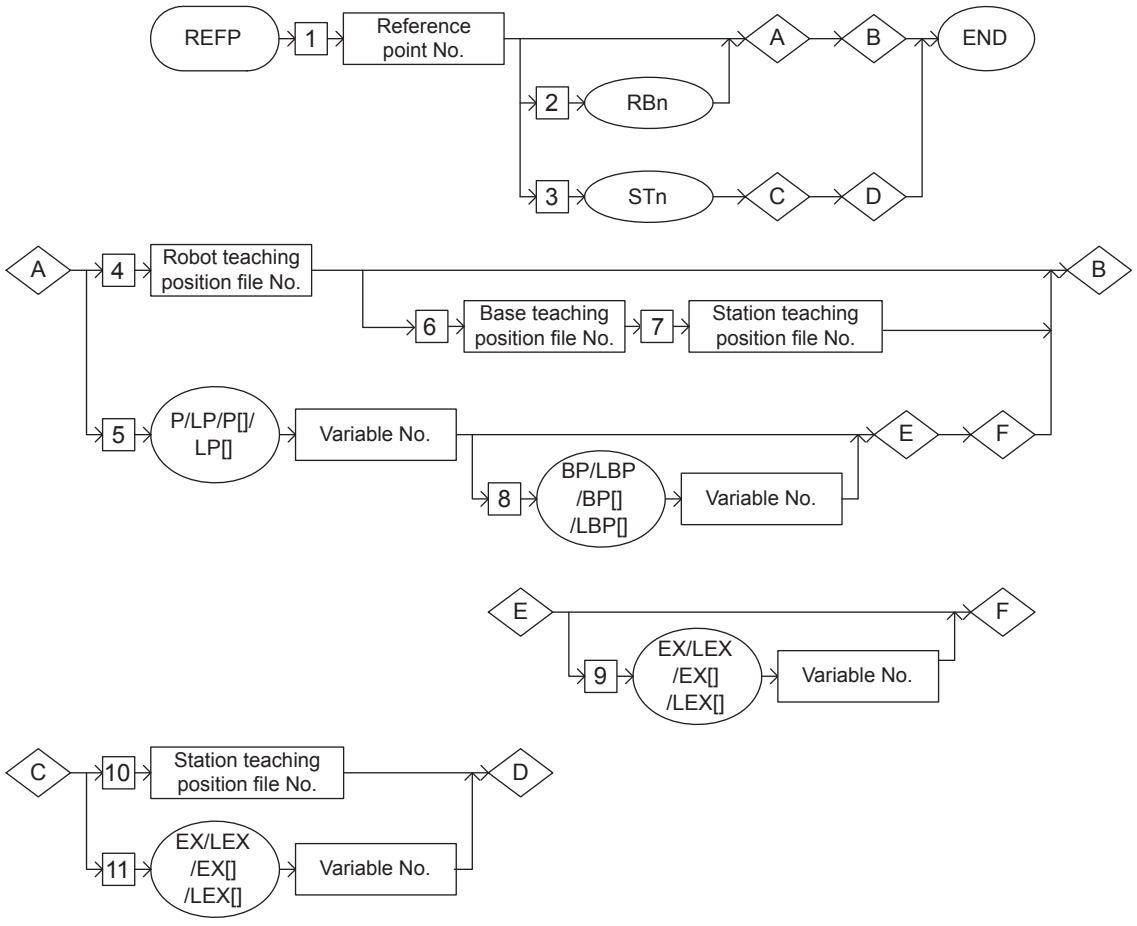


Table 2-13: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Station axis only	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional
8	Coordinated	Coordinated job with one manipulator and the station axis (designated as master)	Optional
9	Coordinated	Coordinated job with one manipulator (with base axis) and the station axis (designated as master)	Optional

Table 2-14: Availability of Each Tag

No	Tag	Control Group									Note
		1	2	3	4	5	6	7	8	9	
1	Reference point number	●	●	●	●	●	●	●	●	●	
2	RBn	×	×	×	×	×	●	●	●	●	
3	STn	×	×	×	×	×	×	×	●	●	
4	Robot teaching position file number	●	●	●	●	×	●	●	●	●	
5	P/LP/P[]/LP[]	●	●	●	●	×	●	●	●	●	
6	Base-axis teaching position file number	×	●	×	●	×	×	●	×	●	
7	Station teaching position file number	×	×	●	●	×	×	×	×	×	
8	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	×	●	
9	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	×	×	
10	Station teaching position file number	×	×	×	×	●	×	×	●	●	
11	EX/LEX/EX[]/LEX[]	×	×	×	×	●	×	×	●	●	

●: Available
×: Not available

Explanation

1. Reference Point Number

Add the following tag.

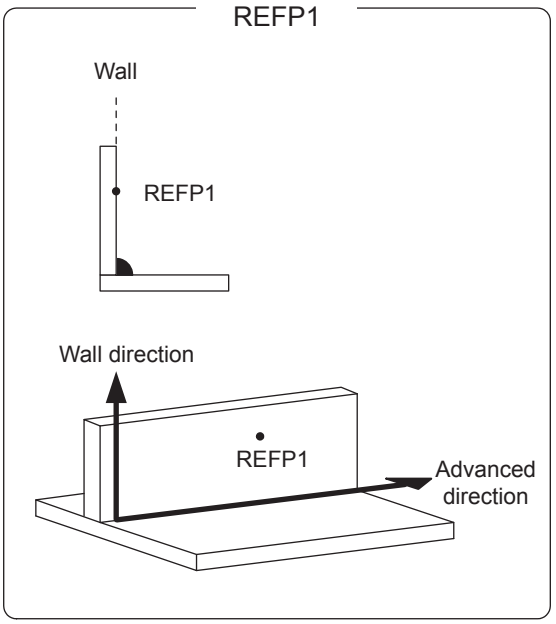
No	Tag	Explanation	Note
1	Reference point number	Specifies the reference point (REFP) number.	Reference points: 1 to 8

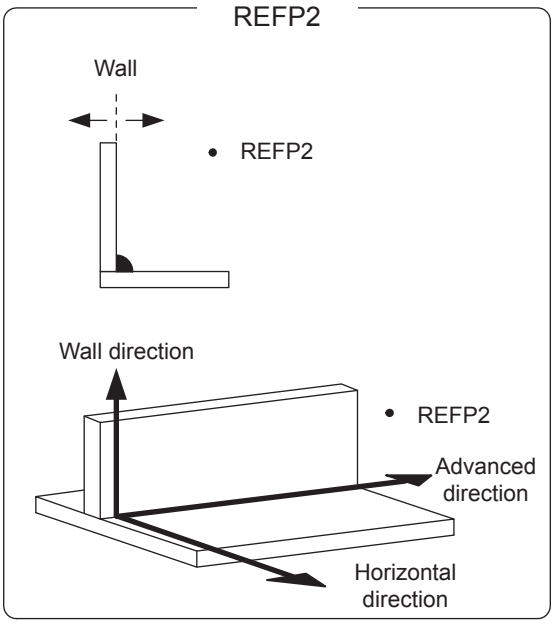
SUPPLE -MENT

Reference points during weaving

Usually it is not necessary to register reference points during the weaving. However, there are cases when it must be registered according to the situation of the workpiece, etc.

In this case, the wall direction is defined as REFP1 and the horizontal wall direction is defined as REFP2.





2. RBn/STn

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	RBn	Specifies the robot to which the reference point is to be input.	n: 1 to 8 RB1: Robot 1
3	STn	Specifies the station to which the reference point is to be input.	n: 1 to 8 ST1: Station 1

3. Robot teaching position file number /P Variable number /LP Variable number /P [Array number] /LP [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
4	Robot teaching position file number	The position in the reference point where the robot axis is taught is unconditionally written in this file. This teaching position cannot be edited.	On the job display, this tag is not displayed.
5	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the position variable number of the robot axis. The position data set in the variable of the specified number becomes a reference point.	Variable number: 000 to 127

4. Base Teaching Position File Number

When the robot teaching position file number is selected from the table in part 3 of this Explanation, add the following tag.

No	Tag	Explanation	Note
6	Base teaching position file number	The position in the reference point where the base axis is taught is unconditionally written in this file. This teaching position cannot be edited.	On the job display, this tag is not displayed.

5. Station Teaching Position File Number

When the robot teaching position file number is selected from the table in part 3 of this Explanation, add the following tag.

No	Tag	Explanation	Note
7	Station teaching position file number	The position in the reference point where the station axis is taught is unconditionally written in this file. This teaching position cannot be edited.	On the job display, this tag is not displayed.

6. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 3 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
8	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis. The position data set in the variable of the specified number becomes a reference point.	Variable number: 000 to 127

7. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 3 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
9	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. The position data set in the variable of the specified number becomes a reference point.	Variable number: 000 to 127

8. Station teaching position file number/EX Variable number /LEX Variable number /EX [Array number] / LEX [Array number]

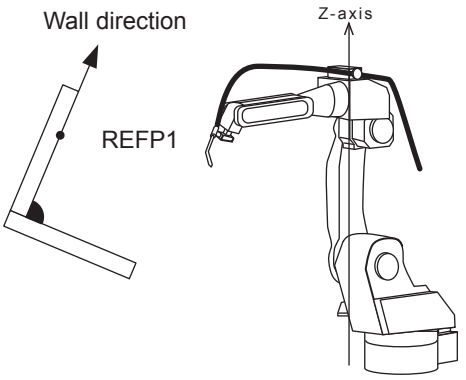
Choose one of the tags from the following table.

No	Tag	Explanation	Note
10	Station teaching position file number	The station axis teaching position in each step is written in this file unconditionally when the step is taught. This teaching position cannot be edited.	On the job display, this tag is not displayed.
11	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis. The position data set in the variable of a specified number becomes a reference point.	Variable number: 000 to 127

Example

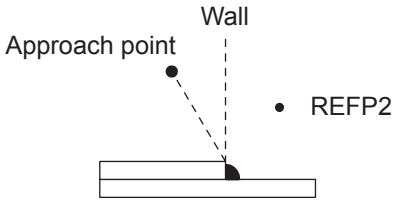
Register REFP1 when the wall direction and the Z direction of the robot axis are different.

```
      :
MOVL V=138
ARCON ASF#(1)
REFP 1
MOVL V=138
      :
```



(2) Register REFP2 when the approach point is on the other side of the wall.

```
      :
MOVJ VJ=25.00♦♦♦Approach point
MOVL V=138
ARCON ASF#(1)
REFP 2
MOVL V=138
      :
```



2.5 Shift Instruction

SFTON

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Begins the parallel shift operation. The amount of the parallel shift is set in a positional variable by the increment value of X, Y, and Z in each coordinate system.

Construction

The tag which can be used is limited by the type of the job.

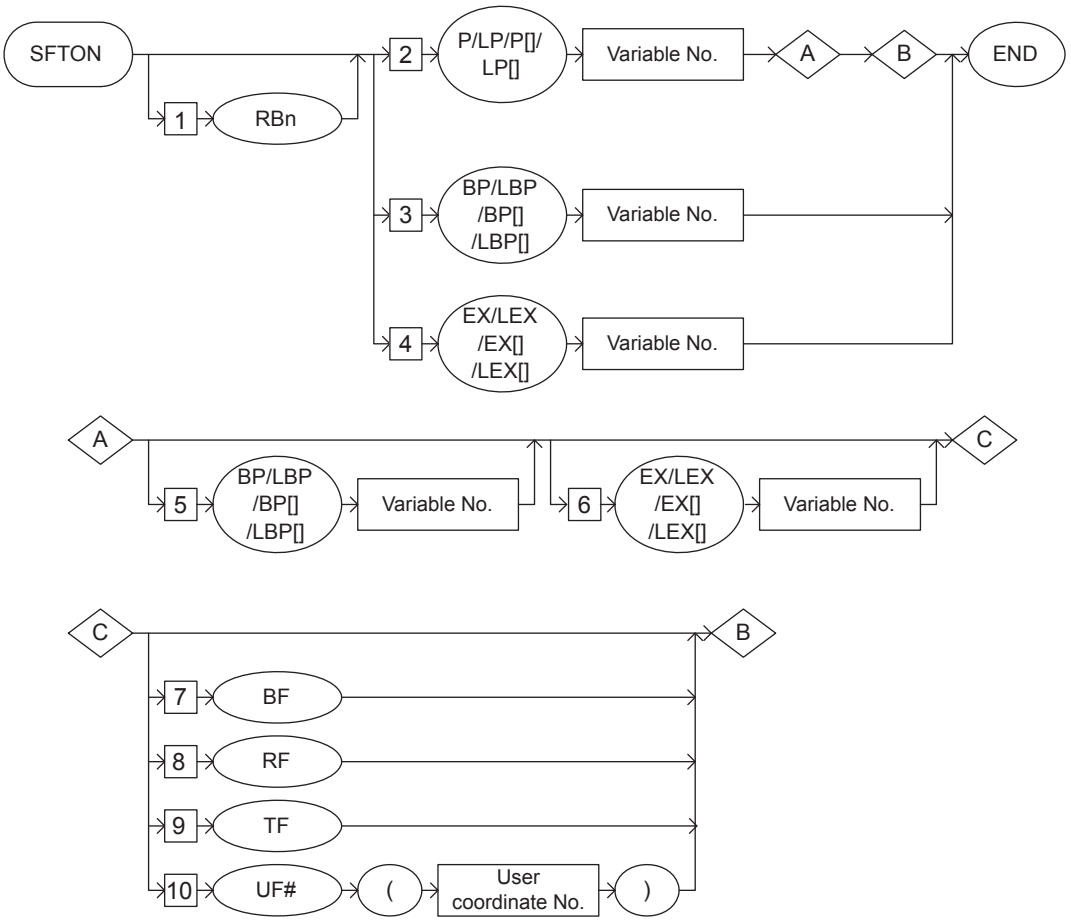


Table 2-15: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Single	One manipulator with base axis	
3	Single	One manipulator with station axis	
4	Single	One manipulator with base and station axes	
5	Single	Station axis only	
6	Coordinated	Two manipulators	Optional
7	Coordinated	Two manipulators with base axis	Optional
8	Coordinated	Coordinated job with one manipulator and the station axis (designated as master)	Optional
9	Coordinated	Coordinated job with one manipulator (with base axis) and the station axis (designated as master)	Optional

Table 2-16: Availability of Each Tag

No	Tag	Control Group									Note
		1	2	3	4	5	6	7	8	9	
1	RBn	×	×	×	×	×	●	●	●	●	
2	P/LP/P[]/LP[]	●	●	●	●	×	●	●	●	●	
3	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	×	●	
4	EX/LEX/EX[]/LEX[]	×	×	●	●	●	×	×	●	●	
5	BP/LBP/BP[]/LBP[]	×	●	×	●	×	×	●	×	●	
6	EX/LEX/EX[]/LEX[]	×	×	●	●	×	×	×	●	●	
7	BF	●	●	●	●	×	●	●	●	●	
8	RF	●	●	●	●	×	●	●	●	●	
9	TF	●	●	●	●	×	●	●	●	●	
10	UF#()	●	●	●	●	×	●	●	●	●	

●: Available
×: Not available

Explanation

1. RBn

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	RBn	Specifies the robot that is to execute a shift operation.	n: 1 to 8 RB1: Robot 1

2. P Variable number /LP Variable number /P [Array number] /LP [Array number] /BP Variable number / LBP Variable number /BP [Array number] /LBP [Array number] /EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	P Variable number/ LP Variable number/ P [Array number]/ LP [Array number]	Specifies the position variable number of the robot axis by which the shift value is set. Only the increment value set in the variable of the specified number shifts.	Variable number: 000 to 127
3	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis by which the shift value is set. Only the increment value set in the variable of the specified number shifts.	Variable number: 000 to 127
4	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis by which the shift value is set. Only the increment value set in the variable of the specified number shifts.	Variable number: 000 to 127

3. BP Variable number /LBP Variable number /BP [Array number] /LBP [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 2 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
5	BP Variable number/ LBP Variable number/ BP [Array number]/ LBP [Array number]	Specifies the position variable number of the base axis by which the shift value is set. Only the increment value set in the variable of the specified number shifts.	Variable number: 000 to 127

4. EX Variable number /LEX Variable number /EX [Array number] /LEX [Array number]

When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 2 of this Explanation, the following tag can be added.

No	Tag	Explanation	Note
6	EX Variable number/ LEX Variable number/ EX [Array number]/ LEX [Array number]	Specifies the position variable number of the station axis by which the shift value is set. Only the increment value set in the variable of the specified number shifts.	Variable number: 000 to 127

5. BF/RF/TF/UF# (User coordinate number)

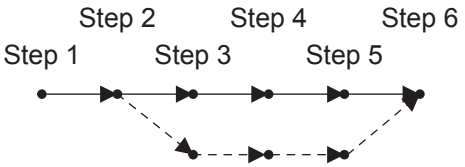
When a P Variable number, LP Variable number, P [Array number], or LP [Array number] is selected from the table in part 2 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
7	BF	Specifies the increment value in the base coordinate system.	
8	RF	Specifies the increment value in the robot coordinate system.	
9	TF	Specifies the increment value in the tool coordinate system.	
10	UF#(User coordinate number)	Specifies the increment value in the user coordinate system.	No.1 to 63 Variable B/I/D/LB/LI/LD can be used.

Example

(1)
```
NOP
MOVJ VJ=50.0
MOVL V=138
SFTON P000 UF#(1)
MOVL V=138
MOVL V=138
MOVL V=138
SFTOF
MOVL V=138
```

Shifted section



Shift between Step 3 and Step 5 in the user coordinate system.

SFTOF

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Ends the parallel shift operation.

Construction

The tags to be added are decided according to the type of the job.

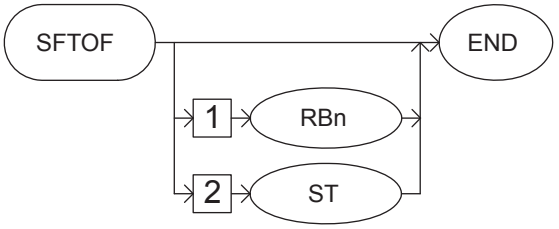


Table 2-17: Job Type and Control Group

No.	Job Type	Control group	Remarks
1	Single	One manipulator (standard)	
2	Coordinated	Two manipulators (without station axis)	Optional
3	Coordinated	Two manipulators (with station axis)	Optional

Table 2-18: Availability of Each Tag

No	Tag	Control group			Note
		1	2	3	
1	RBn	×	●	●	
2	ST	×	×	●	

●: Available
×: Not available

Explanation

1. RBn/ST

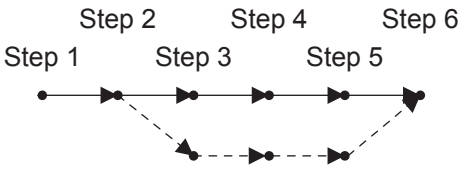
Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	RBn	Specifies the robot that is to end the shift operation.	n: 1 to 8 RB1: Robot 1
2	ST	Ends the station axis shift operation.	

Example

(1)
```
NOP
MOVJ VJ=50.0
MOVL V=138
SFTON P000 UF#(1)
MOVL V=138
MOVL V=138
MOVL V=138
SFTOF
MOVL V=138
```

Shifted section



Shift between Step 3 and Step 5 in the user coordinate system.

MSHIFT

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

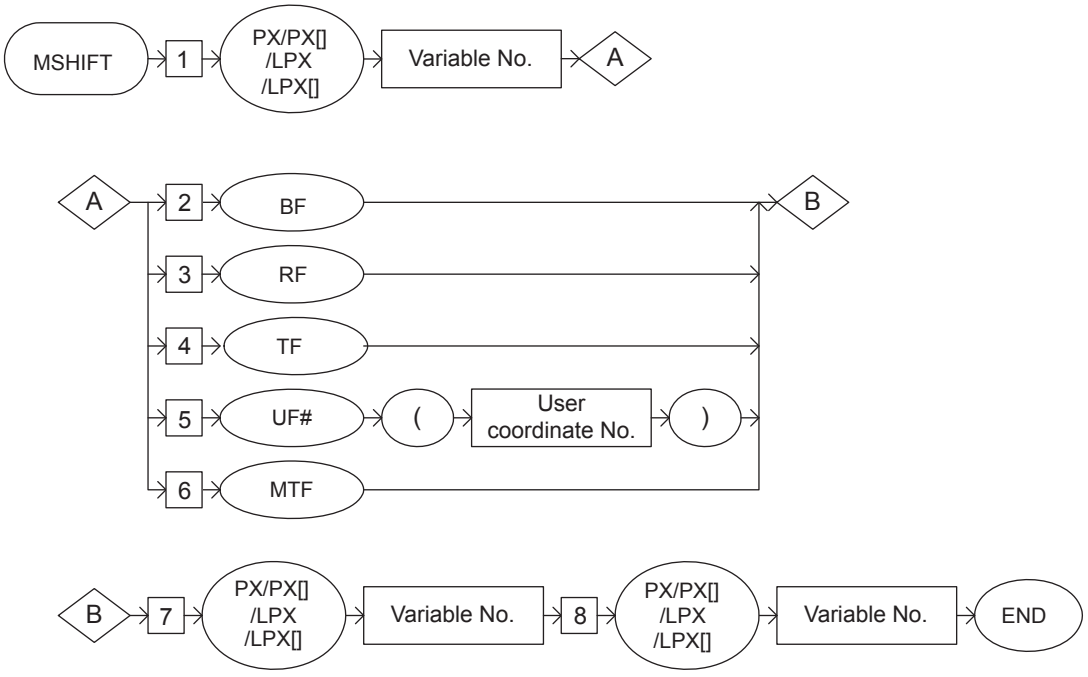
Function

Calculates the amount of the shift in the specified coordinate system according to Data 2 and Data 3 and stores the result in Data 1.

Data 2 indicates the reference position to carry out the parallel shift, and Data 3 is the target position (shifted position).

Construction

MSHIFT <Data 1> Coordinate system designation <Data 2> <Data 3>



Explanation

1. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
1	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the number of the expanded position variable to store the calculated shift.	<Data 1>

2. BF/RF/TF/UF# (User coordinate number)/MTF

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
2	BF	Specifies the calculation of the shift amount in the base coordinate system.	
3	RF	Specifies the calculation of the shift amount in the robot coordinate system.	
4	TF	Specifies the calculation of the shift amount in the tool coordinate system.	
5	UF# (User coordinate number)	Specifies the calculation of the shift amount in the user coordinate system.	No.: 1 to 63 Variable B/I/D/LB/LI/LD can be used.
6	MTF	Specifies the calculation of the shift amount in the master tool coordinate system.	Available only with the optional independent/ coordinated function.

3. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
7	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the expanded position type variable number of the reference position to calculate the amount of the shift.	<Data 2>

4. PX Variable number/LPX Variable number/PX [Array number]/LPX [Array number]

Add the following tag.

No.	Tag	Explanation	Note
8	PX Variable number/ LPX Variable number/ PX [Array number]/ LPX [Array number]	Specifies the expanded position type variable number of the target position to calculate the amount of the shift.	<Data 3>

Example

(1)
```
NOP                          : Moves to the reference position.
MOVJ VJ=20.00                : Sets the current position (the reference
GETS PX000 $PX000            position) in the position variable P000.
MOVJ VJ=20.00                : Moves to the target position.
GETS PX001 $PX000            : Sets the current position (the target
MSHIFT PX010 BF PX000 PX001  position) in the position variable P001.
END                          : Calculates the shift amount and stores it in
                               the position variable P010.
```

2.6 Instruction Which Adheres to an Instruction

IF

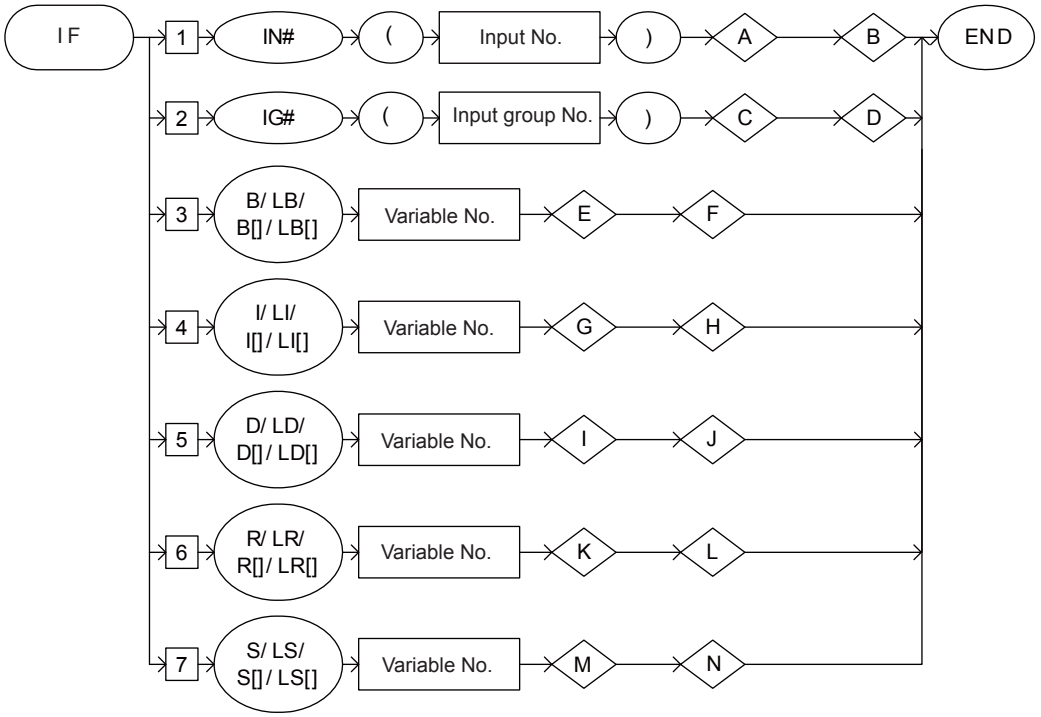
SUBSET	STANDARD	EXPANDED
Available	Available	Available

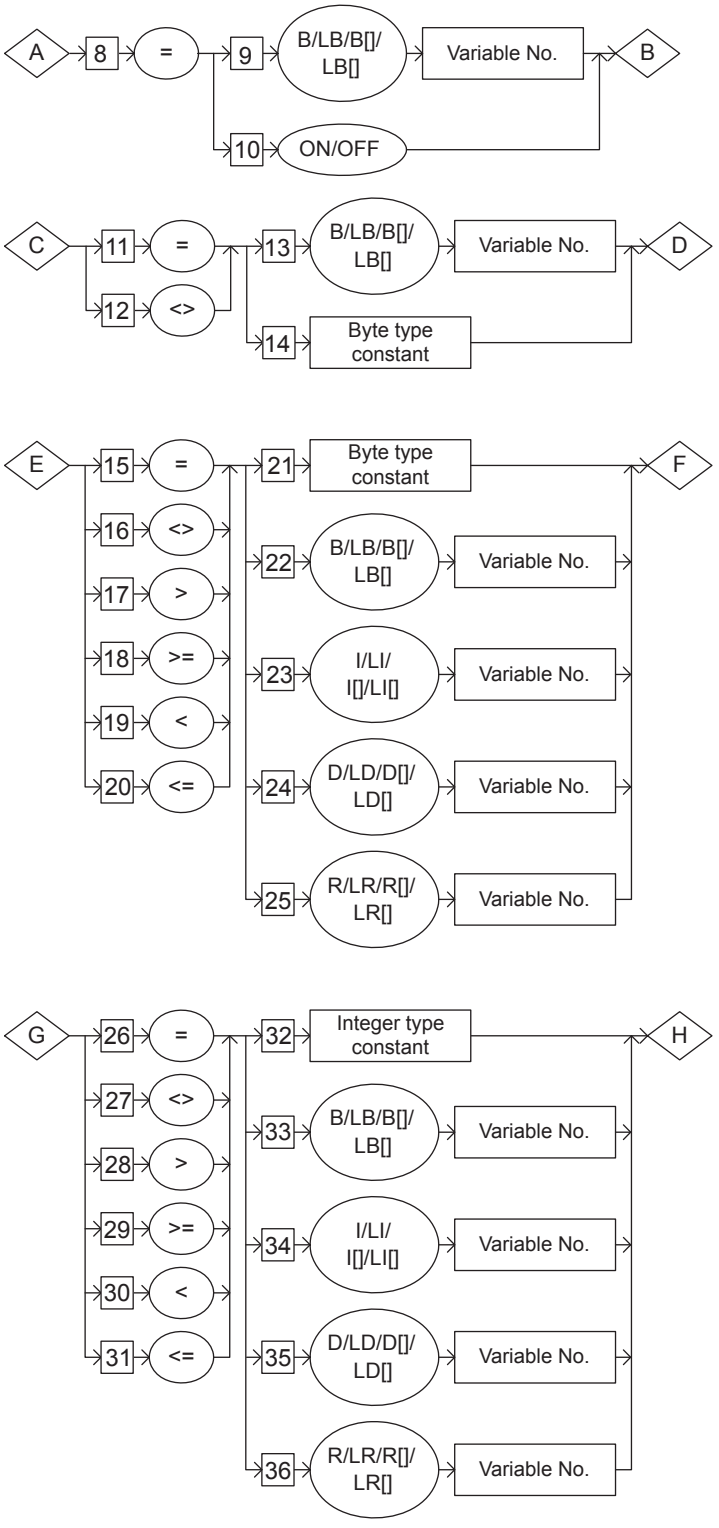
Function

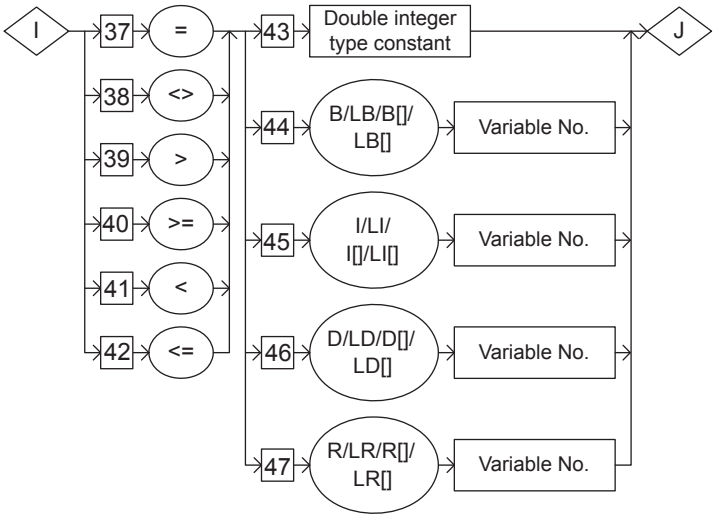
Evaluates the various conditions during operation. This instruction is added after other instructions for processing.

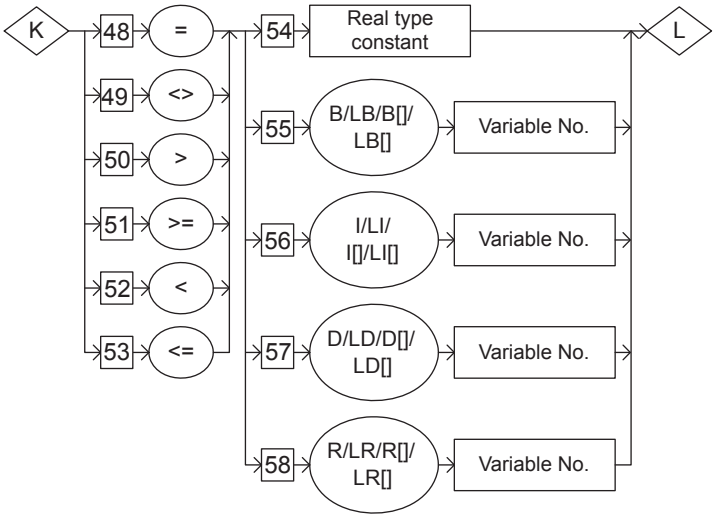
Construction

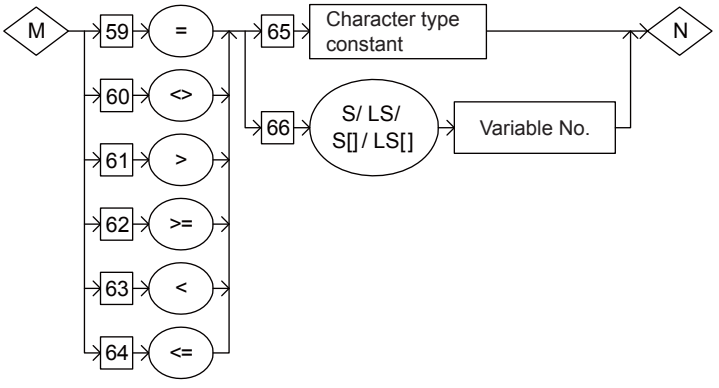
IF <Comparison element 1> =, <>, <=, >=, <, > <Comparison element 2>




A
8
=
9
B/LB/B[]/
LB[]
Variable No.
B
10
ON/OFF
C
11
=
12
<>
13
B/LB/B[]/
LB[]
Variable No.
D
14
Byte type
constant
E
15
=
16
<>
17
>
18
>=
19
<
20
<=
21
Byte type
constant
F
22
B/LB/B[]/
LB[]
Variable No.
23
I/LI/
I[]/LI[]
Variable No.
24
D/LD/D[]/
LD[]
Variable No.
25
R/LR/R[]/
LR[]
Variable No.
G
26
=
27
<>
28
>
29
>=
30
<
31
<=
32
Integer type
constant
H
33
B/LB/B[]/
LB[]
Variable No.
34
I/LI/
I[]/LI[]
Variable No.
35
D/LD/D[]/
LD[]
Variable No.
36
R/LR/R[]/
LR[]
Variable No.


I
37
=
38
<>
39
>
40
>=
41
<
42
<=
43
Double integer type constant
44
B/LB/B[]/ LB[]
45
I/LI/ I[]/LI[]
46
D/LD/D[]/ LD[]
47
R/LR/R[]/ LR[]
Variable No.
J


K
48
=
49
<>
50
>
51
>=
52
<
53
<=
54
Real type constant
55
B/LB/B[]/ LB[]
56
I/LI/ I[]/LI[]
57
D/LD/D[]/ LD[]
58
R/LR/R[]/ LR[]
Variable No.
L


M
59
=
60
<>
61
>
62
>=
63
<
64
<=
65
Character type constant
66
S/ LS/ S[] / LS[]
Variable No.
N

Explanation

1. IN# (Input number) /IG# (Input group number) /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number] / RS Variable number /LS Variable number /S [Array number] /LS [Array number]

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	IN# (Input number)	Specifies the number of the general input signal to be compared.	<Comparison element 1> No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.
2	IG# (Input group number)	Specifies the number of the general input group signal to be compared.	<Comparison element 1> No.: 1 to 512 Variable B/I/D/LB/LI/LD can be used.
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the number of the byte type variable to be compared.	<Comparison element 1>
4	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the number of the integer type variable to be compared.	<Comparison element 1>
5	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the number of the double precision type variable to be compared.	<Comparison element 1>
6	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the number of the real type variable to be compared.	<Comparison element 1>
7	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the number of the character type variable to be compared.	<Comparison element 1>

2. =

When an IN#(Input number) is selected from the table in part 1 of this Explanation, add the following tag.

No	Tag	Explanation	Note
8	=	It is equal.	

3. B Variable number /LB Variable number /B [Array number] /LB [Array number] /ON /OFF

When an IN#(Input number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after the equal sign (=) is added from the table in part 2 of this Explanation.

No	Tag	Explanation	Note
9	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable which becomes a comparison condition.	<Comparison element 2> Least significant bit: 0: OFF 1: ON
10	ON/OFF	The comparison condition is specified as ON or OFF.	<Comparison element 2>

4. =/<>

When an IG#(Input group number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
11	=	It is equal.	
12	<>	It is not equal.	

5. B Variable number /LB Variable number /B [Array number] /LB [Array number] /ON /OFF

When an IG#(Input group number) is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after “=” or “<>” are added from the table in part 4 of this Explanation.

No	Tag	Explanation	Note
13	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable which becomes a comparison condition.	<Comparison element 2>
14	Byte type constant	The comparison condition is specified by byte type constant.	<Comparison element 2>

6. =/<>/>/>=/</<=

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
15	=	It is equal.	
16	<>	It is not equal.	
17	>	It is greater than.	
18	>=	It is greater than or equal.	
19	<	It is less than.	
20	<=	It is less than or equal.	

7. Byte type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When a B Variable number, LB Variable number, B [Array number], or LB [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags in the following table after “=”, ”<>”, “>”, “>=”, “<“ or “<=” is selected from the table in part 6 of this Explanation.

No	Tag	Explanation	Note
21	Byte type constant	The comparison condition is specified by the byte type constant.	<Comparison element 2>
22	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number which becomes a comparison condition.	<Comparison element 2>
23	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the integer type variable number which becomes a comparison condition.	<Comparison element 2>
24	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
25	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the real type variable number which becomes a comparison condition.	<Comparison element 2>

8. =/<>/>/>=/</<=

When an I Variable number, LI Variable number, I [Array number] or LI [Array number] is selected the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
26	=	It is equal.	
27	<>	It is not equal.	
28	>	It is greater than.	
29	>=	It is greater than or equal.	
30	<	It is less than.	
31	<=	It is less than or equal.	

9. Integer type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an I Variable number, LI Variable number, I [Array number], or LI [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after selecting "=", "<>", ">", ">=", "<" or "<=" from the table in part 8 of this Explanation.

No	Tag	Explanation	Note
32	Integer type constant	The comparison condition is specified by the integer type constant.	<Comparison element 2>
33	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number which becomes a comparison condition.	<Comparison element 2>
34	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the integer type variable number which becomes a comparison condition.	<Comparison element 2>
35	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
36	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the real type variable number which becomes a comparison condition.	<Comparison element 2>

10. =/<>/>/>=/</<=

When a D Variable number, LD Variable number, D [Array number] or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
37	=	It is equal.	
38	<>	It is not equal.	
39	>	It is greater than.	
40	>=	It is greater than or equal.	
41	<	It is less than.	
42	<=	It is less than or equal.	

11. Double precision type constant/ B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] /LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When a D Variable number, LD Variable number, D [Array number], or LD [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after "=", "<>", ">", ">=", "<" or "<=" is selected from the table in part 10 of this Explanation.

No	Tag	Explanation	Note
43	Double precision type constant	The comparison condition is specified by the double precision type constant.	<Comparison element 2>
44	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number which becomes a comparison condition.	<Comparison element 2>
45	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the integer type variable number which becomes a comparison condition.	<Comparison element 2>
46	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
47	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the real type variable number which becomes a comparison condition.	<Comparison element 2>

12. =/<>/>/>=/</<=

When an R Variable number, LR Variable number, R [Array number] or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
48	=	It is equal.	
49	<>	It is not equal.	
50	>	It is greater than.	
51	>=	It is greater than or equal.	
52	<	It is less than.	
53	<=	It is less than or equal.	

13. Real type constant /B Variable number /LB Variable number /B [Array number] /LB [Array number] /I Variable number /LI Variable number /I [Array number] / LI [Array number] /D Variable number /LD Variable number /D [Array number] /LD [Array number] /R Variable number /LR Variable number /R [Array number] /LR [Array number]

When an R Variable number, LR Variable number, R [Array number], or LR [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after "=", "<>", ">", ">=", "<" or "<=" is selected from the table in part 12 of this Explanation.

No	Tag	Explanation	Note
54	Real type constant	The comparison condition is specified by the real type constant.	<Comparison element 2>
55	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number which becomes a comparison condition.	<Comparison element 2>
56	I Variable number/ LI Variable number/ I [Array number]/ LI [Array number]	Specifies the integer type variable number which becomes a comparison condition.	<Comparison element 2>
57	D Variable number/ LD Variable number/ D [Array number]/ LD [Array number]	Specifies the double precision type variable number which becomes a comparison condition.	<Comparison element 2>
58	R Variable number/ LR Variable number/ R [Array number]/ LR [Array number]	Specifies the real type variable number which becomes a comparison condition.	<Comparison element 2>

14. =/<>/>/>=/</<=

When an S Variable number, LS Variable number, S [Array number] or LS [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
59	=	It is equal.	
60	<>	It is not equal.	
61	>	It is greater than.	
62	>=	It is greater than or equal.	
63	<	It is less than.	
64	<=	It is less than or equal.	

15. Character type constant /S Variable number /LS Variable number /S [Array number] /LS [Array number]

When an S Variable number, LS Variable number, S [Array number], or LS [Array number] is selected from the table in part 1 of this Explanation, choose one of the tags from the following table after "=", "<>", ">", ">=", "<" or "<=" is selected from the table in part 14 of this Explanation.

No	Tag	Explanation	Note
65	Character type constant	The comparison condition is specified by the character type constant.	<Comparison element 2>
66	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the character type variable number which becomes a comparison condition.	<Comparison element 2>

Example

(1) SET B000 1
JUMP B000 IF IN#(14)=ON
It jumps to Job 1 if input signal No.14 is turned ON.

(2) JUMP *2 IF D005<=D006
Jumps to *2 if D005 is below D006.

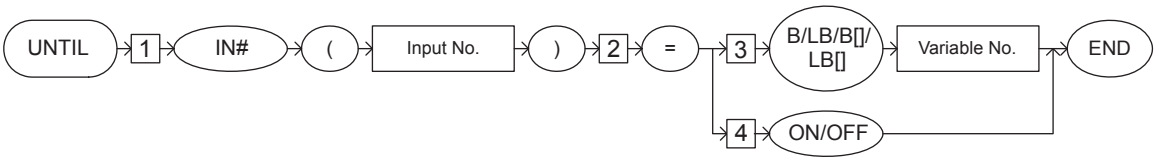
UNTIL

SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Evaluates the input conditions during operation. This instruction is added after other instructions for processing.

Construction



Explanation

1. IN# (Input number)

Add the following tag.

No.	Tag	Explanation	Note
1	IN# (Input number)	Specifies the number of the general-purpose input signal which becomes a input condition.	No.: 1 to 4096 Variable B/I/D/LB/LI/LD can be used.

2. =

Add the following tag.

No.	Tag	Explanation	Note
2	=	It is equal.	

3. B Variable number/LB Variable number/B [Array number]/LB [Array number]/ON/OFF.

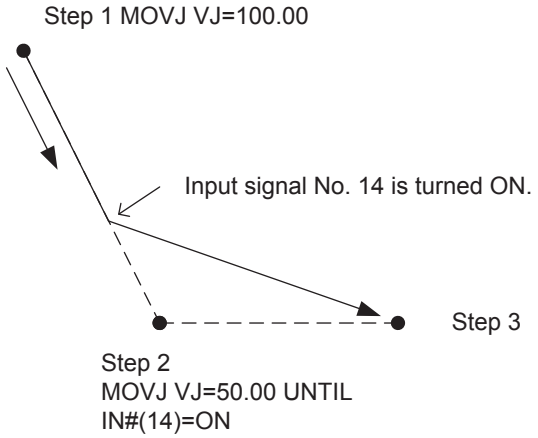
Choose one of the tags from the following table after "=" is selected from the table in part 2 of this Explanation.

No.	Tag	Explanation	Note
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable to be the condition of execution.	Least significant bit: 0: OFF 1: ON
4	ON/OFF	Specifies the condition as ON or OFF.	

Example

(1) Step 1 MOVJ VJ=100.00
Step 2 MOVJ VJ=50.00 UNTIL IN#(14)=ON
Step 3 MOVJ VJ=25.00

The axis moves toward Step 2 until input signal No. 14 is turned ON. When input signal No. 14 is turned ON, the axis moves toward Step 3.



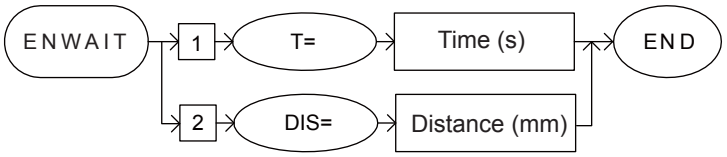
ENWAIT

SUBSET	STANDARD	EXPANDED	Parameter
Available	Available	Available	S2C714

Function

Carries out, in advance for the specified time or distance, an instruction other than a move instruction on the instruction line next to the move instruction that was added with ENWAIT.

Construction



Explanation

1. T=Time/DIS= Distance

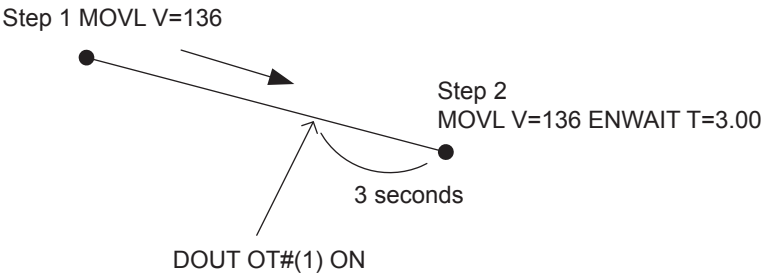
Choose one of the tags from the following table.

No.	Tag	Explanation	Note
1	T=Time	Specifies the time in which the next instruction excluding a move instruction is carried out.	Time: 0.01 to 655.35 seconds Variable I/LI/I []/LI [] can be used. (Units: 0.01 seconds)
2	DIS= Distance	Specifies the distance in which the next instruction excluding a move instruction is carried out.	Distance: 0.0 to 6553.5 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used. (Units: 0.1 mm)

Example

(1) Step 1 MOVL V=136
Step 2 MOVL V=136 ENWAIT T=3.00
DOUT OT#(1) ON

DOUT on the next instruction line is carried out 3 seconds before reaching Step 2.



DIALSB

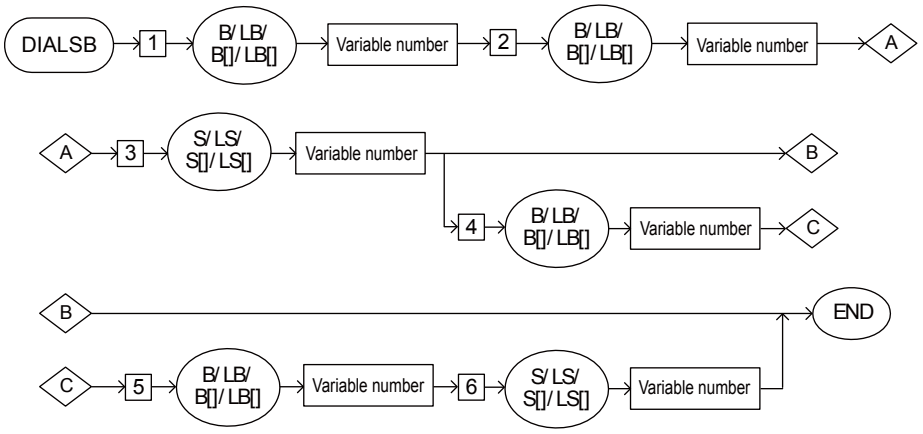
SUBSET	STANDARD	EXPANDED
Not available	Available	Available

Function

Specifies the structure of the dialog (the display position of the message and button) shown by the DIALOG instruction.

* Can be selected only in the DIALOG instruction.

Construction



Explanation

1. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Message X coordinates

Add the following tag.

No	Tag	Explanation	Note
1	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number.	

2. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Message Y coordinates

Add the following tag.

No	Tag	Explanation	Note
2	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number.	

3. S Variable number / LS Variable number / S [Array number] / LS [Array number]: Message character string

Add the following tag.

No	Tag	Explanation	Note
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the character string type variable number.	

4. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Button X coordinates

Make sure to add the following tag for the first DIALSB in the DIALOG instruction.

For the second and after, the following tag can be added or omitted.

No	Tag	Explanation	Note
4	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number.	

5. B Variable number / LB Variable number / B [Array number] / LB [Array number]: Button Y coordinates

For the second and after, the following tag can be added or omitted.

No	Tag	Explanation	Note
5	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Specifies the byte type variable number.	

6. S Variable number / LS Variable number / S [Array number] / LS [Array number]: Button character string

Make sure to add the following tag for the first DIALSB in the DIALOG instruction.

For the second and after, the following tag can be added or omitted.

No	Tag	Explanation	Note
3	S Variable number/ LS Variable number/ S [Array number]/ LS [Array number]	Specifies the character string type variable number.	

2.7 Arc Welding Instruction

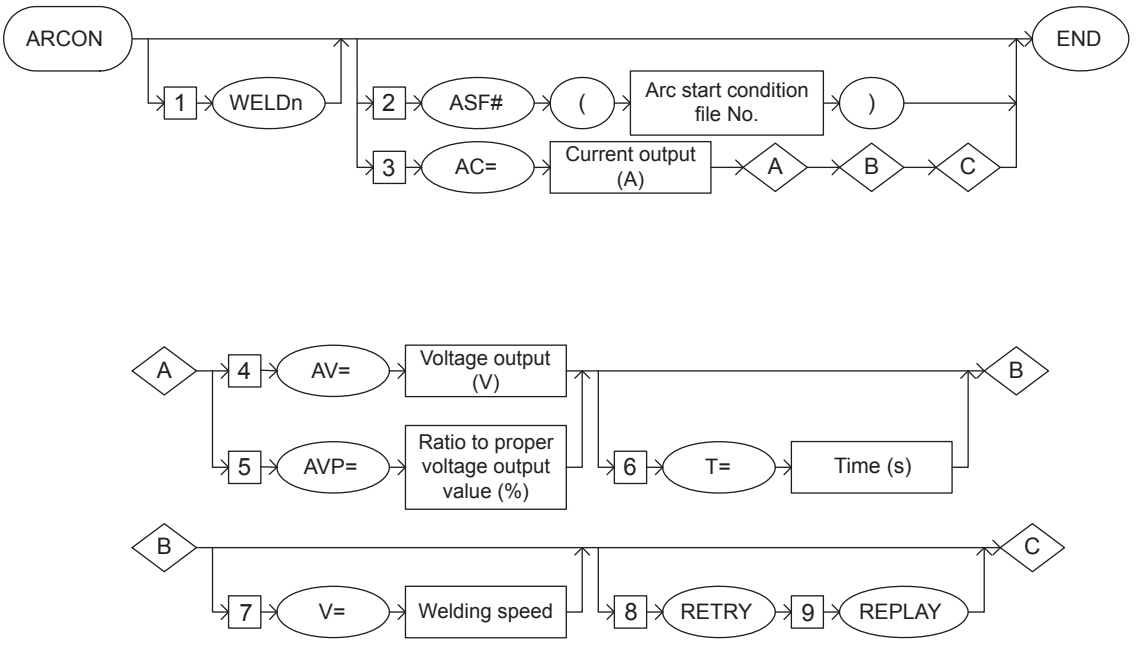
ARCON

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Outputs the welding start command.

Construction



Explanation

1. WELDn

Choose one of the tags from the welder. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. ASF# (Arc start condition file number) /AC=Current output value

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	ASF#(Arc start condition file number)	Specifies the arc start condition file number. The condition when the welding begins is registered in the arc start condition file.	No: 1 to 1000 Variable B/I/D/LB/LI/LD can be used.
3	AC=Current output value	Specifies the output value of the welding current.	Current value: 1 to 999A Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. AV=Voltage output value /AVP=Ratio to proper voltage output value

When AC=Current output value is selected from the table in part 2 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
4	AV=Voltage output value	Specifies the output value of the arc voltage. When the welder power supply is 'Individual', the output value of the arc voltage is specified.	Voltage value: 0.1V to 50.0 V Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1V)
5	AVP=Ratio to proper voltage output value	Specifies the ratio to the aptitude output value of the arc voltage. When the welder power supply is 'Same', the ratio to the aptitude output value of the arc voltage is specified.	Ratio: 50% to 150% Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. T=Time

When AC=Current output value is selected from the table in part 2 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
6	T=Time	Specifies the timer value at the welding start.	Time: 0.01 to 655.35 Seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)

5. V=Welding speed

When AC=Current output value is selected from the table in part 2 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
7	V=Welding speed	Specifies the speed while welding. Specifies the unit of rate using the operation condition setting screen.	Speed: 1 to 9000 cm/min Setting the parameter S2C221 can change the units. Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/ LD/LD[] can be used. (Units: 1 cm/min)

6. RETRY

When AC=Current output value is selected from the table in part 2 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
8	RETRY	Specifies the RETRY function. The RETRY function makes it so that the manipulator does not stop and work is not interrupted when an arc generation error occurs.	Refer to the supplement “RETRY function”.

7. REPLAY

When RETRY is selected from the table in part 6 of this Explanation, add the following tag.

No	Tag	Explanation	Note
9	REPLAY	Specifies the REPLAY mode. REPLAY mode is one of the operation modes. When the RETRY function is available, the ARCON processing can be done again.	Refer to the supplement “RETRY function”.

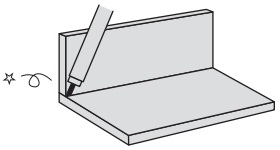
SUPPLE -MENT

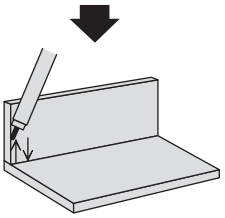
RETRY function

The RETRY function performs the arc retry automatically with a condition set in the auxiliary condition file, when an arc generation error occurs.

When ARCON is processed again, the arc is generated and the manipulator continues working.

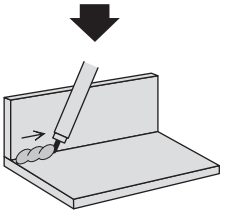
1. Arc generation mistake.





2. ARCON is processed again.

- REPLAY mode
  Returns to the former step, performs retract inching, returns to the start point and tries the arc again.



3. Keeps working when the arc is generated.

SUPPLE -MENT

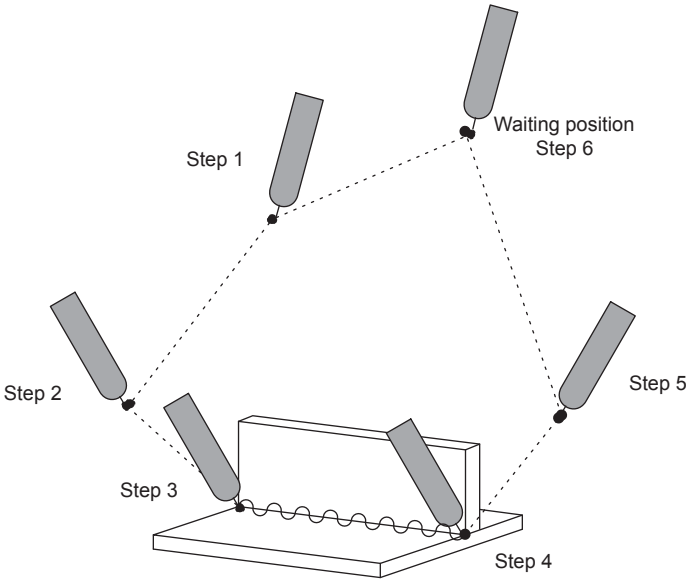
For details of the RETRY function, refer to the “Operator’s Manual for Arc Welding”.

Example

(1) Starts welding with the condition set to No.1 in the arc start condition file.

(2) NOP

```
MOVJ VJ=50.00                    ♦♦♦ Step 1
MOVL V=200                       ♦♦♦ Step 2
MOVL V=220                       ♦♦♦ Step 3
WVON WEV#(2)                     ♦♦♦ Weaving starts
ARCON AC=220 AVP=100 T=0.50      ♦♦♦ Welding starts
MOVL V=138                       ♦♦♦ Step 4
ARCOF                            ♦♦♦ Welding ends
WVOF                             ♦♦♦ Weaving ends
MOVL V=200                       ♦♦♦ Step 5
MOVJ VJ=50.00                    ♦♦♦ Step 6
END
```



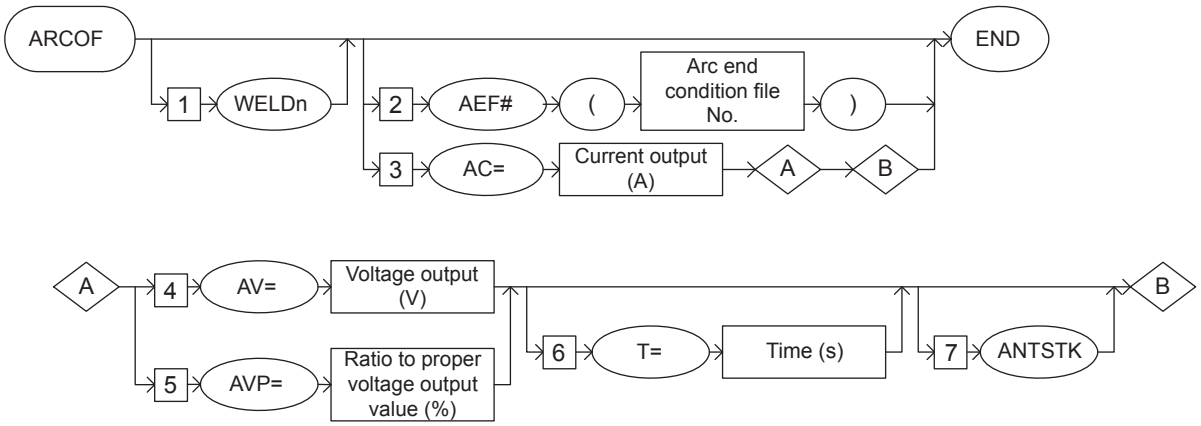
ARCOF

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Outputs welding end command.

Construction



Explanation

1. WELDn

Choose one of the tags from the welder. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. AEF# (Arc end condition file number) /AC=Current output value

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	AEF#(Arc end condition file number)	Specifies the arc end condition file number. The condition when welding has ended is registered in the arc end condition file.	No.: 1 to 1000 Variable B/I/D/LB/LI/LD can be used.
3	AC=Current output value	Specifies the output value of the welding current.	Current value: 1 to 999A Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. AV=Voltage output value /AVP=Ratio to proper voltage output value

When AC=Current output value is selected from the table in part 2 of this Explanation, choose one of the tags from the following table.

No	Tag	Explanation	Note
4	AV=Voltage output value	Specifies the output value of the arc voltage. When the welder power supply is 'Individual' the output value of the arc voltage is specified.	Voltage value: 0.1 V to 50.0 V Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 V)
5	AVP=Ratio to proper voltage output value	Specifies the ratio to the aptitude output value of the arc voltage. When the welder power supply is 'Same' the ratio to the aptitude output value of the arc voltage is specified.	Ratio: 50% to 150% Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. T=Time

When AC=Current output value is selected from the table in part 2 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
6	T=Time	Specifies the timer value at welding end.	Time: 0.01 to 655.35 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)

5. ANTSTK

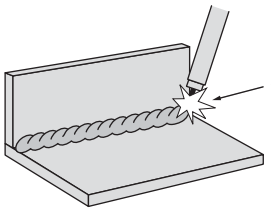
When AC=Current output value is selected from the table in part 2 of this Explanation, the following tag can be added or omitted.

No	Tag	Explanation	Note
7	ANTSTK	Specifies the automatic sticking release function. The automatic wire sticking release function in which the wire sticking is released automatically. It puts out a constant voltage without outputting the wire sticking signal once wire sticking is detected.	Refer to the supplement “Automatic wire sticking release function”.

SUPPLE -MENT

Automatic wire sticking release function

The automatic wire sticking release function in which the wire sticking is released automatically. It puts out a constant voltage without outputting the wire sticking signal once wire sticking is detected. The condition of the frequency etc. of the wire sticking release processing is set in the auxiliary condition file.



Automatic sticking release

Even if a single attempt has failed, the process is repeated up to the specified maximum repetition count.

SUPPLE -MENT

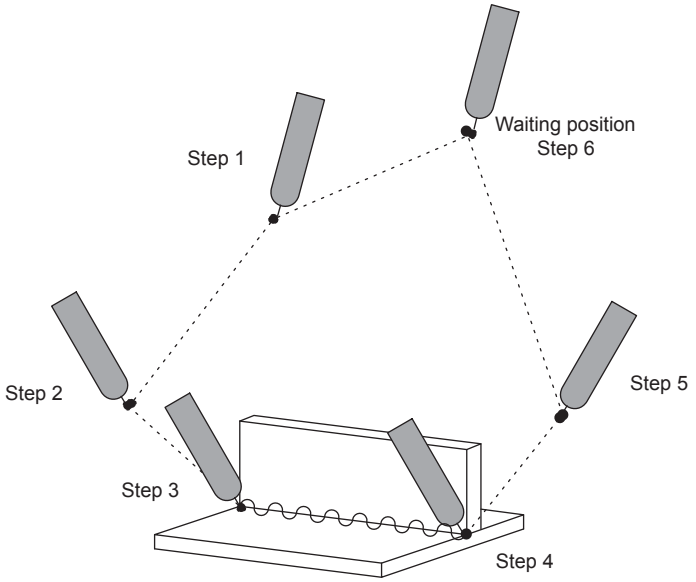
For details of the automatic wire sticking release function, refer to the “Operator’s Manual for Arc Welding”.

Example

(1) ARCOF AEF#(1)
The welding end condition is set in the arc end condition file No.1.

(2) NOP

```
MOVJ VJ=50.00                    ♦♦♦ Step 1
MOVL V=220                       ♦♦♦ Step 2
MOVL V=200                       ♦♦♦ Step 3
WVON WEV#(2)                     ♦♦♦ Weaving starts
ARCON AC=220 AVP=100 T=0.50      ♦♦♦ Welding starts
MOVL V=138                       ♦♦♦ Step 4
ARCOF AC=160 AVP=90 T=0.50       ♦♦♦ Welding ends
WVOF                             ♦♦♦ Weaving ends
MOVL V=200                       ♦♦♦ Step 5
MOVJ VJ=50.00                    ♦♦♦ Step 6
END
```



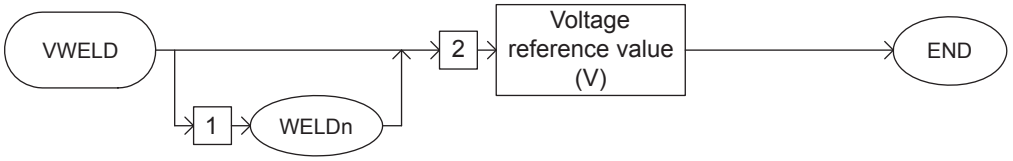
VWELD

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Sets the arc voltage by the voltage command value.

Construction



Explanation

1. WELDn

Choose one of the tags from the welder. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. Voltage command value

Specifies the command value of the arc voltage.

No	Tag	Explanation	Note
2	Voltage command value	Specifies the command value of the arc voltage. This is a command value of the voltage which is transmitted from the controller to the welder to output the welding voltage from the welder. The relation between the command welding voltage and the output value is different depending on the model of the welder.	Command value: -14.00 V to +14.00 V Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

For details of the output characteristics of the welder, refer to the “Operator’s Manual for Arc Welding”.

Example

(1) VWELD 6.0
The command value of the arc voltage is set to 6.0V.

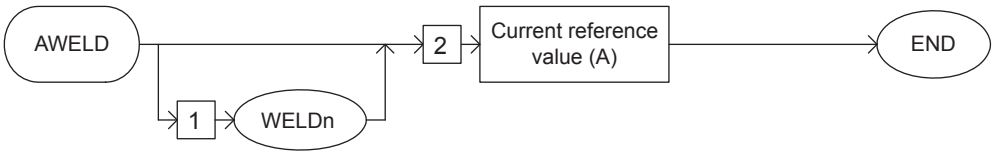
AWELD

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Sets the welding current by the current command position.

Construction



Explanation

1. WELDn

Choose one of the tags from welder. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. Current command value

Specifies the command value of the welding current.

No	Tag	Explanation	Note
2	Voltage command value	Specifies the command value of the welding current. This is a command value of the current which is transmitted from the controller to the welder to output the welding current from the welder. The relation between the command welding current and the output value is different depending on the model of the welder.	Command value: -14.00 V to +14.00 V Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

SUPPLE -MENT For details of the output characteristics of the welder, refer to the “Operator’s Manual for Arc Welding”.

Example

(1) AWELD 6.0
The command value of the welding current is set to 6.0V.

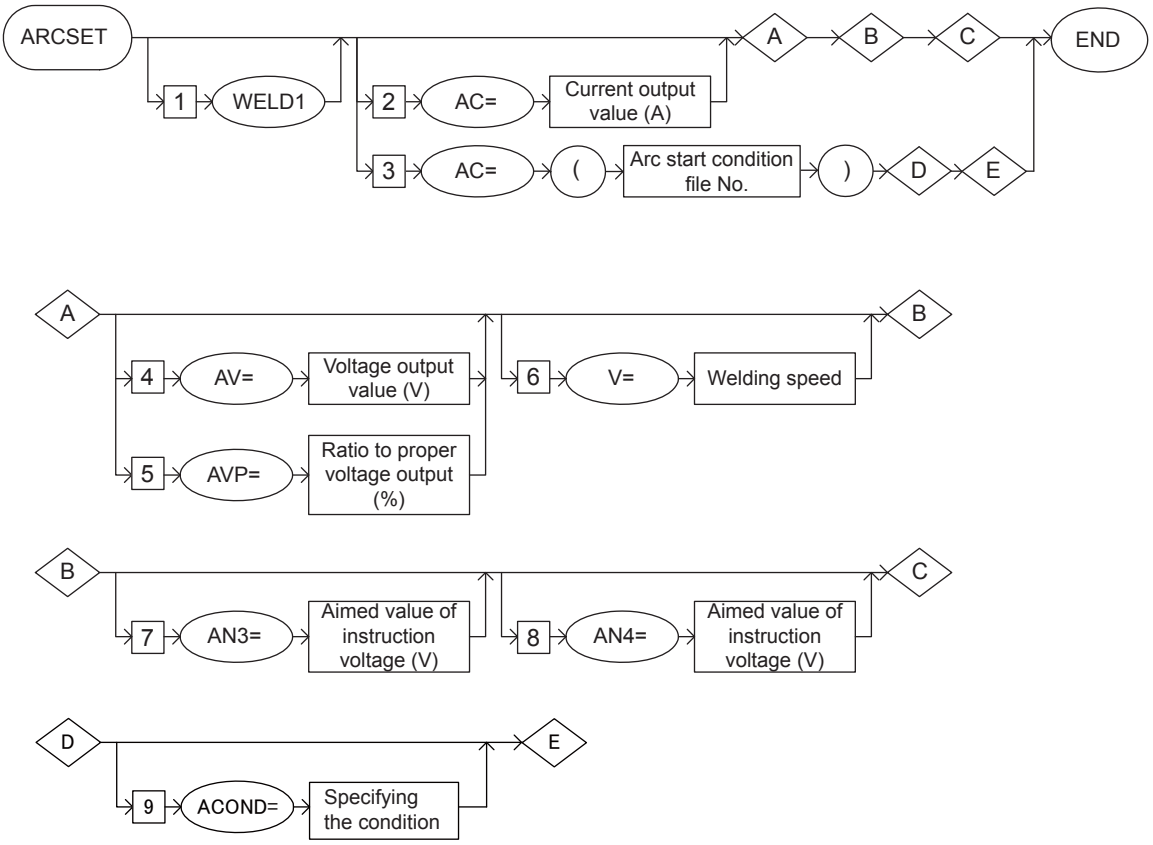
ARCSET

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Sets and changes each welding condition individually.

Construction



Explanation

1. WELDn

Choose one of the tags from welder. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No.	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. AC=Current output value / ASF#(Arc start condition file number)

The following tag can be added or omitted.

No.	Tag	Explanation	Note
2	AC=Current output value	Specifies the output value of the welding current.	Current value: 1 to 999 A Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.
3	ASF#(Arc start condition file number)	Specifies the arc start condition file number. The condition when the welding begins is registered in the arc start condition file.	No: 1 to 1000 Variable B/I/D/LB/LI/LD can be used.

3. AV=Voltage output value/AVP=Ratio to proper voltage output value

Choose one of the tags from the following table.

No.	Tag	Explanation	Note
4	AV=Voltage output value	Specifies the output value of the arc voltage. When the welder power supply is 'Individual', the output value of the arc voltage is specified.	Voltage value: 0.1V to 50.0 V Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1V)
5	AVP=Ratio to proper voltage output value	Specifies the ratio to the aptitude output value of the arc voltage. When the welder power supply is 'Same', the ratio to the aptitude output value of the arc voltage is specified.	Ratio: 50% to 150% Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. V=Welding speed

The following tag can be added or omitted.

No.	Tag	Explanation	Note
6	V=Welding speed	Specifies the speed while welding. Specifies the unit of rate using the operation condition setting screen.	Speed: 1 to 9000 cm/min Setting the parameter S2C221 can change the units. Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 1 cm/min)

5. AN3=Aimed value of instruction voltage

The following tag can be added or omitted.

No.	Tag	Explanation	Note
7	AN3=Aimed value of instruction voltage	Specifies the aimed value of the instruction voltage to analog output 3.	Aimed value: -14.00 V to +14.00 V Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

6. AN4=Aimed value of instruction voltage

The following tag can be added or omitted.

No.	Tag	Explanation	Note
8	AN4=Aimed value of instruction voltage	Specifies the aimed value of the instruction voltage to analog output 4.	Aimed value: -14.00 V to +14.00 V Variable I/LI/I[]/LI[] can be used. (Units: 0.01 V)

7. ACOND=Specifying the condition

The following tag can be added or omitted.

No.	Tag	Explanation	Note
9	ACOND= Specifying the condition	Specifies the either the start condition or the main condition in the welding start condition file to be applied. If this tag is omitted, the main condition will be applied.	Aimed direction: 0 to 1 0: Start condition 1: Main condition Variable B/ I/D/LB/LI/LD can be used.

Example

(1) NOP

MOVJ VJ=50.00	♦♦♦ Step 1
MOVJ VJ=80.00	♦♦♦ Step 2(Arc start position)
ARCON AC=200 AVP=100 T=0.30	♦♦♦ Arc starts
MOVL V=50	♦♦♦ Step 3
MOVL V=50	♦♦♦ Step 4
ARCSET AC=250	♦♦♦ Changes the welding condition
MOVL V=65	(AC=200 → AC=250)
ARCOF	♦♦♦ Step 5
MOVJ VJ=50.00	♦♦♦ Welding ends
MOVJ VJ=100.00	♦♦♦ Step 6
END	♦♦♦ Step 7

WVON

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc, general-purpose, and laser welding

Function

Starts weaving operation.

Construction

The tags to be added differ depending on the control group in the job.

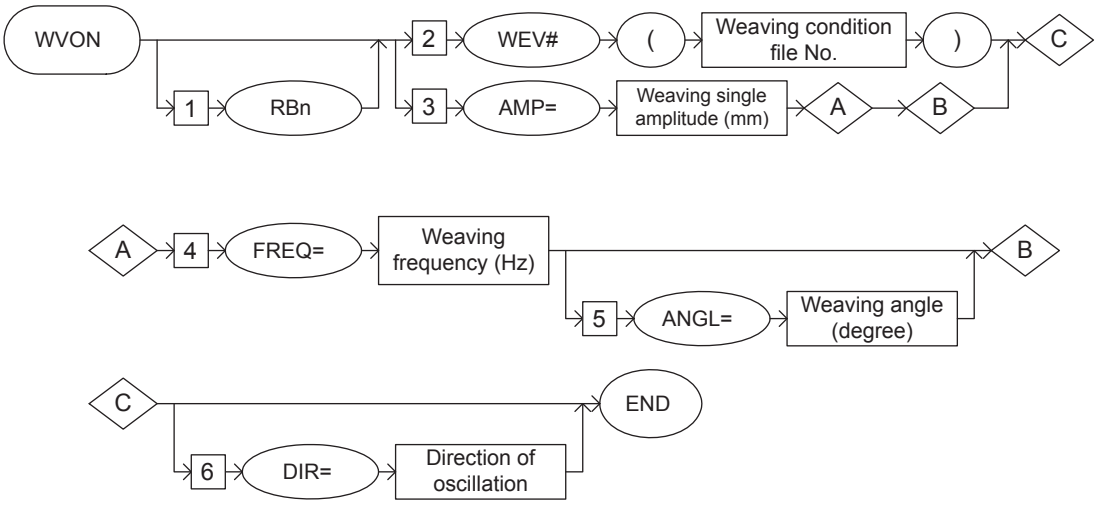


Table 2-19: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Coordinated	Two manipulators	Optional

Table 2-20: Availability of Each Tag

No	Tag	Control Group		Note
		1	2	
1	RBn	×	●	
2	WEV#()	●	●	
3	AMP=	●	●	
4	FREQ=	●	●	
5	ANGL=	●	●	
6	DIR=	●	●	

●: Available
×: Not available

Explanation

1. RBn

Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	RBn	Specifies the robot that is to execute a weaving operation.	n: 1 to 8 RB1: Robot 1

2. WEV# (Weaving condition file number)/AMP=Weaving single amplitude

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	WEV#(Weaving condition file number)	Specifies the weaving condition file number. The condition when the weaving operates is registered in the weaving condition file.	No.: 1 to 255 Variable B/I/D/LB/LI/LD can be used.
3	AMP=Weaving signal amplitude	Specifies the amplitude of oscillation for weaving.	Single amplitude: 0.1 mm to 99.9 mm Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used. (Units: 0.1 mm)

3. FREQ=Weaving frequency

When AMP=Weaving single amplitude is selected from the table in part 2 of this Explanation, add the following tag.

No	Tag	Explanation	Note
4	FREQ=Weaving frequency	Specifies the weaving frequency.	Frequency: 1.0 Hz to 5.0 Hz Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 Hz)

4. ANGL=Weaving angle

When AMP=Weaving single amplitude is selected from the table in part 2 of this Explanation, the following tag can be added or omitted after the tag FREQ=Weaving frequency is selected from the table in part 3 of this Explanation.

No	Tag	Explanation	Note
5	ANGL=Weaving angle	Specifies the weaving angle.	Angle: 0.1 deg. to 180.0 deg. Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 deg.)

5. DIR=Direction of oscillation

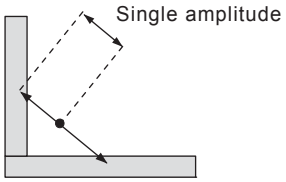
The following tag can be added or omitted.

No	Tag	Explanation	Note
6	DIR=Direction of oscillation	Specifies the direction of oscillation. Refer to the supplement “Weaving conditions”.	Direction: 0 or 1 0: Forward 1: Reversed Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

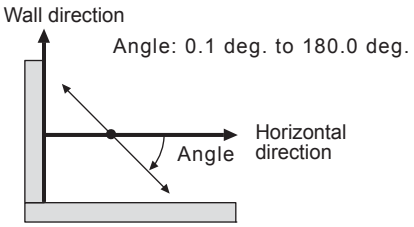
SUPPLE -MENT

Wearing conditions

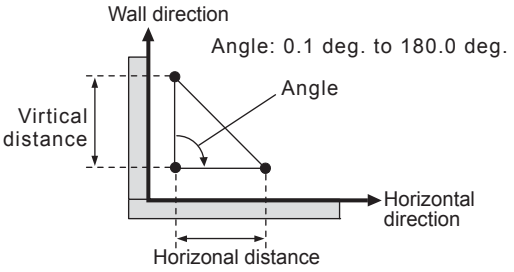
• Weaving single amplitude
Set the amplitude of oscillation.



• Weaving angle
Set the angle of oscillation.

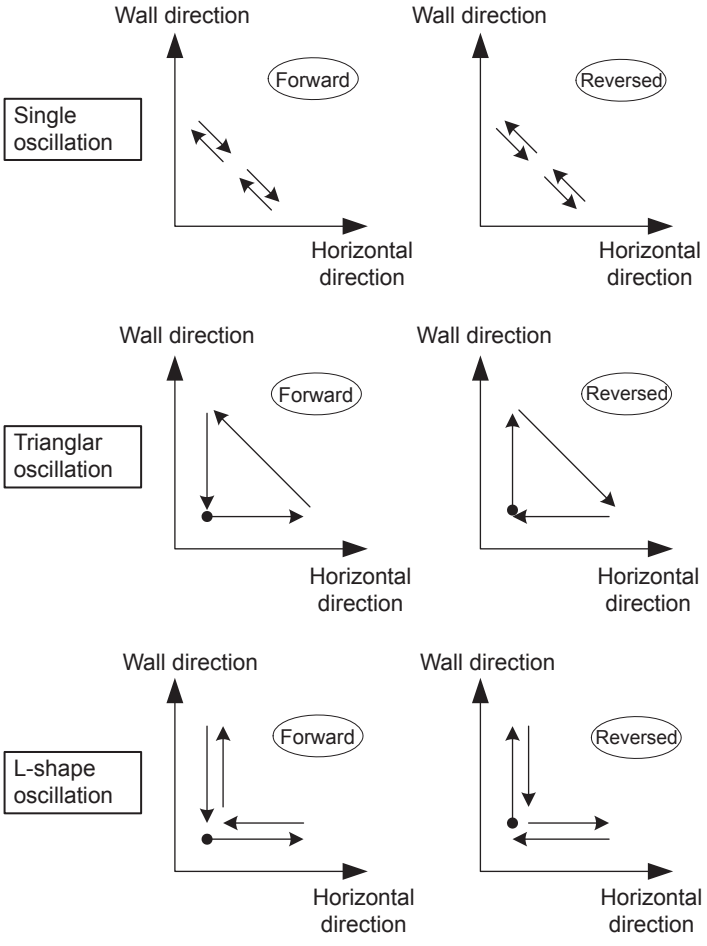


Weaving mode: Single oscllation



Weaving mode: Triangular or L-shape oscillation

• Direction of oscillation
The directions, “forward” and “reversed”, are defined as follows. Set “0 (forward)” or “1 (reversed)” for the direction of oscillation.



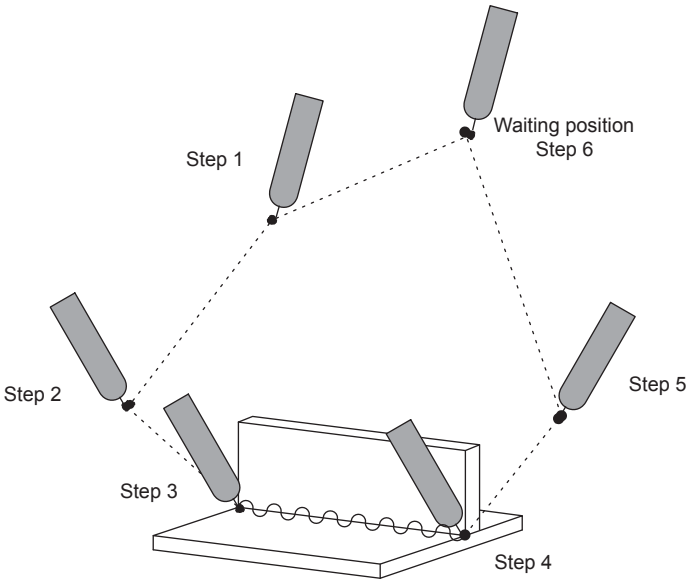
SUPPLE -MENT For details of the weaving condition file number, refer to the "Operator's Manual for the Arc Welding".

Example

(1) WVON WEV#(1) DIR=1
Weaving starts with the conditions specified in the weaving condition file.

(2) NOP

MOVJ VJ=50.00	♦♦♦ Step 1
MOVL V=220	♦♦♦ Step 2
MOVL V=200	♦♦♦ Step 3
WVON AMP=5.0 FREQ=3.0 ANGL40.0	♦♦♦ Weaving starts
ARCON AC=220 AVP=100 T=0.5	♦♦♦ Welding starts
MOVL V=138	♦♦♦ Step 4
ARCOF AC=160 AVP=90 T=0.50	♦♦♦ Welding ends
WVOF	♦♦♦ Weaving ends
MOVL V=200	♦♦♦ Step 5
MOVJ VJ=50.00	♦♦♦ Step 6
END	



WVOF

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc, general-purpose, and laser welding

Function

Ends weaving operation.

Construction

The tags to be added differ depending on the control group in the job.

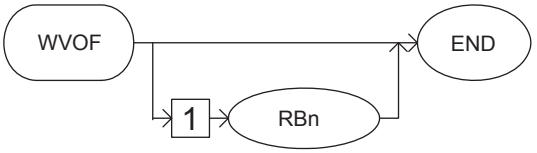


Table 2-21: Job Type and Control Group

No.	Job Type	Control Group	Remarks
1	Single	One manipulator (standard)	
2	Coordinated	Two manipulators	Optional

Table 2-22: Availability of Each Tag

No	Tag	Control Group		Note
		1	2	
1	RBn	×	●	

●: Available
×: Not available

Explanation

1. RBn

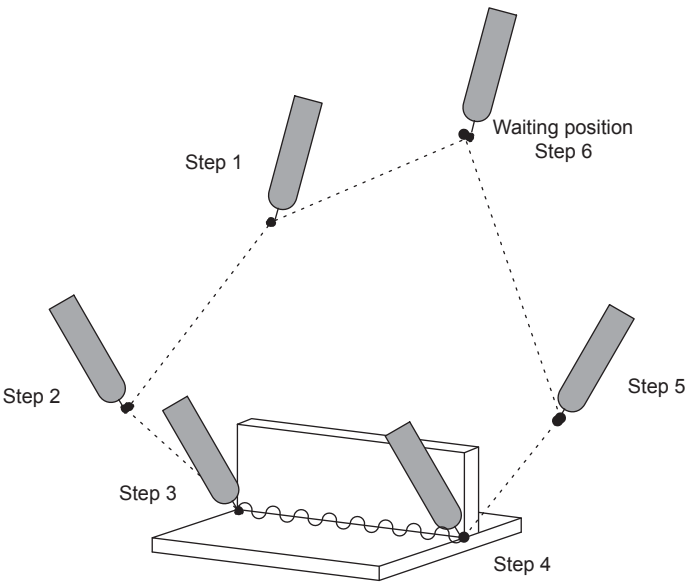
Choose one of the tags from the following table.

No	Tag	Explanation	Note
1	RBn	Specifies the robot that is to end the weaving operation.	n: 1 to 8 RB1: Robot 1

Example

(1) NOP

```
MOVJ VJ=50.00          ♦♦♦ Step 1
MOVL V=220             ♦♦♦ Step 2
MOVL V=200             ♦♦♦ Step 3
WVON WEV#(2)           ♦♦♦ Weaving starts
ARCON AC=220 AVP=100 T=0.50  ♦♦♦ Welding starts
MOVL V=138             ♦♦♦ Step 4
ARCOF AC=160 AVP=90 T=0.50   ♦♦♦ Welding ends
WVOF                   ♦♦♦ Weaving ends
MOVL V=200             ♦♦♦ Step 5
MOVJ VJ=50.00          ♦♦♦ Step 6
END
```



ARCCTS

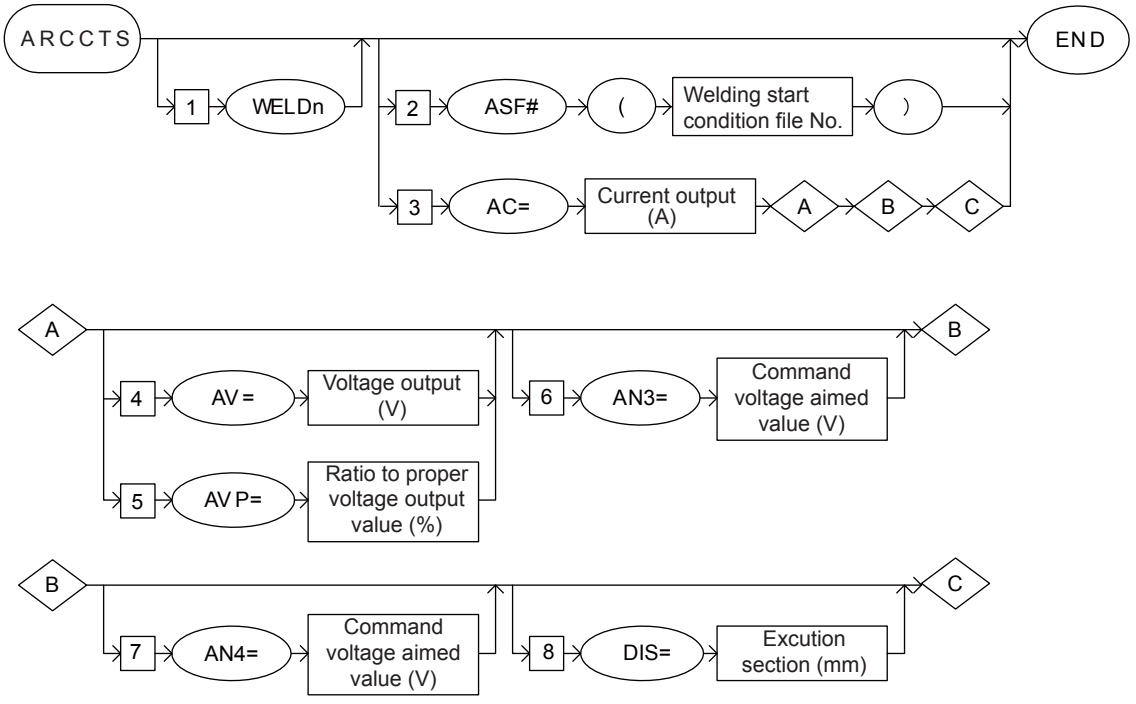
SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Controls the welding current and the voltage in the specified starting section.

This function is used with the move instruction. The current and the voltage are changed while the robot is moving. The aimed value and section have to be set. The section is specified as a distance from the moving start point. If it is not specified, it is regarded as the entire section of the move instruction.

Construction



Explanation

1. WELDn

Choose one of the tags from welder. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. ASF# (Welding start condition fine number)/ AC=Current output value

The following tag can be added or omitted.

No	Tag	Explanation	Note
2	ASF# (Welding start condition file number)	Specifies the welding start condition file number. The condition of when to start is registered in this welding start condition file number	Current value: 1 to 1000 Variable B/I/D/LB/LI/LD can be used.
3	AC=Current output value	Specifies the aimed value of the welding current.	Current value: 1 to 999A Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used to specifiy the current value.

3. AV=Voltage output value /AVP=Ratio to proper voltage output value

Choose one of the tags from following table.

No	Tag	Explanation	Note
4	AV=Voltage output value	Specifies the aimed value of the welding voltage.	Voltage value: 0.1 V to 50.0 V Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 V)
5	AVP=Ratio to proper voltage output value	Specifies the aimed value for the welding voltage in the ratio to the proper voltage output value.	Ratio: 50% to 150% Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. AN3=Aimed value of instruction voltage

The following tag can be added or omitted.

No	Tag	Explanation	Note
6	AN3=Aimed value of instruction voltage	Specifies the aimed value of the instruction voltage to analog output 3.	Aimed value: -14.00 V to +14.00 V Variable I/I[]/LI/LI[] can be used. (Units: 0.01 V)

5. AN4=Aimed value of instruction voltage

The following tag can be added or omitted.

No	Tag	Explanation	Note
7	AN4=Aimed value of instruction voltage	Specifies the aimed value of the instruction voltage to analog output 4.	Aimed value: -14.00 V to +14.00 V Variable I/I[]/LI/LI[] can be used. (Units: 0.01 V)

6. DIS=Performance interval

The following tag can be added or omitted.

No	Tag	Explanation	Note
8	DIS= Execution section	Specifies the execution section to change the current or the volt. The execution section is set up by the distance from the move start point. If there is no specified section, the whole move instruction will be target to be changed.	Interval: 0.0 to 6553.5 mm Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[]] can be used. (Units: 0.1 mm)

Slope up/down function

The slope up/down function allows for the current and the voltage value etc., during welding to be gradually changed.

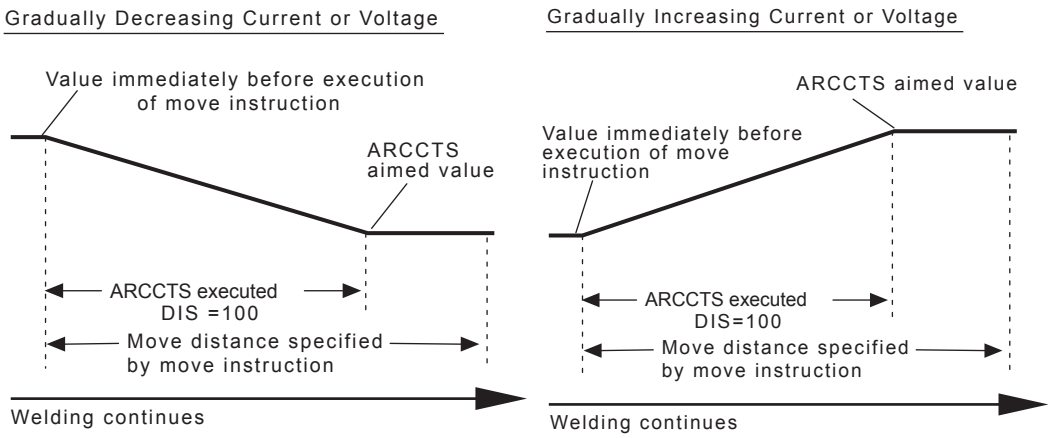
This function is used when the base metal is a board, or when the object is an aluminum which has high heat conductivity.

In this function, the ARCCTS and the ARCCTE instruction are used.

For details of the slope up/down function, refer to the “Operator’s Manual for the Arc Welding”.

Example

(1) ARCCTS AC=150 AV=16.0 DIS=100.0
MOVL V=80
To make the welding current =150A and arc voltage =16V, the current and the voltage are changed in the section of 100mm from the move start point.



(2) ARCCTS AC=150 AV=16.0 AN3=7.50 AN4=6.50 DIS=100.0
To make the welding current =150A, arc voltage =16V, aimed value =7.5V of the instruction voltage to analog output 3, and aimed value =6.5V of the instruction voltage to analog output 4, the current, the voltage, the analog output 3 and the analog output 4 are changed in the section of 100mm from the move start point.

ARCCTE

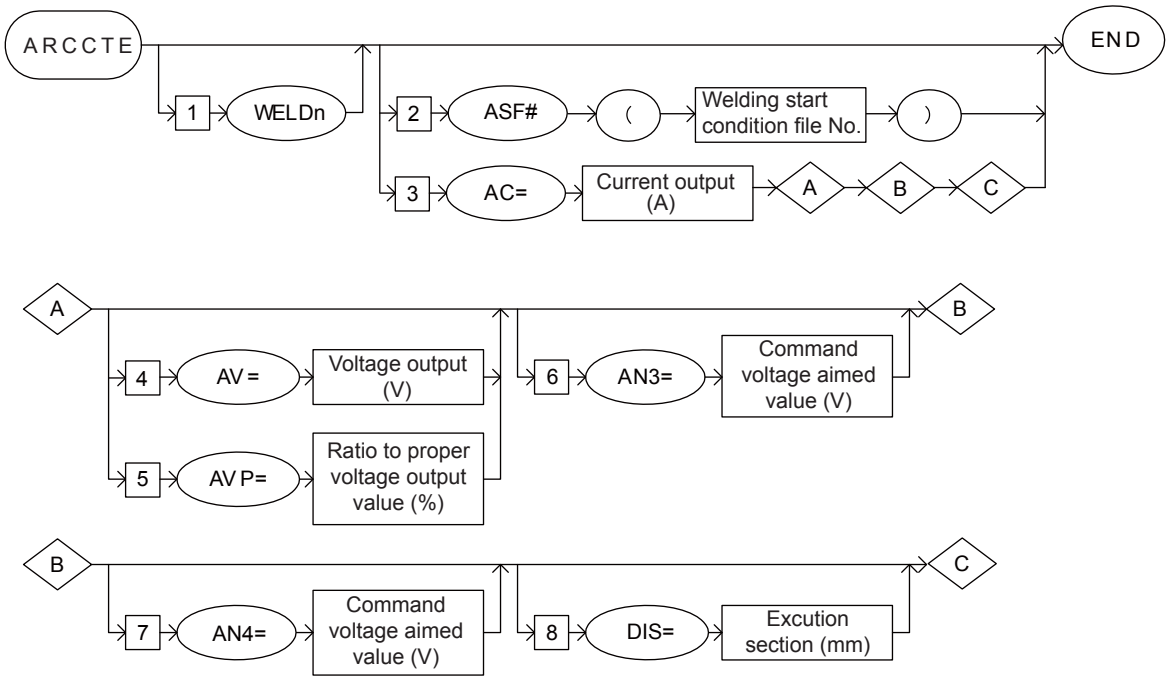
SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Arc

Function

Controls the welding current and the voltage in the specified end section.

This function is used with the move instruction and modifies the current and the voltage while the manipulator is moving. The aimed value and the section are set. The section is specified as a distance from the moving end point. If it is not specified, it is regarded as the entire section of the move instruction.

Construction



Explanation

1. WELDn

Choose one of the tags from the following table. These tags are valid for a system with multiple applications in which two or more arc welding applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	WELDn	Specifies the welder.	n: 1 to 8 WELD1: Welder 1

2. ASF# (Welding start condition fine number)/ AC=Current output value

The following tag can be added or omitted.

No	Tag	Explanation	Note
2	ASF# (Welding start condition file number)	Specifies the welding start condition file number. The condition of when to start is registered in this welding start condition file number	Current value: 1 to 1000 Variable B/I/D/LB/LI/LD can be used.
3	AC=Current output value	Specifies the aimed value of the welding current.	Current value: 1 to 999A Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

3. AV=Voltage output value /AVP=Ratio to proper voltage output value

Choose one of the tags from the following table.

No	Tag	Explanation	Note
4	AV=Voltage output value	Specifies the aimed value of the welding voltage.	Voltage value: 0.1 V to 50.0 V Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used. (Units: 0.1 V)
5	AVP=Ratio to proper voltage output value	Specifies the aimed value for the welding voltage in the ratio to the proper voltage output value.	Ratio: 50% to 150% Variable B/I/D/B[]/I[]/D[]/ LB/LI/LD/LB[]/LI[]/LD[] can be used.

4. AN3=Aimed value of instruction voltage

The following tag can be added or omitted.

No	Tag	Explanation	Note
6	AN3=Aimed value of instruction voltage	Specifies the aimed value of the instruction voltage to analog output 3.	Aimed value: -14.00 V to +14.00 V Variable I/I[]/LI/LI[] can be used. (Units: 0.01 V)

5. AN4=Aimed value of instruction voltage

The following tag can be added or omitted.

No	Tag	Explanation	Note
7	AN4=Aimed value of instruction voltage	Specifies the aimed value of the instruction voltage to analog output 4.	Aimed value: -14.00 V to +14.00 V Variable I/I[]/LI/LI[] can be used. (Units: 0.01 V)

6. DIS=Performance interval

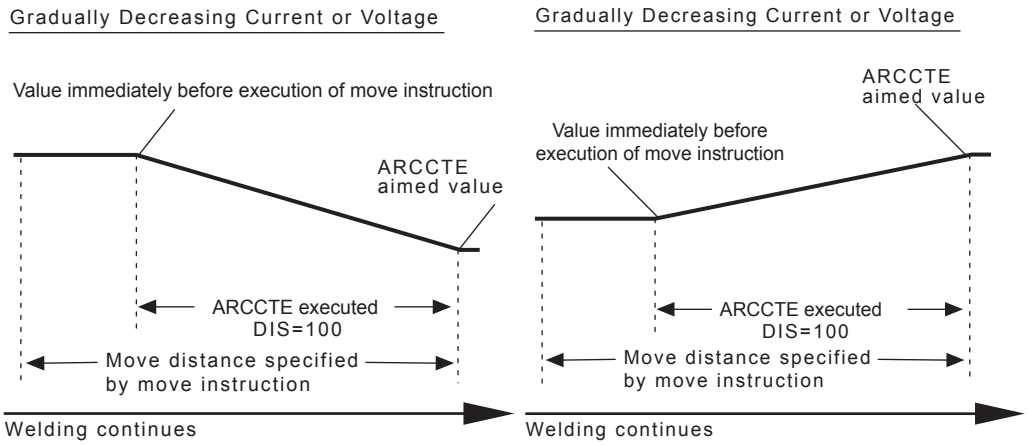
The following tag can be added or omitted.

No	Tag	Explanation	Note
8	DIS= Execution section	Specifies the execution section to change the current or the volt. The execution section is set up by the distance from the move start point. If there is no specified section, the whole move instruction will be target to be changed.	Interval: 0.0 to 6553.5 mm Variable B/I/D/B[]/I[]/D[]/LB/LI/LD/LB[]/LI[]/LD[]] can be used. (Units: 0.1 mm)

For details of the slope up/down function, refer to the “Operator’s Manual for the Arc Welding”.

Example

(1) ARCCTE AC=150 AV=16.0 DIS=100.0
MOVL V=80
To make the welding current =150A and arc voltage =16V, the current and the voltage are changed in the section of 100mm from the move end point.



(2) ARCCTE AC=150 AV=16.0 AN3=7.50 AN4=6.50 DIS=100.0
To make the welding current =150A, arc voltage =16V, aimed value =7.5V of the instruction voltage to analog output 3, and aimed value =6.5V of the instruction voltage to analog output 4, the current, the voltage, the analog output 3 and the analog output 4 are changed in the section of 100mm from the move end point.

2.8 Handling Instruction

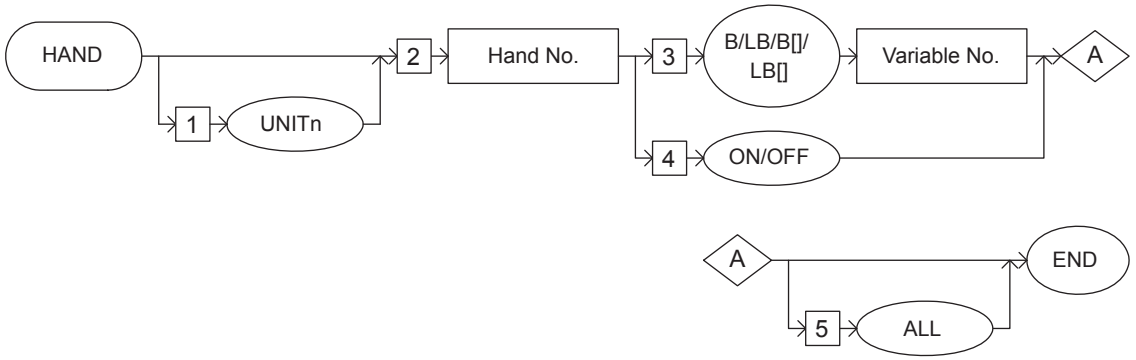
HAND

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Handling

Function

Turns the signal to the tool valve ON or OFF to control the tool.

Construction



Explanation

1. UNITn

Choose one of the tags from the Device. These tags are valid for a system with multiple applications in which two or more handling applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	UNITn	Specifies the Device No.	n: 1 to 8 UNIT1: Device 1

2. Hand number

Add the following tag.

No	Tag	Explanation	Note
2	Hand number	Specifies the hand number.	No.: 1 to 4 Variable B/I/D/LB/LI/LD can be used.

3. B Variable number/LB Variable number/B [Array number]/LB [Array number]/ON/OFF

Choose one of the tags from the following table.

No	Tag	Explanation	Note
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Refers the least significant bit of the specified byte type variable to specify the ON/OFF status of the signal to be sent to the tool valve.	Least significant bit: 0: OFF 1: ON
4	ON/OFF	Specifies the ON/OFF status of the signal to be sent to the tool valve.	

4. ALL

The following tag can be added or omitted.

No	Tag	Explanation	Note
5	ALL	Specifies the simultaneous control of Valve 1 and Valve 2.	Used when a 3P solenoid is used.

Example

HAND 1 OFF

Turns OFF the signal output to tool valve 1.

HSEN

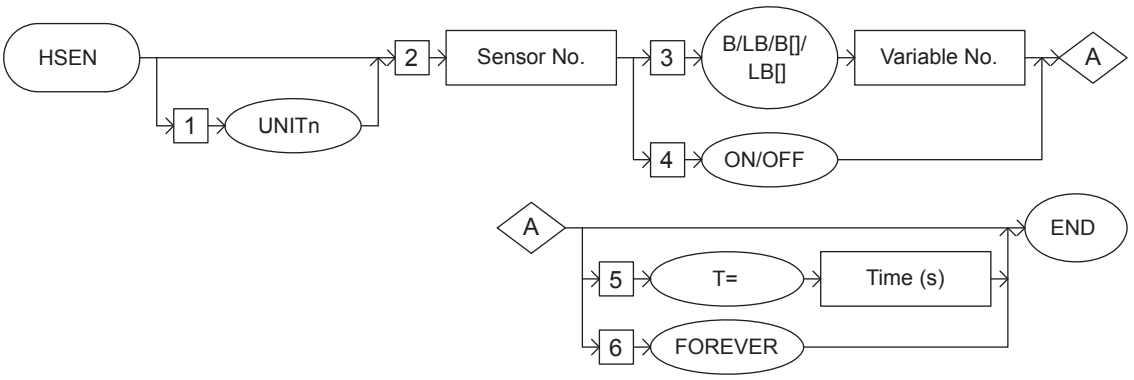
SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Handling

Function

Monitors the input status of the tool sensor. Stores the result in the system variable $B006.

SUPPLE -MENT For details of system variables, refer to GETS of *chapter 2.3 "Operating Instruction"* .

Construction



Explanation

1. UNITn

Choose one of the tags from the following table. These tags are valid for a system with multiple applications in which two or more handling applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	UNITn	Specifies the Device No.	

2. Sensor number

Add the following tag.

No	Tag	Explanation	Note
2	Sensor number	Specifies the sensor number.	No.: 1 to 8 Variable B/I/D/LB/LI/LD can be used.

3. B Variable number/LB Variable number/B [Array number]/LB [Array number]/ON/OFF

Choose one of the tags from the following table.

No	Tag	Explanation	Note
3	B Variable number/ LB Variable number/ B [Array number]/ LB [Array number]	Refers the least significant bit of the specified byte type variable to specify the ON/OFF status of the monitoring input status of the tool sensor.	Least significant bit: 0: OFF 1: ON
4	ON/OFF	Specifies the ON/OFF status of the monitor input of the tool sensor.	

4. T=Time/FOREVER

Choose one of the tags from the following table.

No	Tag	Explanation	Note
5	T=Time	Specifies the time for monitoring the input status.	Time: 0.01 to 655.35 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)
6	FOREVER	Specifies monitoring without a time limit.	

Example

HSEN 1 ON

Checks if sensor 1 is ON at the execution of an HSEN instruction and stores the result in the system variable $B006.
1 is stored in $B006 when sensor 1 is ON, 0 is stored when sensor 1 is OFF.

2.9 Spot Welding Instruction

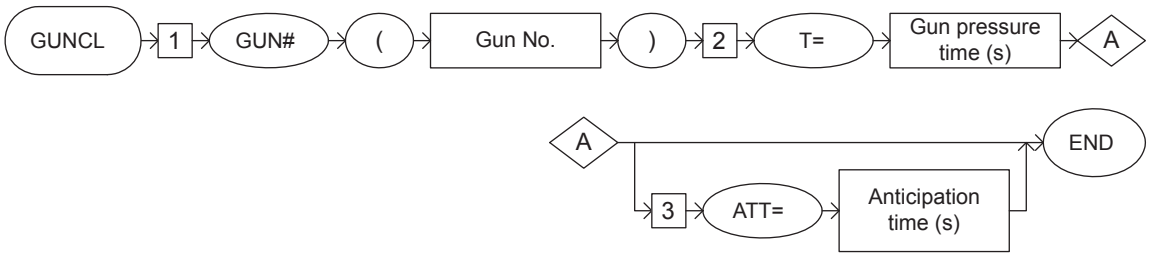
GUNCL

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Spot

Function

Applies pressure to the air gun.

Construction



Explanation

1. GUN# (Gun number)

Add the following tag.

No	Tag	Explanation	Note
1	GUN# (Gun number)	Specifies the number of the air gun to which pressure is applied.	No.: 1 to 8 Variable B/I/D/LB/LI/LD can be used.

2. T=Gun pressure time

Add the following tag.

No	Tag	Explanation	Note
2	T=Gun pressure time	Specifies the time during which the air gun is closed.	Time: 0.01 to 655.35 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)

3. ATT= Anticipation time

The following tag can be added or omitted.

No	Tag	Explanation	Note
3	ATT=Anticipaton time	Specifies the anticipation time for which the execution of the GUNCL instruction is advanced. The GUNCL instruction is carried out in advance for the specified time before reaching the step immediately before the GUNCL instruction. An NWAIT tag must be added to the move instruction of the step immediately before the GUNCL instruction.	Time: 0.00 to 655.35 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)

Example

```
MOVL V=1000 NWAIT                    ♦♦♦ Step 5
GUNCL GUN#(1) T=2.00 ATT=0.50
```

Turns ON the Gun 1 pressure signal 0.5 seconds before the manipulator reaches Step 5, and turns it OFF 2 seconds later (1.5 seconds after the manipulator reaches Step 5).

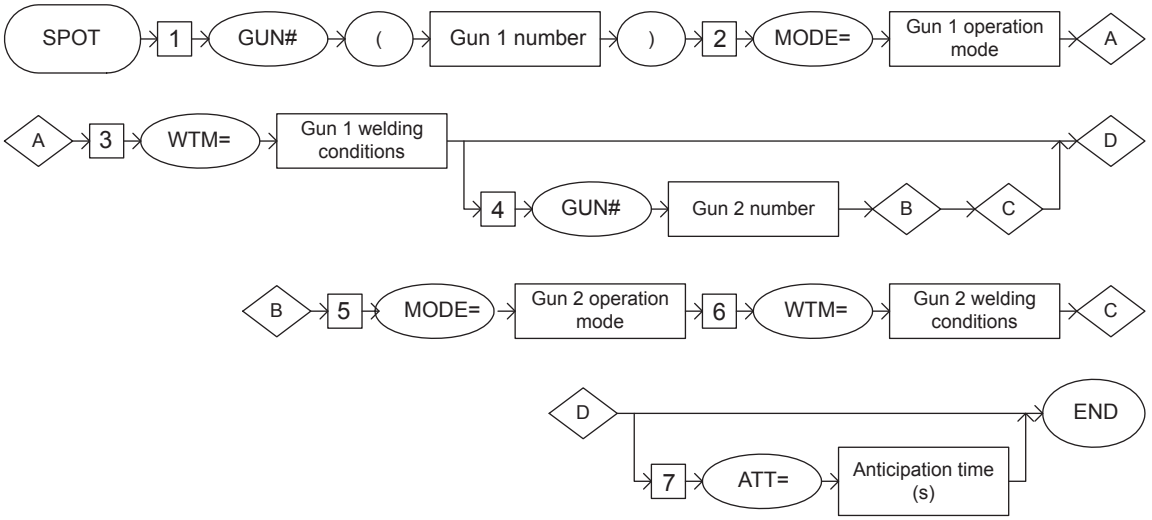
SPOT

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Spot

Function

Starts the welding sequence after pressure has been applied to the air gun.

Construction



Explanation

1. GUN# (Gun 1 number)

Add the following tag.

No	Tag	Explanation	Note
1	GUN# (Gun 1 number)	Specifies the number of the air gun to be used for welding. For a 2-gun system, specify the number of the first air gun.	No.: 1 to 8 Variable B/I/D/LB/LI/LD can be used.

2. MODE=Gun 1 operation mode

Add the following tag.

No	Tag	Explanation	Note
2	MODE=Gun 1 operation mode	Specifies the operation mode of the air gun. For a 2-gun system, specify the operation mode of the first air gun.	Mode: 0 to 4 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

SUPPLE-MENT

Gun operation mode

The following table lists the settings and their operation modes.
For a 2-step stroke gun, make the settings according to the open status before and after welding.

Setting	Before Welding → After Welding
0	Single gun
1	Short open → Short open
2	Short open → Full open
3	Full open → Short open
4	Full open → Full open

3. WTM=Gun 1 welding condition

Add the following tag.

No	Tag	Explanation	Note
3	WTM=Gun 1 welding condition	Specifies the welding condition number set for the welder. For a 2-gun welding system, set the welding condition number of the first air gun.	Condition No.: 1 to 255 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

4. GUN# (Gun 2 number)

The following tag can be added or omitted.

No	Tag	Explanation	Note
4	Gun 2 number	Specifies the number of the air gun used for welding. For a 2-gun welding system, specify the number of the second air gun.	No.: 1 to 8 Variable B/I/D/LB/LI/LD can be used.

5. MODE=Gun 2 operation mode

When a Gun 2 number (GUN#) is selected from the table in part 4 of this Explanation, add the following tag.

No	Tag	Explanation	Note
5	MODE=Gun2 operation mode	Specifies the operation mode of the air gun. For a 2-gun welding system, specify the operation mode of the second air gun.	Mode: 0 to 4 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

6. WTM=Gun 2 welding condition

When a Gun 2 number (GUN#) is selected from the table in part 4 of this Explanation, add the following tag after MODE=Gun 2 operation mode is selected from the table in part 5 of this Explanation.

No	Tag	Explanation	Note
6	WTM=Gun 2 welding condition	Specifies the welding condition number set for the welder. For a 2-gun welding system, specify the welding condition number for the second air gun.	Condition No.: 1 to 255 Variable B/B[]/LB/LB[]/I/I[]/LI/LI[]/D/D[]/LD/LD[] can be used.

7. ATT=Anticipation time

The following tag can be added or omitted.

No	Tag	Explanation	Note
7	ATT=Anticipation time	Specifies the anticipation time for which the execution of the SPOT instruction is advanced. The SPOT instruction is carried out in advance for the specified time before reaching the step immediately before the SPOT instruction. An NWAIT tag must be added to the move instruction of the step immediately before the SPOT instruction.	Time: 0.00 to 655.35 seconds Variable I/LI/I[]/LI[] can be used. (Units: 0.01 seconds)

Example

```
MOVL V=1000 NWAIT                    ♦♦♦ Step 5
SPOT GUN#(1) MODE=2 WTM=5 ATT=0.50
```

0.5 seconds before the manipulator reaches Step 5, the spot welding sequence starts from the moment the air gun is short open, and the air gun is full open after the sequence is completed. Then the manipulator carries out the next step.

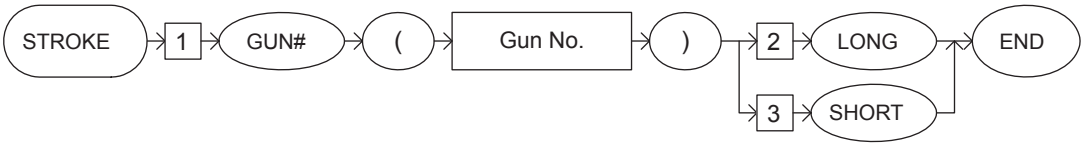
STROKE

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Spot

Function

Switches the open status of the 2-step stroke gun to/from Full open to/ from Short open when not welding.

Construction



Explanation

1. GUN# (Gun number)

Add the following tag.

No	Tag	Explanation	Note
1	Gun# (Gun number)	Specifies the number of the air gun whose open status is to be changed.	No.: 1 to 8 Variable B/I/D/LB/LI/LD can be used.

2. LONG/SHORT

Choose one of the tag from the following table.

No	Tag	Explanation	Note
2	LONG	Specifies Full open.	
3	SHORT	Specifies Short open.	

Example

```
MOVL V=1000 NWAIT        ♦♦♦ Step 5
STROKE GUN#(1) LONG
```

When the manipulator reaches Step 5, the stroke is changed to Full open to avoid interference, and then the manipulator moves to the next step.

STRWAIT

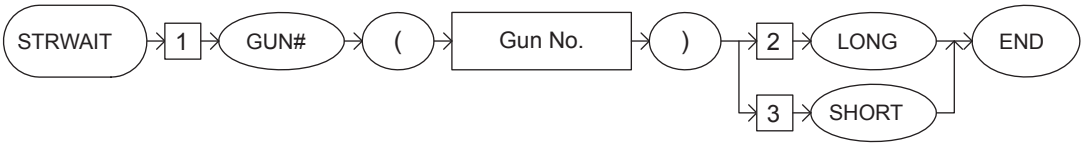
SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	Spot

Function

Confirms the specified open status of a 2-step stroke gun as short open or full open when not welding.

Wait until the signal of the specified open status, short open or full open, is turned ON.

Construction



Explanation

1. GUN# (Gun number)

Add the following tag.

No	Tag	Explanation	Note
1	GUN# (Gun number)	Specify the number of the air gun whose open status is to be confirmed.	No.: 1 to 8 Variable B/I/D/LB/LI/LD can be used.

2. LONG/SHORT

Choose one of the tags from the following table.

No	Tag	Explanation	Note
2	LONG	Specify Full open.	
3	SHORT	Specify Short open.	

Example

```
MOVL V=1000 NWAIT      ♦♦♦ Step 5
STROKE GUN#(1) LONG
STRWAIT GUN#(1) LONG
```

When the manipulator reaches Step 5, the open status changes to Full open, and the manipulator confirms the Full open status before moving to the next step.

2.10 General-purpose Instruction

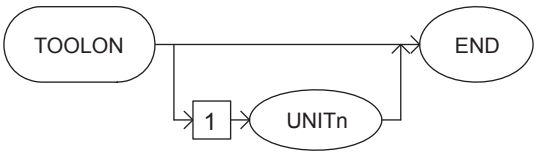
TOOLON

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	General-purpose

Function

Turns ON the work instruction.

Construction



Explanation

1. UNITn

Choose one of the tags from the unit. These tags are valid for a system with multiple applications in which two or more general-purpose applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	UNITn	Specifies the unit.	n: 1 to 8 UNIT1: UNIT1

Example

(1) TOOLON

Turns ON the work instruction.
Turns ON the work start instruction (dedicated output relay #51530) and waits for the work start response (dedicated input relay #41130). When the work start response is turned ON, the next instruction is carried out.
The work start response relay is designed to turn ON immediately after the output of the work start instruction.

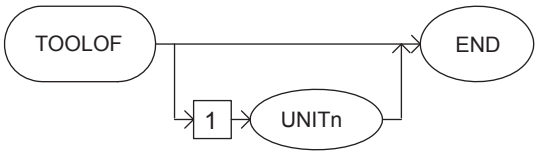
TOOLOF

SUBSET	STANDARD	EXPANDED	APPLICATIONS
Available	Available	Available	General-purpose

Function

Turns OFF the work instruction.

Construction



Explanation

1. UNITn

Choose one of the tags from the unit. These tags are valid for a system with multiple applications in which two or more general-purpose applications are included. These tags are not displayed when there is only one application.

No	Tag	Explanation	Note
1	UNITn	Specifies the Unit.	n: 1 to 8 UNIT1: UNIT1

Example

(1) TOOLOF

Turns OFF the work instruction.
Turns ON the work end instruction (dedicated output relay #51531) and waits for the work end response (dedicated input relay #41131). When the work end response is turned ON, the next instruction is carried out.
The work end response relay is designed to turn ON immediately after the output of the work end instruction.

2.11 Painting Instruction

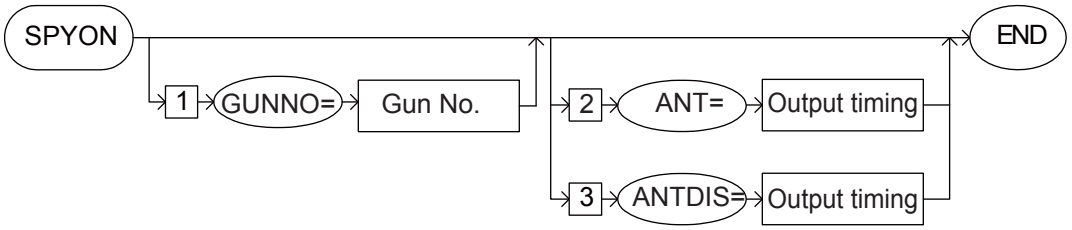
SPYON

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Starts painting.

Construction



Explanation

1. Gun number

The following tag can be added or omitted.

Gun number 1 will be set, if the setting is not specified,

No.	Tag	Explanation	Note
1	Gun number	Specifies the gun.	No.: 1 to 4

2. Output timing (Time)

The following tag can be added or omitted.

0 second will be set, if the setting is not specified,

No.	Tag	Explanation	Note
2	Output timing (Time)	Specifies the anticipation time with seconds.	Time: -327.68 to 327.67 (Units: second)

3. Output timing (Destination)

The following tag can be added or omitted.

0 mm will be set, if the setting is not specified,

No.	Tag	Explanation	Note
2	Output timing (Destination)	Specifies the anticipation destination with mm.	Time: -3276.8 to 3276.7 (Units: mm)

Example

1. SPYON GUNNO = 1
   Turns on the work output signal of the specific output for the gun1.
2. SPYON ANT = 0.5
   Turns on the work output signal of the specific output for the gun1 in 0.5 seconds.
3. SPYON ANTDIS = 0.5
   Turns on the work output signal of the specific output for the gun1 at the position progressed 0.5mm after the step.

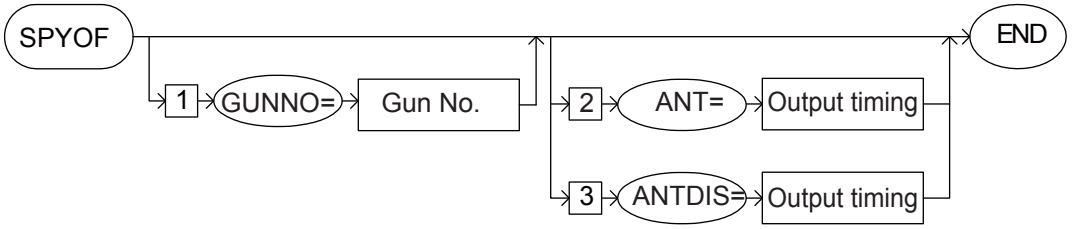
SPYOF

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Finishes painting.

Construction



Explanation

1. Gun number

The following tag can be added or omitted.

Gun number 1 will be set, if the setting is not specified,

No.	Tag	Explanation	Note
1	Gun number	Specifies the gun.	No.: 1 to 4

2. Output timing (Time)

The following tag can be added or omitted.

0 second will be set, if the setting is not specified,

No.	Tag	Explanation	Note
2	Output timing (Time)	Specifies the anticipation time with seconds.	Time: -327.68 to 327.67 (Units: second)

3. Output timing (Destination)

The following tag can be added or omitted.

0 mm will be set, if the setting is not specified,

No.	Tag	Explanation	Note
2	Output timing (Destination)	Specifies the anticipation destination with mm.	Time: -3276.8 to 3276.7 (Units: mm)

Example

1. SPYOF GUNNO = 1
   Turns off the work output signal of the specific output for the gun1.
2. SPYOF ANT = 0.5
   Turns off the work output signal of the specific output for the gun1 in 0.5 seconds.
3. SPYOF ANTDIS = 0.5
   Turns off the work output signal of the specific output for the gun1 at the position progressed 0.5mm after the step.

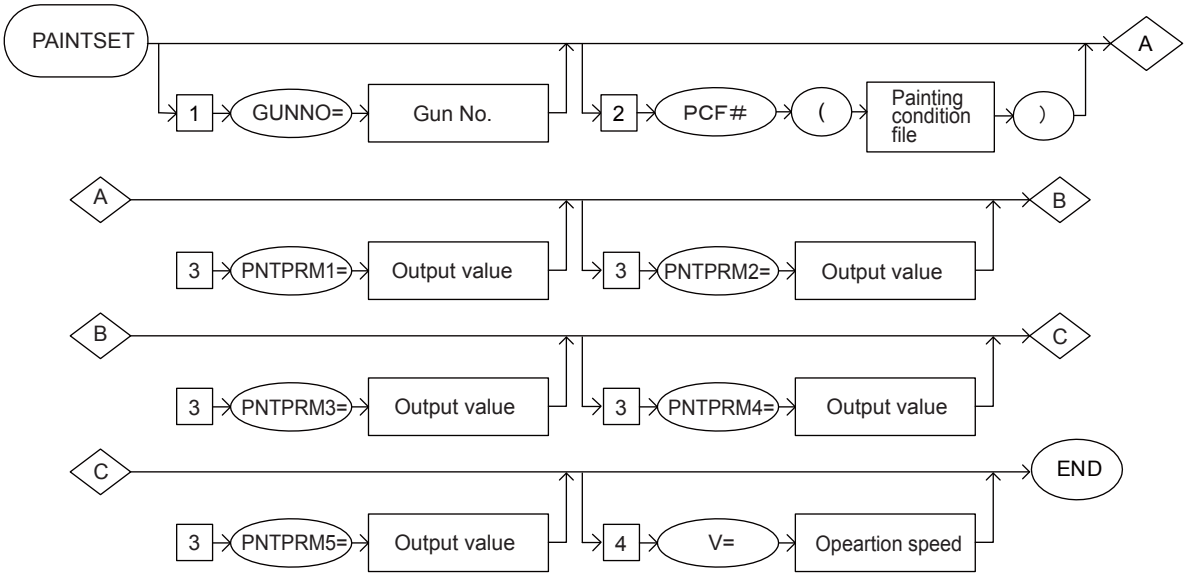
PAINTSET

SUBSET	STANDARD	EXPANDED
available	Available	Available

Function

Sets the painting condition on the paint controller.

Construction



Explanation

1. Gun number

The following tag can be added or omitted.

Gun number 1 will be set, if the setting is not specified,

No.	Tag	Explanation	Note
1	Gun number	Specifies the gun.	No.: 1 to 4

2. Painting condition file

The following tag can be added or omitted.

The output value set in the painting condition file is output to the specified output destination.

The setting value of the output value will be output to the specified destination, if the setting is not specified.

No.	Tag	Explanation	Note
2	Painting condition file	Specifies the painting condition file.	No.: 1 to 255

3. Output value

The following tag can be added or omitted.

The setting value of the output value is output to the specified destination.

No.	Tag	Explanation	Note
3	Output value	Specifies the output value to be set on the paint control panel.	Output value: 0 to 65535

4. Painting speed

The following tag can be added or omitted.

No.	Tag	Explanation	Note
4	Painting speed	Specifies the painting speed of the robot to paint.	Speed: 0.1 to 1500.0 (Unit: mm/sec)

The output condition will not change if the painting file number and the output value are omitted.

The output value set in the painting condition file will be overwritten with the output value set, when the painting file number and the output value are being used.

Example

1. PAINTSET GUNNO = 1 PCF# (1)
   The value which is set for the painting condition file1 of the gun1 is output to the specified destination.
2. PAINTSET GUNNO = 1 PCF#(1) PNTPRM1 = 1000
   The PNTPRM1 outputs the output value 1000 to the specified output destination.
   PNTPRM2 to 5 output the output value which is set in the painting condition file1 of the gun1 to the specified output destination.

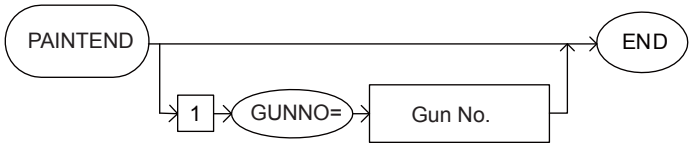
PAINTEND

SUBSET	STANDARD	EXPANDED
Available	Available	Available

Function

Sets OFF (0 output) the painting condition output on the paint controller.

Construction



Explanation

1. Gun number

The following tag can be added or omitted.

Gun number 1 will be set, if it is not specified,

No.	Tag	Explanation	Note
1	Gun number	Specifies the gun.	No.: 1 to 4

Example

1. PAINTEND GUNNO = 1
   Set OFF (0 output) the painting condition output of the output destination which is specified in the gun1.

DX200 OPTIONS
INSTRUCTIONS
FOR INFORM LANGUAGE

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