



HITACHI
S10 α SERIES

SOFTWARE MANUAL
OPERATION

HI-FLOW
For Windows[®]
V7

2 α
S10mini
SERIES

Applicable to :

HITACHI-S10/2 α	NESP-S25E
HITACHI-S10/2 α E	NESP-2 α E
HITACHI-S10/2 α H	NESP-2 α H
HITACHI-S10/2 α Hf	NESP-2 α Hf
S10mini model S	
S10mini model H	
S10mini model F	
S10mini model D	

NOTE

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FIRST EDITION, FEBRUARY, 1999, SAE - 3 - 132 (B) (out of print)
SECOND EDITION, NOVEMBER, 2000, SAE - 3 - 132 (D) (out of print)
THIRD EDITION, SEPTEMBER, 2003, SAE - 3 - 132 (F)
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SAFETY PRECAUTIONS

- Read this manual thoroughly and follow all the safety precautions and instructions given in this manual before operations such as system configuration and program creation.
- Keep this manual handy so that you can refer to it any time you want.
- If you have any question concerning any part of this manual, contact your nearest Hitachi branch office or service engineer.
- Hitachi will not be responsible for any accident or failure resulting from your operation in any manner not described in this manual.
- Hitachi will not be responsible for any accident or failure resulting from modification of software provided by Hitachi.
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- Make it a rule to back up every file. Any trouble on the file unit, power failure during file access or incorrect operation may destroy some of the files you have stored. To prevent data destruction and loss, make file backup a routine task.
- Furnish protective circuits externally and make a system design in a way that ensures safety in system operations and provides adequate safeguards to prevent personal injury and death and serious property damage even if the product should become faulty or malfunction or if an employed program is defective.
- If an emergency stop circuit, interlock circuit, or similar circuit is to be formulated, it must be positioned external to the programmable controller. If you do not observe this precaution, equipment damage or accident may occur when the programmable controller becomes defective.
- Before changing the program, generating a forced output, or performing the RUN, STOP, or like procedure during an operation, thoroughly verify the safety because the use of an incorrect procedure may cause equipment damage or other accident.



“RUN/STOP” SWITCH CAUTION

The “RUN/STOP” switch only stops execution of the ladder logic program or HI-FLOW program. Digital and analog outputs are left in the active state when execution stops, unless the optional rungs described in the CPU manual have been added. The “RUN/STOP” switch does not affect the operation of C-language or FA-BASIC language programs. Outputs can still be produced in response to C-language or FA-BASIC programs, or by the action of programmers typing in commands in these languages, while the “RUN/STOP” switch is in the “STOP” position.

DO NOT DEPEND ON THE STOP SWITCH TO STOP MOVING PARTS OR TO PREVENT UNEXPECTED MOTION OR ENERGIZATION. USE HARDWIRED SAFETY DISCONNECT AND LOCK OUT POWER AND CONTROL VOLTAGES BEFORE WORKING ON ELECTRICAL CIRCUITS OR PARTS THAT CAN MOVE.

PREFACE

We greatly appreciate your purchase of this HI-FLOW system.

This system, running on a personal computer, is used for creation and correction of HI-FLOW application program, and many other operations.

This manual describes the operation of the HI-FLOW system.

This manual is applicable to the following system versions.

System name/version
HI-FLOW SYSTEM For Windows® 07-02

For HI-FLOW program (instruction), refer to the manual listed below.

<Related manual>

SOFTWARE MANUAL PROGRAMMING HI-FLOW For Windows®
(Manual number SAE-3-122)

See the following list when you use the NESP
(Nissan Electronic Sequence Processor) series.

【HITACHI-S10α series】		【NESP series】
HITACHI-S10/2 α	NESP-S25E
HITACHI-S10/2 α E	NESP-2 α E
HITACHI-S10/2 α H	NESP-2 α H
HITACHI-S10/2 α Hf	NESP-2 α Hf

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Systems Supported by Windows® 2000 and Windows® XP

The systems supported by Microsoft® Windows® 2000 operating system (hereafter abbreviated as Windows® 2000) and Microsoft® Windows® XP operating system (hereafter abbreviated as Windows® XP) are shown in the following table.

Systems of earlier versions than those shown in the following table are not supported by Windows® 2000 and Windows® XP but supported by only Microsoft® Windows® 95 operating system (hereafter abbreviated as Windows® 95) and Microsoft® Windows® 98 operating system (hereafter abbreviated as Windows® 98). (The system names in the following table are hereafter abbreviated as each system.)

<Table of Systems Supported by Windows® 2000 and Windows® XP>

No.	System name	Type	Version	Windows® 2000	Windows® XP
1	S10Tools SYSTEM	S-7890-01	07-05	√	√
2	LADDER CHART SYSTEM	S-7890-02	07-05	√	√
3	HI-FLOW SYSTEM	S-7890-03	07-02	√	√
4	CPMS LOADING SYSTEM	S-7890-04	07-04	√	√
5	CPMSE LOADING SYSTEM	S-7890-05	07-04	√	√
6	CPMS DEBUGGER SYSTEM	S-7890-06	07-02	√	√
7	CPMSE DEBUGGER SYSTEM	S-7890-07	07-02	√	√
8	GP-IB LOADING SYSTEM	S-7890-08	07-01	√	√
9	BACKUP RESTORE SYSTEM	S-7890-09	08-01	√	√
10	RPDP/S10 SYSTEM	S-7891-10	03-03	√ (*2)	ns (*1)
11	NX/Tools-S10 SYSTEM	S-7890-13	07-02	√	√
12	4α LADDER CHART SYSTEM	S-7890-17	07-05	√	√
13	4αH LADDER CHART SYSTEM	S-7890-18	07-05	√	√
14	LADDER COMMENT CONVERTER SYS	S-7890-19	06-01	√	√
15	HIGH SPEED REMOTE I/O SYSTEM	S-7890-21	07-01	√	√
16	CPU LINK SYSTEM	S-7890-22	07-01	√	√
17	4ch ANALOG PULSE COUNTER SYS	S-7890-23	07-01	√	√
18	EXTERNAL SERIAL LINK SYSTEM	S-7890-24	07-02	√	√
19	S10ET LINK SYSTEM	S-7890-25	07-02	√	√
20	J.NET SYSTEM	S-7890-27	07-02	√	√
21	OD.RING/SD.LINK SYSTEM	S-7890-28	07-03	√	√
22	ET.NET SYSTEM	S-7890-29	07-01	√	√
23	FL.NET SYSTEM	S-7890-30	07-03	√	√
24	D.NET SYSTEM	S-7890-31	07-04	√	√
25	LADDER CHART MONITOR SYSTEM	S-7890-34	07-04	√	√
26	HI-FLOW MONITOR SYSTEM	S-7890-35	07-01	√	√
27	IR.LINK SYSTEM	S-7890-36	07-02	√	√
28	Crossing C compiler (manufactured by Mentor graphics company)	MCP68K	5.3	√ (*2)	ns (*1)

√: Supported ns: Not supported

(*1) Crossing C compiler (No.28) is not supported by Windows® XP. Use it on Windows® 2000.

(*2) Crossing C compiler (No.28) must be a version supported by Windows® 2000 (later than version 5.3) as a premise.

<Definitions of Terms>

- N coil: A ladder program converted into a form that can be run on the PCs by pasting a symbol on the sheet displayed on a PC.
- Process: A HI-FLOW program converted into a form that can be run on the PCs by pasting a symbol on the sheet displayed on a PC.
- Compile: To convert an application program such as a ladder chart and HI-FLOW into a form (N coil, process, etc.) that can be run on the PCs.
- Build: To compile only a corrected application program.
- Rebuild: To compile every existing application program.
- Sheet: Paper to prepare an application program of ladder chart and HI-FLOW, etc. This paper is controlled on a PC.
- PCs: An abbreviation of Programmable Controllers.
This is a general term for PLC such as the S10 α and S10mini series.
- PLC: An abbreviation of Programmable Logic Controller.
This is an industrial electronic device to exert sequence control, having an incorporated program.
The S10 α and S10mini series come under this PLC.

<Note for storage capacity calculations>

- Memory capacities and requirements, file size and storage requirements, etc. must be calculated according to the formula 2^n . The following examples show the results of such calculations by 2^n (to the right of the equals signs).
1 KB (kilobyte) = 1024 bytes
1 MB (megabyte) = 1,048,576 bytes
1 GB (gigabyte) = 1,073,741,824 bytes
- As for disk capacities, they must be calculated using the formula 10^n . Listed below are the results of calculating the above example capacities using 10^n in place of 2^n .
1 KB (kilobyte) = 1000 bytes
1 MB (megabyte) = 1000^2 bytes
1 GB (gigabyte) = 1000^3 bytes

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1 BEFORE USE

1 BEFORE USE

This manual is intended for users who want to program a personal computer under the Windows®.

1.1 System Overview

HI-FLOW For Windows® (hereinafter referred to as the HI-FLOW system) is used to create, correct, monitor, and debug HI-FLOW application program for the 2α series and S10mini series. The HI-FLOW system can be operated in the same way as ordinary Windows® applications are operated.

1.2 Hardware and Software Requirements

Using each system requires the following hardware and software.

<Personal Computers (hereafter abbreviated as PC)>

Item \ OS	Windows® 95 (*1)	Windows® 2000 (*1)	Windows® XP (*1)
	Windows® 98 (*1)		(*2)
CPU	Pentium 133 MHz or more		Pentium 300 MHz or more
Memory (RAM)	32 MB or more	64 MB or more	128 MB or more
Free hard disk capacity (*3)	20 MB or more/system (However, 10 MB or more/system for OS loading and option module support software)		
Floppy disk drive	1 unit or more (required to install software by FD)		
CD-ROM drive	1 unit or more (required to install software by CD-ROM)		
Ethernet (10BASE-T)	1 port or more (required to connect a PC with the ET.NET module)		
Serial (D-sub 9-pin)	1 port or more (required to connect the PCs with a PC by RS-232C or set an IP address for the ET.NET module)		
PC card (conforming to the PC Card Standard (JEITA V4.2) TYPE II or TYPE III)	1 slot or more (required to connect a PC with the parallel interface module (LWZ400). At this time, the following GP-IB card is also required.) GP-IB card: PCMCIA-GPIB (Model: 777438-02) (manufactured by National Instruments Corporation)		
Display	Resolution of 800 × 600 pixels or more		
Microsoft® Internet Explorer	Version 4.01 or later		

(*1) For the OS service pack, refer to the attached reference materials for software.

(*2) No.10 and No.28 in <Table of Systems Supported by Windows® 2000 and Windows® XP> in “PREFACE” are excepted.

(*3) This is a capacity required to install each system. A free capacity to save user programs is also required.

<Hardware other than PC>

- CPU for HITACHI-S10 α series (2 α) or S10mini series
- Power supply for HITACHI-S10 α series or S10mini series
- Backboard for HITACHI-S10 α series or S10mini series
- Connection cable between the personal computer and PCs
- Remote I/O stations, other power supplies and backboards, cards, and wiring as required

1.3 Precautions

1.3.1 Precautions to be observed during the use of the NX/Tools-S10 system

The NX/HOST-S10 programs transferred to the PCs by the NX/Tools-S10 system use the following areas depending on the type. When you use the NX/Tools-S10 system in conjunction with HI-FLOW, perform the following loading procedures to avoid an area overlap.

<Areas used by NX/HOST-S10>

TYPE1: /120000 to /15D800

TYPE2: /120000 to /163000

TYPE3: /120000 to /180000

TYPE4: /120000 to /164000

TYPE5: /120000 to /16E800

TYPE6: /120000 to /195800

(1) Loading HI-FLOW when the NX/HOST-S10 system is already loaded in the PCs

- ① Stop the PCs.
- ② First, load only the HI-FLOW system program into the PCs.
(Operation: Select [Utility] – [PCs] – [Delete process of PCs], and [Exchange all process and system] in sequence.)
- ③ After completion of system program loading, use the system edition function to define the user area so that it does not overlap with the above NX/HOST-S10 area.
(Operation: Select [Utility] – [PCs], and [System edition] in sequence.)
- ④ Transfer the HI-FLOW programs (processes) to the PCs.

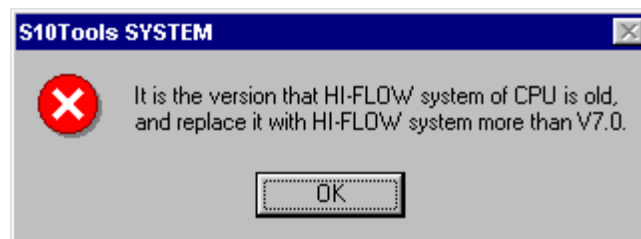
1 BEFORE USE

- (2) Loading NX/HOST-S10 when HI-FLOW is already loaded in the PCs
 - ① Stop the PCs.
 - ② Receive all the HI-FLOW programs (processes) from the PCs and saves them on the personal computer you are operating.
 - ③ Use the system edition function to define the user area so that it does not overlap with the above NX/HOST-S10 area.
 - ④ Transmit the saved HI-FLOW programs back to the PCs.
 - ⑤ Transmit the NX/HOST-S10 system to the PCs.
 - ⑥ (Performing Steps ④ and ⑤ in reverse order will cause no problem.)

1.3.2 HI-FLOW system replacement

The message below appears on the display when the HI-FLOW system establishes an on-line condition with the PCs. Then, be sure to replace the HI-FLOW system on the PCs (CPU unit side).

Replacing the system deletes all the existing HI-FLOW programs (processes) on the PCs side. Therefore, be sure to save the programs to the personal computer before making a system replacement.



- (1) Replacing the HI-FLOW system
 - ① Stop the PCs.
 - ② Select [Utility] – [PCs] – [Delete process of PCs], and [Exchange all process and system] in sequence.
 - ③ When the system is replaced, all the processes are deleted from the PCs. Therefore, retransmit all the HI-FLOW programs (processes) to the PCs.

NOTICE

Users of this product require knowledge of the Windows® environment and user interface. The HI-FLOW system conforms to the Windows® standard. This manual is intended for users who have mastered the basic usage of Windows®.

**CAUTION**

- This product can be used to rewrite programs or the content of internal registers while the PCs are running. However, if they are rewritten without sufficient care, a serious accident such as damage to a facility may occur. Check the condition of the facility before rewriting programs or the content of internal registers.
- When you use a personal computer with the suspend function, disable the function. The personal computer may malfunction if the suspend function remains enabled during execution of the HI-FLOW debugger system.
- If RAM runs short during execution of an application program, an application error may result. When this happens, check the free memory capacity and, if the RAM needs to be extended, do it.

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2 INSTALLATION

2 INSTALLATION

2.1 Installing the System (*)

First, check if your CD is correct.

To install each system, double-click the Setup.exe file saved in the DISK1 folder of the system CD. After installing it, an installed program window is not displayed.

To install each system, install Microsoft® Internet Explorer 4.01 or later. If it is not installed, install each system after installing it.

NOTE

- To operate each system, install Microsoft® Internet Explorer 4.01 or later. If it is not installed, each system does not operate normally.
- Before installing each system, be sure to terminate such a program residing in the memory as virus monitoring software. If each system is installed without terminating the program, an error may occur. In this case, uninstall the system by referring to “2.2 Uninstalling the System” and terminate all Windows® programs. Then, install each system once again.
- To install and uninstall each system by using Windows® 2000, set “Administrator” or “Member of Administrators” as the user account to be logged on.
- To install and uninstall each system by using Windows® XP, set “Computer administrator” as the user account to be logged on. If “Account with limitations” is set, each system does not operate normally.

(*) No.10 and No.28 in <Table of Systems Supported by Windows® 2000 and Windows® XP> in “PREFACE” are excepted.

2.2 Uninstalling the System (*)

To uninstall each system for version-up, observe the following procedure.

(1) Uninstalling from Windows® 95 or Windows® 98

Open [Settings] in the [Start] menu – [Control Panel]. Double-click [Add/Remove Programs], select “Each System” by the [Install/Uninstall] tab, and click the button. When the [Confirm File Deletion] window is displayed, click the button.

(2) Uninstalling from Windows® 2000

Open [Settings] in the [Start] menu – [Control Panel]. Double-click [Add/Remove Programs], click [Change or Remove Programs], select “Each System,” and click the button. When the [Confirm File Deletion] window is displayed, click the button.

(3) Uninstalling from Windows® XP

Open ([Settings] –) [Control Panel] in the [Start] menu. Double-click [Add or Remove Programs], click [Change or Remove Programs], select “Each System,” and click the button. When the [Confirm File Deletion] window is displayed, click the button.

When a shortcut of each system executable file has been created on the desktop, etc. delete this shortcut.

NOTE

- When the [Remove Shared File?] window is displayed while each system is uninstalled on Windows®, click not to delete the shared file.
- To install and uninstall each system by using Windows® 2000, set “Administrator” or “Member of Administrators” as the user account to be logged on.
- To install and uninstall each system by using Windows® XP, set “Computer administrator” as the user account to be logged on.
- If the [Add/Remove Programs] window is locked (inoperable) when each system is uninstalled by using Windows® 2000, log off from [Shut Down] in the [Start] menu of Windows®, and then log on again on the [Log On to Windows] window.

(*) No.10 and No.28 in <Table of Systems Supported by Windows® 2000 and Windows® XP> in “PREFACE” are excepted.

2 INSTALLATION

2.3 Starting Up the System (*)

- (1) The system to be installed by each system is automatically registered in the [Start] menu of Windows®. From this [Start] menu, select [Programs (All Programs)] – [Hitachi S10] – “Each System” to start the system.

If the logged-on user name in installing each system is different from the user name in starting each system, each system is not displayed in the [Start] menu. In this case, create a shortcut of the executable file (extension .exe) for each system shown below and then double-click this shortcut to start each system.

<Executable File Storage Directory Table>

No.	System name	Type	Executable file storage directory (*1)	Executable file name
1	S10Tools SYSTEM	S-7890-01	C:\Hitachi\S10	S10Ladder.exe
				S10Tool.exe
2	LADDER CHART SYSTEM	S-7890-02	C:\Hitachi\S10\2ALDC	S10Ladder.exe
3	HI-FLOW SYSTEM	S-7890-03	C:\Hitachi\S10\HF	S10Tool.exe
4	CPMS LOADING SYSTEM	S-7890-04	C:\Hitachi\S10\CPMS	Cpms.exe
5	CPMSE LOADING SYSTEM	S-7890-05	C:\Hitachi\S10\CPMSE	Cpmse.exe
6	CPMS DEBUGGER SYSTEM	S-7890-06	C:\Hitachi\S10\DEBUG	Debugger.exe
7	CPMSE DEBUGGER SYSTEM	S-7890-07	C:\Hitachi\S10\DEBUGE	DebuggerE.exe
8	GP-IB LOADING SYSTEM	S-7890-08	C:\Hitachi\S10\GPIB	Gpib.exe
9	BACKUP RESTORE SYSTEM	S-7890-09	C:\Hitachi\S10\BACKUP	SysAllSaveLoad.exe
10	NX/Tools-S10 SYSTEM	S-7890-13	C:\Hitachi\S10\NX	NXTool.exe
11	4α LADDER CHART SYSTEM	S-7890-17	C:\Hitachi\S10\4ALDC	S10Ladder_4A.exe
12	4αH LADDER CHART SYSTEM	S-7890-18	C:\Hitachi\S10\4AHLDC	S10Ladder_4AH.exe
13	LADDER COMMENT CONVERTER SYS	S-7890-19	C:\Hitachi\S10\CFCONV	Cfconv.exe
14	HIGH SPEED REMOTE I/O SYSTEM	S-7890-21	C:\Hitachi\S10\HISRIO	HiSpeedRIO.exe
15	CPU LINK SYSTEM	S-7890-22	C:\Hitachi\S10\CPULINK	CpuLink.exe
16	4ch ANALOG PULSE COUNTER SYS	S-7890-23	C:\Hitachi\S10\ANALOG	AnalogPuls.exe
17	EXTERNAL SERIAL LINK SYSTEM	S-7890-24	C:\Hitachi\S10\EXLINK	ExLink.exe
18	S10ET LINK SYSTEM	S-7890-25	C:\Hitachi\S10\ETLINK	EtherNet.exe
19	J.NET SYSTEM	S-7890-27	C:\Hitachi\S10\JNET	JNet.exe
20	OD.RING/SD.LINK SYSTEM	S-7890-28	C:\Hitachi\S10\ODRING-SDLINK	ODRing.exe
21	ET.NET SYSTEM	S-7890-29	C:\Hitachi\S10\ETNET	Et_Net.exe
22	FL.NET SYSTEM	S-7890-30	C:\Hitachi\S10\FLNET	FLnet.exe
23	D.NET SYSTEM	S-7890-31	C:\Hitachi\S10\DNET	DNet.exe
24	LADDER CHART MONITOR SYSTEM	S-7890-34	C:\Hitachi\S10\2ALDCM	S10LadderM.exe
25	HI-FLOW MONITOR SYSTEM	S-7890-35	C:\Hitachi\S10\HFM	S10ToolM.exe
26	IR.LINK SYSTEM	S-7890-36	C:\Hitachi\S10\IRLINK	IrLink.exe

(*1) Directory name when “C” is the drive name of installing destination.

(*) No.10 and No.28 in <Table of Systems Supported by Windows® 2000 and Windows® XP> in “PREFACE” are excepted.

2.4 Terminating the System

To terminate the HI-FLOW system, select [Application termination] from the [File] menu.

When the system terminates, the Windows® screen appears again.

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3 HI-FLOW SHEETS

3 HI-FLOW SHEETS

Application programs in the HI-FLOW system have a structure different from that of their DOS versions. Programs on the PCs are handled in the same way as in both the HI-FLOW system and DOS system. In the HI-FLOW system, however, application programs are handled as sheets on a personal computer.

3.1 Relationship with DOS Version Files (e.g., .PSE)

HI-FLOW is capable of reading various DOS version files and saving them in a specified extension format. Use the conversion feature ([File] – [FD] – [Read]) or save in a specified format ([File] – [FD] – [Save]).

3.2 HI-FLOW Sheets

The HI-FLOW system manages the following types of sheets.

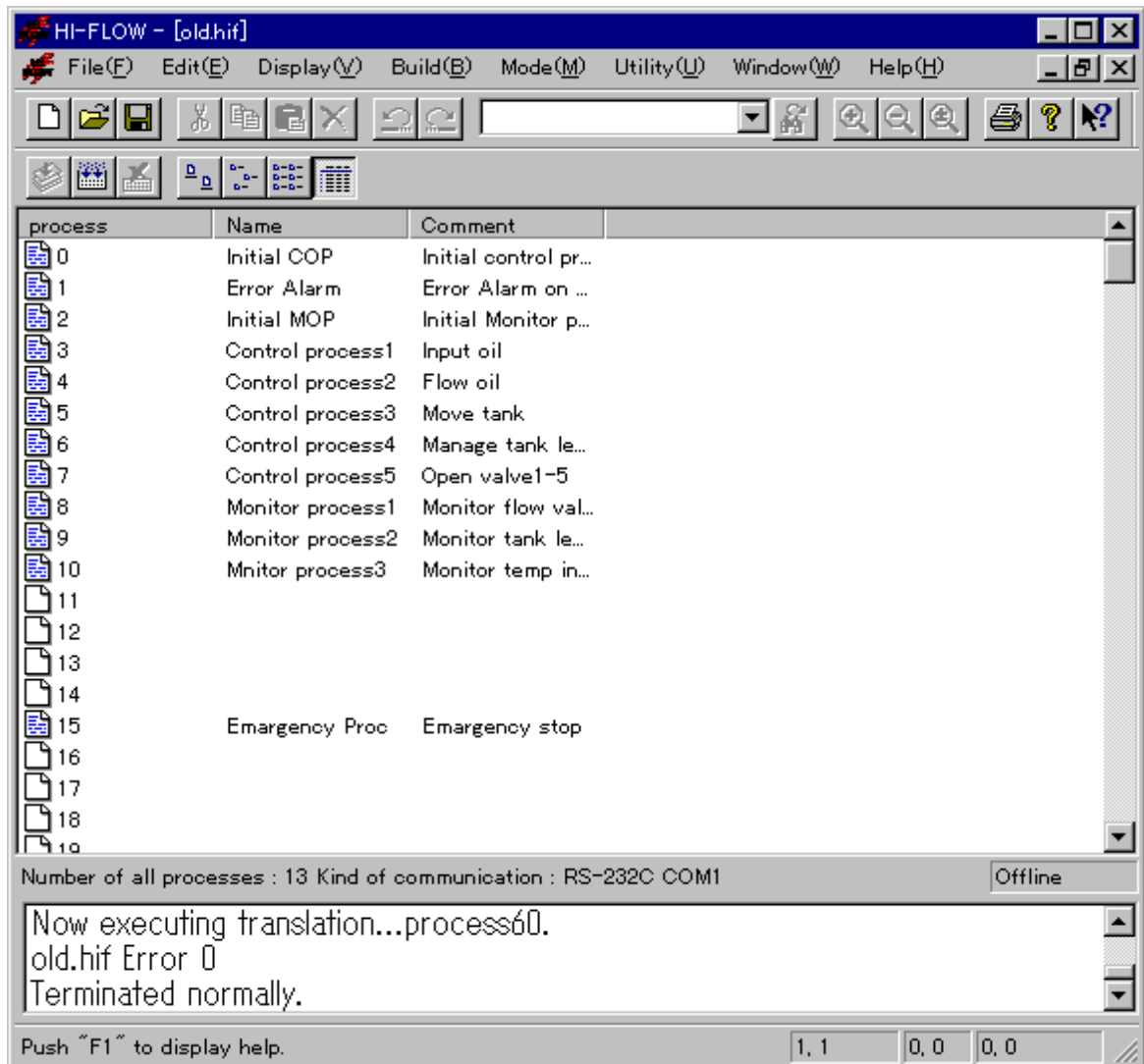
- HI-FLOW process sheet
- HI-FLOW sheet

One of these types is specified when creating a new sheet or opening an existing sheet.

3.3 HI-FLOW Process Sheets

The HI-FLOW system visually manages HI-FLOW programs for each process. HI-FLOW process sheets provide all necessary information for visual management of multiple processes.

A HI-FLOW process sheet is an equivalent of the process list screen in the DOS version.

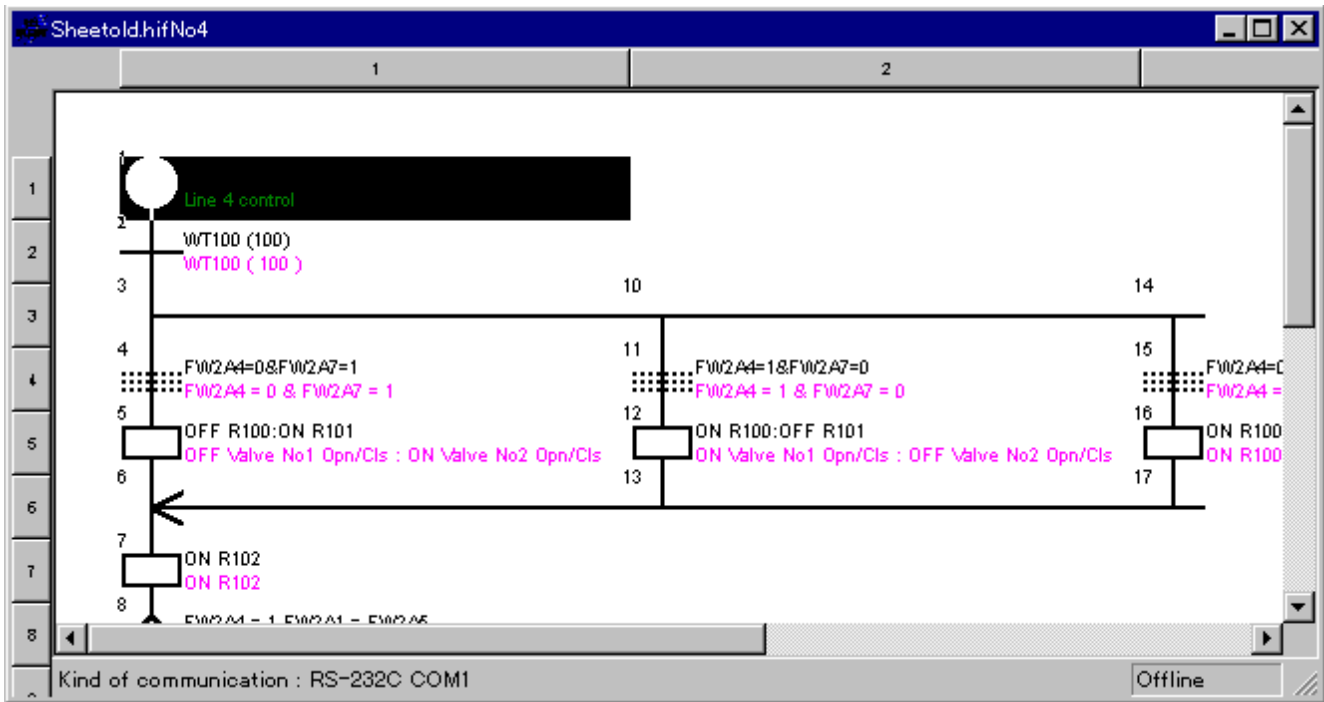


Clicking a process icon on the process sheet opens a HI-FLOW sheet.

3 HI-FLOW SHEETS

3.4 HI-FLOW Sheets

HI-FLOW sheets contain HI-FLOW programs that are managed on HI-FLOW process sheets. Up to 256 HI-FLOW sheets can be created, and on each such sheet can up to 256 lines, or up to 999 steps, be coded (in the same language as used in the DOS version).



A HI-FLOW program can be created by entering HI-FLOW symbols. Paste registered HI-FLOW symbols from the symbol bar into the program by using drag-and-drop or other operations.

<HI-FLOW symbol bar>



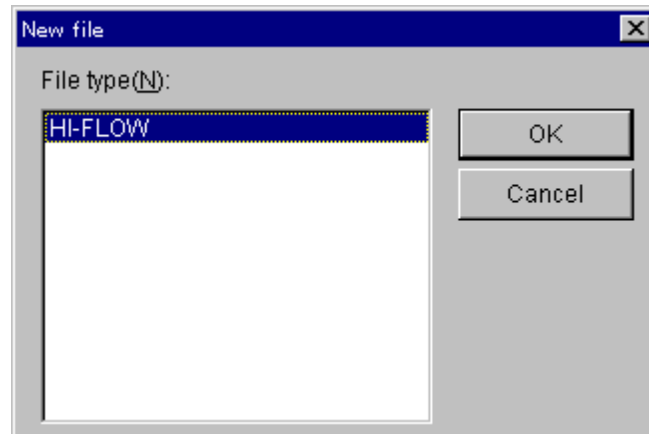
4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

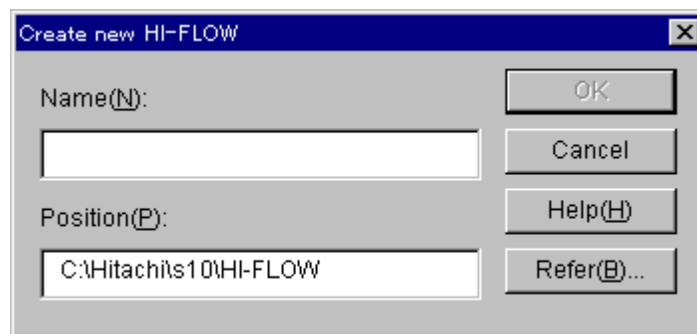
This chapter outlines the functions of HI-FLOW process sheets and HI-FLOW sheets as well as the method of using these two types of sheet. For details, refer to the help provided by the HI-FLOW system.

4.1 Creating HI-FLOW Process Sheets

HI-FLOW process sheets are used to visually manage existing HI-FLOW sheets for each process. To create a HI-FLOW process sheet, select [File] menu – [New file].



Click the button and set the name of a new sheet on the following window.

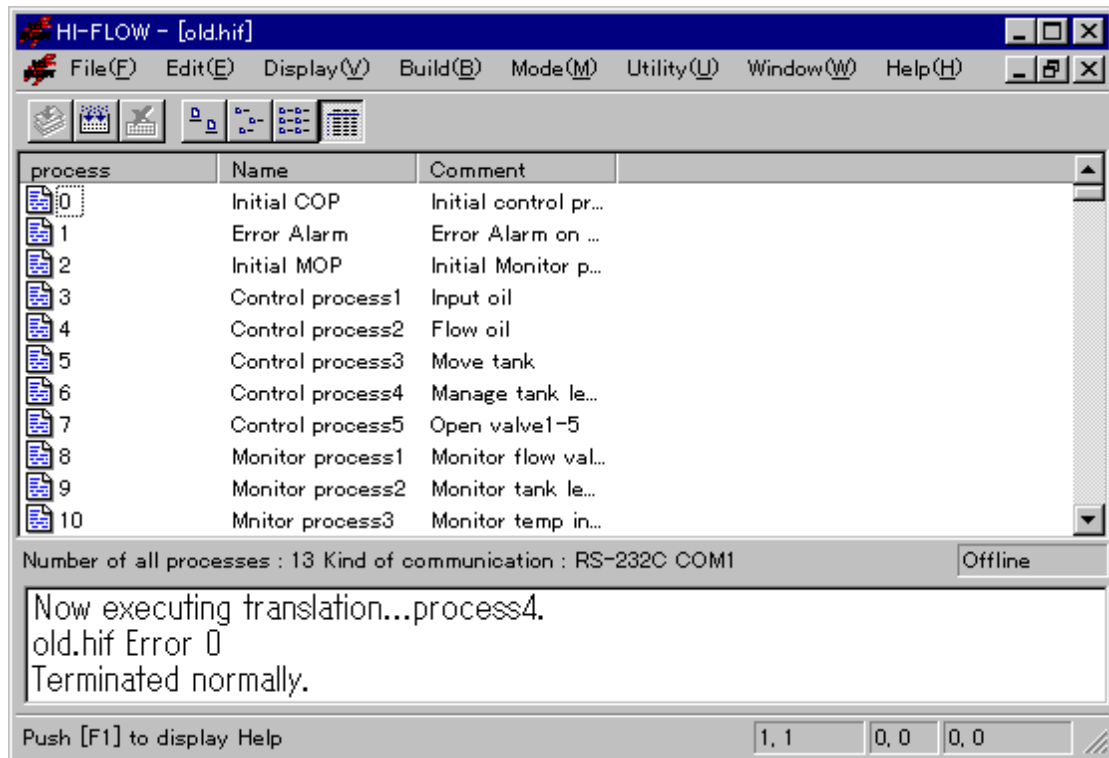


To open an existing HI-FLOW process sheet, select [File] menu – [Open file].



4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

When a new HI-FLOW process sheet is created, it is opened with no program provided. Any existing HI-FLOW process sheet, when opened by selecting [File] menu – [Open], inherits the state that existed when that process sheet was closed previously.



Only one HI-FLOW process sheet can be opened at a time. When opening a HI-FLOW program from the HI-FLOW process sheet, double-click the HI-FLOW sheet icon on the HI-FLOW process sheet.

A HI-FLOW process sheet has the following eight main menus.

File: Provides file-related functions, such as saving, reading, and printing HI-FLOW process sheets.

Edit: Provides edit functions for editing HI-FLOW process sheets.

Display: Provides functions related to display formats in the HI-FLOW system.

Build: Provides functions related to compilation of HI-FLOW programs.

Mode: Provides functions related to transmission and reception between the PCs and HI-FLOW programs.

Utility: Provides utility functions.

Window: Provides functions for operations on ladder sheet windows.

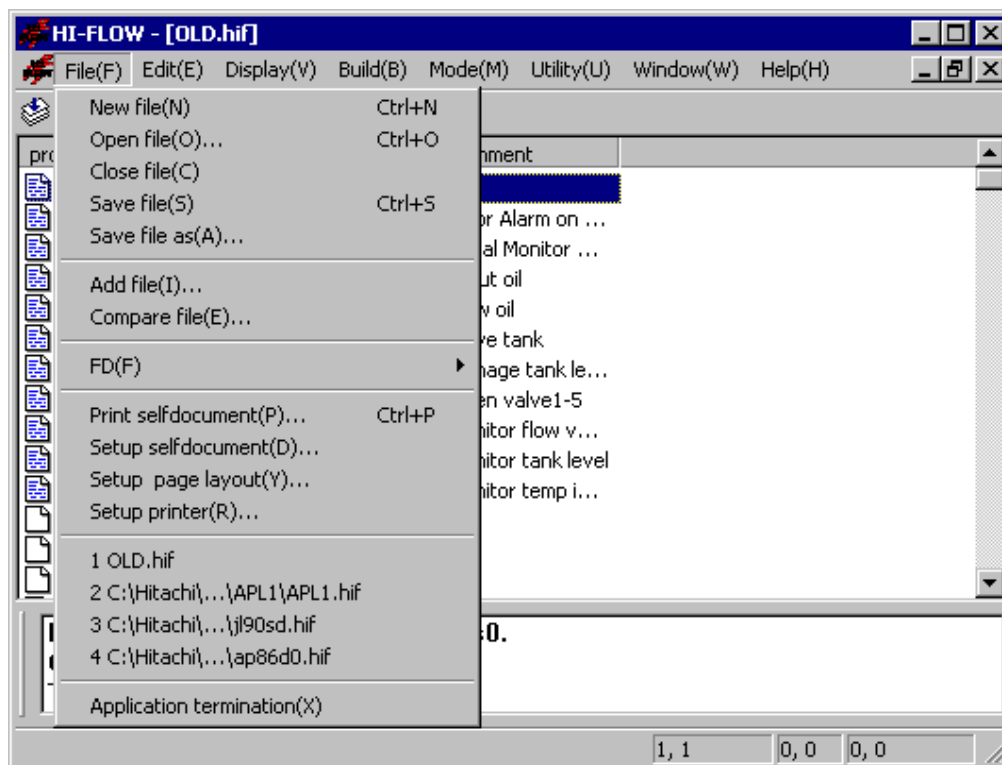
Help: Provides help.

Toolbars also have the same functions as these menus.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.2 HI-FLOW Process Sheet File Functions

The file functions for HI-FLOW process sheets are selectable from a pull-down menu.

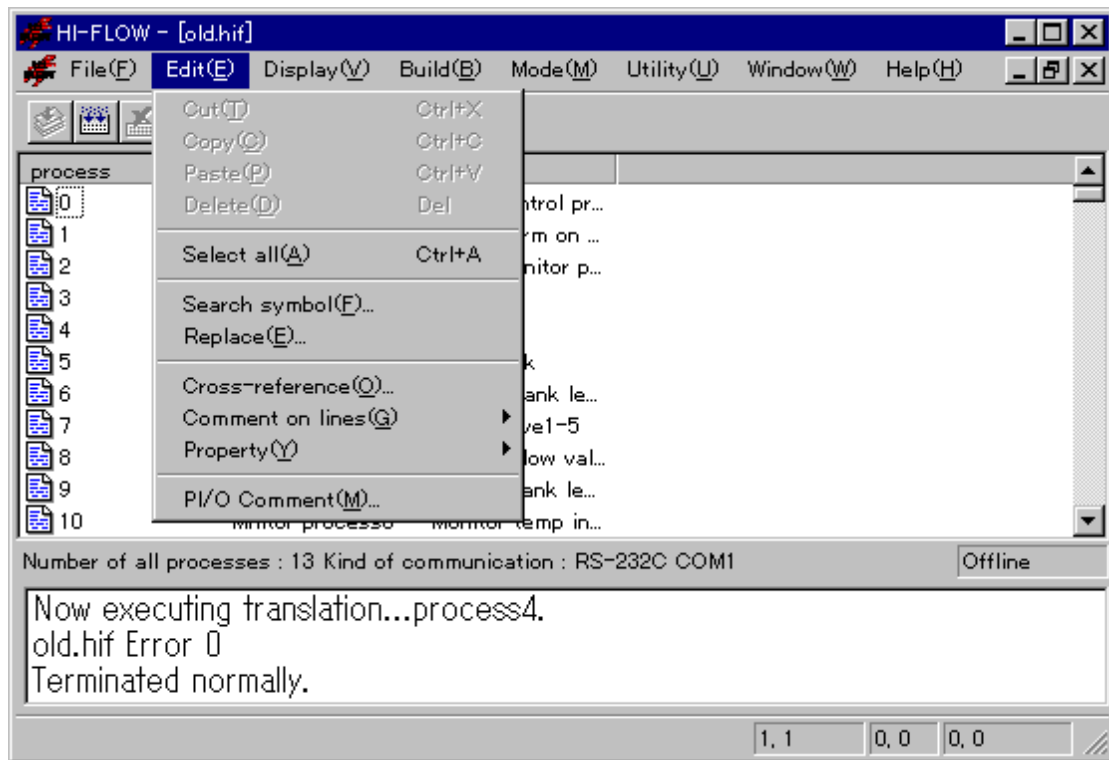


The file functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	File	New file		Opens a window to create a new program.
2		Open file		Reads a specified program file.
3		Close file		Closes the window currently active.
4		Save file		Overwrites and saves program data and comment data in the window currently active.
5		Save file as		Saves program data in the window currently active as a different name.
6		Add file		Adds a process.
7		Compare file		Compares processes on an object basis.
8		FD	Save	Saves program data in the window currently active to a floppy disk.
9			Read	Reads a program file from a floppy disk.
10		Print selfdocument		Prints a document created by self-documentation.
11		Setup selfdocument		Sets a format in which a document created by self-documentation is to be printed.
12		Setup page layout		Sets a page layout.
13		Setup printer		Selects a printer and sets a print format.
14		File names 1, 2, 3, 4, ...		Displays the names of files that were used before.
15		Application termination		Terminates the HI-FLOW system.

4.3 HI-FLOW Process Sheet Edit Functions

The HI-FLOW process sheet edit functions are selectable from a pull-down menu. The edit functions described in this section apply to HI-FLOW processes rather than HI-FLOW programs. Processes can be copied or deleted on HI-FLOW process sheets.

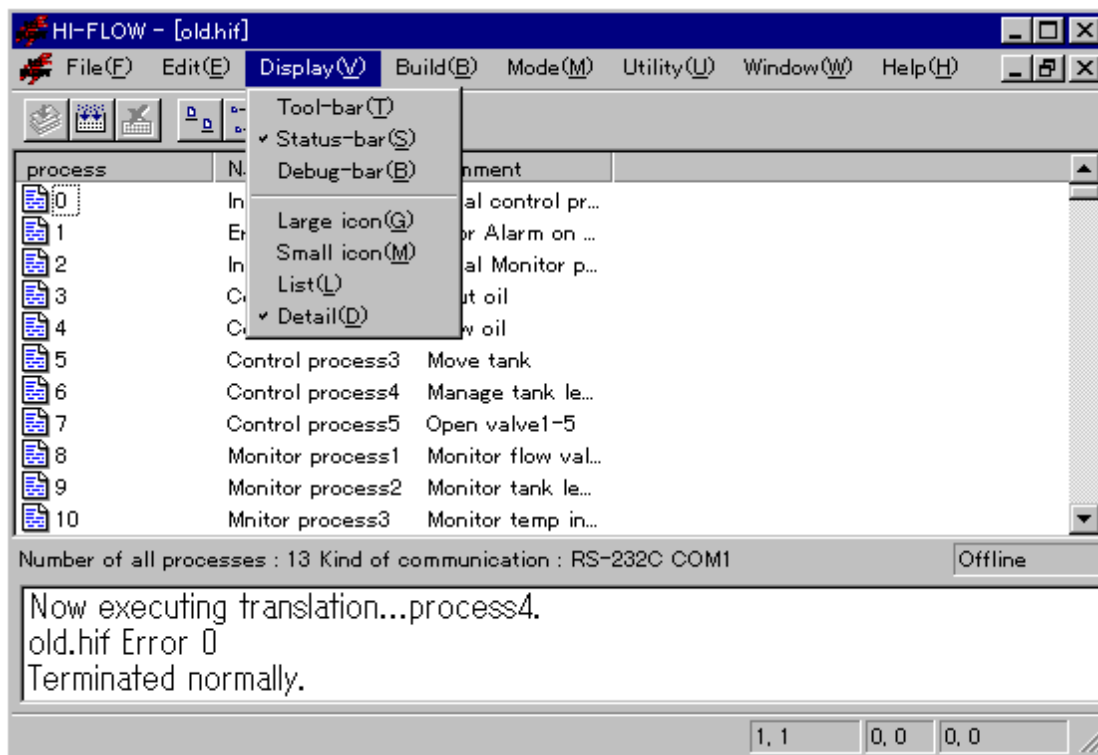


The edit functions are described below.

No.	Level 1	Level 2	Level 3	Description	
1	Edit	Cut		Removes a specified part of a process and copies it to the clipboard.	
2		Copy		Copies a specified part of a process to the clipboard.	
3		Paste		Copies data from the clipboard to a specified position.	
4		Delete		Deletes a specified part of a process.	
5		Select all		Selects all process icons.	
6		Search symbol		Searches for a specified symbol.	
7		Replace		Replaces a specified structure.	
8		Cross-reference		Searches for specified process symbol information.	
9		Comment on lines	All processes		Copies the symbol structures of all processes.
10			Designated process		Copies the symbol structure of a designated process.
11		Property	Property		Sets properties for a file comment.
12			Process		Sets properties for a sheet.
13		PI/O Comment			Edits PI/O comment information.

4.4 HI-FLOW Process Sheet Display Functions

The HI-FLOW process sheet display functions are selectable from a pull-down menu.

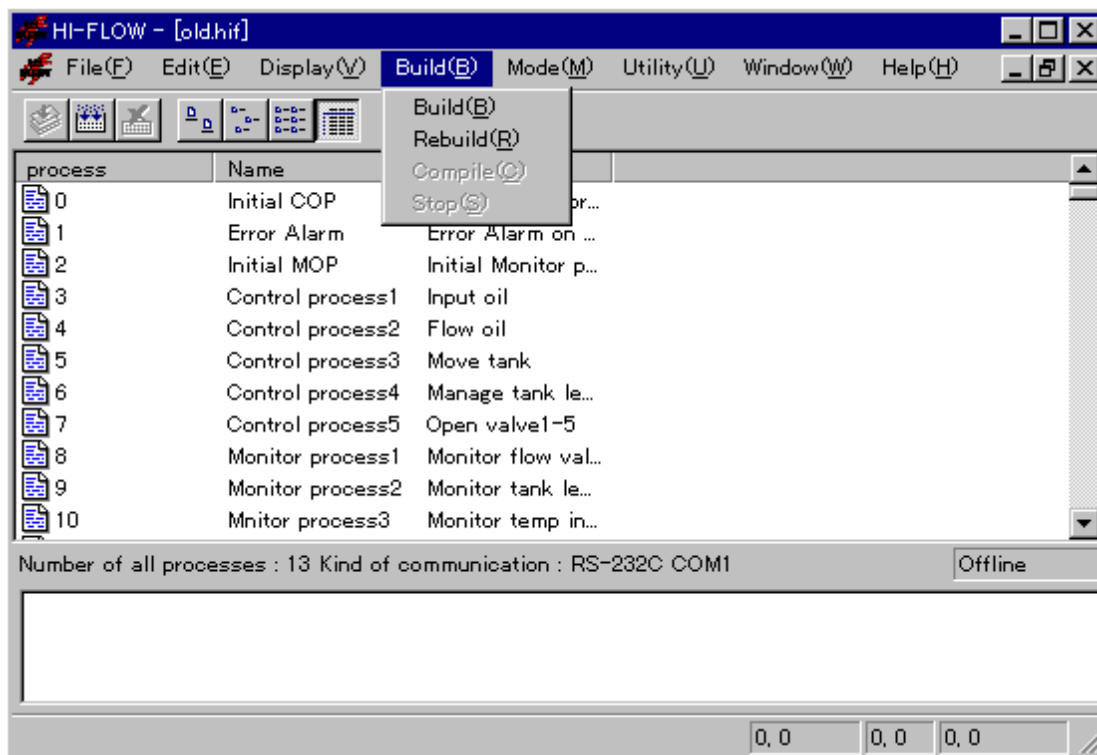


The display functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Display	Tool-bar		Displays or hides the toolbar.
2		Status-bar		Displays or hides the status bar.
3		Debug-bar		Displays or hides the debug bar.
4		Large icon		Displays a process with a large icon.
5		Small icon		Displays a process with a small icon.
6		List		Lists processes.
7		Detail		Displays a process in detail.

4.5 HI-FLOW Process Sheet Build Functions

The HI-FLOW process sheet build functions are selectable from a pull-down menu.



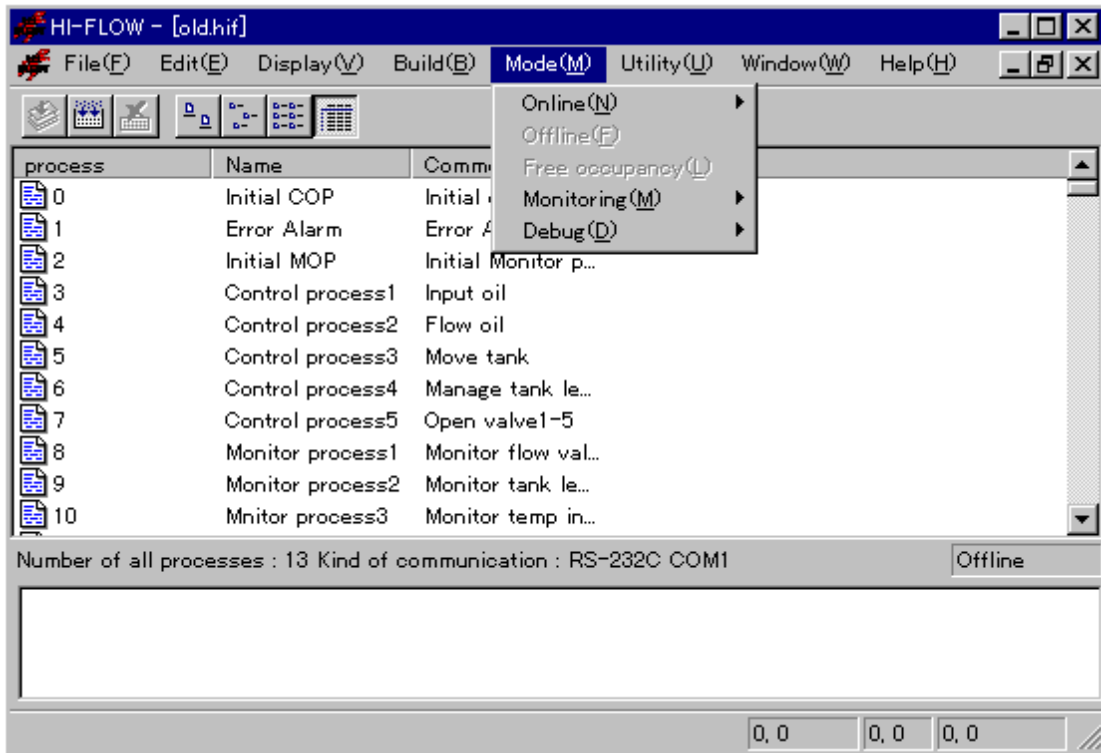
The build functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Build	Build		Compiles all processes that are not yet compiled.
2		Rebuild		Compiles all processes, regardless of whether they have already been compiled.
3		Compile		Compiles a specified process.
4		Stop		Cancels compilation.

When performing compilation, make sure that at least one process has been selected. To specify multiple processes, hold down the [Shift] or [Ctrl] key and click the HI-FLOW sheet icon.

4.6 HI-FLOW Process Sheet Mode Functions

The HI-FLOW process sheet mode functions are selectable from a pull-down menu.



The target to be edited and available functions vary, depending on which mode, offline or online, is currently enabled.

- Offline mode

Memory content in the personal computer or a file is edited.

- Online mode

Memory content in the personal computer or the file which matches that in the PCs is edited. To switch to online mode, make a match with the PCs through transmission or reception.

When the HI-FLOW system is started, it always enters offline mode. Use a pull-down menu to switch to online mode, if necessary.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

The mode functions are described below.

No.	Level 1	Level 2	Level 3		Description
1	Mode	Online	Send (PC -> S10)	All processes	Transmits all processes to the PCs and enables online mode.
2				Designated process	Transmits a designated process to the PCs and enables online mode.
3			Receive (S10 -> PC)	All processes	Receives all processes from the PCs and enables online mode.
4				Designated process	Receives a designated process from the PCs and enables online mode.
5			Unconditional	Always enables online mode.	
6		Offline	Switches to offline mode.		
7		Free occupancy	Releases the lock set by the local personal computer.		
8		Monitoring	Start monitoring	Starts monitoring.	
9			Stop monitoring	Stops monitoring.	
10		Debug	Trace	Traces and displays the operation of a process, starting when a given start condition is met and ending when a given end condition is met.	
11			Time monitor	Monitors time elapse from the time when a given start condition is met until when a given end condition is met.	
12			Breakpoint	Sets or removes breakpoints.	

Any HI-FLOW system on a network has a lock function compatible with that network. This is to prevent multiple such HI-FLOW systems from accessing the same PC simultaneously. When online mode is specified, the connected PCs are locked. The locked PCs are unlocked when the user selects the free occupancy menu.

Online mode may not be specified for the PCs that are already locked by the HI-FLOW system on another personal computer. If this happens, an error message is displayed and the specified online mode is invalidated.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.6.1 HI-FLOW four-line simultaneous monitoring function

HI-FLOW system versions 7 and later (system floppy disk versions 07-00 and later) support the four-line simultaneous monitoring function that is exercised via an Ethernet. This function enables four personal computers to conduct simultaneous HI-FLOW monitoring operations with respect to one CPU unit. For the use of this function, the monitoring HI-FLOW system (program product type: S-7890-35) is required in addition to the HI-FLOW system.

The requirements for the use of the four-line simultaneous monitoring function are indicated below with a typical configuration.

(1) Requirements

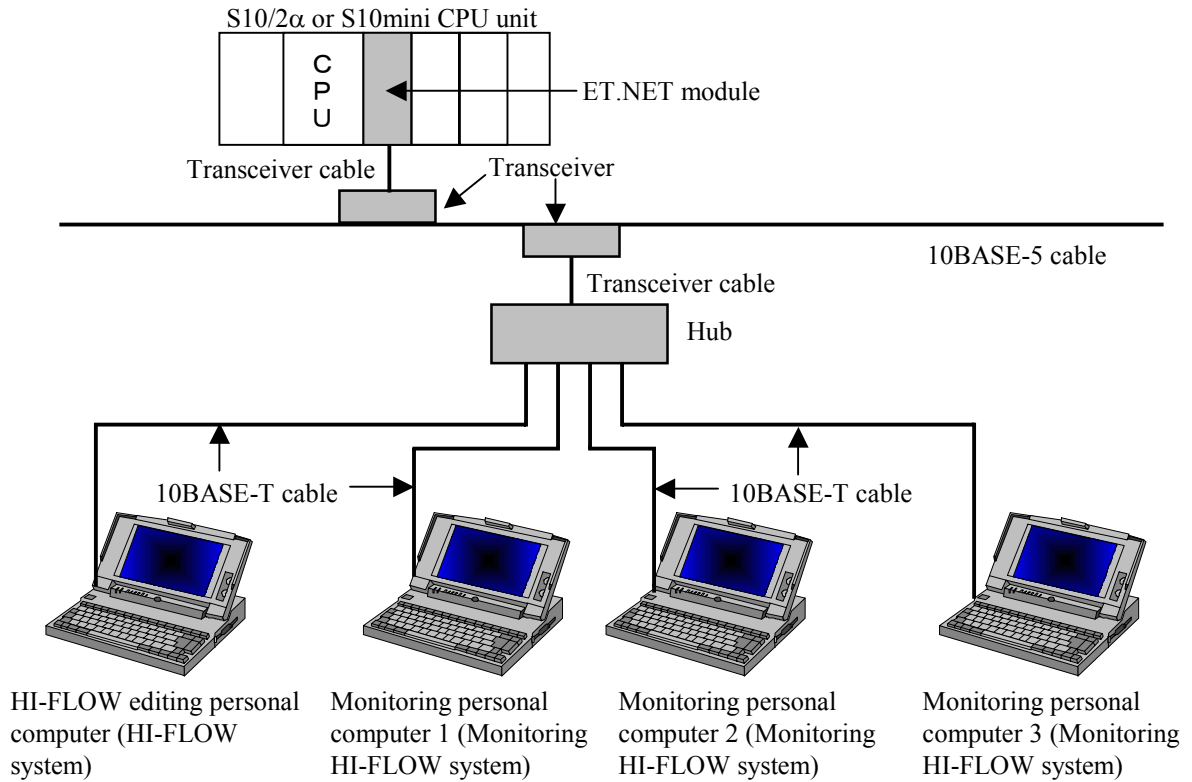
- The version of the employed ET.NET module must be as indicated below:
 - LWE550: Version 4, Revision 1 or later (2 α series)
 - LQE020: Version 3, Revision 1 or later (S10mini series)
- The PCs must be connected to personal computers via Ethernet (the function supporting this is not available if the RS-232C or GP-IB interface is used).
- The PCs must be connected to personal computers via a LAN (the function supporting this is not available through the use of a one-to-one direct connection).
- Up to four personal computers can be simultaneously connected to the PCs. However, only one HI-FLOW editing personal computer (regular HI-FLOW system) must be used. The other personal computers must be dedicated to monitoring (up to three monitoring HI-FLOW system machines can be used).

(2) Limitations

Even when two ET.NET modules (main module and submodule) are connected to one CPU unit, up to four personal computers can be connected to that CPU unit.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(3) Typical configuration



NOTE

- Use of the four-line simultaneous monitoring function requires the following version of ET.NET module:

LWE550: Version 4, Revision 1 or later (2α series)

LQE020: Version 3, Revision 1 or later (S10mini series)

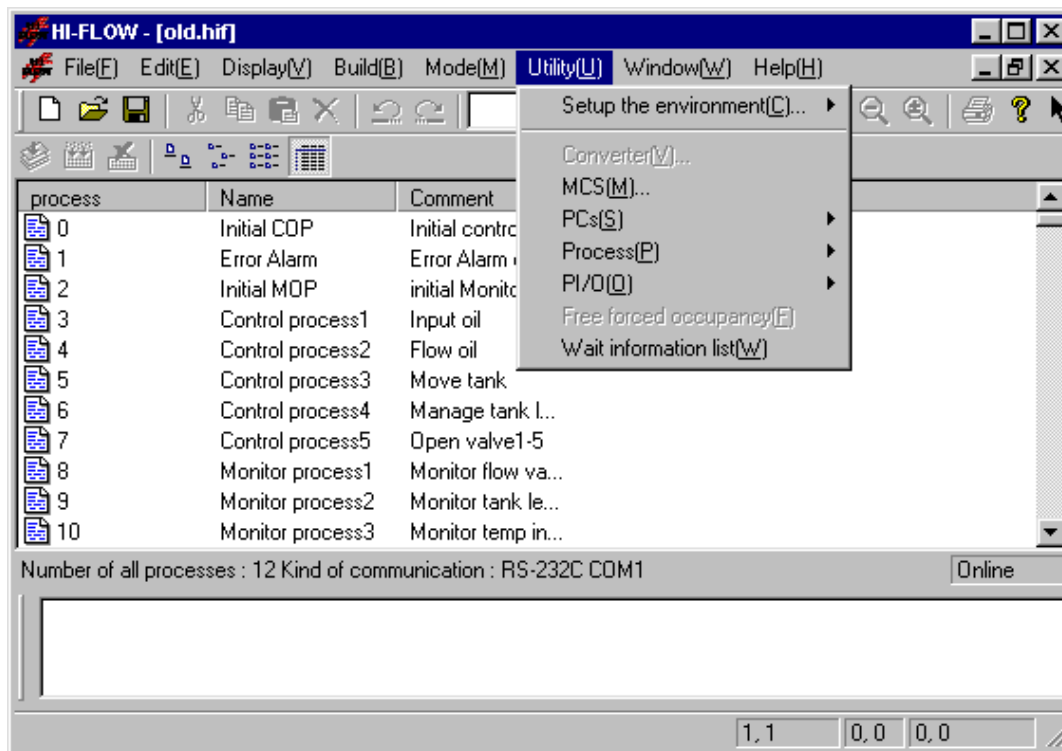
If an attempt is made to connect one CPU unit with two or more personal computers and the version of the ET.NET module employed is earlier than shown above, the following error message appears on the display to indicate that it cannot enter an on-line condition with the personal computers.



- Ladder chart system versions 7 and later also support the four-line simultaneous monitoring function. However, the number of personal computers that can be connected with one PCs unit is limited to four including the ladder chart system (the unit dedicated to monitoring is also included) and HI-FLOW system (the unit dedicated to monitoring is also included). Even when two ET.NET modules (main module and submodule) are mounted in one PCs unit, the maximum number of connectable personal computers is 4.

4.7 HI-FLOW Process Sheet Utility Functions

The HI-FLOW process sheet utility functions are selectable from a pull-down menu.



The utility functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Utility	Setup the environment	Setup Tool-bar	Sets buttons on the toolbar.
2			Setup Display position	Sets the positions where structures, labels, or comments are to be displayed by default.
3			Background color	Sets the background color to be used for a sheet in each mode.
4			Paste	Selects between the “overwrite” and “insert” modes of pasting.
5		Converter		Converts the source code created by a DOS version of the HI-FLOW system.
6		MCS		Reads or writes memory.
7		PCs	Change connection of PCs	Sets a type of communication with the PCs.
8			Change PCs status	Forcibly stops the PCs or releases the PCs from their forcibly stopped state.
9			System edition	Sets conditions and an environment required for operation on the PCs.
10			Delete process of PCs	Replaces or deletes the HI-FLOW system.
11			Layout system bits	Sets a bit-type PI/O register so as to reflect the run state on the PCs.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

No.	Level 1	Level 2	Level 3	Description	
12	Utility (continued from the previous page)	Process (continued from the previous page)	Interrelation chart of processes	Displays the correlation between processes and their names.	
13			Total Process capacity	Displays the capacity of total processes.	
14			Restart process	Forcibly restarts the processes on the PCs from their current states.	
15			Process ACT	Starts the processes on the PCs from their current states.	
16			Process RST	Resets the processes on the PCs from their current states.	
17			Process STP	Stops the processes on the PCs from their current states.	
18			Process CLR	Clears the processes on the PCs from their current states.	
19			PI/O	Delete unused PI/O	Deletes unused PI/O registers.
20			Free forced occupancy		Forcibly unlocks the PCs.
21			Wait information list		Displays a symbolic figure, syntax, or the like for a process stop step.

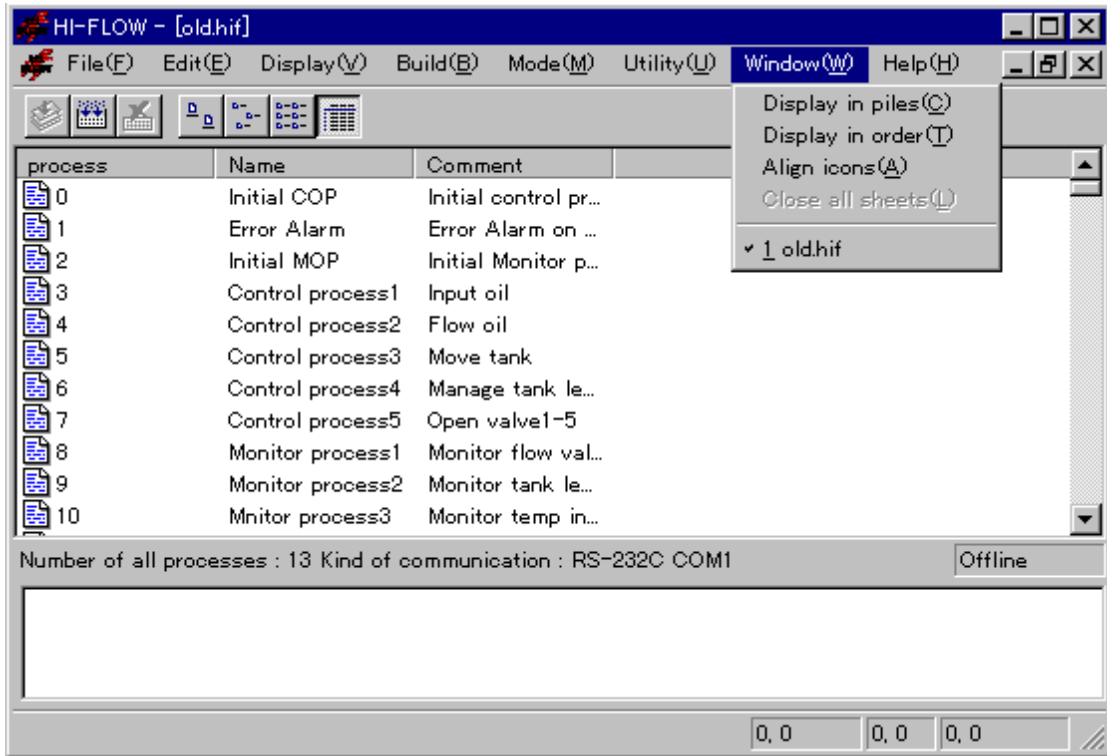
Free forced occupancy is related to the network-compatible function described in “4.6 HI-FLOW Process Sheet Mode Functions.” If the HI-FLOW system becomes disconnected for some reason from the PCs being locked by it, the PCs may be left locked and, as a result, may no longer be connected to any personal computer. In such a case, use the free forced occupancy function to forcibly release the PCs from the locked state.

NOTE

The free forced occupancy function can be executed even when another user is keeping the PCs locked. If it is executed in such a situation, the other user who has been keeping the PCs locked is not notified of the fact. This may cause multiple simultaneous accesses to the same PC in some operation. To prevent this, check for any warning message indicating that another user is keeping the PCs locked, before using the free forced occupancy function.

4.8 HI-FLOW Process Sheet Window Functions

The HI-FLOW process sheet window functions are selectable from a pull-down menu.



The window functions are described below.

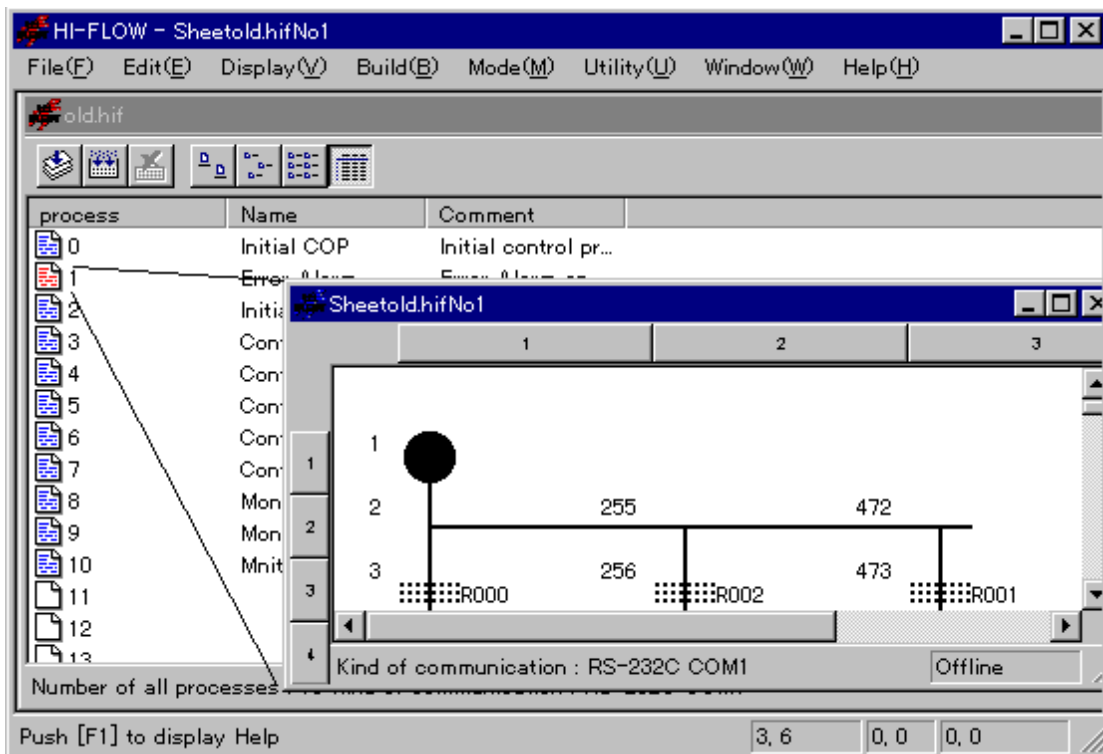
No.	Level 1	Level 2	Level 3	Description
1	Window	Display in piles		Cascades windows.
2		Display in order		Tiles windows.
3		Align icons		Arranges icons.
4		Close all sheets		Closes all process detail sheets that are currently open.
5		File names 1, 2, ...		Selects the active window.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.9 Creating HI-FLOW Sheets

HI-FLOW sheets for 256 processes are available. They are opened from HI-FLOW process sheets. To open a HI-FLOW sheet, double-click the sheet icon on the HI-FLOW process sheet. Write a HI-FLOW program on the HI-FLOW sheet and save it. The HI-FLOW sheet will then be registered on the HI-FLOW process sheet.

<HI-FLOW process sheet and HI-FLOW sheet>



<HI-FLOW symbol bar>



The HI-FLOW symbol bar contains the following symbols, which are listed as arranged on the bar from left to right.

- Start process
- Terminate process
- Wait
- Box
- Control box
- Call
- Parallel start
- Parallel end
- Start of route
- Termination of route
- Select
- Cell end
- Cell wait
- If
- Jump
- Escape
- Start of repeat
- Termination of repeat
- Function
- Clear wait

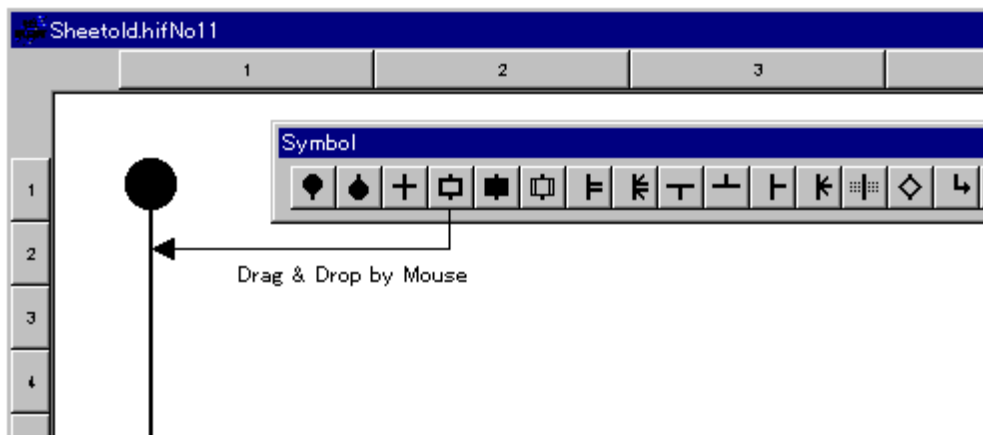
4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.9.1 Pasting HI-FLOW symbols

There are several methods of pasting HI-FLOW symbols to sheets. Select the desired method from among those listed below.

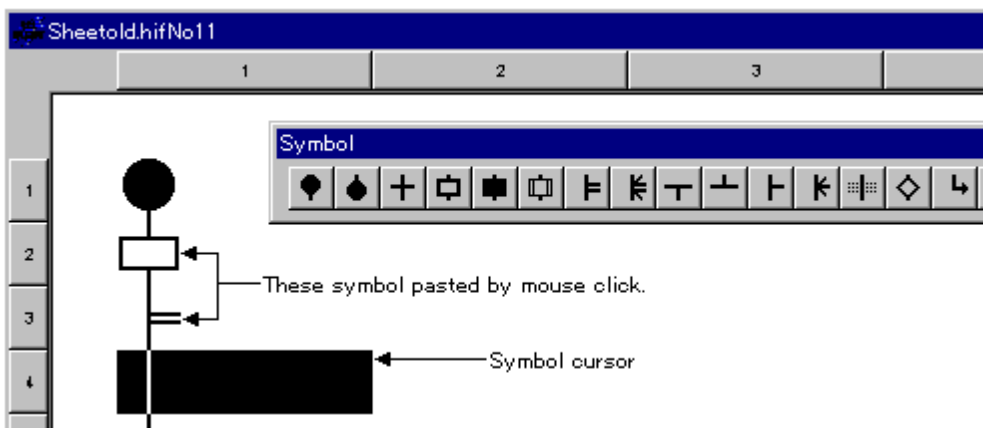
(1) Drag-and-drop with the mouse

Drag the desired symbol from the symbol bar to the position where to paste the symbol, and drop the symbol.





(2) Pasting at the input cursor position with the mouse

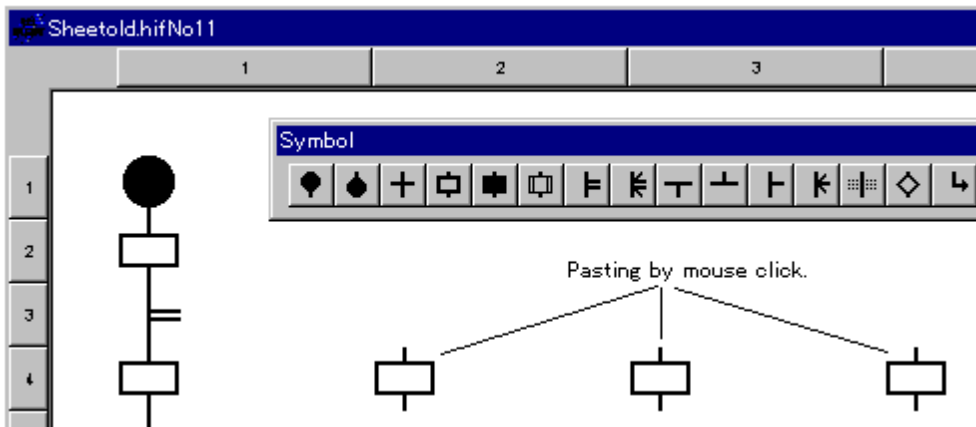
Click the desired symbol on the symbol bar. The symbol will then be pasted at the symbol cursor position.



4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(3) Repetitive inputs of a specified symbol with the mouse

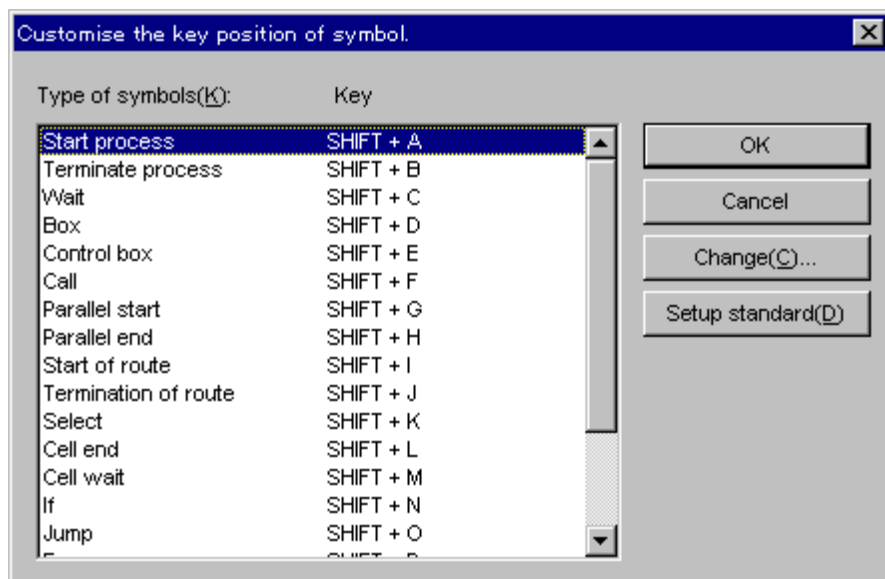
Select  (repetitive) from the edit bar. The specified symbol can then be input repeatedly. Click the position on the sheet into which to paste the symbol. The symbol will then be pasted into that position. To cancel repetitive inputs, select  (repetitive) again from the edit bar.



(4) Pasting with keys

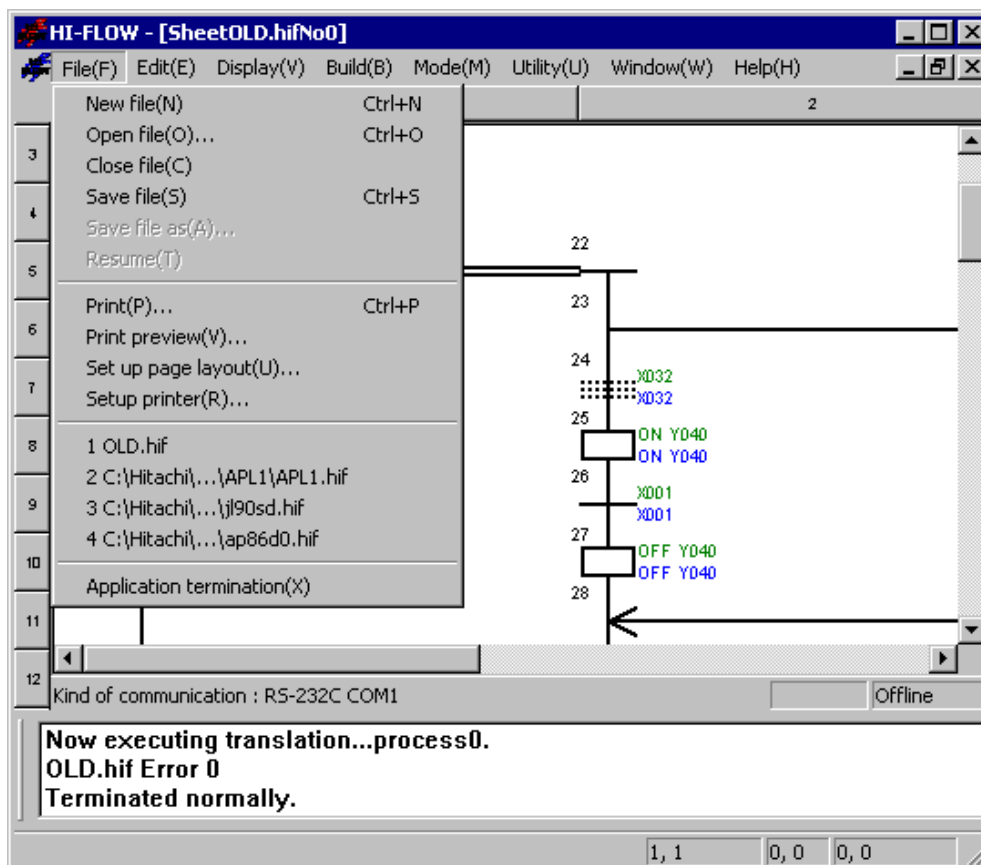
A symbol can be pasted by a specified combination of key strokes at the symbol cursor position on the sheet. To move the symbol cursor, use the [\leftarrow], [\rightarrow], [\uparrow], and [\downarrow] arrow keys. Key strokes can be customized by selecting [Utility] menu – [Keyboard].

<[Customize the key position of symbol.] window>



4.10 HI-FLOW Sheet File Functions

The file functions for HI-FLOW sheets are selectable from a pull-down menu.



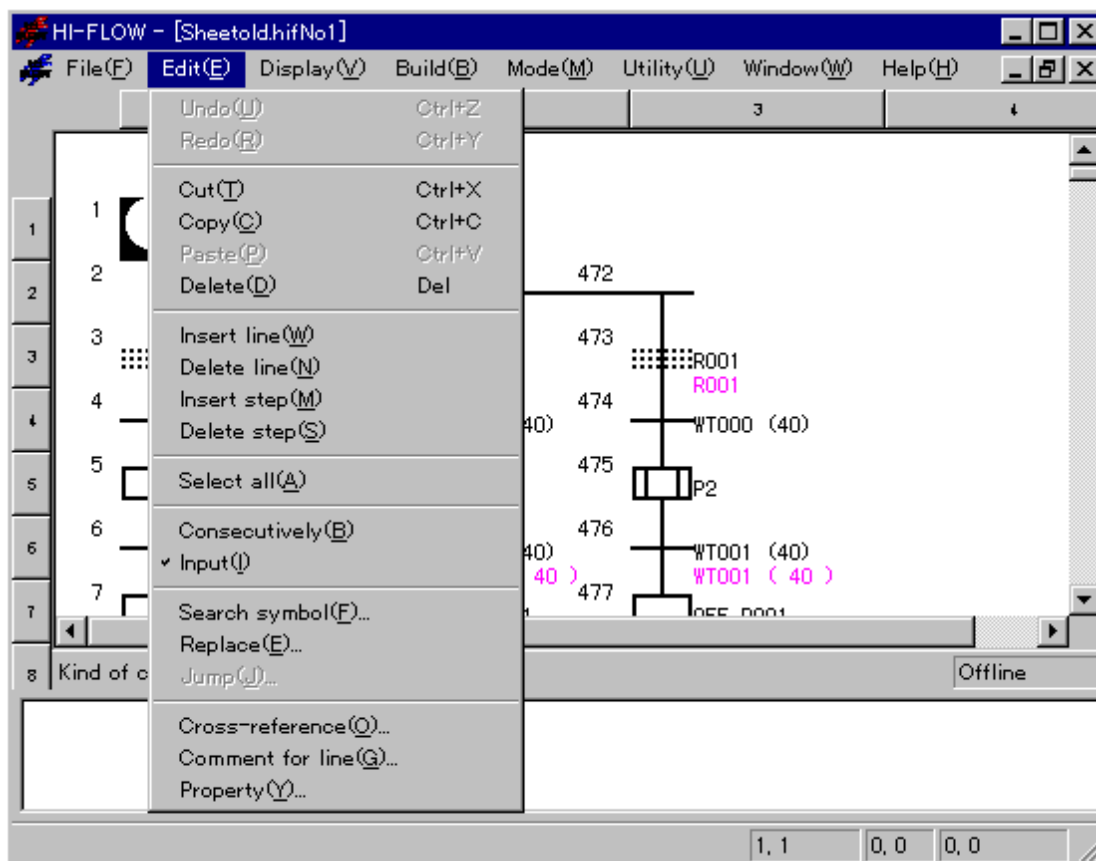
The file functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	File	New file		Opens a window to create a new program.
2		Open file		Reads a specified program file.
3		Close file		Closes the window currently active.
4		Save file		Overwrites and saves program data and comment data in the window currently active.
5		Save file as		Saves program data in the window currently active as a different name.
6		Resume		Restores a window to the state that existed when it was opened.
7		Print		Sets a range of image data to be printed, a printer, and other parameters, and then prints the image data.
8		Print preview		Displays a print image on the screen.
9		Set up page layout		Sets a page layout.
10		Setup printer		Sets up a printer.
11		File names 1, 2, 3, 4, ...		Displays the names of files that were used before.
12		Application termination		Terminates the HI-FLOW system.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.11 HI-FLOW Sheet Edit Functions

The HI-FLOW sheet edit functions are selectable from a pull-down menu. The edit functions described in this section apply to HI-FLOW programs. Steps, lines, symbols, and structures can be copied or deleted on HI-FLOW sheets.



The edit functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Edit	Undo		Reverses the last action.
2		Redo		Reexecutes the action canceled by Undo.
3		Cut		Removes the data in a specified range and copies it to the clipboard.
4		Copy		Copies the data in a specified range to the clipboard.
5		Paste		Copies data from the clipboard to a specified position.
6		Delete		Clears the data in a specified range.
7		Insert line		Inserts a line on the sheet.
8		Delete line		Deletes a specified line.
9		Insert step		Inserts one step on the sheet.
10		Delete step		Deletes a specified step.
11		Select all		Selects all items.
12		Consecutively		Draws a specified symbol repeatedly.
13		Input		Opens a input window when a symbol is accepted.
14		Search symbol		Moves the cursor to a specified symbol.

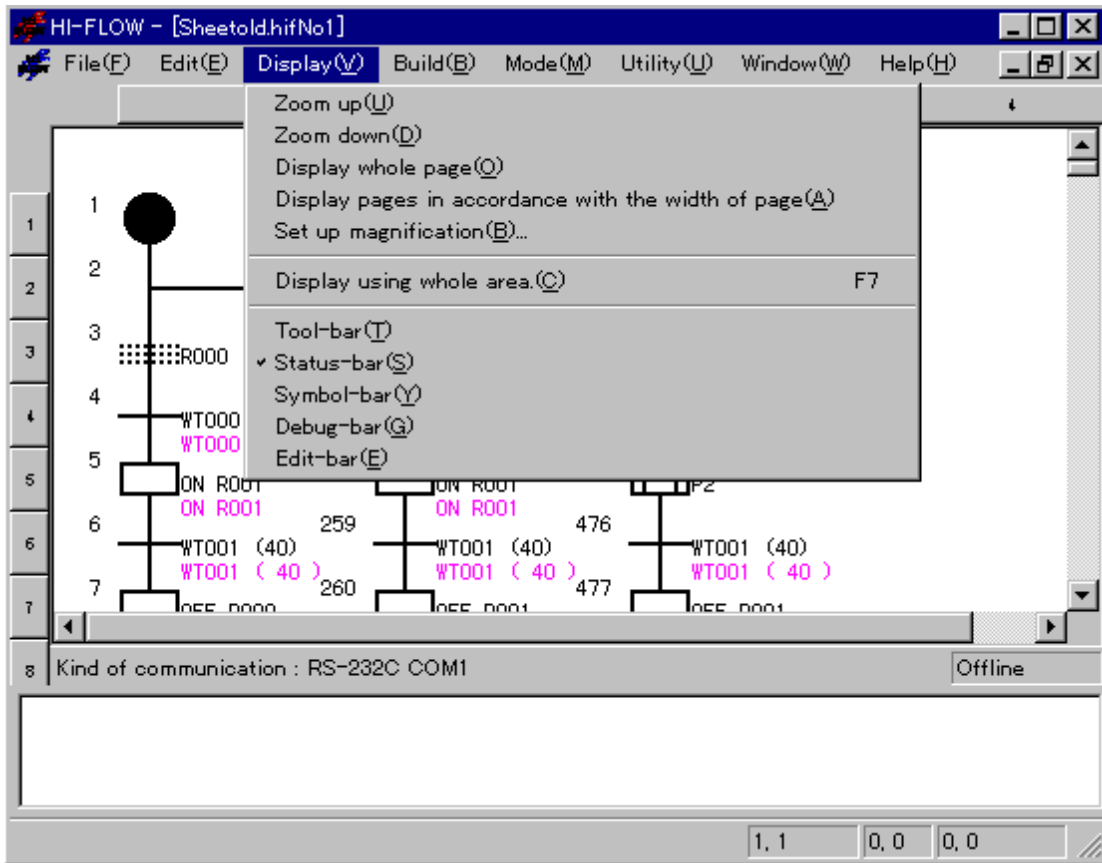
4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

No.	Level 1	Level 2	Level 3	Description
15	Edit	Replace		Replaces a specified structure.
16	(continued	Jump		Moves the cursor to a specified step.
17	from the	Cross-reference		Searches for symbol information of a specified process.
18	previous	Comment for line		Copies a symbol structure to a comment.
19	page)	Property		Sets sheet properties.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.12 HI-FLOW Sheet Display Functions

The HI-FLOW sheet display functions are selectable from a pull-down menu.



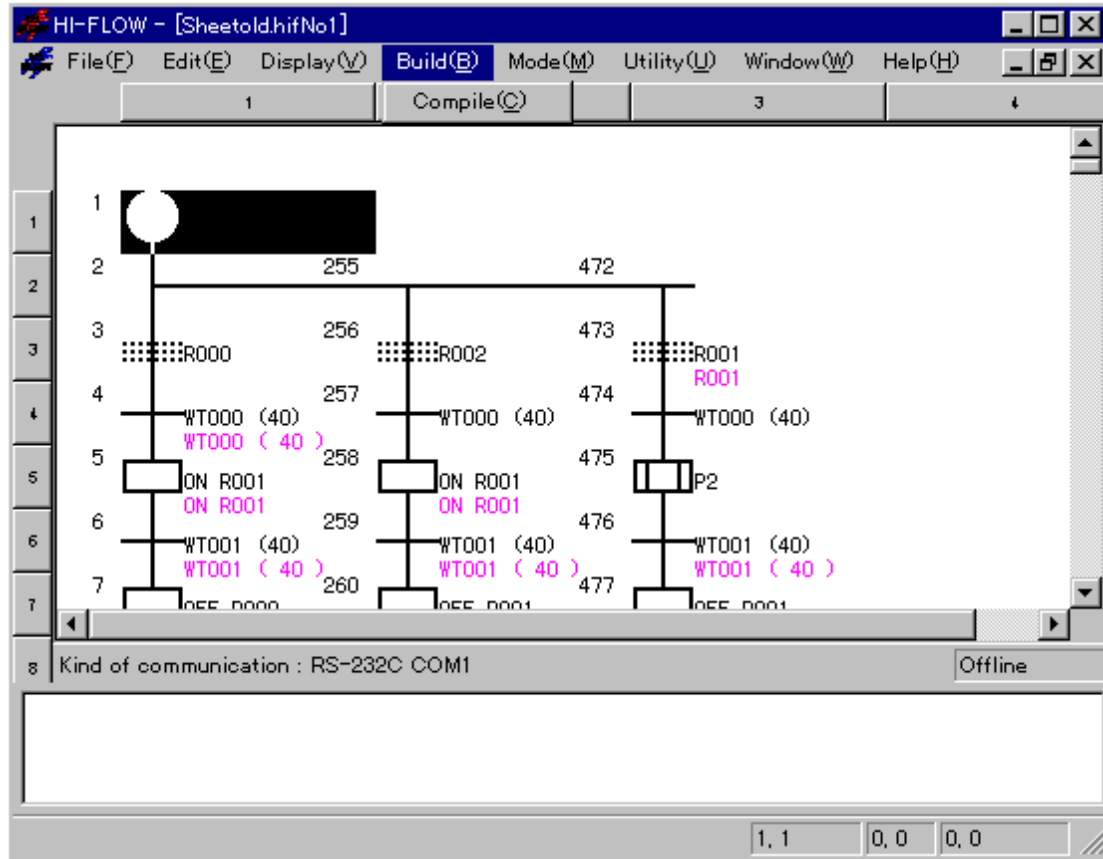
The display functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Display	Zoom up		Enlarges a page.
2		Zoom down		Contracts a page.
3		Display whole page		Displays an entire page.
4		Display pages in accordance with the width of page		Displays a page according to the page width.
5		Set up magnification		Sets a percentage of actual size.
6		Display using whole area		Displays a page using the entire screen.
7		Tool-bar		Displays or hides the toolbar.
8		Status-bar		Displays or hides the status bar.
9		Symbol-bar		Displays or hides the symbol bar.
10		Debug-bar		Displays or hides the debug bar.
11		Edit-bar		Displays or hides the edit bar.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.13 HI-FLOW Sheet Build Function

The HI-FLOW sheet build function is selectable from a pull-down menu.



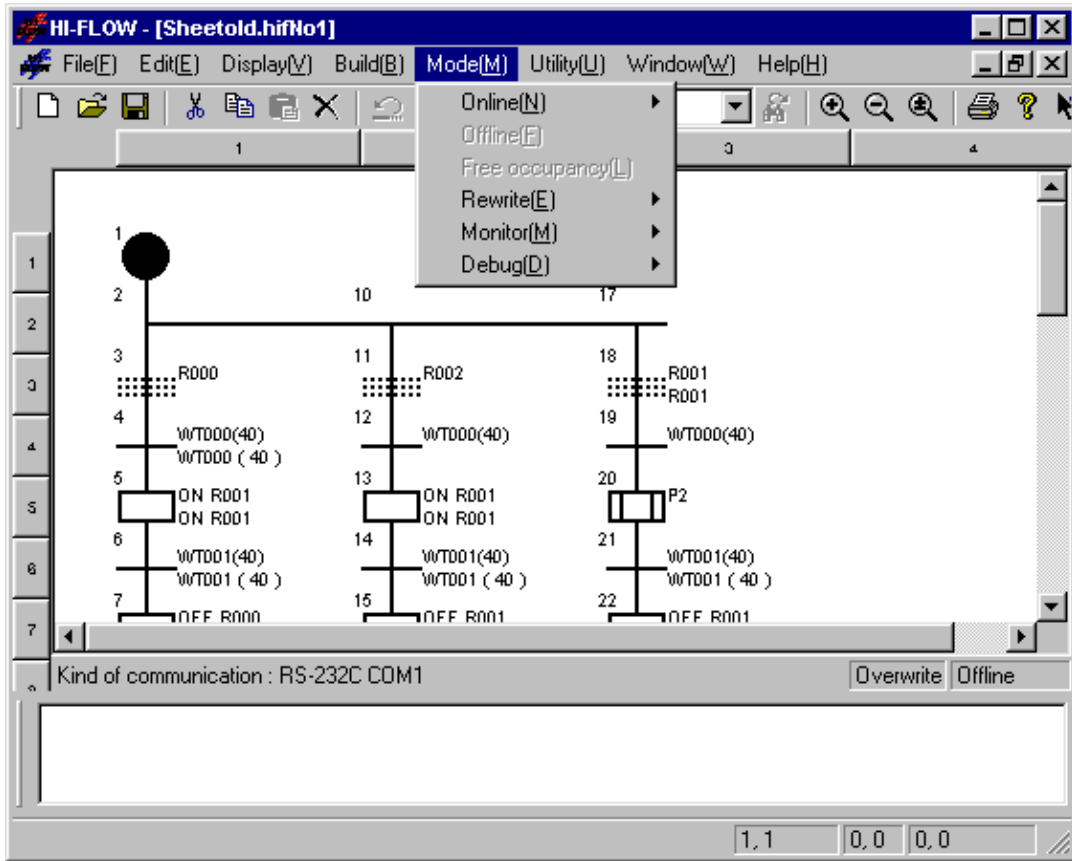
The build function is described below.

No.	Level 1	Level 2	Level 3	Description
1	Build	Compile		Performs compilation.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.14 HI-FLOW Sheet Mode Functions

The HI-FLOW sheet mode functions are selectable from a pull-down menu.



The mode functions are described below.

No.	Level 1	Level 2	Level 3	Description	
1	Mode	Online	Send (PC -> S10)	Transmits a process to the PCs and enables online mode.	
2			Receive (S10 -> PC)	Receives a process from the PCs and enables online mode.	
3			Unconditional	Always enables online mode.	
4		Offline		Switches to offline mode.	
5		Free occupancy		Releases the lock set by the local personal computer.	
6		Rewrite		Step	Rewrites the program contents stored in the PCs (the syntax/comments in a step are the target).
7				Process	Rewrites the program contents stored in the PCs (all items within a process are the target).
8		Monitor		Start monitoring	Starts monitoring.
9				Stop monitoring	Stops monitoring.
10				Step	Monitors the passing from step to step.
11				Token	Monitors tokens.
12				I/O	Monitors the setting and resetting of bits.
13			Clear	Initializes the maintained trace of execution.	

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

No.	Level 1	Level 2	Level 3	Description
14	Mode (continued from the previous page)	Debug	Trace	Traces and displays the operation of a process, starting when a given start condition is met and ending when a given end condition is met.
15			Time monitor	Monitors time elapse from the time when a given start condition is met until when a given end condition is met.
16			Breakpoint	Sets or removes breakpoints.
17			Execution point	Moves the cursor to an execution point.

Any HI-FLOW system on a network has a lock function compatible with that network. This is to prevent multiple such HI-FLOW systems from accessing the same PC simultaneously. When online mode is specified, the connected PCs are locked. The locked PCs are unlocked when the user selects the free occupancy menu.

Online mode may not be specified for the PCs that are already locked by the HI-FLOW system on another personal computer. If this happens, an error message is displayed and the specified online mode is invalidated.

4.14.1 Overview of a rewrite during a run

In marked contrast to the other functions, the run-time rewrite function can seriously affect the plant facilities, depending on its use. Therefore, this function is particularly explained below in detail.



CAUTION

The run-time rewrite function for a HI-FLOW program can seriously affect the plant facilities depending on its use. If you are not familiar with the HI-FLOW program processes, do not attempt to rewrite during a run but rewrite while the CPU is stopped.

(1) Functionality

This function enables you to rewrite a HI-FLOW program during a run (i.e., during an on-line condition). This run-time rewrite function offers three functions: step rewrite, process rewrite, and register value rewrite.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(2) Run-time rewrite function overview

- Step rewrite

If the [Rewrite] – [Step] is selected from the [Mode] menu, it will be in a step rewriting state. Again, if the [Rewrite] – [Step] is selected from the [Mode] menu, a step rewriting state will be canceled.

The step rewrite function allows you to rewrite the syntax used in a step. However, it does not enable you to rewrite the syntax in such a manner as to increase its size or the size of comments.

- Process rewrite

If the [Rewrite] – [Process] is selected from the [Mode] menu, it will be in a process rewriting state. Again, if the [Rewrite] – [Process] is selected from the [Mode] menu, a process rewriting state will be canceled.

The process rewrite function is newly offered by Version 7. It offers all the editing functions that can be exercised in an off-line condition, such as step size increase, step addition, and step deletion.

- Register value rewrite

This function permits you to change a register value within a HI-FLOW program in an on-line condition. If a symbol is double-clicked at the time of online, the list of the registers currently used as the applicable symbol is displayed, and the value of a register can be changed.

(3) Limitations

- Step rewrite

The step rewrite function does not perform a rewrite in such a manner as to increase the size of the syntax or comments within a step.

- Process rewrite

- When the process rewrite function is exercised, no limitations are imposed on editing within a process detail window. However, you cannot change the right of interaction with a detail window or a list window.

- Version 7 does not allow you to set the run-time rewrite mode during the monitoring or debugging state.

- Register value rewrite

Register values cannot be rewritten in an off-line condition or process rewrite mode.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(4) Program execution state synchronization in process rewrite mode

When the following conditions are met, the process rewrite mode achieves synchronization with the HI-FLOW program status prevailing before a rewrite.

If the conditions are not met, process initialization takes place (by clearing the process execution state and then executing from the beginning of the process [in the same manner as for a process restart]).

<Synchronization conditions>

- No symbolic figure for a program is added, deleted, or changed.
- No label (label or free label) is added, deleted, or changed (jump source changes are allowable).
- No addition, deletion, or change is made to the route structure.



CAUTION

- No monitoring or debugging process can be performed in the run-time rewrite mode for a HI-FLOW program.
- Even if a rewrite is performed during a run, the PI/O register status remains unchanged. Therefore, do not perform a run-time rewrite until you have given adequate consideration to resulting program operations.
- If one or more calling processes exist in a process rewritten in the process rewrite mode, they (nesting processes included) reset.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(5) Timer/loop counter processing after a process rewrite

Timer/loop counter processing after a process rewrite is described below. Timer/loop counter processing is performed as described below no matter whether the synchronization conditions stated in (4) above are met.

- A parallel timer (PTXXX) or wait timer (WTXXX) used within a rewritten process resets (i.e., the elapse value reaches 0 and invokes a timer stop) without regard to the process startup conditions (TUP, TRS, or unspecified). The status of a specified PI/O register for a parallel timer remains the same as before a rewrite. When control stays at a wait timer and the synchronization conditions are met, a counting sequence starts again from 0.
- If a loop counter (CNXXX) is already running within a rewritten process, it unconditionally resets. (i.e., the elapse value is automatically set equal to its set final value.) As a result, it exits the loop when a loop check is conducted after a rewrite. It means that the loop comes to an end when the synchronization conditions are met upon a process rewrite in situations where control stays between the loop start and loop end.
- If a box symbol is used in an ON statement within a rewritten process with MRST selected as a process startup condition, the register(s) used in the ON statement are cleared except when no such registers are specified.
- If the CALL symbol is used within a rewritten process, the called process is executed starting from its beginning after a rewrite. Timers and loop counters at the call destination and register(s) in the ON statement are processed in accordance with CALL startup conditions. A parallel timer within the called process is retained if the call specifies nothing. Therefore, a wait state continues until an unrewritten timer is freed. To avert such a wait state, it is necessary to place a call with TRS or TUP specified. The elapse value of a wait timer or loop counter is retained if the call specifies nothing. However, a counting sequence starts from 0 upon reexecution.

Example:

Process name	Processing	Description
P0	ACT P1, MRST, TUP	The P0 performs a master reset/timeout startup of the P1.
P1	ON MFF0 CALL P2	The P1 issues a master reset call to the P2.
P2	ON Y000	(Execution in progress)

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

<User operation>

Rewriting the P1 process, compiling it, and transmitting it. (See “(7) Procedures for performing a rewrite during a run.”)

<Internal process>

- Since the P1 is started in MRST mode, the MFF0 of the P1 resets. (i.e., it is cleared to 0.) However, the Y000 of the P2 remains unchanged.
- When a timer is used by the P1, a timer reset process is performed without regard to the TUP selection for the P0 (caller’s route process). When a timer is used by the P2, a reset process is not performed.

The list below shows the possible timer, loop counter, and PI/O register states prevailing after a process rewrite.

<List of the possible timer and loop counter states prevailing after a process rewrite>

	Process startup condition	Timer/loop counter state
Process rewritten	Unspecified	An unconditional reset is performed. (The parallel timer stops. The wait timer restarts counting from 0. The elapse value of the loop counter is set equal to its set final value so as to exit the loop.)
	TUP	
	TRS	
Called process	Unspecified	The elapse value remains unchanged. The following occurs upon reexecution. Parallel timer : Maintains a wait state until the unrewritten timer times out. Wait timer : Starts counting again from 0. Loop counter : Starts counting again from 0.
	TUP	Times out.
	TRS	Resets.

<List of the possible PI/O register states prevailing after a process rewrite>

	Process startup condition	PI/O register state
Process rewritten	Unspecified	Retains the state that prevailed before a rewrite.
	MRST	Clear to 0.
Called process	Unspecified	Retains the state that prevailed before a rewrite.
	MRST	Clear to 0.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

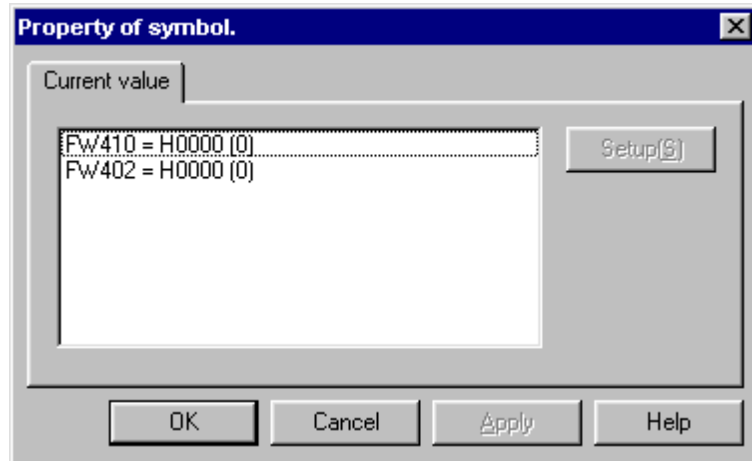
- (6) Breakpoint-setting process in process rewrite mode
Performing a process rewrite deletes all set breakpoints without regard to the selection of the synchronization option or the occurrence of a break.
- (7) Procedures for performing a rewrite during a run
- Step rewrite
 - ① With the process detail window open in an on-line condition, select [Mode] menu – [Rewrite] – [Step].
 - ② Select the step to be rewritten.
 - ③ The [Property of symbol.] dialog box is displayed.
 - ④ The [Property of symbol.] dialog box allows you to edit the syntax and comments. Use the same editing procedures as in an off-line condition.
 - ⑤ After completion of a rewrite, click the button in the dialog box. The system then automatically performs compilation and transmission processes.
 - Process rewrite
 - ① With the process detail window open in an on-line condition, select [Mode] menu – [Rewrite] – [Process].
 - ② You can rewrite a target symbolic figure or syntax (see NOTE below). Use the same procedure as in an off-line condition.
 - ③ After completion of a rewrite, select [Build] menu – [Compile].
 - ④ Select [Mode] menu – [Online] – [Send].

NOTE
The process rewrite procedure differs from the step rewrite procedure. Exercise due care not to perform an incorrect procedure.

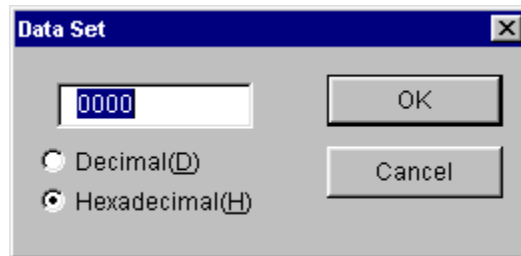
4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

- Register value rewrite

- ① Double-click a symbol in an on-line condition. The system then displays the [Property of symbol.] dialog box in the on-line condition.



- ② Double-click the register whose value is to be rewritten. The [Data Set] dialog box is displayed.

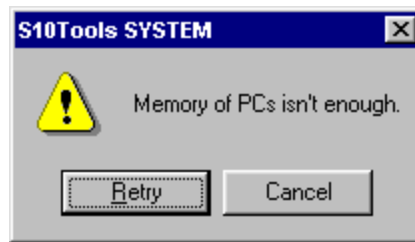


- ③ Enter a value and then click the **OK** button.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(8) Remedies for memory insufficiency during a run-time rewrite

An unoccupied HI-FLOW user program area on the PCs side is used to perform a rewrite while a HI-FLOW program is running. (The user program area is an area that is specified from [System edition], which can be accessed by selecting [PCs] from [Utility].) Therefore, if an attempt is made to perform a run-time rewrite repeatedly, the following message may be displayed to indicate memory insufficiency.



When the above message is displayed, you can achieve recovery from memory insufficiency by sending all processes to the PCs as directed below. To achieve recovery, however, you must stop the PCs.

- ① Stop the PCs.
- ② Place the PCs and HI-FLOW system in an off-line condition (by selecting [Mode] and then [Offline]).
- ③ Send all processes to the PCs (by selecting [Mode] menu, [Online], [Send], and then [All processes]).
- ④ Start the PCs.

If you do not want to stop the PCs, you should define an extra-large user program area beforehand from [System edition].

If the above procedure does not remedy the memory insufficiency problem on the PCs side, you must extend the user program area or add extended memory.

4.14.2 Process execution after a run-time rewrite

A synchronization process is performed in some run-time rewrite operations and not in the others. This section explains about risks in various run-time rewrite operations.

(1) Synchronization process execution

The synchronization process is performed when all the following conditions are met.

<Synchronization conditions>

- No symbolic figure of a program is added, deleted, or changed.
- No label (label or free label) is added, deleted, or changed.
- No addition, deletion, or change is made to the route structure.

The synchronization process is significant when control stays in the process to be rewritten during a run. More specifically, it means that the location (step) at which control stays in an unrewritten process is retained even after the process is rewritten. Therefore, it involves the following risks.

- The stop conditions can be rewritten. Therefore, a previously unexecuted process may be executed, in which case there may occur a facility malfunction or, in a worse case, an accident.
- The stop conditions can be rewritten. Therefore, a previously executed process may be left unexecuted, in which case there may occur a facility synchronization failure.
- The control process numbers, which are the ACT, RST, STP, and CLR parameters for the control box, can be changed. Therefore, there may occur a facility malfunction or, in a worse case, an accident.
- A process to be called in the control box can be changed. Therefore, there may occur a facility malfunction or, in a worse case, an accident.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

(2) Initialization process execution

The initialization process is executed when any of the following conditions is met:

<Initialization conditions>

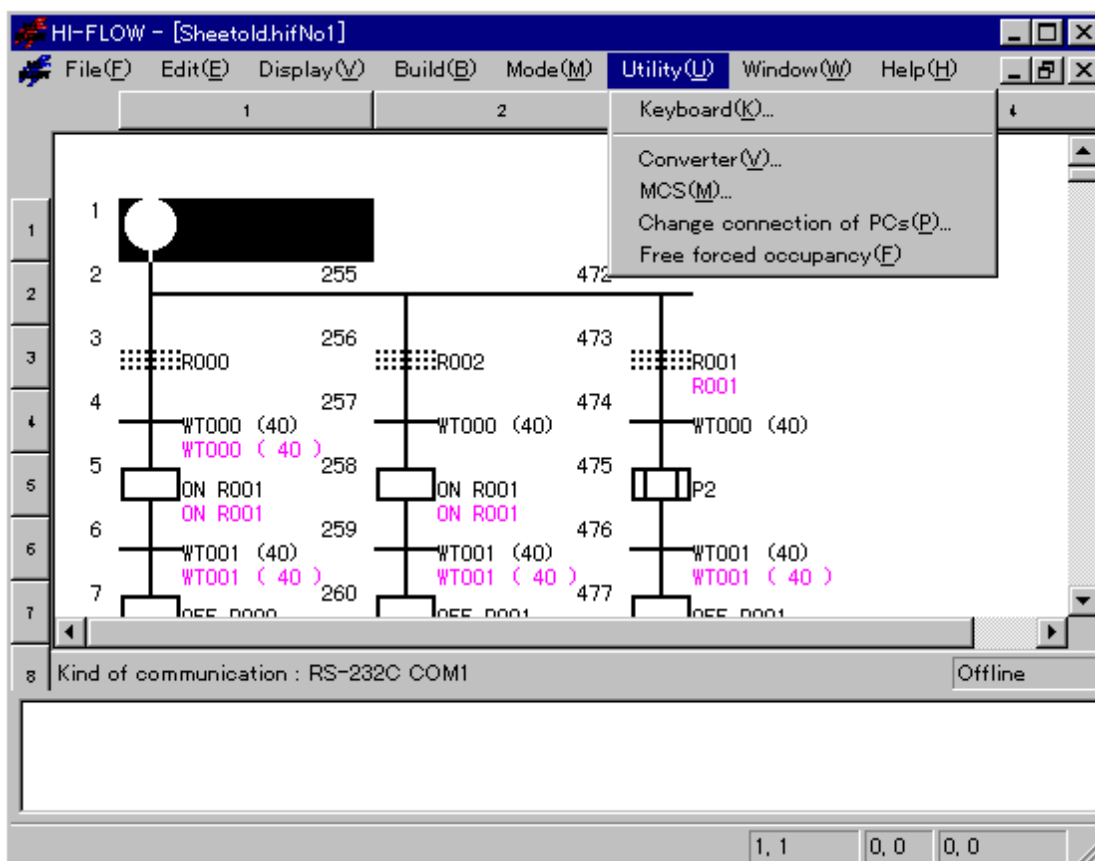
- A symbolic figure of a program is added, deleted, or changed.
- A label (label or free label) is added, deleted, or changed.
- An addition, deletion, or change is made to the route structure.

The initialization process is significant when control stays in the process to be rewritten during a run. More specifically, it means that execution starts from the beginning of a rewritten process without regard to the location (step) at which control stays in an unrewritten process. Therefore, it involves the following risk.

- Since execution starts from the beginning of a process, a synchronization failure may occur with respect to another process, resulting in an accident.

4.15 HI-FLOW Sheet Utility Functions

The HI-FLOW sheet utility functions are selectable from a pull-down menu.



The utility functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Utility	Keyboard		Assigns short-cut keys for symbol entry from the keyboard.
2		Converter		Converts the source code created by a DOS version of the HI-FLOW system.
3		MCS		Reads or writes memory.
4		Change connection of PCs		Sets a type of communication with the PCs.
5		Free forced occupancy		Forcibly unlocks the PCs.

Free forced occupancy is related to the network-compatible function described in “4.14 HI-FLOW Sheet Mode Functions.” If the HI-FLOW system becomes disconnected for some reason from the PCs being locked by it, the PCs may be left locked and, as a result, may no longer be connected to any personal computer. In such a case, use the free forced occupancy function to forcibly release the PCs from the locked state.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

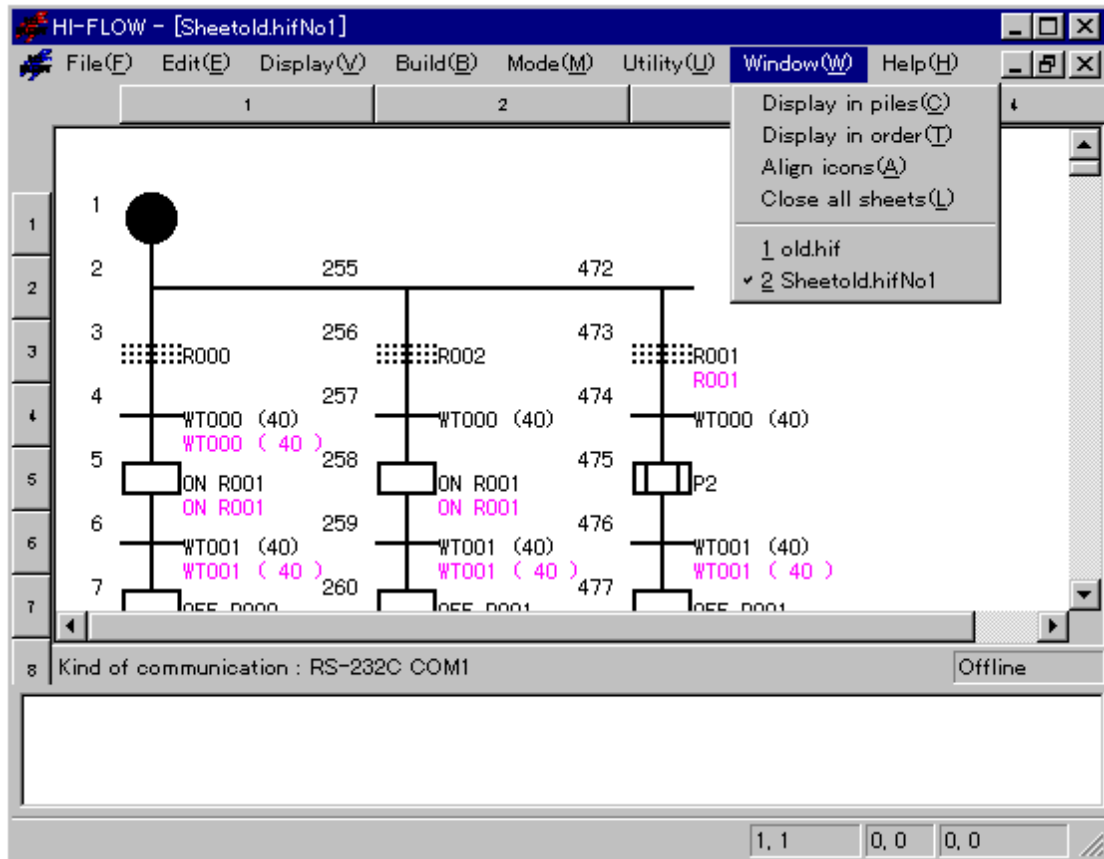
NOTE

The free forced occupancy function can be executed even when another user is keeping the PCs locked. If it is executed in such a situation, the other user who has been keeping the PCs locked is not notified of the fact. This may cause multiple simultaneous accesses to the same PC in some operation. To prevent this, check for any warning message indicating that another user is keeping the PCs locked, before using the free forced occupancy function.

4 HI-FLOW PROCESS SHEET AND HI-FLOW SHEET FUNCTIONS AND THEIR USE

4.16 HI-FLOW Sheet Window Functions

The HI-FLOW sheet window functions are selectable from a pull-down menu.



The window functions are described below.

No.	Level 1	Level 2	Level 3	Description
1	Window	Display in piles		Cascades windows.
2		Display in order		Tiles windows.
3		Align icons		Arranges icons.
4		Close all sheets		Closes all process detail sheets that are currently open.
5		File names 1, 2, ...		Selects the active window.