PLC PROGRAM DEVELOPMENT MANUAL
(FOR PERSONAL COMPUTER)
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Introduction

This manual describes the handling of the PLC development software, a support tool used to develop the user PLC (ladders, messages) for the MELDAS 64 Series or MELDASMAGIC 64 Series.

Please read this manual before starting use.

Please read the "Precautions for Safety" listed on the following page to ensure safe use of the MELDAS 64 Series and MELDASMAGIC 64 Series.

Details described in this manual

⚠️ CAUTION

⚠️ For items described in "Restrictions" or "Usable State", the instruction manual issued by the machine maker takes precedence over this manual.

⚠️ Items not described in this manual must be interpreted as "not possible".

⚠️ This manual is written on the assumption that all option functions are added. Refer to the specifications issued by the machine maker before starting use.

⚠️ Some screens and functions may differ or may not be usable depending on the NC version.

General precautions

Refer to the following documents for details on the handling.

(1) MELDAS64 Series
   MELDAS 64 PLC Onboard Instruction Manual ......................... BNP-B2213
   MELDAS 64 PLC Programming Manual (Ladder section) ....... BNP-B2212
   MELDAS 64 PLC Interface Manual ................................. BNP-B2211

(2) MELDASMAGIC64 Series
   MELDASMAGIC 64 PLC Onboard Instruction Manual ............. BNP-B2213
   MELDASMAGIC 64 PLC Programming Manual
     (Ladder section) .......................... BNP-B2212
   MELDASMAGIC 64 PLC Interface Manual ......................... BNP-B2211
   MELDASMAGIC 64 MELDASMAGIC
     Monitor Operation Manual ..................... BNP-B2192
   MELDASMAGIC 64 Utility Manual ................................. BNP-B2196

(Note) In this manual, the MELDASMAGIC man-machine interface software is abbreviated as the MMI software or MMI.
Precautions for Safety

Always read the specifications issued by the machine maker, this manual, related manuals and enclosed documents before starting installation, operation, programming, maintenance or inspections to ensure correct use. Thoroughly understand the basics, safety information and precautions of this numerical controller before using the unit. The safety precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this manual.

- **DANGER**: When there is a great risk that the user could be subject to fatalities or serious injuries if handling is mistaken.
- **WARNING**: When the user could be subject to fatalities or serious injuries if handling is mistaken.
- **CAUTION**: When the user could be subject to injuries or when physical damage could occur if handling is mistaken.

Note that even if the item is ranked as "CAUTION", incorrect handling could lead to serious results. Important information is described in all cases, so please observe the items.

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
<th>Not applicable in this manual</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING</strong></td>
<td>Not applicable in this manual.</td>
</tr>
<tr>
<td><strong>CAUTION</strong></td>
<td>1. Items related to product and manual</td>
</tr>
<tr>
<td></td>
<td>✅ For items described as &quot;Restrictions&quot; or &quot;Usable State&quot; in this manual, the instruction manual issued by the machine maker takes precedence over this manual.</td>
</tr>
<tr>
<td></td>
<td>✅ Items not described in this manual must be interpreted as &quot;not possible&quot;.</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>✅ Some screens and functions may differ or may not be usable depending on the NC version.</td>
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1. Outline

This manual describes the handling of the PLC development software, a support tool used to develop the user PLC (ladders, messages). Ladder circuits and mnemonic expressions are used as the programming language with this tool, so a sequence program can be created easily. A function (message creation function) to create messages such as the alarm messages and operator messages, and the ladder contact comments and coil comments is also provided.

(Note 1) PLC is the abbreviation for Programmable Logic Controller.
(Note 2) The terms "control unit" and "controller" used in this manual refer to the "NC Card" in the MELDAS MAGIC 64 Series.
(Note 3) The "◼" key used in this manual refers to the Enter key (Return key). Note that the key names may differ according to the type of personal computer being used.
2. System Configuration

2.1 System Configuration for PLC Development

The system configuration used for PLC development is shown below.

(1) MELDAS 64 Series

Communication terminal

Program development, ladder monitor and PLC RUN/STOP, etc.

To connector AUX

Control unit

Base I/O unit

Up/downloading is carried out with the control unit's maintenance function.

Personal computer

Used for development and saving data.
(Hard disk or floppy disk)

Commercial printer
(Ex.: PC-PR201G2)

(Note) When developing (onboard development) with the communication terminal, refer to the "MELDAS 64 Series PLC Onboard Development Manual".
(2) MELDASMAGIC 64 Series

By using the NC’s onboard function from the M64 monitor, the ladders can be developed and the signal operation can be monitored, etc.

By using the optional PLC development software, the ladders can be developed even if an NC Card is not provided.

(Note 1) When developing (onboard development) with the MELDASMAGIC monitor, refer to the "MELDASMAGIC Series PLC Onboard Development Manual".

(Note 2) Refer to the MELDASMAGIC Monitor Operation Manual for details on the MELDASMAGIC monitor.

---

Diagram:

- Personal computer
  - Used for development and saving data
    - (Hard disk or floppy disk)

- Display unit
  - MELDASMAGIC monitor (onboard)
  - PLC development software
  - Various utility disk tools

- Keyboard

- RS-232-C

- NC Card
  - PLC ladder area
  - NC Card built-in RAM
    - 16K steps
    - 128K bytes

- Base I/O unit

- Commercial printer (Ex.: PC-PR201GS)

- Dedicated printer (PRT-02B)

- Utility disk

- MAGIC Monitor

- PLC development software
### 2. System Configuration

#### 2.2 Devices Required for Ladder Development

<table>
<thead>
<tr>
<th>Device, tool</th>
<th>Details</th>
<th>Supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Personal computer</td>
<td><strong>PC9801 Series (NEC)</strong>  &lt;br&gt; CPU: 80386 or higher  &lt;br&gt; Required memory: Main memory 640K bytes  &lt;br&gt; + Protected RAM 1M byte or more  &lt;br&gt; Required disk unit: 1.25M byte compatible floppy disk drive x 1 unit  &lt;br&gt; Hard disk open capacity 1M byte or more  &lt;br&gt; <strong>PC/AT compatible unit</strong>  &lt;br&gt; CPU: 80386 or higher  &lt;br&gt; Required memory: Main memory 640K bytes  &lt;br&gt; + Protected RAM 1M byte or more  &lt;br&gt; Required disk unit: 1.44M byte compatible floppy disk drive x 1 unit  &lt;br&gt; Hard disk open capacity 1M byte or more</td>
<td>Commercial</td>
</tr>
<tr>
<td>(2) Printer</td>
<td>This is used to output the ladder. (Ex.) PC-PR201 GS</td>
<td>Commercial</td>
</tr>
<tr>
<td>(3) Cable</td>
<td>This cable is used to connect the personal computer and printer.</td>
<td>Commercial</td>
</tr>
<tr>
<td>(4) Cable</td>
<td>This cable is used to connect the control unit and personal computer. (R020 or equivalent)</td>
<td>Mitsubishi Electric</td>
</tr>
<tr>
<td><strong>Software</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLC development software package</td>
<td><strong>PLC4B</strong>: Ladder editing tool  &lt;br&gt; The ladders and messages can be edited, linked, divided and printed.  &lt;br&gt; <strong>LIST4B</strong>: List editing tool  &lt;br&gt; The list can be edited and converted into a text file.  &lt;br&gt; <strong>COMU</strong>: Ladder transfer tool  &lt;br&gt; The PLC program file is transferred between the personal computer and NC using a serial I/F.</td>
<td>Mitsubishi Electric</td>
</tr>
<tr>
<td>PC9801 Series</td>
<td>DEV-A10Z01</td>
<td></td>
</tr>
<tr>
<td>PC/AT compatible unit</td>
<td>DEV-A10Z02</td>
<td></td>
</tr>
<tr>
<td>MELDASMAGIC 50</td>
<td><strong>CNV4BMM</strong>: Ladder file format conversion tool  &lt;br&gt; (PC/AT version only)  &lt;br&gt; The file is converted between the PLC4B format and MELDASMAGIC format.  &lt;br&gt; <strong>MAGICTRS</strong>: Ladder file transfer tool  &lt;br&gt; This is Windows software used to transfer the file between the personal computer disk and NC.</td>
<td>Mitsubishi Electric</td>
</tr>
<tr>
<td>Utility disk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japanese conversion F.E.P. (ATOK)</td>
<td>Word processing type is used to type in Kanji codes when editing the messages.</td>
<td>Commercial</td>
</tr>
<tr>
<td>OS</td>
<td><strong>PC9801 Series</strong>: MS-DOS Version 3.3 and above  &lt;br&gt; <strong>PC/AT compatible unit</strong>: MS-DOS Version 5.0 and above</td>
<td>Commercial</td>
</tr>
</tbody>
</table>

**Note 1** For the various tools of the PLC development software to run properly, a protected RAM (1M byte or more) in the personal computer and the operating system MS-DOS Version 3.3 and above (MS-DOS Version 5.0 and above for PC/AT compatible unit) must be provided.

**Note 2** Either the PC9800 Series or PC/AT series personal computer can be used. Note that even if the personal computer is compatible, the PLC development software may not run in some cases.
3. Development Procedure
The procedure used to create a new user PLC on the personal computer is shown below.

1. Tool installation
   - The PLC development software tools are copied into the personal computer.
   - Refer to the section "4.1 Installing the Tools".

2. Starting
   - The PLC development software is started with the PLC4B.
   - Refer to the section "4.2 Starting Up and Ending PLC4B".

3. File registration
   - The names of the ladder and message files are registered.
   - Refer to the section "5. Registering the Edit File".

4. Ladder creation
   - A sequence program is created using a ladder circuit.
   - Refer to the section "6. Creating a Ladder Circuit".

5. Message creation
   - Messages such as the alarm messages are created.
   - Refer to the section "7. Messages".

6. Printing
   - The created ladder and message list is output.
   - Refer to the section "8. Printing".

7. Link file creation
   - The ladder file and message file are linked, and a link file is created.
   - Refer to the section "9. Linking".

8. End
   - The PLC development software is quit.

9. Transfer to actual machine
   - The created link file is transferred to the NC.
   - Refer to the section "11. Transferring Ladder Files (MELDAS 64)" or "12. Transferring Ladder Files (MELDASMAGIC 64)".

This procedure will be explained in the following sections.
3. Development Procedure

3.1 General Flow of Ladder Development Procedure

The following procedure is used to develop a built-in ladder with the PLC development software.

(1) MELDAS 64 Series

Start

Connect the personal computer and control unit used for the PLC development tool (PLC4B).

Refer to the section "2. System Configuration" for details on the connection.

Stop the PLC using RUN/STOP under the menu file of the onboard function or by setting the rotary switch NCSYS on the control unit to "1".

Refer to the "PLC Onboard Instruction Manual" for details.

Start the PLC development tool (PLC4B) and create or edit the ladders and messages.

Refer to the section "4. Start Up" for how to start the PLC development tool (PLC4B). To edit a ladder that is already running in the control unit, start the ladder file's communication program (COMU.EXE), and read the file into the personal computer.

Quit the PLC development tool, and convert the ladder file using the MELDAS-compatible ladder conversion tool (chscx.exe).

Refer to section "11. Transferring Ladder Files (MELDAS 64)" for details.

Start the ladder file's communication program (COMU.EXE), and transfer the link file to the control unit.

Run the PLC using RUN/STOP under the menu file of the onboard function or by setting the rotary switch NCSYS on the control unit to "0".

Debug using the onboard monitor function, etc.

Refer to the "PLC Onboard Instruction Manual" for details.

Completion of creating (debugging)

No

Yes

End
(2) MELDASMAGIC 64 Series

Start

Connect the personal computer and NC Card used for the PLC development tool (PLC4B).

Stop the PLC using RUN/STOP under the menu file of the onboard function.

Start the PLC development tool (PLC4B) and create or edit the ladders and messages.

Quit the PLC development tool, start the file format conversion tool (Chgcx.EXE), and convert the file into a format usable by the MELDASMAGIC 64.

Quit the PLC development tool, start the file transfer tool (MAGICTRS.EXE), and transmit the link file to the NC Card.

Run the PLC using RUN/STOP under the menu file of the onboard function.

Debug using the onboard monitor function, etc.

Completion of creating (debugging)

No

Yes

End

Refer to the section "2. System Configuration" for details on the connection.

Refer to the "PLC Onboard Instruction Manual" for details.

Refer to the section "4. Start Up" for how to start the PLC development tool (PLC4B). To edit a ladder that is already running in the NC Card, start the file transfer tool (MAGICTRS), and read the file into the personal computer.

Refer to section "12.3 Converting the PLC Program Data" for details.

Refer to the section "12. Transferring Ladder Files (MELDASMAGIC 64)" for details.

Refer to the "PLC Onboard Instruction Manual" for details.
3. Development Procedure

3.2 Before Starting Operations

The basic items for using the PLC development software are explained in this section.

3.2.1 Menu operation

The following title screen will display when the PLC development software is started up.

When the title screen is displayed, the menu will appear on the bottom of the screen. Use the function keys PF1 to PF10 to select a menu. The menu number and function key numbers correspond to each other. (These keys may be F1 to F10 depending on the personal computer model.)

The menu configuration is shown below.

When 1.MSSG is selected:

```
PF1 2 3 4 5 6 7 8
pf1 pf2 pf3 pf4 pf5 pf6 pf7 pf8

PF 1
```

```
1.ALARM 2.OPERAT 3.PLLD 4.DEVICE 5.COIL 6.COMMENT 7.INIT SUBMENU
```

```
PF 1 ~ 6
```

```
PF 7 :
```

```
PF8
```

```
1.READ 2.WRITE 3.INSERT 4.DELETE 5.CONVT 7.MONIT SUBMENU MENU
```

```
2.WRITE 5.CONVT SUBMENU MENU
```
3. Development Procedure

When **4.LADDER** is selected:

![Diagram showing PF 4 and PF 2 connections]

**Note 1)** ESC \[\text{Esc}\] can be used for INS.

When **5.LINK** is selected:

![Diagram showing PF 5 connection]

When **6.EXIT IO** is selected:

![Diagram showing PF 6 connection]

When **7.FILE** is selected:

![Diagram showing PF 7 connection]

The PLC development software title screen will appear when **PF10** is pressed.

### 3.2.2 Movement of the cursor

- During ladder creation: 1 step movement 
- During message creation: To move between setting sections  \[\text{Tab}\] 
- To move between columns \[\leftarrow \rightarrow\]
3. Development Procedure

3.2.3 Explanation of terms

(1) Device and device number

The device is the address signal used to classify the signals handled by the PLC. The device number is the serial number allocated to that device.

The device numbers for devices X, Y, U, W and H are expressed with a hexadecimal, and the others are decimals.

List of devices

<table>
<thead>
<tr>
<th>Device</th>
<th>Device number</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X+</td>
<td>X0~X4BF</td>
<td>1 bit</td>
<td>Signal input to PLC for machine input, etc.</td>
</tr>
<tr>
<td>Y+</td>
<td>Y0~Y53F</td>
<td>1 bit</td>
<td>Signal output from PLC for machine output, etc.</td>
</tr>
<tr>
<td>U+</td>
<td>U0~U178</td>
<td>1 bit</td>
<td>Signal input to PLC for No.2 system.</td>
</tr>
<tr>
<td>W+</td>
<td>W0~W1FF</td>
<td>1 bit</td>
<td>Signal output from PLC for No. 2 system.</td>
</tr>
<tr>
<td>M</td>
<td>M0~M5119</td>
<td>1 bit</td>
<td>Temporary memory</td>
</tr>
<tr>
<td>G</td>
<td>G0~G3071</td>
<td>1 bit</td>
<td>Temporary memory</td>
</tr>
<tr>
<td>F</td>
<td>F0~F127</td>
<td>1 bit</td>
<td>Temporary memory. Alarm message interface.</td>
</tr>
<tr>
<td>L</td>
<td>L0~L255</td>
<td>1 bit</td>
<td>Latch relay (back up memory)</td>
</tr>
<tr>
<td>E+</td>
<td>E0~E127</td>
<td>1 bit</td>
<td>Special relay</td>
</tr>
<tr>
<td>T</td>
<td>T0~T15</td>
<td>1 bit/16 bit</td>
<td>10ms unit timer</td>
</tr>
<tr>
<td></td>
<td>T16~T95</td>
<td>1 bit/16 bit</td>
<td>100ms unit timer</td>
</tr>
<tr>
<td></td>
<td>T96~T103</td>
<td>1 bit/16 bit</td>
<td>100ms unit integral timer</td>
</tr>
<tr>
<td>Q</td>
<td>Q0~Q39</td>
<td>1 bit/16 bit</td>
<td>10ms unit timer (fixed timer)</td>
</tr>
<tr>
<td></td>
<td>Q40~Q135</td>
<td>1 bit/16 bit</td>
<td>100ms unit timer (fixed timer)</td>
</tr>
<tr>
<td></td>
<td>Q136~Q151</td>
<td>1 bit/16 bit</td>
<td>100ms unit integral timer (fixed timer)</td>
</tr>
<tr>
<td>C</td>
<td>C0~C23</td>
<td>1 bit/16 bit</td>
<td>Counter</td>
</tr>
<tr>
<td>B</td>
<td>B0~B103</td>
<td>1 bit/16 bit</td>
<td>Counter (fixed counter)</td>
</tr>
<tr>
<td>D</td>
<td>D0~D1023</td>
<td>16 bit/32 bit</td>
<td>Data register. Register for calculation.</td>
</tr>
<tr>
<td>R+</td>
<td>R0~R8191</td>
<td>16 bit/32 bit</td>
<td>File register. PLC to CNC interface. The user released registers are R500 to R549 and R1900 to R2799. R1900 to R2799 are backed up by the battery.</td>
</tr>
<tr>
<td>A</td>
<td>A0, A1</td>
<td>16 bit/32 bit</td>
<td>Accumulator</td>
</tr>
<tr>
<td>Z</td>
<td>–</td>
<td>16 bit</td>
<td>D or R address index (for ±n)</td>
</tr>
<tr>
<td>V</td>
<td>–</td>
<td>16 bit</td>
<td>D or R address index (for ±n)</td>
</tr>
<tr>
<td>N</td>
<td>N0~N7</td>
<td>8 points</td>
<td>Nesting level of master control.</td>
</tr>
<tr>
<td>P+</td>
<td>P0~P255</td>
<td>–</td>
<td>Label for conditional jump and subroutine call. (P900 to P511 are used to call C language modules.)</td>
</tr>
<tr>
<td>K</td>
<td>K-32768~K3276</td>
<td>–</td>
<td>Decimal constant for 16-bit command.</td>
</tr>
<tr>
<td>H</td>
<td>H0~HFFFFF</td>
<td>–</td>
<td>Hexadecimal constant for 16-bit command.</td>
</tr>
<tr>
<td></td>
<td>H0~HFFFFFFFF</td>
<td>–</td>
<td>Hexadecimal constant for 32-bit command.</td>
</tr>
</tbody>
</table>

(Note 1) The devices with a + mark in the device column have designated application.
Do not use the non-defined device numbers even if they are blank.

(Note 2) In addition to the above devices, there are the I, J and S devices, but these must not be used.
3. Development Procedure

(Note 3) There are limits to the usage range, so refer to the "PLC Programming Manual (ladder section)" for explanations on each device. (For example, the user release range for point P is P0 to P159.)

(Note 4) The X100 to X13F, Y100 to Y13F, R80 to R83 and R180 to R183 devices cannot be used with the MELDASMAGIC64 Series.

(2) Circuit signals
The following eight types of circuit signals are used.

<table>
<thead>
<tr>
<th>Circuit signal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used for A contact circuit.</td>
<td></td>
</tr>
<tr>
<td>Used for B contact circuit.</td>
<td></td>
</tr>
<tr>
<td>Used for A contact OR circuit.</td>
<td></td>
</tr>
<tr>
<td>Used for B contact OR circuit.</td>
<td></td>
</tr>
<tr>
<td>Used for coils (Y, M, G, F, L, E, T, C etc.)</td>
<td></td>
</tr>
<tr>
<td>Used for programming machine commands. (MOV, =, +, –, etc.)</td>
<td></td>
</tr>
<tr>
<td>Used for connecting between circuit symbols.</td>
<td></td>
</tr>
<tr>
<td>Used for connecting between circuit symbols.</td>
<td></td>
</tr>
</tbody>
</table>

(3) Circuit block
The circuit block is the circuit closed with the circuit symbols.

(Example)
3. Development Procedure

(4) Step numbers and pointers (P)
The step numbers are allocated in order to the created program, and is automatically changed when the circuit is edited.
The pointers (P) are used as labels for the jumping destination of the conditional jump command and for the jumping destination for the subroutine command. The points (P) shown below are for special applications.
P128~P159 : These can be used in the same manner as P0~P127 but these will also function as the page return when printing out the ladder circuit diagram.
P250~P225 : These are used to separate the PLC program processing levels.

P251 is assigned to the head of the high-speed processing program. 
P252 is assigned to the head of the main processing program.

(Example)
4. Start Up

4.1 Installing the Tools

Confirm that there is no PLC directory below the hard disk drive root directory. If there is a PLC directory, change the name of the existing PLC directory, or move to a place other than the root directory.

(Operation procedure)

(1) Turn on the personal computer and start up MS-DOS.

(2) Insert the floppy disk labeled as "PLC Development Tool Version PC-98" (or Version PC-AT) into the B drive.

(3) Input the install command.

(Example)

Input "B:INSTALL_A_:B:". (_ indicates a space.)

(4) Comments will appear as shown on the right, and the installation will be completed.

(5) The following files will be copied to the designated drive during the installation process.

<For Version PC-98>

A:\CHG4PB.BAT    A:\PLC\BIN \ATOKCH.EXE
\HELP4B.BAT    \CHG4PB.EXE
\LIST4B.BAT    \CODECCNV.INF
\M3MFD.BAT    \COME.BAT
\RUN386.EXE    \COME.EXE
\HELP4B.BAT    \COME.MAE
\COME.MAJ
\M3MFD.EXE    \NORMCNV.EXE
\HELP4B.EXE    \HELP4B.MAJ
\HELP4B.MAE    \HELP4B.EXE
\HELP4B.MAJ
\PLC2B.EXP    \PLCCM4B.EXE
\PLCLIST.H    \PLCLIST.H
\PLC_LB.EXP    \PLC_LB.EXP
\SET9801.EXE    \SETIBMPC.EXE
\SETMFAS.EXE

<For Version PC/AT>

C:\CHG4PB.BAT    C:\PLC\BIN \ATOKCH.EXE
\HELP4B.BAT    \CHG4PB.EXE
\LIST4B.BAT    \LIST4B.BAT
\CODECCNV.INF    \CODECCNV.INF
\M3MFD.BAT    \COME.BAT
\RUN386.EXE    \COME.EXE
\HELP4B.BAT    \COME.MAE
\COME.MAJ
\M3MFD.EXE    \NORMCNV.EXE
\HELP4B.EXE    \HELP4B.MAJ
\HELP4B.MAE    \HELP4B.EXE
\HELP4B.MAJ
\PLC2B.EXP    \PLCCM4B.EXE
\PLCCM4B.H    \PLCCM4B.H
\PLCLIST.H    \PLCLIST.H
\PLC_LB.EXP    \PLC_LB.EXP
\SET9801.EXE    \SETIBMPC.EXE
(6) When the installation is completed, use a commercial editor, and delete the following device drivers related to the memory from "CONFIG.SYS".

EMM386.EXE
EMM.SYS
HIMEN.SYS
SMARTDRV.SYS

Change the "CONFIG.SYS" details as shown below.

[Example of CONFIG.SYS details]
BUFFERS=30
FILES=30
DEVICE=A:\DOS\RSDRV.SYS

Refer to a commercial book on MS-DOS for details on CONFIG.SYS.

4.2 Starting Up and Ending PLC4B

PLC4B is the tool used to newly create or edit the ladders and messages.

[Start up method]

(1) The PLC development software will start up by inputting command "plc4b". Refer to section 5 for explanations on each screen.

A:\>plc4b

(2) When the PLC development software starts, the title screen will appear. The initial screen of the PLC development software will appear when the [PF10] key is pressed on any screen while PLC4B is running.

[Ending method]

(1) Press [PF10] on the keyboard, and display the initial screen of the PLC development software.

(2) Press [PF8] ([8.END]). The prompt (A:\>) will appear on the screen, and the program will return to the normal MS-DOS mode.
5. Registering the Edit File

Register the file name and estimated file size when creating a new ladder circuit or message.

[Basic operation]

7.FILE → 2.WRITE → Set each necessary setting section number file name and size.

[Operation procedure]

(1) The PLC FILE screen will display when menu 7.FILE is pressed.
(2) The setting section will appear when 2.WRITE is pressed.
(3) Set the ladder file name and estimated file size, and message 1 file name and estimated file size.
   The file name must be a maximum of 10 characters.
   (Note) If the file name exceeds 10 characters the last 10 characters will be valid.

(1) The file name and size scheduled for ladder usage is set in "# LADDER".
   The size scheduled for ladder usage is a maximum of 16 Kbytes (16384 bytes).
   One ladder step: 4 bytes
(2) Only the file name is set in "# MESSAGE 1".
   When various messages are registered with the initial setting on the message creation size,
   the size will be displayed automatically.
(3) Set the file that exists in the same directory as PLC4B.EXE or the name of the file created in
    the same directory here.
6. Creating a Ladder Circuit

The method for editing the sequence program using the ladder circuit is explained here. A list of ladder circuit editing functions is shown below.

<table>
<thead>
<tr>
<th>Function item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit write</td>
<td>Creation of new circuit</td>
</tr>
<tr>
<td></td>
<td>Correction of existing circuit</td>
</tr>
<tr>
<td></td>
<td>Addition of circuit block</td>
</tr>
<tr>
<td>Circuit read</td>
<td>Circuit read with step number</td>
</tr>
<tr>
<td></td>
<td>Circuit read with device number</td>
</tr>
<tr>
<td></td>
<td>Circuit read with contact or coil number</td>
</tr>
<tr>
<td></td>
<td>Circuit read with command</td>
</tr>
<tr>
<td></td>
<td>Final circuit read with END command</td>
</tr>
<tr>
<td>Circuit insertion</td>
<td>Insertion in circuit symbol units</td>
</tr>
<tr>
<td>Circuit delete</td>
<td>Delete of circuit block</td>
</tr>
<tr>
<td></td>
<td>Delete in circuit symbol units</td>
</tr>
</tbody>
</table>
6. Creating a Ladder Circuit

6.1 Creating a New Circuit

This operation is used to create a new ladder circuit or to erase an existing ladder circuit.

[Basic operation]

4.LADDER → 2.CIRCUIT → 2.WRITE → 9.SET → Y → \[→ \]
→ (Writing operation) → INS → 5.CONVT → \[→ \]

[Operation procedure]

(1) Register the edit file before creating a new circuit.
(2) Press function menu 4.LADDER and the sub menu will display.
(3) Press 2.CIRCUIT, 2.WRITE, 9.SET and the following interactive screen will display.
(4) Press Y, \[ to create a new circuit or erase an existing circuit. Press 1.READ for other applications.
(5) Only the two vertical lines on both sides and step number 0 will display if Y, \[ are pressed.
(6) Start the writing operation

(1) Write the program from the cursor position using the circuit symbols (menu keys) and alphanumeric keys.
(2) When approximately one screen worth of program is written, press INS 5.COUNT, \[.

Note) A maximum of two screens worth of program can be created at once, but INS 5.CONVT, \[ should be pressed after one screen if possible.

The final object will not be created on the screen if INS 5.CONVT, \[ are not pressed after the circuit is completed.
(3) The message “COMPLETED” will appear on the screen when INS 5.CONVT, \[ are pressed and the conversion is completed.

(Example)

The following screen will display when the following are pressed:

4.LADDER → 2.CIRCUIT → 2.WRITE → 9.SET

CLEAR MEMORY FOR NEW PROGRAM?
* YES = “Y” “RETURN”
* NO = SELECT READ

Note) The existing circuits will all be deleted when Y, \[ are pressed.
The following screen will display when $\mathbf{Y} \to \mathbf{□}$ are pressed. Perform the writing operation on this screen.
6. Creating a Ladder Circuit

6.2 Modification of Existing Circuit

An existing sequence circuit can be modified.

[Basic operation]

(Read out circuit) → **INS** 2.WRITE → (Input commands) → **INS** 5.CONVT → ✅

[Operation procedure]

1. Read out the circuit to be modified with the read procedure.
2. When 2.WRITE is pressed, the circuit block at the cursor position will display and the following blocks will disappear.
   - To modify a circuit block other than the one displayed on the top of the screen, move the cursor to the top of the target block and press 2.WRITE. That circuit block will display on the top line and the other blocks will disappear.
3. Move the cursor to the circuit position to be modified and input the commands.
   (Use ↑ ↓ ← → keys)
4. Always press **INS** 5.CONVT ✅ after modifying the circuit.
   - The message “COMPLETED” will appear when the ✅ key is pressed, and the circuit will display after modification.

POINT

(1) When the existing circuit where the step number is changed is modified, the step numbers of the existing program and the CJ command jump destination will also be automatically changed.

(Example) To change coil Y10 to Y35.

```
2.CIRCUT → 1.READ → 9.SET → 2 → 0 → ✅ → INS
```

```
2.WRITE → ✅ → 5. → Y → 3 → 5 → ✅ INS 5.CONVT → ✅
```

Change Y10 to Y35
6.3 Adding a Circuit Block

This operation is used to add a circuit to the existing sequence circuits.

[Basic operation]

(Circuit read operation) → \textbf{INS} \ 2.WR \ → \ + \ → \textbf{INPUT} → (Command input) → \textbf{INS} \ 5.CONVT → 

[Operation procedure]

1. Read the circuit to where a circuit block is to be added with the read operation.
2. When \textbf{2.WR} \ is pressed, the circuit block at the cursor position will display and the following blocks will disappear.
   - To add a circuit block to the block other than the one displayed on the top of the screen, move the cursor to the top of the target block and press \textbf{2.WR}. That circuit block will display on the top line and the other blocks will disappear.
3. Press \textbf{+} and the top circuit block will disappear, and the next step number and vertical lines of the circuit block will display.
4. Write the additional circuit block by inputting the commands.
5. Press \textbf{INS} \ 5.CONVT \ → \textbf{Ins} \textbf{Ins} \ 5.CONVT \ → \textbf{Ins} \textbf{Ins} \ 5.CONVT \ → \ (continued on the next page)

\textbf{(Example)} Adding circuit blocks X5 and Y15 to step No. 50

\textbf{2.CIRCUT → 1.READ → 9.SET → 5 → 0 → 0} → (continued on the next page)

Read step No. 50

![Ladder Circuit Diagram]

- 20 -
6. Creating a Ladder Circuit

INS → 2.WRITE → + → →

Set the write area after the read circuit block.

→ 1. → X → 5 → → 5. → Y → 1 → 5 → INPUT →

Write X5 and Y15

INS → 5.CONVT → →

POINT

(1) When a circuit block is inserted or added, the following program step numbers and CJ command, etc., jump destinations will be automatically changed.
6.4 Reading the Circuit

6.4.1 Reading the circuit with step number

This operation is used to read the circuit by designating a step number.

[Basic operation]

2.CIRCUIT → 1.READ → 9.SET → STEP NO. → [ ]

[Operation procedure]

(1) Press 2.CIRCUIT, 1.READ, 9.SET, STEP NO., [ ] and one screen worth of data following the designated number will display.  
   ○ Even if in the middle of the designated step number command, the circuit will be displayed from the start of that command.

(2) Press [ ] and the circuit on the previous screen will display. The circuit on the next screen will display by pressing [ ]. The succeeding or preceding screens can be displayed by pressing [ ] continuously. “LADDER END” will display in the message display section when the last circuit block is displayed. 
   Pressing [ ] after [ ] will function in the same manner.
   **Note** Displaying a screen by pressing [ ] will take three times longer than pressing [ ].

(3) If a circuit block is divided over two screens, use the [ ] key to move the cursor to the bottom of the screen. Press the [ ] key continuously to scroll the screen one line. Hold down the cursor key until the whole block appears on the screen.
   The screen can be scrolled by pressing [ ] or [ ] even if the circuit block is not split between screens. Note that pressing the [ ] key will scroll the screen but will not display the next circuit.

(Example 1) To read the step No. 100 program

2.CIRCUIT → 1.READ → 9.SET → 1 → 0 → 0 → [ ]
(Example 2) When step No. 100 program is read, the cursor is moved to the bottom of the screen with ↓, and ↓ is pressed four times and ↑ four times.

**Note** If the read circuit is split, the remaining screen can be displayed with the ↓ key, but the next circuit cannot be displayed. The circuit before the read circuit, step No. 100 above, also cannot be displayed with ↑.
(Example 3) When step No. 100 program is read, and + \[\xrightarrow{\text{+}}\] \[\xrightarrow{\text{○}}\] \[\xrightarrow{\text{△}}\] \[\xrightarrow{-}\] \[\xrightarrow{\text{△}}\] are pressed.
6. Creating a Ladder Circuit

6.4.2 Reading the circuit with device number

This operation is used to read the circuit containing a designated device number.

[Basic operation]

\[2\text{.CIRCUIT} \rightarrow 1\text{.READ} \rightarrow \text{DEVICE NO.} \rightarrow \text{DISPLAY}\]

[Operation procedure]

1. Press 2.CIRCUIT, 1.READ, DEVICE NO., and the circuit block containing the designated device number will appear.
   If there are several circuit blocks with the designated device, the screen with the smallest step number will display first. If \( \text{DISPLAY} \) is pressed again, the circuit with the next smallest step number will be displayed under the currently displayed block.
   If the screen is full and \( \text{DISPLAY} \) is pressed, the top circuit block will disappear and another circuit block will be added to the bottom.

2. If the device number is changed during the display, that circuit block will be added to the bottom of the currently displayed block.

3. If reading is attempted after all blocks with the corresponding device number have been displayed, the message “PROG NOT FOUND” will appear.

(Example) Read the circuit block containing output device Y30.

\[2\text{.CIRCUIT} \rightarrow 1\text{.READ} \rightarrow Y \rightarrow 3 \rightarrow 0 \rightarrow \text{DISPLAY}\]
6. Creating a Ladder Circuit

6.4.3 Reading the circuit with contact or coil number

This operation is used to read a circuit containing a designated contact or coil number.

[Basic operation]

2.CIRCUIT → 1.READ → CIRCUIT SYMBOL → DEVICE NO. → ▼

[Operation procedure]

(1) Press 2.CIRCUIT, 1.READ, CIRCUIT SYMBOL, (1. , 2. , 3. , 4. , 5. ) → DEVICE NO. and ▼.

The circuit block containing the designated contact or coil number will display.

If several circuit blocks contain the designated contact or coil number, the circuit block with the smallest step number will display. Press ▼ again to display the circuit with the next smallest step number under the currently displayed circuit block.

If the screen is full and ▼ is pressed, the top circuit block will disappear and another circuit block will be added to the bottom.

(2) If the contact or coil number is changed during the display, that circuit block will be added to the bottom of the currently displayed block.

(3) If reading is attempted after all blocks with the corresponding contact or current number have been displayed, the message “PROG NOT FOUND” will appear.

(4) Contact A will be read if 1. DEVICE NO. is pressed and a device number is set when searching with a contact, and contact B if 2. DEVICE NO. is pressed and a device number is set.

(5) The OUT command will be read out by pressing 5. and setting a device number.

(Example) Read the circuit block containing contact A with device No. X10.

2.CIRCUIT → 1.READ → 1. → X → 1 → 0 → ▼

Specified contact A with device No. X10.
6.4.4 Reading the circuit with command

This operation is used to read a circuit containing a designated command.

**[Basic operation]**

1.Circuit → 1.READ → 6. → [ ] → COMMAND →

**[Operation procedure]**

1. Press 2.Circuit, 1.READ, 6. → [ ] → COMMAND, and the program with the designated command will display from the circuit block with the smallest step number. The device number designation is insignificant. If is pressed again, the circuit with the next smallest number will display under the currently displayed block.

2. If the command is changed during the display, that block will display under the currently displayed block.

3. If the screen is full and is pressed, the top circuit block will disappear and another circuit block will be added to the bottom. (Refer to Example 2)

4. If reading is attempted after all corresponding blocks have been displayed, the message “PROG NOT FOUND” will appear.

**Example 1**  Read the circuit block with the PLS M80 command. (M80 is insignificant here.)

2.Circuit → 1.READ → 6. → [ ] → P → L → S → M → 8 → 0 →

---

![Diagram of the ladder circuit](image)
(Example 2) Read the circuit block with the MOV command.

2.CIRCUIT → 1.READ → 6. { } → M → O → V → ☑️

Press ☑️ after the screen is full.
6.4.5 Reading the circuit with the END command

This operation is used to read the circuit block immediately before the block with the END command.

[Basic operation]

2.CIRCUIT → 1.READ → 6.→[ ]→E→N→D→□

[Operation procedure]

(1) Press 2.CIRCUIT, 1.READ, 6.→[ ]→E→N→D, and then □.

The circuit block immediately before the one with the END command will display.

(Example) Read the last circuit block.

2.CIRCUIT → 1.READ → 6.→[ ]→E→N→D→□

![Diagram of a ladder circuit with labels and instructions for reading the circuit block before the END command.](image)
6.4.6 Circuit read functions

<table>
<thead>
<tr>
<th>Read method</th>
<th>Operation example</th>
<th>Example of displayed circuit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step number</td>
<td>9.SET 2 8</td>
<td><img src="example1.png" alt="Example of displayed circuit" /></td>
<td>Reads the circuit block with the designated step and succeeding steps.</td>
</tr>
<tr>
<td>Device number</td>
<td><img src="example2.png" alt="Device example" /></td>
<td><img src="example3.png" alt="Example of displayed circuit" /></td>
<td>Reads the circuit block containing the designated device number regardless of the circuit symbols.</td>
</tr>
<tr>
<td></td>
<td>T 1 5</td>
<td><img src="example4.png" alt="Example of displayed circuit" /></td>
<td>When reading a circuit block by designated T or C, the circuits with “–&lt; &gt;–” cannot be read. “–&lt;T15 K15&gt;–”, etc., cannot be read.</td>
</tr>
<tr>
<td>and device number</td>
<td><img src="example5.png" alt="Device example" /></td>
<td><img src="example6.png" alt="Example of displayed circuit" /></td>
<td>Reads each circuit symbol separately. The combination of circuit symbol “–[ ]–” and device number cannot be used for reading.</td>
</tr>
<tr>
<td></td>
<td><img src="example7.png" alt="Device example" /></td>
<td><img src="example8.png" alt="Example of displayed circuit" /></td>
<td>Reads the circuit blocks of the designated timer or counter coil.</td>
</tr>
<tr>
<td>Circuit symbol and command code</td>
<td><img src="example9.png" alt="Circuit example" /></td>
<td><img src="example10.png" alt="Example of displayed circuit" /></td>
<td>Reads the blocks with the MOV command regardless of the device numbers.</td>
</tr>
<tr>
<td></td>
<td><img src="example11.png" alt="Circuit example" /></td>
<td><img src="example12.png" alt="Example of displayed circuit" /></td>
<td>Reads the last circuit block in the sequence.</td>
</tr>
</tbody>
</table>
6.5 Inserting a Circuit

6.5.1 Inserting with circuit symbol units

This operation is used to insert the circuit in circuit symbol units.

[Basic operation]

(Circuit read operation) → **3.INSERT** → \[ \uparrow \] → (Command Input) → **INS** → **5.CONVT** → כדי

[Operation procedure]

1. Using the circuit read operation display the block to where the circuit symbol is to be inserted.
2. Press **3.INSERT** and all circuit blocks other than the one at the cursor position will disappear.
   - To insert a circuit symbol into a circuit block other than the one displayed at the screen top, move the cursor to the beginning of the target block and then press **3.INSERT**. The designated circuit block will move to the top of the screen, and all other blocks will disappear.
3. Move the cursor to the position where the symbol is to be inserted using the cursor keys, and then input the command.
   - (Note) Inputting the data at the top of the screen may not be possible depending on the system. An operation error will occur if this is attempted in such a system, and "OPERATING ERROR" will display in the message display section.
   - “COMPLETED” will display in the message display section when **5.CONVT** is pressed and the updated circuit will display.

**POINT**

1. When insertion or addition is performed, the step numbers of the succeeding program and the CJ command jump destinations will also be changed automatically.

(Example) Read step No. 18 and insert contact B with device No. X8 as an AND circuit after the contact with device No. Y15.

2.CIRCUIT → 1.READ → 9.SET → \[ \square \] → **INS**

Read step No. 18

\[ \square \] → 3.INSERT → \[ \square \] → 2. \[ \square \] → X → 8 → **INS** → 5.CONVT → Therefore

Insert contact B with device No. X8 after Y15

![Diagram](image_url)
Examples of insertion and addition of other circuit symbols are shown below.

(1) Inserting a contact

(a) 3.INSERT \[\rightarrow \] \[\rightarrow \] 1. \[\rightarrow \] \[\rightarrow \] 0

(b) 3.INSERT \[\rightarrow \] \[\rightarrow \] \[\rightarrow \] \[\rightarrow \] \[\rightarrow \] \[\rightarrow \] \[\rightarrow \]

(2) Inserting a horizontal bar

3.INSERT \[\rightarrow \] \[\rightarrow \] 8. \[\rightarrow \] 0
6. Creating a Ladder Circuit

(3) Inserting a vertical bar

3. INSERT → 7. | → 横線

Before key input

After key input

X1 X3 Y60
X2 X4

X1 X3 Y60
X2 X4
6. Creating a Ladder Circuit

6.6 Deleting a Circuit

6.6.1 Deleting a circuit block

This operation is used to delete the sequence circuits one at a time.

[Basic operation]

(Circuit read operation) → 4.DELETE → \[\begin{align*}
5. & \rightarrow \\
6. & \rightarrow
\end{align*}\] →

[Operation procedure]

(1) Display the circuit to be deleted with the read operation.
(2) Press 4.DELETE and all circuit blocks other than the one at the cursor position will disappear.
   - To delete a circuit block other than the one displayed at the screen top, move the cursor to the
     beginning of the target block and then press 4.DELETE. The designated circuit block will
     move to the top of the screen.
(3) Press \[\begin{align*}
5. & \rightarrow \\
6. & \rightarrow
\end{align*}\]. “DELETE 1-CIRCUIT” will display in the message display section. Press the key again to delete the designated block.
   - Even if the target circuit block contains the commands for the output device, the block can be
     deleted by pressing 4.DELETE, \[\begin{align*}
5. & \rightarrow \\
6. & \rightarrow
\end{align*}\].

Note: 5.CONVT, do not need to be pressed after deleting the circuit block.

POINT

(1) When deletion is performed, the step numbers of the succeeding program and the CJ
command jump destinations will also be changed automatically.

(Example) Read step No. 25 and delete the circuit block containing it.

2.CIRCUIT → 1.READ → 9.SET → 2 → 5 → 4.DELETE → 5. → 5.
(Example) To delete the faulty circuit if a “LADDER ERROR”, etc., occurs when \[ \text{5.CONVT} \], \[ \text{5.} \] are pressed after creating the circuit, or to delete a circuit block before pressing \[ \text{5.CONVT} \], \[ \text{5.} \].

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{example_circuit.png}
\caption{Circuit where “LADDER ERROR” has occurred. (Step numbers are not assigned.)}
\end{figure}

(Circuit edit operation) \[ \text{5.CONVT} \rightarrow \text{“LADDER ERROR”} \]

\[ \downarrow \quad \text{INS} \quad \text{4.DELETE} \quad \text{5.} \quad \text{“DELETE 1-CIRCUIT (DISP)”} \quad \text{INS} \quad \text{5.CONVT} \quad \text{5.} \]

Move the cursor down \hspace{1cm} Delete Y25 circuit block \hspace{1cm} Convert the Y26 circuit block

(Note) “DELETE 1-CIRCUIT” will display in the message display section when a normal circuit block is deleted. “DELETE 1-CIRCUIT (DISP)” will display when a circuit block with no step number assigned is deleted.
6. Creating a Ladder Circuit

6.6.2 Deleting a circuit symbol

This operation is used to delete a sequence circuit in circuit symbol units.

[Basic operation]

(Circuit read operation) → 4.DELETE → ↑ →  → → 5.CONVT →  

[Operation procedure]

(1) Display the circuit block with the circuit symbol to be deleted with the read operation.

(2) Press 4.DELETE and all circuit blocks other than the one at the cursor position will disappear.
   • To delete a circuit block other than the one displayed at the screen top, move the cursor to the
     beginning of the target block and then press 4.DELETE. The designated circuit block will
     move to the top of the screen.

(3) Move the cursor to the circuit symbol to be deleted with the cursor keys, and press
    1., 2., 3., 4., 7. or 8. and then press to delete it.

(4) Always press 5.CONVT,  after deleting the circuit.
   • “COMPLETED” will display in the message display section when  is pressed and the
     updated circuit will display.

POINT

(1) When deletion in circuit symbol units is performed, the step numbers of the succeeding
   program and the CJ command jump destinations will also be changed automatically.

(Example) Read step No. 12 and delete X3.

2.CIRCUIT → 1.READ → 9.SET → 1 → 2 → →  

Read step No. 12

4.DELETE → → → 3. → → → INS 5.CONVT →  

Delete X3
6. Creating a Ladder Circuit

Examples of deletion of other circuit symbols are shown below.

(1) Deleting a contact

(a) 4.DELETE → ← ➔ ➔ ➔ or 4.DELETE → ← ➔ 7. — — — — 8. →

(Note) 5.CONVT is invalid in this circuit.

(b) 4.DELETE → ← ➔ ➔ ➔ 3. — — — — ➔

(c) 4.DELETE → ← ➔ ➔ ➔ 3. — — — — ➔

(2) Deleting a vertical line

(a) 4.DELETE → ← 7. — — ➔

(Note) 5.CONVT is invalid in this circuit.
6. Creating a Ladder Circuit

6.7 Circuit Extension Function

The circuit extension function is used to create a ladder circuit that is wider than eight contacts and one coil (equivalent to nine contacts.) The circuit extension function operation method and specifications are explained below.

**CAUTION**

(1) When 2.WRITE is pressed, a maximum of eight returns can be created if there is one extended line. When 3.INSERT is pressed a maximum of one return can be created.

The ladder circuit display buffers are 18 stages long and nine contacts (including a coil) wide. The section not displayed on the screen is displayed with the cursor keys ↑ ↓.
6. Creating a Ladder Circuit

6.7.1 Examples of extension circuit operation

(1) Example of writing single return

A maximum of six returns can be created if there is one extended line in the same manner.

- Circuit symbols that can be extended during writing:

- Circuit symbols that cannot be extended during writing:

If any of these symbols are used, an “OPERATING ERROR” will occur when [ ] is pressed.
6. Creating a Ladder Circuit

(2) Example of writing two or more extended lines

This example is completed by pressing INS  5.CONVT.
(3) Example of writing function command into return section

When writing a function command into the return section, extend with a − (horizontal line) first, and then write in the function command. An "OPERATING ERROR" will occur if the function command is written in directly.
6. Creation of Ladder Circuit

(4) Example 1 of inserting a single extended line

- The insertion function inserts a contact etc., at the cursor position. If nine contacts (including a coil) are exceeded, the line will be extended as shown above. However, only one return can be created with the insertion operation.

- Circuit symbols that can be extended during insertion:

- Circuit symbols that cannot be extended during insertion:

If any of these symbols are used, an “OPERATING ERROR” will occur when is pressed.
(5) Example 2 of inserting a single extended line (when more than one coil exists)

This example is completed by pressing INS 5.CONVT.
(6) Example of inserting when a function command exists in the coil section

Note) Insertion is not possible if a function command handled as a contact such as =, >, or < exists in the return section. An "OPERATING ERROR" will occur if insertion is attempted.
6. Creation of Ladder Circuit

(7) Example 1 of inserting when there are two or more extended lines

This example is completed by pressing **INS** **5.CONVT**.
(8) Example 2 of inserting when there are two or more extended lines

This example is completed by pressing **INS 5.CONVT**.
6. Creation of Ladder Circuit

6.7.2 Error messages

An “OPERATING ERROR” occurs.

A “CIRCUIT CONTINUATION ERROR” or “OPERATING ERROR” occurs. Only one return can be created when two or more lines are extended.

“CIRCUIT CONTINUATIVE SIZE OVER” occurs. The maximum number of returns is six.
6. Creation of Ladder Circuit

A "CIRCUIT CONTINUATION ERROR" will occur if during conversion if a vertical branch exists at the return start position.

Program as shown below:

A vertical branch is possible at this position.
6. Creation of Ladder Circuit

6.7.3 Relation of number of returns and circuit length

The relation between the number of returns and the maximum length of the circuit that can be created is as shown below.

<table>
<thead>
<tr>
<th>Number of returns</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit length (stages)</td>
<td>18</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

A “LADDER ERROR” will occur if the limits are exceeded.

Example)
7. Messages

Sequence programs as well as message data used for the CNC message function and the ladder circuit printing function can be created with the PLC development software. The messages that can be created are as follows:

1. Alarm message (ALARM MESS)
2. Operation message (OPERATE MESS)
3. PLC switch name (PLC SW MESS)
4. Device message (DEVICE MESS)
5. Coil message (COIL MESS)
6. Comment message (COMMENT MESS)

The functions of each message are explained below.

1. ALARM MESS
   The alarm messages displayed on the CNC DIAGNOSIS screen are created as character strings. Alphanumeric, kana and kanji characters can be used. Two half-byte characters are used to display one kanji character.
   The maximum length of an ALARM MESS is 32 characters, and a maximum of 256 messages can be registered. However, the limits will depend on the CNC memory size.

2. OPERATE MESS
   The operator messages displayed on the CNC DIAGNOSIS screen are created as character strings. Alphanumeric, kana and kanji characters can be used. Two half-byte characters are used to display one kanji character.
   The maximum length of an OPERATE MESS is 60 characters, and a maximum of 256 messages can be registered. However, the limits will depend on the CNC memory size.

3. PLC SW MESS
   The switch names displayed on the CNC DIAGNOSIS screen are created as character strings. Alphanumeric, kana and kanji characters can be used. Two half-byte characters are used to display one kanji character.
   The maximum length of an PLC SW MESS is 14 characters, and a maximum of 32 switches can be registered. However, the limits will depend on the CNC memory size.

4. DEVICE MESS
   Create a contact name to be printed with the device numbers during printing of the ladder circuit. The names are created as character strings.

   Alphanumeric, kana and kanji characters can be used. Two half-byte characters are used to display one kanji character.
   The maximum length of a DEVICE MESS is 6 characters, and a maximum of 1000 device names can be registered. However, the limits will depend on the CNC memory size.
(5) COIL MESS
Create a coil name to be printed with the device numbers during printing of the ladder circuit. The names are created as character strings.

![Diagram of ladder circuit with coil name]

Alphanumeric, kana and kanji characters can be used. Two half-byte characters are used to display one kanji character.
The maximum length of a COIL MESS is 18 characters, and a maximum of 2700 coil names can be registered. However, the limits will depend on the CNC memory size.

(6) COMMENT MESS
Create a tool name (8 alphanumeric characters × 5) to display on the CNC TOOL REGISTRATION screen and a character string to display the load type and scale of the load meter display. Alphanumeric, kana and kanji characters can be used. Two half-byte characters are used to display one kanji character.
The maximum length of a COMMENT MESS is 60 characters, and a maximum of 100 comments can be registered. However, the limits will depend on the CNC memory size.

**Note** The number of comment characters will differ according to the application such as the tool name being 8 characters and the comment for the load meter display 60 characters. The number of characters will be determined by the longer comment. Thus the number of characters is normally 60.

**CAUTION**

Semi-graphics cannot be used for messages created on the personal computer. If semi-graphics are required for the load meter, etc., leave that line blank, and create a message including the semi-graphics with the CNC onboard. An odd number of characters must not be used for one message as the CNC may not function correctly.
7. Messages

7.1 Initial

Select the initial screen and set the message size before creating a new message. Messages cannot be created if this is not performed. The data length must always be an even number.

[Basic operation]

1.MSSG → 7.INIT → 2.WRITE → (Set data size) → 5.CONVT → Y → 🗑

[Operation procedure]

(1) Select 1.MSSG, and then 7.INIT.
(2) Press 2.WRITE and the setting section will display.
(3) Set the used size and data length for each message.
(4) Press 5.CONVT. The message “CHANGE SIZE (Y/N)” will appear, so press Y. “COMPLETED” will display when conversion is completed.

Note) Conversion is performed only when each message size is changed.

<table>
<thead>
<tr>
<th>Index number</th>
<th>Number of messages</th>
<th>Data length</th>
<th>Setting section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ALARM MESS</td>
<td>0/0</td>
<td>32 BYTE</td>
<td></td>
</tr>
<tr>
<td>2. OPERATE MESS</td>
<td>0/0</td>
<td>60 BYTE</td>
<td></td>
</tr>
<tr>
<td>3. PLC SW MESS</td>
<td>0/0</td>
<td>14 BYTE</td>
<td></td>
</tr>
<tr>
<td>4. DEVICE MESS</td>
<td>0/0</td>
<td>6 BYTE</td>
<td></td>
</tr>
<tr>
<td>5. COIL MESS</td>
<td>0/0</td>
<td>18 BYTE</td>
<td></td>
</tr>
<tr>
<td>6. COMMENT MESS</td>
<td>0/0</td>
<td>60 BYTE</td>
<td></td>
</tr>
<tr>
<td>7. CONTROL CODE (0)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The maximum number of messages and maximum length of each message are shown below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Max. number of messages</th>
<th>Max. data length</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 ALARM MESS</td>
<td>256</td>
<td>32 bytes/message</td>
<td>The alarm message data memory size is set.</td>
</tr>
<tr>
<td>2 OPERATE MESS</td>
<td>256</td>
<td>60 bytes/message</td>
<td>The operator message data memory size is set.</td>
</tr>
<tr>
<td>3 PLC SW MESS</td>
<td>32</td>
<td>14 bytes/switch</td>
<td>The PLC switch data memory size is set. Normally set this to 14.</td>
</tr>
<tr>
<td>4 DEVICE MESS</td>
<td>1000</td>
<td>6 bytes/contact</td>
<td>The memory size of the ladder diagram contact comments such as SP CCW is set.</td>
</tr>
<tr>
<td>5 COIL MESS</td>
<td>2700</td>
<td>18 bytes/coil</td>
<td>The memory size of ladder diagram coil comments such as Y100 SPINDLE CCW is set.</td>
</tr>
<tr>
<td>6 COMMENT MESS</td>
<td>100</td>
<td>60 bytes/comment</td>
<td>The memory size of comment data for tool registration, load meter, etc. is set. Up to 60 characters can be used for the load meter comment, so normally set this to 60.</td>
</tr>
<tr>
<td>7 CONTROL CODE</td>
<td>—</td>
<td>—</td>
<td>Not used. Set to 0.</td>
</tr>
</tbody>
</table>
7. Messages

7.1.1  Example of settings

The above screen will appear when the [7.INIT] menu is selected, and the message file set with the edit file is searched for but not found.

For example, perform the following to set USED SIZE in ALARM MESS:

2.WRITE → 5.CONVT

Note) This can be omitted as the default values are set in the data length.

Set the numbers in USED SIZE in OPERATE MESS to COMMENT MESS are required.

Next, register this data into a file. The display shown on the right will appear when [5.CONVT] is pressed. The size can be changed or registered by pressing [Y].
7. Messages

The numbers in the USED SIZE sections are as follows:

\[
\text{Number of messages} / \text{Number of registered messages}
\]

- Number of registered messages: The number of messages registered in the message table.
- Number of messages: The number of messages that can be registered.

The number of messages and number of registered messages are displayed in the “MEMORY ( / )” of each message create screen after this.

**CAUTION**

If the data length per block of each message is changed, the message data that had been created previously will be invalid.

The message “SELECT INIT!” will appear if an ALARM or OPERATOR MESSAGE screen, etc., is selected without setting the number of messages or data length in the initial setting.
7. Messages

7.2 Writing

The method for writing each message is explained in this section.

[Basic operation]

1. MSG → 1. ALARM → (Read) → 2. WRITE → (Write data) → MENU
   2. OPERAT
   3. PLC SW
   4. DEVICE
   5. COIL
   6. COMMENT

[Operation procedure]

(1) Press 1. MSG, select each message menu, and then read.
(2) Press 2. WRITE and the setting section will display.
(3) Press MENU after writing the message data and then press 5. CONVT, "COMPLETED" will display on the top of the screen when the conversion is completed.

Examples of operation for each message are given on the following pages.
7. Messages

7.2.1 ALARM MESS and OPERATE MESS

[Operation example] Writing ALARM MESS “EMERGENCY”.

1) The following screen will display when [1.MESS] [1.ALARM] [1.READ] [1] [2.WRITE] are pressed.

(2) The following data will display when [1] [0] [EMERGENCY] are pressed.
7. Messages

(3) The message data has not been transmitted to the file yet.
Press [MENU] 5.CONVT. "COMPLETED" will display when the operation is completed correctly.

```
# (     ) (     ) (                                 )
MEM (          /  100 STEP) COMPLETED
MODE ALARM MENU WRITE
```

The message data has been transmitted to the file.

(4) The data register number is 0 here. If 1 to 1023 is input, an identification number can be displayed after the message when the ALARM MESS is displayed on the CNC. For example, if 1 is input, the data register (D) 1 contents are displayed after the message. If the D1 contents are 3, 3 will display. The F or R method can be used for the ALARM MESS display. To use F, start the index from 0. To use R, start the index at 1. Note that even if a message with index 0 is created, the message cannot be displayed in the R method.

(5) The OPERATE MESS setting method is the same as the ALARM MESS setting method but only the R method can be used. A message created with index 0 will be insignificant. Refer to the PLC Programming Manual (Ladder Section) for the specifications of ALARM MESS and OPERATE MESS.

The machine name and title used during printing can also be creating using the operator messages.

<table>
<thead>
<tr>
<th>9000</th>
<th>Machine name start number</th>
<th>Used during printing</th>
</tr>
</thead>
<tbody>
<tr>
<td>9001</td>
<td>Machine name end number</td>
<td>Used during printing</td>
</tr>
<tr>
<td>9002</td>
<td>Title display start number</td>
<td>Used during printing</td>
</tr>
<tr>
<td>9003</td>
<td>Title display end number</td>
<td>Used during printing</td>
</tr>
</tbody>
</table>
7. Messages

Example of title display and machine name printing

FILE MESSAGE1

.....................................................................................................................................

.....................................................................................................................................

.. STANDARD SEQUENCE DIAGRAM

.. ;98-08-18 BY.MITSUBISHI

.. ........

.. MODIFY MEMO ........

.. ........

.. ........

.. ........

.. ........

.. ........

.. ........

.. ........

.. ........

Machine name printout ——— MELDAS 64 SERIES LADDER
(Printed on every page) BND-400W000-A0 ‘98-08-18
MACHINE TYPE ABC100
Example of OPERATE MESS used for title display and machine name printing

0 (9000) (MELDAS 64 SERIES LADDER )
1 (9000) (BND-400W000-A0  ’98-08-18 )
2 (9001) (MACHINE TYPE     ABC100 )
3 (9002) (................................................................. )
4 (9002) (......................................................... )
5 (9002) (......................................................... )
6 (9002) (......................................................... )
7 (9002) (......................................................... )
8 (9002) (......................................................... )
9 (9002) (......................................................... )
10 (9002) (......................................................... )
11 (9002) (......................................................... )
12 (9002) (......................................................... )
13 (9002) (......................................................... )
14 (9002) (......................................................... )
15 (9002) (......................................................... )
16 (9002) (......................................................... )
17 (9002) (......................................................... )
18 (9003) (......................................................... )

Machine name message
(Max. of three lines are valid)

Title display message
(The number of lines is not limited)

Set 9000 to 9003
Maximum of 80 characters
7.2.2 PLC switches

[Operation example] Assign “MST_LOCK” to PLC switch 1.

(1) Press 1.MSG → 3.PLC SW → 1.READ 0 2.WRITE, and the following setting section will display.

```
# ( ) ( )
```

Message

Index number

(2) Input 0 → MST_LOCK

```
# ( ) (MST_LOCK )
```

(3) Press and the following display will appear.

```
PLC SWITCH

# 1 (MST LOCK )
2 ( )
3 ( )
4 ( )
5 ( )
6 ( )
7 ( )
8 ( )
9 ( )
10 ( )
11 ( )
12 ( )
13 ( )
14 ( )

# ( ) ( )
MEM ( / 32 STEP)

MODE PLC SW MENU WRITE
```

(4) Execute MENUE and press 5.CONVT. “COMPLETED” will display and the message writing will be completed. The PLC switch number displayed on the CNC will be the index number incremented by one.

**CAUTION**

To use the PLC switch name file created here with the MELDASMAGIC MMI software (option), a conversion must be made with the “PLC Switch Conversion Tool (CNVPLCSW)” found on the “Utility disk”. Refer to the “Utility Disk Instruction Manual” for details on how to use this conversion tool.
7. Messages

7.2.3 Device (Contact) comment and coil comment

[Operation example] Write device “M100” and comment “SP.CW” in contact 10.

(1) Press 1.MSSG → 4.DEVICE → 1.READ → 1.0 [ ] 2.WRITE, and the following setting section will display.

```
# ( ) ( ) ( ) ( )
```

Contact comment or coil comment
Device number
Device
Index number

(2) Input 1 0 [ ] M [ ] 1 0 0 [ ] S [ ] P [ ] C [ ] W [ ]

```
# (  10) (M) ( 100) ( SP. CW)
```

(3) Press [ ] and the following will display.

```
# ( 10) (M) (100) (SP.CW)
```

(4) The coil comment can be set in the same manner as the contact comment.

Note)

The (A) comment is the contact comment.
The (B) comment is the coil comment.
7. Messages

7.2.4  Comment

[Operation example]

(1) Press 1.MSSG 6.COMMENT 1.READ 0 WRITE and the following setting section will display.

<table>
<thead>
<tr>
<th>Message</th>
<th>Device number</th>
<th>Device</th>
<th>Index number</th>
</tr>
</thead>
<tbody>
<tr>
<td># (     ) (     ) (       )</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(2) Set the device as 1, the device number as 0 and create a message for the TOOL REGISTRATION screen. A maximum of five steps with a maximum of eight characters can be created. The CNC will display only the first five steps even if more than five steps are created.

(3) Set the device as 2, the device number as 0 or 1 and create a message for the load meter. The load meter comment is divided into the title, scale and unit, etc., and created.

<table>
<thead>
<tr>
<th>No.</th>
<th>Device</th>
<th>Device No.</th>
<th>Comment display length</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Not used (default value 0)</td>
<td>8 alphanumeric characters</td>
<td>Device 1 comment is read from top to bottom and displayed from left to right on the TOOL REGISTRATION screen.</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>0: First series screen comment 1: Second series screen comment</td>
<td>30 characters or 10 characters</td>
<td>The comments with a device 2 is read from the top and displayed as the load meter comments.</td>
</tr>
</tbody>
</table>

(4) Execute MENUE and press 5.CONVT after writing the comment messages.

An example of comment creation is shown below.

0 (1) (0) (Spindle]
1 (1) (0) ([Standby 1]
2 (1) (0) ([Standby 2]
3 (1) (0) ([Standby 3]
4 (1) (0) ([Index]
5 (2) (0) (Spindle load 1
6 (2) (0) (0 50 100
7 (2) (0) (* %
8 (2) (0) ( | _ | _ | _ | _ | _ | _ | _ | _ | _ |
9 (2) (0) (Z axis load 1
10 (2) (0) (0 50 100
11 (2) (0) (* %
12 (2) (0) ( | _ | _ | _ | _ | _ | _ | _ | _ | _ |
13 (2) (1) (X axis load 2
14 (2) (1) (0 50 100
15 (2) (1) (* %
16 (2) (1) ( | _ | _ | _ | _ | _ | _ | _ | _ | _ |
17 (2) (1) (Z axis load 2
18 (2) (1) (0 50 100
19 (2) (1) (* %
20 (2) (1) ( | _ | _ | _ | _ | _ | _ | _ | _ | _ |
21 ( ) (1) ( )

The comments number 13 to 20 (device number:1) are the comment data for the second series when using a 2-series system.
Load meter display

The bar graph start position is fixed to the 11th character from the left.
The display length (number of characters) is set in R155/R355.
The R154/R354 value is displayed (binary 0~32767).
The display length (number of characters) is set in R153/R353.
The R152/R352 value is displayed (binary 0~32767).

(Note) R152 to 155 control the first series screen display when using a 2-series system, and R352 to 355 control the second series screen display when using a 2-series system.

Precautions for creating load meter

A pair is created with two lines using the first line for the first step and the second line as the second step. In the above example, No. 5, 7, 9 and 11 are the first step, and No. 6, 8, 10 and 12 are the second step.

1. The comment message length must be 60 bytes. (The maximum display data on the actual machine is 30 characters, so this is set to 60 characters for compatibility with other models.)
2. The message display will display a maximum of 10 bytes on the first step and 30 bytes on the second step.
3. Write the device number in the second step even if the message that is 10 bytes or shorter is being displayed.
4. Do not use a Kanji character for the 10th byte. (Kanji characters that extend over the 9 to 10th bytes are possible, but those that extend over the 10 to 11th bytes are not possible.)
5. The third step and seventh step of the comment display will not display the first six characters of the ten characters. In this example, the first six characters are "\%".
7. Messages

7.2.5 Precautions for creating messages

(1) Semi-graphics (↑, ↓, etc.) cannot be used for the message data created with the personal computer. If semi-graphics must be used with the load meter, etc., leave that line blank, and create the message containing the semi-graphics with the CNC's onboard function.

(2) An even number of characters must always be set for each message. The CNC may not function correctly if an odd number is set.

(3) A maximum of 60 characters (30 characters × 2 lines) can be displayed for the operator message. Thus, if a Kanji character (2 character data) is used for the 30th or 31st character, it will not be displayed correctly. Use a blank space for the 30th character here.

Example of operator message

The external operator message display uses two lines.

Use a space for the 30th character.

#1 ( 0) (The external operator message display uses two lines.)
7.3 Read

The method for reading the messages is explained in this section.

[Basic operation]

1.MSSG → 1.ALARM → 1.READ → 2.OPERAT → 3.PLC SW → 4.DEVICE → 5.COIL → 6.COMMENT

(1) Press 1.MSSG and then select one from 1.ALARM to 6.COMMENT.

(2) Press 1.READ and the setting section will display. Input the index number of the message to be read into the setting area, and press  . 15-lines worth of messages will display from the index number.

(3) Input “+” or “−” into the index number setting area to feed the page and then press  . “+” indicates forward page feed and “−” indicates reverse page feed.
7.4 Insertion

The method for inserting each message is explained in this section.

[Basic operation]

1. MSGG → 1.ALARM → (Message read) → 3. INSERT → (Message data input)
   2. OPERAT
   3. PLC SW
   4. DEVICE
   5. COIL
   6. COMMENT

[Operation example]

(1) Press 1.MSGG and then select one from 1.ALARM to 6.COMMENT.
(2) Read the message section to be inserted.
(3) Press 3. INSERT, set the index number and data to be inserted into the setting area, and then press enter.
   An example is shown below.

For example to insert data between 101 and 102, designate the 102 position, and create the data to be inserted.

<table>
<thead>
<tr>
<th>Index</th>
<th>Message Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>(1001) (EMERGENCY STOP! )</td>
</tr>
<tr>
<td>101</td>
<td>(1001) (EMERGENCY! )</td>
</tr>
<tr>
<td>102</td>
<td>(1002) (SPINDLE ERROR )</td>
</tr>
<tr>
<td>103</td>
<td>(1003) (OIL PRESSURE PUMP ERROR )</td>
</tr>
</tbody>
</table>

# (102) (1002) (SPINDLE ERROR)  
When [Enter] is pressed, the following will occur.

<table>
<thead>
<tr>
<th>Index</th>
<th>Message Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>(1001) (EMERGENCY STOP! )</td>
</tr>
<tr>
<td>101</td>
<td>(1001) (EMERGENCY! )</td>
</tr>
<tr>
<td>102</td>
<td>(1002) (SPINDLE ERROR )</td>
</tr>
<tr>
<td>103</td>
<td>(1002) (SPINDLE ERROR )</td>
</tr>
<tr>
<td>104</td>
<td>(1003) (OIL PRESSURE PUMP ERROR )</td>
</tr>
</tbody>
</table>

(4) Press [INS] if insertion is completed, press [5. CONVT] and then [Enter].
"COMPLETED" will display when conversion is completed.

(Note) The inserted data will be invalid if write or read is selected without conversion.
7.5 Deletion

The method for deleting each message is explained in this section.

[Basic operation]

1. MSSG → 1. ALARM → (Message read) → 4. DELETE → (Input index number of message to be deleted)

[Operation example]

(1) Press 1. MSSG and then select one from 1. ALARM to 6. COMMENT.
(2) Read the message section to be deleted.
(3) Press 4. DELETE, set the index number to be deleted into the setting area, and then press .

An example is shown below.

<table>
<thead>
<tr>
<th>#</th>
<th>Index</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>(1001)</td>
<td>(EMERGENCY STOP!)</td>
</tr>
<tr>
<td>101</td>
<td>(1001)</td>
<td>(EMERGENCY!)</td>
</tr>
<tr>
<td>102</td>
<td>(1002)</td>
<td>(SPINDLE ERROR)</td>
</tr>
<tr>
<td>103</td>
<td>(1003)</td>
<td>(OIL PRESSURE PUMP ERROR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(continued)</td>
</tr>
</tbody>
</table>

Set the index and press .

(4) Press INS if deletion is completed, press 5. CONVT and then .

The following will occur.

<table>
<thead>
<tr>
<th>#</th>
<th>Index</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>(1001)</td>
<td>(EMERGENCY STOP!)</td>
</tr>
<tr>
<td>101</td>
<td>(1001)</td>
<td>(EMERGENCY!)</td>
</tr>
<tr>
<td>102</td>
<td>(1003)</td>
<td>(OIL PRESSURE PUMP ERROR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(continued)</td>
</tr>
</tbody>
</table>
7.6 Conversion

The edited data is written into the message file.

[Basic operation]

1.MSSG → (Edit message) → INS → 5.CONVT → completion

[Operation example]

(1) Press 1.MSSG and edit the message (write, insert, delete).

(2) Press INS → 5.CONVT → completion after editing.

The contents of the message file will be updated when "COMPLETED" is displayed.
8. Printing

The PLC development software can edit as well as print the ladder circuits and messages. There are two methods of printing: printer and printer 2. Printer 2 allows the size of the ladder circuit to be selected.

**PRINT MODE**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. LADDER</strong></td>
<td>(1) PRINT OUT</td>
<td></td>
</tr>
<tr>
<td><strong>2. COMMENT</strong></td>
<td>(0)</td>
<td>SET = 1</td>
</tr>
<tr>
<td><strong>3. ALARM MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>4. OPERATE MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>5. COMMENT MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>6. PLC SW MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>31. USED PAPER SIZE</strong></td>
<td>11INCH</td>
<td></td>
</tr>
<tr>
<td><strong>32. PRINT START POINT</strong></td>
<td>X=0</td>
<td></td>
</tr>
<tr>
<td><strong>33. DATA LENGTH</strong></td>
<td>8+1</td>
<td></td>
</tr>
<tr>
<td><strong>34. START PAGE NO</strong></td>
<td>(1)</td>
<td>0 &lt;= X &lt; 10000</td>
</tr>
<tr>
<td><strong>20. MACHINE NAME</strong></td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td><strong>21. LADDER FILE</strong></td>
<td>(BASE.LD)</td>
<td></td>
</tr>
<tr>
<td><strong>22. POINT START STEP</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>23. END STEP</strong></td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td><strong>24. MODE SELECT</strong></td>
<td>(0)</td>
<td>0: LAD, 1: LAD. + COM, 2: LAD. + COM. + CRS</td>
</tr>
<tr>
<td><strong>25. MESSAGE FILE</strong></td>
<td>(BASE.MS)</td>
<td></td>
</tr>
<tr>
<td><strong>26. I/O DEVICE</strong></td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td><strong>27. POINT START NO</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>28. END NO</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>29. MODE SELECT</strong></td>
<td>(0)</td>
<td>0: ALL DEVICE, 1: DEVICE, 2: DEV. + DEV NO.</td>
</tr>
<tr>
<td><strong>30. USED PAPER SIZE</strong></td>
<td>11INCH</td>
<td></td>
</tr>
<tr>
<td><strong>31. USED PAPER SIZE</strong></td>
<td>210mm</td>
<td></td>
</tr>
<tr>
<td><strong>32. PRINT START POINT</strong></td>
<td>X=0</td>
<td></td>
</tr>
<tr>
<td><strong>33. DATA LENGTH</strong></td>
<td>8+1</td>
<td></td>
</tr>
<tr>
<td><strong>34. START PAGE NO</strong></td>
<td>(1)</td>
<td>0 &lt;= X &lt; 10000</td>
</tr>
</tbody>
</table>

Screen for 5. PRINT2

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. LADDER</strong></td>
<td>(1) PRINT OUT</td>
<td></td>
</tr>
<tr>
<td><strong>2. DEVICE, COIL</strong></td>
<td>(0)</td>
<td>SET = 1</td>
</tr>
<tr>
<td><strong>3. ALARM MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>4. OPERATE MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>5. COMMENT MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>6. PLC SW MSG</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>30. USED PAPER SIZE</strong></td>
<td>11INCH</td>
<td></td>
</tr>
<tr>
<td><strong>31. USED PAPER SIZE</strong></td>
<td>210mm</td>
<td></td>
</tr>
<tr>
<td><strong>32. PRINT START POINT</strong></td>
<td>X=0</td>
<td></td>
</tr>
<tr>
<td><strong>33. DATA LENGTH</strong></td>
<td>8+1</td>
<td></td>
</tr>
<tr>
<td><strong>34. START PAGE NO</strong></td>
<td>(1)</td>
<td>0 &lt;= X &lt; 10000</td>
</tr>
<tr>
<td><strong>20. MACHINE NAME</strong></td>
<td>(1)</td>
<td></td>
</tr>
<tr>
<td><strong>21. LADDER FILE</strong></td>
<td>(BASE.LD)</td>
<td></td>
</tr>
<tr>
<td><strong>22. POINT START STEP</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>23. END STEP</strong></td>
<td>(100)</td>
<td></td>
</tr>
<tr>
<td><strong>24. MODE SELECT</strong></td>
<td>(0)</td>
<td>0: LAD, 1: LAD. + COM, 2: LAD. + COM. + CRS</td>
</tr>
<tr>
<td><strong>25. MESSAGE FILE</strong></td>
<td>(BASE.MS)</td>
<td></td>
</tr>
<tr>
<td><strong>26. I/O DEVICE</strong></td>
<td>( )</td>
<td></td>
</tr>
<tr>
<td><strong>27. POINT START NO</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>28. END NO</strong></td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td><strong>29. MODE SELECT</strong></td>
<td>(0)</td>
<td>0: ALL DEVICE, 1: DEVICE, 2: DEV. + DEV NO.</td>
</tr>
<tr>
<td><strong>30. USED PAPER SIZE</strong></td>
<td>11INCH</td>
<td></td>
</tr>
<tr>
<td><strong>31. USED PAPER SIZE</strong></td>
<td>210mm</td>
<td></td>
</tr>
<tr>
<td><strong>32. PRINT START POINT</strong></td>
<td>X=0</td>
<td></td>
</tr>
<tr>
<td><strong>33. DATA LENGTH</strong></td>
<td>8+1</td>
<td></td>
</tr>
<tr>
<td><strong>34. START PAGE NO</strong></td>
<td>(1)</td>
<td>0 &lt;= X &lt; 10000</td>
</tr>
</tbody>
</table>

Screen for 3. PRINT

# (21 ) DATA ( ) LAD1 3PRINT 5PRINT2

Screen for 5. PRINT2

# ( ) DATA ( ) 3PRINT 5PRINT2
8. Printing

[Basic operation]

\[
6.\text{EXT IO} \rightarrow \begin{cases} 3.\text{PRINT} \\ 5.\text{PRINT2} \end{cases} \rightarrow \text{(Set printing conditions)} \rightarrow \boxed{G \ O} \boxed{\square}
\]

[Example of operation] ... For both printer and printer 2

1. Select \text{6.EXT IO} and then select printer or printer 2.
2. Next input the various conditions into the setting section.
   
   \[
   \#(\quad)\quad(\quad)\quad\text{Index}\quad\text{Data}
   \]

3. Input \boxed{G \ O} in the index setting section, and press \boxed{\square}. Printing will start.
   
   When completed, the GO display will disappear and the cursor will appear.
8.1 Printing the Ladder Program (Printer)

The procedure for selecting the printer and printing the ladder circuit is shown below.

1. Select LADDER.

2. To print with the machine name added, set 20. MACHINE NAME to 1.

3. Set the ladder file name.

4. Set the START STEP and END STEP. All steps will be printed when both the START STEP and END STEP are set to 0.

5. Set MODE SELECT.

6. Set the message file when "20. MACHINE NAME" and "24. MODE SELECT (with comment)" are designated.

7. Set the start signal. 

   # (GO) DATA (   )

   Execute printing.

   The start signal will disappear and # (   ) DATA (   ) will appear when printing is completed.

8. Set the page to start printing from in 34. START PAGE NO. Normally, printing will start from page 1.

CAUTION

Do not use the same name for the ladder file and message file.
8.2 Printing the Comment List (Printer)

The procedure for selecting the printer and printing the comment list (coil comments, contact comments) is shown below.

Select COMMENT MSSG.

To print with the machine name added, set 20. MACHINE NAME to 1.

Set the message file name. Set into 25. MESSAGE FILE ( ).

Set the comment list mode. 29. MODE SELECT ( )
Select one of the following:
0. ALL DEVICE
1. DEVICE
2. DEV. + DEV. NO.

If 1 or 2 is selected above, set the designated device. Designate device A to Z.

Next, set the range of the designated device.
Refer to "Section 3. Development Procedure" for the setting range.

Set the start signal.
# (GO) DATA ( )

Execute printing. The GO message will disappear and # ( ) DATA ( ) will appear when printing is completed.
8.3 Printing the Ladder Program (Printer 2)

The procedure for selecting the printer 2 and printing the ladder circuit is shown below.

Select LADDER.

To print with the machine name added, set 20. MACHINE NAME to 1.

Set the ladder file name.

Set the START STEP and END STEP. All steps will be printed when both the START STEP and END STEP are set to 0.

Set the MODE SELECT.

Set the message file when “20. MACHINE NAME” and “24. MODE SELECT (with comment)” are designated.

Designate the printer paper.

Set the line spacing.

Note) Only the ladder will be printed if the message file is not designated.

Note) "0" is set for the screen selection.

To next page.
Set the start signal.
# (GO) DATA ( )

Execute printing.

The start signal will disappear and # ( ) DATA ( ) will appear when printing is completed.

Set the page to start printing from in 34. START PAGE NO. Normally, printing will start from page 1.

**CAUTION**

1. Do not set the same name for the ladder file and message file.

2. Only the ladder will be printed if the message file name is not designated even if “1” or “2” is set in 24. MODE SELECT ( ).

3. The contact comments and coil comments must be created with the message function. A maximum of 6 characters can be set for the contact comment and 18 characters for the coil contact.

4. The OR circuit is not separated when the page is changed, but if the coil’s cross section is more than four lines when the OR circuit is printed on the last line of the page, the OR circuit will be continued on the next page.
8.4 Printing the Contact Comments and Coil Comments (Printer 2)

The procedure for selecting printer 2 and printing the contact comments and coil comments is shown below.

Set "1" in 2. DEVICE/COIL ( ).

To print with the machine name added, set 20. MACHINE NAME to 1.

Set the message file name in 25. MESSAGE FILE ( ).

Set 29. DEVICE/COIL MODE ( ). Select one of the following:
- 0: ALL DEVICE
- 1: DEVICE
- 2: DEV. + DEV. NO.
- 3: ALL DEVICE
- 4: DEVICE
- 5: DEV. + DEV. NO.

If 1, 2, 4 or 5 is set in 29. MODE SELECT ( ) above, set device A to Z in the I/O DEVICE ( ).

If 2 or 5 is set in 29. MODE SELECT ( ) above, set the range of the designated device. Set the device number in:
- 27. POINT START NO. ( )
- 28. END NO. ( )

**Note** If END NO. is "0", all device Nos. will be printed.

Set the start signal.
# (GO) DATA ( )

The GO message will disappear and # ( ) DATA ( ) will appear when printing is completed.
8.5 Example of Printing

An example of printing with printer 2 using the PLC development software is shown below.

8.5.1 Printing with ladder + comment + cross

Printer   Example LP-7000

FILE LAD M1000

<table>
<thead>
<tr>
<th>Address</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td></td>
</tr>
<tr>
<td>M1000</td>
<td></td>
</tr>
<tr>
<td>X0</td>
<td></td>
</tr>
<tr>
<td>X1</td>
<td></td>
</tr>
<tr>
<td>X2</td>
<td></td>
</tr>
<tr>
<td>X3</td>
<td></td>
</tr>
<tr>
<td>X4</td>
<td></td>
</tr>
<tr>
<td>X5</td>
<td></td>
</tr>
<tr>
<td>X6</td>
<td></td>
</tr>
<tr>
<td>ZCAN</td>
<td></td>
</tr>
<tr>
<td>Y0</td>
<td></td>
</tr>
<tr>
<td>Y1</td>
<td></td>
</tr>
<tr>
<td>Y2</td>
<td></td>
</tr>
<tr>
<td>Y3</td>
<td></td>
</tr>
<tr>
<td>Y4</td>
<td></td>
</tr>
<tr>
<td>Y5</td>
<td></td>
</tr>
<tr>
<td>Y6</td>
<td></td>
</tr>
<tr>
<td>Y7</td>
<td></td>
</tr>
<tr>
<td>Y8</td>
<td></td>
</tr>
<tr>
<td>Y9</td>
<td></td>
</tr>
<tr>
<td>Y10</td>
<td></td>
</tr>
<tr>
<td>Y11</td>
<td></td>
</tr>
</tbody>
</table>

Automatic operation start: 13
Automatic operation stop: 15
Single block: 17
Dry run: 19
Automatic machine lock 1: 21
Automatic machine lock 2: 22
Automatic machine lock 3: 23
Automatic machine lock 4: 24
Automatic machine lock 5: 25
Automatic machine lock 6: 26
Manual machine lock 1: 27
Manual machine lock 2: 28
Manual machine lock 3: 29
Manual machine lock 4: 30
Manual machine lock 5: 31
Manual machine lock 6: 32
Optional block skip: 33
Manual machine lock 7: 34
Miscellaneous function lock: 35
Memory: 36

Memory:

- 77 -
8. Printing

8.5.2 Example of contact comment printing

<table>
<thead>
<tr>
<th>COMMENT</th>
<th>FILE MSG500</th>
</tr>
</thead>
<tbody>
<tr>
<td>X180 RDY1</td>
<td>X1CB</td>
</tr>
<tr>
<td>X181 RDY2</td>
<td>X1CC</td>
</tr>
<tr>
<td>X182 RDY3</td>
<td>X1CD</td>
</tr>
<tr>
<td>X183 RDY4</td>
<td>X1CE</td>
</tr>
<tr>
<td>X184 RDY5</td>
<td>X1CF</td>
</tr>
<tr>
<td>X185 RDY6</td>
<td>X1D0</td>
</tr>
<tr>
<td>X186 RDY7</td>
<td>X1D1</td>
</tr>
<tr>
<td>X187 RDY8</td>
<td>X1D2</td>
</tr>
<tr>
<td>X188 AX1</td>
<td>X1D3</td>
</tr>
<tr>
<td>X189 AX2</td>
<td>X1D4</td>
</tr>
<tr>
<td>X18A AX3</td>
<td>X1D5</td>
</tr>
<tr>
<td>X18B AX4</td>
<td>X1D6</td>
</tr>
<tr>
<td>X18C AX5</td>
<td>X1D7</td>
</tr>
<tr>
<td>X18D AX6</td>
<td>X1D8</td>
</tr>
<tr>
<td>X18E AX7</td>
<td>X1D9</td>
</tr>
<tr>
<td>X18F AX8</td>
<td>X1DA</td>
</tr>
<tr>
<td>X190 MVP1</td>
<td>X1DB</td>
</tr>
<tr>
<td>X191 MVP2</td>
<td>X1DC</td>
</tr>
<tr>
<td>X192 MVP3</td>
<td>X1DD</td>
</tr>
<tr>
<td>X193 MVP4</td>
<td>X1DE</td>
</tr>
<tr>
<td>X194 MVP5</td>
<td>X1DF</td>
</tr>
<tr>
<td>X195 MVP6</td>
<td>X1E0 J0</td>
</tr>
<tr>
<td>X196 MVP7</td>
<td>X1E1 HO</td>
</tr>
<tr>
<td>X197 MVP8</td>
<td>X1E2 SO</td>
</tr>
<tr>
<td>X198 MVW1</td>
<td>X1E3 PTP0</td>
</tr>
<tr>
<td>X199 MVW2</td>
<td>X1E4 ZRNO</td>
</tr>
<tr>
<td>X19A MVW3</td>
<td>X1E5</td>
</tr>
<tr>
<td>X19B MVW4</td>
<td>X1E6</td>
</tr>
<tr>
<td>X19C MVW5</td>
<td>X1E7</td>
</tr>
<tr>
<td>X19D MVW6</td>
<td>X1E8 MEMO</td>
</tr>
<tr>
<td>X19E MVW7</td>
<td>X1E9 TO</td>
</tr>
<tr>
<td>X19F MVW8</td>
<td>X1EA</td>
</tr>
<tr>
<td>X1A0 ZP11</td>
<td>X1EB DO</td>
</tr>
<tr>
<td>X1A1 ZP12</td>
<td>X1EC</td>
</tr>
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<td>X1A3 ZP14</td>
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<td>X1A4 ZP15</td>
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</tr>
<tr>
<td>X1A5 ZP16</td>
<td>X1FO MA</td>
</tr>
<tr>
<td>X1A6 ZP17</td>
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</tr>
<tr>
<td>X1A7 ZP18</td>
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<td>X1A8 ZP21</td>
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<tr>
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<td>X1F5 RST</td>
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<td>X1F6 CNX</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>X1AE ZP27</td>
<td>X1F9 TIMP</td>
</tr>
<tr>
<td>X1AF ZP28</td>
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</tr>
<tr>
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</tr>
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<td>X1FE</td>
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<tr>
<td>X1B4 ZP35</td>
<td>X1FF HINT</td>
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<tr>
<td>X1B5 ZP36</td>
<td>X200 RPN</td>
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<td>X1B6 ZP37</td>
<td>X201 CUT</td>
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<td>X1B7 ZP38</td>
<td>X202 TAP</td>
</tr>
<tr>
<td>X1B8 ZP41</td>
<td>X203 THRD</td>
</tr>
<tr>
<td>X1B9 ZP42</td>
<td>X204 SYN</td>
</tr>
<tr>
<td>X1BA ZP43</td>
<td>X205 CSS</td>
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<tr>
<td>X1BB ZP44</td>
<td>X206 SKIP</td>
</tr>
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<td>X1BC ZP45</td>
<td>X207 ZRNN</td>
</tr>
<tr>
<td>X1BD ZP46</td>
<td>X208 INCH</td>
</tr>
<tr>
<td>X1BE ZP47</td>
<td>X209 DLKN</td>
</tr>
<tr>
<td>X1BF ZP48</td>
<td>X20A FIDN</td>
</tr>
<tr>
<td>X1C0 ZP49</td>
<td>X20D SLOW</td>
</tr>
<tr>
<td>X1C1 ZP50</td>
<td>X20E SLOW</td>
</tr>
<tr>
<td>X1C2 ZP51</td>
<td>X20F SLOW</td>
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<td>.</td>
<td>.</td>
</tr>
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<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
8.5.3 Example of coil comment printing

<table>
<thead>
<tr>
<th>DEVICE</th>
<th>COMMENT LIST</th>
<th>DEVICE</th>
<th>COMMENT LIST</th>
<th>DEVICE</th>
<th>COMMENT LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y180</td>
<td>AXIS OFF 1</td>
<td>Y1C8</td>
<td>Automatic machine lock 4</td>
<td>Y216</td>
<td></td>
</tr>
<tr>
<td>Y181</td>
<td>AXIS OFF 2</td>
<td>Y1C9</td>
<td>Automatic machine lock 5</td>
<td>Y217</td>
<td></td>
</tr>
<tr>
<td>Y182</td>
<td>AXIS OFF 3</td>
<td>Y1CD</td>
<td>Automatic machine lock 6</td>
<td>Y218</td>
<td>Automatic operation start</td>
</tr>
<tr>
<td>Y183</td>
<td>AXIS OFF 4</td>
<td>Y1CE</td>
<td>Automatic machine lock 7</td>
<td>Y219</td>
<td>+Automatic operation stop</td>
</tr>
<tr>
<td>Y184</td>
<td>AXIS OFF 5</td>
<td>Y1CF</td>
<td>Automatic machine lock 8</td>
<td>Y21A</td>
<td>Single block</td>
</tr>
<tr>
<td>Y185</td>
<td>AXIS OFF 6</td>
<td>Y1D0</td>
<td>Manual machine lock 1</td>
<td>Y21B</td>
<td>+Block start interlock</td>
</tr>
<tr>
<td>Y186</td>
<td>AXIS OFF 7</td>
<td>Y1D1</td>
<td>Manual machine lock 2</td>
<td>Y21C</td>
<td>+Cutting start interlock</td>
</tr>
<tr>
<td>Y187</td>
<td>AXIS OFF 8</td>
<td>Y1D2</td>
<td>Manual machine lock 3</td>
<td>Y21D</td>
<td>Dry run</td>
</tr>
<tr>
<td>Y188</td>
<td>SERVO OFF 1</td>
<td>Y1D3</td>
<td>Manual machine lock 4</td>
<td>Y21E</td>
<td></td>
</tr>
<tr>
<td>Y189</td>
<td>SERVO OFF 2</td>
<td>Y1D4</td>
<td>Manual machine lock 5</td>
<td>Y21F</td>
<td>Error detect</td>
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<tr>
<td>Y18A</td>
<td>SERVO OFF 3</td>
<td>Y1D5</td>
<td>Manual machine lock 6</td>
<td>Y220</td>
<td>NC reset 1</td>
</tr>
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<td>Y18B</td>
<td>SERVO OFF 4</td>
<td>Y1D6</td>
<td>Manual machine lock 7</td>
<td>Y221</td>
<td>NC reset 2</td>
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<tr>
<td>Y18C</td>
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<td>Y1D7</td>
<td>Manual machine lock 8</td>
<td>Y222</td>
<td>Reset &amp; rewind</td>
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<tr>
<td>Y18D</td>
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<td>Y1D8</td>
<td>Feed axis selection 1</td>
<td>Y223</td>
<td>Chamfering</td>
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<td>Y1DB</td>
<td>Feed axis selection 4</td>
<td>Y226</td>
<td>M function complete 1</td>
</tr>
<tr>
<td>Y191</td>
<td>MIRROR IMAGE 2</td>
<td>Y1DC</td>
<td>Feed axis selection 5</td>
<td>Y227</td>
<td>M function complete 2</td>
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<td>Y1DD</td>
<td>Feed axis selection 6</td>
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<td>Tool length measurement</td>
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<td>Y1DE</td>
<td>Feed axis selection 7</td>
<td>Y229</td>
<td>Tool length measurement 2</td>
</tr>
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<td>MIRROR IMAGE 5</td>
<td>Y1DF</td>
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<td>Y195</td>
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<td>Y1E0</td>
<td>Feed axis selection –1</td>
<td>Y22B</td>
<td>Program resume</td>
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<td>Y196</td>
<td>MIRROR IMAGE 7</td>
<td>Y1E1</td>
<td>Feed axis selection –2</td>
<td>Y22C</td>
<td>Playback</td>
</tr>
<tr>
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<td>MIRROR IMAGE 8</td>
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<td>Y22D</td>
<td>Macro interrupt</td>
</tr>
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<td>Y1E3</td>
<td>Feed axis selection –4</td>
<td>Y22E</td>
<td>Rapid traverse</td>
</tr>
<tr>
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<td></td>
<td>Y1E4</td>
<td>Feed axis selection –5</td>
<td>Y22F</td>
<td></td>
</tr>
<tr>
<td>Y19A</td>
<td></td>
<td>Y1E5</td>
<td>Feed axis selection –6</td>
<td>Y230</td>
<td>Manual absolute</td>
</tr>
<tr>
<td>Y19B</td>
<td></td>
<td>Y1E6</td>
<td>Feed axis selection –7</td>
<td>Y231</td>
<td>Display lock</td>
</tr>
<tr>
<td>Y19C</td>
<td></td>
<td>Y1E7</td>
<td>Feed axis selection –8</td>
<td>Y232</td>
<td>F 1 digit speed change valid</td>
</tr>
<tr>
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<td>Y1E8</td>
<td></td>
<td>Y233</td>
<td>Recalculation request</td>
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<td>Y1E9</td>
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<td></td>
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<td>Y236</td>
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<td></td>
<td>Y237</td>
<td></td>
</tr>
<tr>
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<td></td>
<td>Y238</td>
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<tr>
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<td></td>
<td>Y239</td>
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<td></td>
<td>Y240</td>
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<td>Y1F0</td>
<td></td>
<td>Y241</td>
<td>+Data protect key 4</td>
</tr>
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<td></td>
<td>Y242</td>
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<td>Y1F2</td>
<td></td>
<td>Y243</td>
<td></td>
</tr>
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<td>Y1A8</td>
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<td>Y1F3</td>
<td></td>
<td>Y244</td>
<td></td>
</tr>
<tr>
<td>Y1A9</td>
<td>Automatic interlock 2</td>
<td>Y1F4</td>
<td></td>
<td>Y245</td>
<td></td>
</tr>
<tr>
<td>Y1AA</td>
<td>Automatic interlock 3</td>
<td>Y1F5</td>
<td></td>
<td>Y246</td>
<td></td>
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<tr>
<td>Y1AB</td>
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<td>Y1F6</td>
<td></td>
<td>Y247</td>
<td></td>
</tr>
<tr>
<td>Y1AC</td>
<td>Automatic interlock 5</td>
<td>Y1F7</td>
<td></td>
<td>Y248</td>
<td>No.1 handle axis No.11</td>
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<td>Y1AD</td>
<td>Automatic interlock 6</td>
<td>Y1F8</td>
<td></td>
<td>Y249</td>
<td>No.1 handle axis No.12</td>
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<tr>
<td>Y1AE</td>
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<td>Y1F9</td>
<td></td>
<td>Y24A</td>
<td>No.1 handle axis No.14</td>
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<td>Y1AF</td>
<td>Automatic interlock 8</td>
<td>Y1FA</td>
<td></td>
<td>Y24B</td>
<td>No.1 handle axis No.18</td>
</tr>
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<td>Y1B0</td>
<td>Automatic interlock –1</td>
<td>Y1FB</td>
<td></td>
<td>Y24C</td>
<td>No.1 handle axis No.116</td>
</tr>
<tr>
<td>Y1B1</td>
<td>Automatic interlock –2</td>
<td>Y1FC</td>
<td></td>
<td>Y24D</td>
<td></td>
</tr>
<tr>
<td>Y1B2</td>
<td>Automatic interlock –3</td>
<td>Y1FD</td>
<td></td>
<td>Y24E</td>
<td></td>
</tr>
<tr>
<td>Y1B3</td>
<td>Automatic interlock –4</td>
<td>Y1FE</td>
<td></td>
<td>Y24F</td>
<td>No.1 handle axis valid</td>
</tr>
<tr>
<td>Y1B4</td>
<td>Automatic interlock –5</td>
<td>Y1FF</td>
<td></td>
<td>Y250</td>
<td></td>
</tr>
<tr>
<td>Y1B5</td>
<td>Automatic interlock –6</td>
<td>Y1FG</td>
<td></td>
<td>Y251</td>
<td></td>
</tr>
<tr>
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<td>Automatic interlock –7</td>
<td>Y200</td>
<td></td>
<td>Y252</td>
<td></td>
</tr>
<tr>
<td>Y1B7</td>
<td>Automatic interlock –8</td>
<td>Y201</td>
<td></td>
<td>Y253</td>
<td></td>
</tr>
<tr>
<td>Y1B8</td>
<td>Manual interlock 1</td>
<td>Y202</td>
<td></td>
<td>Y254</td>
<td></td>
</tr>
<tr>
<td>Y1B9</td>
<td>Manual interlock 2</td>
<td>Y203</td>
<td></td>
<td>Y255</td>
<td></td>
</tr>
<tr>
<td>Y1BA</td>
<td>Manual interlock 3</td>
<td>Y204</td>
<td></td>
<td>Y256</td>
<td></td>
</tr>
<tr>
<td>Y1BB</td>
<td>Manual interlock 4</td>
<td>Y205</td>
<td></td>
<td>Y257</td>
<td></td>
</tr>
<tr>
<td>Y1BC</td>
<td>Manual interlock 5</td>
<td>Y206</td>
<td></td>
<td>Y258</td>
<td></td>
</tr>
</tbody>
</table>
8.6 Free Form Setting of the Printing Paper

8.6.1 Outline

When "6. FREE FORM" is selected for "30. USED PAPER" on the "PRINT2" screen, the following printing is possible.

- Free No. of lines (Designate with "32. LINE")
- Free No. of columns (Designate with "33. COLUMNS")
- Reduction (Designate with "34. REDUCTION")
- Free left margin (Designate with "35. LEFT MARGIN")

Note that this function is dedicated for the "PRINT2" screen.

8.6.2 Screen configuration

| PRINT 2 |
|---|---|
| 1.LADDER (0) | PRINT OUT |
| 2.DEVICE, COIL (0) | SET = 1 |
| 3.ALM MESSG (0) | |
| 4.OPERATE MESSG (0) | |
| 5.COMMENT MESSG (0) | |
| 6.PLC SW MESSG (0) | |
| 30.Used paper (0) | |
| 31.WIDE | |
| 32.LINE | |
| 33.COLUMNS | |
| 34.REDUCTION | |
| 35.LEFT MARGIN | |
| 36.START PAGE NO | |
| 3 PRINT | 5 PRINT2 |

Note that the screen configuration is dedicated for the "PRINT2" screen.
### 8.6.3 Details of function

When "6. FREE FORM" is selected for "30. USED PAPER" on the "PRINT 2" screen, the data set in items 32. to 35. will be validated.

If a setting other than 6 is made, the 32. to 35. settings will be ignored. Thus, if reduction printing or a left margin is to be designated, set 6 for the "30. USED PAPER" setting.

<table>
<thead>
<tr>
<th>Display Item</th>
<th>Details</th>
<th>Setting range (Default value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. USER PAPER</td>
<td>0: 15+11-inch, 1: A4 portrait, 2: A4 landscape, 3: B4 portrait, 4: B4 landscape, 5: 9+11-inch, 6: Free</td>
<td></td>
</tr>
<tr>
<td>32. LINE</td>
<td>Designate the number of lines to be printed on one page. Designate this value so that the lines will fit on the paper being used. When the designated number of lines have been printed, the change page code will be output. The number of lines here refers to the lines from the file name to the page number. Set the paper size with the printer.</td>
<td>40 ~ 100 (80)</td>
</tr>
<tr>
<td>33. COLUMNS</td>
<td>Designate the number of columns on one line. Designate this so that the columns will fit on the paper being used. If there are more than 75 columns, a comment or cross reference can also be printed. The number of cross references printed on one line will depend on the number of columns. Number of cross references = ( \frac{\text{Number of columns} - 75}{6} + 1 ) (round down decimal values)</td>
<td>70 ~ 136 (75)</td>
</tr>
<tr>
<td>34. REDUCTION</td>
<td>Designate whether to carry out reduction printing. (Note that some printers may not be capable of this function.)</td>
<td>0/1 (0)</td>
</tr>
<tr>
<td>35. LEFT MARGIN</td>
<td>Designate the left margin width with a number of columns. PC-98: Number of normal characters regardless of the reduction designation. PC/AT: Normally, the normal characters. When reduction is designated, the number of reduction characters. (Note) Some printers may not be capable of this function.</td>
<td>0 ~ 40 (0)</td>
</tr>
<tr>
<td>36. START PAGE NO</td>
<td>Designate the page to start printing. The page number will be printed at the bottom center of the page from the set value. If a value other than 0 is designated for &quot;22. POINT START STEP&quot;, the printing will start from the designated step position. At this time, the printing page number will start from the designated value. If an illegal value is set in &quot;36. START PAGE NO&quot;, the &quot;START PAGE ILLEGAL&quot; error will display. The &quot;START PAGE ILLEGAL&quot; error will occur in the following case: 1) When a setting not within the setting range is made.</td>
<td>0 ~ 9999 (1)</td>
</tr>
</tbody>
</table>

### 8.6.4 Precautions

1. If the ladder mode is 0 or if the number of columns does not satisfy 75, the comment or cross reference cannot be printed.
2. The reduction and left margin settings are valid only when the "30. USED PAPER" setting is "6. FREE FORM".
3. The default value of each data can be changed to an arbitrary value by using the external file "PR_DATA". Refer to the section "8.7 External File (PR_DATA)" for details.
8.7 External File (PR_DATA)

The initial values of the parameters on the PRINT 2 screen can be set.
The parameters shown below can be set.

8.7.1 Outline

If the printer output setting data and control codes are registered in the external file (PR_DATA), the
following settings and changes will be possible.
- Setting of initial value of parameters for printing
- Changing of printer control codes.

8.7.2 Details of functions

(1) Parameters for printing

The following parameters are read when the tool is started, and are used as the initial setting values.

24. MODE SELECT (LDM)
30. USED PAPER (PPP)
31. WIDE (CRW)
32. LINE (LNS)
33. COLUMN (CLS)
34. REDUCTION (RED)
35. LEFT MARGIN (LFT)

* The names given in parentheses are used when defining in the external file.

Cautions

(1) If there is no external file, the default values will be set as the initial values for all parameters.
(2) The default value will be set as the initial values for any parameter that is not designated.

If a value that exceeds the setting range is set, or if a character other than a number is set,
the default value will be set as the initial value.

Setting range :

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDM</td>
<td>0 ~ 2</td>
</tr>
<tr>
<td>PPP</td>
<td>0 ~ 6</td>
</tr>
<tr>
<td>CRW</td>
<td>0 / 1</td>
</tr>
<tr>
<td>LNS</td>
<td>40 ~ 100</td>
</tr>
<tr>
<td>CLS</td>
<td>70 ~ 136</td>
</tr>
<tr>
<td>RED</td>
<td>0 / 1</td>
</tr>
<tr>
<td>LFT</td>
<td>0 ~ 40</td>
</tr>
</tbody>
</table>

If LDM is set to 1 or 2, and PPP is set to 1 or 5, both LDM and PPP will be invalid.
(This is because the printing details and paper size do not match.)

(2) Printer control code

This tool outputs the printer control codes that correspond to PC/AT (ESC/P) or PC98 (PR201).
To use a printer other than these, register the control code that matches the printer into the external
file. The following control codes can be set.

Reduction designation (RED)
Reduction cancel (NRD)
Left margin (LFT)

* The names given in parentheses are used when defining in the external file.

These codes are output to the printer according to the state when the printer output starts.
- The reduction designation control code is output when "34. REDUCTION" is set to 1.
- The reduction cancel control code is output when "34: REDUCTION" is set to 0.
- The left margin control code is added to the margin width set in "35. LEFT MARGIN" and output.
8. Printing

### Cautions

1. If a control code is not designated, the default control code will be used.
   - **Default control code:**
     - For PC/AT ... Follows ESC/P
     - For PC98 ...... Follows PR201
2. The control codes are sequentially output one byte at a time. The output will stop at the point that an illegal code is found (more than three digits, or other than 0-9, A-F or special codes).
   - Even if an incorrect code is designated, the output will continue to the end if the format is correct. In this case, the following printer operation cannot be guaranteed, so take special care when designating the control code.
3. If the length of one line exceeds 256 characters, the line following the 257th character will be invalid.
   - Thus, if all control codes are described with two digits, up to 84 control codes can be output.

(3) **External file directory**

The directory in which the external file is placed is as follows.

- **Storage directory:** \PLC\BIN (Directory that stores the main tool)
- **External file name:** "PR_DATA"

(4) **File format**

The external file is a text file, and the data is set as follows.

- **Parameter name** = Data (decimal)
- **Control code name** = Data, data, data... (hexadecimal)

If there are multiple control codes, always separate each byte with a comma (,). If there is a line return midway, the output will end at the return.

**Example of external file**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDM=2</td>
<td>2</td>
</tr>
<tr>
<td>PPP=6</td>
<td>6</td>
</tr>
<tr>
<td>CRW=1</td>
<td>1</td>
</tr>
<tr>
<td>LNS=80</td>
<td>80</td>
</tr>
<tr>
<td>CLS=136</td>
<td>136</td>
</tr>
<tr>
<td>RED=0</td>
<td>0</td>
</tr>
<tr>
<td>LFT=5</td>
<td>5</td>
</tr>
<tr>
<td>_RED=0F</td>
<td>0F [HEX]</td>
</tr>
<tr>
<td>_NRD=12</td>
<td>12 [HEX]</td>
</tr>
<tr>
<td>_LFT=1B,6C,X0</td>
<td>1B [HEX] 6C [HEX] special code</td>
</tr>
</tbody>
</table>

The printer control code will be written.
Special code: The data that starts with an "X" such as "X0" in the control code is called a special code. The special code indicates a code that cannot be designated because the code changes due to the conditions, etc.

Currently, the left margin width is a special code. The method of expressing the margin width differs according to the printer, so the width is changed by the special code type.

**ESC/P**
- Binary, 1 byte (0A for 10 digits)
**PR201**
- Character string, 3 bytes (30,31,30 for 10 digits)

For ESC/P type: Designate the special code "X0".
For PR201 type: Designate the special code "X1".

(Escape) **ESC/P** _LFT=1B,6C,X0  
**PR201** _LFT=1B,4C,X1

If set as shown above, the tool will generate the margin width data from the left margin setting value, and will output the data to the printer. The left margin value can be applied with a fixed value, but in this case, the left margin setting value set on the screen will be ignored.

### 8.7.3 Appendix ESC/P and PR201 printer control codes

* The format used to designate with the external file "pr_data" is shown in the parentheses.

| Reduction designation | ESC/P : 0x0F (_RED=0F)  
PR201 : 0x1C, 0x6D, "1/1, 1/2, H."  
(_RED=1C,6D,31,2F,31,2C,31,2F,32,2C,48,2E)  
| Reduction cancel  | ESC/P : 0x12 (_NRD=12)  
PR201 : 0x1C, 0x6D, "1/1, 1/1, H."  
| Left margin  | ESC/P : 0x1B, 0x6C, margin width (_LFT=1B,6C,X0)  
For margin width 10... 0x1B,0x6C,0x0A  
PR201 : 0x1B, 0x4C, margin width" (_LFT=1B,4C,X1)  
For margin width 10... 0x1B,0x4C,0x10

### 8.8 Canceling the printing

The printing will be canceled if the **ESC** key is pressed during printing.

1. Printing will stop when the **ESC** key is pressed.
2. The message "PRINTING CANCELED" will appear when the printing is canceled.
9. Linking

Linking is a function used to merge the ladder file and message file described earlier into one file. The file created by merging the ladder file and message file is called a link file. Normally, this link file is transferred to the control unit. The ladder file and message file will remain intact even after they are linked.

There is also a function used to divide the link file into a ladder file and message file. Up to eight message files can be linked.

### PLC FILE LINK

<table>
<thead>
<tr>
<th>#1</th>
<th>LINK</th>
<th>(LINK)</th>
<th>21568/29952</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>LADDER</td>
<td>(LADDER)</td>
<td>8000/16384</td>
</tr>
<tr>
<td>3</td>
<td>MESSG.1</td>
<td>(MESSG1)</td>
<td>4096/4096</td>
</tr>
<tr>
<td>4</td>
<td>MESSG.2</td>
<td>(MESSG2)</td>
<td>4096/4096</td>
</tr>
<tr>
<td>5</td>
<td>MESSG.3</td>
<td>(MESSG3)</td>
<td>4096/4096</td>
</tr>
<tr>
<td>6</td>
<td>MESSG.4</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>7</td>
<td>MESSG.5</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>8</td>
<td>MESSG.6</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>9</td>
<td>MESSG.7</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>10</td>
<td>MESSG.8</td>
<td>( )</td>
<td>( )</td>
</tr>
<tr>
<td>11</td>
<td>ADDRESS</td>
<td>(41000100)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>C ADDR.1</td>
<td>(0001FF00)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>C ADDR.2</td>
<td>(0002FF00)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>LANG. I/F</td>
<td>(0003FF00)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>C-MACRO</td>
<td>(0004FF00)</td>
<td></td>
</tr>
<tr>
<td># ( ) NAME ( )</td>
<td>1READ</td>
<td>5LINK</td>
<td>7DIVIDE</td>
</tr>
</tbody>
</table>

### Link screen

9.1 File Linking

The procedures for creating a link file are described in this section.

#### [Basic operations]

\[
\text{5LINK} \rightarrow \text{1READ} \rightarrow \left( \begin{array}{c}
\text{Designate ladder file name} \\
\text{Designate message file name} \\
\text{Designate link file name}
\end{array} \right) \rightarrow \text{5LINK} \rightarrow \text{ }
\]

#### [Operation example]

1. The following setting area will appear when \text{5LINK} \rightarrow \text{1READ} are pressed.

\[
# ( ) NAME ( )
\]

   File name (Note 1)

   Index

2. Register the name of the ladder file created previously into "#2 LADDER". The used size will also appear at this time.

3. Register the name of the message file created previously into "#3 MESSG.1". The used size will also appear at this time.

   To create a multi-language compatible program, register the various language message files in "#4 to 10".

4. Register the name of the link file in "#1 LINK". (Note 2)

5. When \text{5LINK} and \text{ } are pressed, the message "EXECUTION" will appear. When the linking is completed "COMPLETED" will appear.

   The link file size will also appear at this time.

   (Note 1) Only files created in the same directory as PLC4B.EXE or files in the same directory can be designated here.

   (Note 2) If a link file with the same name as the ladder file is designated and the linking is completed normally, the link file cannot be actually sent. (The transmission capacity will be 0.) Designate a name that differs from the ladder file.
9. Linking

9.1.1 Operation example

(1) Register the required file with 1READ, and then press 5LINK and .

When 5LINK is pressed, the setting area parentheses ( ) will appear, but nothing needs to be set here in particular.

(2) The file indicated with an asterisk * does not exist. Designate the file name again.

If Y and are pressed, the file linking will start with the designated files.

(3) The file indicated with an asterisk * already exists. Designate the file name again if required.

(4) The file linking will start when the following keys are pressed.

If Y and are pressed, the file linking will start with the designated files.
9. Linking

(5) The message “COMPLETED” will appear when the linking is completed.

9.2 File Division

The procedures for dividing the link file will be described in this section.

[Basic operation]

5LINK → 1READ → (Designate link file name) → 7DIVIDE

[Operation example]

(1) The following setting area will appear when 5LINK → 1READ are pressed.

```
# (     ) NAME (                  )
```

File name

Index

(2) Register the name of the link file created previously in "#1 LINK". The names and sizes of the ladder file and message files in the link file will appear.

(3) When 7DIVIDE and [Y] are pressed " ( ) " will appear.

If [Y] and [ ] are pressed, the message "EXECUTION" will appear.

When the division is completed, the message "COMPLETED" will appear.
9. Linking

9.2.1 Operation example

(1) Read in the link file, and press the 7DIVIDE and  keys.

1READ
1 → L N K
7DIVIDE

(2) The file indicated with an asterisk * does not exist. Designate the file name again.

1READ
1 → L N K
7DIVIDE

(3) The file indicated with an asterisk * already exists. Designate the file name again if required.

If Y and  are pressed, the file division will start with the designated files.

1READ
V FILE IS EXIST. OK (Y/N)

(4) The file division will start when the following keys are pressed.

Y
9. Linking

(5) The message "COMPLETED" will appear when the division is completed.

<table>
<thead>
<tr>
<th>PLC FILE LINK</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 LINK (LINK1) (21568/29952)</td>
</tr>
<tr>
<td>2 LADDER (LAD) (8000/16384)</td>
</tr>
<tr>
<td>3 MESSG.1 (MSG1) (4096/4096)</td>
</tr>
<tr>
<td>4 MESSG.2 (MSG2) (4096/4096)</td>
</tr>
<tr>
<td>5 MESSG.3 (MSG3) (4096/4096)</td>
</tr>
<tr>
<td>6 MESSG.4 ( ) ( )</td>
</tr>
<tr>
<td>7 MESSG.5 ( ) ( )</td>
</tr>
<tr>
<td>8 MESSG.6 ( ) ( )</td>
</tr>
<tr>
<td>9 MESSG.7 ( ) ( )</td>
</tr>
<tr>
<td>10 MESSG.8 ( ) ( )</td>
</tr>
<tr>
<td>11 ADDRESS ( ) ( )</td>
</tr>
<tr>
<td>12 C ADDR. ( ) ( )</td>
</tr>
<tr>
<td>13 C ADDR.2 ( ) ( )</td>
</tr>
<tr>
<td>14 LANG. I/F ( ) ( )</td>
</tr>
<tr>
<td>15 C-MACRO ( ) ( )</td>
</tr>
</tbody>
</table>

( ) COMPLETED

1READ 5LINK 7DIVIDE

9.3 Others

9.3.1 Address

This is not used with the MELDAS 64 Series and MELDASMAGIC 64 Series.

9.3.2 C Address

This is not used with the MELDAS 64 Series and MELDASMAGIC 64 Series.

9.3.3 C Address 2

This is not used with the MELDAS 64 Series and MELDASMAGIC 64 Series.

9.3.4 Language I/F

This is not used with the MELDAS 64 Series and MELDASMAGIC 64 Series.

9.3.5 C-Macro

This is not used with the MELDAS 64 Series and MELDASMAGIC 64 Series.
10. Editing an Existing File

The methods for editing a link file, ladder file or message file created previously will be described in this section. To edit these files, they must be placed in the root directory of the disk in which the PLC development software is installed.

10.1 Link File

The existing link file is edited after dividing it into the ladder file and message file.

[Basic operation]

5LINK → 1READ → [Designate link file name] → 7DIVIDE → 

[Designate link file name] → （ ） 

Edit ladder file 

Edit message file 

Create link file

[Operation procedures]

(1) The following setting area will appear when 5LINK → 1READ are pressed.

# ( ) NAME ( )

(2) When the following is input, the ladder file name, message file name, capacity of each file and used size will appear.

# (1) NAME (Name of link file to be edited) 

(3) The parentheses ( ) will appear when the keys are pressed in the order of 7DIVIDE → 

(4) The message "EXECUTION" will appear when Y → are pressed, and the division will start.

The message "COMPLETED" will appear when the division is completed.

(5) When 4LADDER → 2CIRCUIT are pressed on the Title screen, the ladder file can be edited.

(6) When 1MESSAGE → (Each message file) are pressed on the Title screen, the message file can be edited.

(7) When completed with the editing, return to the Title screen, and press 5LINK → 5LINK → 

The message "EXECUTION" will appear, and the edited files will be linked.

The message "COMPLETED" will appear when the linking is completed.
10.2 Ladder File
An existing ladder file is edited with the following procedure.

**[Basic operation]**

5LINK → 1READ → [Designate ladder file name] → [Edit ladder file]

**[Operation procedures]**

1. The following setting area will appear when 5LINK → 1READ are pressed.
   
   # ( ) NAME ( )

2. When the following is input, the ladder file capacity and used size will appear.
   
   # ( 2) NAME (Name of ladder file to be edited)

3. When 4LADDER → 2CIRCUIT are pressed on the Title screen, the ladder file can be edited.

10.3 Message File
An existing message file is edited with the following procedure.

**[Basic operation]**

5LINK → 1READ → [Designate message file name] → [Edit message file]

**[Operation procedures]**

1. The following setting area will appear when 5LINK → 1READ are pressed.
   
   # ( ) NAME ( )

2. When the following is input, the message file capacity and used size will appear.
   
   # ( 3) NAME (Name of message file to be edited)

3. When 1MESSAGE → Each file name are pressed on the Title screen, the message file can be edited.
11. Converting Ladder Files

11.1 Outline

The conversion tool required to convert the PLC program files (link files) developed on a personal computer to a format that can be handled by the MELDAS 64 Series is described in this section.
(File name: chgcx.exe. Hereafter, conversion tool.)

Using this tool, PLC programs developed on a personal computer and MELDAS500/50 Series ladder assets can be used and smoothly transferred to the M64 Series.

(Precautions)

(1) PLC program files converted and created with this conversion tool cannot be corrected with the PLC development software.

(2) PLC program files converted and created with this conversion tool cannot be operated by any control unit (MELDAS500/50 Series) besides the MELDAS64 Series, even if transferred to such a unit.

11.2 Conversion operation

The basic command format is shown below. Items in < > brackets can be omitted.
(Refer to section "11.3.1 Normal Operation Example" for an operation example.)

```
CHGCX < - option > in_file<.ext>  <out_file.ext >
```

- `< − option >` : Designate the conversion option. (Can be omitted.)
  - m : Message deletion mode. Delete the link file message.
  - h : Output mode in which the header is not deleted. Refer to section "11.4.5 Header".
  - Always add this option in the MELDAS64 Series.
  - n : Ladder/message name conversion mode. Refer to section "11.3.2 Operation Example for Link File Conversion".
  - p : Mode in which the NOP commands after the END command are not deleted.
  - Always add this option in the MELDAS64 Series.
  - c : Mode in which ANDSW commands are used for software command operation codes.

- `< in_file< . ext >` : Designate the file name to be converted. (Extensions can be omitted.)
  Refer to section "11.4.1 File Name Restrictions Before Conversion" for details on file names.

- `< out_file. ext >` : Designate the file name after conversion. (Can be omitted.)
  If omitted, the file name after conversion will be the same as that in the in_file, with extensions added.
  The new file after conversion will be created in the same directory as the file before conversion.
  Refer to section "11.4.2 File Name Restrictions After Conversion" for details on file names.

Always add the above options "−h" and "−p" in the MELDAS64 Series.
11.3 Operation Examples

11.3.1 Normal Operation Example

The conversion operation is carried out as follows when the file type to be converted is a ladder file.

Ladder file name
DEF

Ladder file name
MNO.LDX

The conversion operation for the above conversion example is as follows. (In this case, options "h" and "p" are added.)

CHGCX –HP DEF MNO

11.3.2 Operation Example for Link File Conversion

When the file type to be converted is a link file, the file names of the ladder file and message file included in the link file can be converted using the option "n". If option "n" is not used, the file name before conversion will be used as is.

Link file name before conversion
ABC
Ladder file name
DEF
Message file name
GHI

Link file name after conversion
JKL.LKX
Ladder file name
MNO
Message file name
PQR

The conversion operation for the above conversion example is as follows.

1) Convert the file using the command "CHGCX".

A> CHGCX –N ABC  JLK

2) Designate the ladder file name of the converted file.
At this time, the same name can be designated by inputting a ". " (period).

Old ladder file name is DEF
Please type new ladder file name MNO

3) Designate the message file name of the converted file.
At this time, the same name can be designated by inputting a ". " (period).

Old message file name is GHI
Please type new ladder file name PQR
11.4 Restrictions

The following restrictions apply to designated file names before and after conversion.

11.4.1 File Name Restrictions Before Conversion

1) The file name must be expressed as [file name. extension]. Extensions are not required.
2) The file name must be within 128 characters (including drive name, backslashes, extensions and periods.)
3) All characters in the file name must be characters that can be used normally.

11.4.2 File Name Restrictions After Conversion

1) The file name must be designated as [file name. extension]. When the extension is omitted, an extension is automatically depending on the contents of the file before conversion.

<table>
<thead>
<tr>
<th>Details of the file before conversion</th>
<th>File name after conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Link file</td>
<td>[file name. LKX]</td>
</tr>
<tr>
<td>Ladder file</td>
<td>[file name. LDX]</td>
</tr>
</tbody>
</table>

2) The file name must be within 128 characters (including drive name, backslashes, extensions and periods.)
3) All characters in the file name must be characters that can be used normally.

11.4.3 File Attributes of Output Files

Attributes dedicated for reading are added.

11.4.4 Device No.

An error will occur if an attempt is made to convert ladder files using the following device Nos. Change to another device No. before conversion.
- X4C0 ~ X4FF (machine input spare)
- Y540 ~ Y57F (machine output spare)
- S140 ~ S1FF (rotation tool input/output spare)
- I400 ~ I4BF (input signal spare)

11.4.5 Header

Header address information is required in the M64 Series. An output in which the header is not deleted can be obtained by adding the "-h" option. Always add the "-h" option in the M64 Series.

11.4.6 Check Sum

The check sum of the data from the head to end (excluding the header) is calculated and stored in the entry table.

11.4.7 Message data

Individual ladder files and ladder message link files can be converted. Single files of message data and help messages cannot be converted.
12. Transferring Ladder Files (MELDAS 64)

12.1 Outline
The communication program required to transmit and receive the PLC program files (ladder and message link file) between the [NC] and [personal computer] will be described in this section. (File name: COMU.EXE. Hereafter, communication program.)

A PLC program file (ladder + message) developed on the personal computer can be transferred to the control unit.

(Note 1)
The following two types of files can be communicated.

1. Files generated by linking with PLC development software and converted into MELDAS64 Series format.
2. PLC program created with NC onboard PLC development function and input/output with the maintenance data input function (#99 250).

When linking with the PLC development software, if a link file with the same name as the ladder file is designated, the file cannot be sent. (The linking will be completed normally, but the transmission capacity will be 0.) Do not designate the same name as the ladder file for the link file name.

12.2 Starting Method
Type in the start command as shown below.

A:\>comu

The communication program screen will appear when the communication program starts.
12. Transferring Ladder Files (MELDAS 64)

12.3 Communication Execution Sequence

12.3.1 From [personal computer] to [NC]

The PLC program (ladder, message) is created with the following procedure using the PLC development software.

The file to be transmitted must be a file that has been linked with the PLC development software and converted into MELDAS64 Series format.

(Read the details of (Note 1) carefully.)

1) Start the communication program. (Personal computer side)
2) Check the NC RS-232-C parameters (baud rate, parity, etc.), and set them according to the communication program.
3) Set the Maintenance Data Input Wait state on the NC DATA INPUT screen.

Transmission will start from the communication program.

When the communication program displays "Transmitting Completed", the transmission has been completed normally.

12.3.2 From [NC] to [personal computer]

1) Start the communication program. (Personal computer side)
2) Check the NC RS-232-C parameters (baud rate, parity, etc.), and set them according to the communication program.
3) Set the communication program to the reception wait state.
4) Output the maintenance data on the NC DATA OUTPUT screen.

When the communication program displays "Receiving Completed", the reception has been completed normally.

The received file cannot be read into the PLC development software.
12.4 Communication Program Screen Configuration

The following screen will appear when this program (COMU.EXE) is started.

```
*** < PLC Program Transfer Utility [BND 635W035- ] > *  (MELDAS64 )

Copyright (C) MITSUBISHI ELECTRIC CORPORATION 1994. all rights reserved

Baud Rate : 4800 1200 600 300
Data Length : 8 7 5 6 1
Stop Bit : 2
Parity : O (ODD) E (EVEN) N (NONE)
Monitor : ON

COM-LINE : TRANSMIT RECEIVE

File Name : -
Execute ? : START MS-DOS

[Monitor]
Transmit Data :
Receive Data :
Message :

Arrow Key [UP][DOWN][LEFT][RIGHT] : Item Select
```

(Note 2)
The system number shown on the first line of the screen is BND-655W036-** for the PC-AT compatible unit communication program.

(Note 3)
- The cursor used to select the items by moving vertically (using the ↑ and ↓ keys) will be called the "vertical cursor" hereafter.
- The highlighted items are the default settings.
- The basic operation can be carried out by selecting the items with the arrow keys.
12.5 Communication Program Operation Methods

12.5.1 SIO setting
Refer to <Fig. 12.1> for the default settings.
The setting can be changed with the arrow keys (↑ • ↓ • ← • →).
The setting details are as follow.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate</td>
<td>Baud rate setting</td>
</tr>
<tr>
<td>Data Length</td>
<td>Number of data bits</td>
</tr>
<tr>
<td>Stop Bit</td>
<td>Number of stop bits</td>
</tr>
<tr>
<td>Parity</td>
<td>Parity bit setting</td>
</tr>
<tr>
<td>Monitor</td>
<td>Setting of transmission/reception data display</td>
</tr>
</tbody>
</table>

12.5.2 Com.Mode (Communication mode)
The communication mode (TRANSMIT/RECEIVE) is set.
The setting can be changed with the arrow keys (← • →).

TRANSMIT     Transmission mode (personal computer → controller)
RECEIVE      Reception mode (personal computer ← controller)

12.5.3 File Name (File name input)
When the vertical cursor is set to "File Name", the cursor will appear at the input area, and "Enter File Name" will appear in the message area.

Type in the file name. (The BS key is valid.)
The ← key is identical to the ↓ key operation. (This key will not function as the fixing key.)

To transmit file to be transmitted.
(Example) To transmit the file "DATA1.DAT" under the directory "USER" in drive B.

To receive file to be received.
(Example) To save the reception data in the file "READ1.DAT" under the directory "USER" in drive B.
12. Transferring Ladder Files (MELDAS 64)

12.5.4 Execute?
If the key is pressed when "START" is highlighted, the transmission or reception will start according to the "Com.Mode" setting.

[Transmitting] The designated file will be transmitted to the control unit.

(Note 5)
If the designated transmission file is not found, error message 7 (refer to Table 12.1) will appear.

[Receiving] The reception data will be saved in the designated file.

(Note 6)
- If a file with the same name exists, it will be overwritten.
- If the file is not found, a file will be created.
- A directory will not be created. If a directory that does not exist is designated, error message 8 (refer to Table 12.1) will appear.
- If the FLD is write-protected, a message will be output from MS-DOS.
  (The screen will be distorted in this case, but work can be continued by following the given instructions.)

If the key is pressed when "MS-DOS" is highlighted, this program will be quit, and the system will return to MS-DOS.

12.5.5 Monitor
TRANSIT DATA : The transmission data will be displayed when the Monitor is ON.
RECEIVE DATA : The reception data will be displayed when the Monitor is ON.

12.5.6 Message
Instructions or warnings will be displayed in this area as required. Refer to section "12.6 Message List" for details on the messages.

(Note 7)
If the communication is not completed normally (including when an error is judged during [COMP]), the personal computer may not accept the STOP key (including Ctrl + C).
Reset the personal computer if communication is not completed normally.
### 12.6 Message List

The following messages will appear as required in the Message area of <Fig. 12.1>.

<table>
<thead>
<tr>
<th>No.</th>
<th>Message</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Transmitting</td>
<td>File is being transmitted.</td>
</tr>
<tr>
<td>02</td>
<td>Transmitting Completed</td>
<td>The transmission has been completed.</td>
</tr>
<tr>
<td>03</td>
<td>Receiving</td>
<td>The file is being received.</td>
</tr>
<tr>
<td>04</td>
<td>Receiving Completed</td>
<td>The reception has been completed.</td>
</tr>
<tr>
<td>05</td>
<td>No Answer</td>
<td>There is no answer. (The line is not connected.)</td>
</tr>
<tr>
<td>06</td>
<td>Communication Error</td>
<td>Communication error (overrun, framing error, etc.)</td>
</tr>
<tr>
<td>07</td>
<td>No File</td>
<td>The designated file or directory was not found. (During transmission)</td>
</tr>
<tr>
<td>08</td>
<td>File Create Failure</td>
<td>A directory that does not exist was designated, and a file was not created. (During reception)</td>
</tr>
<tr>
<td>09</td>
<td>Enter File Name</td>
<td>Request for entering of file name. (When the cursor is at &quot;File Name&quot;)</td>
</tr>
<tr>
<td>10</td>
<td>Press Enter Key (Communication Start)</td>
<td>Communication will start when      [return] key is pressed. (When cursor is at &quot;Execute?&quot;, and &quot;START&quot; is selected.)</td>
</tr>
<tr>
<td>11</td>
<td>Press Enter Key (Return to MS-DOS)</td>
<td>MS-DOS will be returned to when      [return] key is pressed. (When cursor is at &quot;Execute?&quot;, and &quot;MS-DOS&quot; is selected.)</td>
</tr>
<tr>
<td>12</td>
<td>H-Parity Error</td>
<td>A horizontal parity error occurred in the reception data. (Data Bit 7 is the horizontal parity.)</td>
</tr>
<tr>
<td>13</td>
<td>File Create Failure (Capacity)</td>
<td>This message appears when the storage medium (FLD, etc.) capacity is low during reception.</td>
</tr>
<tr>
<td>14</td>
<td>File Modify OK? (Y/N) (Note 10)</td>
<td>This message will appear to confirm whether to clear the area at 00H when the received file's 164H (140H+24H) to 223H (1FFH+24H) is not 00H. (Press Y or N)</td>
</tr>
<tr>
<td>15</td>
<td>Receiving Completed (Copying File Completed)</td>
<td>This message appears when the corrections to message 14 have been completed. The &quot;04 Receiving Completed&quot; message appears when the check is passed.</td>
</tr>
</tbody>
</table>
12. Transferring Ladder Files (MELDAS 64)

(Note 8)
The message area will be cleared when the vertical cursor (cursor that moves with ↓ and ↑) is moved.

(Note 9)
If reception is executed while the FLD is write-protected, a warning message will be output from the MS-DOS, so the screen will be partially distorted.

If the FLD write-protection tab is released and the instructions are followed, work can be continued.

(Note 10)
When message 14 appears:

This message means that when the 164H to 223H bytes from the head of the received file were checked, data that was not the binary [00H] was found. If this area is not [00H], the file may not run correctly on the "PLC development software". Thus, this message will appear and request the user to take measures.

When [Y] is pressed, 164H to 223H in the reception file will be unconditionally changed to [00H].
(The uncorrected file will not be saved.)

An error will always occur if [COMP] is carried out on the corrected file.

When [N] is pressed, nothing will be changed, so there will be no guarantee that the file will run correctly on the "PLC development software".
13. Transferring Ladder Files (MELDASMAGIC 64)

13.1 Outline
The PLC program data (ladder and message) created with "PLC4B" on the personal computer can be transferred to the NC (MELDASMAGIC 64). The PLC program data created with the PLC development function (onboard) on the NC side can also be transferred to the personal computer.

In this section, the methods for transmitting and receiving the PLC program data (ladder and message) between the [NC] and [personal computer] using the transfer tool (magictrs.exe) will be described. The data is transferred from the personal computer to the NC with the following procedure when using the MELDASMAGIC 64.

1. Create PLC program file
   *1
   The PLC program file is created using "PLC4B". (*1)
   Refer to sections "4. Start Up" to "9. Linking".

2. Transfer to NC
   *3
   Using the MELDASMAGIC transfer tool (magictrs.exe), the converted PLC data is transferred to the NC. (*3)
   Refer to the section "12.4 Transferring PLC program data".

(Note 1) The following two types of files can be communicated.
1. A file generated by linking with the PLC development software and converted into MELDASMAGIC format.
2. PLC program generated with MELDASMAGIC 64 onboard (M64 monitor) that has been input/output with the maintenance data input function (#99 250).

(Note 2) When linking a ladder file and message file with the PLC development software (PLC4B), do not designate the same name as the ladder file for the link file name. If a link file with the same name as the ladder file is designated, the file cannot be transferred.
   (The linking will be completed normally, but the transmission capacity will be 0.)

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13.2 Operating Environment

13.2.1 Personal computer operating conditions

(1) PC-9800 Series
Use a PC-9800 Series that is running "MS-DOS Version 3.3 and above".

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
<tbody>
<tr>
<td>The PLC development software (PLC4B) can be used on the PC-9800 Series, but the conversion tool (CNV4BMM) is dedicated for the PC/AT compatible unit, and thus will not run on the PC-9800 Series. Before converting a PLC program developed with the PC-9800 Series, load it into a PC/AT compatible unit using a FLD, etc.</td>
</tr>
</tbody>
</table>

(2) PC/AT compatible unit
Use an IBM-PC/AT or compatible unit that is running "MS-DOS Version 5 and above".

13.2.2 Required software

(1) Transfer tool (MAGICTRS.EXE)
This tool is located in the "UTILITY disk". Use the file transfer function in the MELDASMAGIC 64 MMI software (option). Refer to the "Utility Operation Manual" for details on installing the "UTILITY disk" and the operation of the tools, etc.
13.3 Converting PLC Program Data

Convert the PLC program data (ladder and message link file) created with the PLC4B into a format that can be handled by the MELDASMAGIC using the following procedure. This procedure can also be used to convert a file used with the MELDASMAGIC into a format that can be handled by the PLC4B (format that can be used with conventional NC).

13.3.1 Conversion procedures

Convert the data with the following procedures.

1. Start MS-DOS.
2. Start the conversion tool (cnv4bmm.exe), and type in the following command.

   (The following example shows when the tool is installed in the C:\directory.)

   C:\>C:\meltools\dos\cnv4bmm.exe

   The following type of explanation will appear.

   [CNV4BMM]  PLC4B format File Converter  Ver. A0
   Convert  PLC4B format File into MELDASMAGIC format File.
   Usage: CNV4BMM [-option] input_file [output_file]
   option : [-m | -4 | -a]
   -m : convert PLC4B format into MELDASMAGIC format
   -4 : convert MELDASMAGIC format into PLC4B format
   -a : automatically convert into another format (default)
   input_file : input file name
   output_file : output file name
   If no output file name ordered, it use “USERPLC.LAD”.
   Copyright (C) 1995  Mitsubishi Electric Corporation  ALL Rights Reserved.

   (3) Following the explanation above, designate the file name and option, and type in the command.

   (Example) To convert a file (c:\plc1) created with the PLC development software, etc., and located in the drive C root directory into a file that can be input into MELDASMAGIC.

   C:\>C:\meltools\dos\cnv4bmm.exe -m plc1

   A file named USERPLC.LAD will be created in the execution directory (C:\).
   (In this example, output_file has been omitted, so the default file name will be assigned.)
13. Transferring Ladder Files (MELDASMAGIC 64)

<table>
<thead>
<tr>
<th>Caution</th>
</tr>
</thead>
</table>
| 1) File name designation  
  - If the same name is designated for the input file name and output file name, an error will occur.  
  - If the input file name is omitted, an error will occur.  
  - If the output file name is omitted, the output file name will be set to "USERPLC.LAD".  
  - All lowercase characters in the input or output file name will be interpreted as uppercase characters. |
| 2) Command inputs (option designation)  
  - The option characters are case sensitive. For example, -A or -M will cause an error.  
  - Only one of the options (-m, -4 or -a) can be designated. If two or more options are designated, an error will occur.  
  - If no option (-m, -4 or -a) is designated, the same process as when -a is designated will take place. |
| 3) File size  
  - The MELDASMAGIC can handle up to 4K steps of ladder data. When converting ladder data developed with the conventional model (MELDAS 50 Series, MELDAS 500 Series), or ladder data developed with the PLC4B, take care so that this size is not exceeded.  
  - If 4K steps is exceeded, the excessive data will not be converted. |
13. Transferring Ladder Files (MELDASMAGIC 64)

13.4 Transferring PLC Program Data

Data is transferred between the personal computer and NC with the following procedure using the MELDASMAGIC transfer tool (magictrs) or the MELDASMAGIC MMI software.

13.4.1 From [personal computer] to [NC Card]

(1) Stop the PLC and enter the emergency stop state. The following method can be used.

   **Method** Stop the PLC from the onboard PLC screen.

   When the function keys are pressed in the order of F12 → F3 (File) → F4 (4RUN/SP), the following message will appear. Set 1.

   0: RUN   1: STOP

   **(Note)** When the PLC program data has been created using the PLC4B and is to be converted and transferred, the PLC is stopped. Check the state before proceeding with the work.

(2) Start the transfer tool with the following procedure.

   **[When using MMI software file transfer window]**

   **(Note)** Start with this method when using the MELDASMAGIC 64.

   The MELDASMAGIC MMI software is an option specification.

   1) Start Windows.
   2) Start the MELDASMAGIC MMI software.
   3) Click on the [Monitor] - [Search] and [File Transfer] commands, and open the File Transfer window.

   **[When using transfer tool (magictrs.exe)]**

   **(Note)** This method can be used to start when using MELDASMAGIC 64.

   1) Start Windows.
   2) Select the [File] → [Run...] menus under the Program Manager.
   3) Type the following in the command line, and click on the [OK] button.

   \[MELDASMAGIC MMI Install Destination Directory]/MAGIC.EXE/M=NC Card No.

   **(Example)** When MELDASMAGIC MMI software is installed in C:\.

   C:\>MAGICTRS.EXE
(4) Select the NC side directory "M01:\LAD" with the following procedure.
   1) Double-click on "M01:".
   2) Double-click on "LAD".

(5) Designate the PLC file to be transferred (file that has been converted with CNV4BMM) with the following procedure.
   1) Double-click on the directory containing the PLC file to be transferred.
   2) Select and click on the file in the file list.

(6) Click on the copy button PC → NC ( ).

(7) The Copy window will open. The file name designated in step (5) will appear in the text box. Change this to "USERPLC.LAD".
(8) Click on the [OK] button. 
If an error message does not appear, the transmission is completed.

(9) Start the PLC and confirm that there is no error. The PLC can be started with the following two methods.

(Note 1) If "Method 1" was selected for stopping the PLC in step (1), select Method 1. If "Method 2" was selected, select Method 2.

Method 1) Return the RS611 card rotary switch CS2 to 0.

Method 2) Stop the PLC from the onboard PLC screen.
When the function keys are pressed in the order of F12 → F3 (file) → F4 (4RUN/SP), the following message will appear. Type in 0.
0: RUN  1: STOP

CAUTION

(1) Always set the file name to "USERPLC.LAD" when transferring from the PC to the NC.

(2) Refer to section "13.5 Message List" for details on the error messages.
13.4.2 From [NC Card] to [personal computer]

(1) Stop the PLC and enter the emergency stop state.
(Refer to the section "13.4.1 From [personal computer] to [NC Card]" for details.)

(2) Start the transfer tool.
(Refer to the section "13.4.1 From [personal computer] to [NC Card]" for details.)

(3) Select the PLC file "M01:\LAD\USERPLC.LAD" (NC side) to be transferred with the following procedure.
   (1) Double-click on "M01:".
   (2) Double-click on "LAD".
   (3) Select and click on "USERPLC.LAD" in the file list.

(4) Designate the file transfer destination (personal computer side directory).

(5) Click on the copy button NC → PC ( ).

(6) The Copy window will open. The "USERPLC.LAD" will appear in the text box. Change the file name here.

(7) Click on the [OK] button. If an error message does not appear, the transmission is completed.

(8) Start the PLC and confirm that there is no error.
(Refer to the section "13.4.1 For [personal computer] to [NC Card] for details.)
CAUTION

(1) The following steps must be taken to edit the file transferred to the personal computer with the PLC4B.
1. Using the conversion tool CNV4BMM, convert the transferred file into a format that can be read by the PLC4B. (Refer to the section "13.3 Converting PLC program data".)
2. Divide the link file (converted) into a ladder file and message file. (Refer to the section "9.2 File division".)
(2) Refer to section "13.5 Message List" for details on the error messages.

13.5 Message List
The following messages will appear as required when the data is transferred with the File Transfer window.

<table>
<thead>
<tr>
<th>No.</th>
<th>Message</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The designated file does not exist.</td>
<td>Select the file from the file list on the window.</td>
</tr>
<tr>
<td>2</td>
<td>It failed in copying file.</td>
<td>Confirm the file name, copy destination directory or file name.</td>
</tr>
<tr>
<td>3</td>
<td>Designated file name already exists.</td>
<td>Confirm the file name, and make sure that it is not duplicated.</td>
</tr>
<tr>
<td></td>
<td>Designate the other file name.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Copying, deleting or renaming of files cannot be executed while a program running.</td>
<td>Re-execute after the program has ended.</td>
</tr>
<tr>
<td>5</td>
<td>Files cannot be copied while PLC operation.</td>
<td>Re-execute after the PLC has ended.</td>
</tr>
</tbody>
</table>
14. List Mode Function

14.1 Function

The codes can be directly input with characters instead of using the ladder circuit symbols when using the PLC development software. This is called the list mode function. Programming can be performed more efficiently than using circuit symbols by using the list mode function.

The list mode function also has a function to convert the ladder sequence file into a list text file.

The list text file can be edited using an editor such as mifes. Changing of the devices, etc., on the NC side can be performed easily with the function to convert the ladder sequence file into a list text file.
The function to convert the ladder sequence file into a list text file is used as shown below. To convert LD X0 in the ladder sequence file to LD Y0 (device batch conversion)

Convert the ladder sequence file into a list file as shown on the left.

```
LD X0000
AND X0000
AND X0100
OUT M0056
LD X0107
OUT M0276
LD X0000
OUT M0549
```

Editing of text file (in MIFES)

Convert the list text file into a ladder sequence file.

```
LD Y0000
AND X0000
AND X0100
OUT M0056
LD X0107
OUT M0276
LD Y0000
OUT M0549
```
14.2 Menu Operation

The following title screen will display when the PLC development software is started up.

When the title screen is displayed, the menu will appear on the bottom of the screen. Use the function keys PF01 to PF10 to select a menu. (These keys may be F1 to F10 depending on the personal computer model.) The menu number and function key numbers correspond to each other. The menu configuration is shown below.
When 4.LADDER is selected:

When 4.LADDER is selected:

- PF 4
- PF 1
- PF 1 ～ 4
- PF 7
- PF 8
- INS

(Note 1) ESC can be used instead of INS.

The PLC development software title screen will appear when PF10 is pressed.

14.3 Starting Up and Ending the List Mode (LIST4B)

[Start up method]
(1) Input the following startup command to start the list mode function.

```
A:\> list4b
```

(2) The list mode function will start, and the title screen will display.

[Ending method]
(1) Press PF10 on the keyboard, and display the title screen of the PLC development software.

(2) Press PF8 (EXIT) to end LIST4B. The prompt (A:\>) will appear on the screen, and the program will return to the normal MS-DOS mode.
### 14.4 List of List Mode Edit Functions

A list of edit functions used for editing the sequence program using the list mode is shown below.

<table>
<thead>
<tr>
<th>Function item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>List write</td>
<td>Creation of new list</td>
</tr>
<tr>
<td></td>
<td>Correction of existing list</td>
</tr>
<tr>
<td>List read</td>
<td>List read with step number</td>
</tr>
<tr>
<td></td>
<td>List read with device number</td>
</tr>
<tr>
<td></td>
<td>List read with command</td>
</tr>
<tr>
<td>List insertion</td>
<td>Insertion in list command units</td>
</tr>
<tr>
<td>List delete</td>
<td>Deletion of list in command units</td>
</tr>
<tr>
<td></td>
<td>Deletion of list with range designation</td>
</tr>
</tbody>
</table>
14.5 Registering Edited Files

The following operation is used to register the ladder file name and text file name.

[Basic operation]

7.FILE \rightarrow 2.WRITE \rightarrow (Set the necessary setting number and file name.) \rightarrow ✦

[Operation procedure]

1. Press function menu 7.FILE and the PLC FILE screen will display.
2. Press 2.WRITE and the setting section will appear.
3. Set the ladder file name, message file name 1 and text file name.
   • Set the estimated file size for the ladder file.
   • A maximum of 8 characters can be used for the file name.

(Example) To register the text file as “MELLIST”.

7.FILE \rightarrow 2.WRITE \rightarrow 3 \rightarrow M E L L I S T \rightarrow ✦

<table>
<thead>
<tr>
<th># 1 LADDER</th>
<th>( MELLADDER )</th>
<th>( 4096/ 0 BYTE)</th>
</tr>
</thead>
<tbody>
<tr>
<td># 2 MESSAGE</td>
<td>( MELMSG1 )</td>
<td>( 4096)</td>
</tr>
<tr>
<td># 3 TEXT</td>
<td>( MELLIST )</td>
<td>( 12345)</td>
</tr>
</tbody>
</table>

(#( ) NAME ( ) SIZE ( KBYTE))

2WRITE 5CONVT
14.6 Converting Text Files and Ladder Files

The following operation is used to convert a text file into a ladder file and vice versa.

**[Basic operation]**

```
7.FILE → 5.CONVT → 1 → 2 → Y → 2
```

**[Operation procedure]**

1. Press function menu **7.FILE**.
2. Press **5.CONVT** and the text file and ladder file conversion direction will appear.
3. Designate the conversion direction.
   - **1**: The ladder file will be converted to a text file.
   - **2**: The text file will be converted to a ladder file.

The message "COMPLETED" will appear when the conversion is completed.

**[Note]**

After conversion, the converted details will be written into each designated file. If the designated file name (for example, a text file name when 1 is selected above) already exists, the message "VI-FILE IS EXIST. OK (Y/N)" will display.

If **Y** is pressed here, the conversion process will start.

If **N** is pressed or if another operation is carried out, the conversion process will be canceled.

**[Note]**

There must be only one “END” command when converting from a text file to a ladder file. An error will occur if there are several "END" commands.

**[Example]**

To convert a ladder file into a text file

```
7.FILE → 5.CONVT → 1 → 2
```

Preset the ladder file name and text file name before starting this operation.

If the text file exists, the message “VI-FILE IS EXIST. OK (Y/N)” will display. Press **Y** if the file can be replaced.

The message “COMPLETED” will appear when the conversion is completed.

```
VI-FILE IS EXIST. OK (Y/N)
1.LADDER > TEST 2.TEXT>LADDER  (1)
2.WRITE   5.CONVT

COMPLETED
1.LADDER > TEST 2.TEXT>LADDER  (1)
2.WRITE   5.CONVT
```
14.7 Writing PLC Lists

14.7.1 Creating a new PLC list

This operation is used to create a new PLC list or to erase and existing PLC list.

[Basic operation]

4.LADDER \rightarrow 1.LIST \rightarrow 2.WRITE \rightarrow 1.SET \rightarrow Y \rightarrow \text{Writing operation) \rightarrow } 5.CONVT \rightarrow \text{Y}

[Operation procedure]

1. Register the edit file before creating a new circuit.
2. Press function menu 4.LADDER and the sub menu will display.
3. Press 1.LIST, 2.WRITE, 1.SET and the following interactive screen will display.
4. Press Y, \text{Y} to create a new circuit or erase an existing circuit. Press 1.READ for other applications.
5. Only the bus bar on both sides and the step number will display if Y, \text{Y} are pressed.
6. Start the writing operation.
   a. Create a program from the cursor position using the alphanumeric keys.
   b. When approximately one screen worth of program is written, press 5.CONVT, \text{Y}.

Note) A maximum of two screens worth of program can be created at once, but 5.CONVT, \text{Y} should be pressed after one screen if possible.

The final object will not be created on the screen if 5.CONVT, \text{Y} are not pressed after the list is completed.

c. The message “COMPLETED” will appear on the screen when 5.CONVT, \text{Y} are pressed and the conversion is completed.

(Example) The following screen will display when the following are pressed:

4.LADDER \rightarrow 1.LIST \rightarrow 2.WRITE \rightarrow 1.SET

Note) The existing lists will all be deleted when Y, \text{Y} are pressed.

Perform the writing operation on this screen.
14. List Mode Function

14.7.2 Modification of existing PLC list

An existing PLC list can be modified.

[Basic operation]

(Read out program list) → ⤴ ⤵ → 2.WRITE → (Input commands) → 5.CONVT → ⬅

[Operation procedure]

(1) Read out the PLC list to be modified with the read procedure.
(2) Move the cursor to the PLC list position to be modified. (Use ⤴ ⤵ keys)
(3) Press 2.WRITE and the step number at the cursor will display at the setting section.
    Press 4.DATA and the data at the cursor position will display in the setting section.
    • Move the cursor at the setting section with the → ← keys and modify the command.
(4) The program list can also be changed by inputting the step number and command instead of step (3).
(5) Always press 5.CONVT , ⬅ after modifying the PLC list.
    • The message “COMPLETED” will appear in the message section after the PLC list is written into the file. The step number will also be updated at this time.
(6) When the data is rewritten, the step numbers will be updated according to the number of steps in the command. The step number on the left will also be updated.

POINT

(1) When the existing circuit where the step number is changed is modified, the step numbers of the existing program and the CJ command jump destination will also be automatically changed.

(Example 1) To change “R0070” to “R0170” at step 5 using the 4.DATA key.

1.LIST → 1.READ → 5 → ⬅ → 4.DATA → ⬅ → R0170

FILE (       TEST)
MEM (       0/    512 STEP )
MODE LIST MENU WRITE SET #( ) ( )
1.SET 2.DEVICE 3.COMMAND 4.DATA 5.CONVT

```plaintext
PLC LIST
1   LD M1000
2 ORI M1000
3   OUT M1000
4   LD M1000
5   MOV R0070 M41008
6   LD M1000
7 MOV R2934 M41024
8   LD X0000
9   OUT Y0119
10  OUT Y0218
11  OUT Y021A
12  OUT Y021D
13  OUT Y0218
14  OUT Y021A
15  OUT Y021D
16  OUT Y0002
17  OUT Y0003
18  OUT Y0004
19  OUT Y0005
```
(Example 2) To rewrite to after step 20 using the 2. WRITE key.

1.LIST → 1.READ → 2 → 0 → 2 → 2.WRITE → LD SP M 1 0 →

5.CONVT → 

```
1. LD M1000
2. ORI M1000
3. OUT M1000
4. LD M1000
5. MOV R0070 K4M1008
6. LD M1000
7. MOV P2344 K4M1024
8. LD X0000
9. OUT Y0218
10. LD X0001
11. OUT Y0219
12. LD X0002
13. OUT Y021A
14. LD X0003
15. OUT Y021D
16. LD X0004
17. OUT Y0218
18. OUT Y0219
19. OUT Y021A

FILE (TEST)
MEM (0/512 STEP)
MODE LIST MENU WRITE SET ( ) ( )
1.SET 2.DEVICE 3.COMMAND 4.DATA MENU
```
14. List Mode Function

14.8 Reading the PLC List

14.8.1 Reading the PLC list with step number

This operation is used to read the PLC list by designating a step number.

[Basic operation]

1.LIST → 1.READ → 1.SET → STEP NO. → ↘

[Operation procedure]

1. Press 1.LIST, 1.READ, 1.SET, STEP NO., ↘, and one screen worth of data following the designated number will display.
   - The PLC list will be displayed from the start of that command even if in the middle of the designated step number command.

2. Press ↗ and the list on the screen following the current PLC list screen will display.

3. Press ↖ and the list on the screen before the current PLC list screen will display.

(Example 1) To read out the step number 300 list

1.LIST → 1.READ → 300 → ↘

The screen on the right will appear when the following are pressed:

Press ↗ and the list on the last screen will appear.
14. List Mode Function

14.8.2 Reading the PLC list with device number

This operation is used to read the PLC list by designating a device number.

[Basic operation]

1.LIST → 1.READ → 2.DEVICE → DEVICE NO. →

[Operation procedure]

(1) Press 1.LIST, 1.READ, 2.DEVICE, DEVICE NO., and one screen worth of data from the command with the designated device will appear.

If there are several commands with the designated device, the screen with the smallest step number will display first.

(2) If reading is attempted after all program lists with the corresponding device number have been displayed, the message “PROG NOT FOUND” will appear.

(Example) To read out “D500”

1.LIST → 1.READ → 2.DEVICE → D 5 0 0 →

When the key is pressed again, the next “D500” will be searched for and displayed.
14.8.3 Reading the PLC list with command

This operation is used to read a PLC list containing a designated command.

**[Basic operation]**

\[1.\text{LIST} \rightarrow 1.\text{READ} \rightarrow 3.\text{COMMAND} \rightarrow \text{COMMAND CODE} \rightarrow \text{PLC LIST}\]

**[Operation procedure]**

1. Press \[1.\text{LIST} \rightarrow 1.\text{READ} \rightarrow 3.\text{COMMAND} \rightarrow \text{COMMAND CODE}\], the PLC list with the designated command will display from the list with the smallest number. If is pressed again, the PLC list with the next smallest number will display.

2. If reading is attempted after all commands have been displayed, the message “PROG NOT FOUND” will appear.

**(Example)** To read out “MOV”

\[1.\text{LIST} \rightarrow 1.\text{READ} \rightarrow 3.\text{COMMAND} \rightarrow M O V \rightarrow \text{PLC LIST}\]

When the key is pressed again, the next "MOV" will be searched for and displayed.
14.9 Inserting a PLC List

This operation is used to insert the PLC list in command units.

**[Basic operation]**

```plaintext
(3.INSERT → (Input command) → [ ] → 5.CONVT → [ ]
```

**[Operation procedure]**

1. Display the position to where the PLC list is to be inserted using the circuit read operation.
2. Move the cursor to the position where the PLC list is to be inserted. (Use `↑` `↓`)
3. Press 3.INSERT and the step number at the cursor position will display in the setting section. Press 4.DATA and the data at the cursor position will display in the setting section.
4. Write the command to be inserted in the setting section, and press [ ].
5. Always press 5.CONVT after inputting the command.
   - The message “COMPLETED” will appear in the message display section when the PLC list has been written into the file. The PLC list read will display again after being written into the file. The step number will be updated simultaneously.

**POINT**

(1) When the existing circuit where the step number is changed is modified, the step numbers of the existing program and the CJ command jump destination will also be automatically changed.

**Example** To insert “AND M123” at step 5.

1.LIST → 1.READ → 5 → [ ] → 3.INSERT → AND M123 → 1.Set 2.DEVICE 3.COMMAND 4.DATA

Reading of step number 5

→ [ ] → 5.CONVT → [ ]
14. List Mode Function

14.10 Deleting a PLC List

This operation is used to delete the PLC list in command units or in a batch.

[Basic operation]

(Program list read operation)

\[
\begin{array}{c}
4.\text{DELETE} \quad (\text{No. of steps to be deleted})
\end{array}
\]

[Operation procedure]

1. Display the PLC list to be deleted with the read operation.
2. Move the cursor to the PLC list position to be deleted. (Use \(\uparrow\) \(\downarrow\))
3. Press \(4.\text{DELETE}\) and the step number at the cursor position will display in the setting section.
   To delete several commands in a batch, set the last step to be deleted in the brackets on the right of the setting section.
4. Press \(\text{ESC}\) and the step number displayed in the setting section will be deleted.
5. Always press \(5.\text{CONVT}\) after inputting the command.

- The message "COMPLETED" will appear in the message display section when the PLC list has been written into the file. The read PLC list will display again after being written into the file. The step number will be updated simultaneously.

POINT

(1) When part of the PLC list is deleted, the step numbers of the following program and the CJ command jump destination will also be automatically changed.

Example 1) To delete 1 command.

\[
\begin{array}{c}
1.\text{LIST} \rightarrow 1.\text{READ} \rightarrow 1.\text{SET} \rightarrow 5 \rightarrow \text{ESC} \rightarrow 4.\text{DELETE} \rightarrow \text{ESC} \rightarrow 5.\text{CONVT} \rightarrow \text{ESC}
\end{array}
\]

Reading of step number 5

---

### PLC LIST

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LD</td>
<td>W1000</td>
<td>20</td>
<td>LD</td>
</tr>
<tr>
<td>2</td>
<td>ORI</td>
<td>W1000</td>
<td>21</td>
<td>OUT</td>
</tr>
<tr>
<td>3</td>
<td>OUT</td>
<td>W1000</td>
<td>22</td>
<td>OUT</td>
</tr>
<tr>
<td>4</td>
<td>LD</td>
<td>W1000</td>
<td>23</td>
<td>OUT</td>
</tr>
<tr>
<td>5</td>
<td>MOV</td>
<td>R0070</td>
<td>K4M1008</td>
<td>24</td>
</tr>
<tr>
<td>8</td>
<td>LD</td>
<td>W1000</td>
<td>25</td>
<td>OUT</td>
</tr>
<tr>
<td>9</td>
<td>MOV</td>
<td>R2394</td>
<td>K4M1024</td>
<td>26</td>
</tr>
<tr>
<td>12</td>
<td>LD</td>
<td>X0000</td>
<td>27</td>
<td>OUT</td>
</tr>
<tr>
<td>13</td>
<td>OUT</td>
<td>Y0218</td>
<td>28</td>
<td>LD</td>
</tr>
<tr>
<td>14</td>
<td>LD</td>
<td>X0001</td>
<td>29</td>
<td>OR</td>
</tr>
<tr>
<td>15</td>
<td>OUT</td>
<td>Y0219</td>
<td>30</td>
<td>OUT</td>
</tr>
<tr>
<td>16</td>
<td>LD</td>
<td>X0002</td>
<td>31</td>
<td>LD</td>
</tr>
<tr>
<td>17</td>
<td>OUT</td>
<td>Y021A</td>
<td>32</td>
<td>OUT</td>
</tr>
<tr>
<td>18</td>
<td>LD</td>
<td>X0003</td>
<td>33</td>
<td>LD</td>
</tr>
<tr>
<td>19</td>
<td>OUT</td>
<td>Y021D</td>
<td>34</td>
<td>OUT</td>
</tr>
</tbody>
</table>

FILE (TEST)
MEM (400/512 STEP)
MODE LIST / MENU / INSERT # (5) ( )
1.SET 2.DEVICE 3.COMMAND 4.DAATA MENUE
(Example 2) To delete from step 5 to 19 in one batch.

1.LIST → 1.READ → 1.SET → 5 → 4.DELETE → 1 → 9

→ 5.CONVT →

<table>
<thead>
<tr>
<th>PLC LIST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 LD M1000 20 LD X0004</td>
</tr>
<tr>
<td>2 ORI M1000 21 OUT Y01C8</td>
</tr>
<tr>
<td>3 OUT M1000 22 OUT Y01C9</td>
</tr>
<tr>
<td>4 LD M1000 23 OUT Y01CB</td>
</tr>
<tr>
<td>5 MOV R0070 K4M1008 24 OUT Y01D0</td>
</tr>
<tr>
<td>8 LD M1000 25 OUT Y01D1</td>
</tr>
<tr>
<td>9 MOV R2934 K4M1024 26 OUT Y01D2</td>
</tr>
<tr>
<td>12 LD X0000 27 OUT Y01D3</td>
</tr>
<tr>
<td>13 OUT Y0218 28 LD X0004</td>
</tr>
<tr>
<td>14 LD X0001 29 OR X0006</td>
</tr>
<tr>
<td>15 OUT Y0219 30 OUT Y01CA</td>
</tr>
<tr>
<td>16 LD X0002 31 LD X0005</td>
</tr>
<tr>
<td>17 OUT Y021A 32 OUT Y023F</td>
</tr>
<tr>
<td>18 LD X0003 33 LD X0007</td>
</tr>
<tr>
<td>19 OUT Y021D 34 OUT Y029A</td>
</tr>
</tbody>
</table>

FILE ( TEST)
MEM ( 400/ 512 STEP )
MODE LIST MENU INSERT # ( 5 ) ( 19 )
1.SET 2.DEVICE 3.COMMAND 4.DATA MENUE
### 15. Messages

#### 15.1 Alarm Messages

<table>
<thead>
<tr>
<th>No.</th>
<th>Message</th>
<th>Display conditions</th>
<th>Remedies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Blank</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>NO END</td>
<td>The END command is not found in the sequence program.</td>
<td>Display the end of the circuit on the screen, move the cursor to the position displaying the step and input P255.</td>
</tr>
<tr>
<td>2</td>
<td>OPERATING ERROR</td>
<td>The operation method was mistaken.</td>
<td>Press the correct key.</td>
</tr>
<tr>
<td>3</td>
<td>DEVICE NO. ERROR</td>
<td>An invalid device number was input in the write mode.</td>
<td>Set a valid device number.</td>
</tr>
<tr>
<td>4</td>
<td>LADDER ERROR</td>
<td>A circuit that cannot be converted is in the circuit mode.</td>
<td>Revise to the correct circuit.</td>
</tr>
<tr>
<td>5</td>
<td>PROGRAM SIZE OVER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>NOT WRITE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>SETTING ERROR</td>
<td>The key input operation was mistaken while creating a message.</td>
<td>Press the correct key.</td>
</tr>
<tr>
<td>8</td>
<td>STEP NO. ERROR</td>
<td>A number of steps exceeding the memory capacity was designated when reading the sequence program.</td>
<td>Change the number of designated steps.</td>
</tr>
<tr>
<td>9</td>
<td>PROGRAM SIZE OVER</td>
<td>The parameter and set memory capacity was exceeded during circuit conversion.</td>
<td>Increase the memory capacity.</td>
</tr>
<tr>
<td>10</td>
<td>COMMAND CODE ERROR</td>
<td>A code that cannot be converted into a sequence command was found.</td>
<td>Rewrite to a correct command.</td>
</tr>
<tr>
<td>11</td>
<td>SETTING ERROR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>PROG NOT FOUND</td>
<td>The designated program was not found during the search.</td>
<td>Input the correct program name (file name) into the file designation section.</td>
</tr>
<tr>
<td>13</td>
<td>COIL ALREADY USED</td>
<td>The same coil was designated in duplicate when creating the sequence program.</td>
<td>The same coil can be programmed (used), but check that the same coils have not been programmed by mistake.</td>
</tr>
<tr>
<td>14</td>
<td>CIRCUIT CONTINUATIVE SIZE OVER</td>
<td>The number of returns in the circuit exceeded eight returns.</td>
<td>Change the circuit so that there are less than eight or less returns.</td>
</tr>
<tr>
<td>15</td>
<td>SETTING ERROR</td>
<td>The data input in the message screen is incorrect.</td>
<td>Input the data again.</td>
</tr>
<tr>
<td>16</td>
<td>CIRCUIT CONTINUATION ERROR</td>
<td>Two returns return two or more times in the circuit.</td>
<td>Change the ladder circuit so that the two returns return only once.</td>
</tr>
<tr>
<td>17</td>
<td>DEVICE ERROR</td>
<td>An invalid value was input for the device.</td>
<td>Input a value within the range again.</td>
</tr>
<tr>
<td>18</td>
<td>NO COMMENT DATA</td>
<td>Display of the comment was attempted with no existing contact or coil comment.</td>
<td>Create a contact or coil comment.</td>
</tr>
<tr>
<td>19</td>
<td>FILE TYPE INCORRECT</td>
<td>The ladder file and message file were mistaken and registered.</td>
<td>Register as a correct file.</td>
</tr>
</tbody>
</table>
15. Messages

15.2 Messages

<table>
<thead>
<tr>
<th>No.</th>
<th>Message</th>
<th>Display conditions</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>DELETE 1-CIRCUIT</td>
<td>Displayed when one ladder circuit is deleted.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>LADDER END</td>
<td>Displayed when the last program was read during the circuit display.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>DISPLAY OVER FLOW</td>
<td>Displayed when the display of a circuit covering two screens was attempted.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DELETE 1-CIRCUIT</td>
<td>Displayed when the circuit block not having a step number before circuit conversion is deleted.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>COMPLETED</td>
<td>Displayed when the conversion is completed.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DISPLAYING COMMENTS</td>
<td>Displayed while a coil comment or contact comment is displayed.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>PRESS &lt;CNV&gt;</td>
<td>Displayed when a ladder circuit is edited and reading is attempted without converting the file.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>SELECT INIT!</td>
<td>Displayed when the message has not been initialized.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>EXECUTION</td>
<td>Displayed when conversion or initialization is being performed.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>SELECT MODE</td>
<td>Displayed if a key is pressed when a mode is not selected.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>SELECT FUNCTION</td>
<td>Displayed when a function must be selected in the next operation.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>SELECT FILE!</td>
<td>Displayed when a ladder or message file name is not registered.</td>
<td></td>
</tr>
</tbody>
</table>
## Revision History

<table>
<thead>
<tr>
<th>Sub-No.</th>
<th>Date of revision</th>
<th>Revision details</th>
</tr>
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<tr>
<td>*</td>
<td>April 1998</td>
<td>First edition created.</td>
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