FS100
OPERATOR’S MANUAL
FOR LADDER EDITOR

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

MOTOMAN INSTRUCTIONS
- MOTOMAN-□□□ INSTRUCTIONS
- FS100 INSTRUCTIONS
- FS100 OPERATOR’S MANUAL
- FS100 MAINTENANCE MANUAL

Part Number: 159653-1CD
Revision: 0
MANDATORY

• This manual explains the ladder editing program of the FS100 system. Read this manual carefully and be sure to understand its contents before handling the FS100.

• General items related to safety are listed in Chapter 1: Safety of the FS100 Instructions. To ensure correct and safe operation, carefully read the FS100 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 FS100.

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

**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.

---

**NOTE**

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

• Before operating the manipulator, check that servo power is turned off when the emergency stop button on the programming pendant is 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

• In the case of not using the programming pendant, be sure to supply the emergency stop button on the equipment. Then before operating the manipulator, check to be sure that the servo power is turned OFF by pressing the emergency stop button. Connect the external emergency stop button to the 5-6 pin and 16-17 pin of the robot system signal connector (CN2).

• Upon shipment of the FS100, this signal is connected by a jumper cable in the dummy connector. To use the signal, make sure to prepare a new connector, and then input it.

If the signal is input with the jumper cable connected, it does not function, which may result in personal injury or equipment damage.

• 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 EM

• Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  – View the manipulator from the front whenever possible.
  – Always follow the predetermined operating procedure.
  – Ensure that you have a safe place to retreat in case of emergency.

Improper or unintended manipulator operation may result in injury. The emergency stop button is located on the programming pendant.
Definition of Terms Used Often in This Manual

The MOTOMAN is the YASKAWA industrial robot product.

The MOTOMAN usually consists of the manipulator, the FS100 controller, manipulator cables, the FS100 programming pendant (optional), and the FS100 programming pendant dummy connector (optional).

In this manual, the equipment is designated as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS100 controller</td>
<td>FS100</td>
</tr>
<tr>
<td>FS100 programming pendant</td>
<td>Programming pendant</td>
</tr>
<tr>
<td>Cable between the manipulator and the controller</td>
<td>Manipulator Cable</td>
</tr>
<tr>
<td>FS100 programming pendant dummy connector</td>
<td>Programming pendant dummy connector</td>
</tr>
</tbody>
</table>
Descriptions of the programming pendant keys, buttons, displays and keyboard of the PC are shown as follows:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Manual Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programming Pendant</td>
<td>Character Keys: The keys which have characters printed on them are denoted with [ ].</td>
</tr>
<tr>
<td></td>
<td>ex. [ENTER]</td>
</tr>
<tr>
<td>Symbol Keys</td>
<td>The keys which have a symbol printed on them are not denoted with [ ] but depicted</td>
</tr>
<tr>
<td></td>
<td>with a small picture.</td>
</tr>
<tr>
<td></td>
<td>ex. PAGE key</td>
</tr>
<tr>
<td></td>
<td>The Cursor is an exception, and a picture is not shown.</td>
</tr>
<tr>
<td>Axis Keys</td>
<td><em>Axis Keys</em> and <em>Numeric Keys</em> are generic names for the keys for axis operation and</td>
</tr>
<tr>
<td>Numeric Keys</td>
<td>number input.</td>
</tr>
<tr>
<td>Keys pressed simultaneously</td>
<td>When two keys are to be pressed simultaneously, the keys are shown with a &quot;+&quot;</td>
</tr>
<tr>
<td></td>
<td>sign between them.</td>
</tr>
<tr>
<td></td>
<td>ex. SHIFTkey +COORD key</td>
</tr>
<tr>
<td>Mode Key</td>
<td>Three kinds of modes that can be selected by the mode key are denoted as follows:</td>
</tr>
<tr>
<td></td>
<td>REMOTE, PLAY, or TEACH</td>
</tr>
<tr>
<td>Button</td>
<td>Three buttons on the upper side of the programming pendant are denoted as follows:</td>
</tr>
<tr>
<td></td>
<td>HOLD button</td>
</tr>
<tr>
<td></td>
<td>START button</td>
</tr>
<tr>
<td></td>
<td>EMERGENCY STOP button</td>
</tr>
<tr>
<td>Displays</td>
<td>The menu displayed in the programming pendant is denoted with { }.</td>
</tr>
<tr>
<td></td>
<td>ex. {JOB}</td>
</tr>
<tr>
<td>PC Keyboard</td>
<td>The name of the key is denoted</td>
</tr>
<tr>
<td></td>
<td>ex. Ctrl key on the keyboard</td>
</tr>
</tbody>
</table>

**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 the SELECT key is pressed, or that the item is directly selected by touching the screen.

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1 Editing Ladder Programs

1.1 Flow of Data by Ladder Programs

Flow of data in editing, storage, and execution areas by operation of ladder program is shown below.

- Only the user ladder program can be edited. The system ladder program cannot be edited.
- When the system ladder program is changed, the ladder program from the external memory unit cannot be loaded.
- If control power is shut down while the ladder program is being edited, the edited ladder program is lost. The intact program remains in the execution area.
- During editing of ladder programs, “EDITING” is indicated on the upper right of the user section display. This indication appears only when the program in the editing area and that in the execution area do not match. No indication will be displayed after compilation of cancellation of editing when the programs in the two areas match.
1.2 Editing by Mnemonic and Editing Program

The editing operations for ladder programs are two ways as follows.

1. Editing by Mnemonic Codes
   - Ladder programs can be edited in mnemonic codes as shown below.

2. Editing by Editing Program
   - Ladder programs can be edited with the image of ladders as shown in the window below.
1.3 Ladder Editor Window

1.3.1 Basic Operation

The Ladder Editor consists of Ladder View window and Ladder Editing window.

The ladders to be edited are selected in the Ladder View window.

Ladder programs are edited in the Ladder Editing window.

1. Select {IN/OUT} under the main menu.
2. Select {LADDER EDITOR}.

– The view window of the User Ladder appears.
3. Move the cursor to the ladder program to be edited.
   - The selected one row appears in the Ladder Editing window.

4. Edit Operation.
   - For each editing operation, see chapter 1.3.3 “Editing Operation of Ladder Editing Window” at page 1-12 on the following pages. The system ladder section cannot be edited.

5. Move the cursor to the menu pressing area key .
6. Select {EDIT}.
7. Select {SAVE RUNG (OVERWRITE)}.
   - Returns to the view window of the User Ladder section.
8. Select {EDIT}.
9. Select {COMPILE}.

- The edited ladder program is checked for syntax error. If no error is found, the new program is written into the execution area to run. If any error is found in the edited ladder program, the erroneous step is identified. In this case, the program stored in the execution area remains unchanged.

• Ladder operation and editing are prohibited depending on FS100 security level as listed in the following table.

<table>
<thead>
<tr>
<th>Security Level</th>
<th>Operational Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>Referring to ladder diagram, monitoring signals</td>
</tr>
<tr>
<td></td>
<td>(Operation and editing of ladders are not allowed.)</td>
</tr>
<tr>
<td>Editing</td>
<td>Referring to ladder diagram, monitoring signals, editing and operating user ladders.</td>
</tr>
<tr>
<td>Management</td>
<td>Referring to ladder diagram, monitoring signals, editing and operating user ladders.</td>
</tr>
</tbody>
</table>

• Cursor key operation on Ladder View window. The cursor moves up/down line by line each time the up/down cursor key is pressed. The cursor moves up/down five lines at a time each time [SHIFT] + up/down cursor keys are pressed.
1 Editing Ladder Programs

1.3 Ladder Editor Window

- **Ladder View Window**
  The Ladder View window consists of the ladder view and menu. The position of a cursor in the window switches every pressing [AREA] as shown in the following pictures.

- **Ladder Editing Window**
  The Ladder Editing window consists of the ladder editing, menu, and instruction menu. The position of a cursor in the window switches every pressing [AREA] as shown in the following pictures.
1.3.2 Editing Operation of Ladder View Window

The Ladder View window allows to insert new rungs, and cut (copy) and paste rungs.

1.3.2.1 Insert New Rungs

The following explains the insertion of new rungs. Perform appropriate ladder editing as a default value is already set for the rung to be inserted.

A new rung is inserted after the rung where a cursor locates in the Ladder View window.

1. Move the cursor to the rung to be inserted.
2. Move the cursor to the menu pressing area key.
3. Select (EDIT).
4. Select (INSERT NEW RUNG)
   - New rung (input: #20010 - output: #30010) is inserted under the rung where a cursor locates.
1.3.2.2 Cut (Copy) and Paste Rungs

1. Selecting Subject Rungs

Subject rungs for cut and copy can be specified as follows.

1. Move the cursor to the rung where selection starts.

2. Press [SHIFT] + [SELECT].
   – Start on a multiple rung selection.

3. Move the cursor to the last rung to be selected.

Press [CANCEL] to release the multiple rung selection status during the multiple selection.
2. Copy and Paste Rungs

This function allows to copy and paste ladders.

1. Move the cursor to the menu pressing area key.
2. Select {EDIT}.
3. Select {COPY}.
4. Move the cursor to the rung position in which the copied rung is pasted.
5. Move the cursor to the menu pressing area key.
6. Select {EDIT}. 
7. Select {INSERT PASTE RUNG}.
- The copied rung is inserted under the cursor position.

![Image of a ladder program editor window showing the insertion of a rung]

3. Cut (Copy) and Paste Rungs
This function allows to cut (copy) and paste rungs.

1. Move the cursor to the menu pressing area key.
2. Select {EDIT}.
3. Select {CUT RUNG}.
4. Move the cursor to the rung position in which the cut rung is pasted.
5. Move the cursor to the menu pressing area key.
6. Select {EDIT}.
7. Select {INSERT PASTE RUNG}.
1.3.3 Editing Operation of Ladder Editing Window

The Ladder Editing window allows registration of instructions (including adding, changing, and deleting instructions), operands editing, and other operations such as inserting and deleting rows and columns.

1.3.3.1 Inserting and Changing Instructions

1. Selecting and Pasting Instructions

1. Move the cursor to the instruction menu pressing area key .
2. Select an instruction to be added under the instruction menu.

- The following instructions are ready to be selected under the instruction menu.

  ![Instruction Menu]

  (RELAY): STR (A contact), NOT (B contact), GRP (GSTR-GOUT), TMR, CNT, OUT, PLS, PLF
  (CALC): ADD, SUB, MUL, DIV, MOD
  (LOGIC): WAND, WOR, WXOR, WNOT, MOV
  (SHIFT): SHL, SHR, ROL, ROR
  (BCD): BIN, BCD

- For details on each instructions, refer to “12.2 Instruction Description” in the FS100 Concurrent I/O.

3. Move the cursor to the pasting position of the detailed window, then select it.
1 Editing Ladder Programs

1.3 Ladder Editor Window

- Paste the instruction selected under the instruction menu.

2. Input Value

1. Move the cursor to the instruction menu pressing area key. 
2. Select {INPUT}.

---

Select

---
3. Select {INPUT VALUE}.

4. Input values.
   - Move the cursor to the instruction to which the value is input, then select it.
   - Input the value when the following dialog box appears.

5. Press [ENTER].
   - The value is registered.
3. **Connect Instructions**

1. Move the cursor to the instruction menu pressing area key.

2. Select **(OPERATION)**.

3. Select **(CANCEL MODE)**.

4. Connect instructions.
   - Move the cursor to the starting position of the connection, then select it.
– Move the cursor to the end position of the connection, then select it.
  The selected instructions are connected.

- The selected mode can be cancelled by pressing [CANCEL] instead of following the procedures 1 to 3 of "3. Connect Instructions" described above.

- Connecting instructions of OR circuit in the same column can be achieved by:
  Front connection (instructions connected in the order of upper instruction to lower instruction).
  Rear connection (instructions connected in the order of lower instruction to upper instruction).
1.3.3.2 Delete Instructions

1. Move the cursor to the instruction menu pressing area key .
2. Select {DELETE}.
3. Select {DELETE INSTRUCTIONS}.
4. Move the cursor to the instruction to be deleted, then select it.
5. The instruction is deleted.
The following explains how to insert a new instruction between the instructions already set when editing ladders. The function "INSERT COLUMN" allows to shift all the columns behind the designated cursor position by one column at a time.

1. Move the cursor to the instruction menu pressing area key.
2. Select {INSERT}.
3. Select {INSERT COLUMN}.
4. Move the cursor to the column to which the new column is inserted, then select it.
   - A new column is inserted.
Insertion of column is invalid if there is an instruction in the column “08” as shown below.

Insertion of column is invalid when there is an instruction in this row.
1. Move the cursor to the instruction menu pressing area key.

2. Select {INSERT}.

3. Select {INSERT ROW}.

4. Move the cursor to the row to which a new row is inserted, then select it.

   – A new row is inserted.
Insertion of row is invalid if there is an instruction in the row “07” as shown below.
1.3.3.5 Delete Columns

1. Move the cursor to the instruction menu pressing area key.

2. Select {DELETE}.

3. Select {DELETE COLUMN}.

4. Move the cursor to the column to be deleted, then select it.
   - The selected column is deleted.
1.3.6 Delete Rows

1. Move the cursor to the instruction menu pressing area key.
2. Select {DELETE}.
3. Select {DELETE ROW}.
   - The selected row is deleted.
1.3.3.7  Undo and Redo

Use these functions when restoring the editing ladders to the status immediately before the operation.

1. **Undo**
   1. Move the cursor to the instruction menu pressing area key .
   2. Select {EDIT}.
   3. Select {UNDO}.
      - Cancel the last editing operation.
2. Redo

1. Move the cursor to the instruction menu pressing area key.
2. Select {EDIT}.
3. Select {REDO}.
   – Cancel the last “UNDO” operation.

– The following is an example of displays showing [UNDO]/[REDO] operations when pasting the ladder instructions.
1.3.3.8 Clear Rungs

This function allows to clear rungs of the Ladder Editing window on the edit. Use this function when re-editing the current status of the Ladder Editing window from the beginning.

1. Move the cursor to the instruction menu pressing area key .
2. Select {EDIT}.
3. Select {CLEAR RUNG}.
   – The rungs of the edit window are all cleared.
1.3.3.9 Save Edited Ladders

The followings explain how to save (overwrite/insert) or cancel the edited ladders of the Ladder Edit window. After saving or canceling, the display returns to the Ladder View window.

1. **Save (Overwrite)**
   1. Move the cursor to the instruction menu pressing area key [ ].
   2. Select {EDIT}.
   3. Select {SAVE (OVERWRITE)}.
      – The edited ladders are saved/overwritten, then the display returns to the Ladder View window.

2. **Save (Insert)**
   1. Move the cursor to the instruction menu pressing area key [ ].
   2. Select {EDIT}.
   3. Select {SAVE (INSERT)}.
      – The edited ladder is inserted under the selected rung, then the display returns to the Ladder View window.
3. Cancel

1. Move the cursor to the instruction menu pressing area key [AREA].
2. Select {OPERATION}.
3. Select {CANCEL}.
   – The status of the display returns to the one before edited, the Ladder View window appears.
   (The editing operation of the Ladder Edit window is not reflected.)
Use the following steps to compile ladder programs after editing.

1. Move the cursor to the instruction menu pressing area key .
2. Select {EDIT}.
3. Select {COMPILE}.

– The ladder program starts compiling.
The edited ladder program is checked for syntax errors. If no error is found, the new program is saved as a new executing program to run. If any error is found in the edited ladder program, the error message appears on the window. In this case, the executing program remains unchanged.
1.3.5 Search

The search operation is available only in the Ladder View window when editing and confirming programs.

1.3.5.1 Go to the First Rung / Last Rung

These functions allow to go to the first or last rung of the ladder program.

- **1. Go to the First Rung**
  1. Move the cursor to the instruction menu pressing area key.
  2. Select {DISPLAY}.
  3. Select {GO TO FIRST RUNG}.
     - Goes to the first rung of the ladder program.

- **2. Go to the Last Rung**
  1. Move the cursor to the instruction menu pressing area key.
  2. Select {DISPLAY}.
  3. Select {GO TO LAST RUNG}.
     - Goes to the last rung of the ladder program.
1.3.5.2 Go to Rung

This function allows to go to the designated line number.

1. Move the cursor to the instruction menu pressing area key. 
2. Select {EDIT}.

3. Select {GO TO RUNG}.
   - The following dialog box appears. Enter the line number, then press [ENTER] key. The cursor goes to the destination line number.
1.3.5.3 Find Value

This function allows to search values such as relay, register, and decimal numbers, then go to the ladders where the searched values are used.

1. Move the cursor to the instruction menu pressing area key .
2. Select {EDIT}.
3. Select {FIND VALUE}.
   - The dialog box to enter values appears. Enter the relay number to refer to, then press [ENTER]. The cursor goes to the destination ladder in use.

The values can be designated by kinds.
- Relay: Relay Number (#xxxxx)
- Register: Register Number (Mxxx)
- Constant: Decimal Number
1 Editing Ladder Programs

1.3 Ladder Editor Window

The functions “FIND BACKWARD” and “FIND FORWARD” are available only for the search-value operation.

1. Select {EDIT} after finding values.
2. Select (FIND BACKWARD/FIND FORWARD).

1.3.5.4 Find Forward

This function allows to find the designated value forward from the current line, that is searching toward the bigger line numbers than the current line number.

The retrieval object data for “FIND BACKWARD” or “FIND FORWARD” functions is the value set by “FIND VALUE” function.

The value of the retrieval object remains unchanged unless the new value is entered by “FIND VALUE” function.

This function allows to grasp where and how the value is used easily.
1.3.5.5 Find Output Relays

This function allows to find relay numbers set for output instructions of the ladder program.

1. Move the cursor to the instruction menu pressing area key .
2. Select {EDIT}.

3. Select {FIND OUTPUT RELAYS}.
   - The dialog box to enter values appears. Enter the relay number to refer to, then press [ENTER]. The cursor goes to the destination ladder in use.
1.3.6 Other Functions

1.3.6.1 Header Information

1. Move the cursor to the instruction menu pressing area key .

2. Select {DISPLAY}.

3. Select {HEADER INFORMATION}.

- The Header Information dialog window appears.

- The Header Information dialog box consists of the followings:
  
  **NAME:**
  Indicates ladder names. (The ladder names cannot be edited.)

  **SYSTEM REGISTER**
  Sets the initial value for the system register.
  The register numbers to be allocated are as follows:

<table>
<thead>
<tr>
<th>Register Numbers</th>
<th>System Register Numbers in the Header Information Dialog Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>M920 to 924</td>
<td>920</td>
</tr>
<tr>
<td>M925 to 929</td>
<td>925</td>
</tr>
<tr>
<td>M930 to 934</td>
<td>930</td>
</tr>
<tr>
<td>M935 to 939</td>
<td>935</td>
</tr>
</tbody>
</table>
1.3.6.2 Instruction Use Table

Various relay numbers are used when editing ladder programs. The other two or more lines may use the currently used relay number. Refer to this instruction when grasping use status of the relay number by other lines.

1. Move the cursor to the menu pressing area key. 
2. Select {DISPLAY}.
3. Select {INSTRUCTION USE TABLE}.

– The dialog box to enter values appears. Enter the value to refer to, then press [ENTER].

The values can be designated by kinds.
Relay : Relay Number (#xxxxx)
Register: Register Number (Mxxx)
Constant: Decimal Number

– The dialog box of Instruction Use Table appears.
The dialog box of the Instruction Use Table consists of the followings.

- **Relay, Registration or Constant:**
  The value is a retrieval object. Usually one item of the value is indicated, but two or more items are indicated for special occasions. In this case, choose one target value.

- **Instruction Type Tree:**
  The diagram indicates the ladder instructions. The line numbers indicated in the “Rungs Containing Item” can be limited by selecting items from this tree diagram.

  For example, when selecting “STR” in Instruction Type Tree, only the line numbers using the relay number set to “STR” instruction are indicated in the matrix of Rungs Containing Item.

- **Rungs Containing Item:**
  Indicates the line numbers using the value selected in “Relay, Registration or Constant”. The numbers currently used are indicated in the following colors.

  Red: Used in the system ladder program.
  Blue: Used in the user ladder program.
Various relay numbers are used when editing ladder programs. Refer to this instruction when finding which line uses the currently used relay number or finding unused relay numbers.

1. Move the cursor to the menu pressing area key .
2. Select {DISPLAY}.

3. Select {RELAY USE TABLE}.
   – The Relay Use Table dialog box appears.
The Relay Use Table dialog consists of the followings.

- **Use Status Matrix:**
  - The used relay numbers are indicated in the following colors.
  - Red: Used in the system ladder program.
  - Blue: Used in the user ladder program.
  - Purple: Used both in the system and user ladder programs.
  
  One cell of the vertical axis in the matrix indicates ten relay numbers as one unit (numbers above the digit of 10).
  Whereas one cell of the horizontal axis in the matrix indicates the digit of 1 of the relay number.

  When selecting the colored cell in the matrix, the list of the line numbers using the designated relays is indicated in the “Line No. Using the Relay” box.

- **The 1st Digit**
  - The use status is indicated in 10,000 numbers as one unit in the use status matrix. Select the 1st digit of the relay number you wish to indicate from the “1st Digit” box.

- **Enter Number**
  - Enter the relay number, then press {SEARCH}. The designated relay number is indicated in the use status matrix.

- **Used in Rung(s)**
  - Line numbers using the relay are indicated with following line information of the ladder programs.

  ![Diagram](image)

  It might take time to display the dialog box when the number of radder program step is big.
1.3.6.4 Register Specification List

Various relay numbers are used when editing ladder programs. Refer to this instruction when finding which line uses the currently used relay number or finding unused relay numbers.

1. Move the cursor to the menu pressing area key.
2. Select (DISPLAY).
3. Select (RELAY USE TABLE).
   – The Relay Use Table dialog box appears.
– The Relay Use Table dialog consists of the followings.

• Use Status Matrix:
  The used relay numbers are indicated in the following colors.
  Red: Used in the system ladder program.
  Blue: Used in the user ladder program.
  Purple: Used both in the system and user ladder programs.

One cell of the vertical axis in the matrix indicates ten relay numbers as one unit.
Whereas one cell of the horizontal axis in the matrix indicates the digit of 1 of the relay number.
When selecting the colored cell in the matrix, the list of the line numbers using the designated relays is indicated in the “Used Rungs” box.

• The 1st Digit
  The use status is indicated in 100 numbers as one unit in the use status matrix. Select the 1st digit of the relay number you wish to indicate from the “1st Digit” box.

• Enter Number
  Enter the relay number, then press {SEARCH}. The designated relay number is indicated in the use status matrix.

• Used in Rung(s)
  Line numbers using the relay are indicated with following line information of the ladder programs.

S:0008  TMR
  Ladder Instruction
  Line No.
  S..System Section
  U..User Section
1.3.6.5 Mnemonic Display

This function allows to indicate one line of the designated ladder program in mnemonic codes.

1. Move the cursor to the ladder to be indicated in mnemonic codes.

2. Move the cursor to the menu pressing area key.

3. Select {DISPLAY}.

4. Select {DISPLAY MNEMONIC}.
   - The mnemonic code dialog appears.
1.3.6.6 Open Relay Label File

This function allows to display relay/register names.

1. Copy the name file (*.NAM) created with the Ladder Editor (off-line edition) to a CompactFlash card.
2. Insert the CompactFlash card into the slot on the programming pendant.
3. Select {Option}.
4. Select {Open Relay Label File}.

The relay/register names are displayed.
• Store the name file (*.NAM) in the root directory of the CompactFlash card.

• The Ladder Editor displays the abbreviated name (composed of up to 8 one-byte characters) of the name file (*.NAM) for relay/register name indication. Note, however, that it will read the name file of which file name and the header information are the same.

  File name: [STANDARD.NAM]

• The relay/register names will be automatically displayed if a CompactFlash card containing the name file is already in the slot of the programming pendant when the Ladder Editor starts running.

• To make the names invisible, select {Option}, then {Hide Relay Name} from the menu. To make the names visible again, select {Option}, then {Show Relay Name}. 
This function allows editing operations of a relay/register name.

1. Move the cursor to the subject rung for name registration of relay/register, and press [SELECT].

2. Select {Input}.

3. Select {Input Name}.
4. Enter a label and comments.
   
   – Move the cursor to the subject instruction for label/comments entry, and press [SELECT].

   – A dialog box Edit Labels and Comments appears.
5. Select {Character Input}.
   - A software keypad window appears. For the details on operation, refer to "1.2.6 Character Input" explained in "FS100 OPERATOR’S MANUAL" (application-specific).

6. Complete input operation.
   - The input characters will be registered as "Label" in the Edit Labels and Comments dialog box upon the completion of input operation.
7. Click on the (Update) button.

- The input characters will be registered as "Label" in the Edit Labels and Comments dialog box upon the completion of input operation.

• Display or editing operation of the relay/register names with the Ladder Editor is enabled only for the label (an abbreviated name composed of up to 8 one-byte characters) of the name file (*.NAM).

• An error message will appear if a CompactFlash card containing the name file is not set in the slot of the programming pendant. Click on the (Update) button once again after setting the CompactFlash card in the slot.
2  Ladder Monitoring Function

1. Select {IN/OUT} under the main menu
2. Select {LADDER EDITOR}
   - The User Ladder View window appears.
   When the ladder circuit is in connected status, the ladder instruction
   on the window is displayed in red, and in black when it is not
   connected.

   **NOTE**
   The ladder monitor is not available on the edit.
   The ladder monitor function can be used either before editing
   or after compiling and saving the ladder program.