Instruction Manual

BASIC Programming Tool M3 for Windows

IM 34M06Q22-02E

YOKOGAWA
Yokogawa Electric Corporation

IM 34M06Q22-02E
2nd Edition

Blank Page

Applicable Product

● Range-free Multi-controller FA-M3

- Model Name: SF560-MCW
- BASIC Programming Tool M3 for Windows

The document number and document model code for this manual are given below.

Refer to the document number in all communications; also refer to the document number or the document model code when purchasing additional copies of this manual.

- Document No. : IM 34M06Q22-02E
- Document Model Code : DOCIM

Media No. IM 34M06Q22-02E (CD) 2nd Edition: Sep. 7, 2012 (AR)

Important

■ About This Manual

- This Manual should be passed on to the end user.
- Before using this product, read this manual thoroughly to have a clear understanding of the product.
- This manual explains the functions of this product, but there is no guarantee that they will suit the particular purpose of a user.
- Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made to ensure accuracy in the preparation of this manual. However, should any errors or omissions come to the attention of the user, please contact the nearest Yokogawa Electric representative or sales office.

■ Symbols Related to Safety

Danger. This symbol on the product indicates that the operator must follow the instructions laid out in this user's manual to avoid the risk of personnel injuries, fatalities, or damage to the instrument. Where indicated by this symbol, the manual describes what special care the operator must exercise to prevent electrical shock or other dangers that may result in injury or the loss of life.

Protective Ground Terminal. Before using the instrument, be sure to ground this terminal.

Function Ground Terminal. Before using the instrument, be sure to ground this terminal.

Alternating current. Indicates alternating current.

Direct current. Indicates direct current.

The following symbols are used only in the user's manual.

WARNING

Indicates a “Warning”.

Draws attention to information essential to prevent hardware damage, software damage or system failure.

CAUTION

Indicates a “Caution”

Draws attention to information essential to the understanding of operation and functions.

TIP

Indicates a “TIP”

Gives information that complements the present topic.

SEE ALSO

Indicates a “SEE ALSO” reference.

Identifies a source to which to refer.

■ Safety Precautions when Using/Maintaining the Product

- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety stated in this manual whenever handling the product. Take special note that if you handle the product in a manner other than prescribed in these instructions, the protection feature of the product may be damaged or impaired. In such cases, Yokogawa cannot guarantee the quality, performance, function and safety of the product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system as well as designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of processes and lines using the product and the system controlled by it, the user should implement it using devices and equipment, additional to this product.
- If component parts or consumable are to be replaced, be sure to use parts specified by the company.
- This product is not designed or manufactured to be used in critical applications which directly affect or threaten human lives and safety — such as nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, shipboard equipment, aviation facilities or medical equipment. If so used, it is the user’s responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not attempt to modify the product.
- In order to prevent electrical shock, turn off all the power sources before connecting wires, etc.
- This product is classified as Class A for use in industrial environments. If used in a residential environment, it may cause electromagnetic interference (EMI). In such situations, it is the user’s responsibility to adopt the necessary measures against EMI.

■ Exemption from Responsibility

- Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa Electric) makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- Yokogawa Electric assumes no liability to any party for any loss or damage, direct or indirect, caused by the use or any unpredictable defect of the product.

■ Software Supplied by the Company

- Yokogawa Electric makes no other warranties expressed or implied except as provided in its warranty clause for software supplied by the company.
- Use the software with one computer only.
- You must purchase another copy of the software for use with each additional computer.
- Copying the software for any purposes other than backup is strictly prohibited.
- Store the original media that contain the software in a safe place.
- Reverse engineering, such as decompiling of the software, is strictly prohibited.
- Under absolutely no circumstances may the software supplied by Yokogawa Electric be transferred, exchanged, or sublet or leased, in part or as a whole, for use by any third party without prior permission by Yokogawa Electric.

■ General Requirements for Using the FA-M3 Controller

● Set the product in a location that fulfills the following requirements:

- Where the product will not be exposed to direct sunlight, and where the operating surrounding air temperature is from 0°C to 55°C (32°F to 131°F).

  There are modules that must be used in an environment where the operating surrounding air temperature is in a range smaller than 0°C to 55°C (32°F to 131°F). Refer to hardware user's manual or the applicable user's manual. In case of attaching such a module, the entire system's operating surrounding air temperature is limited to the module's individual operating surrounding air temperature.
- Where the relative humidity is from 10 to 90%.

  In places where there is a chance of condensation, use a space heater or the like to constantly keep the product warm and prevent condensation.
- For use in Pollution Degree 2 Environment.
- Where there are no corrosive or flammable gases.
- Where the product will not be exposed to mechanical vibration or shock that exceed specifications.
- Where there is no chance the product may be exposed to radioactivity.

● Use the correct types of wire for external wiring:

- USE COPPER CONDUCTORS ONLY.
- Use conductors with temperature ratings greater than 75°C.

● Securely tighten screws:

- Securely tighten module mounting screws and terminal screws to avoid problems such as faulty operation.
- Tighten terminal block screws with the correct tightening torque. Refer to the hardware user's manual or the applicable user's manual for the appropriate tightening torque.

● Securely lock connecting cables:

- Securely lock the connectors of cables, and check them thoroughly before turning on the power.

● Interlock with emergency-stop circuitry using external relays:

- Equipment incorporating the FA-M3 controller must be furnished with emergency-stop circuitry that uses external relays. This circuitry should be set up to interlock correctly with controller status (stop/run).

● Ground for low impedance:

- For safety reasons, connect the [FG] grounding terminal to a Japanese Industrial Standards (JIS) Class D (earlier called Class 3) Ground*1. For compliance to CE Marking, use braided or other wires that can ensure low impedance even at high frequencies for grounding.

  *1 Japanese Industrial Standard (JIS) Class D Ground means grounding resistance of 100 Ω max.

● Configure and route cables with noise control considerations:

- Perform installation and wiring that segregates system parts that may likely become noise sources and system parts that are susceptible to noise. Segregation can be achieved by measures such as segregating by distance, installing a filter or segregating the grounding system.

● Configure for CE Marking Conformance:

- For compliance with CE Marking, perform installation and cable routing according to the description on compliance to CE Marking in the “Hardware Manual”.

● We recommend that you stock up on maintenance parts:

- We recommend that you stock up on maintenance parts, including spare modules, in advance.
- Preventive maintenance (replacement of the module or its battery) is required for using the module beyond 10 years. For enquiries on battery replacement service (for purchase), contact your nearest Yokogawa Electric representative or sales office. (The module has a built-in lithium battery. Lithium batteries may exhibit decreased voltage, and in rare cases, leakage problems after 10 years.)

● Discharge static electricity before touching the system:

- Because static charge can accumulate in dry conditions, first touch grounded metal to discharge any static electricity before touching the system.

● Wipe off dirt with a soft cloth:

- Gently wipe off dirt on the product’s surfaces with a soft cloth.
- If you soak the cloth in water or a neutral detergent, tightly wring it out before wiping the product.

  Letting water enter the module interior can cause malfunctions.
- Do not use volatile solvents such as benzine or paint thinner or chemicals for cleaning, as they may cause deformity, discoloration, or malfunctioning.

● Avoid storing the FA-M3 controller in places with high temperature or humidity:

- Since the CPU module has a built-in battery, avoid storage in places with high temperature or humidity.
- Since the service life of the battery is drastically reduced by exposure to high temperatures, take special care (storage surrounding air temperature should be from –20°C to 75°C).
- There is a built-in lithium battery in a CPU module and temperature control module which serves as backup power supply for programs, device information and configuration information. The service life of this battery is more than 10 years in standby mode at room temperature. Take note that the service life of the battery may be shortened when installed or stored at locations of extreme low or high temperatures. Therefore, we recommend that modules with built-in batteries be stored at room temperature.

● Always turn off the power before installing or removing modules:

- Failing to turn off the power supply when installing or removing modules, may result in damage.

● Do not touch components in the module:

- In some modules you can remove the right-side cover and install ROM packs or change switch settings. While doing this, do not touch any components on the printed-circuit board, otherwise components may be damaged and modules may fail to work.

● Do not use unused terminals:

- Do not connect wires to unused terminals on a terminal block or in a connector. Doing so may adversely affect the functions of the module.

● Use the following power source:

- Use only power supply module F3PU□□-□□ in FA-M3 Controller for supplying power input for control circuit connection.
- If using this product as a UL-approved product, for the external power supply, use a limited voltage / current circuit power source or a Class 2 power source.

● Refer to the user's manual before connecting wires:

- Refer to the hardware user's manual or the applicable user's manual for the external wiring drawing.
- Refer to "A3.6.5 Connecting Output Devices" in the hardware user's manual before connecting the wiring for the output signal.
- Refer to "A3.5.4 Grounding Procedure" in the hardware user's manual for attaching the grounding wiring.

■ Waste Electrical and Electronic Equipment

Waste Electrical and Electronic Equipment (WEEE), Directive 2002/96/EC
(This directive is only valid in the EU.)

This product complies with the WEEE Directive (2002/96/EC) marking requirement.
The following marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category
With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a “Monitoring and Control instrumentation” product.
Do not dispose in domestic household waste.
When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

■ How to Discard Batteries

The following description on DIRECTIVE 2006/66/EC (hereinafter referred to as the EU new directive on batteries) is valid only in the European Union.

Some models of this product contain batteries that cannot be removed by the user. Make sure to dispose of the batteries along with the product.

Do not dispose in domestic household waste.
When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

Battery type: Lithium battery

Note: The symbol above means that the battery must be collected separately as specified in Annex II of the EU new directive on batteries.

Introduction

■ Overview of This Manual

This manual is for BASIC Programming Tool M3 for Windows.

BASIC Programming Tool M3 for Windows is a developmental environment for the FA-M3 BASIC CPU module.

BASIC programming, debugging and CPU setting and diagnosis can be carried out using BASIC Programming Tool M3 for Windows.

This manual describes the hardware and software environments that are necessary for using the BASIC Programming Tool M3 for Windows, and the functions and specifications prepared as the BASIC developmental environment.

The module models that support BASIC Programming Tool M3 for Windows are shown below.

Module	Model
BASIC CPU module	F3BP20-0N,F3BP30-0N

SEE ALSO

For BASIC syntax, refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM 34M06Q22-01E).

■ Configuration of This Manual

This configuration of this manual is as follows.

Chapter 1 Introduction of Software

Describes the operating environment and setup of BASIC Programming Tool M3 for Windows.

Chapter 2 Software Overview

Describes the configuration of BASIC Programming Tool M3 for Windows and summarizes BASIC development using BASIC Programming Tool M3 for Windows.

Chapter 3 Startup and Termination of the Tool

Describes startup and termination of BASIC Programming Tool M3 for Windows.

Chapter 4 File Management Function

Describes the program file management operation.

Chapter 5 Editing Function

Describes the BASIC program editing function.

Chapter 6 Debugging Function

Describes the online debugging function by connecting the BASIC CPU module.

Chapter 7 Maintenance Function

Describes the operation management and setting functions for the BASIC CPU module.

Appendix

■ How to Read This Manual

Use BASIC Programming Tool M3 for Windows after thoroughly reading Chapters 1 and 2 of this manual. These two chapters include a basic general description of the setup methods and BASIC application development.

If you find any unclear sections while using BASIC Programming Tool M3 for Windows, refer to the explanation for each function in Chapter 3 and later.

The contents of each item are independent, respectively, and the manual has the configuration and contents only in reference to a function that will help you understand the specifications for BASIC Programming Tool M3 for Windows.

The basic portions of the operation and editing functions of BASIC Programming Tool M3 for Windows are realized with specifications that are as equivalent to the commercially available Windows software as possible. Accordingly, editing and operation screens are not specifically shown except for those screens specific to BASIC Programming Tool M3 for Windows.

■ Notation in the Text

● Notation for Windows Screens and Operation

Character strings and symbols enclosed in brackets [ ]

These include menus in the menu bar, commands, text box names, and buttons.

(Example): Click [Debug]-[Run] in the menu bar.

Click [Debug] in the menu bar with the mouse and click [Run] in the pulldown menu.

Character strings and symbols enclosed in double quotation marks “ ”

These include icons, windows, dialog boxes, and key-input character strings.

(Example): The “Set date” dialog is displayed.

● Notation of drawings related to BASIC Programming Tool M3 for Windows and display screens

Examples of display screens in the text are described considering a Windows 2000 environment.

In a Windows XP, Windows Vista and Windows 7 environment, icons or application names may differ.

Drawings shown in this manual may be highlighted, simplified, or partially omitted for reason of description. In addition, in the environment of a machine in actual operation, the image of the screen may not agree with that shown in this manual.

● Function keys and shortcuts

In BASIC Programming Tool M3 for Windows, operations with the function keys or shortcuts are possible in addition to mouse operation from the menus.

Since key arrangements on keyboards and the presence or lack of keys vary with the type of computer, this manual describes mouse operation as a basic operation but does not describe operation using the function keys or shortcuts for duplicating functions.

■ Other Instruction Manuals

● When BASIC Programming Tool M3 for Windows is to be used, be sure to read the following instruction manuals before reading this manual.

First read instruction manual for BASIC Programming Tool M3 for Windows Read Me First (IM 34M06Q22-11E).

Refer to the following instruction manuals for the FA-M3 as necessary in addition to this manual.

● For BASIC CPU modules and YM-BASIC/FA syntax, see:

Instruction Manual for the BASIC CPU Modules and YM-BASIC/FA Programming Language.

● For FA-M3 specifications and configuration, mounting and wiring, commissioning, maintenance and inspection, and limitations in mounting the entire system, see the following instruction manual:

Hardware instruction manual (IM 34M06C11-01E)

Note: For specifications of products other than the power module, base module, I/O module, cables, and terminal board unit, see the instruction manual for each product.

● If you use sequence CPU F3SP71, 76, see the following instruction manuals:

Sequence CPU Instruction Manual — Functions (for F3SP71-4N/4S, F3SP76-7N/7S) (IM 34M06P15-01E)

● If you use sequence CPU F3SP66, 67, see the following instruction manuals:

Sequence CPU Instruction Manual — Functions (for F3SP66-4S, F3SP67-6S) (IM 34M06P14-01E)

● If you use sequence CPU F3SP22, 28, 38, 53, 58, 59, see the following instruction manuals:

Sequence CPU Instruction Manual — Functions (for F3SP22-0S, F3SP28-3N/3S, F3SP38-6N/6S, F3SP53-4H/4S, F3SP58-6H/6S, F3SP59-7S) (IM 34M06P13-01E)

● If you use sequence CPU F3SP08, 21, 25, 35, see the following instruction manuals:

Sequence CPU Instruction Manual — Functions (for F3SP21, F3SP25 and F3SP35) (IM 34M06P12-02E)

● For information on the instructions used with sequence CPUs, see the following instruction manuals:

Sequence CPU Instruction Manual — Instructions (IM 34M06P12-03E)

● When programming using ladder, see the following instruction manual.

FA-M3 Programming Tool WideField3 Manual (Instruction and Trouble shooting) (IM 34M06Q16-01E)

FA-M3 Programming Tool WideField3 Manual (Offline) (IM 34M06Q16-02E)

FA-M3 Programming Tool WideField3 Manual (Online) (IM 34M06Q16-03E)

FA-M3 Programming Tool WideField3 Manual (Script) (IM 34M06Q16-04E)

Copyrights and Trademarks

■ Copyrights

The copyrights for programs contained on the CD-ROM and in the online manual belong to Yokogawa Electric Corporation.

For the online manual, PDF security is such that its contents cannot be altered. It can be output to a printer.

If the online manual is output to a printer, use it only for utilizing this product. If the manual is printed out with a printer, exercise care so that no confusion with the latest version occurs. To use the contents, check that the version number agrees with that of the most recent CD-ROM.

Copying the online manual or assignment for, or selling or distributing it (including providing it via a network of personal computers) to a third party is prohibited. In addition, registering or recording the manual on video tape cassette or other medium is also prohibited.

■ Trademarks

- "Microsoft Windows 2000", "Microsoft Windows XP","Microsoft Windows Vista" and "Microsoft Windows 7" are registered trademarks of Microsoft Corporation in the US.
- Pentium is a trademark of Intel Corporation.
- In addition, the product and company names used in the manual are the trademarks or registered trademarks of their respective companies.

Blank Page

FA-M3
BASIC Programming Tool M3 for Windows

IM 34M06Q22-02E 2nd Edition

CONTENTS

Blank Page

1. Introduction of Software

This chapter describes the personal computer environment, the methods of installation and "uninstallation," and connection to the BASIC CPU module for introduction to BASIC Programming Tool M3 for Windows.

CAUTION

Log in with Administrator privileges in order to set up, perform maintenance on, or remove the BASICM3 for Windows software. Users without Administrator privileges cannot set up, perform maintenance on, or remove the BASICM3 for Windows software.

In Windows Vista or Windows 7, select **Run as Administrator** in the installer program. Users without Administrator privileges will not be able to install this software.

CAUTION

When User Account Control (UAC) is enabled in Windows Vista or Windows 7, the installer might not automatically run from the CD-ROM.

If this occurs, use Explorer to select **Setup.exe** on the CD-ROM, and then select **Run as Administrator** to start the installer.

CAUTION

When performing setup in Windows, it is recommended to install the software in a folder for which restricted users have access rights. If the software is installed in a folder that cannot be accessed by restricted users, such users will be unable to use the BASIC Programming Tool M3 for Windows software.

1.1 Operating Environment

The BASIC Programming Tool M3 for Windows operates in the personal computer environment shown below.

Item	Specification
OS	Microsoft Windows 7 (32bit/64bit) Microsoft Windows Vista (32bit/64bit) Microsoft Windows XP Service Pack 3 Microsoft Windows 2000 Service Pack 4
CPU	Pentium 133 MHz or faster, adequate for the operating system to run properly.
Memory	32 MB or more, adequate for the operating system to run properly.
Space on hard disk	30 MB minimum.
CD-ROM drive	Supported by the adove operating system
Printer	Any printer compatible with the operating systems listed above and supports A4 printing
Communication requirements	RS-232-C start-stop synchronization; 9600 and 19200 bps
Supported CPU modules	F3BP20-0N and F3BP30-0N

TIP

166 MHz or faster CPU is recommended. If the CPU is slower, the software may run very slowly.

CAUTION

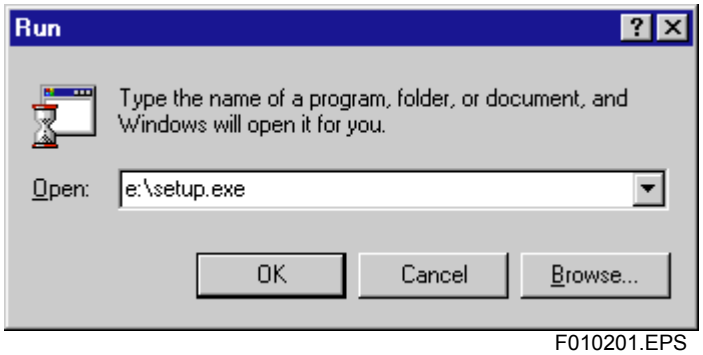
The online help might not be displayed in Windows Vista/7 which does not support the Windows help function by default.

In this case, install a Windows Help program applicable for each OS from the Microsoft Support site.

1.2 Install

The installation procedure for BASIC Programming Tool M3 for Windows is described.

1. Insert the software CD-ROM into the CD-ROM drive.
2. Click [Start]-[Run by specifying file name] from the Windows task bar.
3. Select or enter “setup.exe” located in the root directory of the CD-ROM drive.



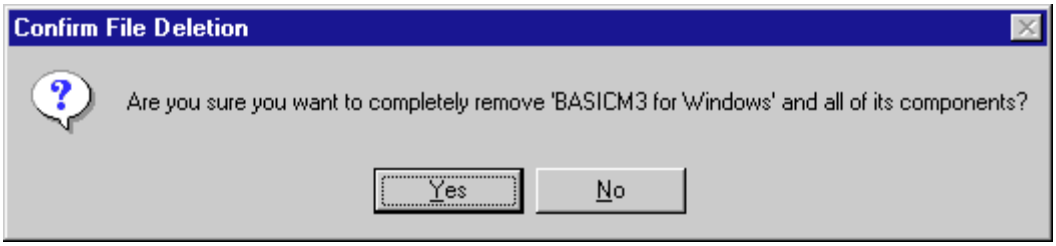
F010201.EPS

4. Click [OK].
5. The setup tool starts up. Check the display contents and click [Next] in turn.M drive.
6. After the setup tool starts, the setup destination can be changed in the setup display of the directory of the installation destination drive.
7. After checking all settings, click [Next].

1.3 Uninstall

A procedure to delete all BASIC Programming Tool M3 for Windows environments from the personal computer is described.

1. Click [Start]-[Set]-[Control Panel]-[Add and delete applications] from the Windows task bar.
2. Select “BASICM3 for Windows” and click [Add and delete].



F010301.EPS

3. Click [Yes].

CAUTION

If a system file required for the removal procedure has been deleted, “uninstallation” cannot be executed. In addition, if there are folders and files not related to the system in the system folder, the removal procedure may not terminate normally.

TIP

For inquiries on the deletion of shared files, select the [All not] button and continue “Uninstall.”

1.4 Personal Computer Environment Setup

● Changing the COM Port Number

The COM port number must be changed depending on the type of personal computer and setup.

Set up the personal computer for the BASIC Programming Tool M3 for Windows port.

Setting on the BASIC Programming Tool M3 for Windows side

Open the BASICM3.ini file in the folder where BASIC Programming Tool M3 for Windows is installed using the text editor and change the following setting:

[COM]

port=COM2: in the case of using a serial port as COM2

TIP

The "BASICM3.ini" file can be opened also by selecting [CPU Setting] - [Port Setting] from the main menu for BASIC Programming Tool M3 for Windows.

TIP

In Windows Vista/7, the folder security prevents restricted users from accessing the folder where BASIC Programming Tool M3 for Windows is installed. In this case, edit the "BASICM3.ini" file in "\ProgramData\Yokogawa\BASICM3" in the installation drive.

Setting on the personal computer side

Check the usable port numbers by selecting “Control panel”-”System”-”Device manager”-”Port”-”Communication port.”

If not set correctly, communication with the BASIC CPU module cannot be made.

TIP

To establish an online connection using KM13-1S, it is required to set up the dedicated driver software on the PC in advance.

USB cable instruction manual (IM34M06C91-01E), which describes the installation procedure and COM port number setting procedure, and the driver software are supplied with the cable. Install the driver software from the CD-ROM supplied with the cable or from our website.

● Shortcut registration

1. Start “Explorer.”
2. Specify the folder where BASIC Programming Tool M3 for Windows is installed and drag out BASM3WIN.
3. Move the above file onto the Windows Desktop form and drop it there.
4. A shortcut can also be carried out.

● Program folder setup

Prepare a folder in advance for saving the BASIC program.

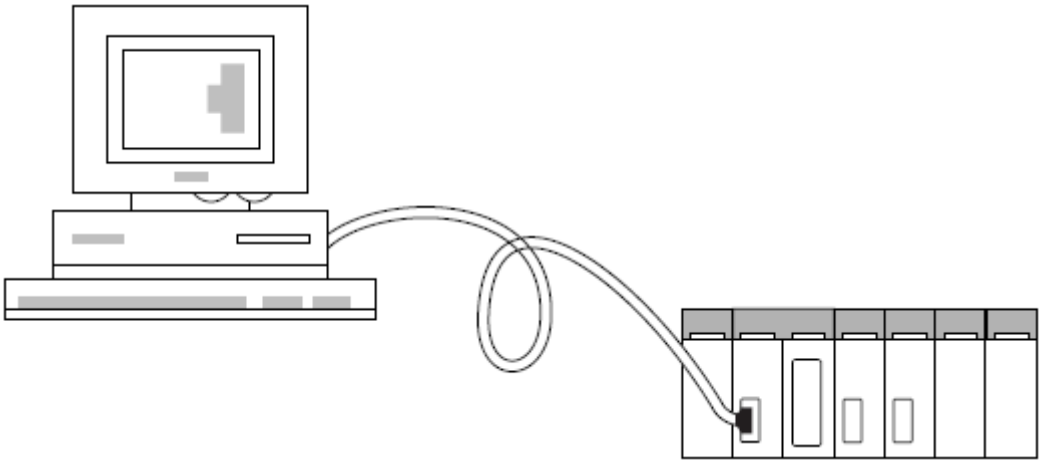
1. Start “Explorer.”
2. Enter the folder name selecting [File]-[New]-[Folder] from the menu bar.

SEE ALSO

To change the personal computer or Windows environment, see applicable instruction manual.

1.5 Connection with BASIC CPU Module

This section describes connection with the BASIC CPU module.



F010501.EPS

■ Preparation

● Personal computer cable

Prepare the cable dedicated to the FA-M3 CPU shown below.

Select one depending on the specifications for the connector of the personal computer serial port.

Model	Suffix Code	Style Code	Option Code	Specifications	
KM11	-2T	*A	---	D-sub 9-pin female	3m long
	-3T	*A	---		5m long
	-4T	*A	---		10m long
KM13	-1S	---	---	USB1.1-compliant cable for use with USB port.	3m long

■ Setting a serial port number

Please set the COM number of a serial port as “BasicM3.ini” which exists in the installation place of “BASICM3 for Windows”.

Open and change the contents of “BasicM3.ini” by the text editor.

It can set up from COM1 to COM9. (Default : COM1)

(example) When the COM number of a serial port is COM5.

```
[com]
port=COM5
```

TIP

The "BASICM3.ini" file can be opened also by selecting [CPU Setting] - [Port Setting] from the main menu for BASIC Programming Tool M3 for Windows.

TIP

In Windows Vista/7, the folder security prevents restricted users from accessing the folder where BASIC Programming Tool M3 for Windows is installed. In this case, edit the "BASICM3.ini" file in "\ProgramData\Yokogawa\BASICM3" in the installation drive.

■ Connection

1. Connection to serial port.

   Connect the cable to the serial port in the rear of the personal computer.
2. Connect the cable to the PROGRAMMER port of the BASIC CPU module. Securely connect the cable removing the protection cover on the CPU side.
3. Confirmation of communications.

   Operate the Debug function or Maintenance function to confirm communication with the CPU.

TIP

For a personal computer having more than one serial port or using a COM port number for infrared communications, it may be necessary to change the COM port number used by the serial port..

TIP

To establish an online connection using KM13-1S, it is required to set up the dedicated driver software on the PC in advance.

USB cable instruction manual (IM34M06C91-01E), which describes the installation procedure and COM port number setting procedure, and the driver software are supplied with the cable. Install the driver software from the CD-ROM supplied with the cable or from our website.

2. Software Overview

This chapter gives a basic overview of BASIC Programming Tool M3 for Windows, the programming flow, and application files.

2.1 Software Environment Configuration

BASIC Programming Tool M3 for Windows is a program development environment for the FA-M3 BASIC CPU module under a Windows environment.

It incorporates the following functions:

● Editing Functions

- Program configuration and display function
  - Subprogram addition
  - Subprogram deletion
- BASIC program editing function
  - Cut, copy, and pasting functions
  - Search, jump, and substitute functions
  - Line number assignment and setting functions
  - Line number re-assignment function
- Line number management function
- Error list display function

● Debug Functions

- Debug run/stop
- Downloading and uploading
- Trace functions
  - Branch tracing
  - Variable tracing
- Break point setting, step run
- Program residence setting
- Run setting when debugging is completed
- Free area displaying

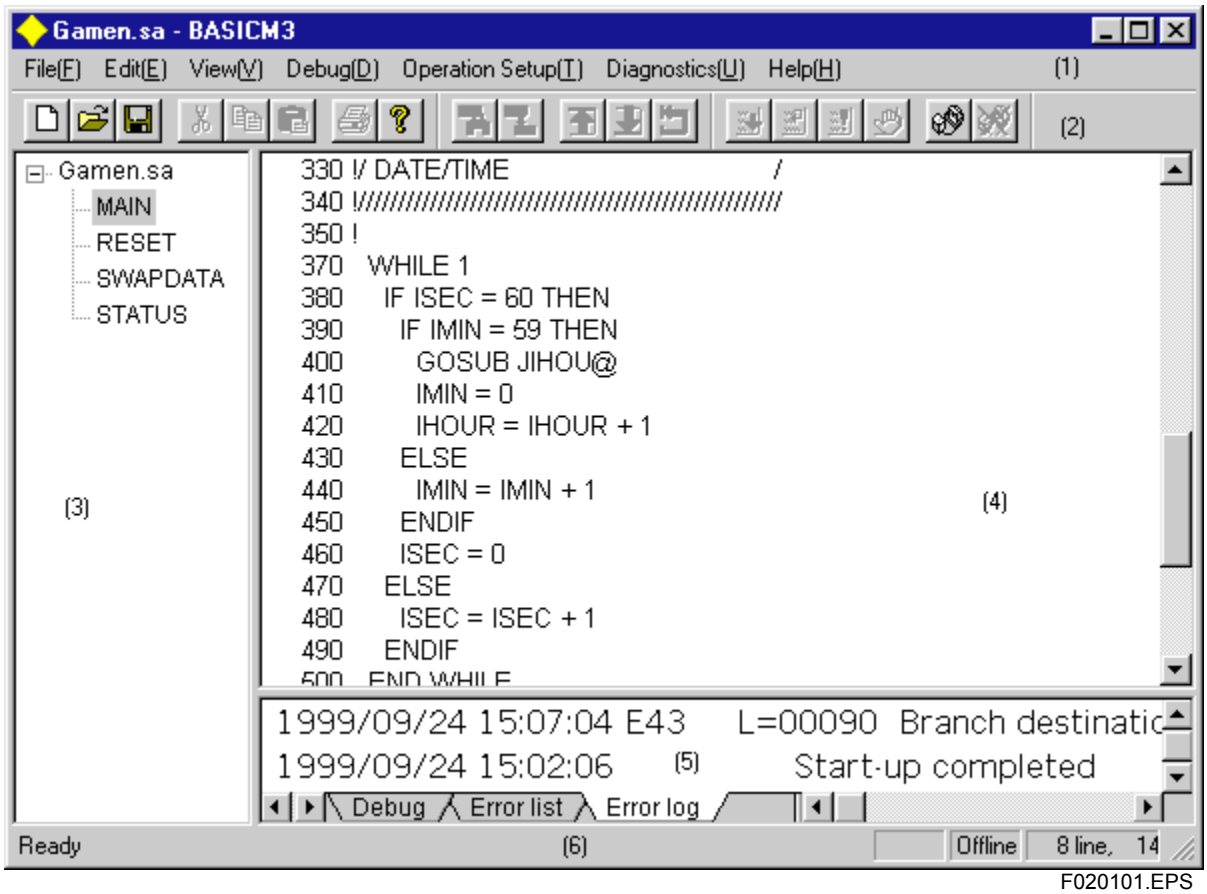
● Maintenance Functions

- CPU reset start
- ROM management function
  - Writing to common area
  - Writing to program area
  - ROM erasing
- Baud setting
- Program run monitor
- Configuration
  - CPU configuration
  - Shared-device setting
- Error log
- I/O configuration display
- Date setting

2.1.1 Screen Configuration

The main frame and each window of BASIC Programming Tool M3 for Windows are described.

■ Main Frame



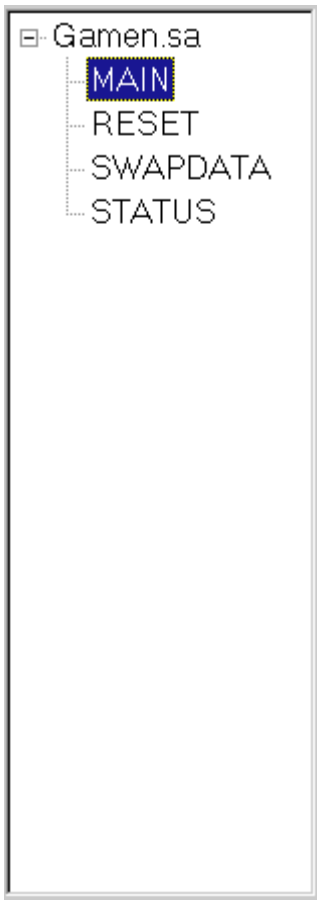
F020101.EPS

The windows and bars that configure BASIC Programming Tool M3 for Windows are:

(1) Menu bar
(2) Toolbar
(3) Program configuration window
(4) Edit window
(5) Debug window
(6) Status bar

■ Program Configuration Window

This window appears on the left side of the main frame and displays the program configuration. In this window, programs to be displayed in the edit window are selected.

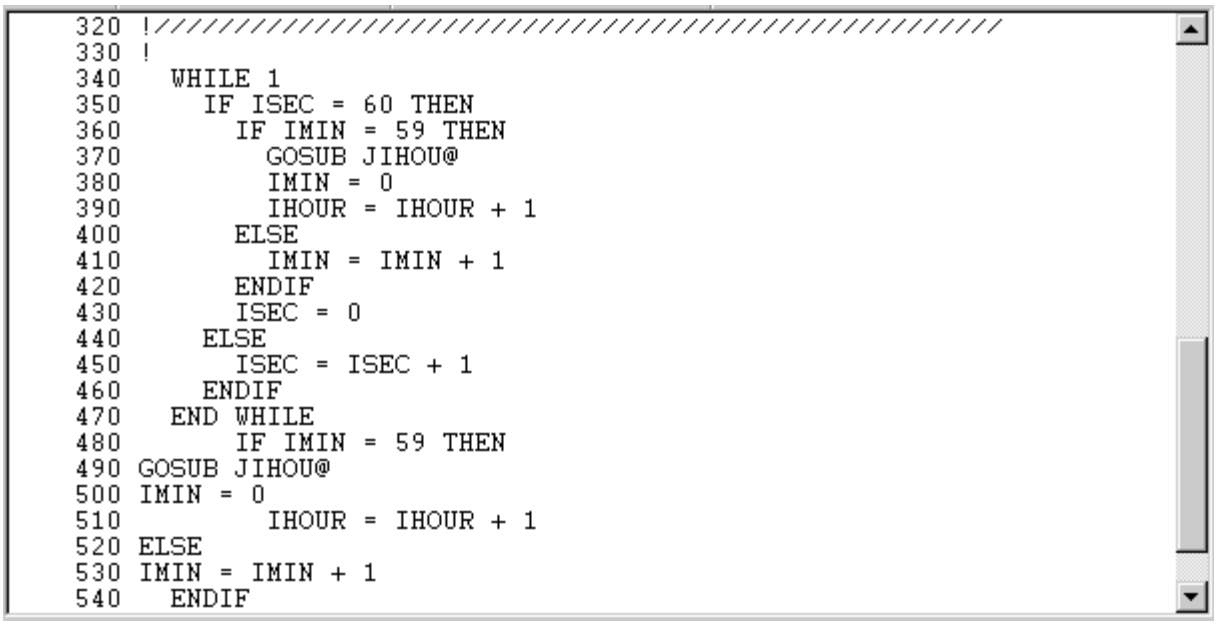


F020102.EPS

****.sa:	Name of a file being edited
MAIN:	Main program
Other displayed names:	Subprograms

■ Edit Window

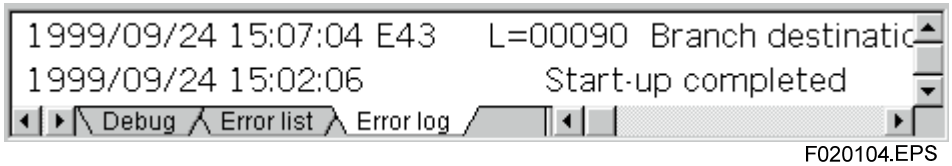
This window is the program editing and debug area that appears from the center to the upper right side of the main frame. It displays a program selected in the program configuration window. For the operating method, see Chapter 5 of this manual, “Editing Functions.”



F020103.EPS

■ Debug Window

This window displays and switches between one of three types of windows: debug, error list, and error log windows.



F020104.EPS

● Debug Window

In this window, debug data sent from the BASIC CPU module are displayed when debugging.

● Error List

This list displays the result of checking the BASIC program syntax.

● Error Log

Information on the CPU error log is displayed. For the operating method, see Chapter 7 of this manual, “Error Log Function in Maintenance Functions.”

CAUTION

The vertical scroll bar of the debug window may disappear or the horizontal scroll bar may not return to the left side, but there is no problem in displaying data. If the vertical scroll bar disappears, click the vertical scroll bar display position.

■ Menu Bar, Toolbar, and Status Bar

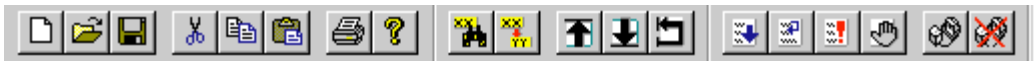
● Menu Bar

The menu is for processing the functions of BASIC Programming Tool M3 for Windows. Basic operation is carried out from this menu.

F020105.EPS

● Toolbar

There are three types of frequently used tool bars: standard toolbar, search toolbar, and debugging toolbar. Each function is the same as that of the menu bar. For a description of the functions, see the section for each function.



F020106.EPS

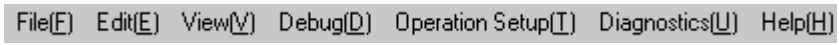
● Status Bar

The CPU communication status, resident mode indication, and the progress status when downloading or uploading, are displayed.

F020107.EPS

2.1.2 Menu Configuration

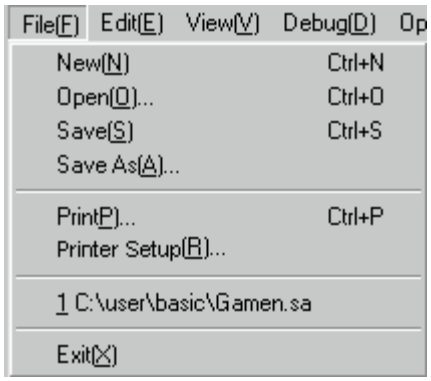
The basic items in the menu bar and described.



F020108.EPS

● File

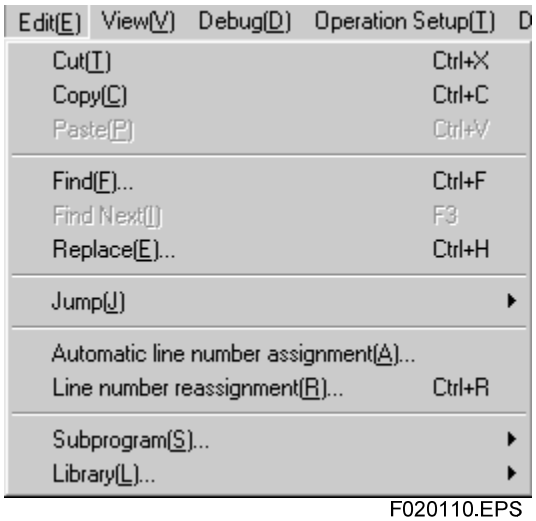
BASIC program file access, program printing, and termination of BASIC Programming Tool M3 for Windows can be performed.



F020109.EPS

● Edit

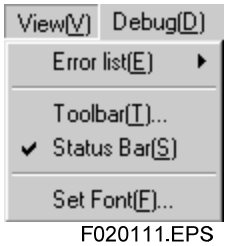
The editing function common to the off-line status and debugging status. Each function can be used in editing programs.



F020110.EPS

● View

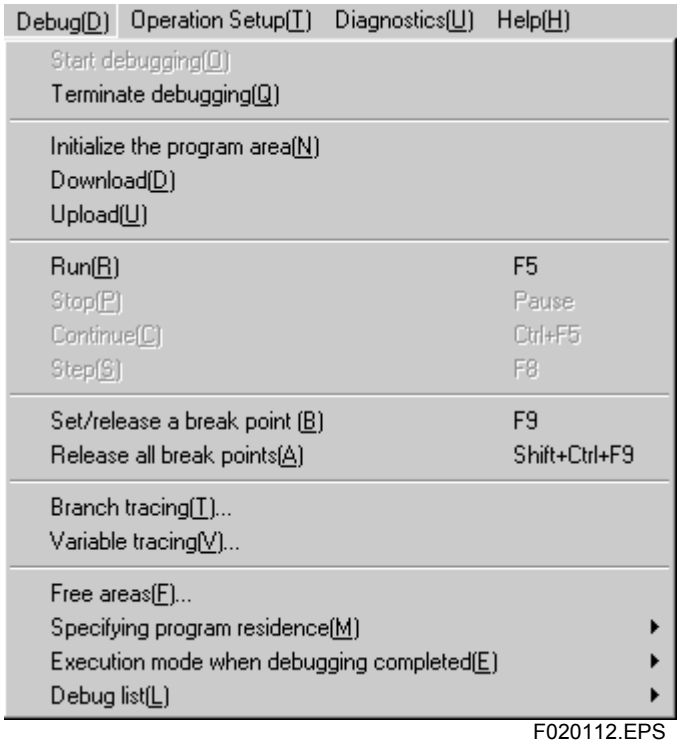
Display for error lists, display and setting for the menu bar and status bar, and font setting for the edit window can be performed.



F020111.EPS

● Debug

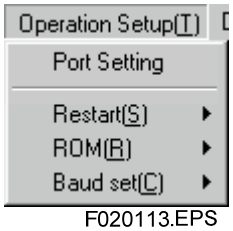
This is the debug function in the on-line status. Each function becomes effective after connection to the BASIC CPU module.



F020112.EPS

● Operation Setup

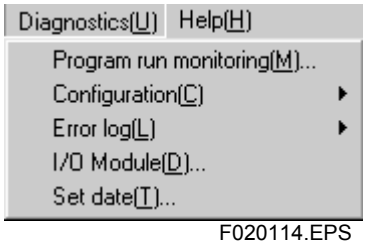
Reset start of the CPU, the ROM management function, and the baud rate are set.



F020113.EPS

● Diagnosis

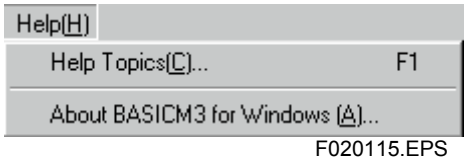
This is the diagnostic function for the BASIC CPU module. CPU operation monitor, configuration, error log saving and other operations are performed.



F020114.EPS

● Help

On-line help is displayed. On-line help includes function help for BASIC Programming Tool M3 for Windows, functions for the BASIC CPU module, and statement help.



F020115.EPS

TIP

Operation setting and the diagnostic function do not operate during debugging. To execute operation setting and the diagnostic function, terminate debugging.

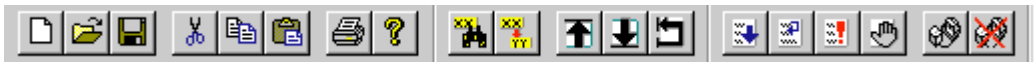
CAUTION

The online help might not be displayed in Windows Vista/7 which does not support the Windows help function by default.

In this case, install a Windows Help program applicable for each OS from the Microsoft Support site.

2.1.3 Tool Buttons

An overview of the tool buttons is described. For a description of the functions corresponding to each tool button, see the section for each respective function.



F020116.EPS

■ Standard Toolbar

Tool buttons for file access, editing, and print functions

New	Copy
Open	Paste
Save	Print
Cut	Help

■ Debug Toolbar

Toolbar used for debug function

Run	Set/release break point
Step	Start debugging
Stop	Terminate debugging

■ Search Toolbar

Toolbar used for Find, Move, and Replace in the editor window for editing and debugging functions.

Find	Move to top line
Replace	Move to bottom line
	Move to specified line

CAUTION

A description of the tool buttons is not displayed during debugging.

2.1.4 Basic Operation

This section describes the basic operating specifications for BASIC Programming Tool M3 for Windows by giving examples. Read the section for each respective function after reading this section.

● Selection from the menu bar

Operate the function by selecting it from the menu bar.

(Example) Search

1. Move the mouse pointer onto [Edit] on the toolbar and then click.
2. Move the mouse pointer to the position for [Search].
3. Highlight [Search] and click.
4. The “Search” menu dialog is displayed.

● Selection using the tool button

Operate the function from the tool button.

(Example) Search

1. Bring the mouse pointer onto the [] tool button and then click.
2. The “Search” menu dialog is displayed.

● Entering characters

Enter them from the keyboard.

(Example) Statement input

1. Click an edit line in the edit window.
2. Since the cursor is displayed, enter characters from the keyboard.
3. Press the Enter key.

● Shortcut

The shortcut keys that are usable in BASIC Programming Tool M3 for Windows are shown below. The functions are the same as the operations from the menu bar. For the operation methods after startup, see each section.

Pull-down Menu Function	Shortcut Key(s)
[File] - [New]	[Ctrl] + N
[File] - [Open]	[Ctrl] + O
[File] - [Save]	[Ctrl] + S
[File] - [Print]	[Ctrl] + P
[Edit] - [Cut]	[Ctrl] + X
[Edit] - [Copy]	[Ctrl] + C
[Edit] - [Paste]	[Ctrl] + V
[Edit] - [Find]	[Ctrl] + F
[Edit] - [Find Next]	[F3]
[Edit] - [Replace]	[Ctrl] + H
[Edit] - [Jump] - [Move to Top Line]	[Ctrl] + T
[Edit] - [Jump] - [Move to Bottom Line]	[Ctrl] + B
[Edit] - [Jump] - [Move to the specified line]	[Ctrl] + G
[Edit] - [Line number reassignment]	[Ctrl] + R
[Debug] - [Run]	[F5]
[Debug] - [Stop]	[Pause]
[Debug] - [Continue]	[Ctrl] + [F5]
[Debug] - [Step]	[F8]
[Debug] - [Set/release a break point]	[F9]
[Debug] - [Release all break points]	[Shift] + [Ctrl] + [F9]
[Help] - [Help Topics]	[F1]

Shortcuts by clicking the right mouse button vary with the type of window that is open.

These are set for functions frequently used or functions that do not exist in the menu bar.

2.1.5 Message Box

This section describes the message boxes displayed in BASIC Programming Tool M3 for Windows and their button input processing. They are omitted in the descriptions of the functions in each chapter.

■ Confirmation and Selection Message

When operation is performed from BASIC Programming Tool M3 for Windows, these messages are displayed when confirmation of the operation is required or some preprocessing is necessary for that operation.

Message Box	Options Available	Time of Confirmation Display	Type of Function
Save changes to xxxxxxx?	Yes No Cancel	When currently displayed program is changed but is not yet saved	File
File xxxxxxx already exists. Overwrite?	Yes No	When the name of a file to be saved already exists	File
OK to delete xxxxxxx?	Yes No	At deletion of subprogram	Subprogram
OK to release xxxxxxx link?	Yes No	At release of library link	Library link
Connects to CPU module. Select process after connection.	Upload Download Cancel	At start of debugging	Debugging
OK to disconnect from CPU module?	Yes No	At termination of debugging	Debugging
OK to initialize program area?	Yes No	At initialization of program area	Debugging
“ xxxxxxx already exists. OK to abort xxxxxxx program?	Yes No	When another program exists during downloading	Debugging
OK to make xxxxxxx resident?	Yes No	At setting of program residence	Debugging
OK to release resident xxxxxxx?	Yes No	At release of program residence	Debugging
After debugging, OK to run program automatically?	Yes No	At completion of debugging or at selection of run set	Debugging
After debugging, OK to abort program?	Yes No	At completion of debugging or at selection of stop set	Debugging

■ Setting Error

A setting error is displayed if operation from BASIC Programming Tool M3 for Windows results in an error and cannot be executed.

Message Box	Options Available	Time of Confirmation Display	Type of Function
Communication error	OK	When an error occurs in communication with the CPU	Diagnosis
Program does not exist.	OK	When running is started or stopped without a program in the CPU	Diagnosis
Program is already running.	OK	Running is started while program is running.	Diagnosis
Program is already stopping.	OK	Stopping is selected while program is stopping.	Diagnosis
Illegal area size; invalid setpoint value	OK	Specified size is out of allowable range in configuration.	Diagnosis
Cannot register.	OK	When configuration is registered while BASIC is running.	Diagnosis
System cannot be reset.	OK	When system reset is selected for CPU that is not the main CPU	Diagnosis
Invalid CPU	OK	Selected function does not exist in CPU being connected.	Diagnosis
Not in ROM writer mode. Data cannot be written or deleted.	OK	When CPU is not in ROM writer mode.	Diagnosis
Not permitted because BASIC is running.	OK	When set to ROM writer mode while BASIC is running.	Diagnosis
OK to restart system?	Yes No	At start of system reset	Operation setting
OK to restart CPU?	Yes No	At start of CPU reset	Operation setting
OK to write common area to ROM?	Yes No	When writing common area	ROM
OK to write program area to ROM?	Yes No	When writing program area	ROM
OK to delete ROM contents?	Yes No	When deleting contents of ROM	ROM
OK to set ROM writer mode	Yes No	At setting of ROM writer mode	ROM
OK to reset ROM writer mode?	Yes No	At release of ROM writer mode	ROM
OK to operate xxxxxx?	Yes No	When running with program operating status display dialog	Diagnosis
OK to stop xxxxxx?	Yes No	When stopping with program operating status display dialog	Diagnosis
OK to update contents?	Yes No	At registration of each diagnostic (set) function	Diagnosis
OK to clear error log?	Yes No	When selecting error log clear	Diagnosis

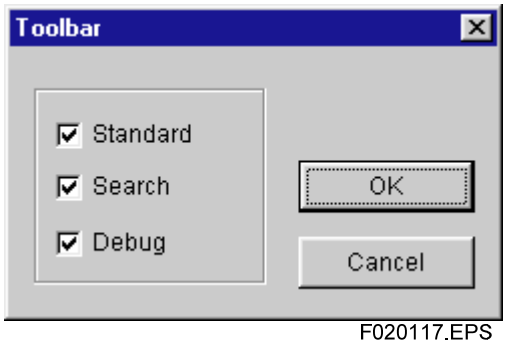
2.1.6 Setups

This subsection describes the changes of the display setup on the screens of BASIC Programming Tool M3 for Windows.

● Setup of Toolbar Display Items

Display or no-display can be set for each item for the three types of toolbars.

1. Click [View] - [Toolbar] from the menu bar.
2. Check the tool to be displayed.
3. Click the [OK] button.

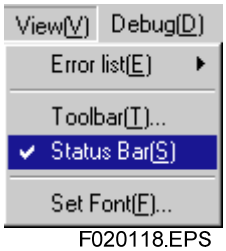


F020117.EPS

4. Checked toolbar is displayed.

● Selection of Status Bar Display

1. Click [View] - [Status bar] from the menu bar.
2. When the status bar is displayed, a check mark appears to the left of the item name.



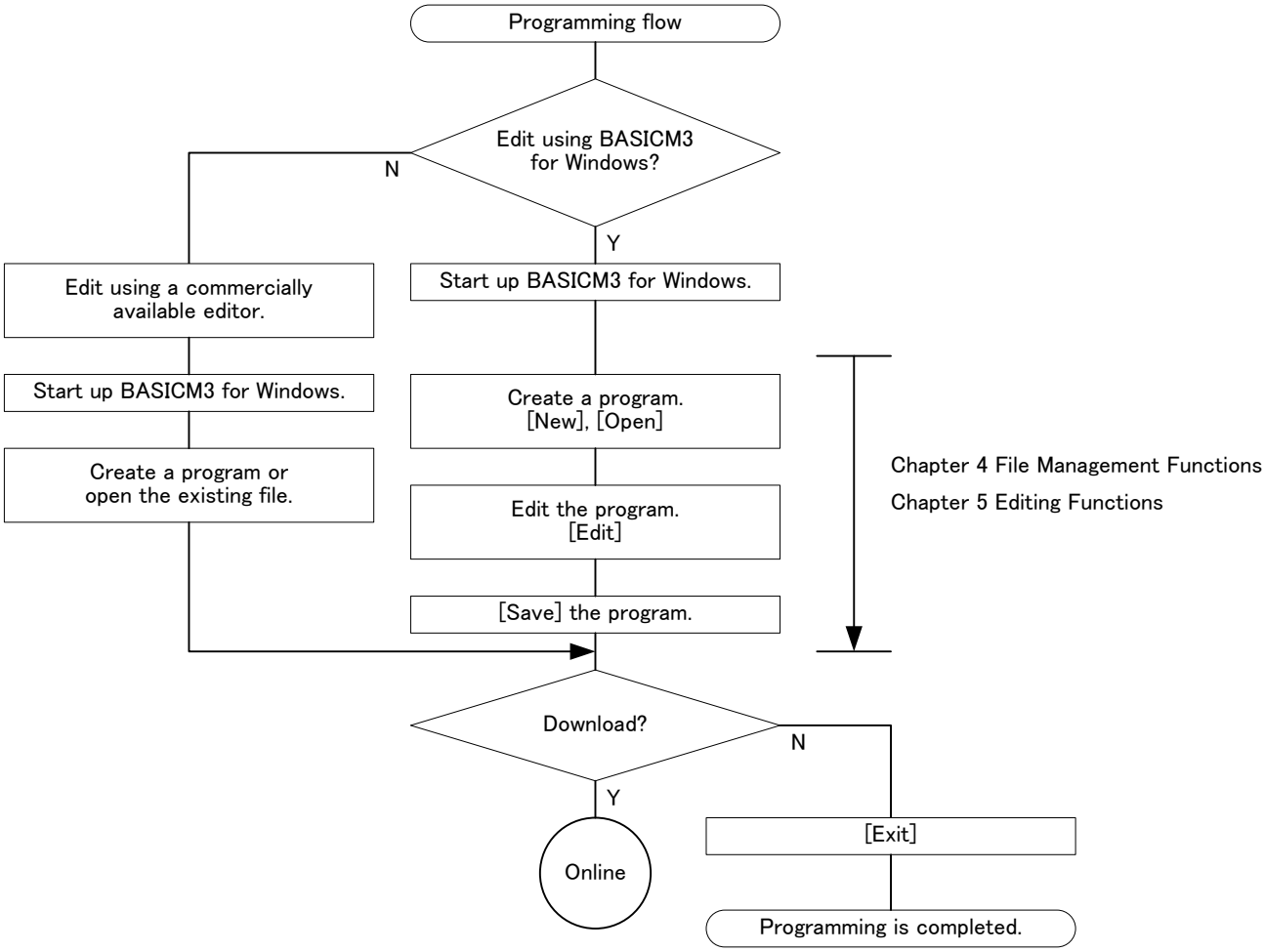
F020118.EPS

2.2 Programming Flow

This section interprets the flow from FA-M3 BASIC application programming to debugging.

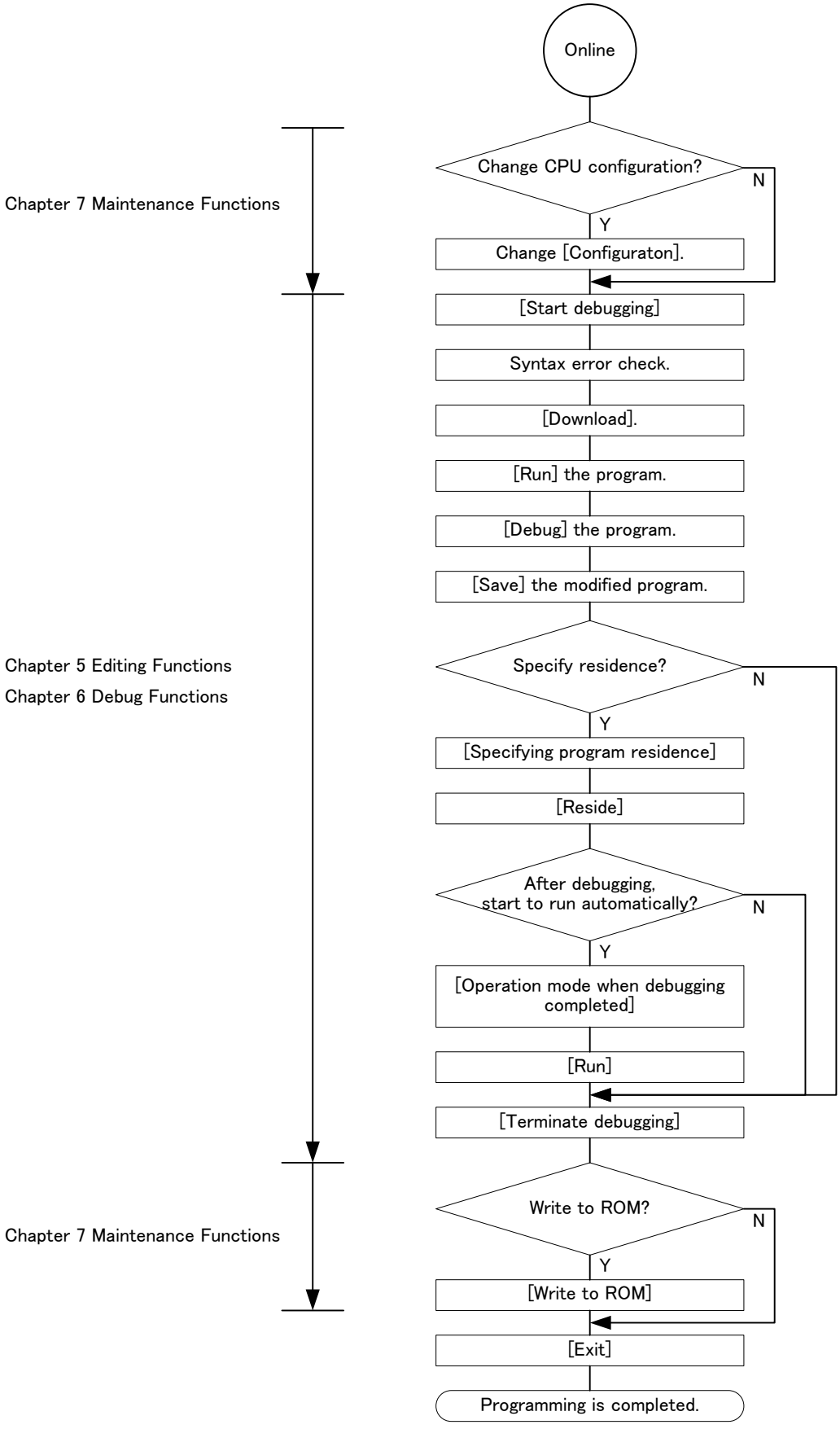
The section describes the functions of the BASIC Programming Tool M3 for Windows that become effective in each process.

● Off-line Programming Functions



F020201.EPS

● Debug and Maintenance Functions



F020202.EPS

2.3 Overview of BASIC Programming Tool M3 for Windows Files

■ File Configuration

This section describes the files created by BASIC Programming Tool M3 for Windows. It is recommended that user files be saved with the following identifying extensions:

Extension	Title	Contents
.SA	BASIC application	BASIC program edited and created with BASIC Programming Tool M3 for Windows or commercially available editor. Text source file.
.UN	BASIC application	BASIC program edited and created with BASIC Programming Tool M3 for Windows. Intermediate file.
.ELG	Error log	Text file in which CPU error information is stored on a line basis.
.ERR	Error log	Text file for displays of syntax errors and the like in editing. Stores up to 1024 items.
.LST	Debug list	Text file for data tracing information and error information lists when CPU is undergoing debugging.

■ BASIC Application File Specifications

A BASIC application file (extension: .SA) can be edited with a commercially available editor and be used. Create it with the following file specifications:

● File Name

Normal operation can be obtained with a character string of up to eight standard-width (single-byte) alphanumeric characters starting with an alphabetical letter.

● File Specifications

Program block:	Compose the entire program block with one file.
Line number:	Initialize the file for every program block and describe it in ascending order.
Line number delimiter:	Insert one or more standard width spaces between each line number and corresponding program.
Subprogram name:	Name it with a character string of up to eight standard-width alphanumeric characters starting with an alphabetical letter.

● Folder Name

A character string not containing a double-width space.

CAUTION

- A program name displayed by the selection of “Diagnosis” - “Program run monitoring” -“Program name” is composed of eight standard-width alphanumeric characters. If a program having file names exceeding eight characters or file names using doublewidth or special characters is downloaded, the displayed characters may vary irregularly. In addition, the part of the program name exceeding the eight characters is not displayed.
- If a file that is not correctly recognized by BASIC Programming Tool M3 for Windows is opened or downloaded, operation after that may be not normal.

TIP

For program syntax, refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM 34M06Q22-01E).

2.4 Interpretation of Terms for BASIC Programming Tool M3 for Windows

This section interprets nouns specific to BASIC programming tool for M3 for Windows used in this manual.

- **Main Program**
  A program block that executes initial operation when a BASIC program is operated, and becomes the main part. It is necessary for an application to have a main program.

- **Subprogram**
  A function block called from a program. Variables and line numbers are all managed independently.

- **Program area**
  An area to store BASIC programs within the BASIC CPU module. The size of the area varies with the module. In addition, the size of the program area can be set using Configuration.

- **Common area**
  An area to store variable data within the BASIC CPU module. This is used when the same data are used between programs. In addition, the size of the common area can be set using Configuration.

- **Download**
  The operation to bring a BASIC program from a personal computer to the BASIC CPU module.

- **Upload**
  The operation to store a BASIC program residing in the BASIC CPU module on a personal computer.

- **Debugging**
  An operation mode in which BASIC program downloading, program changes, program additions, operation checks, etc. are executed by connecting a personal computer to the BASIC CPU module. The BASIC CPU module is connected at the start of debugging to enter debugging.

- **Break point**
  A function to debug the source code of a BASIC program. A running program can be suspended at a line number at which a break point is set and a step run can be made from that line.

- **Step run**
  A function to run a BASIC program step by step.

- **Branch tracing**
  Traces branching programs, such as subprograms or subroutines. The transition status of functions in the program can be seen.

- **Variable tracing**
  The status of variable data used in the program can be seen. Information is displayed every time variable data are changed.

- **Error log**
  Error information of the BASIC CPU module system.

- **Library**
  An application program package using machine language. Its configuration and usage are the same as that of a subroutine.

3. Startup and Termination of the Tool

■ Start up

1. Start BASIC programming tool M3 for Windows.
   Click [Program] - [FA-M3 Application] - [BASICM3 for Windows] of the Windows start menu.
2. “Mainframe” is displayed.

CAUTION

BASIC programming tool M3 for Windows cannot be started more than one time. [Already running] is displayed.

■ Terminate

From the menu bar, click [File] and then click [Exit].

SEE ALSO

If file saving is required or debugging is not terminated, the appropriate message is displayed. For the operating method, refer to the menu sections for each function.

Blank Page

4. File Management Functions

This chapter on File Management Functions describes management of a BASIC application file and program printing.

● BASIC Application File Management

- File is opened.
- File is saved.
- Subprogram is saved.

● Printing Function

- Entire program printing
- Partial printing

CAUTION

The names of folders used for saving BASIC application files cannot have character strings containing double-width spaces.

4.1 Creation of New Program

Newly creates a BASIC program.

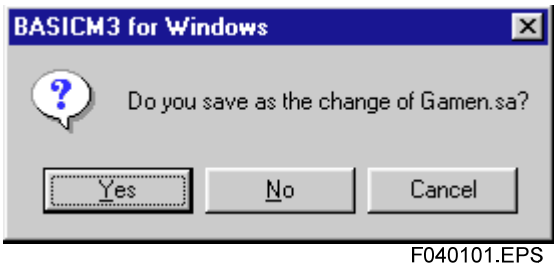
Terminates a BASIC program that has been being edited till now.

If new programming is executed, the program configuration and edit windows are cleared and new programming becomes possible.

1. Select new programming.

   From the menu bar, click [File] and then click [New].

   If program editing is executed in the edit window;



F040101.EPS

   [Yes]: If there is no file name, the Save dialog box is displayed. If the file name already exists, the file is saved with that name.

   [No]: The program file being edited is not updated and new programming is ready.

   [Cancel]: New programming is canceled and the screen returns to the window where the current editing is taking place.

   If program editing is not executed in the edit window;

   The program file is not updated and terminated.

2. Open a new programming screen.

   The program configuration and edit windows are cleared and a new programming screen appears.

4.2 Opening of Existing Program

Opens a BASIC program saved on a personal computer.

Terminates a BASIC program that has been being edited till now.

■ Opening from [Open]

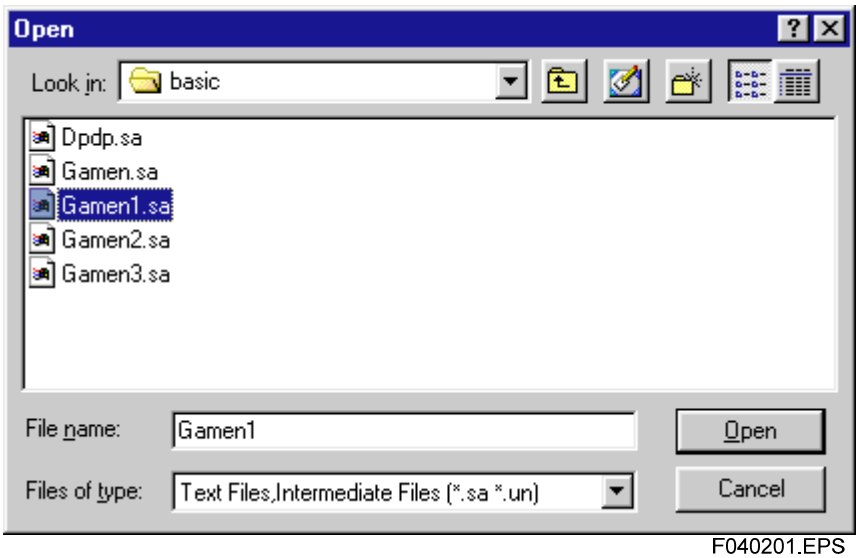
1. Open

   From the menu bar, click [File] and then click [Open].

   “Open” dialog is displayed.

2. Select program file

   Select the program file to be edited.



F040201.EPS

   Click [Open].

3. Program display

   The program configuration is analyzed, and the configuration is displayed in the program configuration window and the main program in the edit window, respectively.

■ Opening by selecting a recently used file

1. A list of recently used files is displayed in the [File] menu.
2. Click the file name.

TIP

A file currently being edited cannot be re-displayed even if it is selected from the recently used files. Select it from [File] - [Open].

4.3 File Saving by Overwriting

Saves a file being edited with the same name as that prior to editing.

1. Save by overwriting.
   From the menu bar, click [File] and then click [Save].
2. Saved
   It is saved with the name of the file being edited.
   Overwriting to the existing file is not confirmed.

TIP

BASIC application linked to a library can be saved in intermediate language format (.UN).

4.4 Saving with New Name

The BASIC application being edited is given a new name and saved as a file.

1. Save

   From the menu bar, click [File] and then click [Save As].

2. Select type of file

   Set “File type.”

   [Text format (*.SA)]: The file becomes a text file that can be edited in another editor.

   [Intermediate format (*.UN)]: Saves a file in the intermediate language.

CAUTION

Save a BASIC application linked with a library in intermediate language format. If it is saved in text format, the library part becomes invalid.

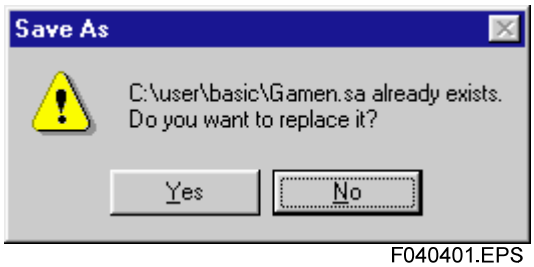
3. Choose name

   Enter a file name.

   If there is no file with the same name,

   The file is saved with the entered name.

   If a file with the same name already exists,



F040401.EPS

[Yes]: Saves by overwriting the file.

[No]: Does not overwrite and the display returns to the Save dialog.

CAUTION

The names of folders used for saving BASIC application files cannot have character strings containing double-width spaces.

4.5 Subprogram Saving

A subprogram being edited in the edit window can be saved as a file.

A saved subprogram can be used in another application.

1. Select program

   Select a program to be saved in the “Program configuration window” and display it in the edit window.

2. Save subprogram

   From the menu bar, click [Edit] and then [Subprogram].

The Save dialog box is displayed.

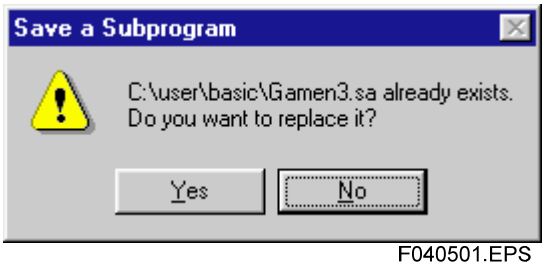
3. Choose file name

   Enter a file name.

   If there is no file with the same name,

   The file is saved with the entered name.

   If a file with the same name already exists,



F040501.EPS

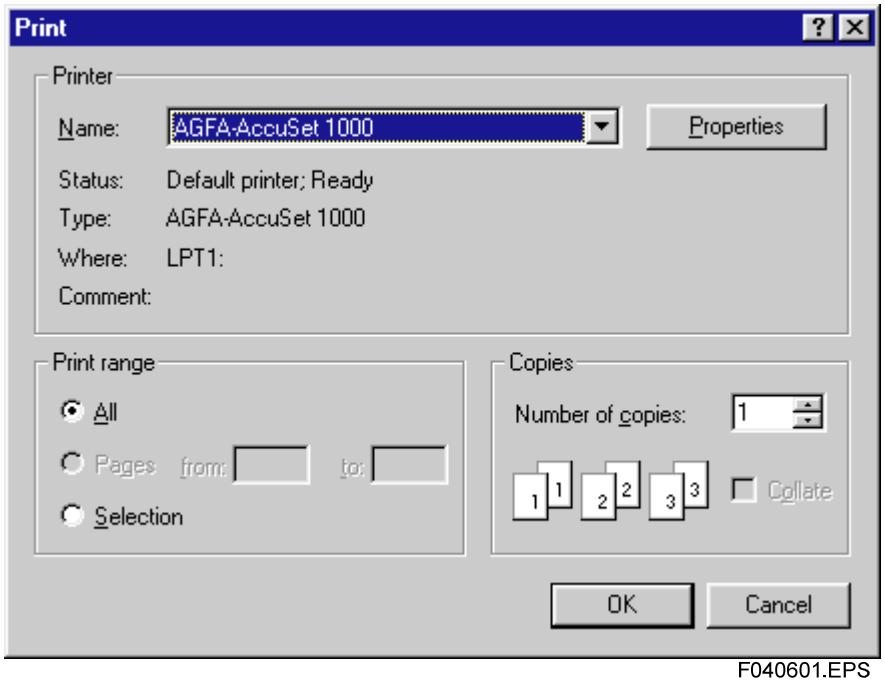
[Yes]: Saves by overwriting the file.

[No]: Does not overwrite and the display returns to the Save dialog.

4.6 Program File Printing

Prints a program being edited.

The function includes printing an entire program being edited or printing a specified program.



F040601.EPS

■ Printing Entire Program

Prints an entire program being edited.

1. Start of printing
   From the menu bar, click [File] and then click [Print].
2. Select [All]
   Click the [All] option button of [Printing range].
3. Print
   Confirm the printer and other items and then click [OK].

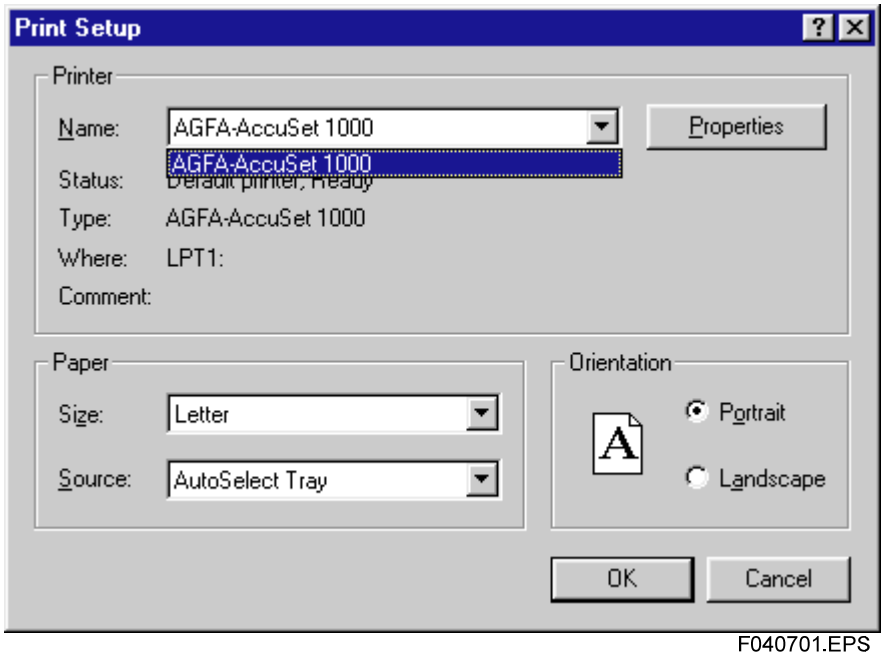
■ Printing Specified Program

Prints a program being displayed in the edit window.

1. Display program
   Display the program to be printed.
2. Start printing
   From the menu bar, click [File] and then click [Print].
3. Select [Selected area]
   Click the [Selected area] option button of [Printing range].
4. Print
   Confirm the printer and other items and then click [OK].

4.7 Printer Setup

Set the output destination of BASIC program printing.



F040701.EPS

1. Open the dialog box.
   From the menu bar, click [File] and then click [Printer Setup].
   The setup dialog box appears.
2. Change the setting.
3. Close the dialog box.
   [OK]: The change is made.
   [Cancel]: Setting reverts to the setting before the change.

4.8 Error List Saving

The contents displayed for syntax errors or the like during editing are saved in a file. The saved file can be read in a text editor.

1. Display the error list.

   From the menu bar, click [View] and then click [Error list] and [Display].

   The debug window displays the error list.

2. Save

   From the menu bar, click [View] and then click [Error list] and [Save].

3. Choose a file name.

   Enter the file name and click [Save].

Blank Page

5. Editing Functions

This chapter describes the editing functions of a BASIC application program. The descriptions center around operation from the menu bar.

- **Program Editing Functions**
  General editing functions, such as cutting, deletion, pasting, search, and jump, are described.

- **Program Configuration Editing Functions**
  Functions, such as subprogram addition and deletion, are described.

- **Error List**
  The display, saving and clearing of data for an error list are described.

5.1 Limitations to Editing Functions

The editing functions have the following limitations.

- If data are to be exchanged with other editors using the clipboard, use correct data. No data can be pasted if they cannot be handled in the clipboard.
- BASIC programming tool M3 for Windows does not have an operation-redo (restoring) function. Carefully execute, for example, program deletion.
- Although line numbers are automatically assigned when lines are inserted using the paste function, if the number of pasted lines is greater than the number of available lines, the line numbers cannot be acquired and thus copying is not executed.
- The length of a line can be no longer than the line number (6 characters including spaces) plus one single-byte space plus the statement (up to 246 single-byte characters). A double-byte character in a statement is converted to two single-byte characters.

5.2 Programming in Edit Window

This section describes program input in the edit window.

■ Text Input

The specifications are equivalent to that of a commercially available screen editor. Display the cursor in the “edit window” and enter text from the keyboard.

Enter the line number, insert one or more spaces, and then enter the description.

If the automatic line number assignment function is set, it is not necessary to enter a line number.

1. Place the cursor to the right of the line number.

F050201.EPS

2. Enter “OPTION BASE 1” from the keyboard.

F050202.EPS

3. Press the [Enter] key.

F050203.EPS

If the automatic line number assignment function is set, a new line is added.

TIP

If the automatic line number assignment function is not set, enter the line number. Separate the line umber from program data with one or more spaces.

■ Line Feed

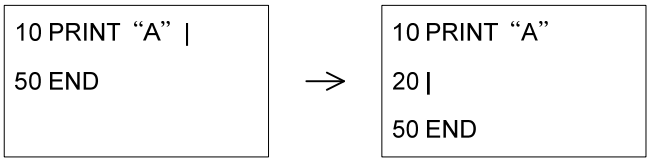
Feed a line using the [Enter] key in the editor.

When feeding a line, the entered line is checked for syntax error.

■ Line Number Management

If the [Enter] key is pressed at the end of a line, a new line is inserted. In this case, if the automatic line number assignment function is set, a line number is generated on the new line. The generated line number is described.

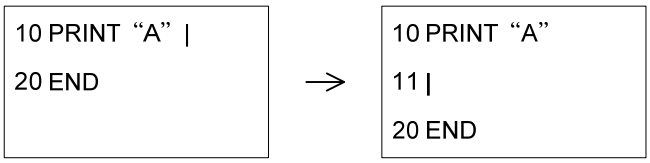
Example 1 If the line number has sufficient margins or the last line:



F050204.EPS

A new line number is generated by adding the designated increment to the preceding line number.

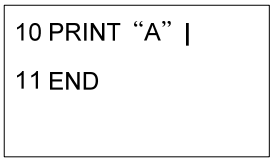
Example 2 If the line number has sufficient margins but the margin is equal to or less than the "increment":



F050205.EPS

A new line number is generated by adding 1 to the preceding line number.

Example 3 If the line number has no margin:



F050206.EPS

An error message is displayed.

■ Blank Line

Don't make a blank line between program lines.

If there is a blank line between program lines, an error occurs.

■ Error Check

A line for which an error occurs due to a syntax error or the like is displayed in the “error list” in the “debug window” and the character string on that line is displayed in red.

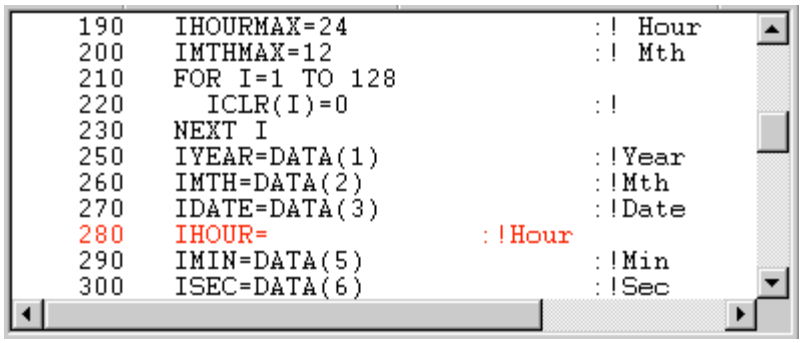
If the contents of the “error list” is double-clicked, a jump is made to the relevant error position.

● Debug Window Error Display

If an error is detected, the error code and message are displayed in the “error list” of the “debug window.”

● Edit Window Error Display

The character string in the error line is displayed in red.



F050207.EPS

Line 280 is displayed in red.

5.3 Cut

Cuts the program list partially.

Cut data are saved in the clipboard.

1. Select the area to be cut.

   Select the area to be cut with the mouse.

```
370   WHILE 1
380     IF ISEC = 60 THEN
390       IF IMIN = 59 THEN
400         GOSUB JIHOU@
410         IMIN = 0
420         IHOUR = IHOUR + 1
430       ELSE
440         IMIN = IMIN + 1
450       ENDIF
460       ISEC = 0
470     ELSE
```

F050301.EPS

2. Cut

   From the menu bar, click [Edit] and then click [Cut].

   The selected area is cut.

```
370   WHILE 1
380     IF ISEC = 60 THEN
460       ISEC = 0
470     ELSE
480       ISEC = ISEC + 1
490     ENDIF
500   END WHILE
510 STOP
520 END
```

F050302.EPS

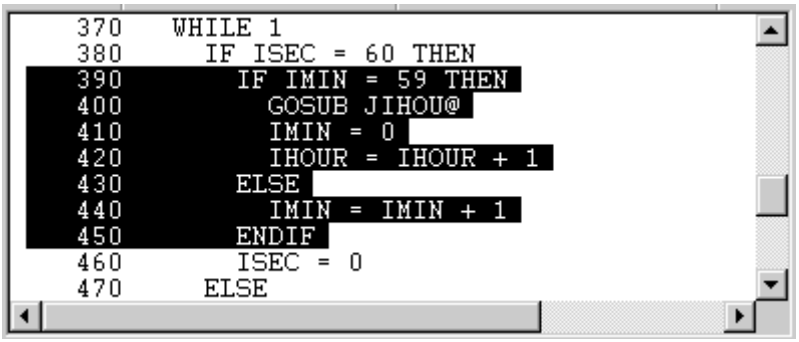
5.4 Copy

Copies the program list partially.

Copied data are saved in the clipboard.

1. Select the copying area.

   Select the copying area with the mouse.



F050401.EPS

2. Copy

   From the menu bar, click [Edit] and then click [Copy].

   The selected area is saved in the clipboard.

5.5 Paste

Pastes the data from the clipboard.

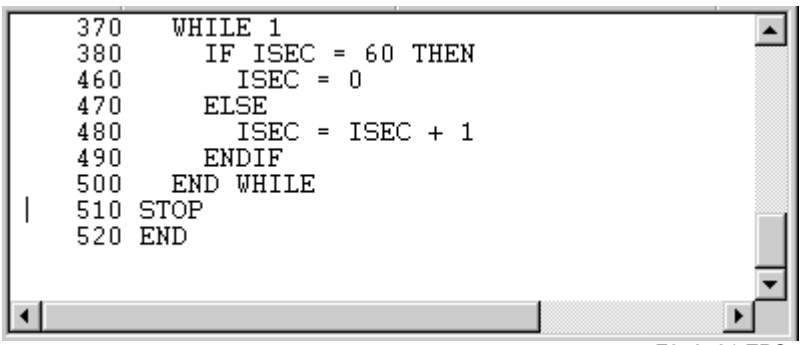
If correct data are not saved to the clipboard, the data are not pasted.

If the number of lines to be pasted is more than the number of empty lines, pasting is not performed and an error is displayed.

The line number for the inserted data is automatically assigned.

1. Specify the position to be inserted.

   Specify the position where data are to be inserted with the cursor.

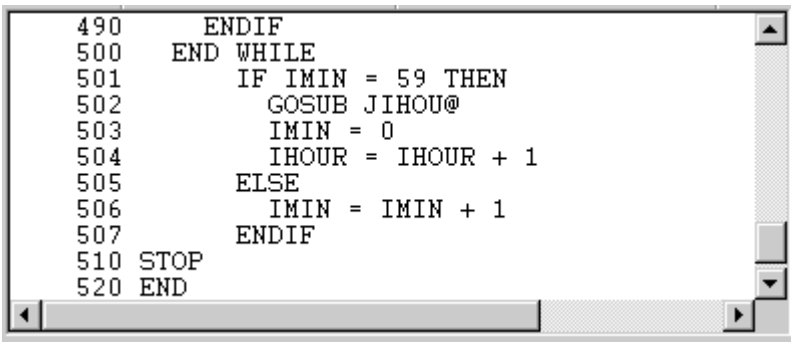


F050501.EPS

2. Paste

   From the menu bar, click [Edit] and then click [Paste].

3. The data are pasted.



F050502.EPS

CAUTION

If a program is to be copied from another Windows application via the clipboard, use data with the same specifications as the BASIC application file (.sa) If the data are not correct, copying is not executed.

TIP

If pasted on a line basis, a line number is assigned regardless of the original program line number.

5.6 Search

Searches for character strings.

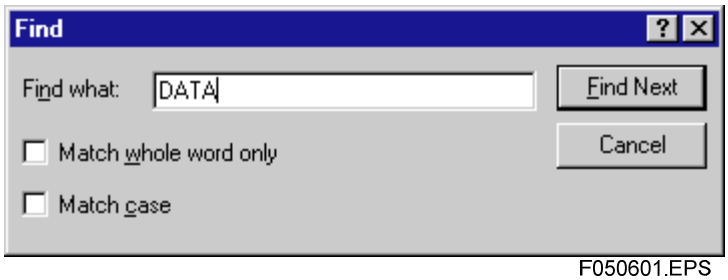
Searches are performed only within a program being edited. Other program blocks cannot be searched.

1. Open the Search dialog box.

   From the menu bar, click [Edit] and then click [Find].

2. Enter the target of the search.

   Place the cursor in the [target character string] input area and enter the target of the search.

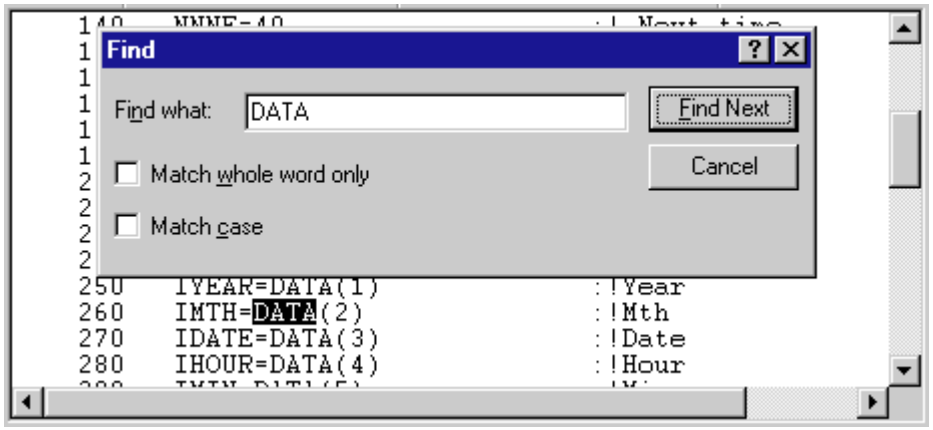


F050601.EPS

3. Search

   Click [Find Next].

   The cursor moves to the target of the search.



F050602.EPS

4. Search for the next target.

   Click [Find Next] again.

5.7 Replace

Replaces program data.

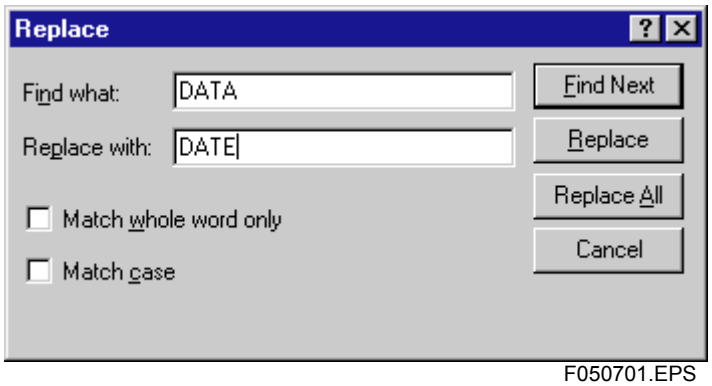
Replacement is carried out only within a program being edited. Other program blocks are not replaced. The replacement methods include a method to execute each replacement after confirming it and one to make all replacements at one time.

1. Open the Replace dialog box.

   From the menu bar, click [Edit] and then click [Replace].

2. Enter the contents of the replacement.

   Place the cursor in the input area for the character string before replacement and enter it; then, place the cursor in the input area for the character string after replacement and enter it.



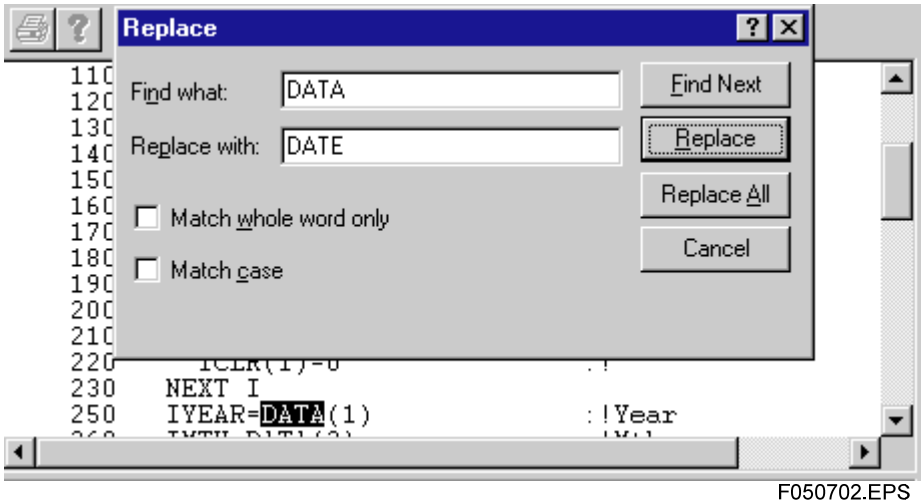
F050701.EPS

3. Replace.

   Replacement after confirming

   Click [Find Next].

   A search is started and the cursor moves to the target of replacement.



F050702.EPS

[Replace and Next]: The character string in the cursor position is replaced.

[Find Next]: The next target is searched without replacing the character string in the cursor position.

Replacement of all targets

Click [Replace all].

The character string in the cursor position and all subsequent occurrences of the character string are replaced.

5.8 Jump

Jumps by specifying a line number.

A jump can be carried out only within a program being edited.

There are the following three modes for jump.

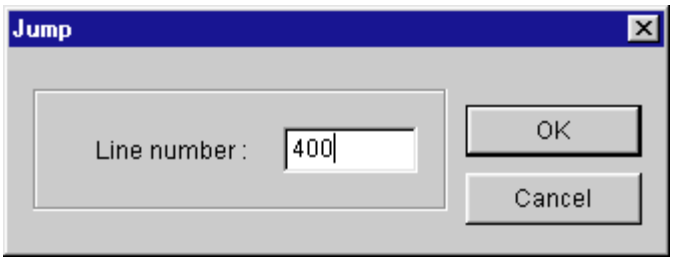
- **[Move to Top Line]**
  If selected, a jump is made to the beginning of the program being edited.

- **[Move to Bottom Line]**
  If selected, a jump is made to the end of the program being edited.

- **[Move to specified line]**
  A jump is made by specifying the line number of the destination.

■ Jump by specifying line number

1. Open the Jump dialog box.
   From the menu bar, click [Edit] and then click [Jump].
2. Enter the line number of the destination.



F050801.EPS

3. Execute.
   Click [OK].

5.9 Automatic Line Number Assignment Setup

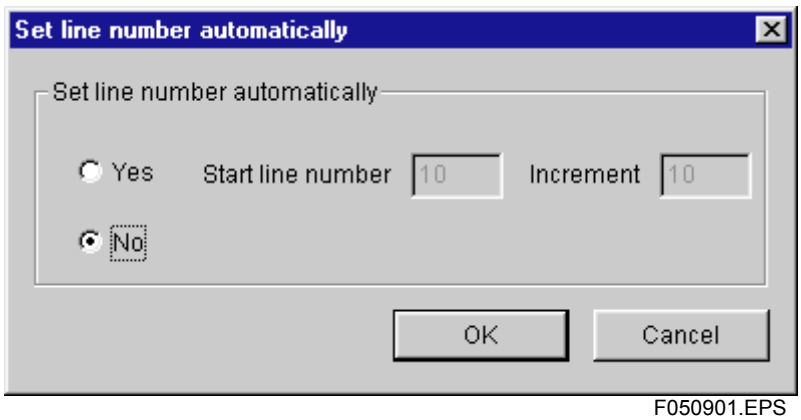
Automatic line number assignment is a function to automatically generate line numbers when beginning the editing of a new line.

Example) Automatic assignment at the setting of starting number 12 in increments of 10

```
12 !////////////////////////////////////////////////////
22 !/ <Program NAME> SequenceCPU common /
32 !////////////////////////////////////////////////////
42 OPTION BASE 1
52 DEFSNG A
62 DEFDBL C
72
```

When a new line is generated, a numeric value obtained by adding 10 to the preceding line number is given to that line.

1. Open the dialog box for setting automatic line number assignment.
   From the menu bar, click [Edit] and then click [Automatic line number assignment].



F050901.EPS

- Set the automatic line number assignment.
  Click the [Yes] option button.
  Enter [Start line number] and [Increment] respectively.

F050902.EPS

- Release the automatic line number assignment.
  Click the [No] option button.

2. Set
   [OK]: Sets the entered contents.
   [Cancel]: Terminates the setting without change.

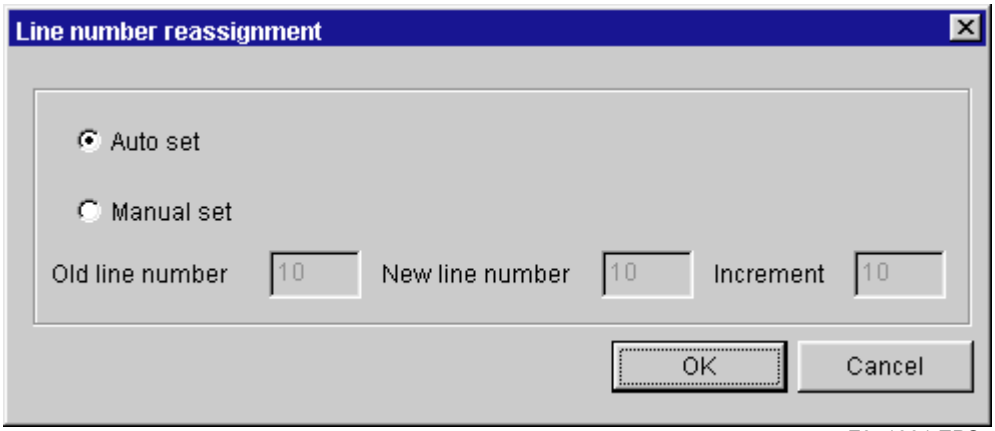
5.10 Line Number Reassignment

Reassigns line numbers.

Example) Automatic assignment at the setting of old line number 12 and new line number 10 in increments of 10

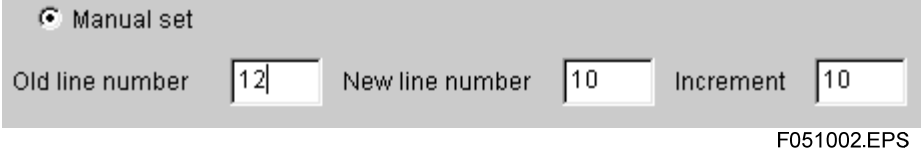
```
12 !////////////////////////////////////////////////////
13 !/ <Program NAME> SequenceCPU common /
14 !////////////////////////////////////////////////////
15 OPTION BASE 1
16 DEFSNG A
17 DEFDBL C
  (from)
    |
   (to)
10 !////////////////////////////////////////////////////
20 !/ <Program NAME> SequenceCPU common /
30 !////////////////////////////////////////////////////
40 OPTION BASE 1
50 DEFSNG A
60 DEFDBL C
```

1. Open the dialog box for reassigning line numbers.
   From the menu bar, click [Edit] and then click [Line number reassignment].



F051001.EPS

- Reassign with automatic setup.
  Line numbers are reassigned at the setting in increments of 10 from the top line.
  Click the [Auto set] option button.
- Reassign with manual setup.
  Reassign line numbers by setting the old line number, new line number and increment.
  Click the [Manual set] option button.
  Enter [Old line number], [New line number], and [Increment] respectively.



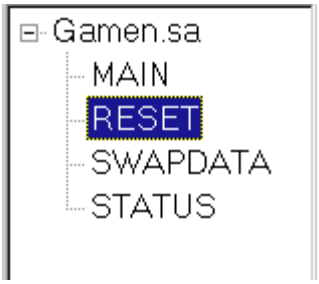
F051002.EPS

2. Set.
   [OK]: Sets the entered contents.
   [Cancel]: Terminates the setting without change.

5.11 Program Display Switching

Switch the programs displayed in the edit window.

1. Click a program to be displayed.

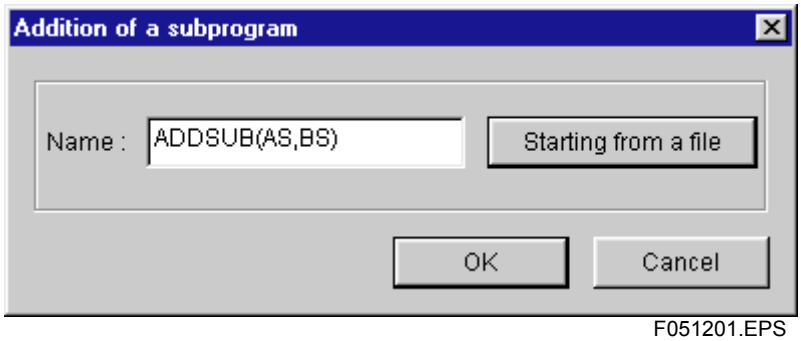


F051101.EPS

2. The selected program is displayed in the edit window.

5.12 Inclusion of Subprogram

Adds a subprogram to the program being opened.



F051201.EPS

■ Reading Subprogram File

1. Open the subprogram inclusion dialog box.
   From the menu bar, click [Edit] and then click [Subprogram] and [Add].
2. Select a file name.
   Click [Starting from a file] to display the file list.
3. Select a file name and click [Open].

■ Inclusion of New Subprogram

1. Open the subprogram adding dialog box.
   From the menu bar, click [Edit] and then click [Subprogram] and [Add].
2. Enter the name of a subprogram.
   Enter a subprogram name and argument.
3. Click [OK].

CAUTION

If including a subprogram from a file, add a file configured with a subprogram only. If codes other than a subprogram exist, the inclusion may be executed incorrectly.

TIP

The name of a file that is the target of editing becomes the main program name. When adding a subprogram, a subprogram with a name identical to the file name cannot be added.

5.13 Deletion of Subprogram

Deletes a selected subprogram from the whole program.

1. Select a subprogram to be deleted.

   In the program configuration window, select and highlight the subprogram to be deleted with the mouse.

2. Delete.

   From the menu bar, click [Edit] and then click [Subprogram] and [Delete].

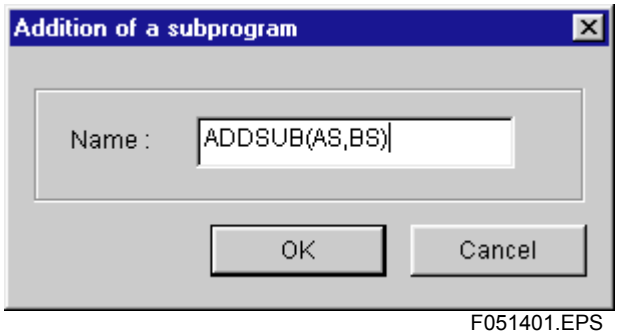
3. Confirmation message is displayed.

   [Yes]: Deletes.

   [No]: Does not delete.

5.14 Deletion of Subprogram

Modifies the program name and argument of a subprogram.



F051401.EPS

1. Selection of subprogram
   Display a subprogram to be modified in the “edit window.”
2. Subprogram modification.
   From the menu bar, click [Edit] and then click [Subprogram] and [Modify].
3. Entry of subprogram
   Modify subprogram name and argument.
4. Click [OK].
   The program name in the “Program configuration window” and the display of the subprogram name and argument of the subprogram are modified.

TIP

- Modification of a subprogram name and argument cannot be executed in the “Edit window.” The name of the file that is the target of editing becomes the main program name.
- Modification to a subprogram with a name identical to the file name cannot be done.

5.15 Library Link

Sets and releases a library link.

■ Link Setup

1. Start the link setup.
   From the menu bar, click [Edit] and then click [Library] and [Add].
2. Select library.
   Select a library file and click [Open].
3. The library is added.

■ Link Release

1. Select library.
   Select a library to be deleted in the program configuration window.
2. Start link release.
   From the menu bar, click [Edit] and then click [Library] and [Delete].
3. Confirmation message is displayed.
   [Yes]: Releases.
   [No]: Does not release.

5.16 Error List Display

The error list checks the syntax of the program being edited and displays the lines in which there are errors and the error codes in its own list in the debug window.

From the menu bar, click [View] and then click [Error list] to start each process.

- **[Display]**
  The debug window section switches to the error list display.

- **[Clear]**
  Clears the error list page.

- **[Save]**
  Saves the error list.

  Enter the file name and click [Save].

  The saved file can be read in a text editor.

- **Jump to the error part**
  If the error contents displayed in the “Error list” in the debug window are double-clicked, a jump is made to the relevant error part.

SEE ALSO

For error contents and countermeasures, refer to the Instruction manual for BASIC CPU Modules YMBASIC/FA Programming Language (IM 34M06Q22-01E), or Online Help.

6. Debugging Functions

This chapter mainly explains the operating methods regarding the debug functions of the BASIC CPU module application programs.

- **Program forwarding and initialization**

  Explains how to download and upload an application program and how to initialize the program area.

- **Debug function**

  Explains the operation of each type of tracing function.

- **CPU control function**

  Explains the residence setup of the application program and the operation method at the completion of debugging.

- **Debug list**

  Explains the clearing of the debug list area and file saving.

6.1 Debug Starting and Ending

■ Debug Starting

Connect with the BASIC CPU Module. After the connection, “Online” will appear in the status bar.

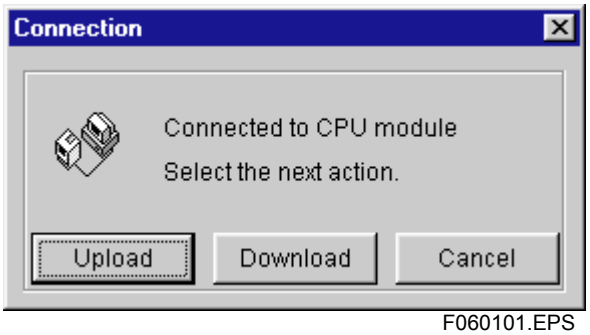
1. Confirm the connection of the hardware.

   Connect the cable connector of the computer to the PROGRAMMER port on the front of the BASIC CPU.

   Connect the cable connector of the computer to the COM port in the back of the computer.

2. Start Debugging

   Click [Debug] - [Start debugging] from menu bar.



F060101.EPS

[Upload]: Uploads the program that is in the CPU.

[Download]: Downloads the program being edited in the CPU.

[Cancel]: Stops the connection with the CPU

Selecting [Upload] or [Download] will place the module in the debug mode, enabling the BASIC CPU Module to be debugged.

3. Online Display

   “Online” appears in the status bar.

CAUTION

When downloading after editing the file, follow the instructions given below:

To download the file before editing: Download it without saving.

To download the edited contents: Download them after saving.

When downloading a new file, be sure to save the file, and then download the file. Otherwise, the edited contents will be lost.

■ Debug Termination

Terminates debug communications between the BASIC CPU Module and ML-bus CPU Module.

1. Terminate Debugging

   Click [Debug] - [Terminate debug] from the menu bar to end the debug mode. After termination, the BASIC CPU Module and ML-bus CPU Module cannot be debugged.

2. Offline display

   “Offline” appears in the status bar.

CAUTION

If the BASIC CPU Module is not in the residence mode at the time of debug termination, the program will be erased. In the case of saving a program in the BASIC CPU module, specify program residence. Refer to Section 6.4, “Program Residence” for the residence function.

6.2 Program Forwarding

This section describes the process of forwarding program information to the BASIC program area.

- Initialization of program area
- Downloading of BASIC program
- Uploading of BASIC program

6.2.1 Initialization of Program Area

Erase and initialize the contents of the program area. With the initialization function of the program area, the common area will not be initialized. To initialize the common area, use the INIT COM statement. For the INIT COM statement, refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM 34M06Q22-01E)

1. Initializing the program area

   Click [Debug] - [Initialize the program area] from the menu.

2. Confirmation

   Confirm the initialization

   [Yes]: Program area is initialized.

   [No]: No program area is initialized.

3. The program area is initialized

6.2.2 Downloading of BASIC Program

The download function downloads the BASIC programs into the BASIC CPU module after performing a syntax check of the program that is undergoing editing.

If a syntax error occurs, the results are displayed in the “Debug window - Error list”, and no downloading is done.

1. Opening the program

   Open the program file before downloading. If it is already opened, the program that is the object of editing is downloaded.

2. Downloading

   Click [Debug] - [Download] from the menu.

   The following operation is performed according to the BASIC program and CPU status.

   If there are no errors in the program:

   “OK to download the program?” is displayed in the message box.

   [Yes]: Downloading is started.

   [No]: No downloading is done.

   “Downloading is completed” appears in the message box.

   If there are errors in the program:

   “Error occurred. Downloading cannot be done” is displayed in the message box.

   Confirm the program.

   If the program already exists in the CPU:

   A confirmation message box is displayed.

   [Yes]: Downloading is started.

   [No]: No downloading is done.

TIP

To avoid an insufficient domain error during downloading, before downloading, save the program in BASIC intermediate files. After confirming the program size with the help of the explorer, etc., carry out the downloading

6.2.3 Uploading of BASIC Program

While connecting with the BASIC CPU module, if a program resides at the BASIC CPU module side, upload that program.

1. Uploading

   Click [Debug] - [Upload] from the menu bar.

   The program that resides in the CPU is uploaded. The upload status is displayed in the “Status Bar.”

2. Display

   The uploaded program is displayed.

6.3 Debug Functions

This section describes the online debug function of the BASIC application program. A detailed explanation of the function and operations from the menu bar is given.

- **Debugging**
  Describes the change functions of CPU running operations like running, disconnecting, step running, etc.

- **Breakpoint setup function**
  Describes the breakpoint setup function.

- **Trace Function**
  Describes the branch tracing and variable tracing setup functions.

6.3.1 Debugging

To start debugging, stop debugging and run programs continuously, follow the instructions given below:

- **Start Debugging**
  Click [Debug] - [Run] from the menu bar.
  Debugging is started.

- **Stop Debugging**
  Click [Debug] - [Pause] from the menu bar.
  The program under execution is temporarily stopped.
  The character string that is stopped changes to green.

- **Continue Debugging**
  Click [Debug] - [Continue] from the menu bar.
  The stopped program will restart.

CAUTION

- An explanation of the tool button will not be displayed during debugging.
- If the program is edited after setting the breakpoint setup function and tracing function, that program will not operate correctly. In that case, make individual settings again after editing.

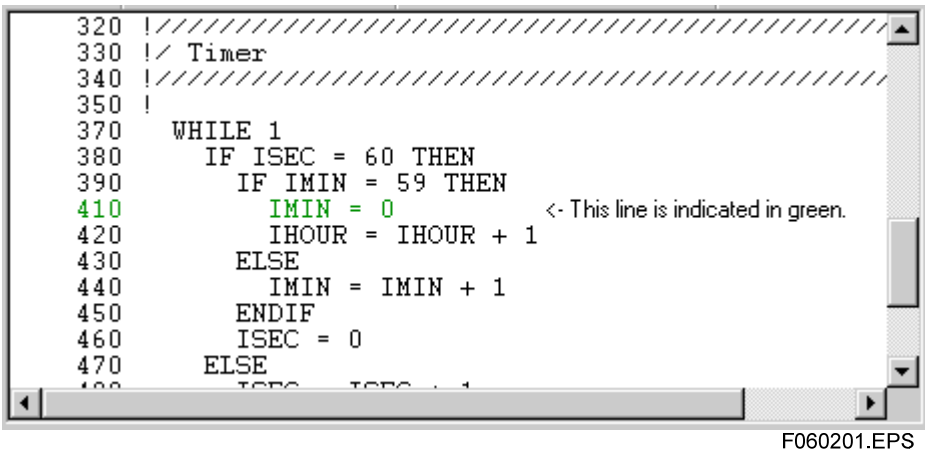
6.3.2 Step Execution

Step execution is a debug function that runs the program step by step after it has been stopped, or paused due to a breakpoint.

1. Stopping running the CPU.

   Stops the CPU using the stop function or at a breakpoint.

   When it is stopped, the character string of the line following the one that was last executed changes to green.



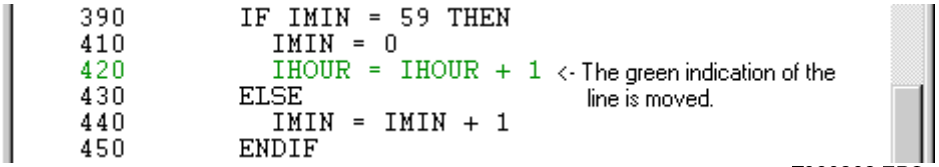
F060201.EPS

2. Running the program step by step

   Click [Debug] - [Step] from the menu bar.

3. Step movement

   Move to the next executed line.



F060202.EPS

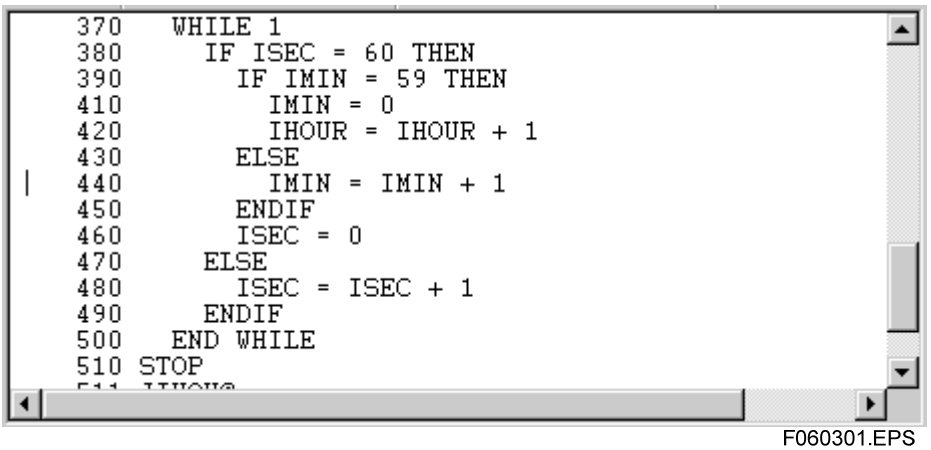
6.3.3 Breakpoint

This sets the place in a program where the program execution halts. The breakpoint can be set up one by one for each subprogram.

■ Setting the breakpoint

1. Selecting the break line

   Display the program in the [Edit Window] and specify the break position with the cursor.



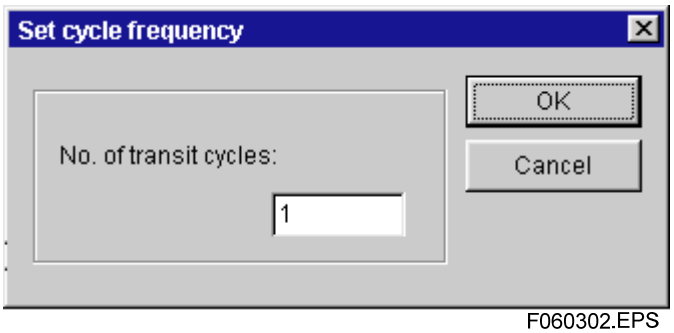
F060301.EPS

2. Setting the breakpoint

   Click the [Debug] - [Set/release a breakpoint] from the menu bar.

3. Entering the number of transit times

   Enter the number of transit times.



F060302.EPS

4. To set the number of transit times, click [OK].

TIP

Setting the number of transit times is a function that makes a break only when the break setup lines pass over the setup cycles.

Set 1 when the break is set for the first time.

After stopping at the breakpoint one time, the setting of the number of break times returns to 1.

5. The number of transit times is set.

   The breakpoint is displayed in blue characters.

```
420          IHOUR = IHOUR + 1
430        ELSE
440          IMIN = IMIN + 1
450        ENDIF
460        ISEC = 0
```

F060303.EPS

CAUTION

There may be some cases where the program is not stopped at the breakpoint when a breakpoint is set to the added lines while editing the program. In this case, reset a breakpoint after executing once.

TIP

Only one breakpoint can be set in one subprogram. If a multiple number of breakpoints is set in one subprogram, only the last setting will be valid and the others will be cancelled. A breakpoint set in a subprogram breaks only once.

■ Releasing a breakpoint

Release a breakpoint that has been set.

1. Select the line.

   Display the program in [Edit Window] and specify with the cursor the position at which the breakpoint has to be released.

```
420          IHOUR = IHOUR + 1
430        ELSE
440          IMIN = IMIN + 1
450        ENDIF
460        ISEC = 0
```

F060304.EPS

2. Release the breakpoint.

   Click [Debug]-[Set/release a breakpoint] from the menu bar.

3. The breakpoint is then released.

```
370    WHILE 1
380      IF ISEC = 60 THEN
390        IF IMIN = 59 THEN
410          IMIN = 0
420          IHOUR = IHOUR + 1
430        ELSE
440          IMIN = IMIN + 1
450        ENDIF
460        ISEC = 0
470      ELSE
480        ISEC = ISEC + 1
490      ENDIF
500    END WHILE
510 STOP
```

F060305.EPS

■ Releasing a breakpoint

Release all the breakpoints in the entire program.

1. To release all the breakpoints:

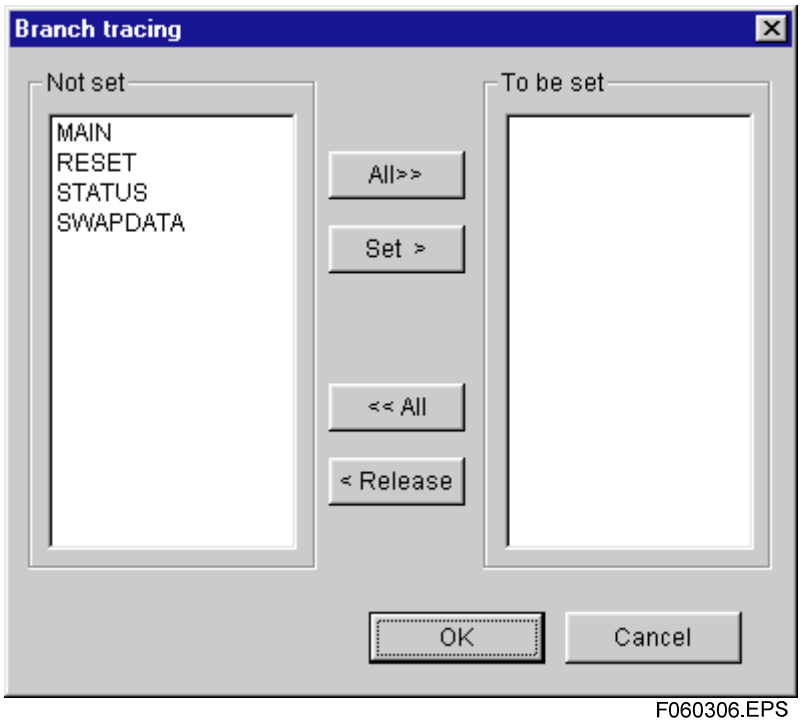
   Click [Debug]-[Release all breakpoints].

2. All breakpoints are released.

6.3.4 Branch Tracing

Branch tracing is a function that traces the branch status in a subprogram.

In a subprogram in which branch tracing is set, when program branching is done, the branch information will be displayed under [Debug] in [Debug Window].



F060306.EPS

CAUTION

If editing is done after setting branch tracing, branch tracing will not be displayed correctly. After editing, reset branch tracing once again.

■ Setting of branch tracing

1. Start the Branch Tracing dialog box.
   Click [Debug]-[Branch tracing] from the menu bar.
2. Select the subprogram that traces the branch status.
   Select the subprogram displayed in [Not Set] and highlight it in reverse video.
3. Set the branch tracing.
   Click the [Set >] button.
   The selected subprogram is moved to “To be set.”

■ Branch tracing setup of all programs

1. Start the branch tracing dialog box.
   Click [Debug] - [Branch tracing] from the menu bar.
2. Set the branch tracing of the whole program
   Click the [All >>] button.
   All the programs are moved to “To be set.”

■ Release of branch tracing

1. Start the branch tracing dialog box.
   Click [Debug] - [Branch tracing] from the menu bar.
2. Select the subprogram that releases tracing of the branch status.
   Select the subprogram that is displayed in “to be set,” and highlight it in reverse video.
3. Release
   Click the [<Release] button.
   The selected subprogram moves to “not set.”

■ Branch tracing release of all subprograms

1. Start the branch trace dialog box.
   Click [Debug] - [Branch tracing] from the menu bar.
2. Release
   Click the [<<All] button.
   Move all the subprograms to “not set.”

■ Display of the branch status

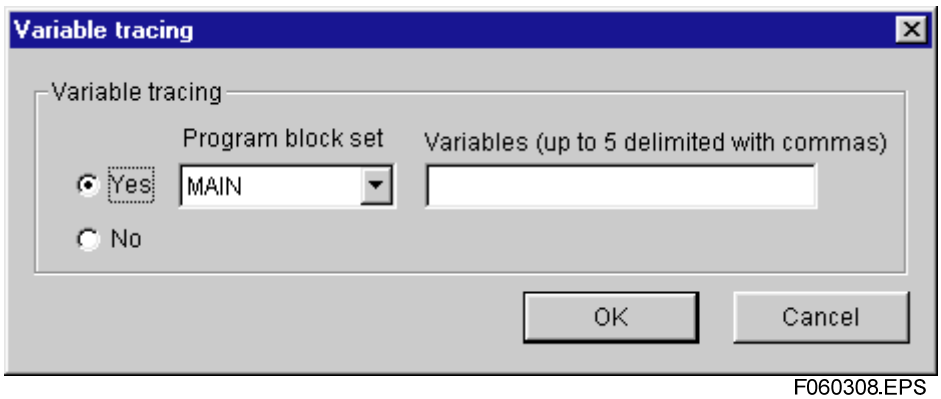
The branch status is displayed under [Debug] in [Debug window].

F060307.EPS

The above example shows the item that has been branched at line 1230 of the program “SUBPRG” in MASTER.

6.3.5 Variable Tracing

Variable tracing is the function that traces a variable change during debugging. For a variable for which variable tracing is set, whenever the data undergoes a change, the change information will be displayed under [Debug] in [Debug Window].



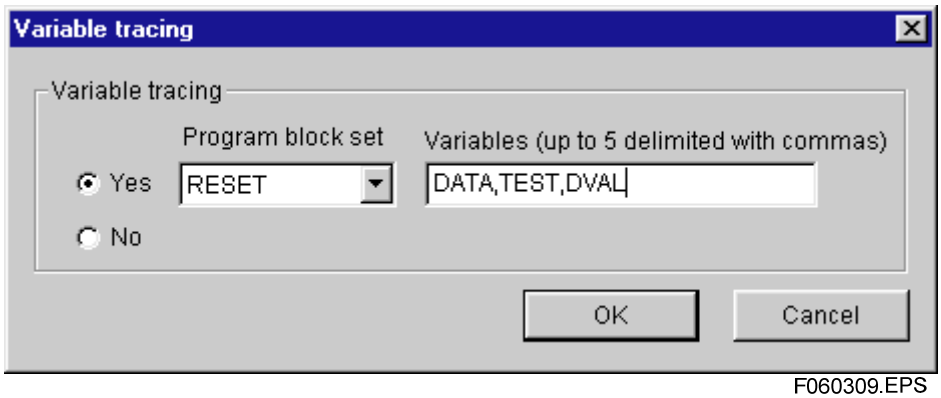
F060308.EPS

CAUTION

After adding a variable in online editing, setup for tracing of the variable cannot be done before executing the program. If it is set, it will be displayed in the debug window as a "Variable name not defined" error. In the case of tracing an additional variable, trace it after executing the program. If editing is done after setting variable tracing, variable tracing will not be displayed correctly. After editing, reset variable tracing once again.

■ Setting of variable tracing

1. Start the variable tracing dialog box.
   Click [Debug] - [Variable tracing] from the menu bar.
2. Select [Yes].
   Click the [Yes] option button.
3. Enter the subprogram name and variable that is to be traced.
   Select the program and input the variable.



F060309.EPS

4. Set the variable tracing.
   [OK]: Variable tracing is set.
   [Cancel]: Deletes and ends the task before it is completed.

SEE ALSO

Variable tracing that can be set once is five variables for one program block. Array variable tracing should be set up completely.

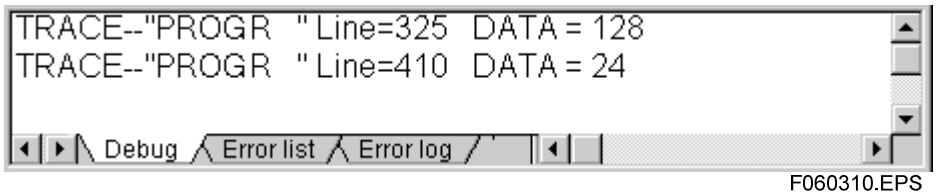
(Example) AB (*) -> AB

■ Release of variable tracing

1. Start the variable tracing dialog box.
   Click [Debug] - [Variable tracing] from the menu bar.
2. Select [No].
   Click the [No] option button.
3. Release variable tracing.
   [OK]: Variable tracing is released.
   [Cancel]: Deletes and ends the task before it is completed.

■ Display of the variable data change

A change in variable data is displayed under [Debug] in [Debug Window].



F060310.EPS

The above example shows that the variable data in the “PROGR” program is changed to 128 on line 325; after that, it changes to 24 on line 410.

6.4 Program Residence

The program residence function is the function that makes the program resident in the CPU during program downloading or at the end of debugging.

1. Specify the Reside.

   Click [Debug] - [Specifying program residence] from the menu bar.

2. Set up.

   Click [Reside] or [Release].

   [Reside]: Does the residence specification.

   [Release]: Deletes the residence specification.

CAUTION

If there is no residence setup, the application program will not be saved in the BASIC CPU module. In this case, the program will be erased at the end of debugging.

6.5 Operation Setup during Debug Completion

The operation setup function at the completion of debugging runs or stops the program after program downloading or at the completion of debugging.

1. Change the operation mode at the completion of debugging.

   Click [Debug] - [Operation mode during debugging completed] from the menu bar.

2. Setup.

   Click [Run] or [Stop].

   [Run]: Run starts at the completion of debugging.

   [Stop]: Stops at the completion of debugging.

3. Confirmation of setup

   Display the confirmation message.

   [Yes]: Makes the setup valid.

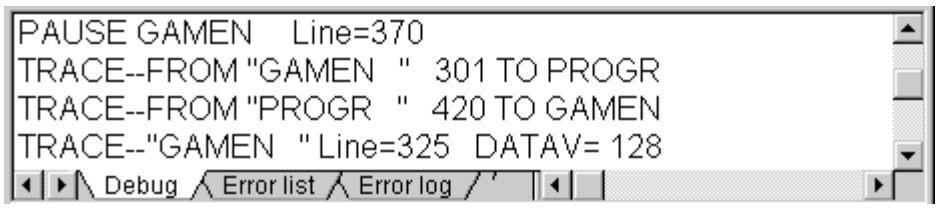
   [No]: Makes the setup invalid.

CAUTION

"Operation setup at completion of debugging" operates only when the program is resident.

6.6 Debug List

The debug list is a list of each type of trace data and error and is displayed while the CPU program is undergoing debugging.



F060601.EPS

- **Displaying the program list.**
  Click the [Debug] tab in [Debug Window].

- **Clearing the debug list.**
  Click [Debug] - [Debug list] - [Clear] from the menu bar to clear the debug list.

- **Saving the Debug list.**
  Click [Debug] - [Debug list] - [Save in File] from the menu bar.

  Input the file name in the Save dialog box, and click [Save].
  A saved file can be read in a text editor.

7. Maintenance Function

**The maintenance functions are detailed set-up functions of the CPU.
The following are the maintenance functions**

- **Restart**
- **ROM Control**
- **Communication Speed Setup**
- **Operation Monitor**
- **Configuration**
- **Shared Device Setup**
- **Error Log**
- **I/O Configuration Display**
- **Date and Time Setup**

CAUTION

The maintenance functions cannot be executed during online debugging.
Before using the maintenance functions, perform [Terminate debugging].

7.1 Restart

The restart function has two types of resets: system restart and CPU restart.

- System restart
  Restarts the CPU for the entire unit. System restart is valid only for the slot 1 CPU.
- CPU restart
  The targeted CPU alone will restart.

■ System restart

1. System restart
   From the menu bar, click [Operation setup] and then click [Resstart] and [System].
2. Confirmation
   Displays the confirmation dialog box
   [Yes]: System restarts.
   [No]: Ends.
3. Restart
   Displays Dialog box “System restarted.”

■ CPU restart

1. CPU restart
   From the menu bar, click [Operation setup] and then click [Restart] and [CPU].
2. Confirmation
   Displays the confirmation dialog box
   [Yes]: CPU restarts.
   [No]: Ends.
3. Restart
   Displays Dialog box “CPU restarted.”

CAUTION

- Restart enables the resetting of the hardware default values and the checking of the self-diagnosis and I/O configuration.
- When restarted, programs which are not resident get erased. The residing programs are saved and started.
- Restarting can be done for an individual CPU. But, if individual CPU resetting (restarting) is done in multiple CPUs, an inter-CPU communications error or an I/O error occurs in other CPUs which are not reset. This will have an adverse effect on program running. To avoid this, restart a multiple CPU system by restarting the system.

7.2 ROM Control

The ROM Control function writes an application program in ROM.

There are two types of ROM writing.

- **Common area write**

  Write Program, Common in ROM

- **Program area write**

  Writes only the program in ROM

- **ROM Erase**

  Erase the contents of ROM

TIP

ROM control can use only the BASIC CPU module (F3BP20-0N, F3BP30-0N) to which the ROM pack can be attached.

SEE ALSO

Refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM 34M06Q22-01E) for details on the ROM Control function.

7.2.1 Switching Modes

In the case of ROM operations, it is necessary to switch to the ROM writer mode.

■ Switching to ROM Writer Mode

1. Set ROM writer mode

   From the menu bar, click [Operation setup] and then click [ROM] - [ROM mode] - [Set].
2. Confirmation

   Displays confirmation dialog box

   [Yes]: Switches to ROM mode.

   [No]: Ends.

■ End ROM Mode

1. End ROM mode

   From the menu bar, click [Operation setup] and then click [ROM] - [ROM mode] - [Reset].
2. Confirmation

   Displays confirmation dialog box.

   [Yes]: Cancels ROM mode.

   [No]: Ends.

TIP

When a BASIC program is in operation, the ROM mode cannot be set. Switch to this mode after stopping the BASIC program.

7.2.2 Common Area Write

Write Program and Common area in ROM.

1. Downloading of program

   Downloads the program written in ROM to the CPU.

2. Switch to residence mode

   Performs the residence specification of the program.

3. Switch to ROM mode

   Switches to ROM mode.

4. Fix the ROM

   Switch off the power to the FA-M3 and fix the ROM and then switch the power back on.

5. Write Common area

   From the menu bar, click [Operation setup] and then click [ROM] and [Write to Common area].

6. Confirmation

   Confirmation dialog box is displayed.

   [Yes]: Write in ROM

   [No]: Ends without writing to ROM.

TIP

Download the program before switching to the ROM write mode.

Downloading cannot be done in the ROM mode.

7.2.3 Program Area Writing

Only the program is written in ROM.

1. Downloading the program

   The program written in ROM is downloaded in the CPU.

2. Switch to the Reside mode.

   Specify the program residence.

3. Switch to ROM mode.

   Switch to ROM mode.

4. Setting up ROM

   Switch off the power to the FA-M3, set up the ROM and switch the power back on again.

5. Writing to Program area.

   Click [Operation setup] - [ROM] - [Write to Program area].

6. Confirmation

   Confirmation dialog box is displayed.

   [Yes]: Write to ROM.

   [No]: End without writing to ROM.

TIP

Download the program before switching to the ROM mode.

Downloading cannot be done in the ROM mode.

7.2.4 Erase ROM

Erasing the contents of ROM

1. To erase ROM:
   From the menu bar, click [Operation setup] and then click [ROM] and [Erase].
2. Confirmation
   The confirmation dialog box is displayed.
   [Yes]: Erase ROM.
   [No]: End.
3. Erased.
   The confirmation dialog box is displayed.

7.3 Communication Speed Setup

Set up the speed of communication with the CPU. After changing the communication speed, carry out [Start Debugging].

1. Changing the communication speed (Baud set)

   From the menu bar, click [Operation setup] and then click [Baud set].

2. Selecting the Baud rate

   Select from 2 modes:

   [9600bps]: This is low speed.

   [19200bps]: This is high speed.

CAUTION

After starting debugging, the baud rate cannot be changed.

After the baud setting, debugging is done by performing [Start debugging]

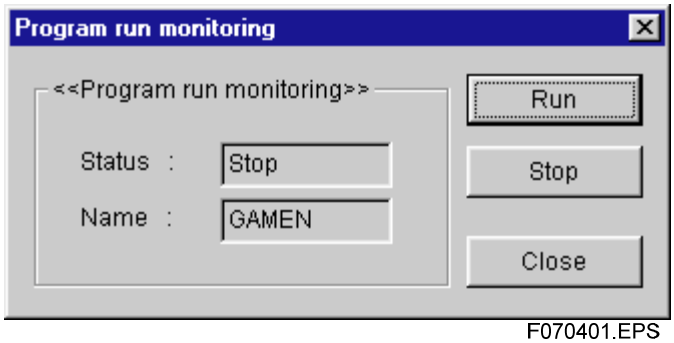
7.4 Operation Monitor

Display running status of the BASIC CPU module.

● Start

From the menu bar, click [Diagnostics] and then click [Program run monitoring].

● View



F070401.EPS

'Status': Displays the run status.

'Name': The name given in the BASIC program. '********' denotes that the program does not exist. '$$$$$$$$' denotes programs that are not saved.

● [Run] Button

Starts a paused program.

● [Stop] Button

Stops a running program.

7.5 Configuration

Sets up the default settings of the BASIC CPU module.

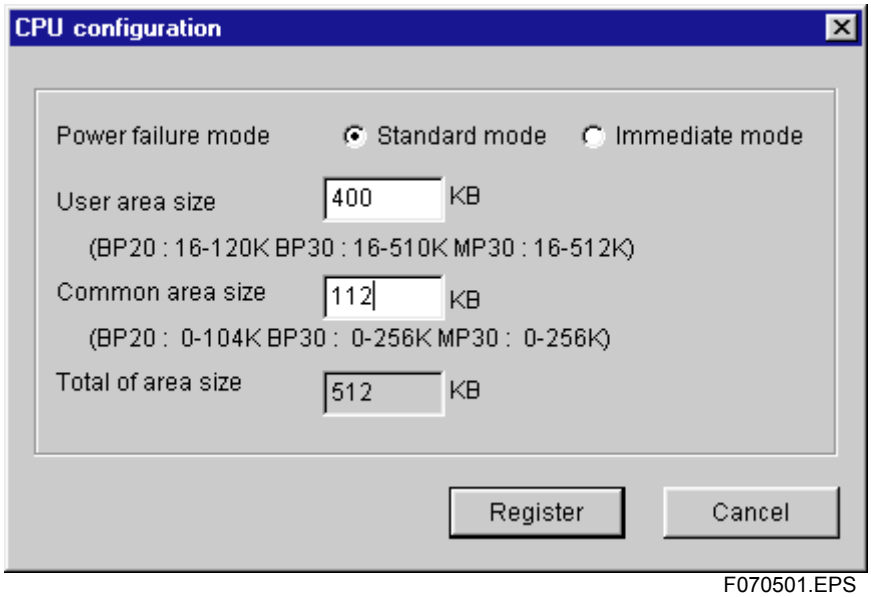
- CPU Configuration
- Shared device setup

WARNING

If CPU Configuration is executed, the program and data saved in the CPU before the execution will be lost. It is recommended that the program be saved before executing CPU Configuration.

7.5.1 CPU Configuration

In CPU Configuration, the 'immediate mode' (momentary power failure detection mode), 'user area size setting' and 'common area setting' are performed.



F070501.EPS

1. Start the dialog box

   From the menu bar, click [Diagnostics] and then click [Configuration] and [CPU Configuration].

2. Switch to immediate mode

   Click either of the option buttons, [Standard Mode]*1 or [Immediate Detection Mode]*1.

   *1: For details, refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM34M06Q22-01E).

3. Change or editing of user area size

   Click the input area.

   Input to the Setting Display (view) Area becomes possible. Input numeric values.

4. Change or editing of common area size

   Click the input Area.

   Input to the setting display (view) area becomes possible. Input numeric values.

5. Registration of change or edit

   Click the [Register] button after having set it in the BASIC CPU Module, clear the memory and automatically start.

CAUTION

The setting of contents to the BASIC CPU Module is performed by [Register]. If it is not performed, the BASIC CPU Module returns to the original setting.

Click [Cancel] in the case where the contents are not set in the BASIC CPU Module.

SEE ALSO

For details on the immediate mode, user area and common area, refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM 34M06Q22-01E).

7.5.2 Shared Device Setting

Do the setting for the number of shared devices.

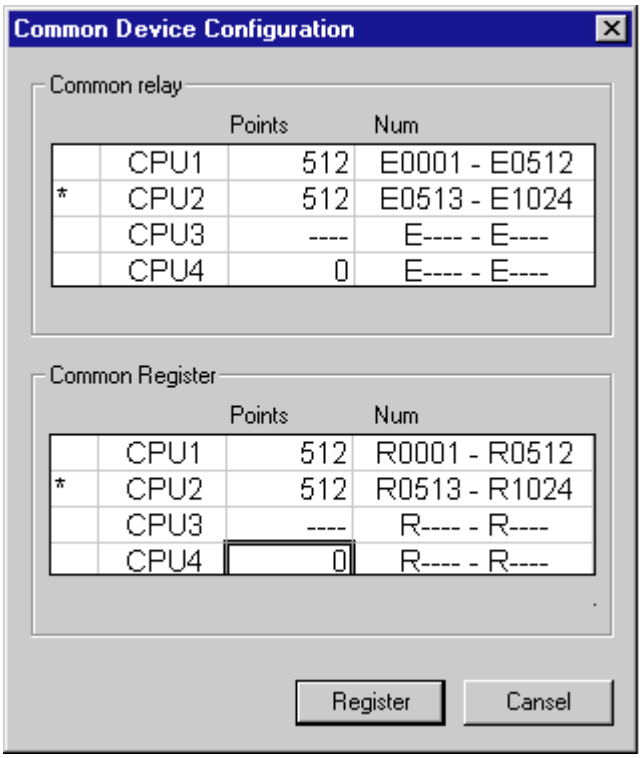
1. Start the shared relay and register configuration dialog box.

   From the menu bar, click [Diagnostics] and then click [Configuration] and [Shared relay and register configuration].

2. Change data (on number of devices).

   Click 'no. of devices display area.'

   Input the number of devices. For shared relays, also do only the setting by matching with the other CPUs. Data sharing with the sequence CPU depending on shared relays cannot be done.



F070502.EPS

   Set with the [Enter] Key.

3. Registration of change

   Click the [Register] button.

   The BASIC CPU Module setting is transmitted and registered.

CAUTION

The setting of contents to the BASIC CPU Module is performed by [Register]. In the case where [Register] is not done, the BASIC CPU Module returns to its original setting.

Click [Cancel] in the case where the contents are not set in the BASIC CPU Module.

SEE ALSO

With regard to an overview of the shared devices and operation specifications, refer to the Instruction Manual for BASIC CPU Modules and YM-BASIC/FA Programming Language (IM 34M06Q22-01E).

7.6 Error Log

The log data for each type of error that occurs during operation are displayed in the BASIC CPU Module.

● Log Display

Display the Log information.

● Log Clear

Clear all the Log contents.

● Save in the File

Save the displayed Log contents in a file.

TIP

- Power on/off, etc. of the FA-M3, changes in system status, abnormalities, error information, etc. are displayed with latest data first.
- A maximum of around 100 to 150 pieces of information can be stored, but this number will differ depending upon the type of information.
- If the storage capacity becomes full, the information will be erased in order starting with the oldest items, and new information will be stored.

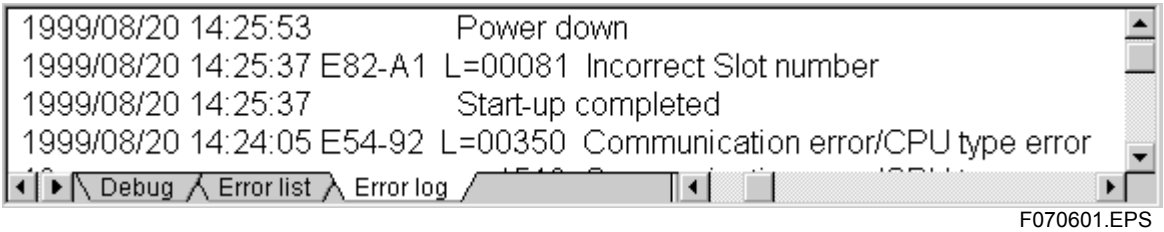
7.6.1 Log Display

Log will be displayed in [Error log] page of “Debug Window.”

1. “Debug Window” is switched to “Error Log Display.”
   Click the [Error log] tab of the “Debug Window.”

   Switched over to “Error Log Display” window.

2. Display error log.
   From the menu bar, click [Diagnostics] and then click [Error log] and [Display]
   This is uploaded and displayed in “Debug Window.”



F070601.EPS

7.6.2 Log Clear

Clear the log information of the BASIC CPU Module.

The error log display of “Debug Window” is also cleared.

1. “Debug Window” is switched to “Error Log Display.”
   Click the [Error log] tab of “Debug Window.”
2. Clear the log
   From the menu bar, click [Diagnostics] and then click [Error log] and [Clear].
   The error log is cleared.

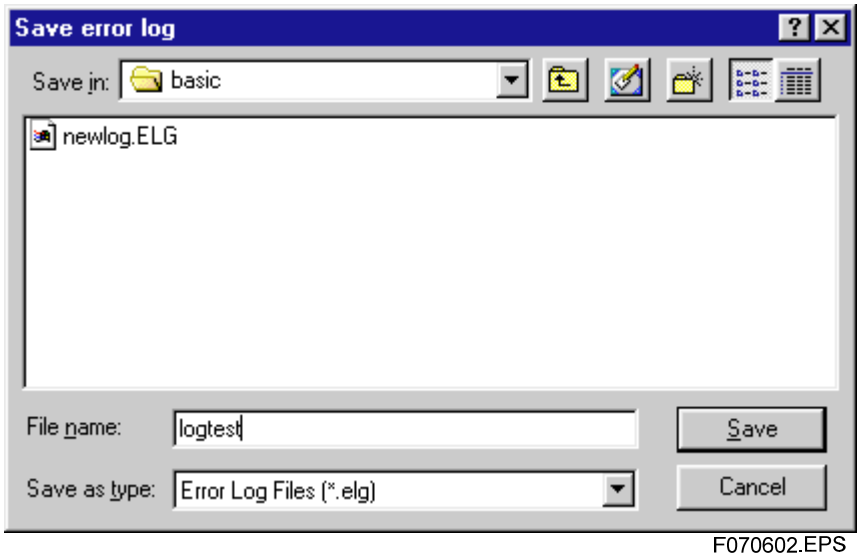
7.6.3 File Saving the Log

Save the error log, while it is displayed in “Debug Window”, in a file.

The saved file can be read in a text editor.

1. “Debug window” is switched to “Error Log Display.”
2. Save File.

   From the menu bar, click [Diagnostics] and then click [Error log] and [Save].



F070602.EPS

3. Enter the file name in the file save dialog box, and click [Save].

7.6.4 Error Messages and Their Correspondence

This section describes the method of correspondence when an error message is displayed in the error log display.

There are the following two types of messages that are displayed in the error log display.

- **System message:** Error message corresponding to the operation status of the power on/off system.
- **BASIC Error Message:** Error message corresponding to the operation status of the BASIC program.

Two types of message information are recorded in the error log file.

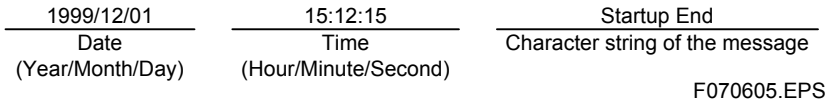
The recording method to the file is as follows:

- **System message:** Record in the normal time error log file.
- **BASIC Error Message:** Recorded in the error log file while BASIC is operating in the real mode.

■ Correspondence of System Messages

The format of a system message is displayed, and it explains the contents of the message and its correspondence.

- **Display Format**



- **System Message List**

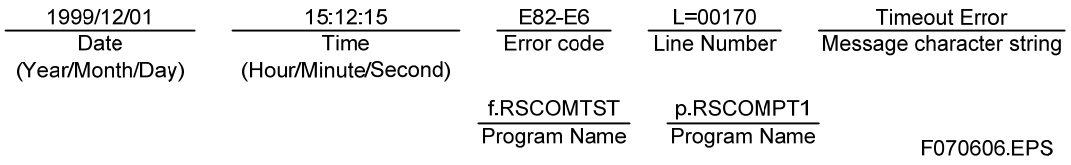
Message Character String	Meaning	Correspondence
Start Up End	The CPU is set up normally and is in the READY status.	Process not necessary since it is normal.
Occurrence of momentary power failure.	Recovered after detecting a momentary stop/failure.	Check the power source system.
CPU Down	Forced down due to an abnormality in the CPU.	Replace the CPU module.
Program Abnormality End Program = x x x x	The system program xxxx has abnormally ended.	Replace the CPU module.
Back-up battery Abnormality	Back-up battery defective or life span affected, or there has been damage to memory.	Replace the CPU module.
Power down	The power has been disconnected.	Not necessary for normal process.
SLOTn I/O Module abnormality(*1) Error code = k	When the CPU accesses the I/O module, an abnormality in the I/O module is detected.	Replace I/O module. There may be a case where the base module and CPU module also must be replaced.

*1: n: Slot number of the I/O module where the abnormality occurred.
K: Error Code (Contents Information)

■ Correspondence of BASIC error messages

Describes the contents and their correspondence BASIC error messages.

- **Display Format**



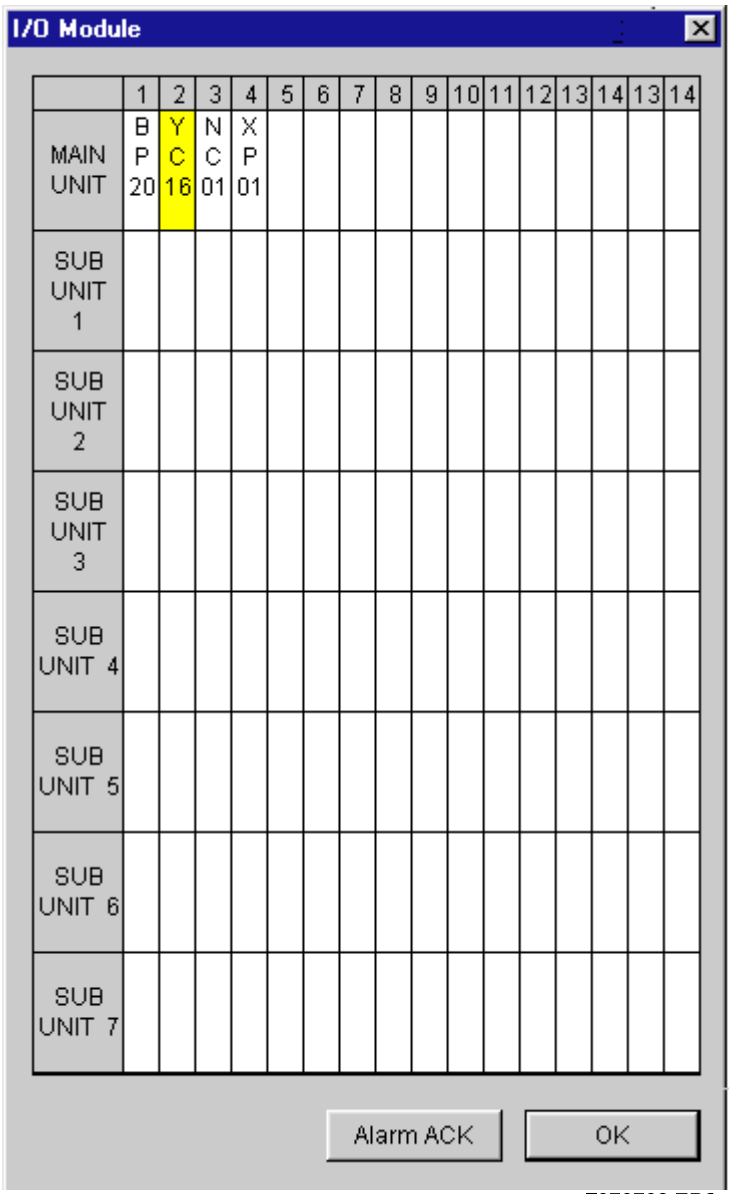
- **BASIC Error Message**

See Appendix 1, Error Codes later in this manual.

7.7 I/O Configuration Display

Displays the module configuration information.

A module accessed by the BASIC CPU module is displayed.



F070702.EPS

● I/O Module/ I/O Configuration Display

From the menu bar, click [Diagnosis] and then click [I/O Module].

● Usage I/O Display

The I/O that is used by the CPU is displayed in yellow.

● Alarm Display

A module that displays red denotes an alarm.

CAUTION

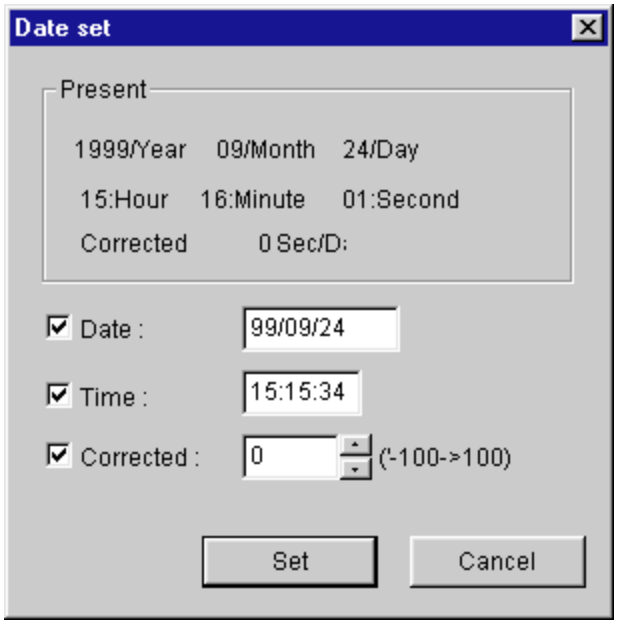
- If the common area size is changed, “registration” must be carried out. Take care as the size will be changed if “Registration” is not done.
- If the setup value of the common area size is not correct, the message “Area size specification error” will be displayed.

7.8 Date Set

Change the date on the clock, which is operated in the BASIC CPU module.

The corrected value should be set in a numeric value (unit: seconds) every 24 hours.

In the case where the clock runs fast, enter the changed value by placing a minus sign (-) before the numeric value. On the other hand, in the case where the clock is slow, enter the changed value without placing any sign.



F070801.EPS

■ Display of Date Setting

1. To display the date setting dialog box:
   From the menu bar, click [Diagnostics] and then clock [Set date].
   The “Date Set Dialog” is displayed.

■ Change of Date

1. Enter the corrected date value.
   Click the Input Area with the mouse, and the cursor is displayed.
   Input from the cursor position.
2. Check the change.
   Check the left side check box of the data that changes.
3. Setup
   Click [Setup].
   The items that are checked in the check box undergo a setting change.

CAUTION

- The contents are set in the BASIC CPU module by [Set]. In the case where [Set] is not carried out, it returns to the original setup.

  When the contents are not set in the BASIC CPU module, click [Cancel].
- The correction of the clock as per the corrected value that has been entered is executed the next time the CPU is restarted.
- The restart of the CPU can be executed either by using the CPU restart function or turning on the FA-M3 power.

FA-M3

BASIC Programming Tool M3 Instruction Manual Appendixes

IM 34M06Q22-02E 2nd Edition

CONTENTS

Blank Page

Appendix 1. Error Codes

Appendix 1.1 YM-BASIC/FA Error Codes

Error Code	Error Message
System errors	
1	Intermediate code not interpreted
2	Parameter error
3	Timer error
Syntax error	
4	Incorrect syntax (invalid operand specified)
5	RESERVED
6	Executing TRANSFER statement (attempted to access module while executing TRANSFER statement)
Computation error	
7	Computation overflow
8	Division by zero
9	Underflow error
10	Integer overflow
11	Unmatched data type (incorrect data results)
12	Numeric value abnormal or argument (function) error
13	Unallocated variable
14	Undefined variable name
15	String concatenate overflow
16	Cannot assign
Array variable declaration error	
17	Invalid subscript value (less than 0 or above 32768) in ALLOCATE statement
18	Array size exceeded
19	Common area size exceeded
Used-defined function error	
20	Undefined function
21	RESERVED
22	Wrong number of arguments
23	RESERVED
24	Attempt to redefine a previously defined function
Reference to array variable	
25	Array subscript out of range
26	Array subscript dimension error
FOR - NEXT error	
27	Improper FOR ~ NEXT, WHILE ~ END WHILE, IF ~ ENDIF matching
28	Needs simple numeric variable in FOR statement
29	RESERVED

Error Code	Error Message
Insufficient data	
30	Too many entries (excessive input data)
31	Too few entries (insufficient data)
32	No data to be read by READ statement
Unmatched data type	
33	Unmatched
34	RESERVED
Image data error	
35	Improper match between IMAGE and data item
36	RESERVED
37	RESERVED
38	RESERVED
Output overflow	
39	Output data overflow
40	Value overflow
41	RESERVED
Invalid line number	
42	IMAGE statement missing in a line referenced
43	Branch destination for GOTO/GOSUB statement not found
44	Program statement name not found
Sequence error of declaration statements	
45	Invalid position of OPTION BASE statement
46	Invalid position of DEFINT, DEFLNG, DEFSNG, DEFDBL statements
47	Invalid operand in DEFINT, DEFLNG, DEFSNG, DEFDBL statements
48	RESERVED
49	RESERVED
50	RESERVED
Inter-user area communications error	
51	RESERVED
52	Communications error/CPU type error
53	Communications error/CPU type error
54	Communications error/CPU type error (refer to detail error codes)
55	SIGNAL transmission error
56	RESERVED
57	RESERVED
58	RESERVED
59	RESERVED
60	RESERVE, RELEASE statement error
61	Invalid numeric value in ON statement
62	Existing variable or array redeclared
63	RESERVED
64	Incorrect RETURN statement (RETURN with no GOSUB)
65	RESERVED
66	RESERVED
67	Numeric conversion error
68	Error detected in ON ERROR processing
69	RESERVED
70	Attempt to execute a statement not executable.
71	RESERVED
72	RESERVED
73	RESERVED
74	RESERVED
75	Prerun error, conflicting program
76	Conflicting error in main program
77	RESERVED
78	Syntax error in subprogram

Error Code	Error Message
Memory overflow	
80	Stack area is now being used (insufficient area).
81	Insufficient area for reserving variable areas
82	I/O error (see detailed error codes)
File or library error	
83	File name (program name) already exists.
84	File name (program name) not found. File name contains double-width spaces.
85	END OF FILE
86	RESERVED
87	RESERVED
88	Error generated in library 88-7n n: n-th parameter error
92	Resident mode error
93	Resident program size too large
94	Resident program upload error
95	CHAIN statement execution error
System error	
101	Insufficient dynamic free area
102	Variable name not found in the symbol table
103	Numeric data value abnormal
104	Numeric data value abnormal
105	Source line length exceeds 306 bytes.
106	Non-reserved word in program code
107	Error in analysis of a computational expression
108	Reserved word code not found
109	Coding error in coded text
110	Parameter error in subroutine call
111	Editor error
112	Editor error
113	Editor error
114	Editor error
Command error	
115	Command entry validity error, command-disabled state due to Type SS, US, or SB program
116	Syntax error
117	Statement not found
Invalid line number	
118	Line number not found
119	Invalid line number
120	Line number exceeds 65535.

Error Code	Error Message
Alarm	
121	Character string not found
122	Free area not more than 400 byts
Subprogram error	
123	Subprogram not found
124	Unable to assign new subblock. Illegal replacement of SUB statement
Syntax error	
130	Unable to assign stack area
131	Invalid array variable in a statement
132	GO, GOTO, GOSUB not described in ON statement.
133	Invalid timer number
134	RESERVED
135	Variable name other than that described as operand was used.
136	Incorrect line number or comma described as operand
137	Invalid significant character string
138	Invalid program name
139	FROM or INTO operand in TRANSFER statement.
140	TO operand missing (FOR statement, etc.)
141	RESERVED
142	RESERVED
143	Invalid operand description
144	Computational expression error
145	RESERVED
146	RESERVED
147	Invalid data list
148	Invalid #Tn or #Un description
149	Invalid binary constant
150	RESERVED
151	Invalid line number or label
152	Too many variable names or labels
153	Invalid variable type declaration
154	Nesting of IF statement exceeds 16 levels.
155	THEN without processing statement
156	ELSE without corresponding IF
157	ENDIF without corresponding IF
158	Statement not terminated in correct format
159	Left part or “=” does not appear in computational expression
160	Invalid DEF statement
161	Permissible numeric size exceeded
162	Invalid hexadecimal constant
163	Invalid FIND command operand
164	Undefined statement type
165	Command headed by a line number
166	Not executed with immediately executable statement
167	Six or more LF codes found between significant characters other than blank characters
168	Invalid statement number
169	Coded statement area (514 bytes) not assigned
170	Statement not allowed in multiple statement line
171	Data type error
172	Invalid subscript
173	Operand error (incorrect operator described in character expression)
174	Variable, label or line number not defined in an immediately executable statement

Appendix 1.2 Detailed Error Codes

The following detailed error codes are output in cases where the BASIC error code 082 (I/O error), 054 (shared access error) or 055 (SIGNAL transmission error) appears.

● I/O errors

82 - xx

The following describes the meaning of error codes and probable causes where errors are output when accessing the Sequence CPU Module and Contact Input/Output Module.

Where errors appear when accessing another module, see applicable instruction manual.

Detailed Error Code (expressed in hexadecimal)	Error Message	Probable Cause
01	No driver exists.	
0C	Insufficient system area	
13	Driver internal error	
81	No driver exists.	
82	Invalid function	• Attempted to execute statement which module does not support (OUTPUT statement for input module, etc.). • Incorrect I/O module slot number
83	Invalid logical file number	
84	Invalid buffer length	• Invalid number of devices
85	Invalid parameter	• Invalid parameter
86	Invalid parameter address	
91	Invalid parameter	• Device number out of range • Invalid parameter
92	Invalid data setting	• Data setting incorrect (data type, etc.) • Specified terminal number other than 0 or 1
93	Invalid command description	• Invalid format specified
94	Invalid module specified	• Invalid module name assigned • Module name not assigned
95	Invalid bit pattern	
9A	Number of specified processing requests exceeded	
9B	Number of specified processing requests exceeded	
9C	Internal error in ASSIGN statement	
9D	ASSIGN statement not executed, I/O not installed	• Incorrect module name assigned • Module name not assigned • Sequence CPU module not found

Detailed Error Code (expressed in hexadecimal)	Error Message	Probable Cause
A1	Incorrect slot number	
B0	Invalid access procedure	
B1	Invalid module designation or data number	• Incorrect device name
B2	Data high/low limit overflow	
B3	Invalid device specification	• Incorrect read/write units
B4	Improper number of devices accessed	• Incorrect device name
B5	Invalid data or code	
B6	Invalid module designation	
BB	Invalid interruption code or number	
BC	Interruption code already requested.	
C1	Buffer overflow	
C7	I/O reset detected	
CD	Insufficient area (driver work area)	
D1	Device error	• Faulty module
D2	Data verification error	
D3	Receiving data error	
D4	Communication error	
D5	No terminator in received text	
D6	Communication error	
D7	Hardware error during data transmission	
D8	Received text header information invalid	
D9	Received text header information invalid	
DA	Program initiation text received	
DB	Invalid transmission mode	
DC	Buffer overflow	
E1	DEVICE NOT READY	• Module not installed • Incorrect slot number • Faulty module
E2	DEVICE BUSY	• Sequence CPU module cannot receive a BASIC statement.
E3	Data error	
E6	Timeout	• Received statement not processed within the given time.
E8	Checksum error	
EA	Data overrun	
F1	Statement-execution check error	• Sequence CPU module not in statement execution status
F2	Improper internal status	• Statement executed, but sequence CPU module is not in normal status
F3	Internal error	
F4	Internal error	
F6	Internal error	
FE	Device not configured	

● Shared access and SIGNAL transmission errors

54 - xx or 55 - xx

The following describes the meaning of error codes and probable causes where errors appear at the time of shared accessing.

If errors are output at the time of SIGNAL transmission, the following failures may be considered. You should also check parameters, cable connections and the destination status.

- Parameter errors involving unit numbers, or the like
- Cables disconnected
- Terminators not connected (terminators missing)
- Destination module or card defective

Detailed Error Code (expressed in hexadecimal)	Error Message	Probable Cause
03	Destination BASIC task not found	
05	Event-receive intermediate buffer overflow in destination BASIC	
82	Internal error	
84	Incorrect buffer length specification	• Common variables are not of integer type or long integer type.
88	Incorrect destination UNIT type (incorrect configuration)	
89	Incorrect own UNIT type	
91	Invalid parameter	• Invalid parameter
92	Invalid data setting	• Set data do not match with configuration.
9D	Sequence CPU not installed	• Incorrect module name assigned • Sequence CPU not assigned • Sequence CPU module not found
A7	Unconnected UNIT no. specified	
B1	Internal error	
B2	Internal error	
B3	Internal error	
B4	Internal error	
B5	Internal error	
B6	Internal error	
B7	Internal error	
BA	Internal error	

Detailed Error Code (expressed in hexadecimal)	Error Message	Probable Cause
C1	Destination memory access error	
C3	Internal error	
C4	Internal error	
D1	Error found in a communication line	
D2	Error found in a communication line	
D3	Error found in a communication line	
D4	Error found in a communication line	
D5	Error found in a communication line	
D6	Error found in a communication line	
D7	Error found in a communication line	
D8	Error found in a communication line	
D9	Error found in a communication line	
DA	Error found in a communication line	
DB	Error found in a communication line	
DC	Error found in a communication line	
E1	DEVICE NOT READY	• Module not installed • Invalid slot number • Faulty module • Subunit turned OFF/ON at the time of Shared accessing
E6	Timeout	
FE	Device not configured	Invalid slot number

Appendix 2. Reserved Words

ABORTIO	COPY	DP	GLOAD	LCOPY
ABS	COS	DU	GMODE	LEFT$
ALL			GO	LEN
ALLOCATE			GOSUB	LET
AND	DATA	EDIT	GOTO	LHEX$
APPEND	DATE$	ELLIPSE	GPOSITION	LINE
ARNAM	DBADD	ELSE IF	GPRINT	LINKLIB
ASC	DBCLOSE	ELSE	GRAPHIC IS	LINPUT
ASSIGN	DBCOND	ENABLE	GSAVE	LINPUT#
AT	DBDEF	ENABLE INTR	GSELECT BT	LIST
ATN		DBDEL	END	GSELECT NT
ATTR$	DBDELM	ENDIF		LISTDEV
AUTO	DBDROP	END WHILE		LOAD
	DBEND	ENTER	HALT	LOCAL
	DBFIND	EOL	HEX$	LOCAL LOCKOUT
BATCH	DBFLD	ERASE	HINSTR	LOF
BATCHOFF	DBFLUSH	ERLIST	HLEFT$	LOG
BCD	DBGET	ERRC	HLEN	LROTATE
BEEP	DBGETM	ERRCE	HMID$	LSHIFT
BFORMAT	DBINIT	ERRCS	HRIGHT$	
BINAND	DBOPEN	ERRL		
BINNOT	DBORDER	ERRM$		MAINTENANCE
BINOR	DBPUT	EXOR	IF	MASTER
BINXOR	DBPUTM	EXP	IMAGE	MERGE
BIT	DBRLS		INIT	MID$
BLEN	DBUPD		INPUT	MOD
BOOT	DEF	FIELD#	INPUT#	MOVE
BOX	DEFAULT OFF	FILES	INPUT$	
BOX FILL	DEFAULT ON	FIND	INSTR	
BYE	DEFDBL	FOR	INT	NAM
	DEFFILE	FORMAT	INTO	NEW
	DEFGCUR	FRAME	IOLOAD	NEWL
CALL	DEFINT	FREE	IOSAVE	NEXT
CALLLIB	DEFLNG	FROM	IOSIZE	NL
CHAIN	DEFSHORT	FUSING		NOFORMAT
CHAR	DEFSNG			NOT
CHG	DEFVOL		KEY IS	
CHR$	DEL	GCOLOR	KEY LABEL	
CIRCLE	DEL#	GCREADX		OFF COMINT
CIRCLE FILL	DELF	GCREADY		OFF EOF
CLOSE	DELP	GCURSOR OFF	LASTBIT	OFF EOT
COL	DIM	GCURSOR ON	LBCD	OFF ERROR
COLOR	DISABLE	GDISPLAY OFF	LBINAND	OFF EVENT
COM	DISP	GDISPLAY ON	LBINNOT	OFF EXEVENT
COM IS	DISP USING	GERASE	LBINOR	OFF GRAPHIC
CONT	DIV	GET#	LBINXOR	OFF INPUT
CONTROL	DJLINE	GINIT	LBIT	OFF INT

OFF KEY	PI	READ IO	SCREEN	TAN
OFF SEQEVT	POINT	RECEIVE	SET MARKER	THEN
OFF SYSEV	POKE	RECOM	SET PAINT	TIME$
OFF TIME	POLYGON	RELESE	SET PEN	TIMEMS
OFF TIMEOUT	POLYGON FILL	REM	SET STATUS	TO
OFF TIMER	POSITION	REMOTE	SET TEXT	TRACE
ON	POSITION#	RENAME	SET TIMEOUT	TRACEP
ON COMINT	POSX	RENUM	SETDAY	TRACEV
ON EOF	POSY	REPEAT	SETMD RES	TRANSFER
ON EOT	PR	RESERVE	SETTIME	TRIGGER
ON ERROR	PRCSRD	RESET	SGN	
ON EVENT	PRCSWT	RESET STATUS	SHIFT	
ON EXEVENT	PRELEASE	RESTORE	SIGNAL	UN TIL
ON INPUT	PRESERVE	RETRY	SIN	USING
ON INT	PRINT	RETURN	SLOAD	
ON KEY	PRINT BFORMAT	RIGHT$	SPC	
ON SEQEVT	PRINT NOFORMAT	RND	SQR	VAL
ON SYSEV	PRINT USING	RNPAR	SSAVE	VIEWPORT W
ON TIME	PRINT#	ROTATE	START	VOL$
ON TIMEOUT	PRINTER IS	RUN	STATUS	VOLUMES
ON TIMER	PROG		STEP	
ON UNIT	PSET		STOP	
OPEN	PU	SAVE	STR$	WAIT
OPTION BASE	PUT#	SCRATCH	SUB	WHILE
OR		SCRATCHP	SUBCOM	WINDOW
OUTPUT		SCRATCHV	SUBEND	WRITE IO
	QUIT	SEND	SUBEXIT	
		SEQACTV	SWAP	
PAINT		SET BLINK		
PAUSE	RANDOMIZE	SET CHAR		
PEEK	READ	SET LINE	TAB	

Revision History

Document Name : BASIC Programming Tool M3 for Windows
Document No. : IM 34M06Q22-02E

Edition	Date	Revised Item
1st	Oct. 1999	New publication
2nd	Sep. 2012	Updated for R1.04 Version

Written by PLC Solution Department
IA Systems Business Division
IA Platform Business Headquarters
Yokogawa Electric Corporation
Published by Yokogawa Electric Corporation
2-9-32 Nakacho, Musashino-shi, Tokyo, 180-8750, JAPAN
Printed by Kohoku Publishing & Printing Inc.

Blank Page