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Cat. No. V034-E1-5

NT30/30C
Programmable Terminal

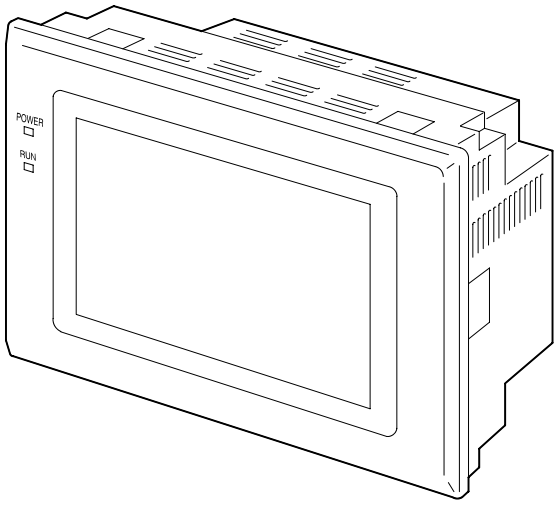
OPERATION MANUAL

OMRON

NT30/30C Programmable Terminal

Operation Manual

Revised January 2001



Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

The abbreviation “host” means a controller, such as an FA computer, that controls a PT (Programmable Terminal).

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

Reference Indicates supplementary information on related topics that may be of interest to the user.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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About this Manual:

This manual describes the basic functions and operating procedures of the NT-series NT30/30C Programmable Terminals and their operation when connected to a PC or other host. It includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate an NT-series NT30/30C Programmable Terminal.

Section 1 describes the operating functions, system configuration, and the direct connection function of the NT30/30C.

Section 2 describes the hardware settings, installation to a control panel, connection to optional devices and connection to a PC.

Section 3 describes the procedure to follow before using the NT30/30C, installation of optional devices, and convenient functions when using the NT30/30C. Also includes information such as how to check NT30/30C operation.

Section 4 describes the functions of the NT30/30C when it is connected to a PC.

Section 5 describes how to use the NT30/30C when it is connected to the PC using a Host Link or NT Link.

Section 6 describes the corrective action to take when the system does not operate normally, and how to carry out daily maintenance of the NT30/30C.

The ***Appendices*** provide information on specifications, dimensions using an RS-232C/RS-422A Link Adapter, NT30/30C internal processing, making the cable to connect to a PC, connecting cable specifications, connection using an RS-232C/RS-422A Link Adapter, standard models, options, PC memory maps, and special characters.

Related Manuals:

Related manuals are listed below. Suffixes have been omitted from the catalog numbers. Be sure you are using the correct revision of the manual.

Purpose	Name	Contents	Cat. No.
Operating the Programmable Terminal and communicating with the host	NT30/30C Programmable Terminal Operation Manual (this manual)	This is the manual for the NT30/30C itself. This operation manual describes the functions and handling of both the Programmable Terminal and the host interface function.	V034
Creating and transferring screen data	NT-series Support Tool Operation Manuals	The screens displayed on the NT30/30C are created with the Support Tool and transferred to the NT30/30C. These manuals describe how to create and transfer screen data.	V028 and V061

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the Programmable Terminal.

The information contained in this section is important for the safe and reliable application of the Programmable Terminal. You must read this section and understand the information contained before attempting to set up or operate a Programmable Terminal.

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1 Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

2 General Precautions

The user must operate the PT according to the performance specifications described in the operation manuals.

Before using the PT under conditions that are not described in the manual or applying the PT to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the PT are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.
This manual provides information for using the Programmable Terminal. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

- If a faulty PT is returned for repairs, write as detailed a description of the fault as possible and send the description together with the PT to the OMRON address indicated on the back cover of this book.
- When disposing of an NT that is no longer required, be sure to comply with all local restrictions that apply to its disposal.

⚠ WARNING It is extremely important that Programmable Terminals and related devices be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your OMRON representative before applying Programmable Terminals to the above mentioned applications.

⚠ WARNING Do not use input functions such as PT touch switches for applications where danger to human life or serious damage is possible, or for emergency switch applications.

3 Safety Precautions

Read these safety precautions carefully and make sure you understand them before using the Programmable Terminal so that you can use it safely and correctly.

⚠ WARNING

- Never attempt repairs, modification or disassembly. You could sustain an electric shock.
- Switch OFF the PT power before changing the backlight. You could sustain an electric shock if you attempt to change the backlight while power is being supplied.

⚠ Caution

- When disposing of a used backlight, comply with all local restrictions that apply to its disposal.
- When replacing the battery, do not allow the battery terminals to touch the board in the PT.
- If not backed up by the built-in battery, the memory switch settings will be initialized to the values set with the NT-series Support Tool when the power is turned OFF. If a message indicating that the battery is low is displayed while the PT is being used, replace the built-in battery immediately. For details on how to replace the battery, refer to *Replacing the Battery* (page 253).
- Switch OFF the power supply to both the PT and the B7A Interface Unit before installing the B7A Interface Unit, otherwise the PT or the B7A Interface Unit may be damaged.
- Switch OFF the power supply to both the PT and the B7A Interface Unit before changing DIP switch settings.
- Do not use input functions, such as PT touch switches, for applications where danger to human life or serious property damage is possible or for emergency switch applications.
- Do not use the expanded I/O functions of the B7A Unit for applications where danger to human life or serious property damage is possible or for emergency switch applications.
- On unpacking the PT, check its external appearance and confirm that there is no damage. Also confirm that there is no abnormal noise on shaking the PT lightly. The PT may malfunction if it is damaged.
- During work at the panel, be sure that no metal scraps enter the PT. Otherwise, the PT may malfunction.
- The thickness of applicable operation panel is 1.6 mm to 4.8 mm. All fittings must be tightened uniformly to a torque of 0.5 to 0.6 N · m in order to ensure water- and dust- resistance. The panel must not be soiled or warped, and must be able to support an installation that will remain secure and strong.
- Carefully check wiring before switching ON the power.

- Do not apply an AC power supply across the power supply terminals.
- Use a DC power supply with a low voltage fluctuation.
- When complying with EC low voltage directives use a power supply with reinforced insulation.
- For the connection to the power supply terminal block, twisted-pair wires with a 2 mm^2 or greater cross sectional area and M 3.5 size crimp terminals must be used. Tighten the screws on the terminal block to a torque of 0.8 N · cm. Otherwise fire may occur.
- If the DIP switch settings have been changed while power was supplied to the PT, reset the power to the PT. The changes with the DIP switch become effective only after the power supply is reset.
- Before switching ON the power for the first time, set pin 6 of DIP switch SW2 on the PT to ON (it is set to OFF on shipping). If it is left OFF, messages will not be displayed normally.
- Press the **Abort** touch switch on the PT when screen data transmission has been completed. Unless this touch switch is pressed, the screen data will not be correctly registered. If the **Abort** touch switch is pressed during transmission, the screen data will not be correctly registered.
- Check the operation of screen data and ladder program thoroughly before actually using them.
- Press touch switches with a force of no greater than 30 N. Applying higher force may cause glass to break, resulting in injuries or preventing operation.
- Do not press touch switches carelessly while the backlight is OFF or while nothing is displayed on the screen. The system may operate unpredictably. Press touch switches only after confirming system safety.
- As far as possible, disconnect all devices connected to the output terminals before executing the output check. Otherwise, each time an output terminal comes ON during the check operation, the outputs to the devices may be activated.

SECTION 1
Functions of the NT30/30C

This section gives the operation examples and characteristics of the NT30/30C so that you will understand the applications of the NT30/30C.

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1-1 Role and Operation of NT30/30C

NT30/30C is a Programmable Terminal used to display and transmit the information in an FA site. The following gives a general description of the role and operation of the NT30/30C for those who use a Programmable Terminal (PT) for the first time.

1-1-1 Operation of an NT30/30C at an FA Production Site

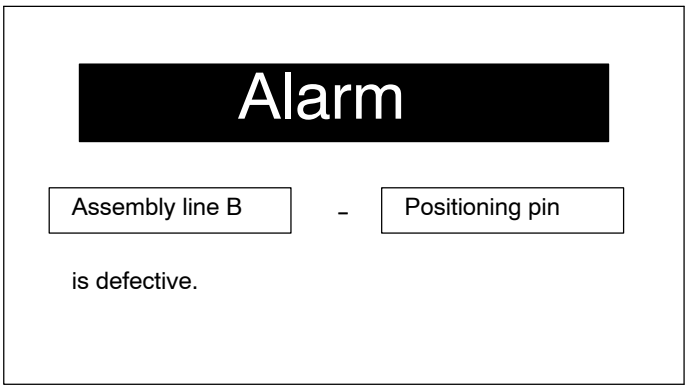
Production Line Status Monitoring

The NT30/30C can be used to display real-time information about the system and equipment operating status, etc.

Production Control		1994/1/25
Product	NT30	NT30C
Today's target	560 units	441 units
Current Production	305 units	275 units
% achieved	54.5 %	63.0 %

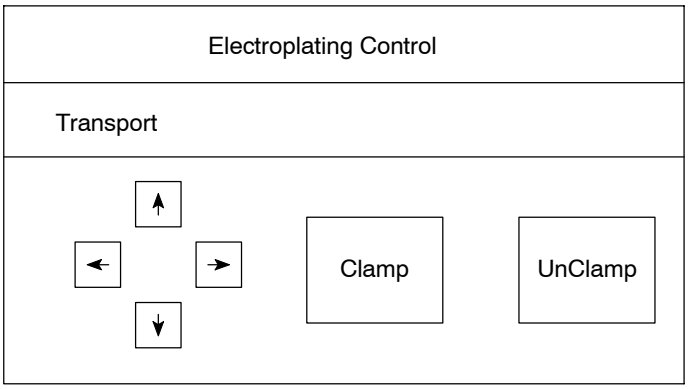
Messages

The NT30/30C can be used to warn of system or equipment failures and prompts the appropriate remedial action.



Panel Switch Functions

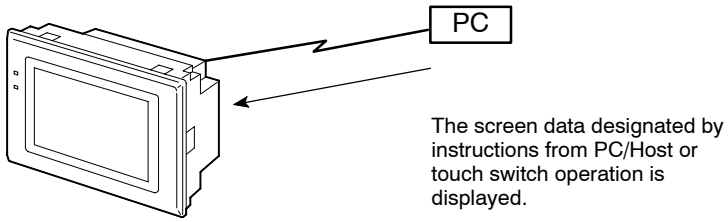
Setting touch switches on the NT30/30C can be set up to allow workers to use the NT30/30C as a control panel. Production data input to the NT30/30C can be transmitted to a PC.



1-1-2 Operations of NT30/30C

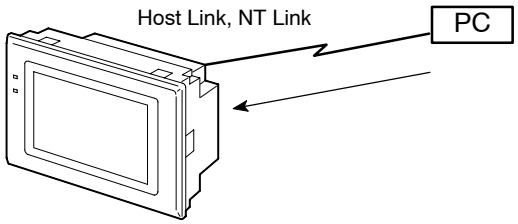
Displays Screens

The information to be displayed (screen data) can be created on a computer by using the NT-series Support Tool and stored in the NT30/30C. The screen data can be displayed on the NT30/30C in response to the instructions from a PC/Host or touch switch operation.



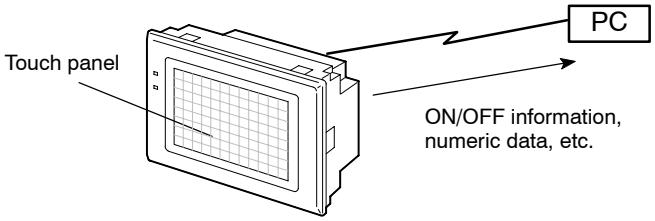
Receives Data from a PC

NT30/30C can be connected to a PC by a Host Link or NT Link and receive necessary data from the PC.



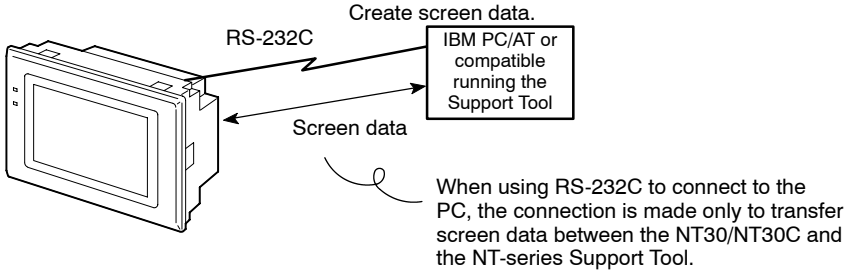
Sends Data to a PC

Data input through a touch panel can be sent to a PC.



Receives Screen Data

The screen data to be displayed on the NT30/30C can be created by a computer using the NT-series Support Tool. Connect the NT30/30C to an IBM PC/AT or compatible with an RS-232C cable so that the screen data are transferred to the NT30/30C.



1-2 Functions of NT30/30C

The NT30/30C has the following features.

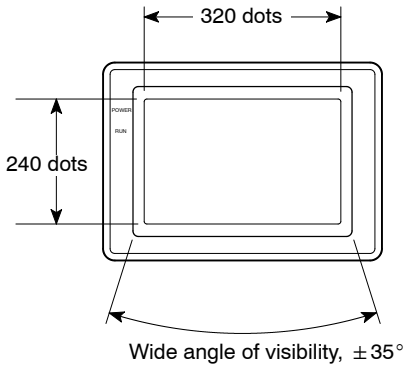
1-2-1 Features

Downsized Body

- Slim body (50 mm or less in the panel).
- The communication cable connectors are housed in the Unit so that they do not protrude from the Unit.
- The same connector is used to connect to the the Support Tool and to the host.

Construction Best Suited to the FA Environment

- Easy-to-read screen even in direct sunlight.
- The panel is a LCD panel with white/red backlight for the NT30, and an STN color LCD panel with backlight for the NT30C.
- Its backlight unit and battery can be replaced at the operation site.
- Waterproofed to a standard equivalent to IP65.



Touch Switch Operation

The System Menu can be displayed by using the touch switches located in four corners of the screen.

Compatibility with NT612G/610C

Existing screen data and user programs are compatible. (Modification required according to screen size.)

1-2-2 Comparison between NT30 and NT30C

Two models are available: The NT30 is capable of versatile graphic displays and the NT30C provides the same features, but is also capable of color displays. The differences between the NT30 and NT30C are listed below.

Function	NT30	NT30C
Model	NT30-ST131-E (Beige) NT30-ST131B-E (Black)	NT30C-ST141-E (Beige) NT30C-ST141B-E (Black)
Display panel	Monochrome LCD type (with white/red backlight)	STN color LCD type (with backlight)

1-2-3 Principal Functions of NT30/30C

The following are the principal functions of the NT30/30C.

Data Displays

Character Displays

Characters of various sizes can be displayed. Characters can be flashed and highlighted.

Figure Displays

Solid lines, squares, polygons, circles, circular arcs, and fan shapes can be displayed. They can also be painted with various patterns, flashed, or highlighted.

Memory Data Displays

Entries in the character string memory table or numeral table can be displayed. The memory table contents can be changed from the PC.

Graph Displays

Not only bar graphs, but also broken line graphs and trend graphs can be displayed using the numeral table.

Lamp Displays

Lamps can be turned ON or flashed from the PC.

Alarm List Displays

In response to the status of PC bits, warning messages can be automatically listed. When and how many times the messages appeared can also be displayed.

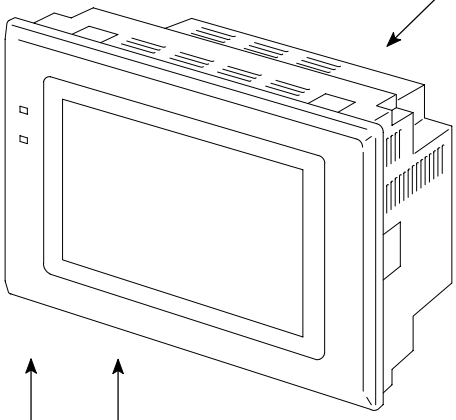
Data Output

Buzzer

A built-in buzzer can be sounded.

Screen Printing

A hard copy of the screen may be printed to the printer connected to the NT30/30C.



Communications

The NT30/30C communicates with PC through a Host Interface Unit or NT Link so that data may be received from PC or information entered from touch switches may be sent to the PC.

Data Input

Touch Switches

Data can be input by simply touching the screen. There are various touch switch functions, such as those for sending input data to the PC.

Pop-up Windows

A window overlaying the currently displayed screen can be opened and closed by pressing a touch switch. In addition to fixed displays, numeric keys and character keys can be set inside the window. The window need be opened only when input is required, to enable effective screen usage.

Numeric Values/Character Strings

Touch switch keys and expanded I/O on a B7A Unit can be allocated numeric values or character strings so that these values and character strings can be input at the operation site or even written onto the numeric or character string table and sent to the PC. It is also possible to disable inputs from the PC.

Expanded I/O Functions on B7A Units

The NT30/30C can receive a switching input from a B7A Unit, and turns ON/OFF the output.

- A B7A Interface Unit is required to connect a B7A Unit.

System

System Functions

System settings and maintenance can be performed by selecting from system menus displayed on the screen.

Creating Screen Data

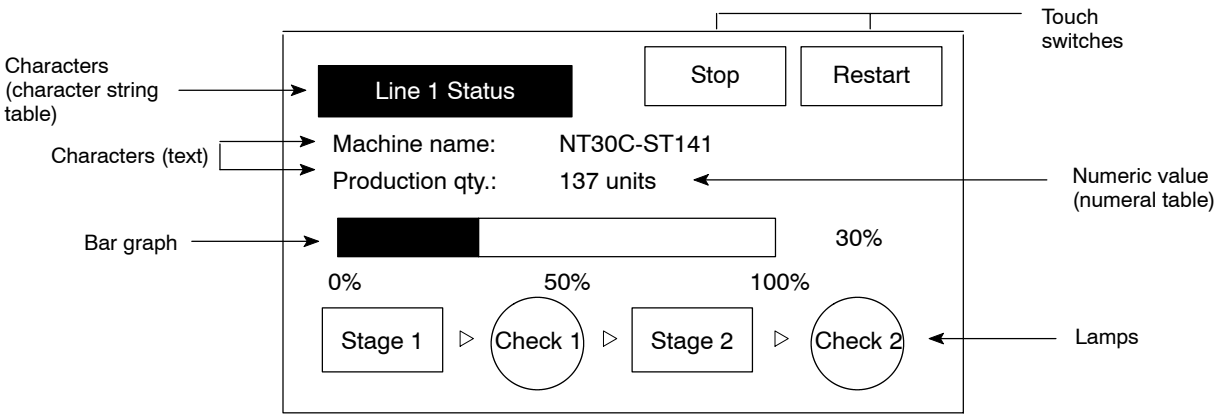
Screen data created by using the NT-series Support Tool on a personal computer can be transferred and stored in the built-in image data memory.

System Program Installation

Using the System Installer (purchased separately), the system programs for the NT30 and NT30C can be replaced.

1-2-4 Displays

The NT30/30C can display various kinds of elements such as characters, numeric value, lamps, touch switches, and graphs on a screen. The screen data displayed on the NT30/30C are created by using the NT-series Support Tool on a computer.



Characters (Text)

Marks and image data that do not need to be changed can be written directly to the screen.

Characters (Character String Memory Table)

Character strings stored in the character string memory table can be displayed. The display characters can be changed by changing the data stored in the character string memory table.

Numeric Values (Numeral Memory Table)

Numbers stored in the numeral memory table can be displayed. The display numbers can be changed by changing the data stored in the numeral table. Hexadecimal values can be displayed.

Lamps

Lamps can be used to indicate operating status. Squares, circles, fans, and polygons can be used. They are controlled by the PC and can be lit (reversed) or made to flash (alternates normal and reversed displays).

Touch Switches

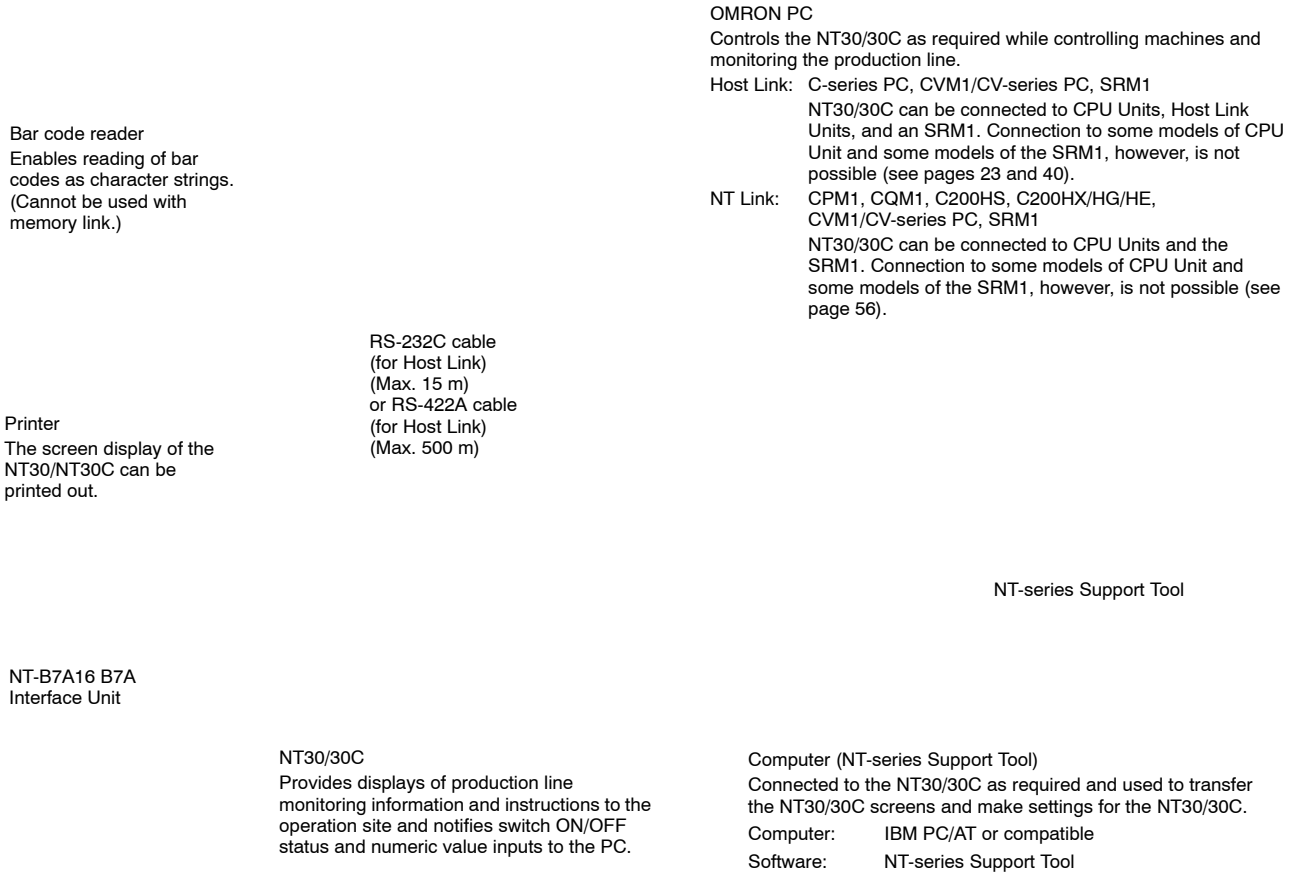
Touch switches can be set anywhere on the screen. Pressing the part of the screen where a touch switch has been set can have the following effects: Notification of the fact that the switch has been pressed to the PC (PC notification function); screen switching; input of a numerical value or character string (input key function); copying of a numerical value or character string (copy key function); shifting to another numerical value or character string input field (cursor moving key function); and obtaining a hard copy of the screen (screen print key function). Touch switches are controlled from the PC and can be made to light or flash in the same way as lamps.

Graphs

Bar graphs, trend graphs, and broken line graphs can be displayed according to the numerical values stored in numeral memory table. These values can also be represented as percentages displayed together with the graphs.

1-3 System Configuration

This section gives the basic configuration of a system that uses an NT30/30C. Use an RS-232C cable or an RS-422A cable to connect to a PC. Refer to the manuals for individual devices for information on devices other than the NT30/30C in the system.



Reference Refer to *3-5 Setting Communications with the PC Using Memory Switches* (page 83) for setting procedures. It is impossible to connect a personal computer running the NT-series Support Tool and a PC at the same time.

Typical optional devices for the NT30/30C include the following.

B7A Interface Unit	NT-B7A16
Backlight (spare)	NT30-CFL01 (for NT30) NT30C-CFL01 (for NT30C)
Protective Sheets	NT30-KBA04 (5 sheets/pack)
Battery	C500-BAT08

1-4 Communications Using the Direct Connection Function

1-4-1 Direct Connection Function

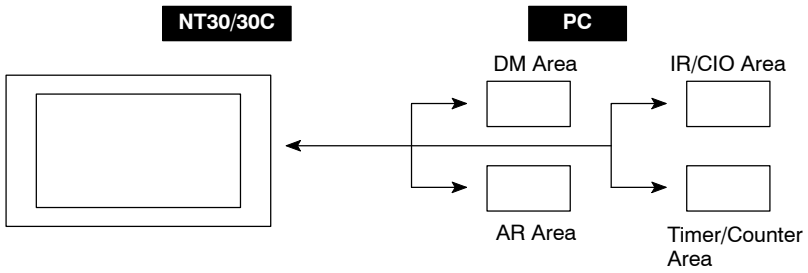
The communications method applied between the NT and the PC is either a Host Link or NT Link.

The NT30/30C can be used to access data for the display or to allocate the bits and words for storing input data in essentially any area in the PC. The NT30/30C can directly write and read the allocated bits and words to change the display elements, control operating status, and notify status.

This function is called the direct connection function. The NT30/30C is designed specially for use with a direct connection.

The bits and words allocated by the direct connection function are called allocated bits and allocated words.

A direct connection enables reading the data to be displayed on the NT30/30C from a memory area in the PC and writing it to a memory table in the NT30/30C. Also, the data input at the NT30/30C can be written to a PC memory area. The NT30/30C screen status can be switched according to PC memory area data, and NT30/30C status data can be written to a PC memory area.



Features

- The bits and words used to access operating status and work instructions and those for storing input data can be allocated in almost any part of PC I/O memory. Bits and words in the PC are accessed from memory table entries.
- The NT30/30C can directly access PC bit and word data so that it can be connected to a PC without changing the PC program that controls the current production line.
- The area to control and notify the NT30/30C status, including display screens, display/no display status, and buzzers, can be allocated in almost any part of PC I/O memory.

The direct connection function allows the NT30/30C to directly read and write almost all bits and words in the PC and to automatically change the NT30/30C screen display. This function can reduce the load on the PC to improve the program development efficiency of the PC.

1-4-2 NT Link

The NT Link is a new communications method between the PT and a PC.

The NT Link uses the direct connection function and can execute high-speed communications with a CPM1, CPM2A, CPM2C, CQM1, CQM1H, C200HS, C200HX/HG/HE(-Z), CS1-series, CVM1, CV-series, or SRM1 CPU Unit (built-in Host Link).

Features of the NT Link

- High-speed communications with specific types of PCs can be executed.
- Writing in units of bits to the PC memory area is possible (except the DM Area.

  .This enables the bit in a word data to which a touch switch has been allocated to be used for other purposes (e.g., to control a lamp).
- This can be used even when the PC is in RUN mode. (With Host Link, if the PC is in RUN mode, the NT30/NT30C switches the mode to MONITOR mode.)

Either the NT Link or the Host Link can be used for connection without changing the NT30/30C screen data or the PC program.

1-4-3 Functions of the Allocated Bits and Words

Elements displayed on the NT30/30C and the NT30/30C status can be allocated to the bits and words of the PC. By changing the contents of the bits and words, the NT30/30C can be controlled by the PC. It is also possible to send data to the PC by pressing the touch switches on the NT30/30C.

- **Controlling the NT30/30C by a PC**

  The following NT30/30C functions can be controlled by a PC.

Screens:	Display of designated screens, confirmation of screen numbers, etc.
Memory tables:	Writing to a memory table entry, copying from a memory table entry to another memory table entry, etc.
Lamps and touch switches:	Display instructions, confirmation of display status, etc.
System control:	Buzzer ON/OFF, display/no display status, screen printing, and other NT30/30C statuses

- **Notifying from the NT30/30C to a PC**

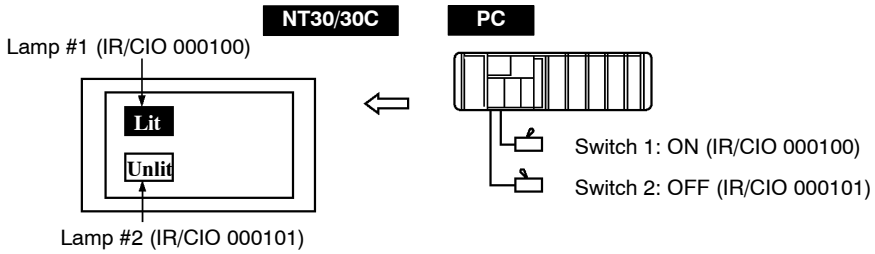
  Data in the NT30/30C is sent to a PC when a touch switch is pressed. The following types of data can be sent to the PC.

  - NT30/30C status
  - Touch switch status
  - Numeric values and character strings input with numeral/character string setting functions using touch switches.
  - Changes in a memory table entry after copying between memory table entries

Display Elements

- **Lamps (page 151)**

  Allocated to: Bits



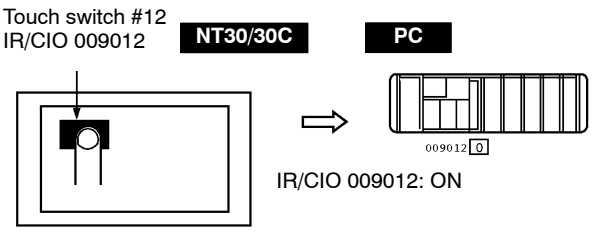
  The PC's bit status can be displayed by lamps on the NT30/30C.

  The lamp lights or flashes when the PC's bit status (i.e., the lamp bit) is ON (1), and goes OFF when it is OFF (0).

  Image/library lamps can also be created to switch the displayed image or library data according to the ON (1)/OFF (0) status of the lamp bit.

- **Touch Switches (page 154)**

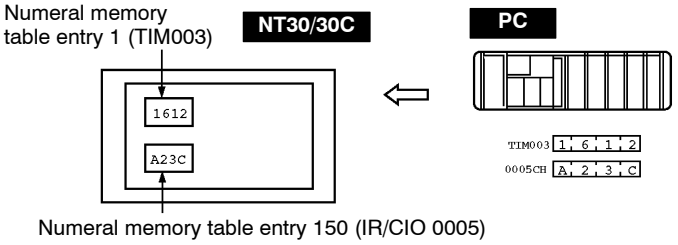
  Allocated to: Bits



  The PC bit allocated for the touch switch turns ON (1) and OFF (0) when the touch switch is pressed to notify the PC of the status of the touch switch.

- **Numeral Memory Table (page 138)**

  Allocated to: Words

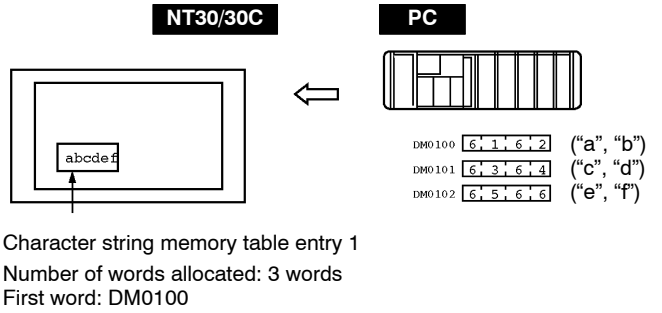


  The numeral memory table is allocated to words in the PC. If word contents change when corresponding numeral memory table entry is displayed on the screen, the value on the screen will also change, enabling the contents of words to be easily monitored.

  Reading and writing are executed so that the contents of allocated words are kept the same as those of the numeral memory table entries.

- **Character String Memory Table (page 136)**

  Allocated to: Words

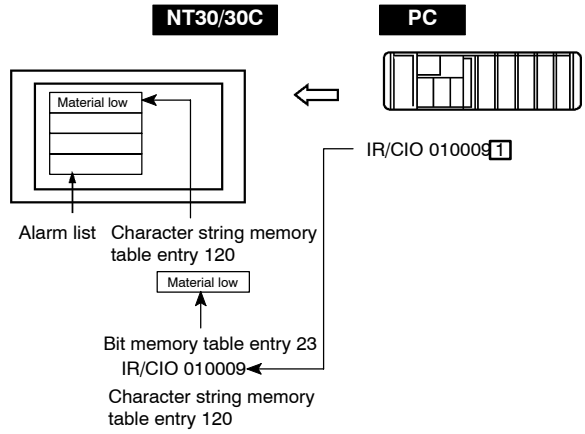


  The character string memory table is allocated to words in the PC. If word contents change when the corresponding character string memory table entry is displayed on the screen, the value on the screen will also change, enabling messages to be easily displayed.

  Reading and writing are executed so that the contents of allocated words are kept the same as those of the character string memory table entries.

- **Alarm List (Bit Memory Table) (pages 140 and 180)**

  Allocated to: Bits



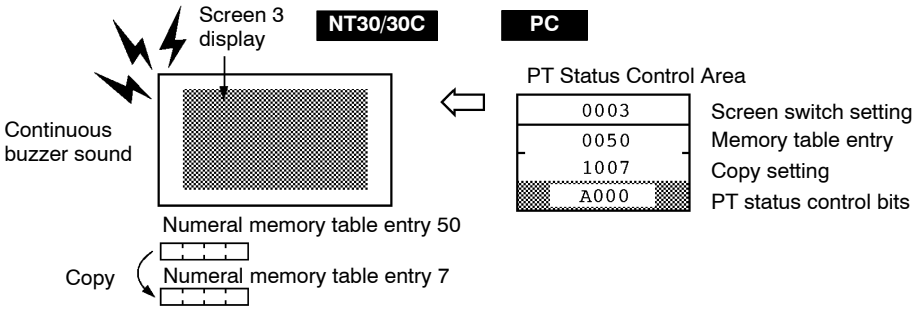
  When the corresponding PC bit turns ON (1), the contents of the character string memory table entry registered for the bit memory table entry is displayed in the alarm list. When the bit returns to the OFF (0) status, the character string memory table entry display is automatically cleared.

PT Status Control Area (PC to NT30/30C)

The PT Status Control Area is used to control the NT30/30C status. When data is written to this area in the PC, the NT30/30C reads the contents and operates according to the contents.

Example of PT Status Control Area Application

When data is written to the PT Status Control Area, the NT30/30C will operate as illustrated below (page 191).

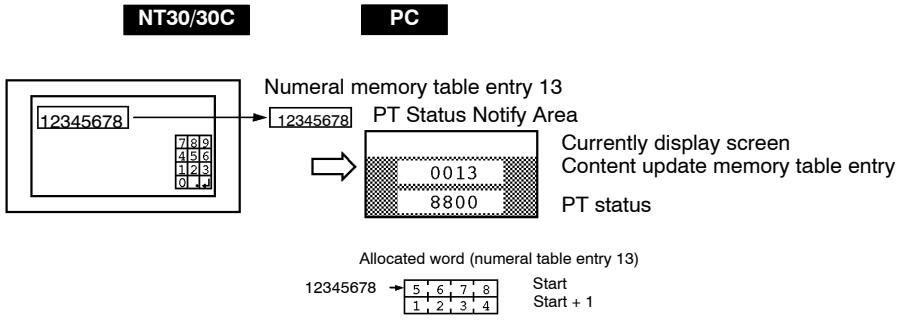


PT Status Notify Area (NT30/30C to PC)

The PT Status Notify Area is used to notify the PC of changes in the NT30/30C status. When a change is made in the NT30/30C status, the change is written to this area in the PC. By reading the data from the area, the NT30/30C status can be checked from the PC.

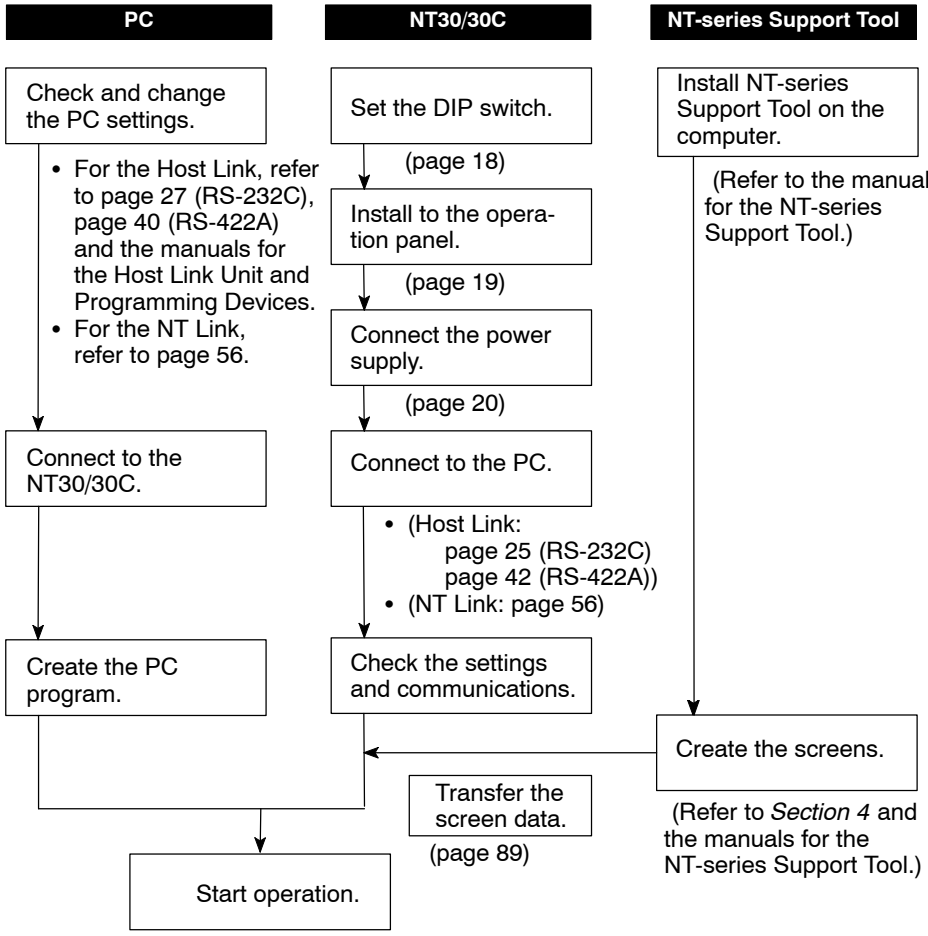
Example of PT Status Notify Area Application

When a change is made in the NT30/30C status, the change will be indicated in the PT Status Notify Area as illustrated below (page 193).



1-5 Before Operating

Use the procedure given below to start the NT30/30C.



⚠**Caution** Be sure to confirm that correct operation is possible with the screen data and the host program before actual operation.

Reference

1. Use the System Installer provided with the NT-series Support Tool for Windows.
2. Use the NT-series Support Tool for Windows.

Refer to the following manuals for the product information.

Product	Manual Title	Cat No.
System Installer	NT-series Support Tool for Windows Operation Manual	V061-E1-□
NT-series Support Tool	NT-series Support Tool Operation Manual	V028-E1-□
	NT-series Support Tool for Windows Operation Manual	V061-E1-□
PCs	SYSMAC CPM1 Operation Manual	W262-E1-□
	SYSMAC CPM1A Operation Manual	W317-E1-□
	SYSMAC CPM2A Operation Manual	W352-E1-□
	SYSMAC CPM2C Operation Manual	W356-E1-□
	SYSMAC C20H/C28H/C40H/C60H Programming Manual	W176-E1-□
	SYSMAC C200H Operation Manual (CPU01-E/03-E/11-E)	W130-E1-□
	SYSMAC C200H Operation Manual (CPU21-E/23-E/31-E)	W217-E1-□
	SYSMAC C200HS Operation Manual	W235-E1-□
	SYSMAC C200HS Installation Guide	W236-E1-□
	SYSMAC C200HX/HG/HE-CPU□□-E/ZE Installation Guide	W302-E1-□
	SYSMAC C200HX/HG/HE Operation Manual	W303-E1-□
	SYSMAC C1000H/C2000H Operation Manual	W140-E1-□
	SYSMAC C200HX/HG/HE-CPU□□-ZE Operation Manual	W322-E1-□
	SYSMAC CQM1 Reference Manual	W228-E1-□
	SYSMAC CQM1H Operation Manual	W363-E1-□
	SYSMAC CV500/CV1000/CV2000 Operation Manual: Ladder Diagrams * For a PC of the CVM1 Series, refer to the SYSMAC CV500/CV1000/CV2000 Operation Manual.	W202-E1-□
	SYSMAC CS1-series Operation Manual	W339-E1-□
	SYSMAC CS1-series Programming Manual	W340-E1-□
CompoBus/S Master Control Unit	SRM1 Operation Manual	W318-E1-□
Programming Devices	SYSMAC C-series and CVM1 PCs SYSMAC Support Software Operation Manual: C-series PCs	W248-E1-□
	SYSMAC C-series and CVM1 PCs SYSMAC Support Software Operation Manual: CVM1 PCs	W249-E1-□
	CX-Programmer Operation Manual	---
Host Link Unit	SYSMAC C-series Host Link Unit Operation Manual	W143-E1-□
	SYSMAC CVM1/C-series Host Link Operation Manual	W205-E1-□

SECTION 2
Hardware Settings and Connections

This section describes the settings of the NT30/30C, connections to a PC, and other hardware settings.

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2-1-1 Description of Parts 16
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2-9-5 B7A Interface Unit Settings 67
2-9-6 Connecting the B7A Unit to the B7A Interface Unit 67

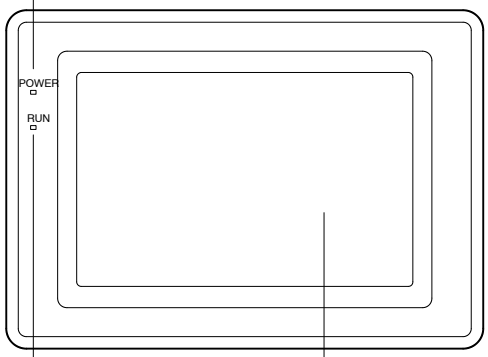
2-1 Description of Parts and Settings

Before getting to the operation, confirm the names and functions of parts. Also set the DIP switch on the NT30/30C.

⚠**Caution** On unpacking the NT30/30C, check its external appearance and confirm that there is no damage. Also confirm that there is no abnormal noise on shaking the Unit lightly. The product may malfunction if it is damaged.

2-1-1 Description of Parts

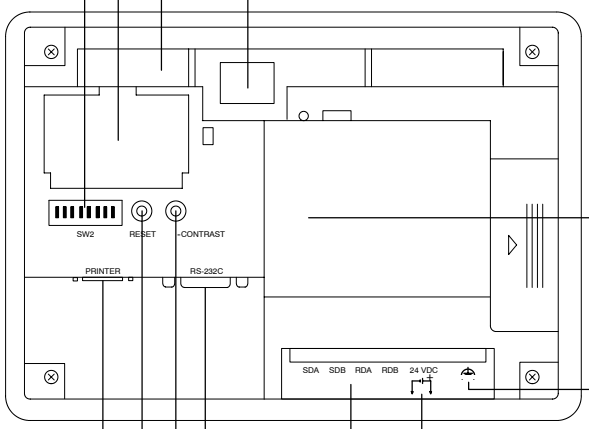
Front View



Reference The NT30/30C comes in two body colors.

NT30	NT30C	Body Color
NT30-ST131-E	NT30C-ST141-E	Beige
NT30-ST131B-E	NT30C-ST141B-E	Black

Rear View



DIP switch (SW2)

Set the system settings with this DIP switch.

Battery cover

The battery is secured underneath this cover.

Backlight unit

Backlight integrated with a connector.

Warning label

B7A interface connector (under the label)

When using a B7A Interface Unit, peel off the label and connect it here.

GR terminal

Grounding terminal to prevent malfunction due to noise

Power input terminals

Connect the power to the NT30/30C at these terminals.

RS-422A terminal block

When making the connection to the PC with RS-422A, connect the cable here.

RS-232C Host I/F tool connector

Connect the cable from a PC or NT-series Support Tool here.

Contrast control

Use a fine flat-blade screwdriver. Turn clockwise to increase the brightness.

Reset switch

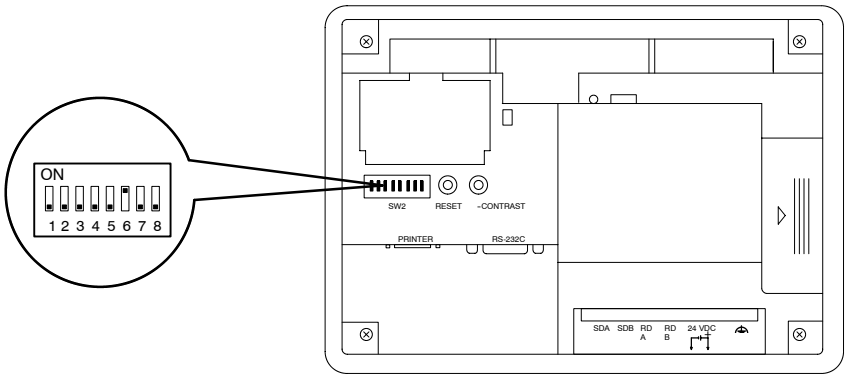
Used to initialize all the statuses of the NT30/30C. However, the screen data memory and memory switches retain their statuses before initialization.

Printer connector

Connect the printer cable here. Output conforms to Centronics specifications.

2-1-2 DIP Switch Settings

Set the NT30/30C operation status with the DIP switch located in the bottom right corner on the rear side of the body.



Pin	Function	
1	Not used.	
	ON	
	[OFF]	
2	Memory protect	
	ON	Data cannot be written to the screen data memory, and screen data transmission and initialization of the screen data memory are not possible.
	[OFF]	Screen data transmission and screen data memory initialization are not possible.
3	Switching to the System Menu enabled/disabled	
	ON	The System Menu cannot be displayed. If an error occurs during a start-up, the System Menu will be automatically displayed. However, RUN Mode cannot be entered.
	[OFF]	The System Menu can be displayed.
4	Screen data initialize effective/ineffective	
	ON	The NT30/30C will start in a special RUN mode in which the screen data memory is initialized. When it is started, the memory initialization menu will be displayed. For the initialization procedure, refer to *3-4 Initializing Memory* (page 78).
	[OFF]	The NT30/30C will start in normal RUN mode.
5	Not used.	
	ON	
	[OFF]	
6	[ON]	When you set the DIP switch pin 7 ON, NT-series System Installer messages are displayed in English.
	OFF	Messages are displayed in Japanese
7	System installation effective/ineffective	
	ON	System program installation is effective (special mode) at the time when the power turn ON.
	[OFF]	Starts normal RUN mode.
8	Terminator setting when using RS-422A	
	ON	When connecting to the PC with RS-422A
	[OFF]	When connecting to the PC with RS-232C

[ ] indicates factory setting.

⚠Caution If the DIP switch settings have been changed when the NT30/30C is powered, reset the power to the NT30/30C. The changes with the DIP switches become effective only after the power supply is reset. Before switching ON the power for the first time, set DIP switch pin 6 of the NT30/30C to ON (they are set to OFF on shipping). If they are left OFF, messages will not be displayed normally.

Reference In addition to the DIP switch settings, set also the host communications, port, baud rate, etc., in the memory switches. For these settings, refer to *3-5 Setting the Conditions of Communications with the PC by Using the Memory Switches* (page 83).

2-2 Installation

Install the NT30/30C to the operation panel and connect the power to the NT30/30C as described below.

Correct use

- Do not install the NT30/30C at sites subject to the following conditions. Otherwise, the product may malfunction.
  - Severe temperature variations
  - Temperatures or humidities outside the ranges stated in the specifications
  - High humidity, condensation
  - Splashing chemical agents
  - Severe oil splashing
  - Corrosive or flammable gases
  - Strong vibrations or shocks
  - Direct exposure to wind and rain (outdoor sites)
  - Strong ultra-violet irradiation
- Take adequate measures to ensure shielding if the NT30/30C is used at a location subject to any of the following conditions. Otherwise, the product may malfunction.
  - Static electricity, or noise from other equipment
  - Strong electromagnetic fields
  - Nearby power cables
  - Potential exposure to radioactivity

2-2-1 Installation to the Operation Panel

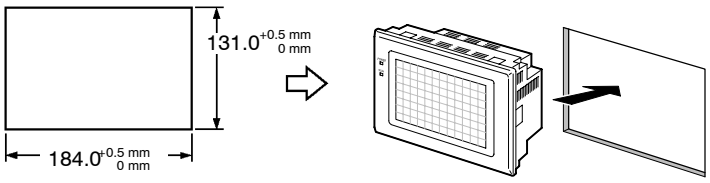
The NT30/30C is mounted on an operation panel by embedding it in the panel.

Use the panel fittings and tools included in the product package and follow the procedure below.

⚠Caution

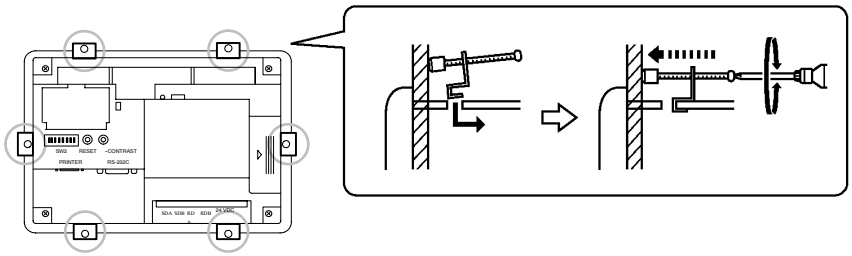
- During work at the panel, take care to ensure that no metal scraps enter the Unit. Otherwise, the product may malfunction.
- The thickness of applicable operation panel is 1.6 mm to 4.8 mm. All fittings must be tightened uniformly to a torque of 0.5 to 0.6 N · m in order to ensure water- and dust-resistance. The panel must not be soiled or warped, and must be able to support an installation that will remain secure and strong.

(1) Open a hole, shown below, in the panel and install the NT30/30C from the front side of the panel.



(2) Attach the panel fittings at four positions for the upper/lower sides and at two positions for the right and left sides, shown below, on the rear side of the NT30/30C.

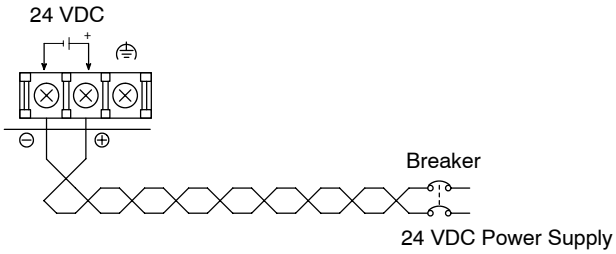
Fit the hook of the fitting in the square hole in the body and tighten the screw with a Phillips head screwdriver while lightly pulling the fitting.



2-2-2 Power Supply Connection

Connect a 24 VDC power supply to the power input terminals.

⚠Caution
- Do not apply an AC power supply across the power supply terminals.
- Use a DC power supply with a low voltage fluctuation stipulation
- When complying with EC directives (low voltage directives) use a power supply with reinforced insulation.
- Carefully check the wiring before switching ON the power.



- **Noise Prevention**

The NT30/30C has a noise preventive feature against the power supply line noise. To further reduce noise, connect a noise filter to the power line.

- **Power Supply**

In order to comply with EC directives, use a SELV power supply.

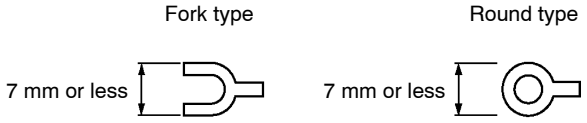
Applicable power supply specifications are as follows.

Item	Value
Power supply voltage	24 VDC
Allowable power supply voltage fluctuation range	20.4 VDC to 26.4 VDC (24 VDC –15%, +10%)
Power supply capacity	15 W or over

- **Parts Used for Connection**

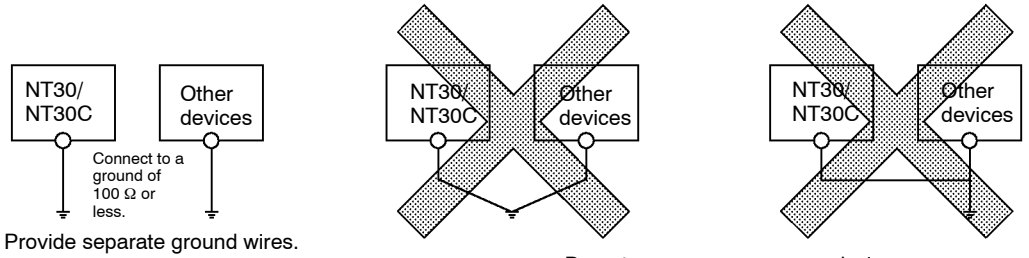
⚠Caution • For the connection to the power supply terminal block, twisted wires of 2 mm^2 or greater cross sectional area and M 3.5 size crimp terminals must be used. Tighten the screws on the terminal block to a torque of 0.8 N · cm. Otherwise fire may occur.

Use crimp terminals to connect the power supply to the power input terminals. Recommended crimp terminals for M3.5 are given below.



2-2-3 Ground Wire Connection

The NT30/NT30C has a functional ground terminal. To prevent malfunctions due to excessive noise, or to prevent electric shocks, wire the NT30/NT30C to a ground of 100 Ω or less using a separate ground wire (2 mm^2 min.). The ground wire should be connected to a point at a distance of 20 m or less. Do not use the same ground wire for other devices, or connect the ground wire to a beam in a building. To further reduce the influence of noise, connect a noise filter.

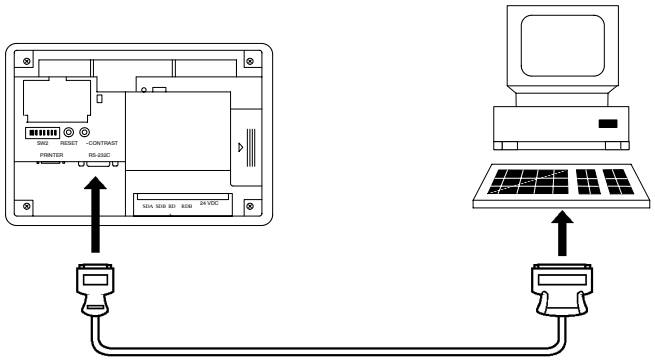


Correct use In order to prevent malfunctions due to noise, perform grounding correctly.

2-3 Connecting to the Support Tool

Connect the NT30/30C to a computer with an RS-232C cable to transfer the screen data created by using the NT-series Support Tool to the NT30/30C.

An NT30/30C cannot be connected to both a personal computer running the NT-series Support Tool and a PC at the same time. Connect the personal computer only when transmitting screen data.



- **Communication Conditions**

Communication conditions are set when the NT-series Support Tool is started.

- **Recommended Connecting Cable**

Use the cables indicated below.

CV500-CN228 (length: 2 m), made by OMRON
(D-sub, 9-pin, male ↔ D-sub, 25-pin, male)

XW2Z-S001 (conversion cable), made by OMRON
(D-sub, 25-pin, female ↔ Half-pitch, 14-pin, male, used together with the CV500-CN228)

XW2Z-S002 (length: 2 m), made by OMRON
(D-sub, 9-pin, male ↔ D-sub, 9-pin, female, for IBM PC/AT or compatible computer)

To make a connector cable, refer to the appendix *Connecting Cable Specifications* (page 281).

2-4 Installing the System Program

With the NT30/NT30C, the system program is not fixed and can be installed (or re-installed). This means that the system program can be easily replaced when grading up or changing the system configuration.

Reference

- If the system program is erased, it will become completely impossible to use the NT30/NT30C without reinstalling the system program. Before erasing the system program, confirm that the System Installer and the system program are at hand. Screen data and memory switch settings, however, will be saved.

The following software is used to install the system program.

- **System Installer**

Model Number	Communications Method	Remarks
NT30-ZS3PC-EV1	Host Link NT Link (1:1)	Installed in the NT30-ST131(B)-EV1/ NT30C-ST141(B)-EV1 at the time of delivery.
NT30-ZS3DV-EV1		
NT-ZJCMX-EV4	Host Link NT Link (1:1)	For Windows

Reference

- The system program that is included in the NT30-ZS3□□-EV1 is installed in the NT30/NT30C at the time of delivery.
- All of the system programs and System Installers required for the NT30/NT30C are provided with the NT-series Support Tool for Windows (Ver. 4).

A simple explanation of the system program installation method is given here. For a detailed explanation about setting up System Installer on a computer and System Installer operations, refer to the manual provided with the System Installer.

- **Installing the System Program**

Install the system program onto the NT30/NT30C using the following procedure.

(1) Initialized the NT30/NT30C

If another system program is already installed, erase that system program first.

With the power supply to the NT30/NT30C turned OFF, turn ON DIP switch (SW2) pin 7 and then turn ON the power supply. When the confirmation message is displayed, execute erasing the system program

(2) Put the NT30/NT30C on Standby for Installation

Turn OFF the power supply and return DIP switch pin 7 that was turned ON in step 1 to OFF. After that, turn ON the power supply again. The NT30/NT30C will go into standby, waiting for system program installation.

(3) Transfer the System Program

Connect the NT30/NT30C to the computer, start up System Installer, and transfer and install the system program.

For details of operation, refer to the manual provided with the System Installer.

- **System Installer Settings**

In the System Installer settings, specify the type of PT to which the system program is installed.

Specify either NT30 or NT30C as the PT model (with DOS versions, the setting is as the NT-series model under the tool settings). Make other settings according to the operating conditions of the System Installer.

- **Selecting the System Program to be Transferred**

Select the name of the desired system program from the communications methods displayed in the system program list in the System Installer.

For details, refer to the the manual provided with the System Installer.

2-5 Connection to a PC by Host Link via RS-232C

Connect the NT30/30C to an OMRON PC by using the RS-232C Host Link method.

In order to make a connection to the PC using the Host Link method via RS-232C, the host communications memory switch of the NT30/30C must be set to Host Link, and the port memory switch must be set to RS-232C. For details on memory switch settings, see *Selecting the Host Communication Method* (page 85) and *Selecting the Host Link Communication Port* (page 87).

2-5-1 Compatible PCs

Some models and series of OMRON PCs have the Host Link function built in. With CS1-series and CQM1H PCs, Host Link communications are possible by adding a Serial Communications Board. Also, there are some C200HX/HG/HE CPU Units that support Host Link communications when a Communications Board is mounted.

Check the model and series of the PC, and the model of Communications Board mounted, before making connections.

The PCs that can be connected by Host Link via RS-232C are listed in the table below.

PC Series	CPU Units with the Host Link Function Built In	CPU Units Connectable Using a Host Link Unit or Communications Board	Host Link Unit or Communications Board	Connectable PC
CS1 Series	CS1G-CPU42/43/44/45 (-EV1) CS1H-CPU63/64/65/66/67 (-EV1)	CS1G-CPU42/43/44/45 (-EV1) CS1H-CPU63/64/65/66/67 (-EV1)	CS1W-SCU21 CS1W-SCB21 CS1W-SCB41	CS1G CS1H
C Series	C20H/C28H/C40H/C60H	---	---	C□□H
	---	C1000H-CPU01-EV1 C2000H-CPU01-EV1	C120-LK201-V1	C1000H C2000H
	---	C200HS-CPU01/03/21/23/31/33-E C200HE-CPU11/32/42-(Z)E C200HG-CPU33/43/53/63-(Z)E C200HX-CPU34/44/54/64-(Z)E	C200H-LK201-V1	C200HS C200HE C200HE-Z C200HG C200HG-Z C200HX C200HX-Z
	C200HS-CPU21/23/31/33	---	---	C200HS
	C200HE-CPU42-(Z)E	C200HE-CPU32/42-(Z)E	C200HW-COM02/04/05/06-V1	C200HE C200HE-Z
	C200HG-CPU43/63-(Z)E	C200HG-CPU33/43/53/63-(Z)E		C200HG C200HG-Z
	C200HX-CPU44/64/65/85-(Z)E	C200HX-CPU34/44/54/64/65/85-Z		C200HX C200HX-Z
	---	C1000H-CPU01-EV1 C2000H-CPU01-EV1	C500-LK201-V1	C1000H C2000H
	---	C1000H-CPU01-EV1 C1000HF-CPUA1-EV1 C2000H-CPU01-EV1	C500-LK203	C1000H(F) C2000H
	CPM1-10/20/30CDR-□ + CPM1-CIF01	---	---	CPM1
	CPM1A-10/20/30/40CD□-□ + CPM1-CIF01	---	---	
	CPM2A-30/40/60CD□□-□ + CPM1-CIF01 (when connected via peripheral port)	---	---	CPM2A
	CPM2C-10/20□□□□□□-□ (*1)	---	---	CPM2C
	CQM1-CPU21-E CQM1-CPU41/42/43/44(-EV1)	---	---	CQM1
	CQM1H-CPU11/21/51/61-E (*2)	CQM1H-CPU51/61-E	CQM1H-SCB41	CQM1H
CV series (*3)	CV500-CPU01-EV1	CV500-CPU01-EV1	CV500-LK201	CV500
	CV1000-CPU01-EV1	CV1000-CPU01-EV1		CV1000
	CV2000-CPU01-EV1	CV2000-CPU01-EV1		CV2000
CVM1 series (*3)	CVM1-CPU01-EV□ CVM1-CPU11-EV□ CVM1-CPU21-EV□	CVM1-CPU01-EV□ CVM1-CPU11-EV□ CVM1-CPU21-EV□	CV500-LK201	CVM1
CompoBus/S Master Control Unit	SRM1-C02-V2	---	---	SRM1

(*1) The CPM2C-CN111 or CS1W-CN114/118 Connecting Cable, or the CPM1-CIF01 RS-232C Adapter is required.

(* 2) The CQM1H-CPU11 is not equipped with an RS-232C port, so connect to the CS1W-CN118 Connecting Cable, and connect the peripheral port of the CS1W-CN118 to the PT.

(* 3) CVM1/CV-series CPU Units without "-V□" at the end of the model number cannot be directly connected. With these CPU Units, connect to the PT using a Host Link Unit.

2-5-2 Connecting the NT30/30C

Refer to the illustrations below to select the appropriate cable for the Unit connectors and connect the NT30/30C to the PC.

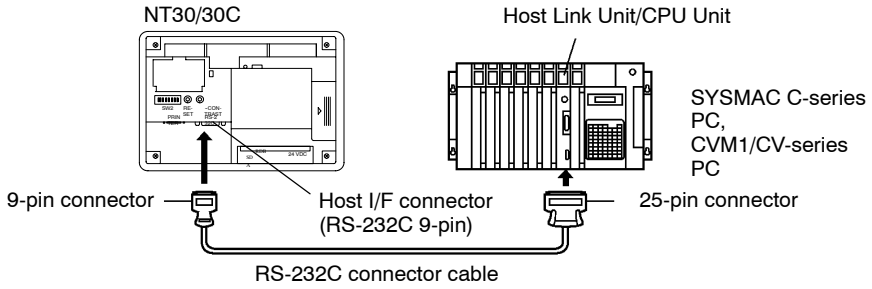
To make a connector cable, refer to the appendix *Making the Cable for Connection to the PC* (page 271).

Correct use

- After connecting a communication cable, always secure it with the screws. Otherwise the cable may disconnect, causing operation to fail.
- The cable's tensile load is 30 N. Do not subject it to loads greater than this. Otherwise a discontinuity may occur, causing operation to fail.

Connecting to a PC with a 25-pin Connector

Use a connector cable with a 25-pin connector on one end and a 9-pin connector on the other end (NT30/30C side) to connect the NT30/30C to a PC with a 25-pin connector.

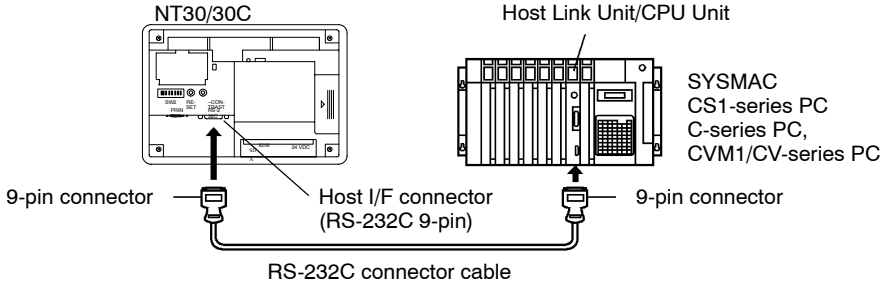


Use the following recommended cables (OMRON);

Connector Specification	Model	Cable Length	Applicable Host Link Unit
25-pin to 9-pin	XW2Z-200S	2m	C500-LK203 C500-LK201-V1 C120-LK201-V1 C200H-LK201 CV500-LK201
	XW2Z-500S	5m	

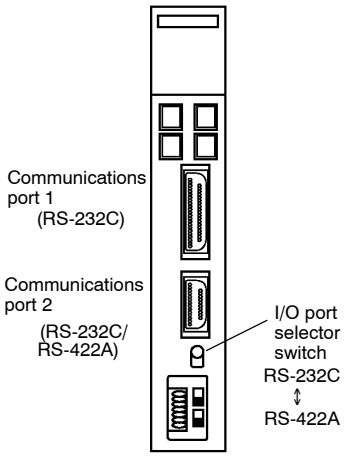
Connecting to a PC with a 9-pin Connector

Use a connector cable with a 9-pin connector on both ends to connect the NT30/30C to a PC with a 9-pin connector.



The connector cable wiring for the C-series CPU Unit (C□□H) is different from that for the other PCs. For details, refer to the appendix *Making the Cable for Connection to the PC* (page 271).

Connecting the NT30/30C to a CVM1/CV-series Host Link Unit



Two types of connectors are provided to CV500-LK201 Host Link Unit. Both of these connector types can connect to the NT30/30C with an RS-232C connector cable. Select the connector cable that matches the connector type.

- **To Connect to Communication Port 1**

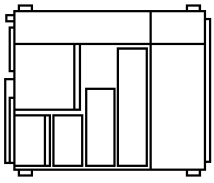
This is a 25-pin RS-232C connector. Use a connector cable with a 25-pin connector on one end and a 9-pin connector on the other end (NT30/30C side).

- **To Connect to Communication Port 2**

This is a 9-pin RS-232C/RS-422A connector. Use a connector cable with a 9-pin connector on both ends.

Set the I/O port selector switch to the RS-232C side (upper side) to use this port.

Connecting the NT30/30C to a C-series CQM1, SRM1 PC



CQM1, SRM1 can connect to the NT30/30C by the RS-232C method. Use an RS-232C 9-pin connector cable.

- **To Connect to the RS-232C Port**

This is a 9-pin RS-232C connector. Use a connector cable with a 9-pin connector on both ends.

Connecting the NT30/30C to a C-series C200HX/HG/HE(-Z) PC

When using a C-series C200HX/HG/HE(-Z) PC, the NT30/30C can be connected to the standard port of the CPU Unit or ports A/B of a Serial Communications Board. Use a connector cable with a 9-pin RS-232C connector.
For details on the specifications and connecting method for the Serial Communication Board used for connection, refer to the *C200HX/HG/HE Serial Communication Board Operation Manual* (W304).

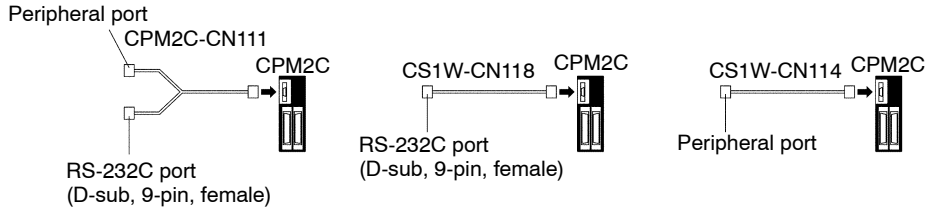
Connecting the NT30/30C to a C-series CPM1 or CPM2A

Connect the CPM1 or CPM2A via an RS-232C Adapter (CPM1-CIF01).
Prepare a connector cable with a 9-pin RS-232C connector.

Connecting the NT30/30C to a C-series CPM2C

The CPM2C has only one connector, which is the same shape as the CS1-series peripheral port. The signals in this connector, however, are divided internally into those for the RS-232C port and those for the peripheral port. Therefore, when using the CPM2C, make separate settings for the RS-232C port and the peripheral port according to the connecting cables and ports used, in the way shown in the following table. For details, refer to the *CPM2C Operation Manual* (W356).

Port Connected to the PT	PC Setup
RS-232C port of the CS1W-CN111 (D-sub, 9-pin)	Perform settings for the RS-232C port.
Peripheral port of the CS1W-CN111	Perform settings for the peripheral port.
Port of the CS1W-CN118 (D-sub, 9-pin)	Perform settings for the RS-232C port.
Port of the CS1W-CN114 (peripheral port)	Perform settings for the peripheral port.



Connecting the NT30/30C to a C-series CQM1H

With C-series CQM1H PCs, in addition to the CPU Unit's RS-232C port and peripheral port, the NT30/NT30C can also be connected to port 1 of the Serial Communications Board. Provide an RS-232C, 9-pin connecting cable.

For details of specifications and mounting methods for Serial Communications Boards that can be used for connection, refer to the *CQM1H Serial Communications Board Operation Manual* (W365).

Connecting the NT30/30C to a CS1-series PC

With CS1-series PCs, in addition to the CPU Unit's RS-232C port and peripheral port, the NT30/NT30C can also be connected to the Serial Communications Board and Serial Communications Unit. Provide an RS-232C, 9-pin connecting cable.

For details of specifications and mounting methods for Serial Communications Boards and Units that can be used for connection, refer to the *CS1-series Serial Communications Boards/Unit Operation Manual* (W336).

When a Connector Cable of 5 m or Longer Is Required

When a connector cable of 5 m or longer is required, please make the cable. However, note that the maximum transmission distance is 15 m.

To make a connector cable, refer to the appendix *Making the Cable for Connection to the PC* (page 271).

When Long-distance Communications are Required

Communications distances not possible with RS-232C specifications can be achieved using RS-422A communications (RS-485 communications cannot be used).

2-5-3 PC Switch Settings

When the NT30/30C and PC are connected to each other, set the conditions at the PC Host Link Unit or the CPU Unit as given in the table below.

The following is a general description of switch settings.

Refer to the manual for respective Units for details of the switch settings.

Item	Switch Setting
I/O port	RS-232C
Baud rate	Set the same baud rate as the NT30/30C. (*1)
Transfer code	ASCII 7 data bits, 2 stop bits
Parity	Even
1-to-1/1-to-N	1-to-N (*2)
Command level	Level 1, 2, 3
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

*2 The 1-to-N setting enables BCC (Block Check Character). It is not possible to connect more than one NT30/30C in a single Host Link.

Correct use When using the CVM1/CV series, always set CPU Unit execution processing (execution control 2) in the PC Setup to synchronous processing.

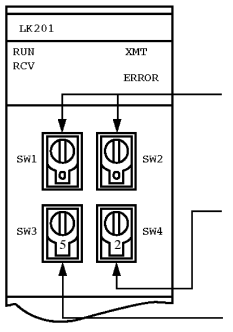
Connecting to a Host Link Unit

Two models of Host Link Units are available: A Rack-mounting Unit and a CPU-mounting Unit. The switch settings differ according to the model of Host Link Unit. Set the switches according to the model of the Unit.

- **C200H Rack-mounting Host Link Unit: C200H-LK201(-V1)**

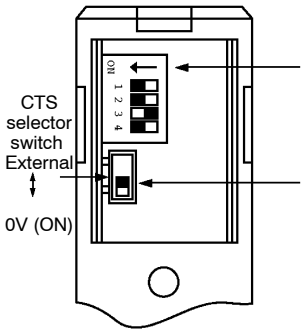
Setting the Front Switches

Set each switch with a flat-blade screwdriver so that the values or symbols in the setting value window agree with the following.



- Unit # (SW1, SW2)
  Set these switches to 0.
- Command level, parity, and transfer code (SW4)
  Set this switch to 2.
- Baud rate (SW3)
  Set this switch to 5 to select 9,600 bps.
  Set this switch to 6 to select 19,200 bps.

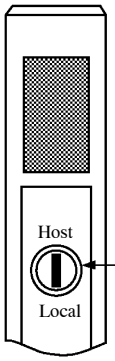
Setting the Rear Switches



- 1-to-1/1-to-N selection (DIP switch)
  Set #3 to ON.
- CTS selection (selector switch)
  Set this always to 0 V (ON).

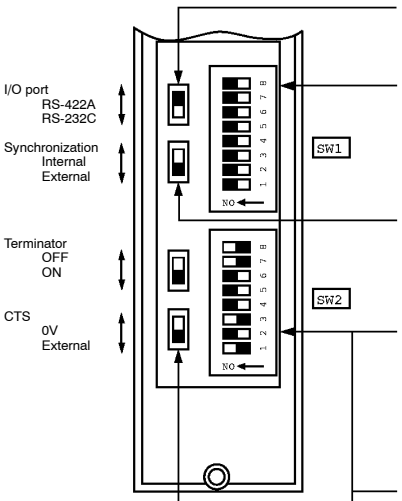
- **C500/C1000H Rack-mounting Host Link Unit: C500-LK201-V1**

Setting the Front Switches



- Mode control (key switch)
  Set this to Host Link.

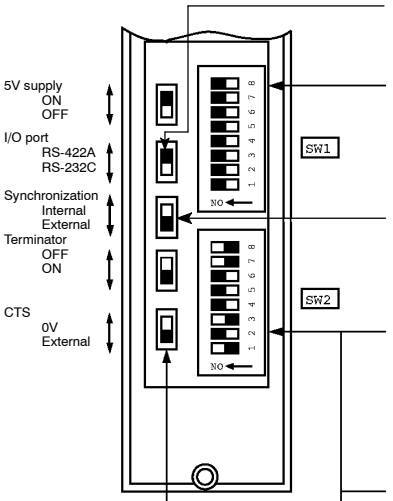
Setting the Rear Switches



- I/O port selection (selector switch)
  Set this to RS-232C.
- Unit # (DIP switch SW1)
  Set pins 1 to 5 to OFF (0).
- Synchronization (selector switch)
  Set this to internal synchronization.
- Baud rate (DIP switch SW2 pins 1 to 4)
  Set these pins to 1010 to select 9,600 bps.
  Set these pins to 0010 to select 19,200 bps.
  (0: OFF, 1: ON)
- 1-to-1/1-to-N selection (DIP switch SW2 pin 6)
  Set pin 6 to OFF (0) (1-to-N).
- Command level (DIP switch SW2 pins 7 and 8)
  Set these pins to ON (1).
  (Levels 1, 2, and 3 are enabled.)
- CTS selection (selector switch)
  Set this always to 0 V (ON).

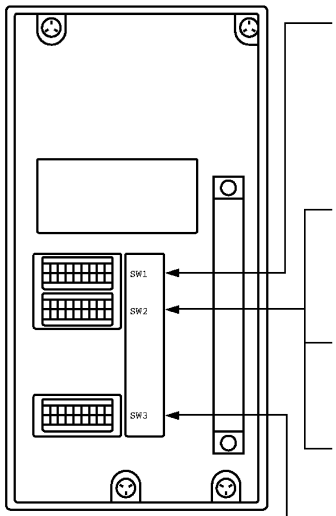
- **C500/C1000H Rack-mounting Host Link Unit: C500-LK203**

Setting the Rear Switches



- I/O port selection (selector switch)
  Set this to RS-232C.
- Unit #, parity, and transfer code (DIP switch SW1 pins 1 to 7)
  Set pins 1 to 7 to OFF (0).
- Synchronization (selector switch)
  Set this to internal synchronization.
- Baud rate (DIP switch SW1 pins 1 to 4)
  Set these pins to 1010 to select 9,600 bps.
  Set these pins to 0010 to select 19,200 bps.
  (0: OFF, 1: ON)
- 1-to-1/1-to-N selection (DIP switch SW2 pin 6)
  Set pin 6 to OFF (0) (1-to-N).
- Command level (DIP switch SW2 pins 7 and 8)
  Set these pins to ON (1).
  (Levels 1, 2, and 3 are enabled.)
- CTS selection (selector switch)
  Set this always to 0V (ON).

- **CPU-mounting Host Link Unit: C120-LK201-V1**



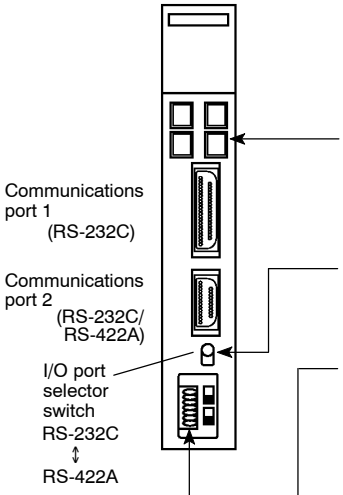
- Unit #, parity, and transfer code (DIP switch SW1 pins 1 to 5)
  Set SW1 pins 1 to 5 to OFF (0).
  * Parity is fixed at Even Parity. Transfer code is fixed at ASCII 7 data bits and 2 stop bits.
- Baud rate (DIP switch SW2 pins 1 to 4)
  Set these pins to 1010 to select 9,600 bps.
  Set these pins to 0010 to select 19,200 bps.
  (0: OFF, 1: ON)
- 1-to-1/1-to-N selection (DIP switch SW2 pin 6)
  Set pin 6 to OFF (0) (1-to-N).
- Command level (DIP switch SW2 pins 7 and 8)
  Set these pins to ON (1).
  (Levels 1, 2, and 3 are enabled.)
- CTS selection (DIP switch SW3 pins 1 and 2)
  Set pin 1 to ON (1) and pin 2 to OFF (0). (Set this always to 0V.)
- Synchronization (DIP switch SW3 pins 3 to 6)
  Set pins 3, 5, and 6 to ON (1), and pin 4 to OFF (0).
  (Set these to Internal synchronization.)

- **CVM1/CV-series Rack-mounting Host Link Unit: CV500-LK201**

Setting the Front Switches

Set the operating conditions with the CPU Bus Unit setting functions when a CVM1/CV-series Host Link Unit is connected to the NT30/30C. The CPU Bus Unit setting can be made directly from the Programming Device (CX-Programmer) or the CPU Bus Unit setting information created with a Programming Device can be transferred to the CPU Unit.

The following describes the switch settings so as to enable the CPU Bus Unit setting. For details of the CPU Bus Unit setting, refer to the *SYSMAC CVM1/CV-series Host Link Operation Manual* (W205).



- Unit # (SW3 and SW4)
  When using communications port 2, set both SW3 and SW4 to 0.

- Setting of I/O port selector switch (selector switch)
  Set the port to RS-232C.

- CTS selection (DIP SW2 and SW3)
  Set SW2 or SW3 to ON. (Normally, this is set to 0V fixed.)
  To use communication port 1, set SW2. To use communication port 2, set SW3.

- Communications condition setting (DIP switch SW1)
  Set all pins of SW1 to OFF.

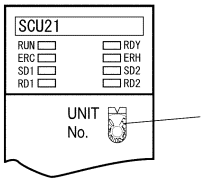
  Communications are performed on the basis of the CPU Bus Unit system settings of the PLC.
  The defaults for the system setting are as follows.
  Baud rate: 9,600bps
  Parity: Even
  Xon/Xoff control: Not performed
  Communications method: Full duplex
  Stop bit: 2
  Data length: 7 bits

Connecting the NT30/30C to a CS1-series Serial Communications Unit

- **CS1-series Rack-mounting Model: CS1W-SCU21**

Setting the Front Switches

Set the unit number of the Serial Communications Unit using the rotary switch on the front of the Unit. Set the number or symbol in the setting display window in the following way using a flat-blade screwdriver.



Unit Number Setting

Set to a value between 0 and F that does not coincide with the unit number set for another Unit.

DM Area Allocation Settings

From the Programming Device (i.e., a Programming Console or CX-Programmer), write the settings directly to the CPU Unit's DM Area allocation (Setup Area). After the settings have been written, they will be enabled when the power supply is reset, the Unit is restarted, the communications ports are restarted, or a STUP instruction is executed.

The DM Area words that are allocated and the contents of the settings are shown in the following table.

m = DM 30000 + 100 × unit number

DM Area Allocation (Words)		Setting	Setting Contents
Port 1	Port 2		
m	m + 10	8000	Serial communications mode: Host Link; stop bits: 2; parity: even; data length: 7 bits
m + 1	m + 11	0000	Baud rate: 9,600 bps
		0007	Baud rate: 19,200 bps
m + 2	m + 12	0000	Send delay time: 0 ms
m + 3	m + 13	0000	No CTS control; Host Link unit number: 0

Connecting to a CPU Unit

- **C-series C□□H, CVM1/CV-series (-EV□)**

Set the operating conditions with the PC Setup functions when a C□□H, CVM1/CV-series CPU Unit is connected to the NT30/30C. The PC Setup can be made directly from the Programming Device (CX-Programmer) or the PC Setup information created with a Programming Device can be transferred to the CPU Unit.

The following describes the switch settings so as to enable the PC Setup. For details of the PC Setup, refer to the *SYSMAC C□□H Programming Manual* (W176) and the *SYSMAC CV500/CV1000/CV2000 Operation Manual: Ladder Diagrams* (W202)

(1) C-series C□□H: C20H/C28H/C40H/C60H

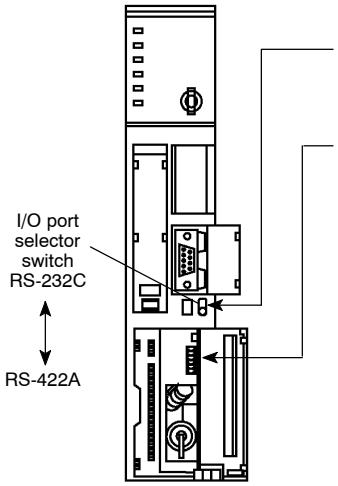
No switch settings are required when connecting to a C-series C□□H CPU Unit.

(2) CVM1/CV-series: CV500-CPU01-EV1
CV1000-CPU01-EV1
CVM1-CPU01-EV□
CVM1-CPU11-EV□
CVM1-CPU21-EV□

Only the CVM1/CV-series CPU Units of version 1 (model number suffixes of "-EV1") or later can be connected to the NT30/30C.

When connecting to a CVM1/CV-series CPU Unit, set the switches as given below.

Setting the Front Switches



- Host Link communications method (selector switch)
  Set this to RS-232C.

- System setting (DIP switch pin 4)
  To effect the existing DIP switch settings, set pin 4 to ON.
  To effect the existing PC Setup, set pin 4 to OFF.
  Note The existing DIP switch settings differ from the existing PC Setup as follows.
  - DIP switch settings: 2400 bps, 1 stop bit, even parity, 7-bit data length
  - PC Setup: 9,600 bps, 2 stop bits, even parity, 7-bit data length

PC Setup Settings

Set the following communications settings in the PC Setup.

Item	Possible Settings
Baud rate	Set to the same baud rate as the NT30/NT30C (See note 1.)
Stop bit	2 stop bits
Parity	Even parity
Data length	ASCII 7 bits
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

- **C-series C200HS, C200HX/HG/HE(-Z), CPM1, CPM2A, CPM2C, CQM1, CQM1H, SRM1**

The method for connecting to the CPU Unit depends on the model of PC in the way shown in the following table.

PC	Connection Method
C200HS, CQM1	• Connect to the CPU Unit's RS-232C port.
C200HX/HG/HE(-Z)	• Connect to the CPU Unit's RS-232C port. • Connect to one of the RS-232C ports (port A or B) on the Communications Board.
CQM1H	• Connect to one of the RS-232C ports (port A or B) on the Communications Board. • Connect via the CS1W-CN118 Connecting Cable using the peripheral port • Connect to the RS-232C port (port 1) on the Serial Communications Board.
CPM1	• Connect via the CPM1-CIF01 RS-232C Adapter using the peripheral port.
CPM2A, SRM1	• Connect to the CPU Unit's RS-232C port. • Connect via the special RS-232C Adapter (CPM1-CIF01) using the peripheral port.
CPM2C	• Connect to the CPU Unit's RS-232C port or peripheral port using the CPM2C-CN111, CS1W-CN114, or CS1W-CN118 Connecting Cable. (The CPM2C-CN111 splits the communications port on the CPU Unit into an RS-232C port and the peripheral port. The CPM1-CIF01 RS-232C Adapter is also required to connect to the peripheral port.)

PC Setup Settings

When connecting to a C200HS, C200HX/HG/HE(-Z), CPM1, CPM2A, CPM2C, CQM1, or CQM1H CPU Unit, or to the SRM1, make the following communications settings in the PC Setup.

Item	Contents of Settings at Host
Communications mode	Host Link
Baud rate	Set to the same baud rate as the NT30/NT30C (See note 1.)
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

Make the PC Setup settings directly from the Programming Device (CX-Programmer). For details of PC Setup operations, refer to the manual for the PC used.

The following tables give the PC Setup words and the contents of settings for different combinations of connected model and port.

- **Peripheral Port of CPM2A, CPM2C, CQM1H, SRM1**

Word	Setting	Setting Contents
DM6650	0001	Host Link mode Conditions set by the contents of DM.
DM6651	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6653	0000	Unit No. 0

- **RS-232C Port of C200HS, C200HX/HG/HE(-Z), CPM2A, CPM2C, CQM1, CQM1H (Except for CPU11), SRM1**

Word	Setting	Setting Contents
DM6645	0001	Host Link mode, no CTS control Conditions set by the contents of DM.
DM6646	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6648	0000	Unit No. 0

- **Port A of Communications Board on C200HG/HX/HE(-Z), Port 1 of Serial Communications Board on CQM1H**

Word	Setting	Setting Contents
DM6555	0001	Host Link mode, no CTS control Conditions set by the contents of DM.
DM6556	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6558	0000	Unit No. 0

- **Port B of Communications Board on C200HG/HX/HE(-Z)**

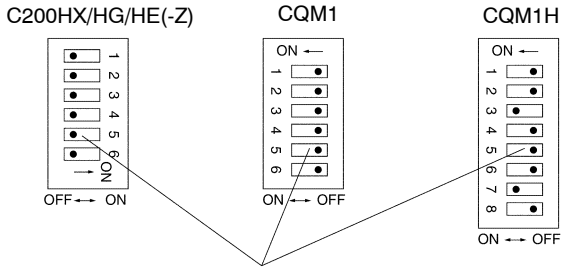
Word	Setting	Setting Contents
DM6550	0001	Host Link mode , no CTS control Conditions set by the contents of DM.
DM6551	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6553	0000	Unit No. 0

- **CPM1**

Word	Setting	Setting Contents
DM6650	0001	Host Link mode Conditions set by the contents of DM.
DM6651	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6653	0000	Unit No. 0

DIP Switch Setting for C200HX/HG/HE(-Z), CQM1, CQM1H

With the C200HX/HG/HE(-Z), CQM1, and CQM1H, in order that the PC Setup settings (data memory) are enabled, set the DIP switch on the front panel in the way shown below.

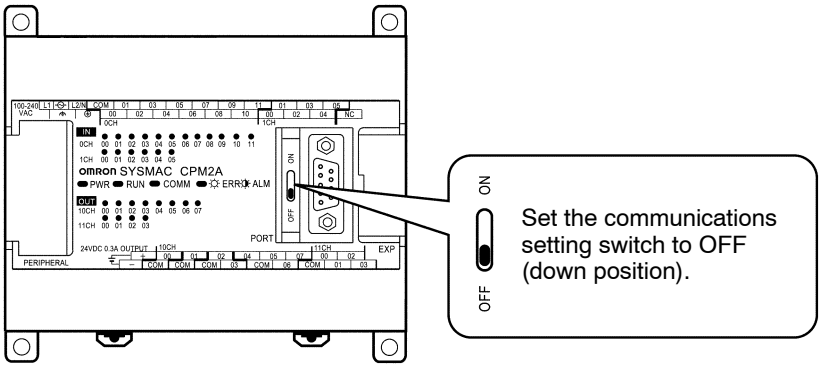


RS-232C Port Communications Conditions Setting
Set SW5 to OFF to enable the settings made in PC Setup.

When using the peripheral port on the CQM1H, set DIP switch pin 7 to ON also.

DIP Switch Setting for CPM2A

With the CPM2A, in order that the PC Setup settings (data memory) are enabled, set the DIP switch on the front panel in the way shown below.



DIP Switch Setting for CPM2C

With the CPM2C, in order that the PC Setup settings (data memory) are enabled, set the DIP switches on the front panel in the way described below.

If (1) the PT is connected to the peripheral port or (2) the PT is connected to the RS-232C port and a device that requires communications settings other than the standard settings is connected to the peripheral port, set the DIP switches in the way shown below.

Set the DIP switches according to the way the peripheral port and the RS-232C port are used.

- If (1) the PT is connected to the peripheral port or (2) the PT is connected to the RS-232C port and a device that requires communications settings other than the standard settings is connected to the peripheral port, set the DIP switches in the way shown below.

Set SW1 to OFF.
Set SW2 to ON.

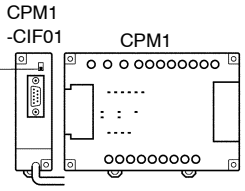
- If the PT is connected to the RS-232C port and a Programming Console is connected to the peripheral port, set the DIP switches in the way shown below.

Set SW1 to OFF.
Set SW2 to OFF.

Switch Setting for the RS-232C Adapter

When using the CPM1-CIF01 RS-232C Adapter, set the mode setting switch in the way shown below.

- Set the mode setting switch to host (upper position).



- **CS1-series CPU Unit: CS1H/G-CPU□□(-V1)**

Connect to the CPU Unit's RS-232C port or the RS-232C port of the Communications Board. When connecting to the peripheral port, use the CS1W-CN118 Connecting Cable.

PC Setup Settings

When connecting to a CS1-series CPU Unit, make the PC Setup settings in the following way. The settings are default settings for the PC Setup and so if the baud rate is 9,600 bps, there is no need to make any changes to the default settings.

Item	Contents of Settings at Host
Baud rate	Set to the same baud rate as the NT30/NT30C (See note 1.)
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

Make the PC Setup settings by setting directly from a Programming Console or by making the settings on the CX-Programmer and then transferring them to the CPU Unit.

For details on the PC Setup, refer to the *SYSMAC CS1 Series Operation Manual* (W339).

- **RS-232C Port of CS1-series CPU Unit**

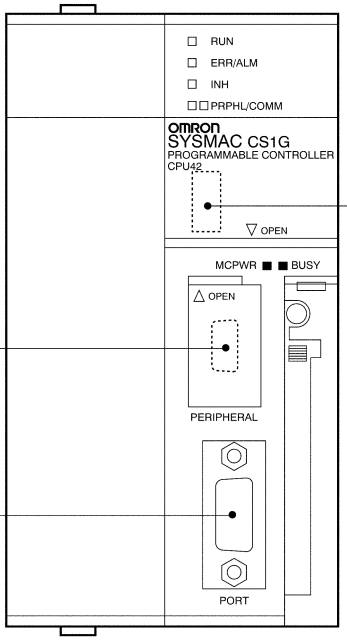
Word	Setting	Setting Contents
IR/CIO 160	8000	Host Link mode, data length: 7 bits, 2 stop bits, even parity
IR/CIO 161	0000	Baud rate: 9,600 bps
	0007	Baud rate: 19,200 bps
IR/CIO 163	0000	Unit No. 0

- **Peripheral Port of CS1-series CPU Unit**

Word	Setting	Setting Contents
IR/CIO 144	8000	Host Link mode, data length: 7 bits, 2 stop bits, even parity
IR/CIO 145	0000	Baud rate: 9,600 bps
	0007	Baud rate: 19,200 bps
IR/CIO 147	0000	Unit No. 0

Setting the Front Switches

Set DIP switch 4 or 5 of the CPU Unit according to the port to which the NT30/NT30C is connected in the following way.



DIP Switch (Inside Battery Cover)

When the NT30/NT30C is connected to the peripheral port, set SW4 to ON (perform communications according to PC Setup settings).

When the NT30/NT30C is connected to the RS-232C port, set SW5 to OFF (perform communications according to PC Setup settings).

Peripheral Port

Mainly used for connecting Programming Devices. (Connection of RS-232C devices also possible.)

RS-232C Port

Mainly used for connecting RS-232C devices. (Connection of CX-Programmer also possible.)

- **CS1-series Serial Communications Board: CS1W-SCB41/21**

DM Area Allocation Settings

From the Programming Device (i.e., a Programming Console or CX-Programmer), write the settings directly to the CPU Unit's DM Area allocation (Setup

Area). After the settings have been written, they will be enabled when the power supply is reset, the Unit is restarted, the communications ports are restarted, or a STUP instruction is executed.

The DM Area words that are allocated and the contents of the settings are shown in the following table.

DM Area Allocation (Words)		Setting	Setting Contents
Port 1	Port 2		
DM32000	DM32010	8000	Host Link mode, 2 stop bits, data length: 7 bits, even parity
DM32001	DM32011	0000	Baud rate: 9,600 bps
		0007	Baud rate: 19,200 bps
DM32002	DM32012	0000	Send delay time: 0 ms
DM32003	DM32013	0000	No CTS control; Host Link unit number: 0

2-6 Connection to a PC by Host Link via RS-422A

Connect the NT30/30C to an OMRON PC by using the RS-422A Host Link method.

If the distance between the NT30/30C and the PC is greater than 15 m, this method should be used. The maximum distance over which a connection can be made is 500 m.

When using the RS-422A method, the host computer and PC are usually connected in a 1 to N ratio (more than one PC), but in the special case of the connection between the NT30/30C and PC, the ratio is 1 to 1.

In order to make a connection to the PC using the Host Link method (RS-422A), the host communications memory switch of the NT30/30C must be set to Host Link, and the port memory switch must be set to RS-422A. For details on memory switch settings, see *Selecting the Host Communication Method* (page 85) and *Selecting the Host Link Communication Port* (page 87).

The terminating resistance setting on the NT30/NT30C (DIP switch 2 pin 8) must also be set to ON.

Reference

- By using the NT-AL001 RS-232C/RS-422A Link Adapter, it is possible to connect the RS-422A terminal block of the NT30/NT30C to the RS-232C connector of the CPU Unit, Host Link Unit, or SRM1. In this case, set the communications method for the NT30/NT30C to RS-422A and the communications method of the PC to RS-232C. For details of the connection method, refer to the manual provided with the RS-232C/RS-422A Link Adapter.
- It is not possible to connect the NT30/NT30C to the PC using RS-485 (2-wire) Host Link communications.

2-6-1 Compatible PCs

Some models and series of OMRON PCs have the Host Link function built in.

- With CS1-series and CQM1H PCs, Host Link communications are possible by connecting via a Serial Communications Board.
- With C200HX/HG/HE PCs, there are some CPU Units that support Host Link communications when a Communications Board is mounted.
- With CPM2A and CPM2C PCs, connection to the NT30/NT30C can be made via the CPM1-CIF11 RS-422A Adapter using RS-422A NT Link (1:1).

Check the model and series of the PC and the model of the Board or Unit before making the connections.

The Units that can be connected to the NT30/NT30C's RS-422A port as the host, and have RS-422A Host Link functionality are listed in the table below.

PC Series	CPU Units with the Host Link Function Built In	CPU Units Connectable Using a Host Link Unit or Communications Board	Host Link Unit or Communications Board	Connectable PC
CS1 series	---	CS1G-CPU42/43/44/45(-EV1) CS1H-CPU63/64/65/66/67(-EV1)	CS1W-SCB41	CS1G CS1H
C series	---	C1000H-CPU01-EV1 C2000H-CPU01-EV1	C120-LK202-V1	C1000H C2000H
	---	C200HS-CPU01/03/21/23/31/33-E C200HE-CPU11/32/42-(Z)E C200HG-CPU33/43/53/63-(Z)E C200HX-CPU34/44/54/64-(Z)E	C200H-LK202-V1	C200HS C200HE C200HE-Z C200HG C200HG-Z C200HX C200HX-Z
	---	C200HE-CPU32/42-(Z)E	C200HW-COM03/06-V1	C200HE C200HE-Z
	---	C200HG-CPU33/43/53/63-(Z)E		C200HG C200HG-Z
	---	C200HX-CPU34/44/54/64-(Z)E		C200HX C200HX-Z
	---	C1000H-CPU01-EV1 C2000H-CPU01-EV1	C500-LK201-V1	C1000H C2000H
	---	C1000H-CPU01-EV1 C1000HF-CPUA1-EV1 C2000H-CPU01-EV1	C500-LK203	C1000H(F) C2000H
	CPM1-10/20/30CDR-□ + CPM1-CIF11	---	---	CPM1
	CPM1A-10/20/30/40CD□-□ + CPM1-CIF11			
	CPM2A-30/40/60CD□□-□ + CPM1-CIF11 (when connected via peripheral port)			CPM2A
	CPM2C-10/20□□□□□□-□ (*1)			CPM2C
	---	CQM1H-CPU51/61-E	CQM1H-SCB41	CQM1
CV series (*2)	CV500-CPU01-EV1	CV500-CPU01-EV1	CV500-LK201	CV500
	CV1000-CPU01-EV1	CV1000-CPU01-EV1		CV1000
	CV2000-CPU01-EV1	CV2000-CPU01-EV1		CV2000
CVM1 series (*2)	CVM1-CPU01-EV□ CVM1-CPU11-EV□ CVM1-CPU21-EV□	CVM1-CPU01-EV□ CVM1-CPU11-EV□ CVM1-CPU21-EV□	CV500-LK201	CVM1
SRM1	SRM1-C02-V2 + CPM1-CIF11	---	---	SRM1

(*1) The CPM2C-CN111 or CS1W-CN114/118 Connecting Cable, the CPM1-CIF01 RS-232C Adapter, or the CPM1-CIF11 RS-422A Adapter is required.

(*2) Connection to CVM1/CV series PC CPU Units that are not suffixed "-V□" is not possible. In the case of these CPU Units, make the connection to the NT30/30C by using a Host Link Unit.

2-6-2 Parts Required for Connection

The RS-422A cable used for RS-422A communications is not supplied by OMRON. Make this cable in accordance with the environment (PC used and transmission distance between the NT30/30C and PC).

Two connectors, two connector covers and one cable are required to make up a connecting cable. One connector and one connector cover is supplied with the PC. However, a cable of the type recommended by OMRON must be prepared.

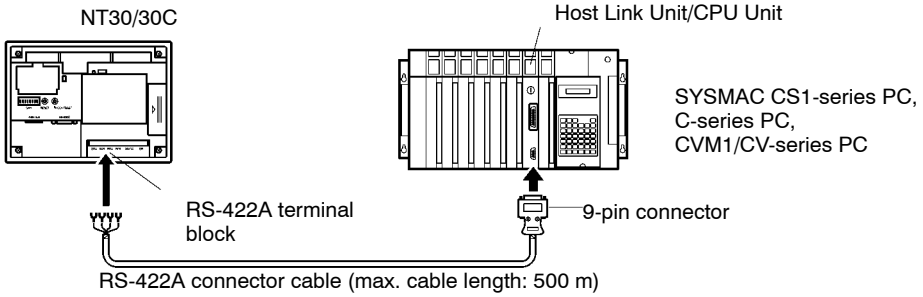
For details on making the cable, refer to *Making the Cable* on page 279. The table below lists the components supplied with each Unit and the recommended cables.

Name	Model	Remarks
Connector	XM2A-0901	9-pin, manufactured by OMRON - Delivered with C-series CQM1 and CVM1/CV-series CPU Unit. - Delivered with the following Host Link Units: C200H-LK202-V1 C500-LK203 CV500-LK201
	DE-9P	9-pin, manufactured by JAE - Delivered with the following Host Link Units: C200H-LK202-V1 C500-LK201-V1
Connector cover	XM2S-0911	9-pin, manufactured by OMRON - Delivered with C-series CQM1 and CVM1/CV-series CPU Unit. - Delivered with the following Host Link Units: C200H-LK202-V1 C500-LK203 CV500-LK201
	DE-CI-J6	9-pin, manufactured by JAE - Delivered with the following Host Link Units: C200H-LK202-V1 C500-LK201-V1
Cable	TKVVBS4P-03	Manufactured by Tachii Electric Wire

2-6-3 Method for Connection

For RS-422A communication, an RS-422A cable is used as the transmission channel connecting the NT30/30C and PC.

As shown in the figure below, the RS-422A cable is connected directly to the NT30/30C.



Correct use

- Ground the FG terminal of the PC to 100 Ω or less. For details, refer to the manual for the PC.
- Switch OFF the NT30/30C power supply before connecting or disconnecting a connector.
- After connecting the connector cable, be sure to secure the connector with screws.

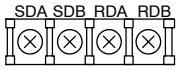
2-6-4 Connector Specifications and Wiring for Each Unit

The combination of pin numbers to which the connecting wires are connected differs according to the connector specifications for each Unit. Check the connector specifications of the Unit to be connected and make the wiring connections by referring to the relevant connection combination among those indicated below.

For details on making the cable, see *Making the Cable* (page 279).

NT30/30C RS-422A Terminal Block Specifications

- Connected terminal block: RS-422A terminal block (M3.5 screws)
- Electrical characteristics: Conform to EIA RS-422A
- Signal direction: Signal input and output is relative to the NT30/30C.



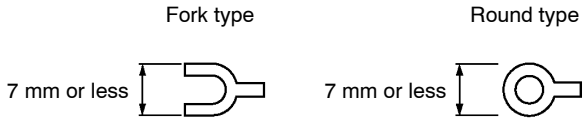
Signal Name	Abbreviation	Signal Direction	
		Input	Output
Send data A	SDA (SD−)		○
Send data B	SDB (SD+)		○
Receive data A	RDA (RD−)	○	
Receive data B	RDB (RD+)	○	

Terminal Screws and Crimp Terminals on the NT30/NT30C's RS-422A Terminal Block

The terminal screws have M3.5 specifications. Use M3.5-compatible crimp terminals for wiring. Tighten terminal screws to a torque not exceeding 0.8 N·m.

⚠**Caution** Be sure to use crimp terminals for wiring.

Examples of Compatible Crimp Terminals

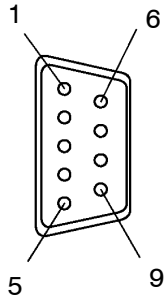


Maker	Model (fork type)	Applicable Wire (stranded wire)
Japan Solderless Terminal MFG	1.25-N3A	SWG22 to AWG18 (0.3 to 0.75 mm^2)
Molex	Y1.25-3.5L	

- **Connecting the NT30/30C to a C-series Host Link Unit**

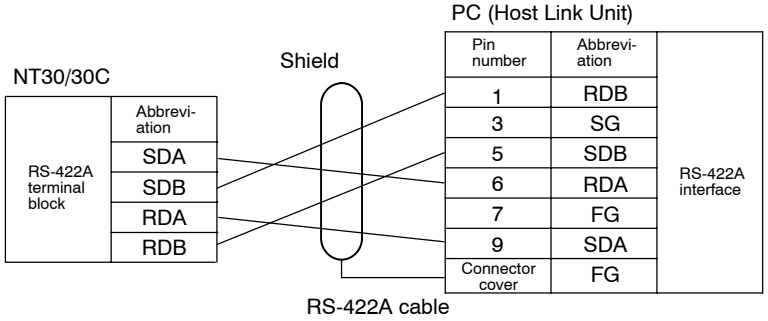
C-series Host Link Connector Specifications

- Applicable Host Link Units: C200H-LK202-V1
  C500-LK202-V1
  C120-LK202-V1
- Electrical characteristics: Conform to EIA RS-422A
- Signal direction: Signal input and output is relative to the Host Link Unit.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
1	Receive data B	RDB	○	
3	Signal ground	SG	–	–
5	Send data B	SDB		○
6	Receive data A	RDA	○	
7	Frame ground	FG	–	–
9	Send data A	SDA		○

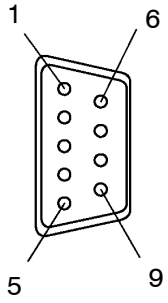
Wiring Connections



- **Connecting the NT30/30C to a C-series Host Link Unit (insulated)**

C-series Host Link Connector Specifications

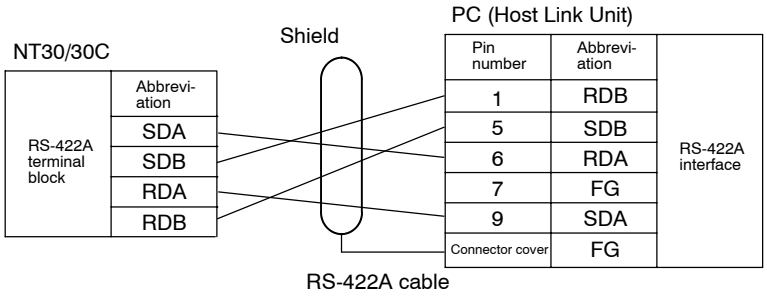
- Applicable Host Link Units: C500-LK203 (insulated)
- Electrical characteristics: Conform to EIA RS-422A
- Signal direction: Signal input and output is relative to the Host Link Unit.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
1	Receive data B	RDB	○	
5	Send data B	SDB		○
6	Receive data A	RDA	○	
7	Frame ground	FG	–	–
9	Send data A	SDA		○

Wiring Connections

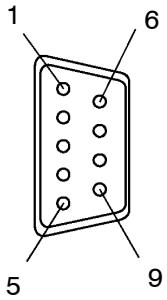
Connect the shield for the cable to pin No. 7 of the connector at the Host Link Unit side only.



- **Connecting the NT30/30C to a CVM1/CV-series Host Link Unit**

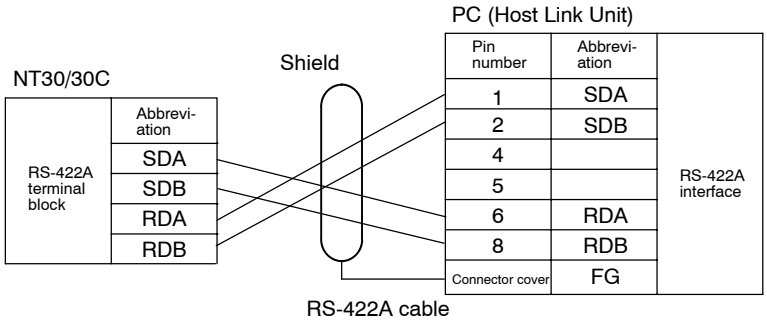
CVM1/CV-series Host Link Unit Connector Specifications

- Applicable Host Link Units: CV500-LK201 (communication port 2)
- Electrical characteristics: Conform to EIA RS-422A
- Signal direction: Signal input and output is relative to the Host Link Unit.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
1	Send data A	SDA (SD–)		○
2	Send data B	SDB (SD+)		○
6	Receive data A	RDA (RD–)	○	
8	Receive data B	RDB (RD+)	○	

Wiring Connections

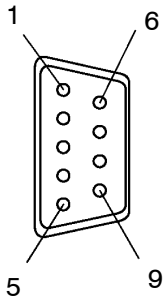


- **Connecting the NT30/30C to a CVM1/CV-series CPU Unit**

CVM1/CV-series CPU Unit Connector Specifications

- Applicable Host Link Units: CV500-CPU01-EV1
  CV1000-CPU01-EV1
  CV2000-CPU01-EV1
  CVM1-CPU01-EV□
  CVM1-CPU11-EV□
  CVM1-CPU21-EV□

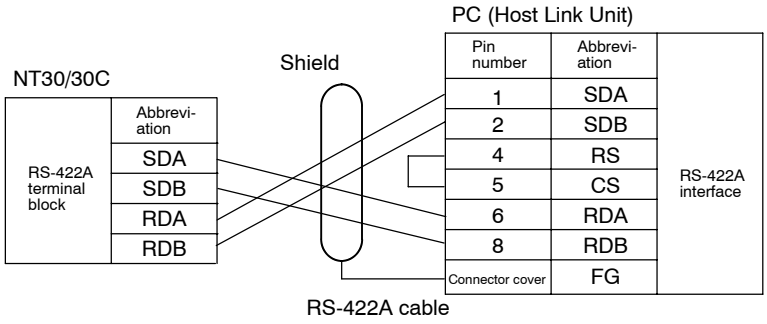
  Only the CVM1/CV-series CPU Units of version 1 (suffix of "-EV1") or later can be connected to the NT30/30C.
- Electrical characteristics: Conform to EIA RS-422A
- Signal direction: Signal input and output is relative to the PC.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
1	Send data A	SDA (SD–)		○
2	Send data B	SDB (SD+)		○
4	Request to send	RS		○
5	Clear to send	CS	○	
6	Receive data A	RDA (RD–)	○	
8	Receive data B	RDB (RD+)	○	

Wiring Connections

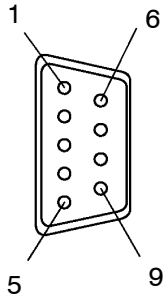
Short pin No. 4 (RS) with pin No. 5 (CS) at the CPU Unit side.



- **Connecting the NT30/30C to a Communications Board on a C200HX/HG/HE(-Z) or to a Serial Communications Board on a CS1-series PC or CQM1H**

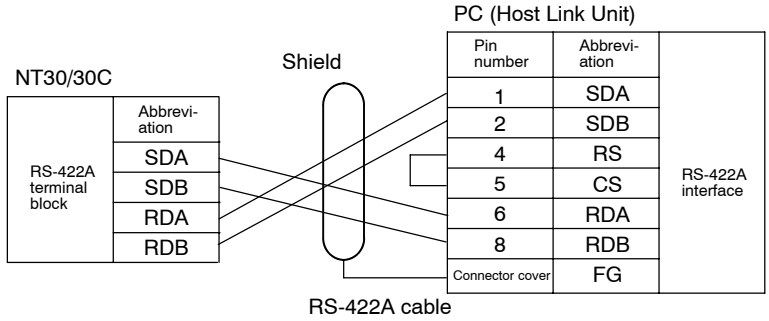
Board RS-422A Connector Specifications

- Applicable Boards: C200HW-COM03-V1
  C200HW-COM06-V1
  CS1W-SCB41
  CQM1H-SCB41
- Electrical characteristics: Conform to EIA RS-422A
- Signal direction: Signal input and output is relative to the PC.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
1	Send data A	SDA (SD–)		○
2	Send data B	SDB (SD+)		○
6	Receive data A	RDA (RD–)	○	
8	Receive data B	RDB (RD+)	○	

Wiring Connections



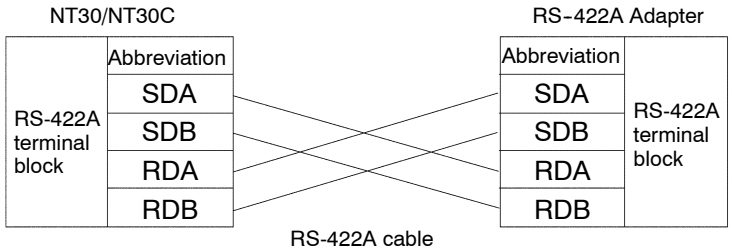
Reference It is not possible to connect the NT30/NT30C to the PC using RS-485 (2-wire) Host Link communications.

- **Connecting the NT30/30C to a CPM1, CPM2A, or CPM2C PC, or an SRM1**

RS-422A Adapter Terminal Block Specifications

- Applicable RS-422A Adapter: CPM1-CIF11
- Electrical characteristics: Conform to EIA RS-422A

Wiring Connections



Terminal Screws and Crimp Terminals on the RS-422A Adapter's RS-422A Terminal Block

The standard for terminal screws is M3. Use M3-compatible crimp terminals for wiring. Tighten terminal screws to a torque not exceeding 0.5 N·m.

⚠**Caution** Be sure to use crimp terminals for wiring.

2-6-5 PC Switch Settings

When the NT30/30C and PC are connected to each other, set the conditions at the PC Host Link Unit or the CPU Unit as given in the table below.

The following is a general description of switch settings.

Refer to the manual for respective Units for details of the switch settings.

Item	Switch Setting
I/O port	RS-422A
Baud rate	Set the same baud rate as the NT30/30C. (*1)
Transfer code	ASCII 7 data bits, 2 stop bits
Parity	Even
1-to-1/1-to-N	1-to-N (*2)
Command level	Level 1, 2, 3
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

*2 The 1-to-N setting enables BCC (Block Check Character). It is not possible to connect more than one NT30/30C in a single Host Link.

Correct use When using the CVM1/CV series, always set CPU Unit execution processing (execution control 2) in the PC Setup to synchronous processing.

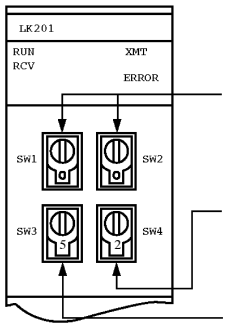
Connecting to a Host Link Unit

Two models of Host Link Units are available: Rack-mounting Unit and a CPU-mounting Unit. The switch settings differ according to the model of Host Link Unit. Set the switches according to the model of the Unit.

- **C200H Rack-mounting Host Link Unit: C200H-LK202-V1**

Setting the Front Switches

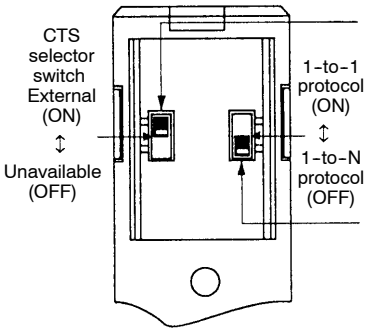
Set each switch with a flat-blade screwdriver so that the values or symbols in the setting value window agree with the switch settings indicated in the table above.



- Unit # (SW1, SW2)
  Set these switches to 0.
- Command level, parity, and transfer code (SW4)
  Set this switch to 2.
- Baud rate (SW3)
  Set this switch to 5 to select 9,600 bps.
  Set this switch to 6 to select 19,200 bps.

C200H-LK202-V1

This Unit has an RS-422A connector.



- Terminator setting (selector switch)
  Set this switch to ON.
  Note: Set the link adapter to ON also.

- 1-to-1/1-to-N protocol selection (selector switch)
  Set this switch to 1-to-N (OFF)

- **C500/C1000H Rack-mounting Host Link Units: C500-LK201-V1 and C500-LK203**

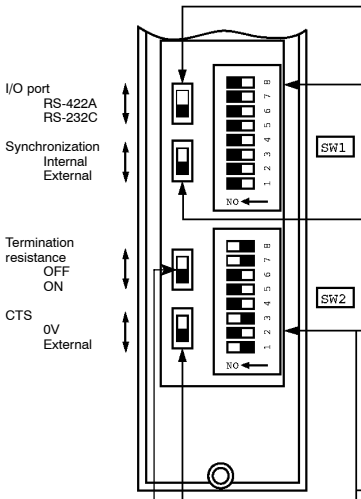
Setting the Front Switches

- C500-LK201-V1

Set the control mode to the Host Link mode. (page NO TAG)

Setting the Rear Switches

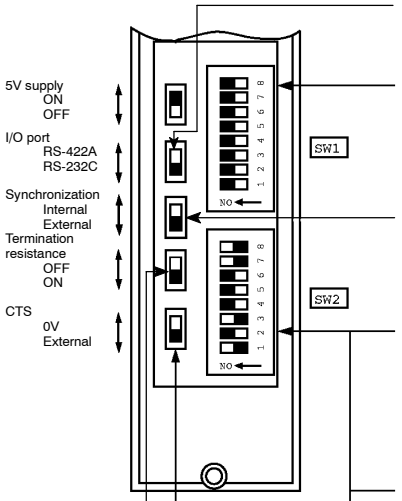
- C500-LK201-V1



- I/O port selection (selector switch)
  - If connecting to an RS-232C connector, set this to RS-232C.
  - If connecting to an RS-422A connector, set this to RS-422A.
- Unit # (DIP switch SW1)
  Set pins 1 to 5 to OFF (0).
- Synchronization (selector switch)
  Set this to internal synchronization.
- Baud rate (DIP switch SW2 pins 1 to 4)
  Set these pins to 1010 to select 9,600 bps.
  Set these pins to 0010 to select 19,200 bps.
  (0: OFF, 1: ON)
- 1-to-1/1-to-N selection (DIP switch SW2 pin 6)
  Set pin 6 to OFF (0) (1-to-N).
- Command level (DIP switch SW2 pins 7 and 8)
  Set these pins to ON (1).
  (Levels 1, 2, and 3 are enabled.)
- CTS selection (selector switch)
  Set this always to 0V (ON).
- Terminator setting (selector switch)
  When using an RS-422A cable, set this to ON.
  Note: Set the Link Adapter to ON also.

Setting the Rear Switches

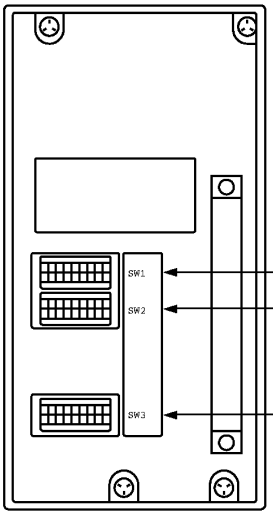
- C500-LK203



- I/O port selection (selector switch)
  - If connecting to an RS-232C connector, set this to RS-232C.
  - If connecting to an RS-422A connector, set this to RS-422A.
- Machine No., parity, transfer code settings
  (DIP switch SW1 pins 1 to 7)
  Set pins 1 to 7 to OFF (0).
- Synchronization (selector switch)
  Set this to Internal.
- Baud rate (DIP switch SW2 pins 1 to 4)
  Set these pins to 1010 to select 9,600 bps.
  Set these pins to 0010 to select 19,200 bps.
  (0: OFF, 1: ON)
- 1-to-1/1-to-N selection (DIP switch SW2 pin 6)
  Set pin 6 to OFF (0) (1-to-N).
- Command level (DIP switch SW2 pins 7 and 8)
  Set these pins to ON (1).
  (Levels 1, 2, and 3 are enabled.)
- CTS selection (selector switch)
  Set this always to 0 V (ON).
- Terminator setting (selector switch)
  When using an RS-422A cable, set this to ON.
  Note: Set the Link Adapter to ON also.

- **CPU-mounting Host Link Units: C120-LK201-V1 and C120-LK202-V1**

Setting the Rear Switches



- Unit #, parity, and transfer code (DIP switch SW1 pins 1 to 5)
  Set pins 1 to 5 to OFF (0).
  * Parity is fixed at even parity. Transfer code is fixed at ASCII 7 data bits and 2 stop bits.

- Baud rate (DIP switch SW2 pins 1 to 4)
  Set these pins to 1010 to select 9,600 bps.
  Set these pins to 0010 to select 19,200 bps.
  (0: OFF, 1: ON)

- 1-to-1/1-to-N selection (DIP switch SW2 pin 6)
  Set pin 6 to OFF (0) (1-to-N).

- Command level (C120-LK201-V1) (DIP switch SW2 pins 7 and 8)
  Set these pins to ON (1).
  (Levels 1, 2, and 3 are enabled.)

- CTS selection (C120-LK201-V1)
  (DIP switch SW3 pins 1 and 2)
  Set pin 1 to ON (1) and pin 2 to OFF (0).
  (Set this always to 0 V.)

- Synchronization (C120-LK201-V1)
  (DIP switch SW3 pins 3 to 6)
  Set pins 3 and 5 to ON (1) and pins 4 and 6 to OFF (0).
  Set this to Internal synchronization.

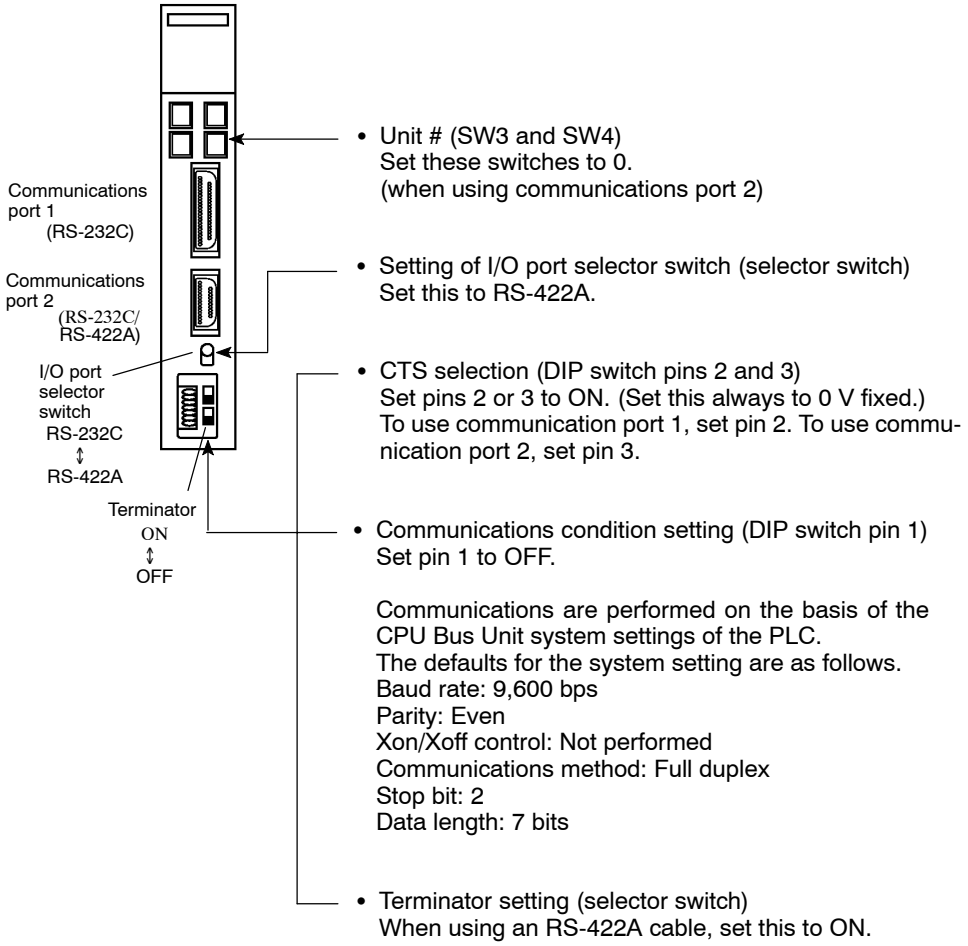
- Terminator setting (C120-LK202-V1)
  (DIP switch SW3 pins 1 to 6)
  When using an RS-422A cable, set pins 1, 3, and 5 to ON (1), and set pins 2, 4, and 6 to OFF (0).
  (Set this for termination.)
  Note: Set the Link Adapter for termination too.

- **CVM1/CV-series Rack-mounting Host Link Unit: CV500-LK201**

Setting the Front Switches

Set the operating conditions with the CPU Bus Unit setting functions when an NT30/30C and a CVM1/CV-series Host Link Unit is connected to the NT30/30C. The CPU Bus Unit setting can be made directly from the Programming Device (CX-Programmer) or the CPU Bus Unit setting information created with a Programming Device can be transferred to the CPU Unit.

The following describes the switch settings so as to enable the CPU Bus Unit setting. For details of the CPU Bus Unit setting, refer to the *SYSMAC CVM1/CV-series Host Link Operation Manual* (W205).



Connecting to a CPU Unit

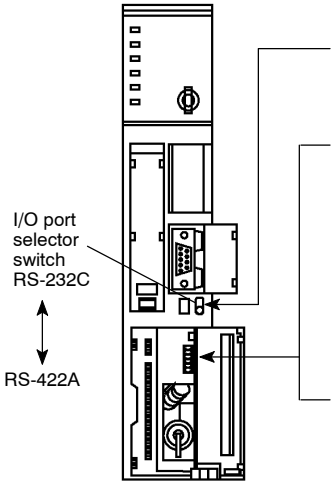
Set the communication conditions with the PC Setup functions when a CVM1/CV-series Host Link Unit is connected to the NT30/30C. The PC Setup can be made directly from the Programming Device (CX-Programmer) or the PC Setup information created with a Programming Device can be transferred to the CPU Unit.

The following describes the switch settings so as to enable the PC Setup. For details of the PC Setup, refer to the *SYSMAC C20H/C28H/C40H/C60H Programming Manual* (W176) and the *SYSMAC C-series and CVM1 PCs SYSMAC Support Software Operation Manual: CVM1 PCs* (W249).

CVM1/CV-series: CV500-CPU01-EV1
CV1000-CPU01-EV1
CVM1-CPU01-EV□
CVM1-CPU11-EV□
CVM1-CPU21-EV□

Only the CVM1/CV-series CPU Units or version 1 (suffix of "-EV1") or later can be connected to the NT30/30C.

Setting the Front Switches



- Host Link communications method (selector switch)
  - If connecting to an RS-232C connector, set this to RS-232C.
  - If connecting to an RS-422A connector, set this to RS-422A.
- Host Link default value setting (DIP switch pin 4)
  To effect the existing DIP switch settings, set pin 4 to ON.
  To effect the existing PC Setup, set pin 4 to OFF.
  Note: The existing DIP switch settings differ from the existing PC Setup as follows.
  - DIP switch settings: 2400 bps, 1 stop bit, even parity, 7-bit data length
  - PC Setup: 9,600 bps, 2 stop bits, even parity, 7-bit data length
- Terminator setting (DIP switch pin 6)
  When using an RS-422A cable, set pin 6 to ON.
  (Set this for termination.)
  Note: Set the Link Adapter to ON also.

PC Setup Settings

Set the following communications settings in the PC Setup.

Item	Possible Settings
Baud rate	Set to the same baud rate as the NT30/NT30C (See note 1.)
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

- **C-series C200HX/HG/HE(-Z), CPM1, CPM2A, CPM2C, or CQM1H CPU Unit, or SRM1**

The method for connecting to the CPU Unit depends on the model of PC in the way shown in the following table.

PC	Connection Method
C200HX/HG/HE(-Z)	• Connect to the RS-422A port (port A) on the Communications Board.
CQM1H	• Connect to the RS-422A port (port 2) on the Serial Communications Board.
CPM1	• Connect via the CPM1-CIF11 RS-422A Adapter using the peripheral port.
CPM2A, SRM1	• Connect via the CPM1-CIF11 RS-422A Adapter using the peripheral port.
CPM2C	• Connect to the peripheral port using the CPM2C-CN111 or CS1W-CN114 Connecting Cable and the CPM1-CIF11 RS-422A Adapter. (The CPM2C-CN111 splits the communications port on the CPU Unit into an RS-232C port and the peripheral port. The CPM1-CIF01 RS-232C Adapter is also required to connect to the peripheral port.)

Reference

- There are no Communications Boards for C200HX/HG/HE(-Z) PCs for which port B is the RS-422A port.
- There are no Serial Communications Boards for CQM1H PCs for which port 1 is the RS-422A port.

PC Setup Settings

When connecting to a C200HX/HG/HE(-Z), CPM1, CPM2A, CPM2C, or CQM1H CPU Unit, or to the SRM1, make the following communications settings in the PC Setup.

Item	Contents of Settings at Host
I/O port	RS-422A
Communications mode	Host Link
Baud rate	Set to the same baud rate as the NT30/NT30C (See note 1.)
Stop bit	2 stop bits
Parity	Even
Data length	ASCII 7 bits
Unit #	00

*1 Set the Host Link baud rate to 9,600 bps or 19,200 bps with the memory switch for the baud rate. For details, refer to *Selecting the Host Link Baud Rate* (page 86).

Make the PC Setup settings directly from the Programming Device (CX-Programmer). For details of PC Setup operations, refer to the manual for the PC used.

The following tables give the PC Setup word numbers and the contents of settings for different combinations of connected model and port.

- **Port A of Communications Board on C200HG/HX/HE(-Z)**

Word	Setting	Setting Contents
DM6555	0001	Host Link mode, no CTS control Conditions set by the contents of DM.
DM6556	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6558	0000	Unit No. 00

- **CPM1, CPM2A, CPM2C, or SRM1**

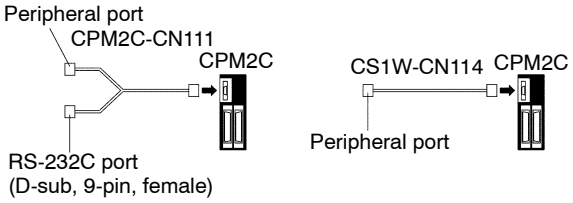
Word	Setting	Setting Contents
DM6650	0001	Host Link mode, no CTS control Conditions set by the contents of DM.
DM6651	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6653	0000	Unit No. 00

- **CQM1H**

Word	Setting	Setting Contents
DM6550	0001	Host Link mode, no CTS control Conditions set by the contents of DM.
DM6551	0303	Data length: 7 bits, 2 stop bits, even parity, baud rate: 9,600 bps
	0304	Data length: 7 bits, 2 stop bits, even parity, baud rate: 19,200 bps
DM6553	0000	Unit No. 00

Connecting the NT30/30C to a C-series CPM2C

The CPM2C has only one connector, which is the same shape as the CS1-series peripheral port. The signals in this connector, however, are divided internally into those for the RS-232C port and those for the peripheral port. Therefore, when using the CPM2C, connect to the peripheral port in the way shown below according to the Connecting Cable and ports used. For details, refer to the *CPM2C Operation Manual* (W356).



Switch Settings for a Communications Board on a C200HX/HG/HE(-Z) PC

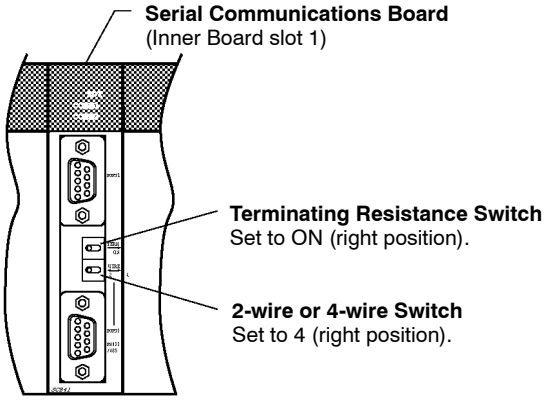
Set the switches for a Communications Board on a C200HX/HG/HE(-Z) PC in the following way:

Switch 1: 4 (4-wire = RS-422A)
Switch 2: ON (terminator ON = terminating resistance enabled)

Switch Settings for a Serial Communications Board on a CQM1H PC

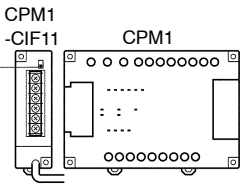
Set the switches for a Serial Communications Board on a CQM1H PC in the following way:

2-wire or 4-wire switch (WIRE): 4 (4-wire = RS-422A)
Terminating resistance switch (TERM): ON (terminator ON = terminating resistance enabled)



Switch Settings for the RS-422A Adapter

- Set the terminal resistance switch to ON (upper position).



- **CS1-series Serial Communications Board: CS1W-SCB41 (Port 2)**

DM Area Allocation Settings

From the Programming Device (i.e., a Programming Console or CX-Programmer), write the settings directly to the CPU Unit's DM Area allocation (Setup Area). After the settings have been written, they will be enabled when the power supply is reset, the Unit is restarted, the communications ports are restarted, or a STUP instruction is executed.

The DM Area words that are allocated and the contents of the settings are shown in the following table.

DM Area Allocation (words)	Setting	Setting Contents
Port 2		
32010	8000	Host Link mode, 2 stop bits, data length: 7 bits, even parity
32011	0000	Baud rate: 9,600 bps
	0007	Baud rate: 19,200 bps
32012	0000	Send delay time: 0 ms
32013	0000	No CTS control; Host Link unit number: 0

2-7 Connection to a PC by the NT Link

Connect the NT30/30C to an OMRON PC by the NT Link method.

To connect an NT30/30C to a PC by the NT Link method, the communications method memory switch of the NT30/30C must be set to NT Link. For details on the communication method memory switch setting, refer to *Selecting of the Host Communication Method* (page 85).

2-7-1 Compatible PCs

Some models and series of OMRON PCs have the NT Link function built in. There are also C200HX/HG/HE(-Z) and CQM1H CPU Units that can be used for NT Link communications when a Board is mounted. Check the model and series of the PC, and the model of the CPU Unit before making the connections.

The PCs that can be connected by NT Link are listed in the table below.

PC series	CPU Units with the NT Link Function Built In	CPU Units Connectable Using a Communications Board	Connectable PC
C series	CPM1-10CDR-□ (*1) CPM1-20CDR-□ (*1) CPM1-30CDR-□ (*1) CPM1-30CDR-□-V1 CPM1A-10CD□-□ (*1) CPM1A-20CD□-□ (*1) CPM1A-30CD□-□ (*1) CPM1A-40CD□-□ (*1)	---	CPM1
	CPM2A-30CD□□-□ CPM2A-40CD□□-□ CPM2A-60CD□□-□	---	CPM2A
	CPM2C-10□□□□□□-□ (*2) CPM2C-20□□□□□□-□ (*2)	---	CPM2C
	CQM1-CPU41-EV1 CQM1-CPU42-EV1 CQM1-CPU43-EV1 CQM1-CPU44-EV1	---	CQM1
	CQM1H-CPU21 CQM1H-CPU51 CQM1H-CPU61	CQM1H-CPU51 (*3) CQM1H-CPU61 (*3)	CQM1H
	C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	---	C200HS
	C200HE-CPU42-(Z)E	C200HE-CPU32-(Z)E (*4) C200HE-CPU42-(Z)E (*4)	C200HE(-Z)
	C200HG-CPU43-(Z)E C200HG-CPU63-(Z)E	C200HG-CPU33-(Z)E (*4) C200HG-CPU43-(Z)E (*4) C200HG-CPU53-(Z)E (*4) C200HG-CPU63-(Z)E (*4)	C200HG(-Z)
	C200HX-CPU44-(Z)E C200HX-CPU64-(Z)E C200HX-CPU65-(Z)E C200HX-CPU85-(Z)E	C200HX-CPU34-(Z)E (*4) C200HX-CPU44-(Z)E (*4) C200HX-CPU54-(Z)E (*4) C200HX-CPU64-(Z)E (*4) C200HX-CPU65-(Z)E (*4) C200HX-CPU85-(Z)E (*4)	C200HX(-Z)
CV series (*5)	CV500-CPU01-EV1	---	CV500
	CV1000-CPU01-EV1	---	CV1000
	CV2000-CPU01-EV1	---	CV2000

PC series	CPU Units with the NT Link Function Built In	CPU Units Connectable Using a Communications Board	Connectable PC
CVM1 series (*5)	CVM1-CPU01-EV□ CVM1-CPU11-EV□ CVM1-CPU21-EV□	---	CVM1
CompoBus/S Master Control Unit	SRM1-C02-V2	---	SRM1

*1 The CPM1-CIF01 Adapter is required.

*2 The CPM2C-CN111 or CS1W-CN114/118 Connecting Cable, the CPM1-CIF01 RS-232C Adapter, or the CPM1-CIF11 RS-422A Adapter is required.

*3 The CQM1H-SCB41 Serial Communications Board is required.

*4 One of the C200HW-COM02/COM03/COM04/COM05/COM06(-V1) Communications Boards is required. (The RS-422A Connecting Cable can be connected to the C200HW-COM03/COM06-V1.)

*5 CVM1 and CV-series CPU Units without "-V□" at the end of the model number cannot be connected.

2-7-2 Connecting the NT30/30C

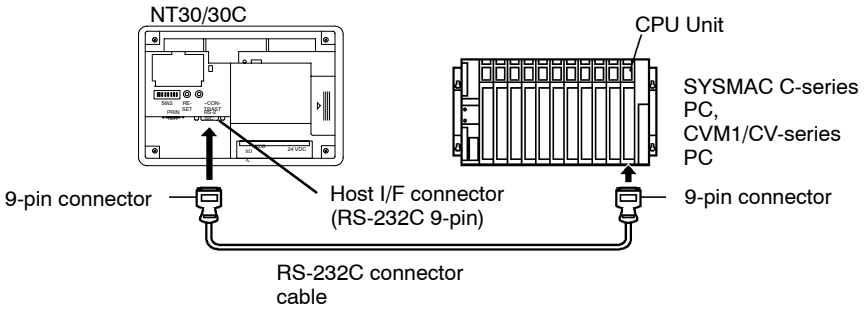
Refer to the illustrations below to select the appropriate cable for the Unit connectors and connect the NT30/30C to the PC.

A Host Link connector cable can also be used. To make a connector cable, refer to the appendix *Making the Cable for Connection to the PC* (page 271).

Correct use

- After connecting a communication cable, always secure it with the screws. Otherwise the cable may disconnect, causing operation to fail.
- The cable's tensile load is 30 N. Do not subject it to loads greater than this. Otherwise a discontinuity may occur, causing operation to fail.

Use a connector cable with a 9-pin connector on both ends to connect the NT30/30C to a PC with a 9-pin connector.



The following are recommended cables (manufactured by OMRON)

Connector Specification	Model	Cable Length
9-pin ↔ 9-pin	SJ46006-102	1 m
	SJ46006-202	2 m

When a Connector Cable of 5 m or Longer Is Required

When a connector cable of 5 m or longer is required, please make the cable. However, note that the maximum transmission distance is 15 m.

To make a connector cable, refer to the appendix *Making the Cable for Connection to the PC* (page 271).

When Long-distance Communications are Required

Communications distances greater than RS-232C standards can be achieved using RS-422A communications (RS-485 communications cannot be used).

2-7-3 PC Switch Settings (RS-232C at PC Side)

The setting methods for different types of Units are given below.

- **C-series C200HS, C200HX/HG/HE(-Z), CPM1, CPM2A, CPM2C, CQM1, CQM1H, SRM1**

PC Setup

Write the settings directly from the Programming Device (e.g., CX-Programmer) to the PC Setup (data memory) according to the model of the host and the port used.

Host	Word	Setting	Setting Contents
RS-232C port of C200HS, C200HX/HG/HE(-Z), CPM2A, CPM2C, CQM1, CQM1H, or SRM1	DM6645	4000	NT (1:1) Link is used.
Port A of C200HX/HG/HE(-Z) (See note 1.) or port 1 of CQM1H (See note 2.)	DM6555		
Port B (See note 1.) of C200HX/HG/HE(-Z)	DM6550		
CPM1	DM6550		

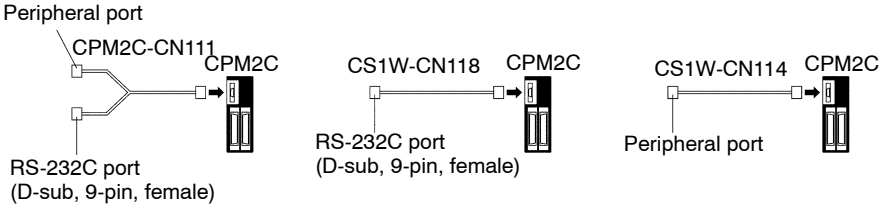
Note 1. RS-232C port of Communications Board.
2. RS-232C port of Serial Communications Board.

For details of PC Setup operations, refer to the manual for the PC used.

Connecting the NT30/30C to a C-series CPM2C

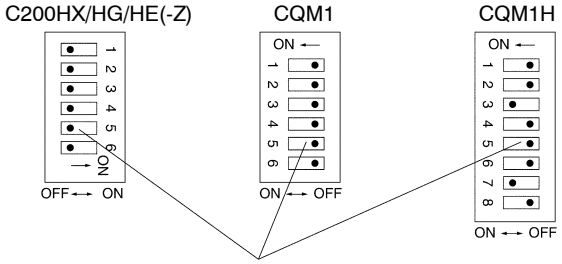
The CPM2C has only one connector, which is the same shape as the CS1-series peripheral port. The signals in this connector, however, are divided internally into those for the RS-232C port and those for the peripheral port. Therefore, when using the CPM2C, make separate settings for the RS-232C port and the peripheral port according to the conversion cables and ports used, in the way shown in the following table. For details, refer to the *CPM2C Operation Manual* (W356).

Port Connected to the PT	PC Setup
RS-232C port of the CS1W-CN111 (D-sub, 9-pin)	Perform settings for the RS-232C port
Peripheral port of the CS1W-CN111	Perform settings for the peripheral port
Port of the CS1W-CN118 (D-sub, 9-pin)	Perform settings for the RS-232C port
Port of the CS1W-CN114 (peripheral port)	Perform settings for the peripheral port



DIP Switch Setting for C200HX/HG/HE(-Z), CQM1, CQM1H

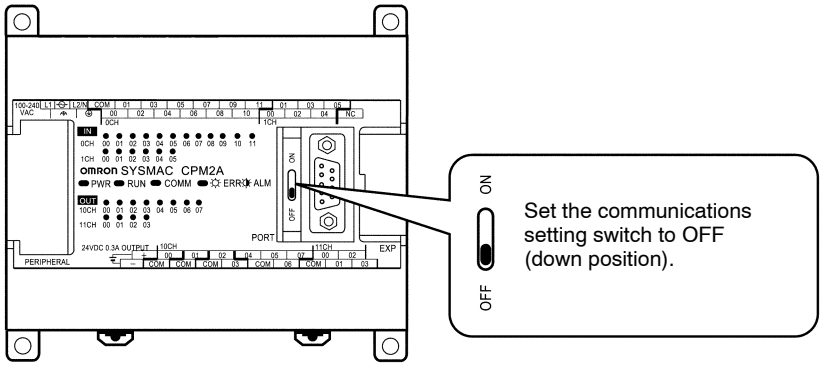
With the C200HX/HG/HE(-Z), CQM1, and CQM1H, in order that the PC Setup settings (data memory) are enabled, set the DIP switch on the front panel in the way shown below.



RS-232C Port Communications Conditions Setting
Set SW5 to OFF to enable the settings made in PC Setup.

DIP Switch Setting for CPM2A

With the CPM2A, in order that the PC Setup settings (data memory) are enabled, set the DIP switch on the front panel in the way shown below.



DIP Switch Setting for CPM2C

With the CPM2C, in order that the PC Setup settings (data memory) are enabled, set the DIP switches on the front panel in the way described below.

Set the DIP switch according to the way the peripheral port and the RS-232C port are used.

- If (1) the PT is connected to the peripheral port or (2) the PT is connected to the RS-232C port and a device that requires communications settings other than the standard settings is connected to the peripheral port, set the DIP switches in the way shown below.

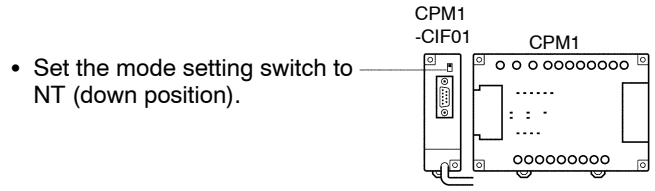
Set SW1 to OFF.
Set SW2 to ON.

- If the PT is connected to the RS-232C port and a Programming Console is connected to the peripheral port, set the DIP switches in the way shown below.

Set SW1 to OFF.
Set SW2 to OFF.

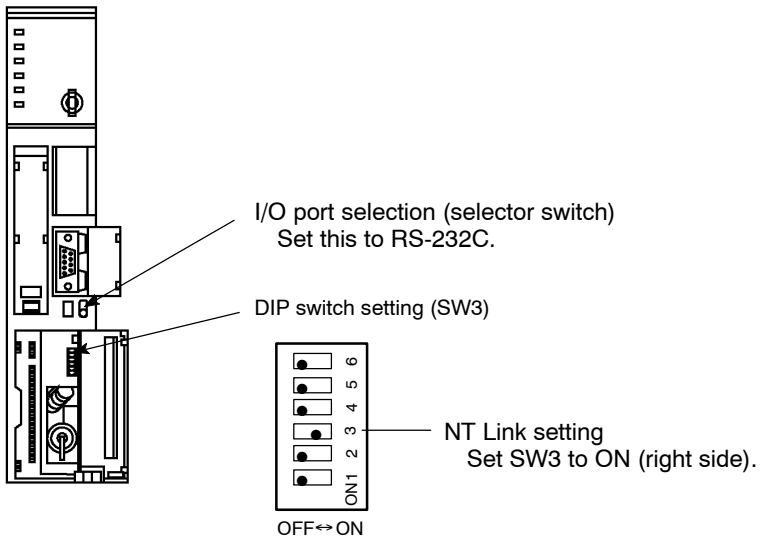
Switch Setting for the RS-232C Adapter

When using the CPM1-CIF01 RS-232C Adapter, set the mode setting switch in the way shown below.



- **CVM1/CV-series (-EV□)**

When connecting to a CVM1/CV-series (-EV□) CPU Unit, set the switches as given below.



Correct use When using the CVM1/CV series, always set CPU Unit execution processing (execution control 2) in the PC Setup to synchronous processing.

2-7-4 PC Switch Settings (RS-422A at PC Side)

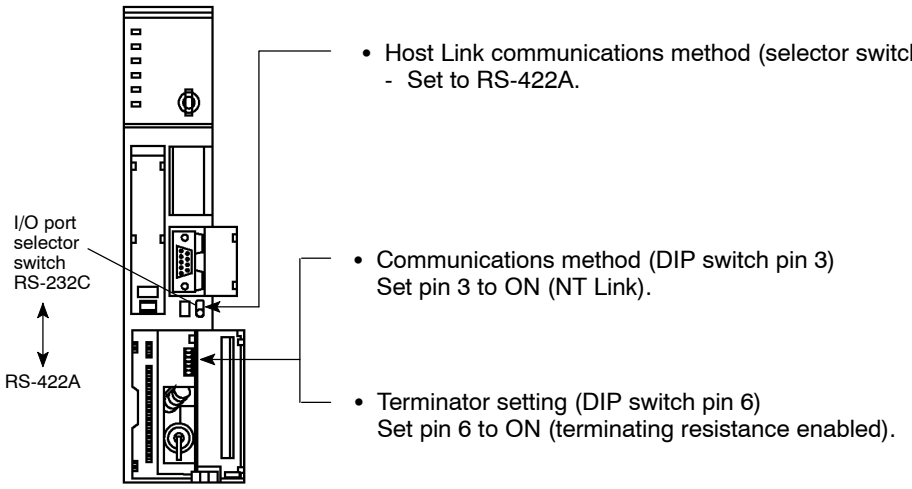
The setting methods for different types of Units are given below.

- **CVM1/CV-series "-V□" CPU Units**

The settings required for the following CPU Units are described below.

CV500-CPU01-V1/CV1000-CPU01-V1/CV2000-CPU01-V1
CVM1-CPU01-V□/CVM1-CPU11-V□/CVM1-CPU21-V□

Setting the Front Switches



PC Setup Settings

There are no particular settings required in the PC Setup for connecting to a CVM1/CV-series CPU Unit via NT Link (1:1).

- **C-series C200HX/HG/HE(-Z) or CQM1H**

PC Setup Settings

Write the settings directly from the Programming Device (e.g., CX-Programmer) to the PC Setup (data memory) according to the model of the host used.

Host	Word	Setting	Setting Contents
Port A of C200HX/HG/HE(-Z) (See note 1.)	DM6555	4000	NT Link is used.
Port 2 of CQM1H (See note 2.)	DM6550	4000	

*1 RS-422A port of Communications Board.

*2 RS-422A port of Serial Communications Board.

For details of PC Setup operations, refer to the manual for the PC used.

Switch Settings for a Communications Board on a C200HX/HG/HE(-Z) PC

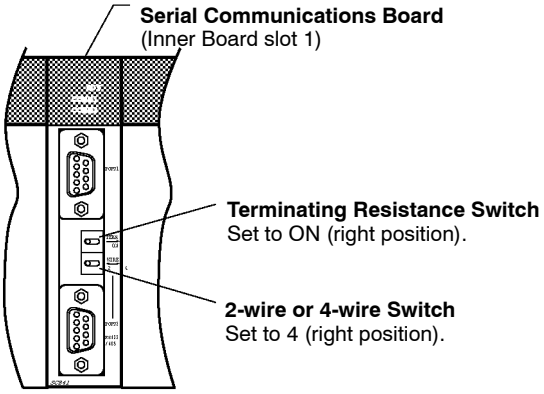
Set the switches for a Communications Board on a C200HX/HG/HE(-Z) PC in the following way:

Switch 1: 4 (4-wire = RS-422A)
Switch 2: ON (terminator ON = terminating resistance enabled)

Switch Settings for a Serial Communications Board on a CQM1H PC

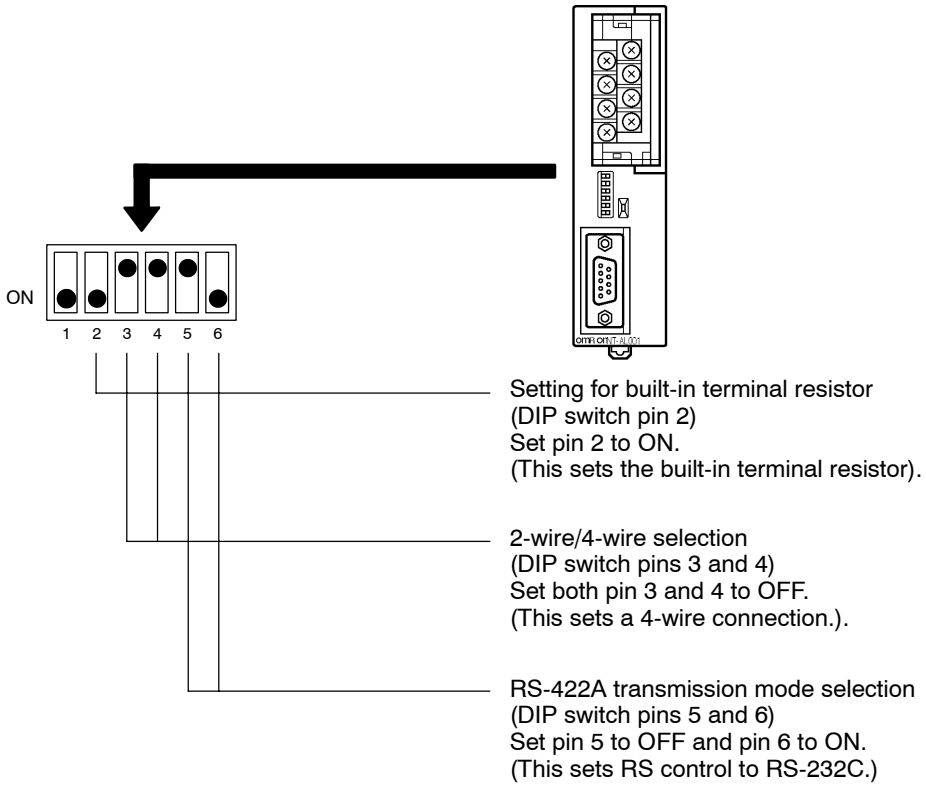
Set the switches for a Serial Communications Board on a CQM1H PC in the following way:

2-wire or 4-wire switch (WIRE): 4 (4-wire = RS-422A)
Terminating resistance switch (TERM): ON (terminator ON = terminating resistance enabled)



- **RS-232C/RS-422A Link Adapter (NT-AL001)**

When using the NT30/30C in a 1:1 RS-422A connection, make the following DIP switch settings at the RS-232C/RS-422 Link Adapter (NT-AL001) used for relay purposes.



2-8 Connecting a Printer

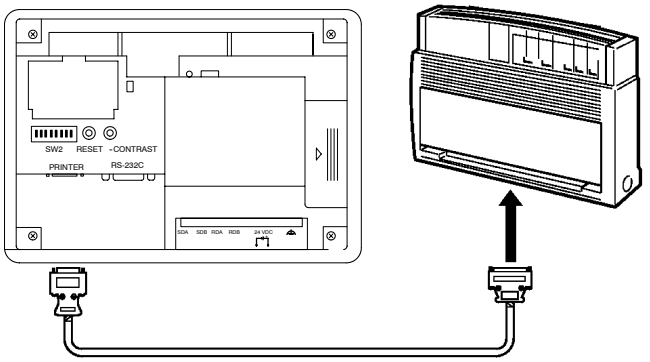
Hard copies of screens can be printed (printing of screen images) onto a printer connected to the NT30/30C.

In order to make a hard copy at a printer connected to the NT30/30C, it is necessary either to create a screen print key as a touch switch on the screen to be printed during screen creation, or to issue a print instruction from the PC. For details, see *4-7 Touch Switches* (page 154), and *5-7 NT30/30C Status Control* (page 239).

2-8-1 How to Connect

Connect the printer to the NT30/30C with a Centronics cable. The length of the cable should not exceed 3 meters.

Reference If the connection cable is connected or disconnected while the power of the printer is on, the NT30/30C may malfunction. Make sure to turn OFF the power of the printer before connecting or disconnecting the connection cable.



EPSON ESC/P
Color Printer (24-pin),
Monochrome Printer (24-pin)

- **Recommended Connection Cable**

The following connection cable is recommended.

NT-CNT121 connection cable (1.5 m, 20-pin to 36-pin)

- **Recommended Printer**

Use a printer that conforms to the control standard of the PC-PR201 made by NEC, or use a printer that conforms the following EPSON printer control standard: ESC/P J83 (color or monochrome)

When using a monochrome printer with an NT30/30C, set the tone with the NT30/30C memory switches (see page 99).

2-9 Connection of Expanded I/O

To provide expanded I/O for the NT30/30C, the B7A Unit can be connected. In order to enable the B7A Unit to be connected, the optional B7A Interface Unit (NT-B7A16) must be installed on the NT30/30C.

This section explains how to use the B7A Interface Unit and how to connect the B7A Unit.

2-9-1 Connectable B7A Units

I/O Classification	Wiring Type	Transmission Delay Time	I/O Format	+ – Terminal Configuration	Model
16 input points	Screw terminal	Standard (Typ. 19.2 ms)	NPN input	– only	B7A-T6A1
				Alternate + and –	B7A-T6B1
			PNP input	Alternate + and –	B7A-T6C1
		High speed (Typ. 3 ms)	NPN input	– only	B7A-T6A6
				Alternate + and –	B7A-T6B6
			PNP input	Alternate + and –	B7A-T6C6
	Module	Standard (Typ. 19.2 ms)	TTL input	–	B7A-T6D2
		High speed (Typ. 3 ms)		–	B7A-T6D7

I/O Classification	Wiring Type	Transmission Delay Time	I/O Format	+ – Terminal Configuration	Model
16 output points	Screw terminal	Standard (Typ. 19.2 ms)	NPN open collector 100 mA/point	+ only	B7A-R6B11
					B7A-R6B31
			PNP open collector 100 mA/point	– only	B7A-R6F11
					B7A-R6F31
		High speed (Typ. 3 ms)	NPN open collector 100 mA/point	+ only	B7A-R6B16
					B7A-R6B36
			PNP open collector 100 mA/point	– only	B7A-R6F16
					B7A-R6F36
	Module	Standard (Typ. 19.2 ms)	NPN open collector 50 mA/point	–	B7A-R6A52
		High speed (Typ. 3 ms)		–	B7A-R6A57
16 input points	Screw terminal	Standard (Typ. 19.2 ms)	NPN input	– common	B7AS-T6B1
		High speed (Typ. 3 ms)			B7AS-T6B6
16 output points	Screw terminal	Standard (Typ. 19.2 ms)	NPN open collector 100 mA/point	+ common	B7AS-R6B11
					B7AS-R6B31
		High speed (Typ. 3 ms)			B7AS-R6B16
					B7AS-R6B36
8 input points/ 8 output points	Screw terminal	Standard (Typ. 19.2 ms)	Input: NPN input Output: NPN open collector 100 mA/ point	Input: – common Output: + common	B7AM-8B11
					B7AM-8B31
		High speed (Typ. 3 ms)			B7AM-8B16
					B7AM-8B36
		Standard (Typ. 19.2 ms)	Input: PNP input Output: PNP open collector 100 mA/ point	Input: – common Output: + common	B7AM-8F31

2-9-2 B7A Interface Unit Specifications

Model	NT-B7A16
Number of I/O points	Input: 8 points/16 points Output: 8 points/16 points (total I/O = 32 points)
Processing on error occurrence	LOAD OFF (clear)/HOLD (latch) Set with DIP switch SW1 pin 1
Indicator (LED)	Lit in green: Operating Lit in orange: Transmission error
Transmission method	Unidirectional time-sharing multiplex transmission
Transmission distance	Standard: Max. 500 m (100 m with common power supply) High speed: Max. 100 m (*1) (50 m with common power supply) (*1)
Transmission cable	VCTF 0.75 mm^2 or greater
Transmission delay time	Standard (Typ. 19.2 ms)/High speed (Typ. 3 ms) (Set with DIP switch SW1 pin 2)
Least input time (*2)	Standard: 16 ms High speed: 2.4 ms
Power supply voltage	21.6 to 26.4 V (24 VDC ±10%)
Insulation resistance	100 MΩ or greater between all terminals together and external reference (500 V)

Model	NT-B7A16
Dielectric strength	1,000 VAC, 50/60 Hz, 1min. between all terminals together and external reference
Noise resistance (*3)	Noise level: 1.5 kV, Pulse width: 100 ns, 1 μs
Vibration resistance	10 to 22 Hz with 0.075 mm single amplitude for a total of 30 min. in X, Y, and Z directions
	22 to 500 Hz with 4.7 m/s^2 acceleration in X, Y, and Z directions
Shock resistance	490 m/s^2 (not operating) or 29.4 m/s^2 (operating), 3 times each in X, Y, and Z directions
Operating ambient temperature	0 to 50°C
Operating ambient humidity	35 to 85%RH (with no condensation)
Storage ambient temperature	−20 to 70°C
Weight	100 g max.

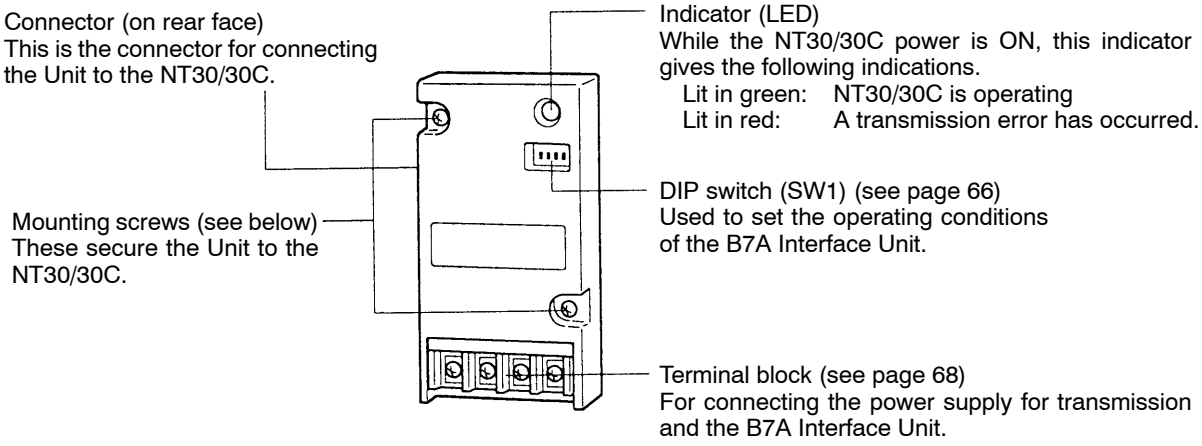
*1 This is the value when a shielded cable is used. If no shielded cable is used, the maximum transmission distance will be 10 m, regardless of the method used to supply power.

*2 The least input time is the least time required for the B7A Interface Unit to read an input signal.

*3 This is induced noise due to coupling with the transmission line. For high-speed transmission, this is the value when the shield is not grounded.

2-9-3 B7A Interface Unit Part Names

The function of each part of the B7A Interface Unit is indicated below.



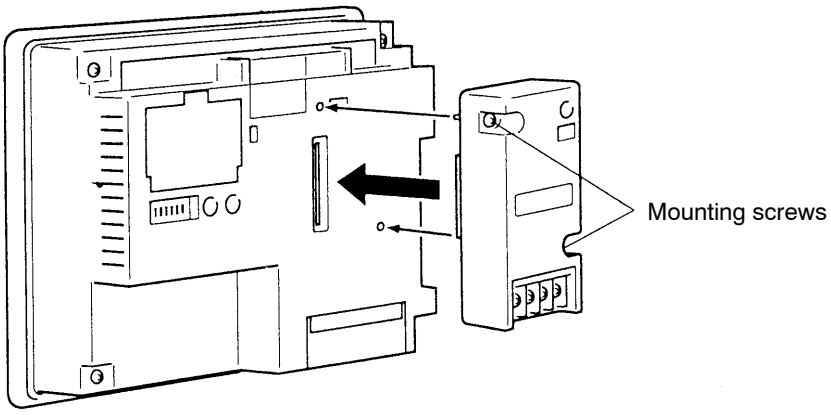
2-9-4 Installing the B7A Interface Unit

⚠**Caution** Be sure to switch OFF the power supply to both the NT30/30C and the B7A Interface Unit before installing the B7A Interface Unit, otherwise the Units may be damaged.

Reference When the B7A Interface Unit is installed, the depth of the NT30/30C is increased by 20 mm to 76 mm. Before installing the B7A Unit, check that there is sufficient space inside the operation panel to accommodate this extra depth.

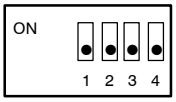
(1) Peel off the label on the right side of the rear face of the NT30/30C. Underneath the label are the connector and screw holes for installing the B7A Interface Unit.

(2) As shown in the figure below, install the NT30/30C on the rear face of the NT30/30C, and secure it with the two mounting screws.



2-9-5 B7A Interface Unit Settings

Set the operating conditions of the B7A Interface Unit as shown below.



	SW1-1	SW1-2	SW1-3	SW1-4
Function	Processing on transmission error	Transmission delay time	ERR indicator status	Not used
ON	LOAD OFF (clear)	High speed (3 ms)	Indicator lights	–
OFF	HOLD	Standard (19.2 ms)	Indicator does not light	Setting fixed as OFF

⚠**Caution** Be sure to switch OFF the power supply to both the NT30/30C and the B7A Interface Unit before changing DIP switch settings.

2-9-6 Connecting the B7A Unit to the B7A Interface Unit

The connection method for each B7A Unit is shown on the following pages.

Use the cable indicated below for the connection:

VCTF0.75 mm^2 or greater transmission cable

- **Power supply method**

A 24 VDC power supply for communication must be supplied to the B7A Interface Unit and the B7A Unit. The connection method differs depending on the method used to supply power to the Units.

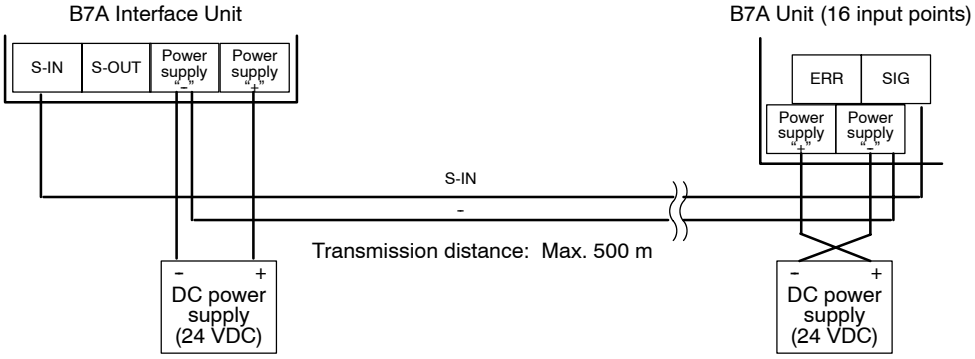
- **Setting the transmission delay time**

When the setting for transmission delay time is for high-speed transmission, use a shielded cable. If no shielded cable is used, the maximum transmission distance will be 10 m regardless of the method used to supply power.

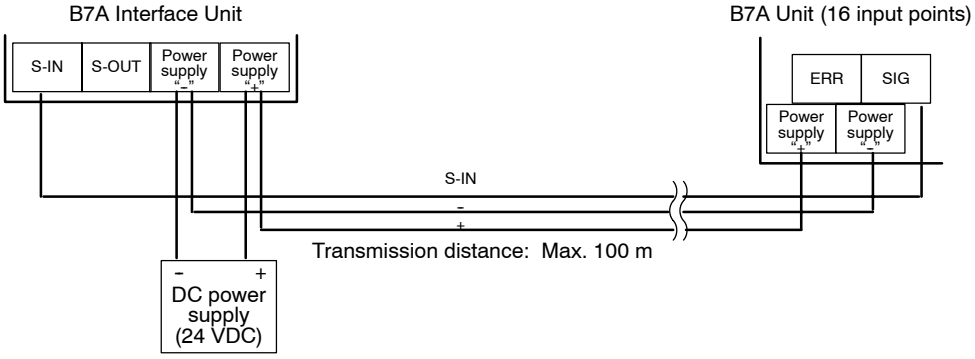
Ground the shield. Do not ground it to the minus terminal of the power supply.

Connecting a B7A Unit with 16 Input Points

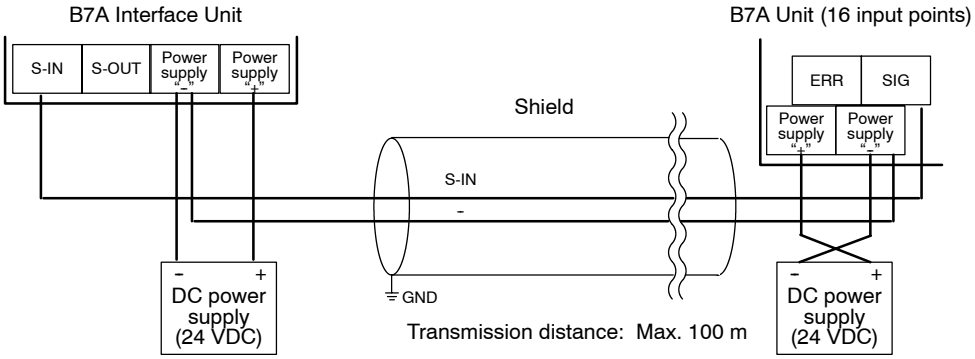
- When separate power supplies are provided (DIP switch SW1 pin 2 setting: Standard)



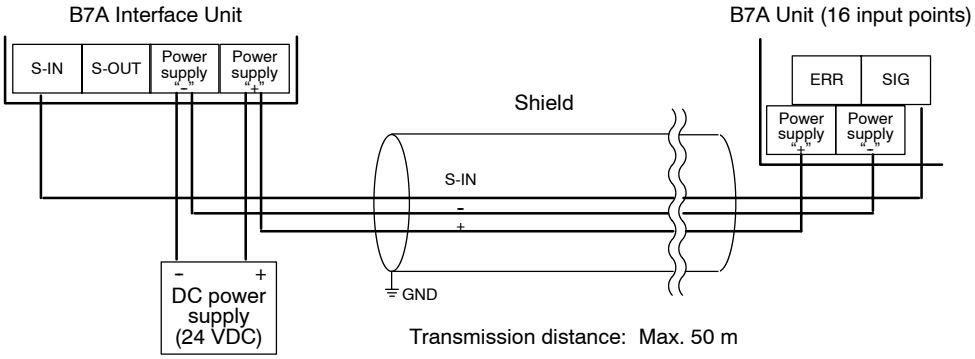
- When using a common power supply (DIP switch SW1 pin 2 setting: Standard)



- When separate power supplies are provided (DIP switch SW1 pin 2 setting: High speed)

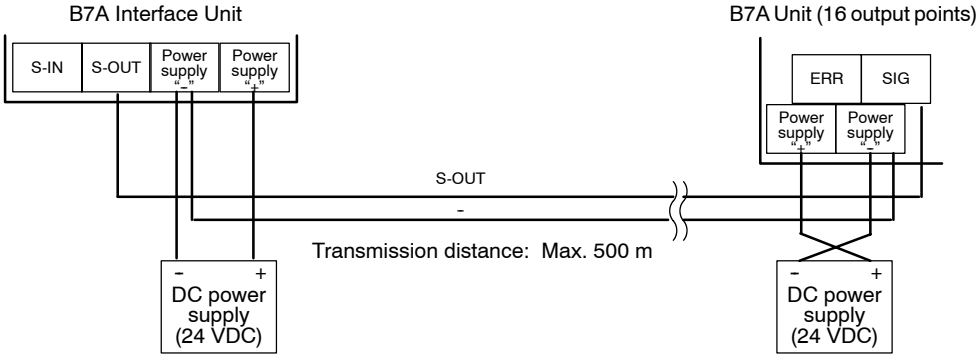


- When using a common power supply (DIP switch SW1 pin 2 setting: High speed)

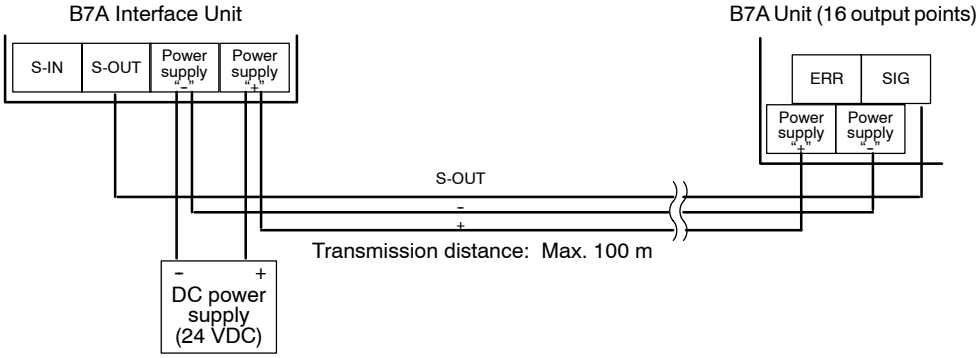


Connecting a B7A Unit with 16 Output Points

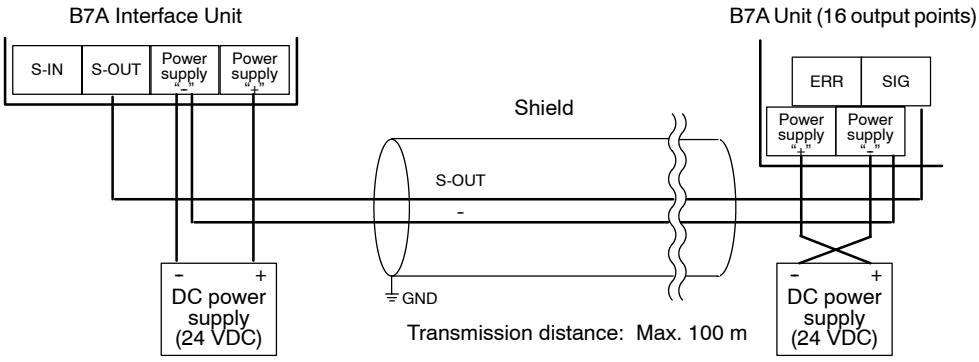
- When separate power supplies are provided (DIP switch SW1 pin 2 setting: Standard)



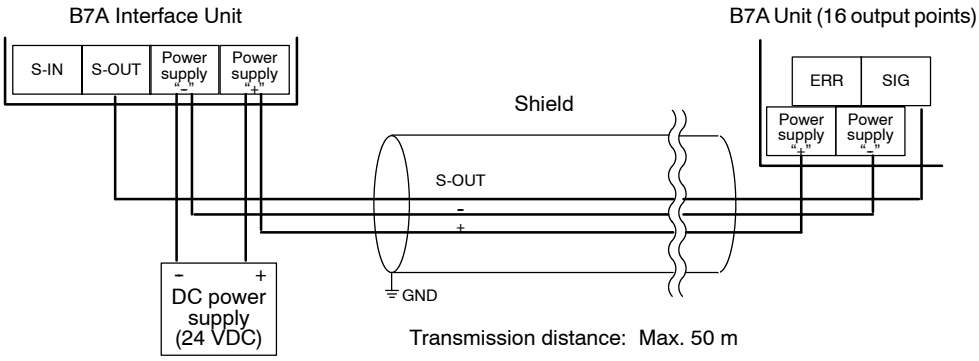
- When using a common power supply (DIP switch SW1 pin 2 setting: Standard)



- When separate power supplies are provided (DIP switch SW1 pin 2 setting: High speed)

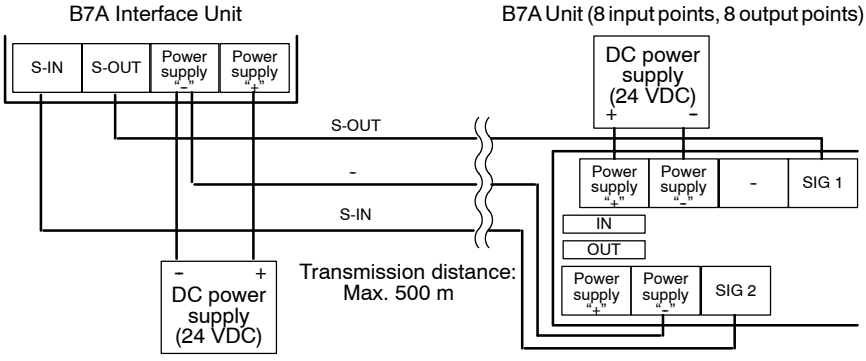


- When using a common power supply (DIP switch SW1 pin 2 setting: High speed)

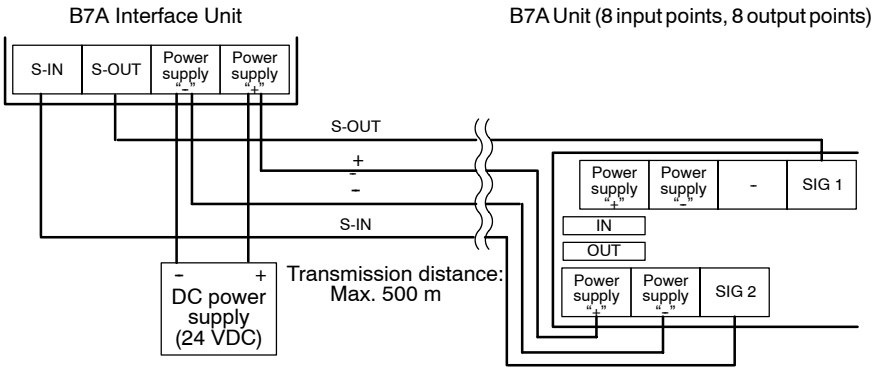


Connecting a B7A Unit with 8 Input Points and 8 Output Points

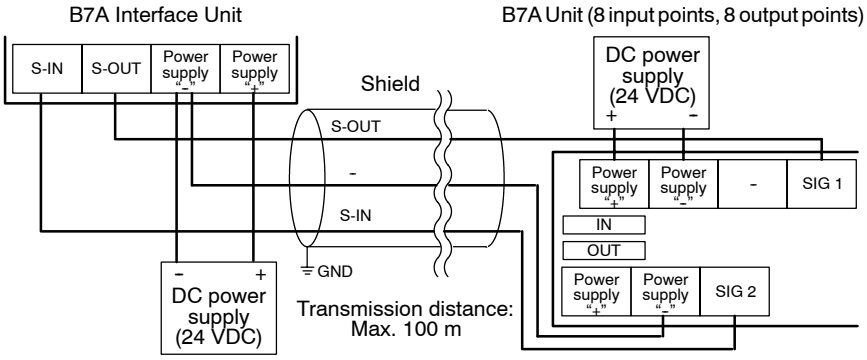
- When separate power supplies are provided (DIP switch SW1 pin 2 setting: Standard)



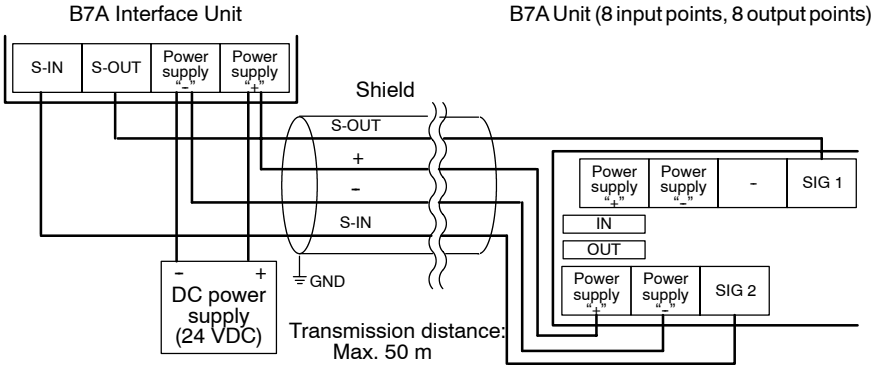
- When using a common power supply (DIP switch SW1 pin 2 setting: Standard)



- When separate power supplies are provided (DIP switch SW1 pin 2 setting: High speed)



- When using a common power supply (DIP switch SW1 pin 2 setting: High speed)



SECTION 3
System Menu Operation

This section describes the operation of the System Menu focusing on the procedure to start up the NT30/30C.

Functions that are convenient to use the NT30/30C and those that are useful for the system maintenance are also explained here.

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3-2 Starting the NT30/30C 74
3-2-1 Changing the System Settings 75
3-3 Operation Modes and the System Menu 75
3-3-1 System Menu and the Operation Modes 75
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3-5 Setting Communications with the PC Using Memory Switches 83
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3-9-2 I/O Check 103
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3-1 Operation Flow by the System Menu

Follow the procedure below when using the NT30/30C for the first time or when changing the system.

System Program Installation When using the NT30/30C for the first time, erase the system program loaded on shipping, and transfer the new system program to the NT30/30C by using the NT series system installer.

Create the Screen Data Create the screen data to be displayed on the NT30/30C by using the NT-series Support Tool.

For the screen data creation, refer to the *NT-series Support Tool for Windows Operation Manual* (V061).

Start Up the NT30/30C (Display the System Menu.) (page 74)

Turn ON the power to the NT30/30C.

When no screen data has been registered, the System Menu will be displayed. If the NT30/30C enters the RUN mode, press appropriate touch switches to display the System Menu.

Initialize Memory (page 78) Select a System Menu and initialize the NT30/30C Unit memory.

Memory Switch Setting (page 83)

Select the System Menu and set the conditions for communications with the PC using the memory switch.

Transfer the Screen Data (page 89)

Connect the NT-series Support Tool to the NT30/30C and transfer the screen data from the NT-series Support Tool to the NT30/30C.

For the connection of the NT-series Support Tool, refer to *2-3 Connecting to the Support Tool* (page 21).

Start the Operation (page 91)

Connect to the PC and start the operation.

System Maintenance (page 100)

If an error has occurred during operation, check the I/Os, settings, etc. referring to this guide.

3-2 Starting the NT30/30C

When the NT30/30C is started, it will enter the RUN mode if system settings and screen data registration have been completed. If no screen data has been registered or the screen data are destroyed, the System Menu will be displayed.

Before turning ON the power, check the following DIP switch settings on the NT30/30C.

- SW2 pin 3 (Switch to the System Menu enabled/disabled) is set to OFF (enabled).
- SW2 pin 4 (Screen data forced initialize Yes/No) is set to No (ineffective).
- SW2 pin 7 (System installation effective/ineffective) is set to OFF (starts in normal RUN mode).

For the DIP switch settings of the Unit, refer to the *DIP Switch Settings* (page 18).

3-2-1 Changing the System Settings

Follow the procedure below to change the system settings or screen data contents.

Procedure

1. Turn ON the power to the NT30/30C.

   The NT30/30C will enter the RUN mode and the start-up screen will be displayed. The start-up screen varies according to registered screen data.

2. Press touch appropriate switches to display the System Menu, and change system settings. For the method for calling the System Menu, refer to the *Operations with the System Menu* (page 77).

If there is no system program installed, or it is corrupted, it must be installed (or re-installed). For details on the system program installation method, refer to *2-4 Installing the System Program* (page *22)*.

If the NT30/30C has failed to start up normally; an error message is displayed or no screen is displayed, memory needs to be initialized.

For the memory initializing procedure, refer to *3-4 Initializing Memory* (page 78).

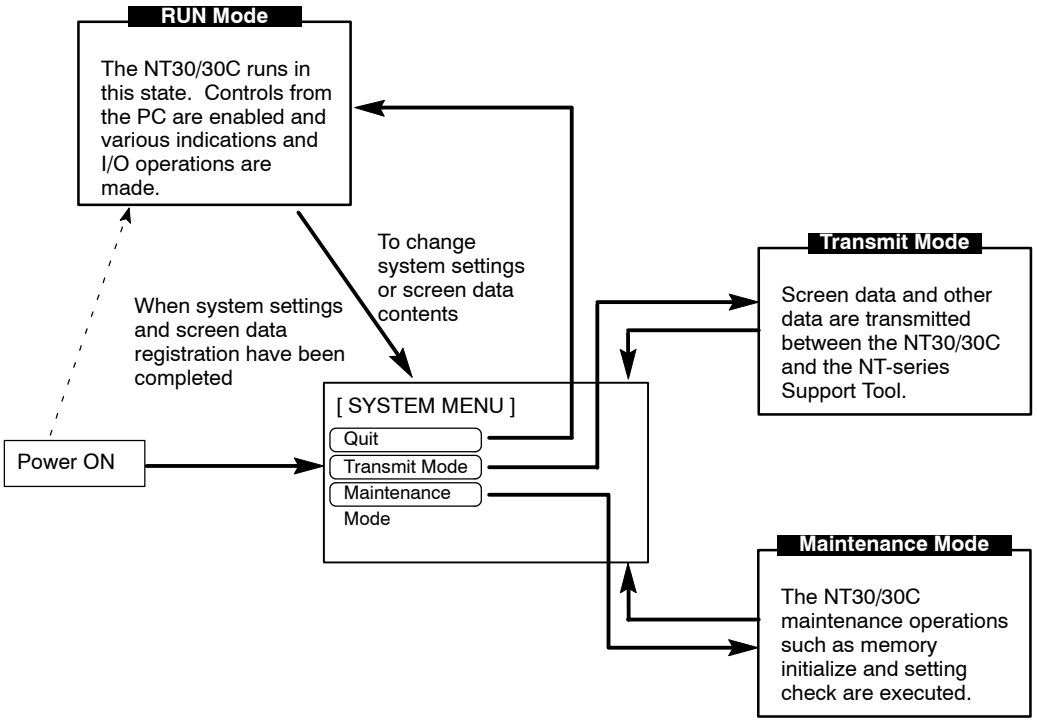
3-3 Operation Modes and the System Menu

The NT30/30C operates in either RUN, Transmit, or Maintenance mode. The operation modes can be switched by using the System Menu.

3-3-1 System Menu and the Operation Modes

Select an operation mode by pressing the corresponding touch switch in the System Menu. The operation modes with respect to the System Menu are related to each other as shown below.

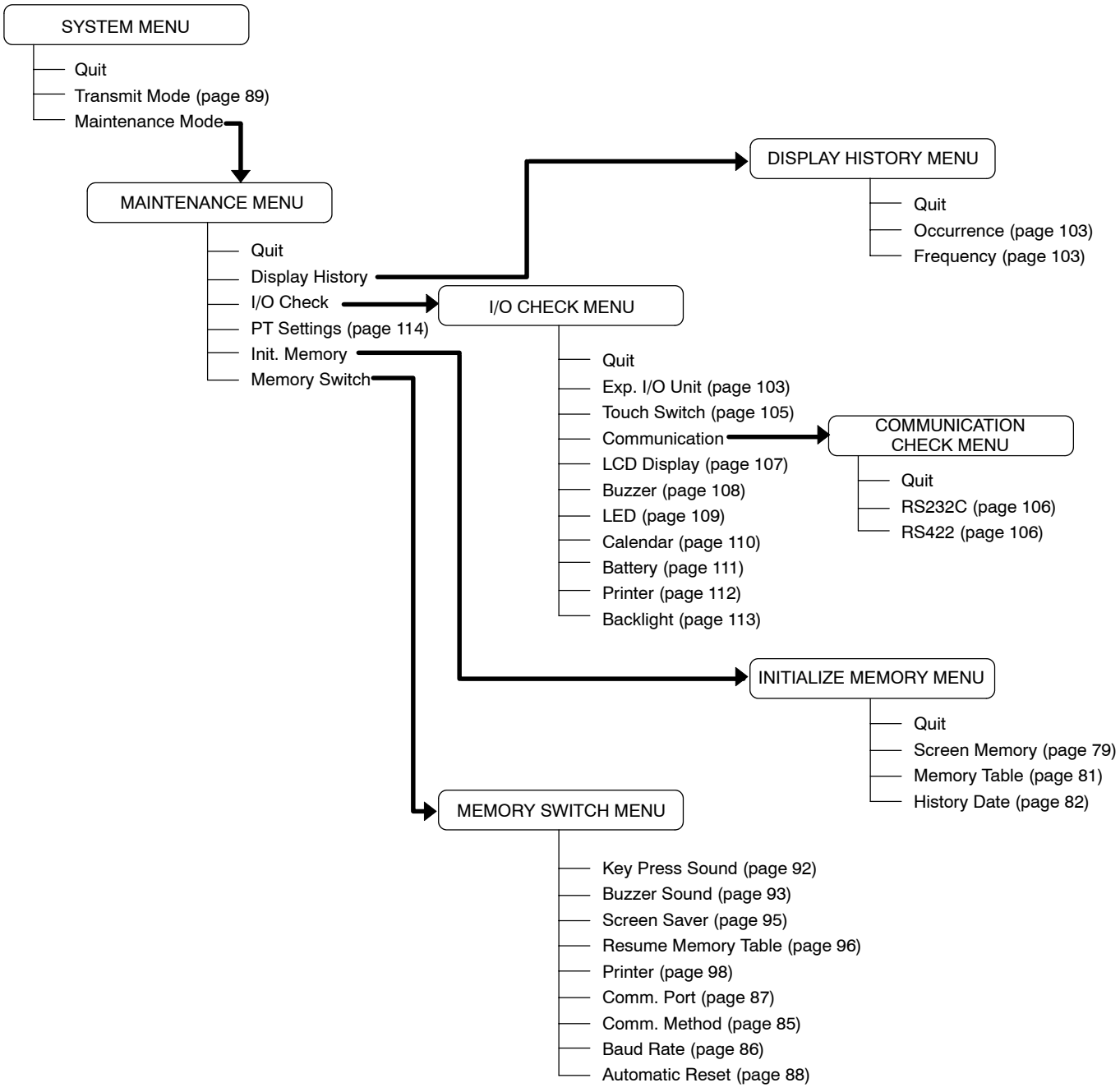
For the operations with the System Menu, refer to the *Operations with the System Menu* (page 77).



3-3-2 Menu Tree

The System Menu allows the user to effect various NT30/30C functions by using the touch switches. The NT30/30C's functions with respect to the System Menu are related as shown below.

For the operations with the System Menu, refer to the *Operations with the System Menu* (page 77).



3-3-3 Operations with the System Menu

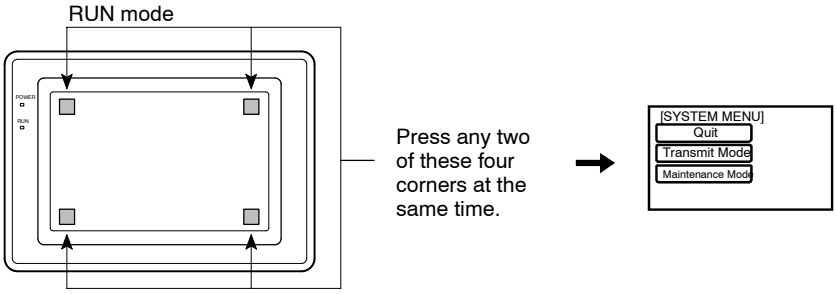
The following gives the procedure to call the System Menu, select the menu items, and other operations with the System Menu.

Make sure that DIP switch SW2 pin 3 (Switch to the System Menu enabled/disabled) is set to OFF (enabled). If the setting is ON (disabled), the System Menu will not be displayed by following the procedure given below.

Displaying the System Menu

Press appropriate touch switches to display the System Menu as mentioned below. The RUN indicator goes OFF when the System Menu is displayed.

The NT30/30C display screen has four touch switches to display the System Menu in the four corners (about 7.2 mm x 7.2 mm size). Press any two of these switches at the same time to call the System Menu screen.



Note that the touch switches used to call the System Menu are not displayed on the screen. If a touch switch displayed in a corner is pressed first, the touch switch will function and the System Menu will not be displayed. To successfully call the System Menu, first press a corner where no touch key is displayed, and then, press any other corner regardless of the presence of a touch key.

If a screen has the touch switches registered at all of the four corners, it is impossible to call the System Menu from the screen.

A system function can be assigned to a touch switch. Pressing the touch switch so assigned on the screen can easily display the System Menu. For the relationship between the system key and the touch switch, refer to the *System Key Functions* (page 159).

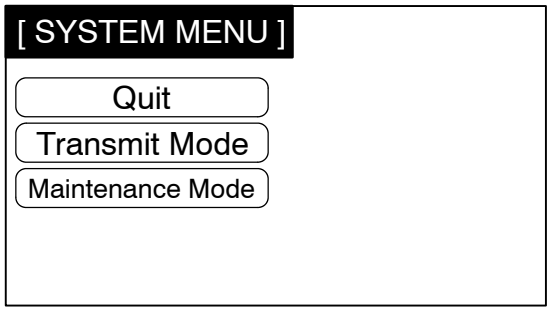
Selecting the Menu Items

Press (touch) a menu item on the screen to select the item.

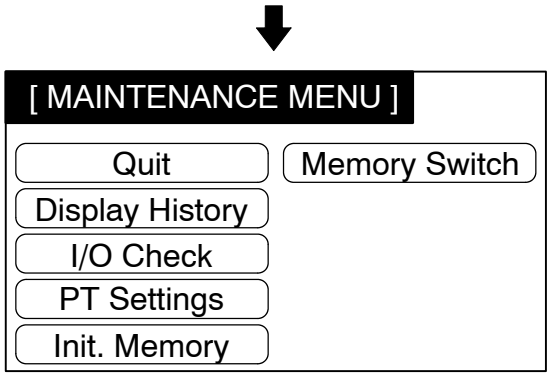
Menu items allow to make the ON/OFF selection or to call subsequent menu or screen.

Example 1

To call the Maintenance Menu by pressing “Maintenance Mode” on the System Menu screen:



Select “Maintenance Mode.”



System Menu Items

The System Menu items and the functions are as given below.

Menu Item	Function
Quit	The System Menu screen is cleared and the NT30/30C will return to the RUN mode.
Transmit Mode	The Transmit Mode screen will be displayed to allow the transmission of the screen data between the NT30/30C and the NT-series Support Tool. For the transmission of the screen data, refer to *3-6 Registering the Screen Data (*page 89).
Maintenance Mode	The Maintenance Mode menu will be displayed to allow the maintenance of the NT30/30C system.

Switching from the System Menu to the RUN Mode

The NT30/30C will exit the System Menu and switch to the RUN mode in the cases mentioned below.

- Selecting “Quit” in the System Menu.
- The screen (touch switches) is not pressed for over 10 seconds.

3-4 Initializing Memory

If the NT30/30C is used for the first time or if the screen data is ruined and the NT30/30C cannot be normally started, the memory needs to be initialized.

The memory initialization is required in the cases mentioned below.

- When the NT30/30C is used for the first time or when an error message indicating that the screen data is ruined etc. when the NT30/30C is started.

  → Use the “Maintenance Mode” – “Init. Memory” in the System Menu.
- When the NT30/30C has made a buzzer sound and the screen has disappeared during the start-up or operation.

  → Use the NT30/30C DIP switch SW2 pin 4 (Screen data forced initialize effective/ineffective).

When an error has occurred, the error messages such as “Screen data corrupted” will be displayed. For the error messages displayed on the screen, refer to *6-2 Responding to Displayed Error Messages* (page 249).

Reference

- Initializing the screen data memory will erase entire screen data registered in the NT30/30C. Make sure that there are backup copies of the screen data on floppy disks before starting the initialization.
- If there is no system program installed, or it is corrupted, it must be installed (or re-installed). For details on the system program installation method, refer to *2-4 Installing the System Program* (page *22)*.

The following memory data can be initialized.

- Image data memory
- Memory tables
- Display history

The screen data is initialized regardless of the setting for the resume function (see page 96).

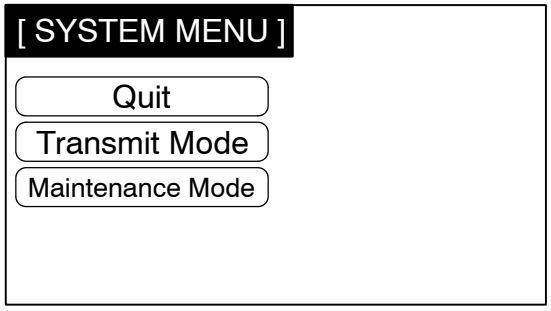
3-4-1 Initialization of the Screen Data

The screen data can be initialized by either of the following two methods.

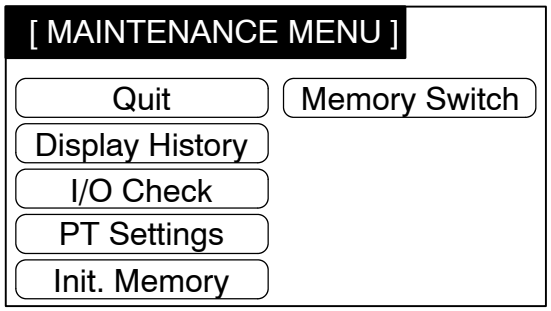
- Initialization by using the System Menu
- Initialization by using the DIP switch (forced initialization)

Initialization by Using the System Menu

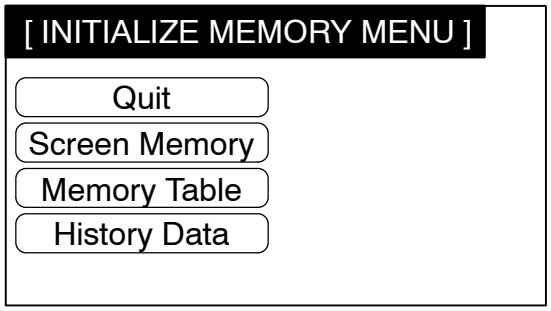
Initialize the image data memory by following the procedure given below.



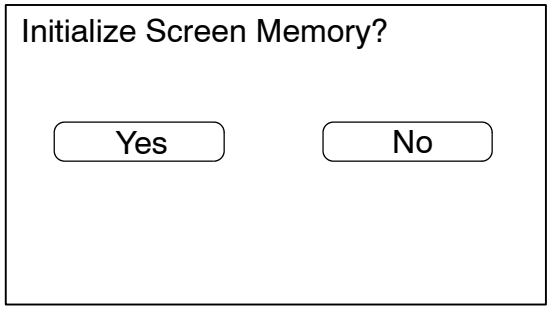
Select “Maintenance Mode.”



Select “Init. Memory.”



Select “Screen Memory.”



Select "Yes."

The screen data memory is initialized. During the initialization, the "Initializing" message will be displayed.

- If no is selected, the memory initialization will be canceled and the NT30/30C returns to the Initialize Memory Menu.

Upon completion of the screen data memory initialization, the NT30/30C returns to the Initialize Memory Menu.

After the screen data memory has been initialized, if an attempt is made to set the NT30/30C to the RUN mode before screen data has been transferred from the NT-series Support Tool, the error message "No direct information is set!!" will be displayed.

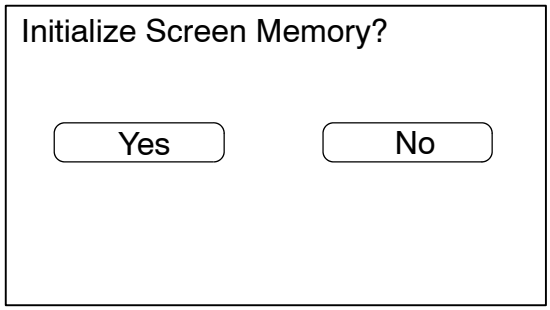
Initialization by Using the DIP Switch (Forced Initialization)

Note Be sure to turn the power OFF before setting the NT30/30C DIP switch.

Set the DIP switch as follows to initialize the screen data memory.

Operation

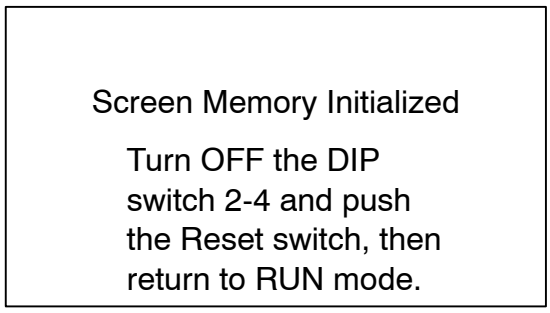
1 Set DIP switch SW2 pin 4 on the NT30/30C to ON and turn the power ON.



Select "Yes." The screen data memory is initialized. During the initialization, the "Initializing" message will be displayed.

- If no is selected, the memory will not be initialized.





2 Turn the NT30/30C power to OFF.

3 Set NT30/30C DIP switch SW2 pin 4 to OFF and turn the power ON.

Reference

- The NT30/30C DIP switch SW2 pin 4 is used to enable/disable the screen data forced initialization. Setting this to ON selects enable initialization, and OFF to disable it.
- Regardless of whether initialization is executed or not, on completion of the operation, switch DIP switch SW2 pin 4 OFF while the power to the NT30/30C is OFF, then start up the NT30/30C again.

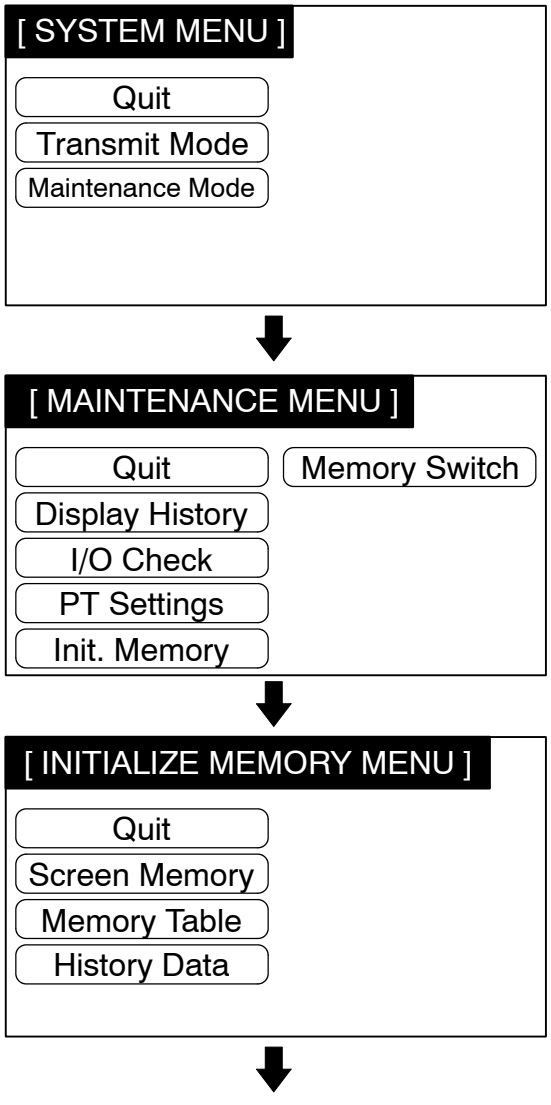
3-4-2 Initialization of the Memory Tables

It is possible to initialize the numeral memory table and character string memory table in the NT30/30C. When these tables are initialized, the values are returned to those set by the NT-series Support Tool.

When memory table initialization is executed in the maintenance mode, the memory tables are initialized regardless of the resume function setting (see page 96).

Reference If OFF is set for the Resume Function memory switch, the memory tables can be initialized just by switching the NT30/30C power OFF and back ON again, or by resetting it (see page 96).

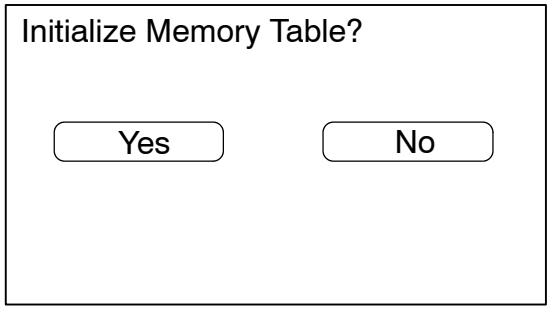
Using the System Menu, initialize the memory tables by following the procedure given below.



Select “Maintenance Mode.”

Select “Init. Memory.”

Select “Memory Table.”



Select "Yes."

The memory table is initialized.

- If no is selected instead of yes, the NT30/30C returns to the Initialize Memory Menu without initializing the memory.

Upon completion of memory table initialization, the NT30/30C returns to the Initialize Memory Menu.

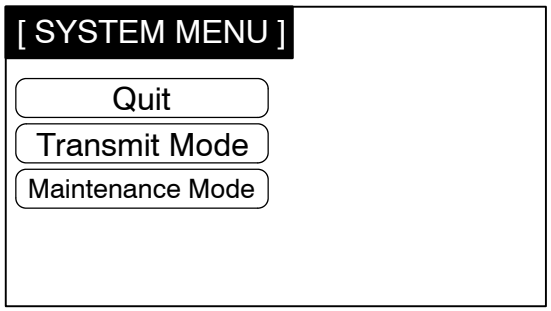
3-4-3 Initialization of the Display History Data Memory

The display history function is a function whereby the display of each screen displayed during operation is recorded in order of display occurrence and order of display frequency. The maximum number of displays that can be recorded is 1,023 for recording in order of display occurrence and 255 for recording in order of display frequency. Once these limits are reached, no more records can be stored, and so the records must be periodically initialized (deleted).

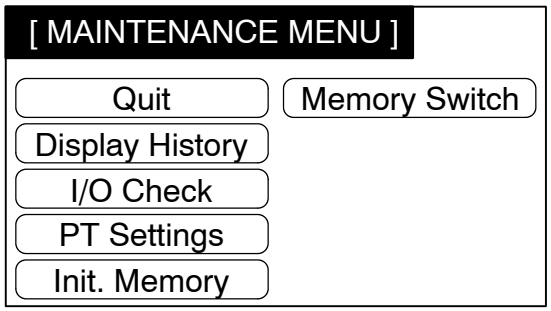
The display history data memory can be initialized by a command given from the PC (page 241).

When the display history data memory is initialized, the alarm history memory is also initialized.

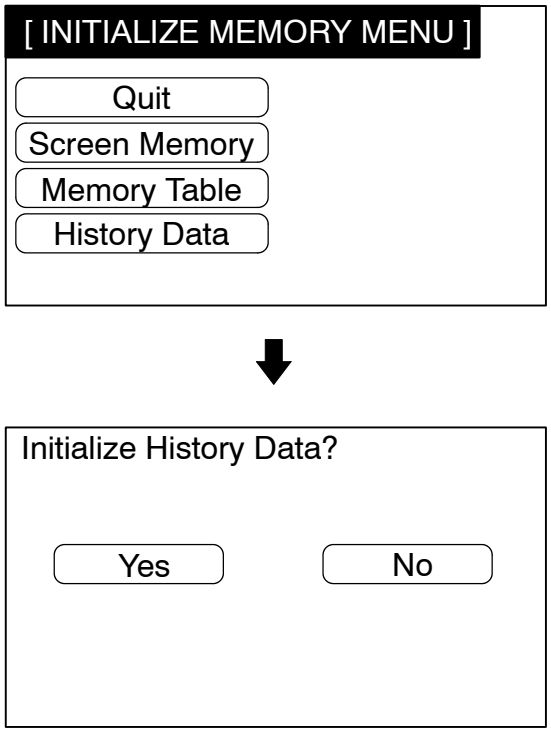
Using the System Menu, initialize the display history data memory by following the procedure given below.



Select "Maintenance Mode."



Select "Init. Memory."



Select "History Data."

Select "Yes."

The display history data memory is initialized.

- If no is selected instead of Yes, the NT30/30C returns to the Initialize Memory Menu without initializing the memory.

Upon completion of display history data initialization, the NT30/30C returns to the Initialize Memory Menu.

3-5 Setting Communications with the PC Using Memory Switches

The NT30/30C can be connected to a PC by the Host Link or NT link. The link can be selected by setting the memory switch. Also, the Host Link baud rate, automatic reset function, RS-232C communication conditions, etc. are set with the memory switches.

This section describes the communications condition settings by using the memory switches.

Memory Switches

The NT30/30C has the memory areas used to store the PC connection method, communications conditions, system settings, etc. that can be used as the switches and called the memory switches. Since the memory switch settings are backed up by battery, they are not lost when the power is turned OFF.

Reference

If the memory switch data is not backed up by the built-in battery, it will all be initialized to the values set with the NT-series Support Tool when the NT30/30C is switched OFF.
If the message "Battery Lowered" is displayed while the NT30/30C is operating, replace the built-in battery immediately. For details on how to replace the battery, see *Replacing the Battery* (page 253).

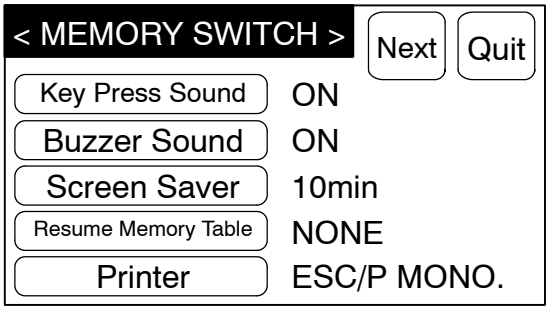
Setting Functions and the Memory Switch Menu

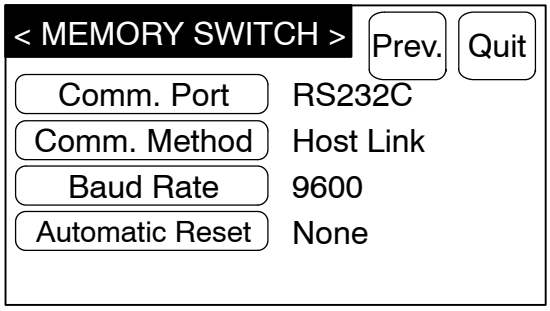
The memory switches can be set easily by using the Memory Switch Menu in the System Menu.

The memory switches can also be set in "System Setting" under "PT Configuration" on the NT-series Support Tool. The settings made using the NT-series Support Tool are written to the NT30/30C on screen data registration. For details, refer to the *NT-series Support Tool for Windows Operation Manual* (V061).

The following settings can be made with the memory switches. Refer to the subsequent pages and *3-8 System Settings* (page 92) for the details of each setting and function.

Previous Next



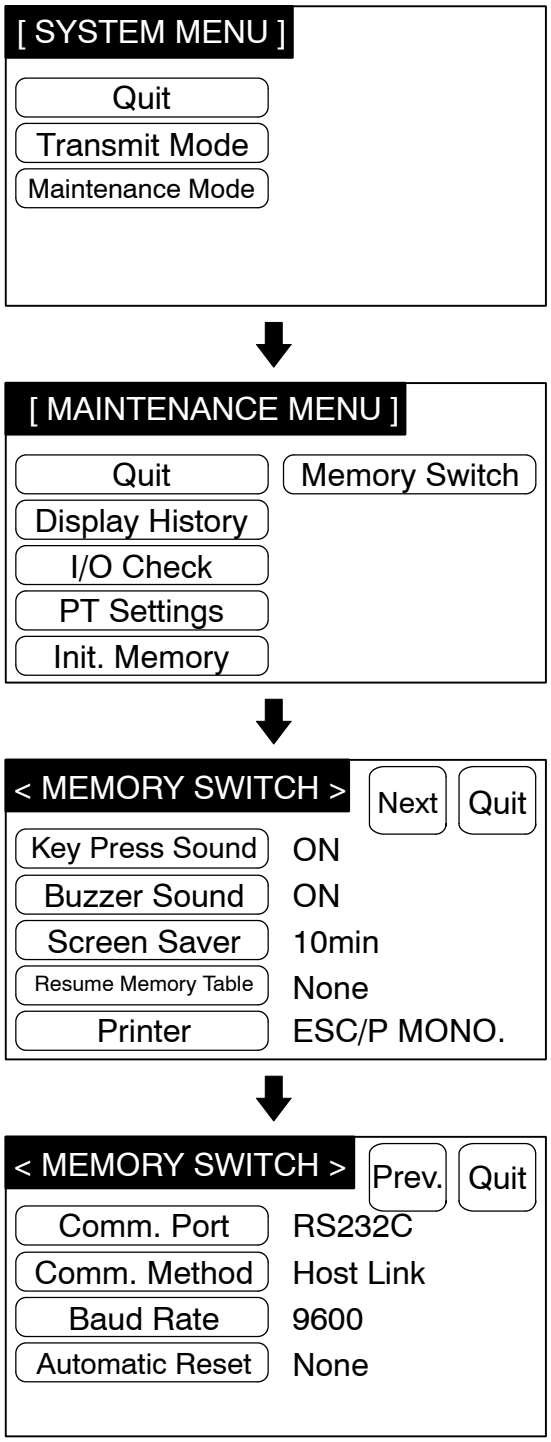


- Key Press Sound 3-8 System Settings (page 92)
- Buzzer Sound 3-8 System Settings (page 93)
- Screen Saver 3-8 System Settings (page 95)
- Resume Memory Table 3-8 System Settings (page 96)
- Printer 3-8 System Settings (page 98)
- Comm. Port Selecting Host Link Communication Port (page 87)
- Comm. Method Selecting Host Communication Method (page 85)
- Baud Rate Selecting the Host Link Baud Rate (page 86)
- Automatic Reset Selecting the Automatic Reset Function (page 88)
- The communications method, baud rate, communications port, and automatic reset can be set only from the Memory Switch Menu called from the System Menu.
- In addition, the following settings can only be set from the NT-series Support Tool.
- Number of numeral memory table entries: Numeral Memory Table (page 138)
- Number of character string memory table entries: Character String Memory Table (page 136)
- Alarm recording method (using the ring buffer): Displaying the Alarm History (page 184)

3-5-1 Selecting the Host Communications Method

The NT30/30C can be connected to a PC by the Host Link or NT link. Either link can be selected by setting the Communications Method memory switch. The factory setting has been made to the Host Link. Select the communications method that is supported by the PC to be connected.

Select the host communications method by the menu operation from the System Menu shown below.



Select "Maintenance Mode."

Select "Memory Switch."

Select "Next."

Each time the "Comm. Method" touch switch is pressed, the setting option changes to the next item in the sequence "Host Link" or "NT Link."

To set and quit the menu, press the Quit touch switch. The settings made last will be set and the display will return to the Maintenance Menu.

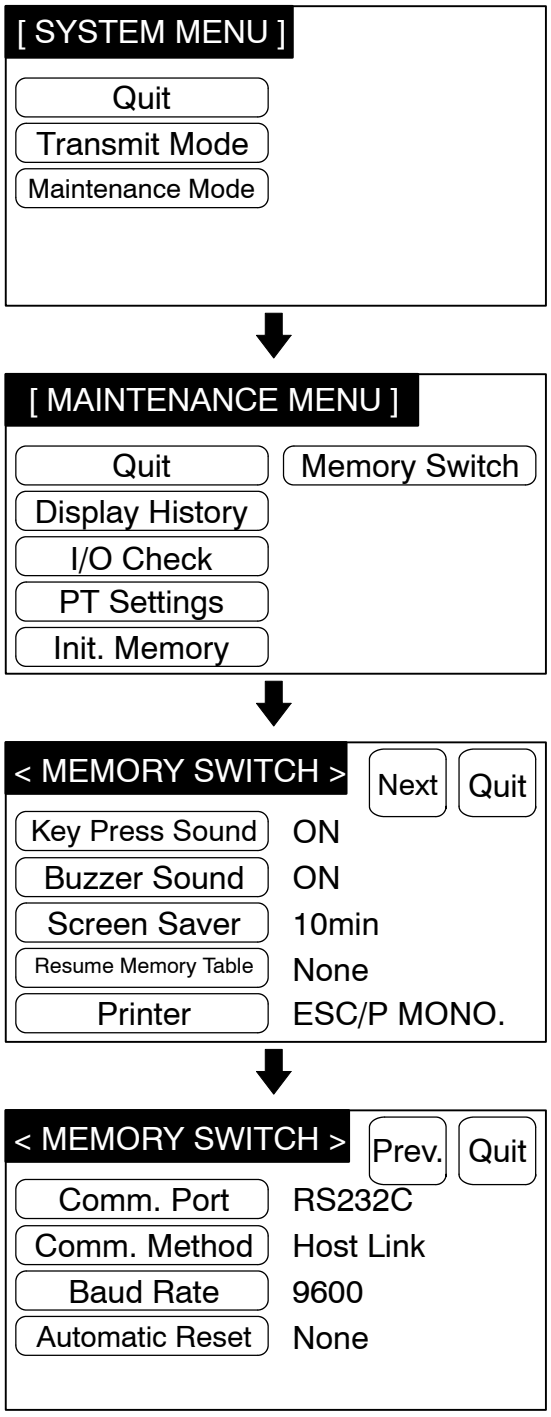
3-5-2 Selecting the Host Link Baud Rate

When the Host Link is used, the baud rate of the communications with the PC can be set. Use the Baud Rate switch and select 9600 bps or 19200 bps.

If the NT link has been selected, the Host Link baud rate setting does not have any effect.

The factory setting has been made at 19200 bps.

Select the baud rate of the communications with the PC by the menu operation from the System Menu shown below.



To set and quit the menu, press the Quit touch switch. The settings made last will be set and the display will return to the Maintenance Menu.

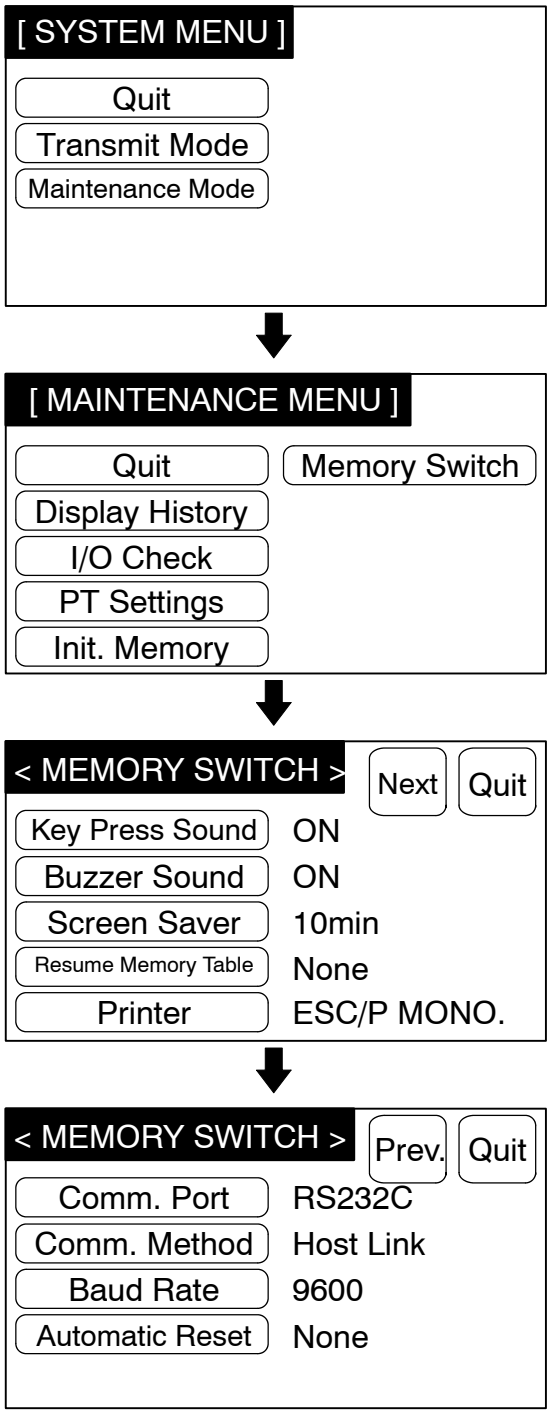
3-5-3 Selecting the Host Link Communications Port

When using the NT30/30C with the Host Link, the port for communications with the PC (communication type) can be selected. Select either RS-232C or RS-422 by using the Communications Port" memory switch.

The factory setting is RS-232C.

Reference When using NT link as the communication method, you must set RS-232C.

Select the communication port for communication with the PC by the menu operation from the System Menu shown below.



Select "Maintenance Mode"

Select "Memory Switch."

Select "Next."

Each time the Communications Port touch switch is pressed, the setting to its right changes between RS-232C and RS-422.

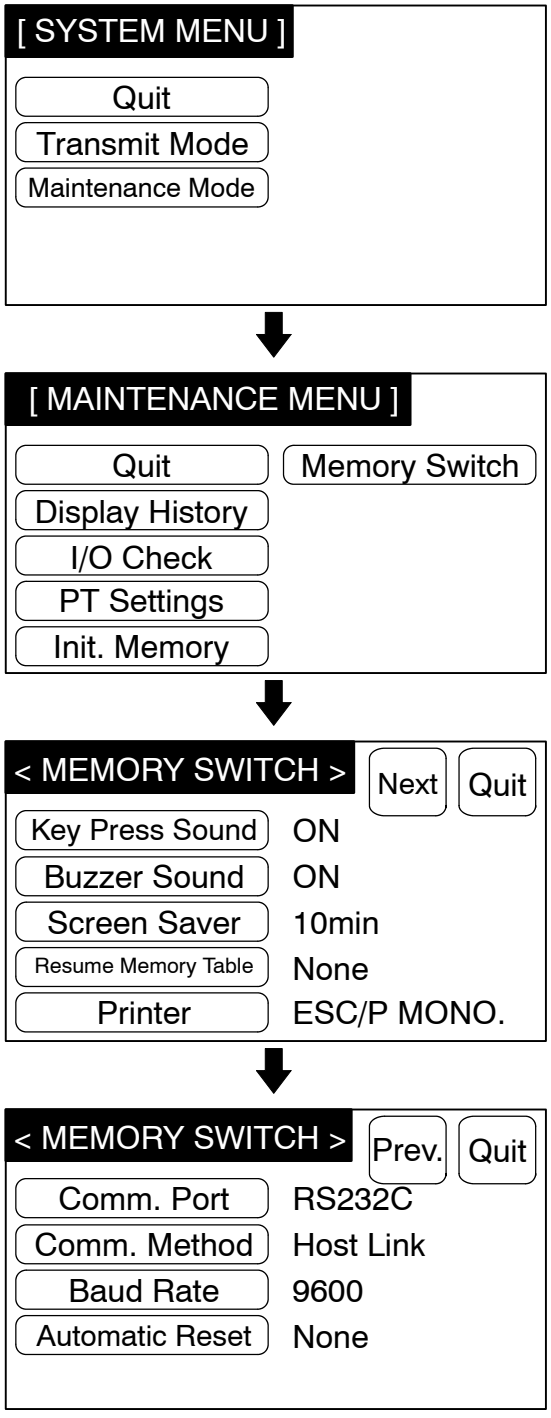
To set and quit the menu, press the Quit touch switch. The settings made last will be set and the display will return to the Maintenance Menu.

3-5-4 Selecting the Automatic Reset Function

The Automatic Reset memory switch is used to set whether or not the communication is automatically reset after the occurrence of a communication error.

The factory setting has been made to exist.

Select the baud rate of the communication with the PC by the menu operation from the System Menu shown below.



Select “Maintenance Mode.”

Select “Memory Switch.”

Select “Next.”

Each time the Automatic Reset touch switch is pressed, the setting option “Exist” alternates with “None.”

To set and quit the menu, press the Quit touch switch. The settings made last will be set and the display will return to the Maintenance Menu.

- None: If a communication error has occurred, corresponding error message is displayed and the operation stops.

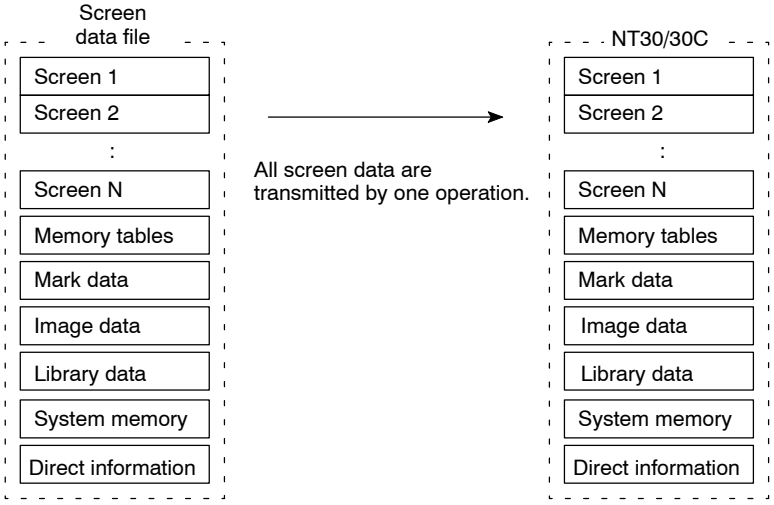
- Exist: If a communication error has occurred, corresponding error message will not be displayed and the operation will be automatically reset. However, the message “Connecting To Host” may be displayed.

3-6 Registering the Screen Data

The screen data is created by using the NT-series Support Tool and registered to the NT30/30C screen data memory. This section describes the procedure to register the screen data to the NT30/30C. For the screen data creation and NT-series Support Tool operation, refer to the *NT-series Support Tool Operation Manual*.

Transmission - Transmission in File Units

The NT30/30C uses several screens that are switched on its display. The screen data of one NT30/30C PT corresponds to the files created by using the NT-series Support Tool. Select a file that contains the screen data to be transmitted when selecting the screen data to be transmitted to the NT30/30C so that the required screen data can be transmitted to the NT30/30C.



When the screen data is transmitted from the NT-series Support Tool to the NT30/30C, the screen data already existing in the NT30/30C will be erased. The NT30/30C cannot transmit the screen data in units of screens.

If an error message and the System Menu are displayed immediately after the NT30/30C has been started, the screen data memory needs to be initialized.

Transmitting the Screen Data from the NT-series Support Tool

To transmit the screen data from the NT-series Support Tool to the NT30/30C, connect the NT30/30C to the computer on which the NT-series Support Tool is being used, and follow the procedure below.

Reference

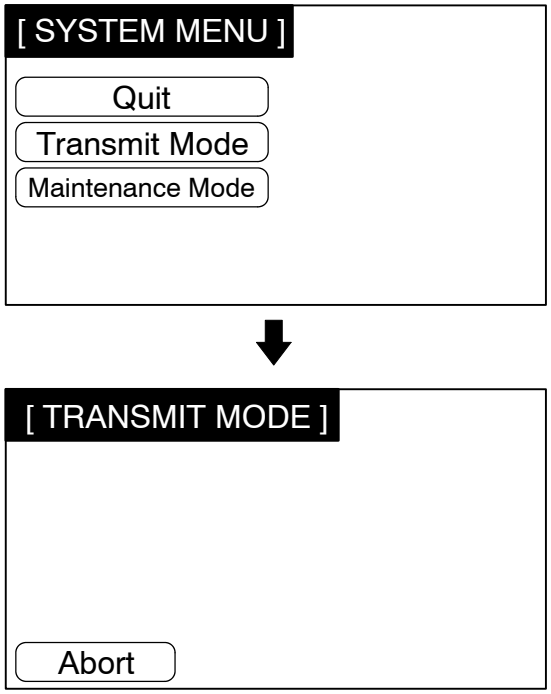
- When screen data transmission is performed, the NT30/30C screen data memory is automatically initialized before the new screen data is transmitted. There is therefore no need to initialize the screen data memory using menu operations before transmitting the screen data.
- The NT30/30C uses the same connector for screen data transfer and RS-232C connection to the PC. If this connector is currently being used for RS-232C connection to the PC, disconnect the cable from the PC, connect it to the NT-series Support Tool (personal computer), then transmit the screen data.

Operation

1 Connect the NT30/30C to the computer on which the NT-series Support Tool is being used, and turn ON the NT30/30C.

2 Turn ON the computer, start up the NT-series Support Tool, and open the screen data to be transmitted.

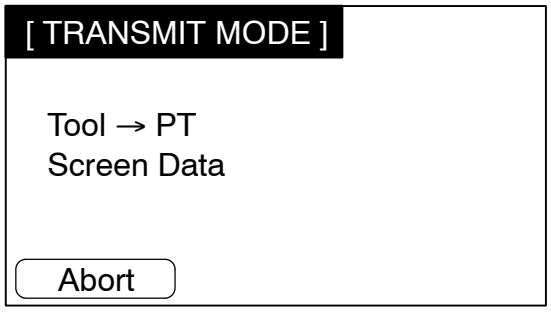
3 Enter the Transmit Mode by operating the menu of the NT30/30C shown below.



Select “Transmit Mode.”

4 Using the NT-series Support Tool, select Connect, Download (NT-series Support Tool → PT), and Application.

5 The NT30/30C will display the following screen when the screen data is being transmitted.



6 While the screen data is being transmitted, the transmission status will be indicated at the NT-series Support Tool on a bar graph.

7 When transmission of screen data has been completed, the transmission status display at the NT-series Support Tool will disappear.

8 Pressing the Abort touch switch in the Transmit Mode screen of the NT30/30C will exit the Transmit Mode and enter the System Menu Mode.

Reference Press the Abort touch switch on the NT30/30C when the screen data transmission is completed. Unless this touch switch is pressed, the screen data will not be correctly registered. If the Abort touch switch is pressed during transmission, the screen data will not be correctly registered.

If screen data cannot be transmitted from the NT-series Support Tool properly, check whether communication between the NT30/30C and NT-series Support Tool (personal computer) is normal.

Precautions to be Observed During the Screen Data Transmission

When any of the following or a system error occurs during the screen data transmission, the transmitted screen data will not be registered correctly to the NT30/30C. If an error message is displayed and the Run Mode cannot be selected, the screen data memory needs to be initialized.

- The power to the NT30/30C is interrupted or the NT30/30C is reset.
- The power to the computer on which the NT-series Support Tool is running is interrupted or the computer is reset.
- The cable connecting the NT30/30C to the computer on which the NT-series Support Tool is running is disconnected or has a broken wire.
- The Cancel touch switch on the NT30/30C screen is pressed to end the transmission during screen data transfer.
- The Cancel button on the NT-series Support Tool is pressed to end the transmission.

When the power to the NT30/30C is turned ON or reset, the screen data is checked. However, if any of the above occurs during the screen data transmission, the screen may disappear and other unexpected problems may occur.

In the case of such problems, set DIP switch SW2 pin 4 to ON to initialize the memory.

For the memory initialization by using the DIP switch, refer to the *Initialization by Using the DIP Switch* (page 80).

3-7 Starting the Operation

After completing the screen data transmission, and setting the communication conditions, connect the NT30/30C to the PC and start the operation.

⚠**Caution** Check the operation of screen data and ladder programs thoroughly before actually using them.

Switching to the RUN Mode Press the Quit touch switch in the System Menu. The start-up screen in the RUN mode will be displayed.

If the NT30/30C has failed to start correctly; e.g., the start-up screen is not displayed, an error message is displayed, or the screen is not displayed at all, refer to *6-2 Responding to Displayed Error Messages* (page 249) and take appropriate action.

Reference The start-up screen is the screen whose screen number is set for the screen switching specification in the PT Status Control Area. If no screen data has been registered at screen number, the “Screen not registered.” error message will be displayed. For the screen number setting, refer to *4-3 Screen Display* (page 131).

Confirming the Communications between the NT30/30C and the PC

Execute the PC program and confirm that the following operations are normally performed.

- Confirm that the NT30/30C screens switch according to the PC program execution.

  If the screens do not switch correctly, check the connection between the NT30/30C and the PC and also check the settings.

  Refer to *Section 2 Hardware Settings and Connections* (page 15).

- Confirm that the information selected by the NT30/30C touch switches has been set in the PC by displaying the contents of the words and bits using a Programming Device (LSS) or at the Host. If the information sent from the NT30/30C has not been correctly received by the PC, check the screen data settings (specifically the switch settings).

  For the details of the screen data creation, refer to the *NT-series Support Tool Operation Manual*.

3-8 System Settings

The NT30/30C can set a variety of functions using memory switches that are convenient during the operation. This section describes the memory switch settings related to the operation environment.

The memory switches can also be set in "System Setting" under "PT Configuration" on the NT-series Support Tool. The settings made using the NT-series Support Tool are written to the NT30/30C on screen data registration. For details, refer to the *NT-series Support Tool for Windows Operation Manua*l (V061).

Since the memory switch data are backed up by the battery in the NT30/30C, they are not cleared when the power is switched OFF.

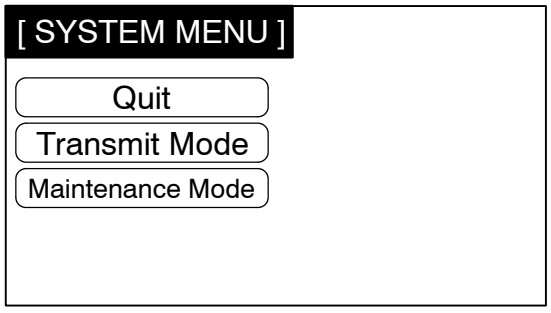
Reference If the memory switch data is not backed up by the built-in battery, it will all be initialized to the values set with the NT-series Support Tool when the NT30/30C is switched OFF. If the message "Battery Lowered" is displayed while the NT30/30C is operating, replace the built-in battery immediately. For details on how to replace the battery, see *Replacing the Battery* (page 253).

3-8-1 Setting the Key Press Sound

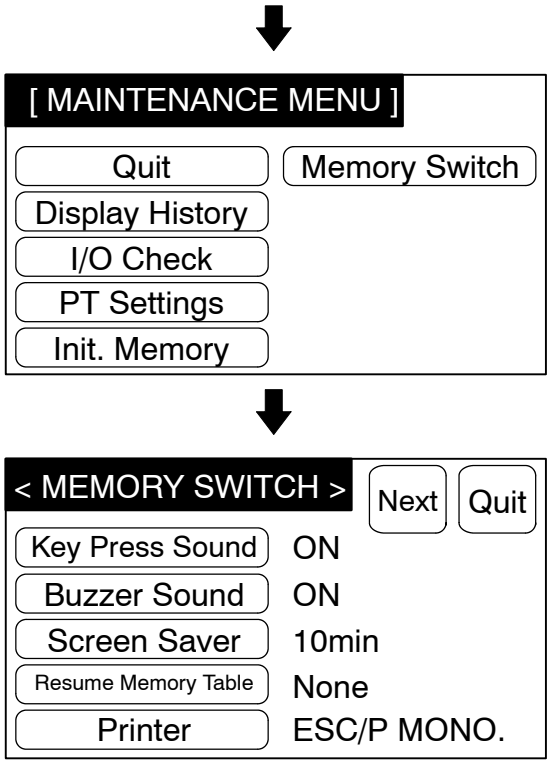
It is possible to set whether or not the key sound is sounded when a touch switch on the NT30/30C screen is pressed or an expanded I/O input comes ON by using the Key Press Sound memory switch.

The factory setting for this memory switch is ON, which means that the key sound will sound in these cases.

Set the key press sound by the menu operation from the System Menu shown below.



Select "Maintenance Mode."



Select "Memory Switch."

Each time the Key Press Sound touch switch is pressed, the setting option ON alternates with OFF.

To set and quit the menu, press the Quit touch switch. The settings made last will be set and the display will return to the Maintenance Menu.

- ON: The key press sound will be given for 0.2 second when a touch switch is pressed.
- OFF: The key press sound will not be given when a touch key is pressed.

3-8-2 Using the Buzzer

The NT30/30C can set a buzzer to indicate the occurrence of an emergency or an NT30/30C error.

Setting the Buzzer

Except when the buzzer has been set so as not to sound at all, the buzzer will sound when an error occurs. To set the buzzer to sound in other cases, the following two procedures can be used.

- **Controlled by the PC**

  It is possible to control the NT30/30C from the PC to sound the buzzer during the operation.

  Refer to *5-7 NT30/30C Status Control* (page 239).

- **Setting the Buzzer as a Screen Data Attribute by Using the NT-series Support Tool**

  When creating the screen data by using the NT-series Support Tool, set the buzzer as a screen attribute so that the buzzer will sound. When the screen in which this attribute has been set is displayed, the NT30/30C will give the buzzer sound.

If the control by the PC and the display of the screen in which the buzzer attribute has been set are executed simultaneously, the priority is given to the control by the PC. Refer to the *NT-series Support Tool for Windows Operation Manual* (V061).

To Stop the Buzzer Sound

The buzzer sound can be stopped by the following operations.

- Control by the PC
- Switch the screen to a screen that does not have a buzzer attribute.
- Press the touch switch to which the buzzer stop attribute has been set.
- Turn ON the input terminal for expansion I/O for which a buzzer stop attribute has ben set.

If a buzzer stop attribute has been set to a touch switch created on the screen in which the buzzer attribute has been set, such touch switch can be used to stop the buzzer sound. To set a buzzer stop attribute to a touch switch, set the control key function for the touch switch by using the input key function.

For the touch switch setting, refer to *4-7 Touch Switches* (page 154).

Types of the Buzzer Sounds

The following buzzer sounds can be set.

- Continuous sound: The buzzer continues to sound.
- Short intermittent sound: The buzzer sounds intermittently at 0.5 second intervals.
- Long intermittent sound: The buzzer sounds intermittently at 1 second intervals.

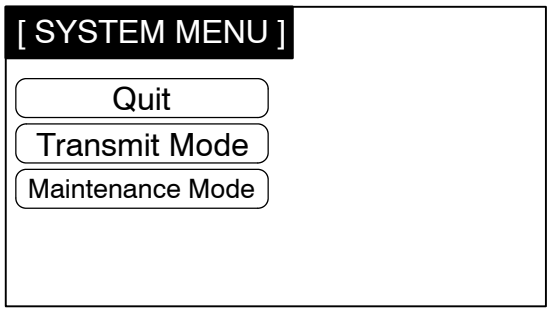
If two or more buzzer sound specifications are made from the PC at the same time, the order of priority that determines that buzzer sound will be used is as follows: (1) continuous sound → (2) short intermittent sound → (3) long intermittent sound. If the continuous sound and short intermittent sound are specified at the same time, the continuous sound takes priority.

Setting the Buzzer

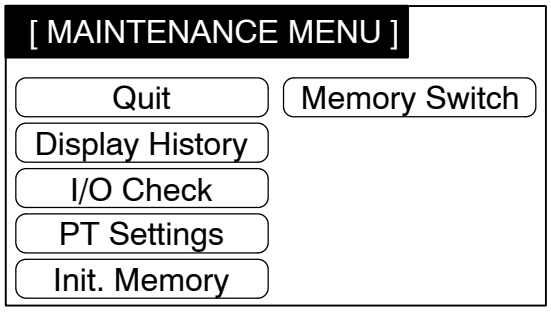
Use the memory switches to set whether or not the buzzer sounds when the buzzer sound has been instructed by the PC or with a screen attribute or when an error has occurred.

The factory setting is ON, which means that the buzzer will sound when a command is received from the PC, when a screen for which the buzzer attributes is set is displayed, and when errors occur.

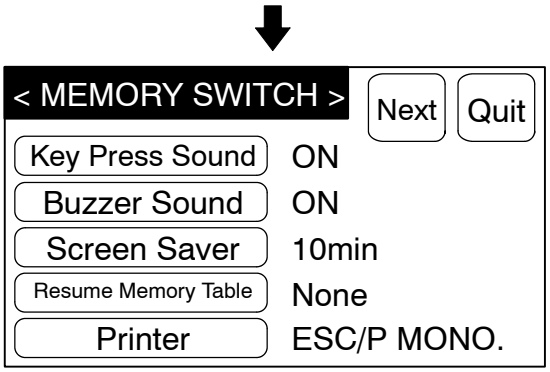
Set the buzzer sound by the menu operation from the System Menu shown below.



Select “Maintenance Mode.”



Select “Memory Switch.”



Each time the Buzzer Sound touch switch is pressed, the setting option "ON" alternates with "ERR ON" , "OFF."

To set and quit the menu, press the Quit touch switch. The setting made last will be set and the display will return to the Maintenance Menu.

- OFF: The buzzer will not sound at all during the operation.
- ON: The buzzer will sound when a command from the PC is given, the screen attribute has been set, or an error has occurred.
- ERR ON: The buzzer will sound only when an error has occurred.

Reference The buzzer will sound when "Buzzer check" is selected in the Maintenance Mode regardless of the buzzer setting.

3-8-3 Screen Saver Function

The NT30/30C has a function that turns OFF the screen display if no operation is performed for a certain period of time to maximize the service life of the backlight and prevent the formation of an afterimage on the screen. (the backlight is also switched OFF at the same time).

Redisplaying a Screen That Has Been Turned OFF

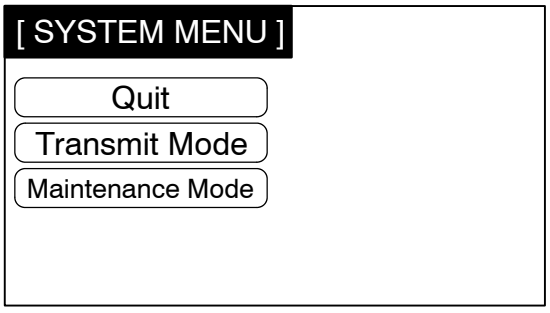
After the screen has been turned OFF by the screen saver function it will be redisplayed if a touch switch is pressed, or if an instruction to switch the screen or redisplay the same screen is received from the PC (the backlight will also be turned back ON at the same time). Changes in numerals or character strings displayed on the screen will not cause the screen to be redisplayed.

Setting the Screen Saver Function

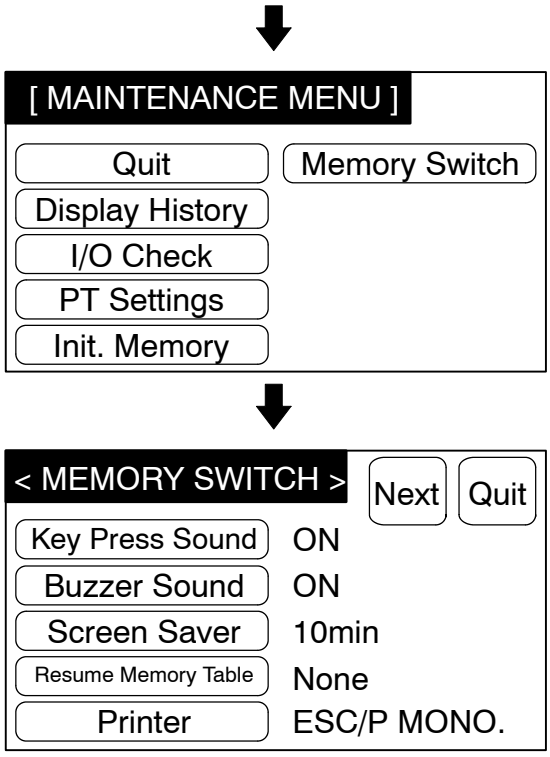
Use the memory switches to set whether or not the screen saver function is used, and the length of time that the screen is turned OFF if it is used.

The factory setting specifies that the backlight will turn OFF if no operation is performed for 10 minutes.

Reference When terminals to which numeric key functions or stand-alone function keys are allocated are turned ON while the backlight is OFF, the key function will not be executed by canceling the backlight OFF status. However, in the case of input communication keys, notification will be sent to the PLC regardless of whether or not there is a backlight OFF function releasing attribute.



Select "Maintenance Mode."



Select "Memory Switch."

Each time the Screen Saver touch switch is pressed, the setting option will switch among 10 min, 1 hour, and None.

To set and quit the menu, press the Quit touch switch. The setting made last will be set and the display will return to the Maintenance Menu.

- None: The screen OFF function is not used. As long as no operation is performed, the same screen remains to be displayed.
- 10min: The screen will be turned OFF when no operation has been performed for 10 minutes.
- 1hour: The backlight or the EL screen will be turned OFF when no operation has been performed for 1 hour.

⚠Caution Do not press touch switches carelessly while the backlight is OFF or while nothing is displayed on the screen. Otherwise the system may operate unpredictably.
Only press touch switches after confirming system safety.

Correct use After images may remain if the same pattern is displayed for a long period (approx. 1 hour).
To prevent the formation of an afterimage, either use the screen saver function or periodically switch screens.

3-8-4 Resume Function

The NT30/30C has a function to protect the contents of the memory tables (value setting key input, data from the PC, etc.) from being erased even if the power to the NT30/30C is shut OFF during operation. This function is called the resume function. Setting the resume function protects the memory tables from being initialized even when the power is turned ON or reset or when the mode is switched to the RUN mode by the System Menu operation.

The screen displayed before the power is turned OFF will be displayed again when the NT30/30C is started next time.

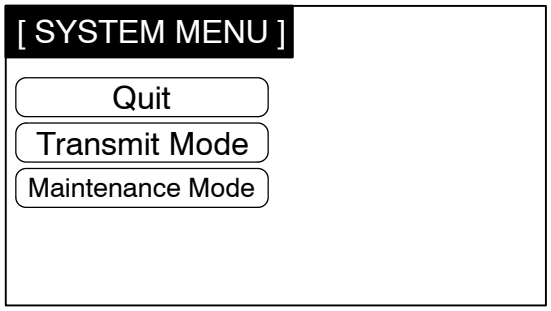
If the memory tables are selected in the Initialize Memory Menu from the Maintenance Mode Menu, the memory tables will be initialized regardless of whether or

not the resume function is set to ON or NONE. For the memory table initialization, refer to *Initialization of the Memory Tables* (page 81).

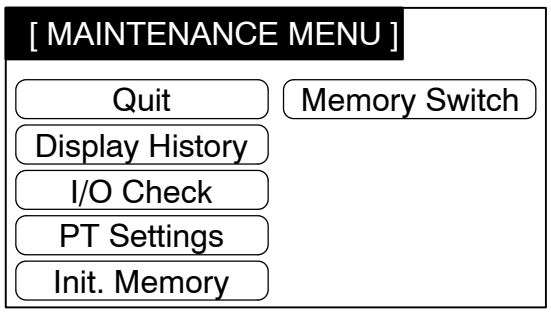
Reference If the voltage of the battery in the NT30/30C gets too low, the contents of the memory tables cannot be saved even if the resume function is effective.

Use the memory switches to set whether or not the resume function is used. The factory setting is ON, which means that the resume function is effective.

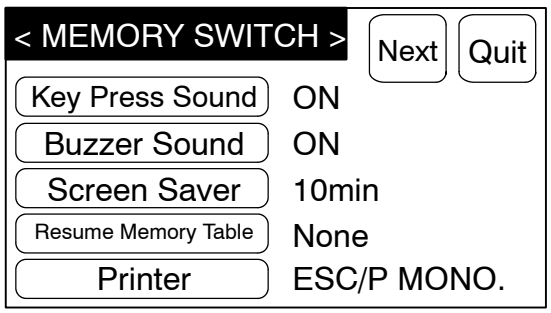
Set the resume function by using the menu operation from the System Menu shown below.



Select “Maintenance Mode.”



Select “Memory Switch.”



Each time the Resume Function touch switch is pressed, the setting option ON alternates with None.

To set and quit the menu, press the Quit touch switch. The setting made last will be set and the display will return to the Maintenance Menu.

- NONE: The resume function will be disabled and the memory tables will be initialized when the power to the NT30/30C is turned ON or reset or when the mode is switched to the RUN mode.
- ON: The resume function will be enabled and the memory tables will not be initialized. When the NT30/30C starts operation, the contents of the memory tables are written to the allocated words in the PC.

3-8-5 Screen Printing Function

The NT30/30C can print a hard copy of the displayed screens onto a printer connected to the NT30/30C. This function is called the screen printing function. The NT30/30C will continue operating even when such a hard copy is being printed.

However, since the screen print function shares the NT30/30C memory with the pop-up window function (page 173), hard copies cannot be printed while a pop-up window is displayed.

For printer connection, refer to *2-8 Connecting a Printer* (page 63).

Printing Screens

Screen printing can be performed by using a touch switch for which screen printing/interruption function is set or by giving a screen printing command from the PC.

- **Using a Touch Switch**

  When creating screen data with the NT-series Support Tool, set the screen printing function to a touch switch. For details, refer to *NT-series Support Tool for Windows Operation Manual* (V061).

  Pressing the touch switch so set as to start hard copy printing prints a hard copy of the screen displayed. To interrupt the printing, press the touch switch to which hard copy printing interruption is set.

- **Giving Instructions from the PC**

  Set up a PT Status Control Area (PC → PT) and then start printing the screen.

  For details, refer to *5-7 NT30/30C Status Control* (page 239).

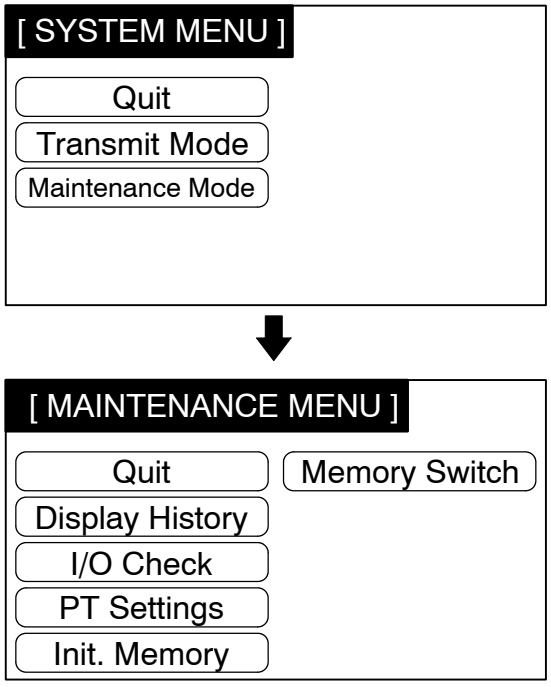
  However, printing of screen hard copies may not be interrupted from the PC.

Setting Screen Printing

Set the type of the printer and a way of printing in the Memory Switch Menu.

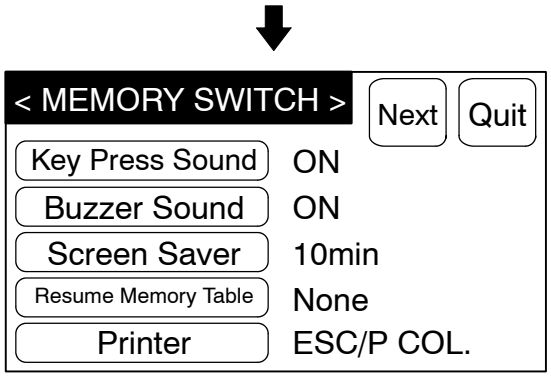
The factory setting is “ESC/P COL.” (if using an NT30, monochrome printing will be executed on color printers).

Screen printing by using the menu operation from the System Menu shown below.



Select “Maintenance Mode.”

Select “Memory Switch.”



Each time the Printer touch switch is pressed, the next item in the applicable cycle of options below is selected:

ESC/P COL.
ESC/P MONO.
PR201H COL.
PR201H TONE.

To set and quit the menu, press the Quit touch switch. The setting made last will be set and the display will return to the Maintenance Menu.

ESC/P COL.: Specify this for a printer, such as the EPSON ESC/P Printer (24-pin), that conforms to the printer control standard ESC/P24-J83C. Hard copies will be made in colors.

PR201H COL.: Specify this for a printer that conforms to the control standard for the PC-PR201H made by NEC. Hard copies will be made in colors.

ESC/P MONO.: Specify this for a printer, such as the EPSON ESC/P Printer (24-pin), that conforms to the printer control standard ESC/P24-J82. Hard copies will be made in monochrome with colors expressed by gray scale levels.

PRO201H MONO.: Specify this for a printer that conforms to the control standard for the PC-PR201H made by NEC. Hard copies will be made in monochrome with colors expressed by gray scale levels.

3-9 System Maintenance

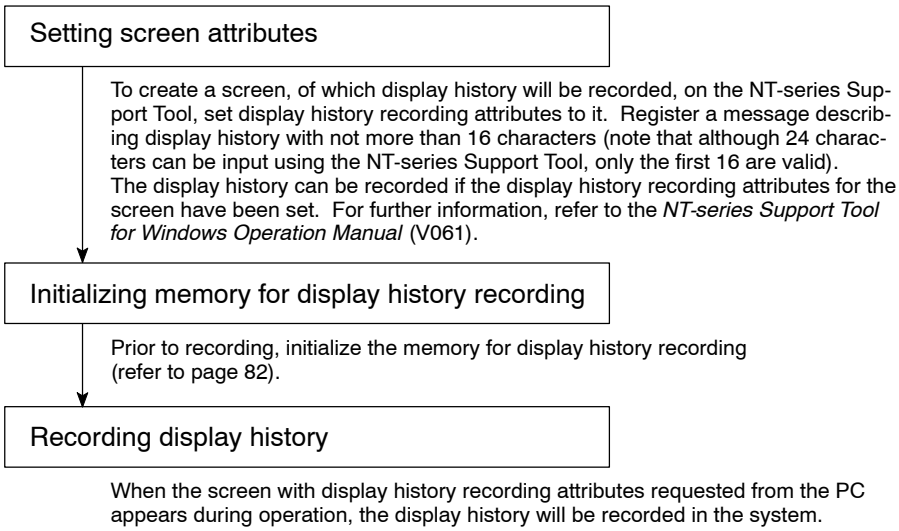
The NT30/30C has self-maintenance functions, such as display history recording, I/O check and PT setting display.

3-9-1 Using the Display History Recording Function

The display history recording function is used to record the display sequence and frequency of screens during operation. The data recorded can be displayed and confirmed on the system screen.

Recording Display History

Display history is recorded in the following procedure:



Display History Recording Format

Display history includes the following items related to the screen displayed:

- Screen number
- Date and time of display
- Message outlining screen data

Maximum Number of Screens to be Recorded

In order of occurrence: Up to 1,023 screens can be recorded regardless of the screen number.

In order of frequency: Up to 1,023 screens can be recorded and number of times each screen is displayed can be recorded up to a maximum of 255.

Since the data recorded is retained by the battery, it will not be lost even if the power to the system is turned OFF.

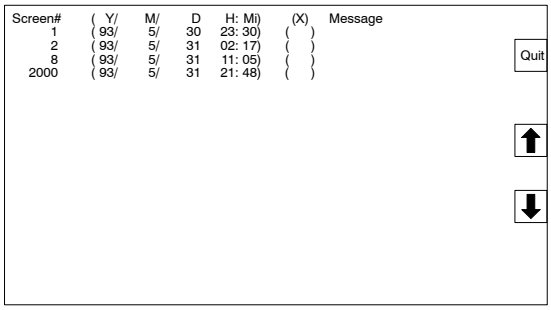
Confirming Screen Data Recorded

There are two ways to confirm screen data recorded: by the maintenance mode, and by displaying the screen by the screen data recording function during operation.

Recorded data can be displayed in order of occurrence or frequency.

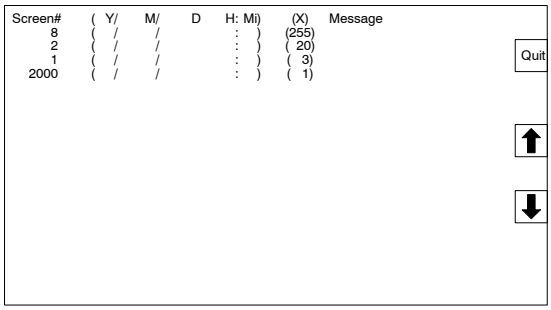
- In Order of Occurrence

Recorded data is displayed in order of occurrence.



- In Order of Frequency

Recorded data is displayed in order of display frequency with the accumulated number of times each screen has been displayed.



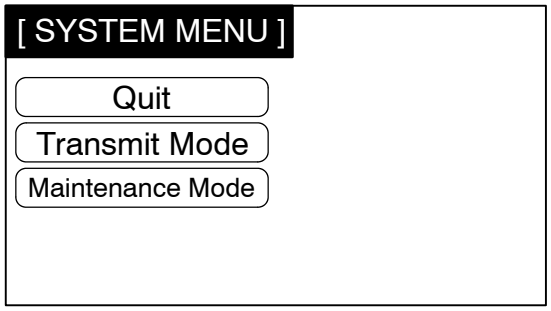
In either case, the system screen shows up to 14 screen numbers and their data at a time.

To take a look at data that is not on the display, press the ⇧ or ⇩ key on the touch panel.

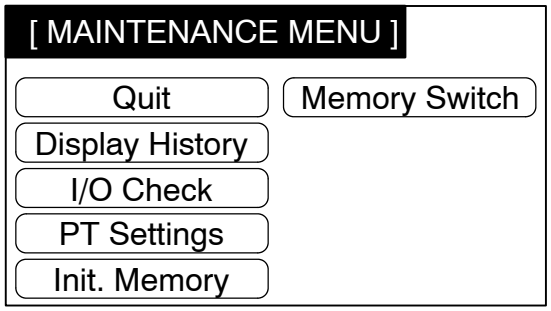
When no screen data is recorded, the message “History Record Not Found” appears, and the screen returns to the history record after about two seconds.

- Confirming Recorded Screen Data by Operation from the System Menu

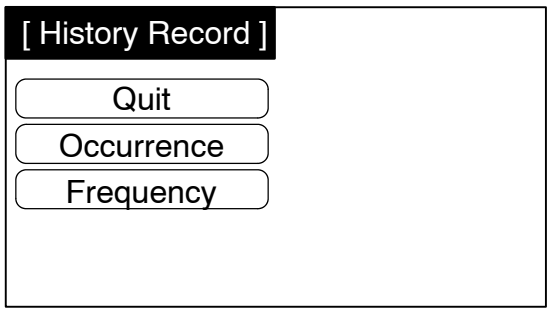
Confirm the recorded screen data by the operation from the System Menu shown below.



Select “Maintenance Mode.”



Select “Display History.”



Select “Occurrence” or “Frequency.”

The recorded data will be displayed in accordance with the selected method.

To quit confirmation, press the Quit touch switch. The History Record menu will be redisplayed.

- Confirming Recorded Screen Data During Operation

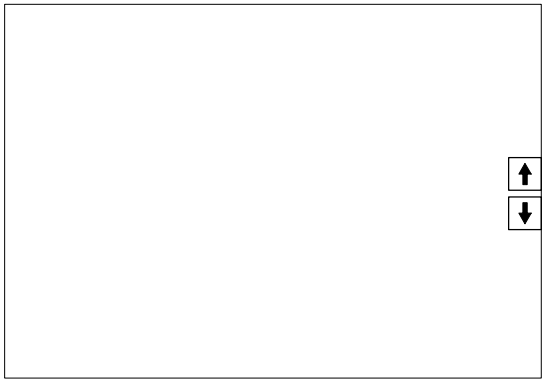
Screens No. 1997 and No. 1998 are for displaying recorded screen data.

Either screen will be displayed according to the data display order selected.

Screen No. 1997: In order of occurrence
Screen No. 1998: In order of frequency

Reference

- When the direct connection system is used, screens No. 1997 and No.1998 are reserved for recorded screen data display. They are unavailable for any other purpose.
- If the screen attribute (numeral setting attribute) for screen numbers 1997 and 1998 is "user," the touch switches used to scroll the screen do not appear when the display history is displayed during operation. In this case, create touch switches – such as the ↑ and ↓ touch switches shown in the figure below – in advance at the right edge of the screen. The size of the switches should not exceed 40 dots (two regular touch switch widths). When using an NT30C, select white as the background color for the screen.



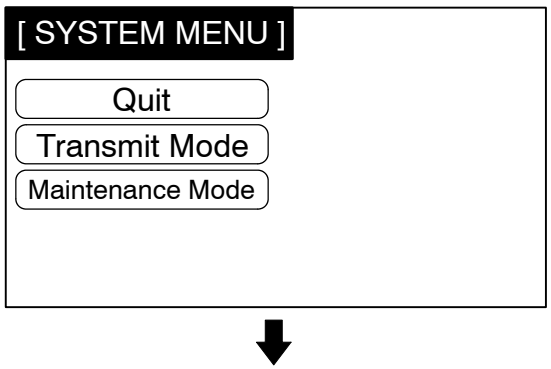
3-9-2 I/O Check

The I/O operations for the following items of the NT30/30C are checked by the I/O check function.

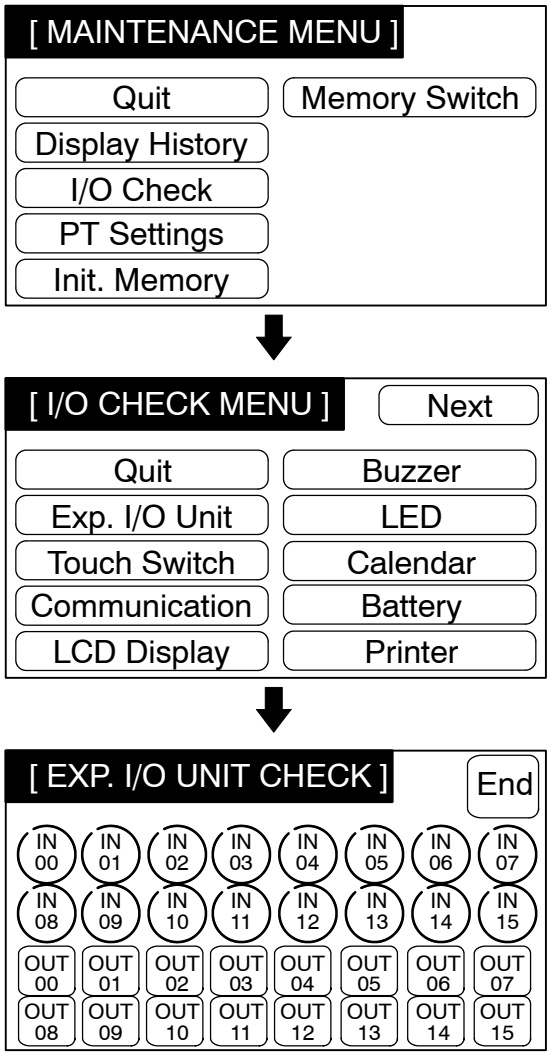
- Expansion I/O Unit (B7A Unit): Buzzer Check
- Touch Switch: LED Check
- Communication Check: Calendar & Clock
- LCD Display: Battery Voltage
- Backlight: Printer Check

Checking the Expanded I/O

Check expanded I/O on a B7A Unit by using the menu operation from the System Menu shown below.



Select "Maintenance Mode."



Select "I/O Check."

Select "Exp. I/O Unit" (B7A Unit).

- **Input Check**

  The two rows of round lamps IN00 to IN15 in the upper part of the screen correspond to expanded I/O input bits 0 to 15. When a touch switch is pressed, the corresponding input bit is ON while it is being pressed.

- **Output Check**

  The two rows of square touch switches OUT00 to OUT15 in the lower part of the screen correspond to expanded I/O output bits 0 to 15. When a touch switch is pressed, the corresponding output bit switches between ON and OFF.

⚠Caution As far as possible, disconnect all peripheral devices connected to the output terminals before executing the output check. Otherwise, each time an output terminal comes ON during the check operation, a buzzer, or warning lamp, etc. will be activated at a peripheral device.

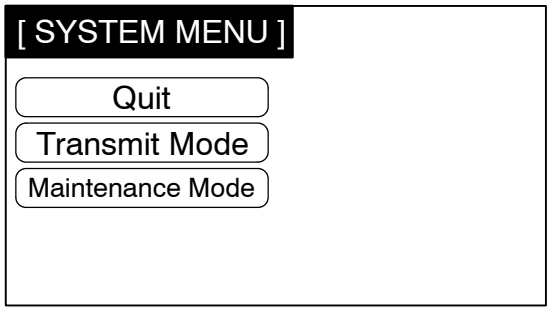
- When the check is finished, press the End touch switch. The I/O check menu will be redisplayed.

Reference

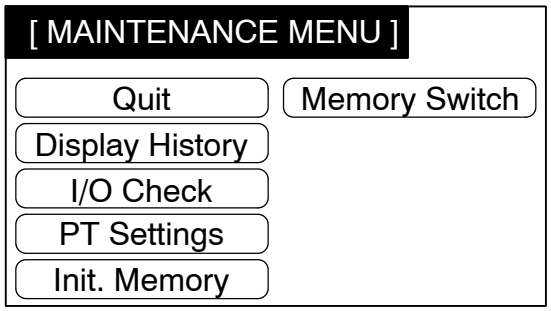
- If the key press sound is set to ON with the memory switches, it will sound when an expanded I/O input bit comes ON.
- The statuses of the expansion I/O inputs are not notified to the PC during the I/O check.
- When using the B7A Unit with 8 inputs and 8 outputs, the lamps IN08 to IN15 turn ON or OFF whenever touch switches OUT00 to OUT07 are pressed.

Checking the Touch Switches

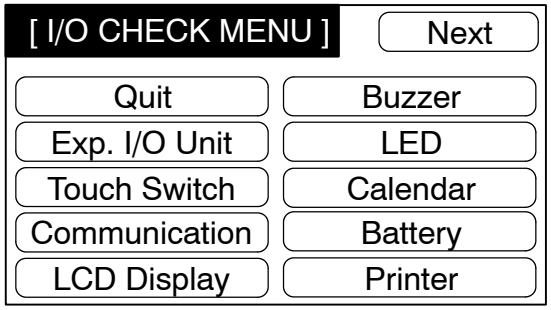
Execute a touch switch check by the menu operation from the System Menu shown below.



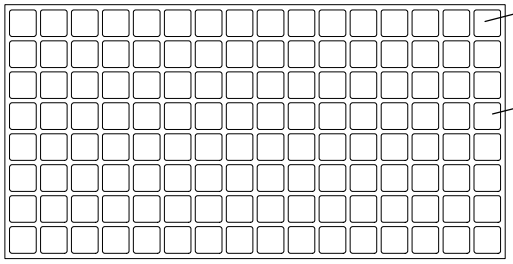
Select “Maintenance Mode.”



Select “I/O Check.”



Select “Touch Switch.”



This touch switch is to exit the touch switch checking screen. Its color is different from that of the other switches.

The touch switch is normal if it is highlighted while it is pressed.

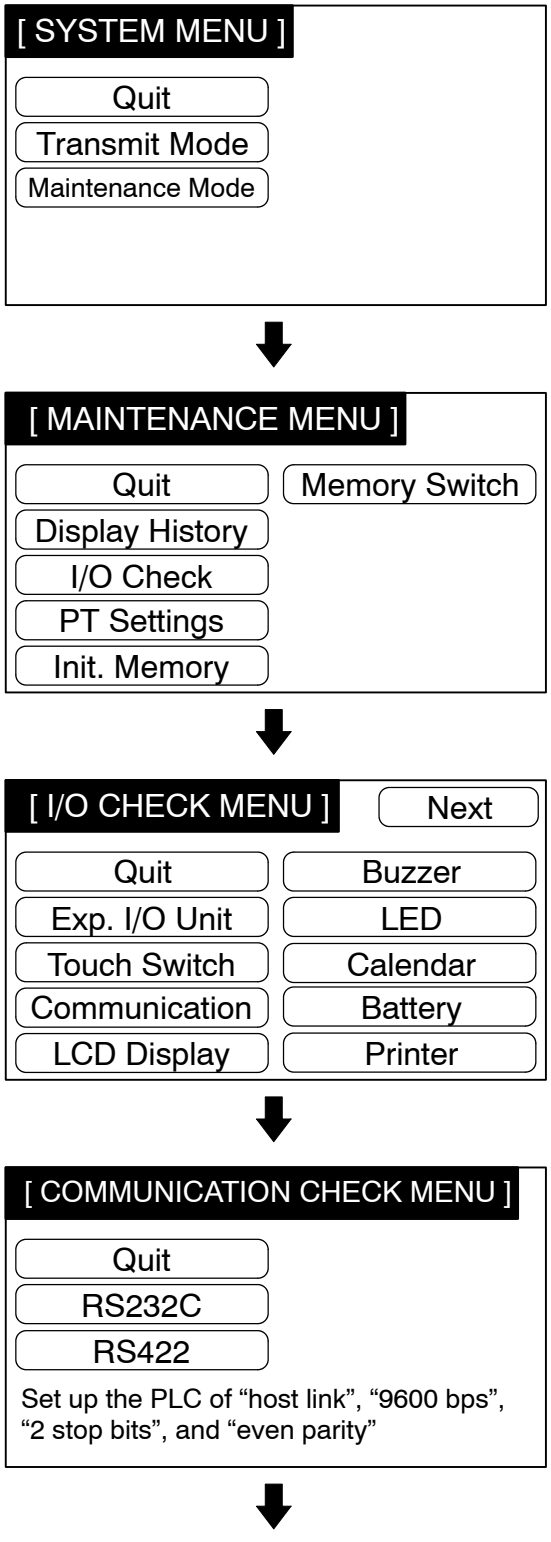
- Press a touch switch on the screen. If the touch switch is highlighted while it is pressed, the touch switch is normally functioning.
- When the check is finished, press the 1x1 touch switch at the top right corner of the screen. The I/O check menu will be redisplayed.

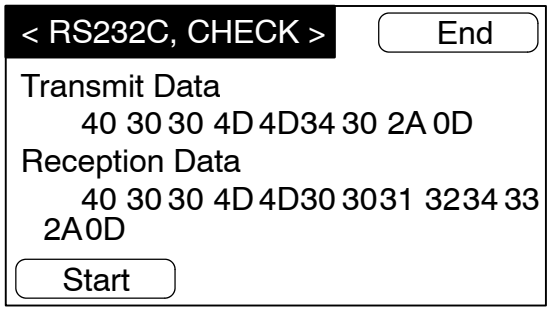
Reference If memory switch setting for the key press sound has been made for ON, the key press sound will be made when a touch switch is pressed. The number of pressed touch switch will not be notified to the PC.

Checking the Communications with PC

Execute a NT30/30C-to-PC communication check by the menu operation from the System Menu shown below.

The NT30/30C uses the same connector for connection to the NT-series Support Tool and RS-232C connection to the PC. To establish an RS-232C connection with the PC, disconnect the cable from the NT-series Support Tool and connect it to the PC: the communication check can then be performed.





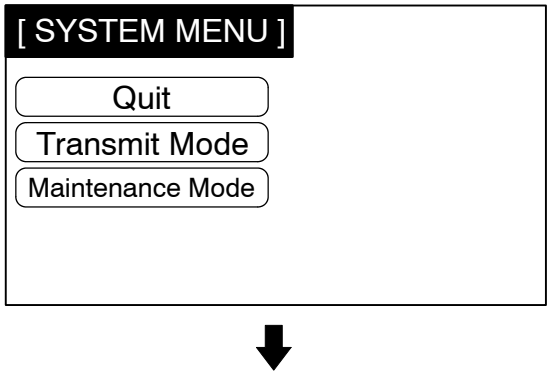
Example: "RS232C" selected

Select "Start."

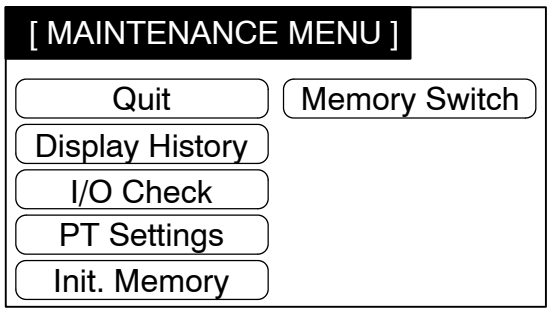
- The data required to check communication will be sent to the PC, and will be displayed at "Transmit Data" in hexadecimal. If communication is normal, the response from the PC will be displayed immediately at "Reception Data." If there is no response from the PC and nothing is displayed at "Reception Data," an error has occurred and the communication cable and setting conditions must be checked.
- When the check is finished, press the End touch switch. The Communication Check Menu will be redisplayed.

Checking the LCD Display

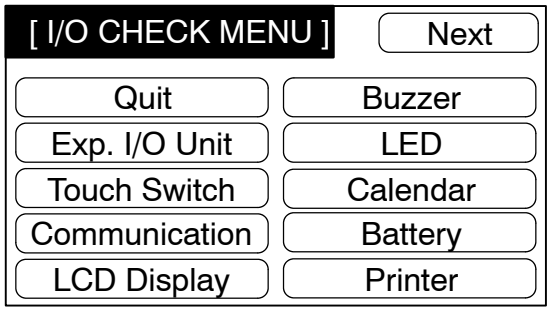
Check the NT30/30C LCD display by using the menu operation from the System Menu shown below.



Select "Maintenance Mode."



Select "I/O Check."

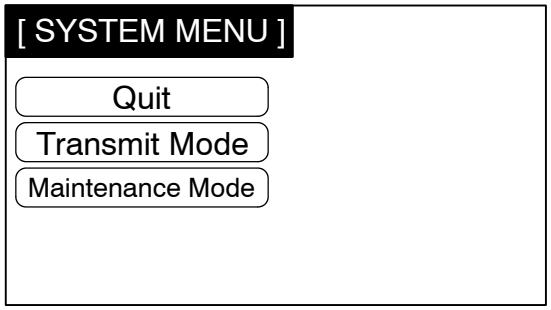


Select "LCD Display."

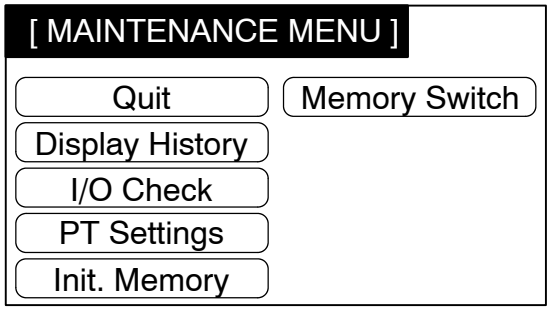
- Dots (the points that make up the screen) are displayed one by one starting at the top left of the screen. In the case of the NT30C, the check is performed for each color (in the order black → blue → magenta → white → yellow → green → black). If all the dots are displayed successfully, the display is cleared and the I/O Check Menu is redisplayed.
- To discontinue a screen display check, press the touch switch at the top right corner of the screen. The I/O Check Menu" will be redisplayed.

Checking the Buzzer

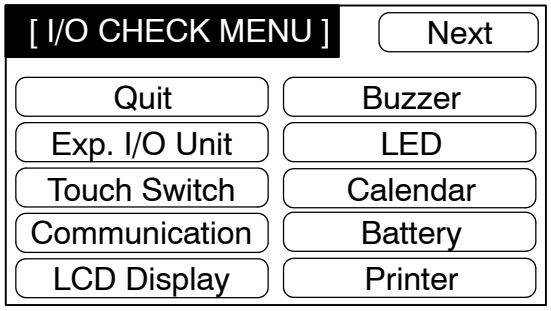
Check the NT30/30C buzzer by using the menu operation from the System Menu shown below.



Select "Maintenance Mode."



Select "I/O Check."



Select "Buzzer."

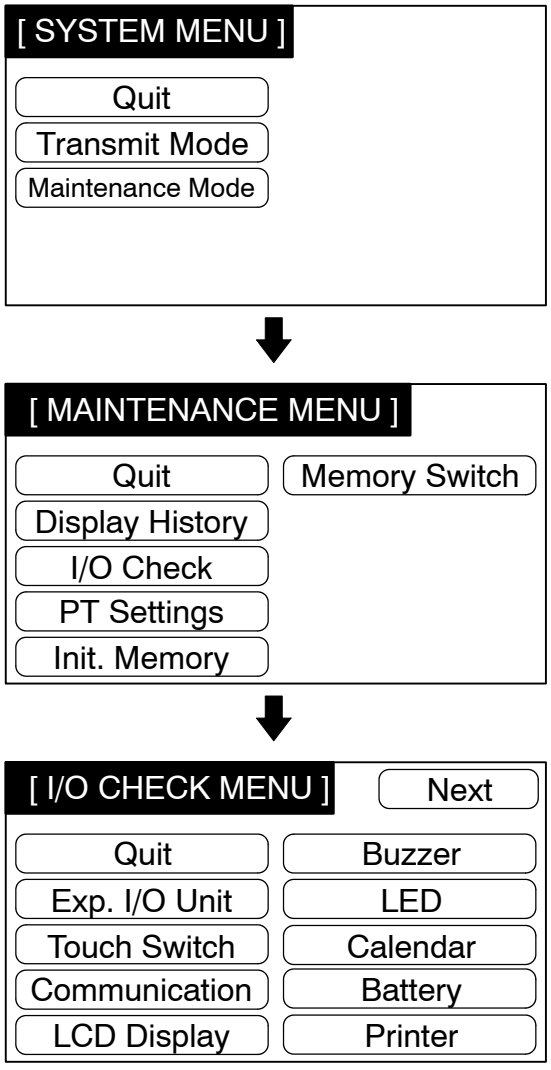
- If the buzzer function is normal, the continuous buzzer sound will be made.
- To stop the buzzer sounding, press the Buzzer touch switch again.

Reference

Though memory switch setting for the buzzer has been made for OFF, the buzzer will sound when the buzzer check is executed.

Checking the Indicators

Check the indicators by using the menu operation from the System Menu shown below.

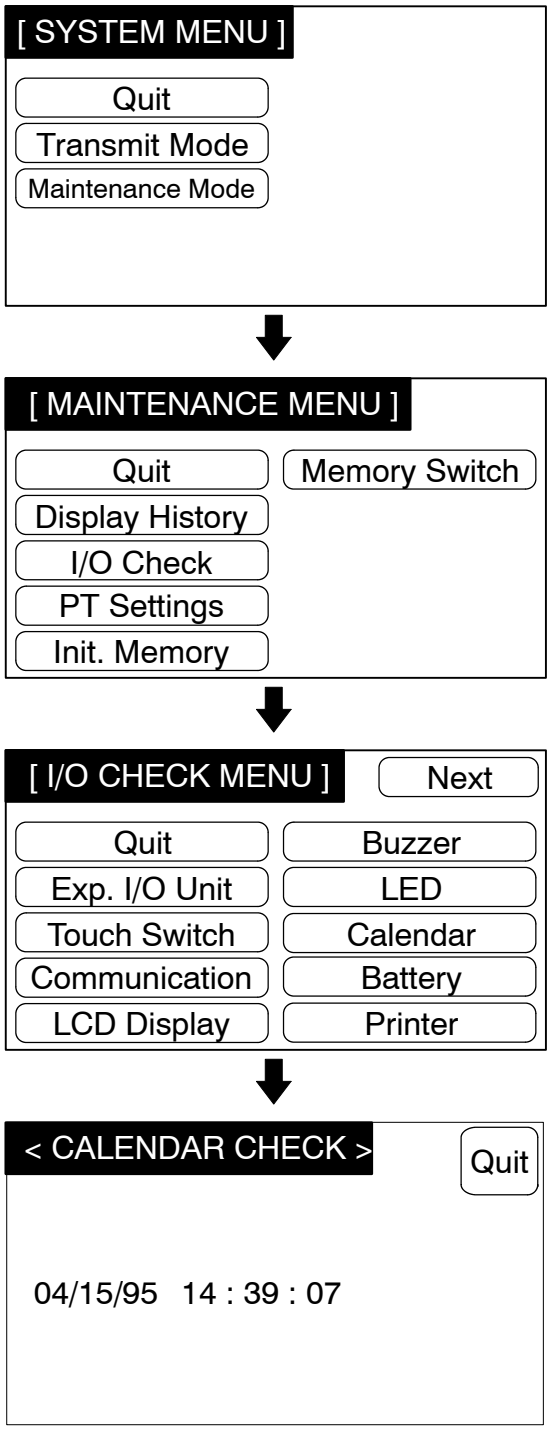


The RUN indicator on the front face of the NT30/30C will flash alternately green and red. The POWER indicator remains lit.

- To quit the indicator check, press the LED Check touch switch again.

Checking the Calendar and Time

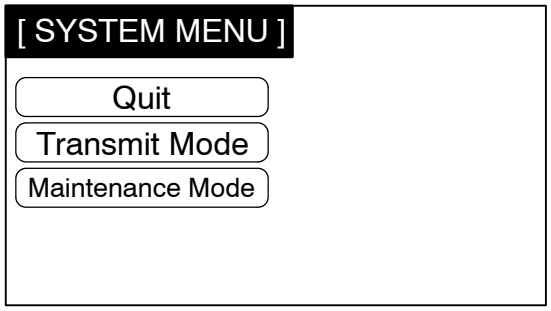
Check the setting of the internal clock function by using the menu operation from the System Menu shown below.



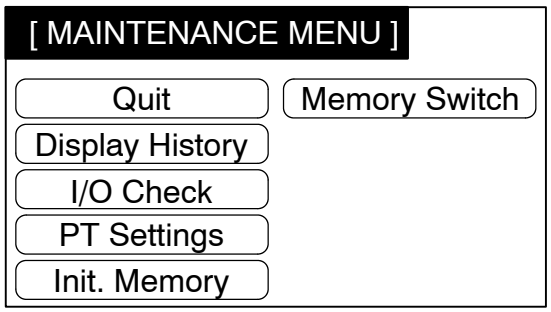
- When the check is finished, press the Quit touch switch. The I/O Check Menu will be redisplayed.
- Calendar and clock setting can also be executed by performing the download operation in “Date and Time” under “Connect” on the NT-series Support Tool, or by using numeral memory table operations. For details on the setting procedure when using the NT-series Support Tool, refer to the *NT-series Support Tool for Windows Operation Manual* (V061), and for details on the setting procedure using numeral memory table, refer to *5-6 Clock Function* (page 234).

Checking the Battery Voltage

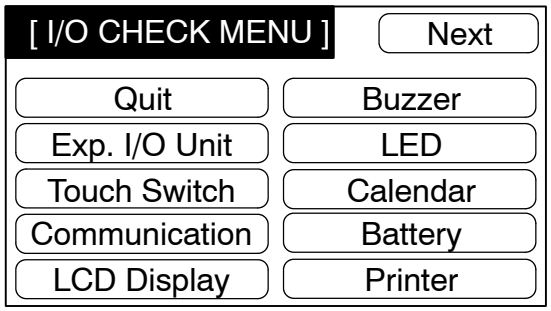
Check the battery voltage by using the menu operation from the System Menu shown below.



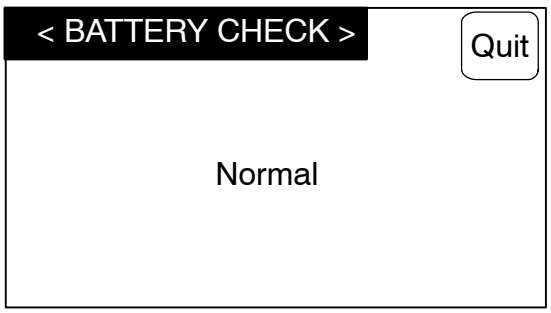
Select “Maintenance Mode.”



Select “I/O Check.”



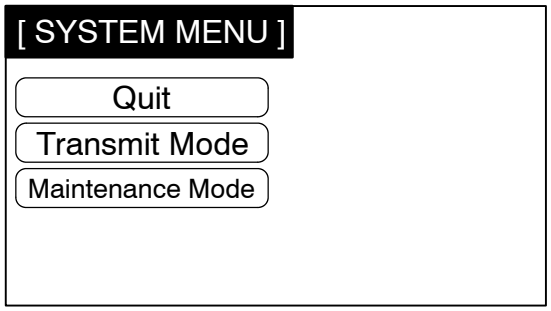
Select “Battery.”



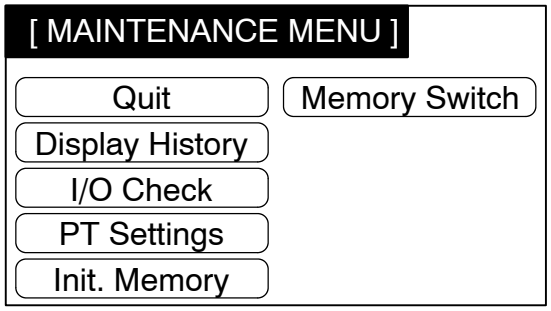
- After checking the screen message, press the Quit touch switch. The I/O Check Menu will be redisplayed.

Checking the Printer

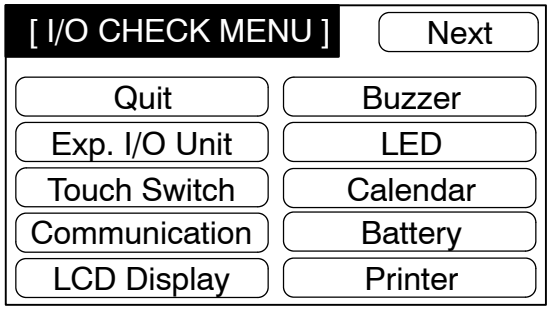
Check communication with the printer by using the menu operation from the System Menu shown below.



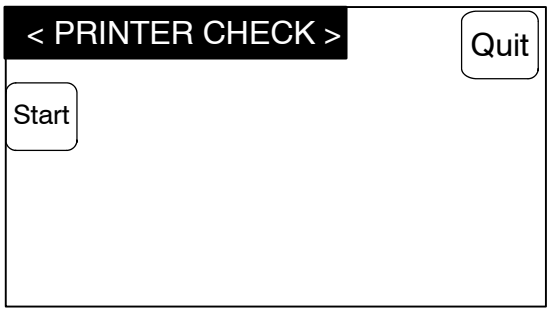
Select “Maintenance Mode.”



Select “I/O Check.”



Select “Printer.”



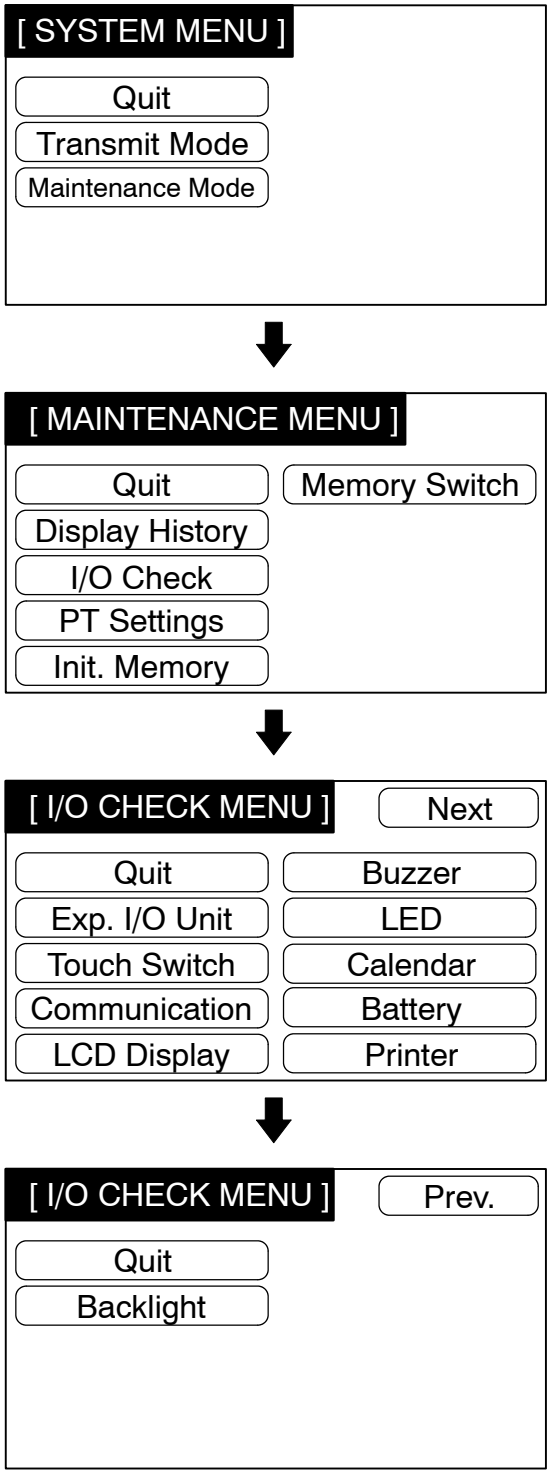
Press “Start.”

“PRINTER CHECK” will be printed out at the connected printer.

- On completion of the check, the message “Finish Check” will be displayed.
- On confirming the result, press the Quit touch switch. The I/O Check Menu will be redisplayed.

Checking the Backlight

Check the Backlight by using the menu operation from the System Menu shown below.



- When “Backlight” is selected, the backlight will start flashing. The NT30 has two backlight colors and this flashing follows the sequence shown below in the case of the NT30:

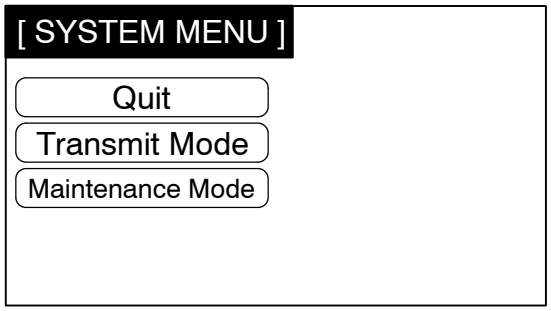
  Red only lights → red OFF → white only lights → white OFF → ...

- To stop the backlight flashing, press the Backlight touch switch again.

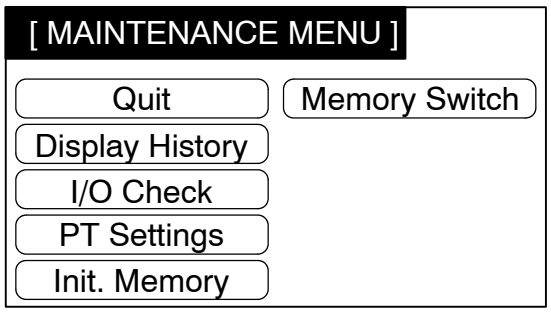
3-9-3 Checking the PT Setting Status

Checking the PT Setting Status

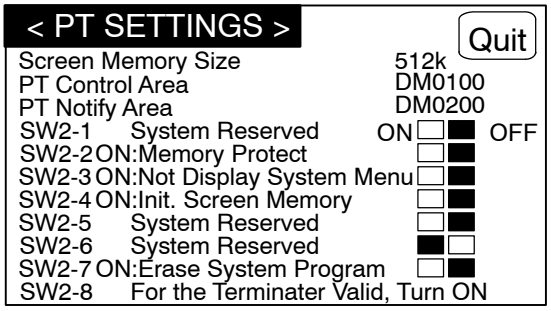
Display the NT30/30C settings by using the menu operation from the System Menu shown below.



Select “Maintenance Mode.”



Select “PT Settings.”



- The current NT30/30C setting status will be displayed.
- Pressing the Quit touch switch will exit the PT Settings display and cause the NT30/30C to return to the Maintenance Menu.

Reference SW2 pin 6 is factory-set to OFF. Since it is not possible to display English with this setting, it must be set to ON before installing the system program. (Use the installer.)

SECTION 4
NT30/30C Functions

This section describes the functions of the NT30/30C.

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4-1 Creating and Transmitting Screen Data

This section describes briefly the NT-series Support Tool settings required for creating screen data and the screen data creation procedure. Screen data must be created to use the NT30/NT30C

For the details of the NT-series Support Tool and screen data creation, refer to the *NT-series Support Tool for Windows Operation Manual* (V061). There are some differences in the displays depending on the version.

4-1-1 Creating Screen Data

Screen Data Creation Method

The screen data is created by using the NT-series Support Tool. The NT-series Support Tool registers the screen data used with one NT30/30C to one file.

Screen data can be created by one of the following three methods:

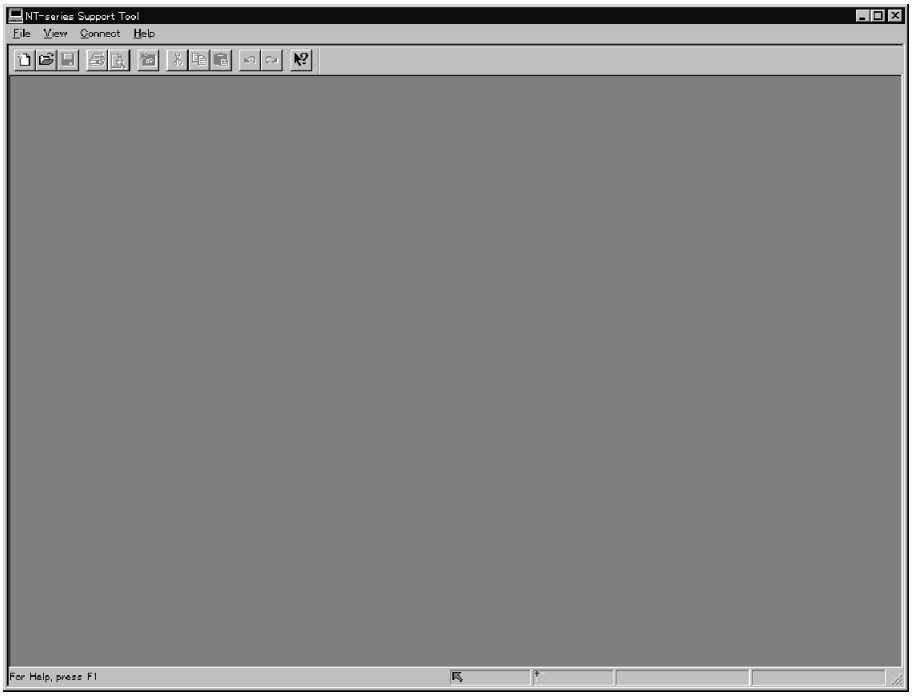
- Creating a new file;
- Editing an existing file to create a new.

The same screen data can be used for both the NT30 and NT30C. Also, NT-series Support Tool for Windows can be used to convert screen data from the NT20S, NT620C, or NT625C for use with the NT30 or NT30C. Refer to the *NT-series Support Tool for Windows Operation Manual* for information on converting screen data between different PT models.

NT-series Support Tool for Windows can read screen data created on the DOS version of the NT-series Support Tool. You can also import individual scenes, components, or tables from screen data files. Refer to the *NT-series Support Tool for Windows Operation Manual* for details.

Screen Data Creation Procedure

The following gives the basic screen data creation procedure. Required settings and reference pages are given for each step of the procedure.

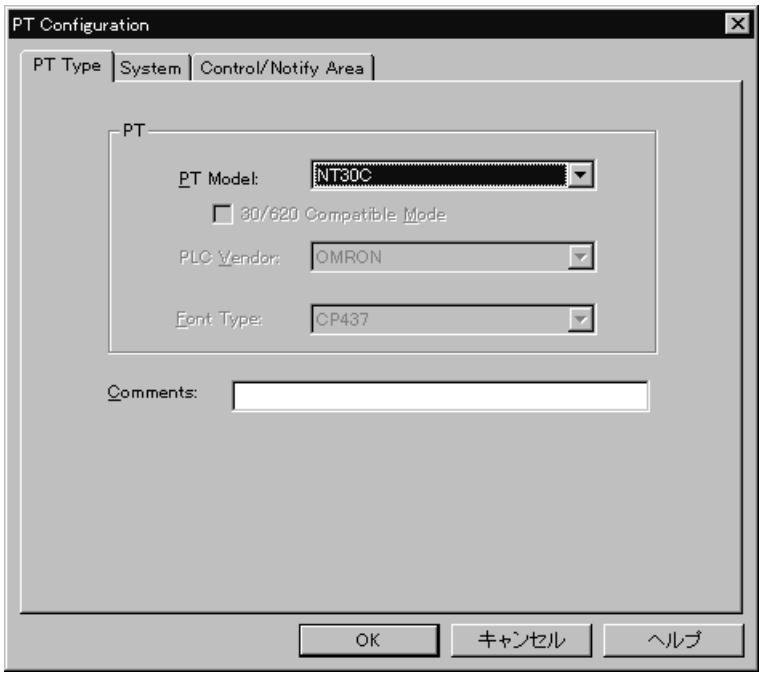


1, 2, 3... 1. After starting the Support Tool, open a screen file to use for storing the screen data from the File Menu.

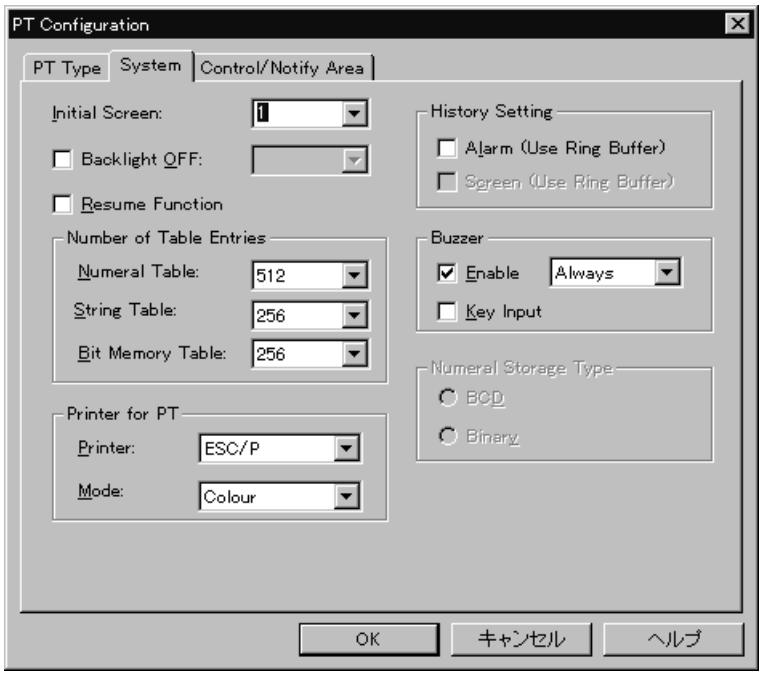
To create a new file, select “New File.” Select “New File” and press [Enter]. Enter filename on completion of creation.

To edit an existing file, select “Open” and then select a file to edit.

The following PT Configuration Window will appear when “New File” has been selected. (The name of the screen data file is input later.)



2. Set the PT Model to NT30 or NT30C and the PLC Vendor to OMRON and click the OK Button.
3. Click the System Tab to set the memory switches for the PT. The actual switch settings in the PT will be made according to the settings made here when the data is transferred to the PT.

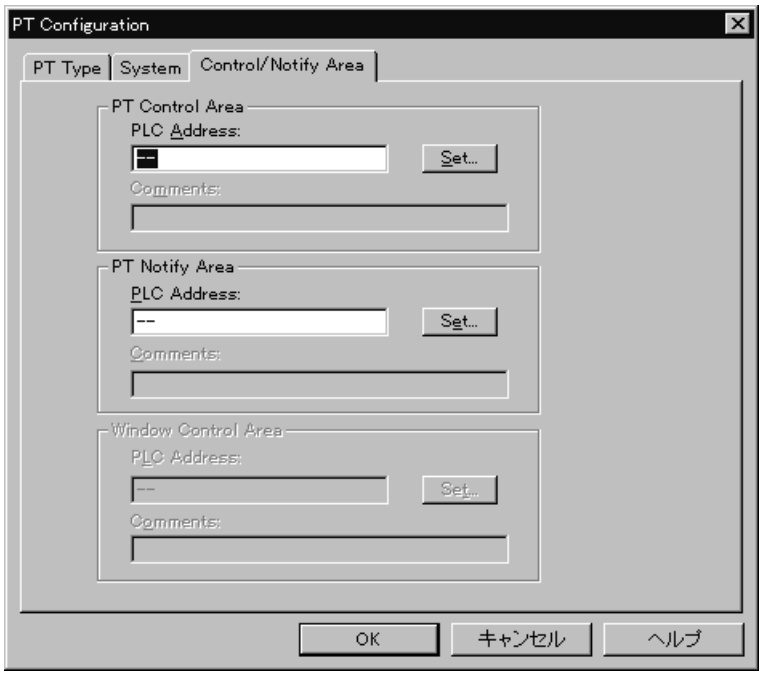


The following settings can be made.

- Startup screen: *Startup Screen* (page 196)
- Number of Table Entries in Numeral Table: *4-4-2 Numeral Memory Table* (page 138)

- Number of Table Entries in String Table: *4-4-1 Character String Memory Table* (page 136)
- History Setting, Alarm (Use Ring Buffer): *4-11-2 Displaying the Alarm History* (page 184)
- Other settings (Number of Table Entries in Bit Memory Table Is Always 256): *3-5 Setting Communications with the PC Using Memory Switches* (page 83)

4. Click the Control/Notify Area Tab to set the PT Status Control Area and PT Status Notify Area as described below before selecting the screen number.



- PT Status Control Area: *5-7 NT30/30C Status Control* (page 239)
- PT Status Notify Area: *5-8 Notification of the Operating Status to the PC* (page 244)

5. The following Application Manager will appear when the PT Environment Settings is selected under “New File” or when a file is opened using the

Open command. The creation screen for screen number 1 will also be displayed.



6. From the Application Manager, the screen to be edited can be designated, screens can be copied, and memory tables can be edited.

   The following tables can be edited:

   - Numeral memory table: *Numeral Memory Table* (page 138)
   - Character string memory table: *Character String Memory Table* (page 136)
   - Bit memory table: *Bit Memory Table* (page 140)
   - Expanded I/O: *4-12 Operation of B7A Unit* (page 185)
   - Mark table: *Marks* (page 126)
   - Image table: *Image Data* (page 126)
   - Library table: *Library Data* (page 127)

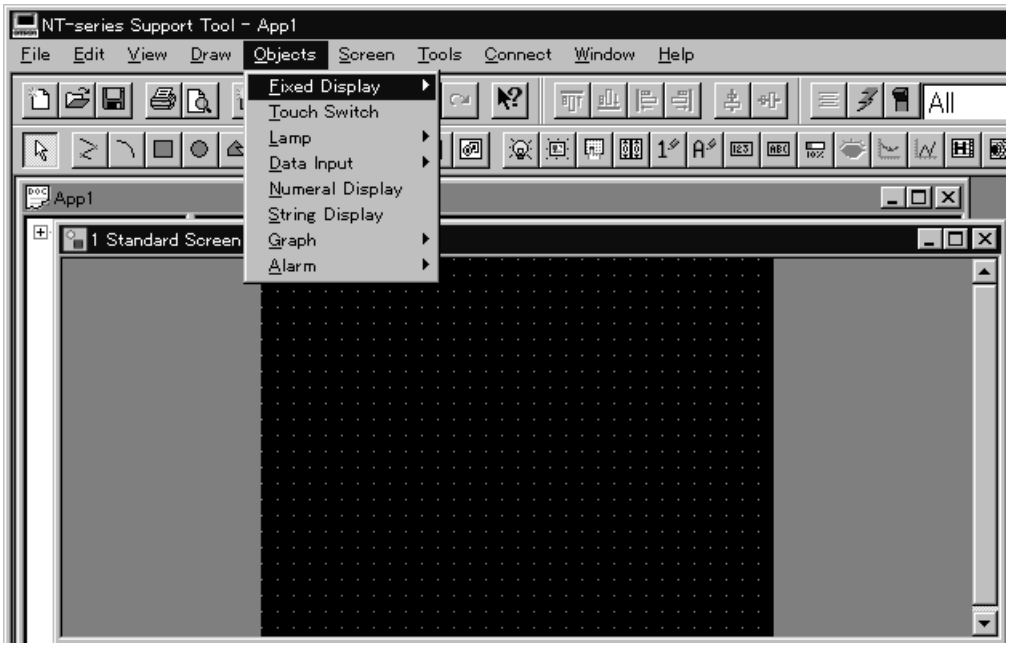
   Refer to the *NT-series Support Tool for Windows Operation Manual* for information on I/O comments.

7. The numbers of the screens that have been registered will be displayed. Select "Properties" from the Screen Menu to set the screen attributes. The following screen attributes can be set:

   - History: No, Yes
   - Backlight: Light, flash, or color
   - Buzzer: None, Cont (continuous sound), Long (long intermittent sound), Short (short intermittent sound)
   - Local 1 Keyboard: Don't display or window screen number for display
   - System Keypad: Use or don't use
   - Back Col

   Note Back Col. (background color) can be set only when using an NT30C. The backlight color can be set for the NC30.

8. Double-click one of the screen numbers in the Application Manager to open the window to edit screen data.

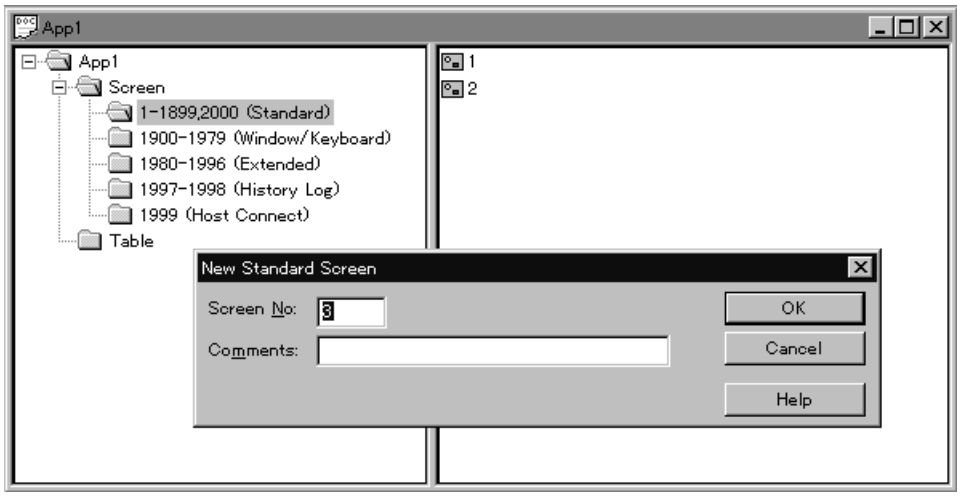


Data of one screen can be created by registering (laying out) the following display elements and attributes on the screen.

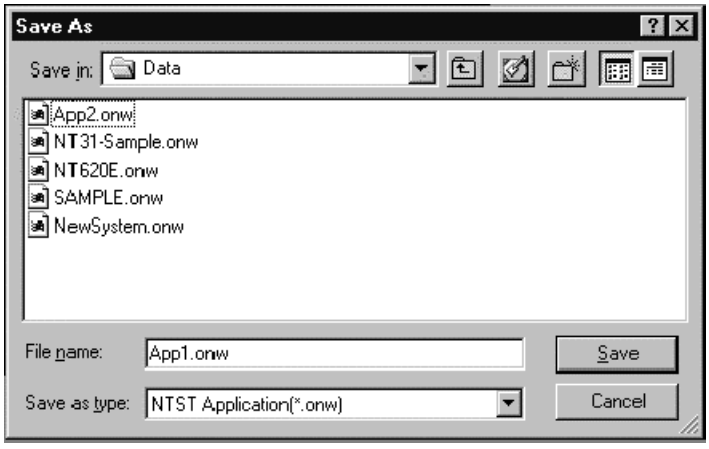
- Fixed display
  Input characters and graphics.
  .....*Characters and Figures that Can be Displayed* (page 126)
- Numeral display:
  Set the numeral memory table entry number and display method.
  .....*Numeral Memory Table* (page 138)
- Character string display:
  Set the character string memory table entry number and display method.
  .....*Character String Memory Table* (page 136)
- Lamp:
  Set the allocated bit and display method.
  .....*4-6 Lamps* (page 151)
- Touch switch:
  Set the functions allocated bits for control and notification, and display method.
  .....*4-7 Touch Switches* (page 154)
- Graph:
  Set the type of graph, numeral memory table entry number, and display method.
  .....*4-5 Graphs* (page 141)
- Input setting:
  Set the numeral/character string memory table entry number.
  .....*4-8 Numeral Setting* (page 161)
  .....*4-9 Character String Setting* (page 171)
- Alarm:
  Set the type of alarm, bit memory table entry number, and display method.
  .....*4-11 Alarm List & History Display Functions* (page 180)

When you have finished creating the screen data, it is not necessary to return to the Application Manager.

9. To successively create another screen, select “New File” and enter the screen type and screen number.



10. When you have finished creating screen data, select “Save” or “Save as” from the File Menu. “Save” will create a new file or overwrite an existing file. “Save as” can be used to change the name of the file.



11. Enter filename for the newly created screen data.

Transmitting Screen Data to the NT30/30C

Transmit the screen data created by using the NT-series Support Tool to the NT30/30C screen data memory.

Connect the NT30/30C to the NT-series Support Tool and set the NT30/30C to Transmit Mode. Then, press the [F6] (Transmit) key in the File List screen to transmit the created screen data to the NT30/30C.

For the connection procedure to the NT-series Support Tool, refer to *2-3 Connecting to the NT-series Support Tool* (page 21). For the transmission of the screen data, refer to *3-6 Registering the Screen Data* (page 89).

4-2 Outline of Functions

4-2-1 NT30/30C Screen

This section gives the outline of the screen, which is the basis of all NT30/30C functions.

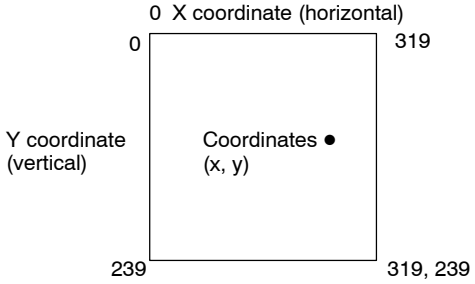
For specific operating procedures, such as screen switching, refer to *Switching the Screen Display* (page 195).

Create screen data, which will be displayed on the screen, on the NT-series Support Tool, and register it in the image data memory of the NT30/30C. For registration of screen data, refer to *3-6 Registering the Screen Data* (page 89).

Screen Composition

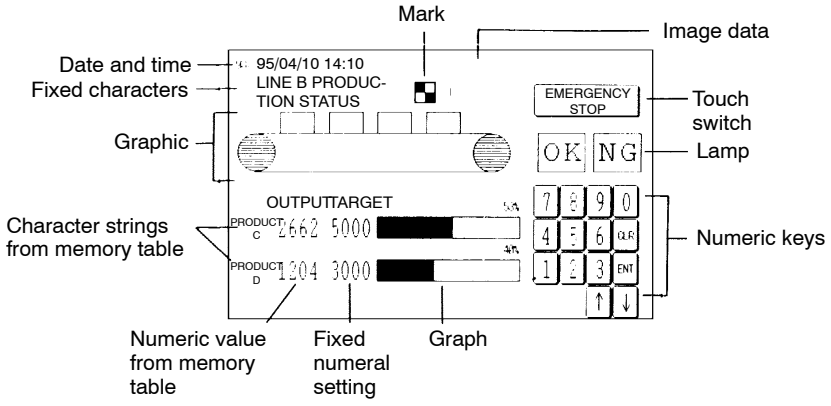
The NT30/30C screen is 320 dots horizontally and 240 dots vertically. Each dot is set using an X coordinate (horizontal) and a Y coordinate (vertical).

The origin (0, 0) is positioned in the upper left corner of the screen.



Display Elements

The screen can display the following elements. Each element is called a display element.



Screen Management

All screens displayed on the NT30/30C are managed by their screen numbers.

A screen number is assigned when the screen is created on the NT-series Support Tool. Up to 2000 screens can be created, and screen numbers from 1 to 2000 can be assigned to them as desired. The screen numbers are very helpful in switching the screen being displayed to a desired one from the PC, or in specifying the screen to be displayed at system startup (called the initial display screen).

Special Screen Numbers

Screens No. 0 and No. 1997 through No. 1999 are received for the following special purposes:

- **Screen No. 0**

  Screen No. 0 is reserved with the system as the no-display screen. Select this screen when there is no need to display data on the screen.

- **Screen No. 1997**

  Screen No. 1997 is reserved with the system as the screen for history record in order of occurrence. Select this screen to display screen data in order of occurrence.

- **Screen No. 1998**

  Screen No. 1998 is reserved with the system as the screen for history record in order of frequency. Select this screen to display screen data in order of frequency.

- **Screen No. 1999**

  Screen No. 1999 can be defined as the Connecting to Host screen. Without registering this screen, a screen with the message “Connecting To Host” automatically appears when the power is turned ON, or the mode is shifted to operation. Screens No. 1900 through No. 1979 may be used for window screens for the pop-up window function. In other cases, they are usable as normal screens.

Reference

Screens No. 1980 through No. 1996 are intended to be used for extension functions. If they are used as user screens, it will not be possible to use extension functions.

4-2-2 Color Display (NT30C Only)

The NT30C can display the entire screen and screen elements, such as characters and graphics, in eight different colors. Specify a color as an attribute for each display element when creating a screen on the NT-series Support Tool.

The NT30 is not capable of color display.

Available Colors

The following eight colors can be selected:

Black, blue, red, magenta, green, cyan, yellow, white

The four color combinations below are exclusive ORed. The combination of two exclusive ORed colors means that if the color of a display element is the same as that of the background, it will be displayed in a different color.

Yellow, for example, is exclusive ORed with blue.

Red ↔ Cyan Green ↔ Magenta Blue ↔ Yellow White ↔ Black

The following display elements are displayed in the above combinations of colors:

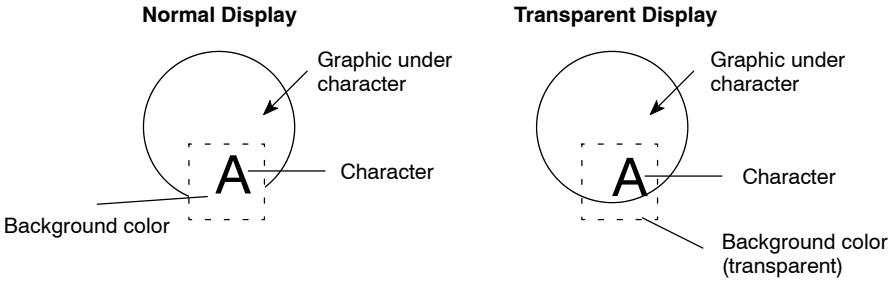
- Input area display frame and background colors of numeral and character string setting screen (Refer to pages 161 and 171.)
- Lamp colors when they are ON, and lamp guide display character colors (Refer to page 151.)
- Touch switch colors when they are ON, and guide display character colors (Refer to page 154.)
- Display color of eight dots beyond the top of a bar graph, and screen background color (Refer to page 141.)

Transparent Display

When two display elements overlap with each other, the background color of the overlying element conceals the underlaid display element.

Besides the above eight colors, the color "transparency" is available for the background of some display elements.

When transparency is set, nothing appears behind a display element, and the display element or screen background color under it becomes visible.



- **Display Elements that Can Be Displayed in the Color Transparency**

  Normal display characters

  Lamp (or touch switch) guide display characters

  Lamps (or touch switches) when they are OFF

  Filled graphic patterns

- **Display Elements that Cannot Be Displayed in the Color Transparency**

  Display character strings from character string memory table

  Display numeric values from numeral table

  Numeric values and character strings on numeral and character string setting screen

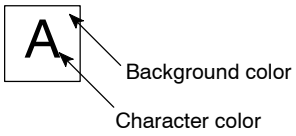
  Characters indicating percentage (%) on graphs

Color Display of the Screen

The background color of the entire screen can be specified. Set the background color as a screen attribute when creating screen data on the NT-series Support Tool.

Color Display of Characters

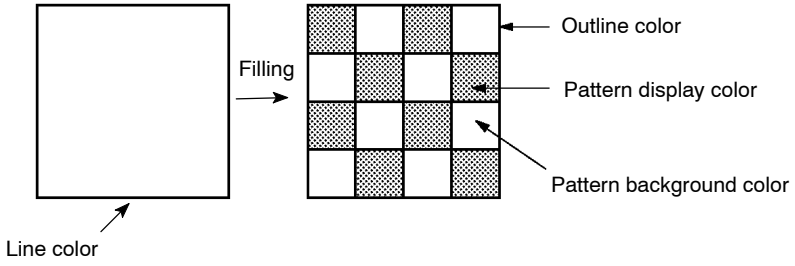
The color of characters (character color) and that of the square frame (background color) can be specified.



Color Display of Graphics

The outline of a graphic can be drawn in a specified color, and the graphic can be filled in a pattern in specified colors.

As filling pattern colors, the display color of the pattern itself, the pattern background color and the filled area boundary line color can be set.



When a lamp, a touch switch and a graphic are to be displayed in specific colors, part of the frames of the display elements may be invisible because of the combination of the background, outline and filling colors. This is a phenomenon peculiar to a color LCD, not a failure with the system.

In such a case, change the color combination.

4-2-3 Characters and Figures that Can Be Displayed

The NT30/30C screen can display characters, figures, and various other elements.

This section describes the types and attributes of the characters and figures that can be displayed but that are not changed/do not change on the display.

For the settings, display, and use of the characters, numeric values, and graphs that change according to the operating status and other conditions, refer to sections starting with *4-4 Memory Tables* (page 136).

The power of expression of the screen can be increased by using various attributes, such as the enlarged or reverse display, for the characters and figures.

The character and figure attributes are set in the Edit Screen when creating the screen data on the NT-series Support Tool.

Types and Attributes of Characters and Figures

The following characters can be input and displayed.

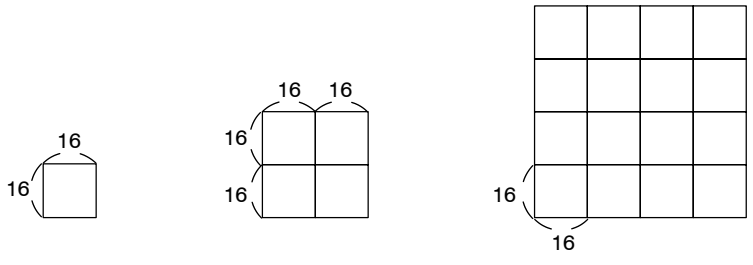
Character type	Dots (vertical x horizontal)	Character set	Maximum number of characters displayed on one screen (without overwriting)
Half size character	8 x 8	Alphanumerics and symbols	80 characters x 50 lines (4,000 characters)
Normal size characters	8 x 16	Alphanumerics and symbols	80 characters x 25 lines (2,000 characters)

The NT30/30C is provided with marks, image data, and library data in addition to fixed characters.

- **Marks**

  A mark is a graphic pattern combining 16 x 16, 32 x 32 and 64 x 64 dots. The 32-dot and 64-dot marks, however, are combinations of 4 (2 x 2) and 16 (4 x 4) 16-dot marks, respectively.

  Up to 224 16-dot marks can be registered on one screen data file as characters with 2-byte codes FF20H to FFFFH.



- **Image Data**

  Image data is a set of images in units of 8 x 8 dots ranging from 8 x 8 dots to 320 x 240 dots (entire screen).

Images for registering as image data can be created using the NT-series Support Tool's image data creation functionality. It is also possible to download files created using commercial image creation software and use them as image data for the NT30/30C.

Image data for up to 224 images can be registered on a screen data file using 2-byte codes from FE20 to FEFF. The number of images that can actually be registered will depend on the status of the image data memory.

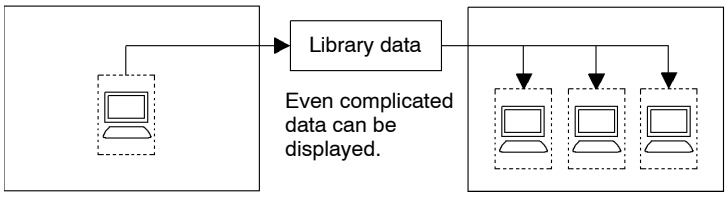
Basically, image data can be displayed in any position on the screen, however, the entire image may not be displayed in some specific positions.

- **Library Data**

Library data is image data consisting of multiple characters and graphics in units of 1 x 1 dot ranging from 1 x 1 to 320 x 240 dots (entire screen).

The creation of library data starts by laying out characters and graphics with attributes on the screen in the same manner as normal screen data.

Next, specify the area to be registered. Only characters and graphics can be extracted from other screen data and registered as library data. Library data cannot be registered as displayed elements.



Once registered as library data, complicated images composed of characters and graphics can be displayed many times easily, and need not be created again. The image data memory be used more efficiently by using library data.

Library data for up to 896 images can be registered on a screen data file using 2-byte codes FA20 to FAFF, FB20 to FBFF, FC20 to FCFF, and FD20 to FDFF.

Basically, library data can be displayed in any position on the screen. But, in a position where the entire library data cannot be displayed, it automatically moves to another position. Use care in setting a display position.

Reference

Difference between Image Data and Library Data

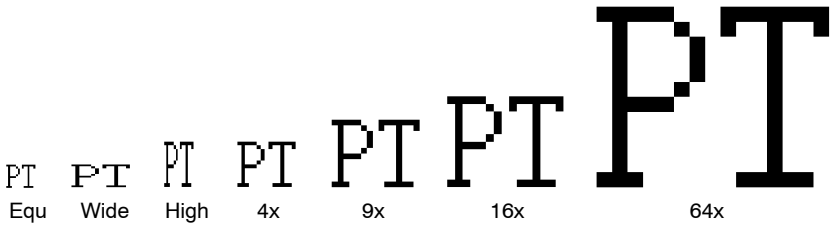
While image data can take any form as shown in the screen example, only images consisting of characters and graphics can be library data.

Because only characters and graphic information are registered as library data, library data requires less memory capacity than image data, for which all the dots to be displayed on the screen must be registered.

Image data cannot be reversed or flashed, whereas library data can be reversed or flashed according to the settings for the elements when they are registered.

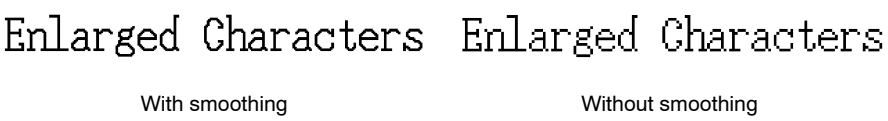
- **Enlargement of Characters and Marks**

  Characters and marks can be enlarged to the following scales. Image data and library data are exceptions.



- **Smoothing**

  Characters (or marks) enlarged to x4 scales or larger are displayed with the outline automatically smoothed. This function is called smoothing. Image data and library data cannot be smoothed.



- **Color Display (NT30C Only)**

  Number of color: 8
  Number of background color: 8 or transparent

- **Reverse and Flashing Display**

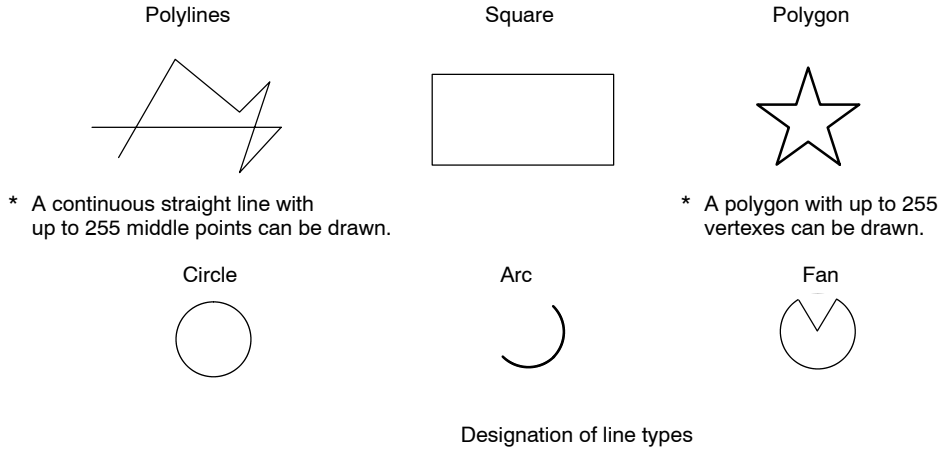
Normal display:	Character and background are reversed.
Reverse display:	The display brightness of the character and the background is reversed comparing with the normal display.
Flashing display:	Characters are displayed as they flash. The normal display alternates with no-display.
Reverse and flashing display:	The reverse display alternates with the normal display.

Image data cannot be inverted, flashed or inverted and flashed alternately.

Library data will be inverted, flashed or inverted and flashed alternately according to the setting at registration.

Graphic Types and Their Attributes

On the NT30/30C, the following types of graphic can be entered and displayed:



Designation of line types

Straight lines are available in the following four types:

Solid line ——————————

Broken line - - - - - - - - - - - -

1-dot chain line —— - —— - ——

2-dot chain line ——— – – ———

Other graphics can be drawn only with a polyline.

- **Filling**

The areas of graphics within the outline (closed areas) can be filled in a tiling pattern.

There are ten tiling patters, as shown below:

Name	Pattern	Name	Pattern
Flat		Slant right	
Box		Crosshatch	
Slant left		Grid	
Stripe		Border	
Diamond		Halftone	

- **Color Display (NT30C Only)**

Number of graphic frame colors: 8

Number of display colors (in filling): 8

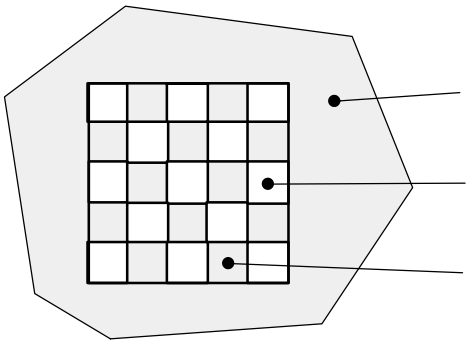
The tiling pattern colors are display colors.

Number of background colors (in filling): 8 or transparent

The color visible between the blocks of the tiling pattern is the background color. When transparent is selected, the display element under the graphic appears to be transparent.

Number of outline colors (in filling): 8

The color of the boundary line surrounding the area to be filled is the outline color.



Part of the graphic frame may be invisible because of the combination of the display (in filling), background and outline colors. This phenomenon is peculiar to a color LCD, not a failure with the system.

In such a case, change the color combination.

- **Reverse and Flashing Display**

Normal display:	Only the outline of a graphic is displayed in a designated color.
Reverse display:	A graphic, whose inner contrast of the border line is reversed, is displayed.
Flashing display:	Normal display alternates with no-display.
Reverse and flashing display:	Normal display alternates with reverse display.

Continuous straight lines and arcs cannot be inverted, flashed or inverted and flashed alternately.

Filling can be designated only with normal display.

Note Do not fill graphics to which a flashing display or inverse flashing display attribute has been set.

If a graphic with a flashing display or inverse flashing display attribute is to be filled, the area outside the graphic may be filled in the same pattern when the system operates.

4-2-4 Communications with the PC

Using Host Link/NT Link

The NT30/30C can communicate with a PC by using the Host Link or NT Link. Using these functions, bits and words can be allocated to almost any area in PC memory and data can be written to and read from these bits and words directly. This makes the following functions possible:

Control and notification of screen elements

Control and notification of NT30/30C status

Screen switching

Obtaining the screen number of the currently displayed screen

Memory table operations

For details on the actual operations required for these functions, refer to *Section 5 Using Host Link/NT Link.*

NT30/30C Functions that can be Controlled

The following NT30/30C functions can be controlled.

Screen display:	Screens can be displayed and deleted.
Buzzer:	Three types of buzzer can be sounded or stopped.
Display history initialization:	The display history can be initialized.
Screen printing:	The displayed screen can be printed.
Window control:	The opening of pop-up windows can be disabled.
Numeral/character string input:	The input of numerals and character strings can be disabled.

For details on the actual methods used for these types of control with the NT30/30C, refer to *5-7 NT30/30C Status Control* (page 239).

Accessible NT30/30C Operation Status

The following NT30/30C status can be accessed.

Operating status:	Whether the NT30/30C is operating or not
Battery voltage:	The battery voltage
Screen number:	The screen number of the currently displayed screen
Numeral setting input:	Whether a numerical value has been input with the numeral setting function
Character string setting input	Whether a character string has been input with the character string setting function
Printer operating status	Whether the printer is printing or stopped

For the actual methods used to determine the operation status of the NT30/30C, see *5-8 Notifying the PC of the Operating Status* (page 244).

Note To ensure system safety, be sure to regularly confirm that the PT is operating normally by reading the PT Operating Status Bit at the host.

4-3 Screen Displays

This section describes the screen information required for the operation with the NT30/30C.

For the actual method used to change the displayed screen, see *Switching the Screen Display* (page 197).

For the actual method used determine the screen number of a displayed screen, see *Notifying the Currently Displayed Screen Number to the PC* (page 199).

4-3-1 Classification of Screens

The NT30/30C is provided with the following types of screens, which are classified by the display method.

- Normal screens
- Overlapping screens

- Consecutive screens

The screen type is set for each screen in the Screen List Screen of the NT-series Support Tool. Select the screen type according to the purpose, and create characters and figures on the screen. Details on each screen type are given below.

Normal Screens

A normal screen is the basic screen of the NT30/30C. It is not necessary to select a screen type (overlapping or consecutive) to create screen data for a normal screen. When a normal screen is selected, the display of existing screens will be stopped and the normal screen will be displayed.

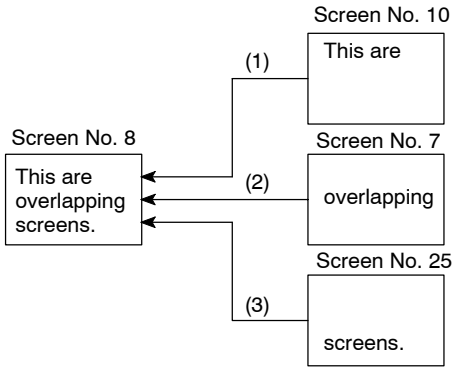
Overlapping Screens

Several screens can be overlapped and displayed as one screen. A group of overlapped screens is called overlapping screens.

Several screens are displayed in the order of screen numbers to form overlapping screens. Up to eight screens can be overlapped. The base screen used for making overlapping screens is called the parent screen, and the screens that are overlapped on the parent screen are called child screens.

With overlapping screens, no display elements are actually created on the patent screen. Create all display elements on the child screens. Screen attributes, such as a buzzer attribute, can be set in the parent screen and will be effective in the overlapping screens.

Example of Overlapping Screens



- Parent screen: No. 8
- Child screens: No. 10, No. 7, and No. 25

When the parent screen (No. 8) is designated, screen No. 8 functions as the parent screen and child screens No. 10, No. 7, and No. 25 are displayed overlapping each other on the parent screen in order.

Only one numeral setting screen or character string setting screen (screens that allow numeral and character string inputs on the NT30/30C screen) can be registered as a child screen. For details on numeral settings, see *4-8 Numeral Settings* (page 161), and for details on character string settings, see *4-9 Character String Settings* (page 171).

Make sure that touch switches and numbers set in the child screens do not overlap when the screens are overlapped. If the set positions of the touch switches and/or numbers in the child screens overlap with each other on the parent screen, the settings may sometimes not work as intended. Use the NT-series Support Tool and make sure that the set positions do not overlap each other.

Consecutive Screens

A group of screens that set up in a specific sequence and can be switched consecutively are called consecutive screens. Up to eight screens can be registered as a group of consecutive screens.

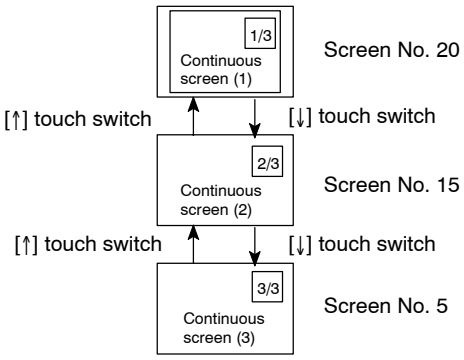
The base screen used for registering the consecutive screens is called the parent screen, and the consecutive screens are called child screens.

The current screen number and the total number of consecutive screens can be displayed in the top right corner of the screen. This is called the page number display.

The page number is set when creating the screen data by using the NT-series Support Tool. Refer to the *NT-series Support Tool for Windows Operation Manual (V061)*.

With consecutive screens, no display elements are actually created on the patent screen. Create all display elements on the child screens. Screen attributes, such as a buzzer attribute, can be set in the parent screen and will be effective in the consecutive screens.

Example of Consecutive Screens



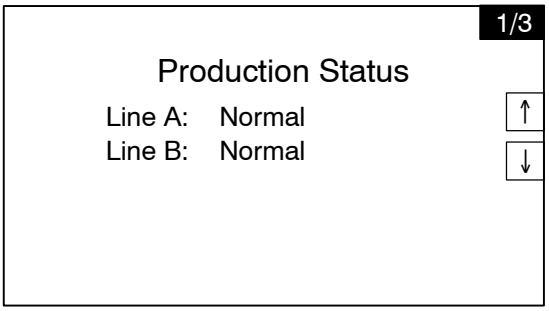
- Parent screen: No. 10
- Child screens: No. 20, No. 15, and No. 5

When the parent screen (No. 10) is designated, screen No. 20, which is page 1 of the continuous screens, will be displayed. Screen No. 15 or No. 5 can be displayed by using the touch switches. Screen No. 10 is the parent screen of the continuous screens and thus cannot be displayed as an individual screen.

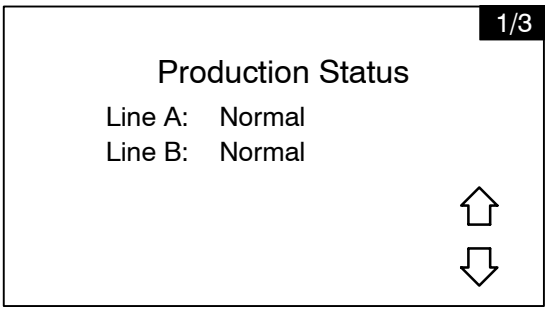
Switching Continuous Screens Using the Touch Switches

Consecutive screens can be switched by using touch switches to which control keys ⇧ and ⇩ have been allocated.

If the numeral setting attribute keypad attribute of the parent screen is set to "system," the ⇧ and ⇩ control keys will be automatically created as shown in the figures below.



If the numeral setting attribute of the parent screen is set to “user,” create touch switches and allocate the control keys ↑ and ↓ to them during screen creation (see *Functions of Control Keys*, page 159).



4-3-2 Screen Attributes

Each screen can be set with a specific function by designating a screen attribute (property), so that the specific function can be executed by displaying the screen. For example, by displaying a screen to which a buzzer attribute has been set, the buzzer of the NT30/30C starts sounding.

Set the screen attributes for each screen on the Screen List screen of the NT-series Support Tool.

The DOS version of the NT-series Support Tool displays the bit input and alarm attributes, but these attributes cannot be used with the NT30/30C.

The following several attributes can be set with one screen.

- **Buzzer Attribute**

  This attribute will become effective to sound the buzzer in the NT30/30C when the screen to which this attribute has been set is displayed. The buzzer sound can be set as follows:

No:	Buzzer does not sound when the screen is displayed.
Continuous sound:	Buzzer sounds continuously.
Short:	Buzzer sounds intermittently at 0.5-second intervals.
Long:	Buzzer sounds intermittently at 1.0-second intervals.

  The buzzer sound is set with the NT30/30C memory switch. The buzzer can also be set by using the PC. Refer to *Using the Buzzer* (page 93) for the buzzer setting using the memory switch.

  To stop the buzzer by using the screen operation, create a control key as a touch switch.

- **Display History Recording Attribute**

  When a screen with this attribute appears, the screen number, date and time (hour, minute, second), frequency and messages will be recorded as screen data.

  Screen data can be read in the maintenance mode or on the NT-series Support Tool.

  Screens No. 1997 and No. 1998 can be used to read the data (see page 184).

- **System Keypad (Numeral Setting) Attribute**

  Select whether the numeric keys are automatically displayed or the numeric keys are created at arbitrary positions on the numeral setting screen. The following two numeral setting attributes are used.

  System (ON):
  The numeric keys and control keys registered to the system are automatically displayed.

  User (OFF):
  The numeric keys and control keys can be created at any arbitrary positions.

  With DOS versions of the NT-series Support Tool, “numeral setting” is displayed.

- **Back Col (NT30C only)**

  Screens for which this attribute has been set are automatically displayed with the set background color extending over the entire screen.

- **Backlight Attributes**

  Select whether the backlight is lit or flashes when the screen is displayed. When using an NT30, these attributes can be used in conjunction with the backlight color attribute. There are two types of backlight attribute in the screen attributes

  Lit: Backlight is lit when the screen is displayed.

  Flashing: Backlight flashes when the screen is displayed.

- **Backlight Color Attribute (NT30 Only)**

  Set whether the screen is displayed using the white backlight or the red backlight. This attribute can be used in conjunction with the backlight attributes.

- **Load Local 1 (Keyboard) Attribute (Windows Version Only)**

  Specify whether or not a window is displayed simultaneously with the display of the screen (initial window), and specify the screen number of the window.

  This screen attribute is not available with the DOS version of the NT-series Support Tool. (Set in Show Window/Keyboard under Input Settings.)

4-4 Memory Tables

The NT30/30C has three memory areas that can be written to and updated by the PC. There is a character string memory table for character data, a numeral memory table for numerical data, and a bit memory table for bit data.

The contents of the memory tables can also be set using the NT-series Support Tool by displaying a memory table entry on the screen or by editing a memory table.

4-4-1 Character String Memory Table

The character string memory table is an NT30/30C internal memory area used to store character data. Up to 1,000 character string memory table entries can be used, and up to 40 characters (40 bytes) can be stored in each memory table entry. Character string memory table entries can be registered at up to 50 positions on one screen.

Number of Entries

Set the number of character string memory table entries in "System Setting" ("System Memory" for DOS versions) under "PT Configuration" on the NT-series Support Tool.

256: Sets the number of character string memory table entries to 256

1000: Sets the number of character string memory table entries to 1,000.

The difference between setting 1000 character string memory table entries and 256 character string memory table entries in terms of the memory capacity required for screens is 29,760 bytes.

Displaying Character Strings

Character string memory table entries are registered using table entry numbers 0 to 999.

When creating screen data on the NT-series Support Tool, set the position on the screen to display the character string and also set the character string number to be displayed.

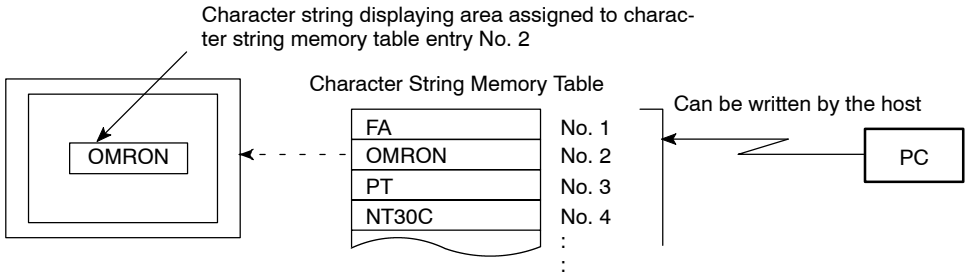
When the NT30/30C is operated, the screen will display the contents of the character string memory table entry.

For the actual method used to modify a currently displayed character string, see *Changing Displayed Numerals or Character Strings* (pages 207, 209).

Character string memory table entries are divided into two types depending on the entry numbers. Numbers 0 to 255 can be written to and read from without restriction, while numbers 256 to 999 are read-only character string memory table entries. The difference in the way memory table entries are used depends on which of these groups they are in, as explained below.

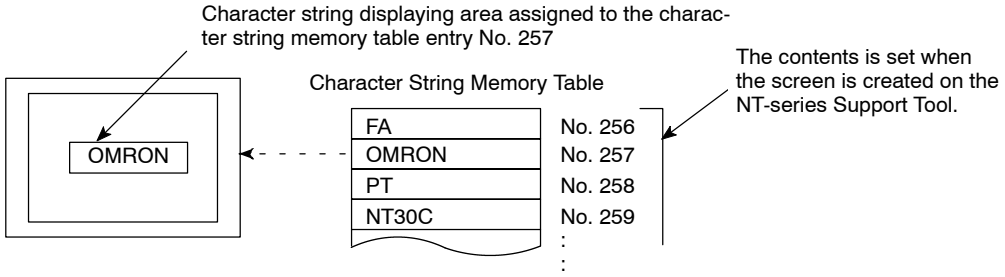
- **Memory Table Entries 0 to 255**

  During PT operation, the character string data in the character string memory table entry is written from the PC and displayed in the screen. An initial value can also be set when screen data is created.



- **Memory Table Entries 256 to 999 (Read-only)**

  Data cannot be written to these entries by the PC. Character string data is set when screen data is created. These memory table entries can be set not to be used in "System Setting" ("System Memory" for DOS versions) under "PT Configuration" on the NT-series Support Tool.



Characters that Can Be Displayed

The power of expression of the screen can be increased by giving various attributes, such as the enlarged or reverse display to the characters of the character string memory table entry.

The character attributes are set in the edit screen when creating the screen data by using the NT-series Support Tool.

The following characters can be displayed on the NT30/30C:

Character type	Dots (vertical x horizontal)	Character set	Maximum number of characters displayed on one screen (without overwriting)
Half size character	8 x 8	Alphanumerics and symbols	40 characters x 30 lines (1,200 characters)
Normal size characters	8 x 16	Alphanumerics and symbols	40 characters x 15 lines (600 characters)
Marks	16 x 16, 32 x 32 (*), 64 x 64 (*)	Create by using the NT-series Support Tool	

Character type	Dots (vertical x horizontal)	Character set	Maximum number of characters displayed on one screen (without overwriting)
Image data	Not fixed (8-dot units in both horizontal and vertical directions)	Created using the NT-series Support Tool	
Library data	Not fixed	Created using the NT-series Support Tool	

* Not available with the Windows version of the NT-series Support Tool. Use combinations of 16 x 16-dot marks.

- **Enlarged Display of the Characters and Marks**

  The characters and marks can be enlarged to the following scales.

  Double width scale, Double height scale, x4 scale, x9 scale, x16 scale, x64 scale

- **Smoothing**

  The characters and marks enlarged to the x4 scale or larger are displayed with the outline automatically smoothed. This function is called smoothing.

- **Reverse and Flashing Display**

  Reverse display: The display brightness of the character and the background is reversed comparing with the normal display.

  Flashing display: Characters are displayed as they flash. The normal display alternates with no-display.

  Reverse and flashing display: The reverse display alternates with the normal display.

- **Character Color (NT30C Only)**

  When using an NT30C, colors can be assigned to characters as follows:

  Character display color: 8 colors

  Character background color: 8 colors

4-4-2 Numeral Memory Table

The numeral memory table is an NT30/30C internal memory are used to store numeral data. Up to 1,000 numeral memory table entries can be used, and up to eight digits (four bytes) of numeral data (including signs) can be stored in each numeral memory table entry. Numeral memory table entries can be registered at up to 50 positions on one screen.

Number of Entries

Set the number of numeral memory table entries in the NT-series Support Tool's system memory.

512: Sets the number of numeral memory table entries to 512

1000: Sets the number of numeral memory table entries to 1,000.

The difference between setting 1000 numeral memory table entries and 512 numeral memory table entries in terms of the memory capacity required for screens is 4,880 bytes.

Displaying a Numeral

The numeral memory table entries are registered using table entry numbers 0 to 999. When creating the screen data on the NT-series Support Tool, set the position on the screen to display the numeral and also set the numeral number to be displayed.

When the NT30/30C is operated, the screen displays the contents of the numeral memory table entry. For the actual method used to modify a currently displayed numerical value, refer to *Changing Displayed Numerals or Character Strings* (pages 207, 209).

Numeral memory table entry numbers 247 through 255 are used for the clock function. They cannot be used for other applications. For details on the clock function, refer to *5-6 Clock Function* (page 234).

Numerals that Can Be Displayed

The power of expression of the screen can be increased by giving various attributes, such as the enlarged or reverse display, to the numerals of the numeral memory table entry.

The numeral attributes are set in the edit screen when creating the screen data on the NT-series Support Tool.

The following numerals can be displayed on the NT30/30C:

- Digits of the whole number: 1 to 8 digits
- Digits of the decimal fraction: 0 to 7 digits
- Character sizes: Half, normal
- Enlarged display: Double width, double height, x4, x9, x16, x64

  The characters enlarged to the x4 scale or larger are displayed with the outline automatically smoothed. This function is called smoothing.
- Display attributes: Normal, reverse, flashing, reverse flashing
- Character displaying color: 8 colors
- Character background color: 8 colors
- Sign display setting
- Decimal/hexadecimal display setting
- Zero suppress setting

The character displaying color and character background color can be set only when using an NT30C.

To display one numeral memory table entry on several different screens simultaneously, the display attributes on all the screens must be the same. If there are discrepancies in the display attributes, the numeral table entry may not be displayed correctly.

Reference

Zero Suppress Setting

The numeral data is displayed in designated display areas as right-aligned. If the number of digits of a numeral data is smaller than that of the display area, 0's will be displayed in the vacant digits. These 0's will not be displayed if the zero suppress setting is set to Yes.

4-4-3 Bit Memory Table

The bit memory table is an internal memory area for bit data.

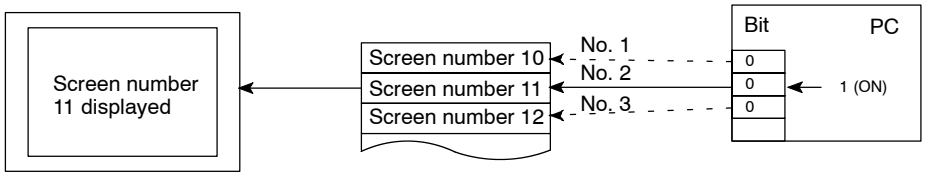
The NT30/30C can use a maximum of 256 bit memory table entries. One bit status in the PC can be stored in a single bit memory table entry.

Functions of Bit Memory Table

There are two functions of the bit memory table.

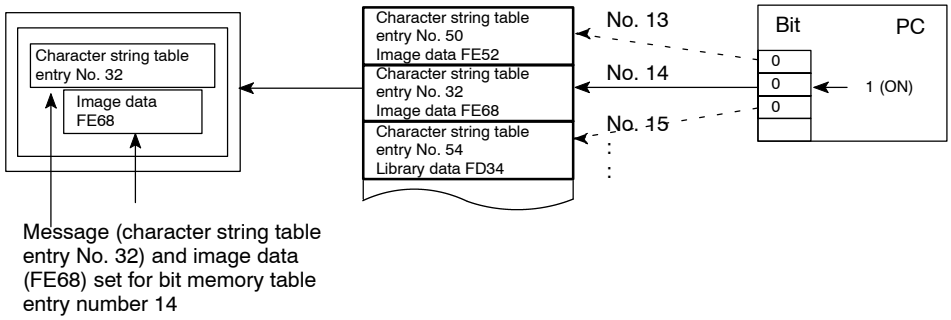
- **Screen Changeover Function**

  When a bit in the PC to which a bit memory table entry is assigned changes from 0 (OFF) to 1 (ON), the screen changes to show the screen set for that bit.



- **Alarm Function**

  When a bit in the PC assigned to the bit memory table entry is 1 (ON), the character string memory table entry and image or library data set for it are displayed. Smaller bit memory table entry numbers are displayed preferentially when multiple bit memory table entries have been set to the alarm list function, enabling setting the order of priority for messages displayed using the bit memory table. For details, refer to the *4-11 Alarm List & History Display Functions* (page 180).



Bit Memory Table Settings

When a bit memory table entry is used, it is necessary to perform the following settings for each table entry before creating the screen data with the NT-series Support Tool. For the settings used for alarm list and history display function, refer to the *4-11 Alarm List & History Display Functions* (page 180).

- **Recording in the Alarm History**

  This setting is to determine whether a change of PC Bit to which the bit memory table entry is assigned is recorded in the Alarm History.

- **Screen Changeover Function**

  This setting is to determine whether the bit memory table entry is used for the screen changeover function.

- **Character String Memory Table Entry Number**

  This setting is the character string memory table entry number displayed as a message. This setting is not necessary for the screen changeover function.

- **Display Color (NT30C Only)**

  Color of the characters used for message is to be set. This setting is not necessary when used for the screen changeover function.

- **Image/Library Data**

  This is a setting of the code for image or library data displayed together with the message. This setting is not necessary for the screen changeover function.

- **Screen Changeover**

  This is a setting of a screen number displayed for the screen changeover function or alarm list & history display function.

- **Bit**

  This is a setting of a bit in the PC to which the bit memory table entry is allocated.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

When specifying the DM Area, specify the bit number (00 to 15) along with the word address.

4-5 Graphs

The contents of numeral memory table entries of the NT30/30C can be displayed as graphs as well as numeral data.

Three types of graph can be displayed: Bar graphs, trend graphs, and broken line graphs.

The display data of graphs is changed by changing the contents of numeral memory table entries.

For the actual method used to update the data of a currently displayed graph, see *Upgrading Graphs* (page 215).
Graph settings are made when creating screen data using the NT-series Support Tool.

4-5-1 Bar Graph Functions

The bar graph function displays a value in a bar graph form as a percentage to the specified value according to the contents of numeral memory table entries. Up to 50 bar graphs can be registered on one screen.

- **Table Entry**

  The numeral memory table entry used used for the bar graph display is set.

The NT-series Support Tool has the direct and indirect options for the access method of the numeral memory table entries. However, the NT30/30C uses the direct method only.

The bar graph display cannot use hexadecimal numbers. If hexadecimal numbers are set in the numeral table entry, the bar graph cannot be displayed. Use caution not to write hexadecimal numbers except the minus sign (F) to the numeral table entry being accessed for the bar graph.

Bar Graph Attributes

The following attributes can be set with the NT30/30C for the bar graph display:

- **Graph Frame**

  This attribute specifies a rectangular area used to display a graph.

- **Incremental Direction**

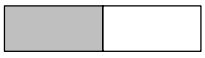
  The incremental direction of the bar graph can be selected from those mentioned below.

  ↑ (up): The bar graph increments upward.

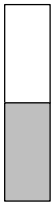
  ↓ (down): The bar graph increments downward.

  ← (left): The bar graph increments to the left.

  → (right): The bar graph increments to the right.



Direction: →



Direction: ↑

- **Graph Frame**

  Select whether or not the graph frame (boundary line of a graph display area) that indicates the effective display range is displayed.



← This frame is not displayed if "Graph frame: No" has been set.

- **% Data Value**

  Data value corresponding to 0%, 100%, –100% can be specified. % Data value can be specified by two methods: by directly specifying a numeric value and/or by accessing a numeral memory table entry.

  - Directly Specifying Method

  Numeric value from 0 to 99999999 (max. 8-digit) is specified. It is necessary to set that 0% value is more than –100% one, and 100% value be more than 0% one without fail.

- Memory Table Access Method

The numeral memory table entry number to be accessed is specified instead of a numeric value. With this method specified, data can be changed from the host during operation.

- **% Display**

% Value can be displayed.

% Value can be calculated according to the following equation:

$$\%\ \text{Value} = \frac{\text{Numeral memory table entry value} - 0\%\ \text{Value}}{100\%\ \text{Value} - 0\%\ \text{Value (or 0\% Value} - (-100\%\ \text{Value}))} \times 100$$

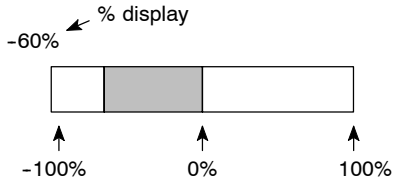
For the font and attributes used for the numeral display, refer to *Numerals that Can Be Displayed* (page 139).

- **Sign Display and Display Method**

Select whether or not the bar graph that indicates a value below 0% is displayed.

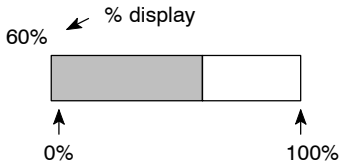
To Display a Value Below 0%: Sign Display Yes

The bar graph is displayed in the range of –100% to 100%. The middle of the bar graph indicates 0%.



Not to Display a Value Below 0%: Sign display No

The bar graph is displayed in the range of 0% to 100%. The end of the bar graph indicates 0%. Values below 0% are indicated as 0%.



- **Differences in the Bar Graph Display Method According to the % Values**

The bar graph display method varies according to the % value range.

(1) When the % value is in the minus range

The display varies as follows according to the sign display setting:

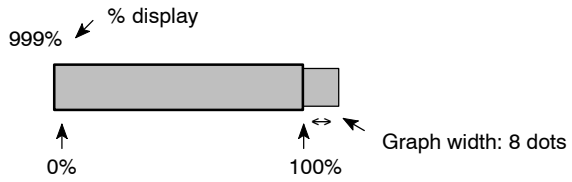
Sign display No: Displayed as 0%.
Sign display Yes: Displayed in the minus range.

(2) When the absolute value of the % value is in the range of 100% to 999%

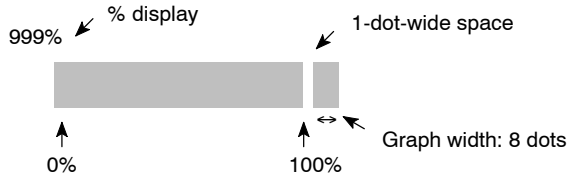
The % value is displayed as it is.

Sign display No: The display will be as mentioned below according to the graph frame setting.

When the frame is displayed:



When the frame is not displayed:



Sign display Yes: A value below −100% will be displayed in the minus direction as shown above.

(3) When the absolute value of the % value is above 1000%

The bar graph will be displayed the same as (2) above.

The % value is displayed as follows according to the sign display setting:

Sign display No: ∗∗∗%
Sign display Yes: ∗∗∗∗%

- **Color Display (NT30C Only)**

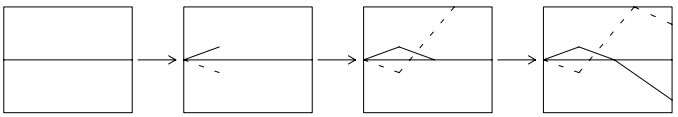
Color of a graph to be displayed can be specified. For background of a graph, screen background color is displayed.

Graph frame (in case of a graph frame): 8 colors
+ direction display area: 8 colors
− direction display area: 8 colors

4-5-2 Trend Graph Setting

A trend graph displays the displacement with the lapse of time as a locus while monitoring (sampling) the numeral memory table entry value periodically. As time goes by, the displacement varies as shown below.

Example of Normal Type that Increases Rightward With a Sign Displayed



For a trend graph, a single graph frame can be shown on a screen and a maximum of 50 graphs can be registered in the graph frame.

- **Table Entry**

This is the same as for bar graphs. See page 142.

Although it is possible to select either direct or indirect as the access method with the NT-series Support Tool, only the direct setting is used by the NT30/30C.

It is not possible to use hexadecimal values for bar graphs. If hexadecimal values are specified in numeral memory table entries for graph values, the graph

will not be displayed. The letter F may be used to indicate negative values, but make sure that no hexadecimal values are written.

It is not possible to use hexadecimal values for trend graphs. If hexadecimal values are specified in numeral memory table entries for graph values, the graph will not be displayed. The letter F may be used to indicate negative values, but make sure that no hexadecimal values are written.

Trend Graph Attributes

When using an NT30/30C, the following attributes can be used when displaying trend graphs.

- **Graph Frame**

  This attribute specifies a rectangular area used to display a graph. Range of this area is a maximum of 320 dots in length by 240 dots in width.

  The following setting can be performed for a graph frame.

  - **Frame Display**

    With Frame Display specified, 1-dot width frame line is displayed outside of the frame area. With the NT30C, color of a frame line can be selected out of eight colors.

  - **Background Color in a Frame (NT30C Only): 8 Colors**

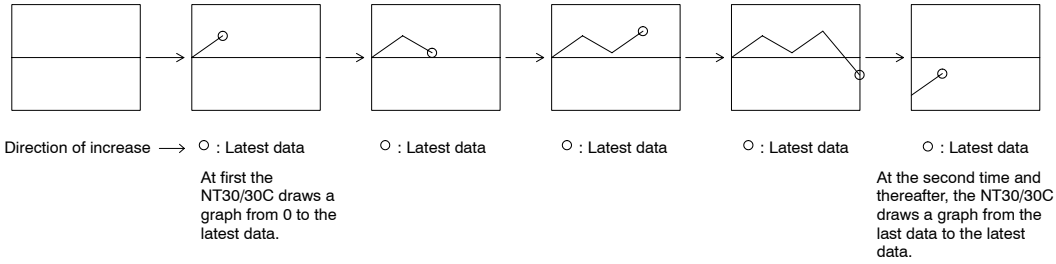
    Separate background color can be specified for positive and negative value display area.

- **Displaying Method**

  A graph displaying method can be selected out of two types: normal type and pen recorder type.

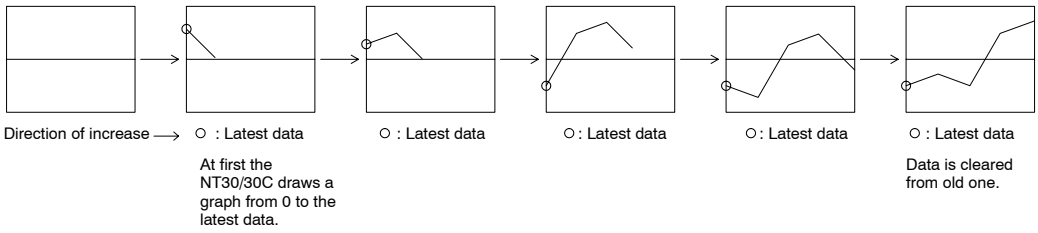
  - **Normal Type**

    As time goes by, the latest data display position moves toward the direction of increase. When the displacement increases to the right, a graph varies as shown below. When a polygonal line reaches the end of a screen, it is cleared once and the NT30/30C starts drawing a polygonal line again from the first.



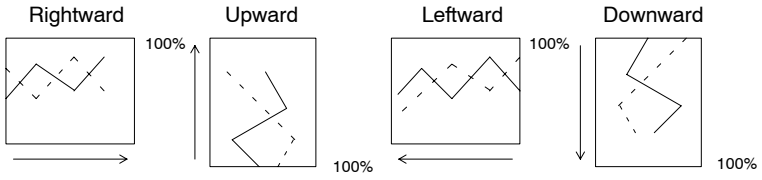
  - **Pen Recorder Type**

    The latest data is always displayed at the end of the screen. As time goes by, the graph already displayed moves in the direction of increase. When a graph increases to the right, it varies as shown in the figure below.



- **Direction of Movement**

The normal type can select the direction that the display position of the latest data moves with the lapse of time. The pen recorder type can select the direction that entire graph moves.



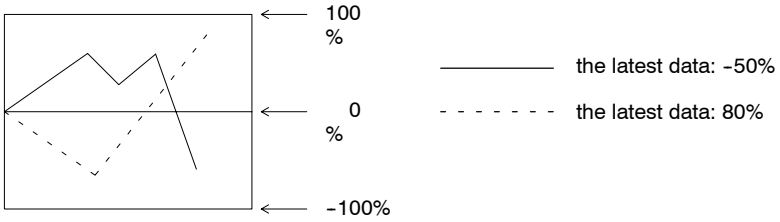
100% position is determined in accordance with the direction of scroll. 100% position falls to the right when a graph scrolls longitudinally and at the upper side when a graph scrolls laterally.

- **Sign Representation**

This attribute can specify whether or not a numeric value less than 0% value is displayed.

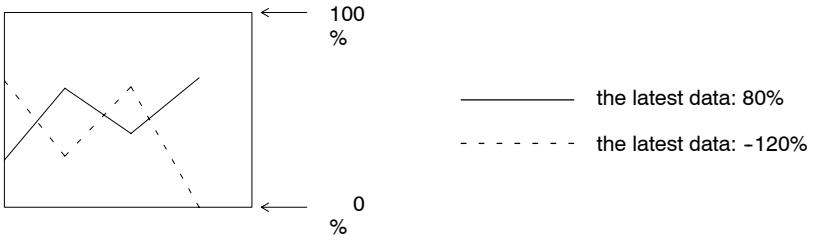
To Display a Value Below 0%: Sign Display Yes

The trend graph is displayed in the range of –100% to 100%. In this case, 0% position of a graph falls the center of a graph display area.



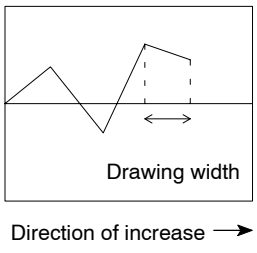
Not to Display a Value Below 0%: Sign Display No

The trend graph is displayed in the range of 0% to 100%. 0% position is at the end of a graph. All values less than 0% are displayed as 0%.



- **Drawing Width**

Drawing width (direction of increase) must be specified from the previous data to the following data in the range of 1 to 320 dots. If a value more than the graph displaying frame is specified, a graph will not be displayed.



- **Sampling Period**

  Sampling period is the time interval applied when the NT30/30C samples and displays the numeral memory table value and is specified in the range of 1 to 65535 in increments of 0.1 second.

Reference Actual drawing timing varies depending on the operating conditions. This does not accurately coincide with the time interval specified.

- **% Data Value**

  The same is also true as the bar graph. Refer to page 142.

- **Graph Line Type**

  This attribute specifies a graph line type among those as shown below. Line color can be selected out of eight colors. A graph width is fixed at one dot.

  Solid line ————————

  Broken line - - - - - - - - - - - -

  1-dot chain line ——— - ——— - ———

  2-dot chain line ——— – – ———

- **% Representation**

  The same is also true as the bar graph. Refer to page 142.

- **Differences in the Bar Graph Display Method According to the % Values**

  The bar graph display method varies according to the % value range.

(1) When the % value is in the minus range

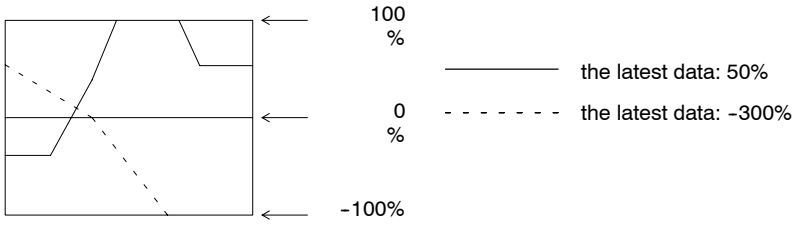
The display varies as follows according to the sign display setting:

Sign display No: Displayed as 0%.

Sign display Yes: Displayed in the minus range.

(2) When the absolute value of the % value is in the range of 100% to 999%

A graph is not displayed in this range of %. Only a part of % value within the graph frame is displayed. A % value is displayed as it is.



(3) When an absolute value of % is equal to or greater than 1000%

A value is displayed in a graph in the same way as (2) at the % display position depending on the presence of a sign as follows:

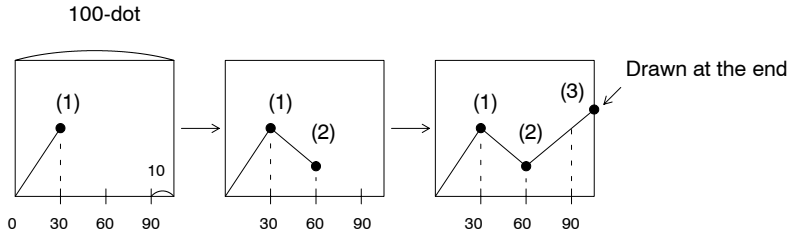
With a sign not displayed:∗∗∗ %

With a sign displayed:∗∗∗∗ %

- **When the Graph Width Is Not an Integral Multiple of the Drawing Width**

  In the normal type, when a graph is over the graph frame next time, the NT30/30C draws a graph of the latest data at the end of the frame.

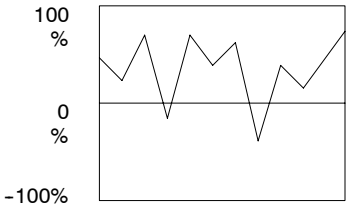
Example: In case the graph width 100-dot and the drawing width 30-dot



Reference If a graph is duplicated by drawing multiple graph lines of the same % value, it is overwritten and displayed in the order of setting. Similarly, when 0% value continues in a graph with a sign displayed, a graph line is overwritten and displayed with respect to the graph frame indicating 0%.

4-5-3 Broken Line Graph Setting

A broken line graph displays multiple present value of numeral memory table entries by a single polygonal line. This allows variation of continuous values of the numeral memory table entries to be seen at a time.



Example displaying 11 numeral memory table entry values with signs

For a broken line graph, a single graph frame can be shown on a screen and a maximum of 256 graphs can be registered in the graph frame. A single broken line can display a maximum of 512 numeral memory table entries. However, the maximum number of numeral memory table entries that can be displayed on one screen is also 512.

- **Table Entries (First Table Entry Number) (Line Attribute)**

  Specifies the first memory table entry number of the series of memory table entries to be accessed for the line graph.

Although it is possible to select either direct or indirect as the access method with the NT-series Support Tool, only the direct setting is used by the NT30/30C.

It is not possible to use hexadecimal values for broken line graphs. If hexadecimal values are specified in numeral memory table entries for the graph values, the graph will not be displayed. The letter F may be used to indicate negative values, but make sure that no hexadecimal values are written.

Broken Line Graph Attributes

When using an NT30/30C, the following attributes can be used when displaying broken line graphs.

- **Graph Frame (Position, Size)**

  This attribute specifies a rectangular area used to display a graph. Range of this area is a maximum of 320 dots in length by 240 dots in width.

  The following setting can be performed for a graph frame.

  - **Frame Display**

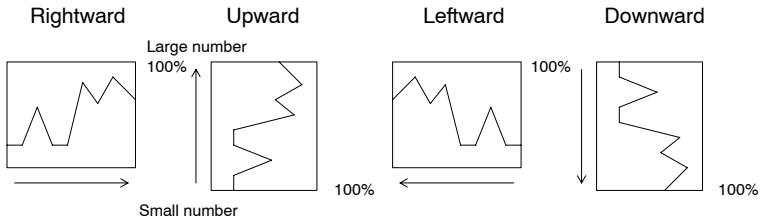
    With the Frame Display specified, 1-dot width frame line is displayed outside of the frame area. With the NT30C, Color of a frame line can be selected out of eight colors.

- Background Color in a Frame (NT30C Only): 8 Colors

Separate background color can be specified for positive and negative value display area.

- **Direction**

This attribute can select the direction of putting the memory table entry values in order.



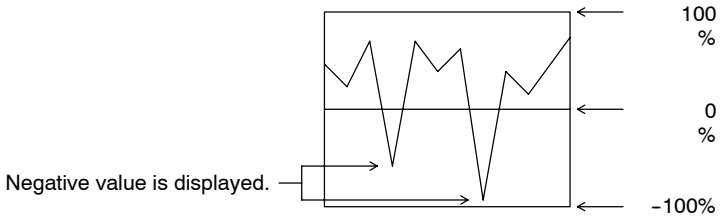
100% position is determined in accordance with the direction of putting the numeral memory table entry values in order. 100% position falls to the right when putting those values longitudinally in order and at the upper side when putting those laterally.

- **Sign Representation**

This attribute can specify whether or not a numeric value less than 0% value is displayed.

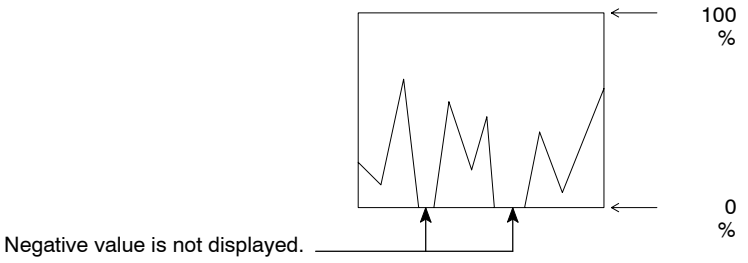
To Display a Value Below 0%: Sign Display Yes

A numeric value less than 0% value is also displayed in a graph. The broke line graph is displayed in the range of –100% to 100%. In this case, 0% position of a graph falls the center of a graph display area.



Not to Display a Value Below 0%: Sign Display No

The broken line graph is displayed in the range of 0% to 100%. All values less than 0% are displayed as 0%. 0% position is at the end of a graph.



- **Number of Apexes (Line Attribute)**

This specifies the number of numeral memory table entries to be accessed. One apex indicates a single memory table entry value.

Since a minimum of one dot width is required to display one memory table entry value as a polygonal line, the maximum number of memory table entries that

can be references for the graph frame width is determined by the following equation.

Graph frame width (number of dots) ≧ Number of memory table entries

- **% Data Value (Line Attribute)**

This attribute specifies the % data value at every polygonal line. For the specifying method, the same is also true as the bar graph. Refer to page 142.

"% representation" cannot be performed for the polygon.

- **Graph Line Type (Line Attribute)**

This attribute specifies a graph line type among those as shown below. With NT30C, line color can be selected out of eight colors. A graph width is fixed at one
dot.

Solid line ——————————

Broken line - - - - - - - - - - - -

1-dot chain line —— - —— - ——

2-dot chain line ——— – – ———

- **Differences when A Broken Line Graph Is Displayed Using Percentage Values**

When % value is in the following range, the graph displaying method is restricted as follows:

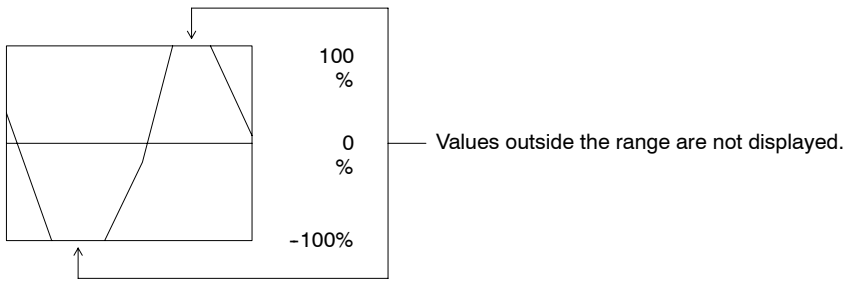
(1) In case of negative % value

A graph is displayed differently depending on the sign representation.
Without sign representation: Displayed in the same manner as 0%.
With sign representation: A graph is displayed in the negative direction.

(2) When an absolute value of % is from 100% to 999%

A graph is not displayed in this range of %. Only a part of % value within the graph frame is displayed.

The values outside of this range are not displayed.



(3) When an absolute value of % is equal to or greater than 1000%

A value is not displayed in a graph in the same way as (2).

Reference

- If a graph is duplicated by drawing multiple graph lines of the same % value, it is overwritten and displayed in the order of setting. At this time, since the part that the lines are duplicated is displayed by use of those colors of the Exclusive OR display (Refer to page 124), the line type and line color are displayed differently than that specified.
- Since a graph line is overwritten with respect to the graph frame when 0% value continues in a graph with a sign displayed, line type and line color are displayed differently than that specified.
- The interval between apexes for broken line graphs can be changed freely using Interval Setting under Line Property. (With DOS versions of the NT-series Support Tool, the interval between apexes is fixed at the same interval and can be changed when the broken line graph is corrected.

4-6 Lamps

A lamp is a graphic area capable of changing the displaying state according to a command from the PC. There are two kinds of lamps: Normal lamps that change the displaying state (OFF, ON, flashing) of a graphic fixedly displayed and image/library lamps that display separate graphics in OFF and ON states. Lamps are set when creating screen data on the NT-series Support Tool.

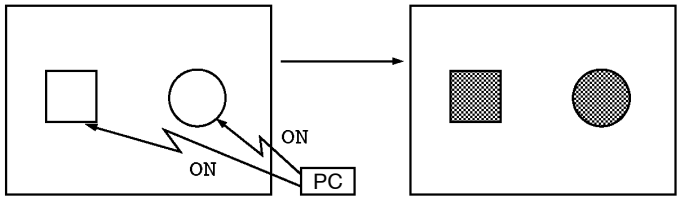
A maximum of 256 lamps can be set on a screen, and 1,024 lamps can be registered in a screen data file.

Contents of the setting differs depending on the lamp type (normal lamp or image/library lamp).

For the actual method used to modify a currently displayed lamp, see *Turning ON and OFF Lamps* (page 216).

4-6-1 Normal Lamp Functions

Normal Lamp is used to change the display state (reverse flashing, erase) of a graphic fixedly displayed according to an instruction (bit ON/OFF) from the PC.



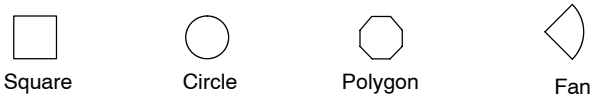
OFF state ON state

Lamp Attributes

The following attributes can be set for the normal lamps.

- **Shape**

  Any shape can be selected out of the following four kinds of shapes. Size can be specified freely.



Square Circle Polygon Fan

- **External Frame**

  This attribute can be set to determine whether or not a boundary line of the Lamp is displayed. When an external frame is set to not be displayed, only the guide display characters of the lamp are displayed when the lamp is not ON (or flashing). When the guide display character is not set, nothing is displayed.

- **ON/Flashing**

  When lamp is ON by an instruction from the PC, its displaying state can be specified out of ON (inverse illumination) or Flashing (inverse flashing).

- **Color Display (NT30C Only)**

  External frame color (in case of color display): 8 colors

  OFF color: 8 colors or transparent

  ON/Flashing color: 8 colors

  A part of external frame may be lost depending on a combination of external frame color of the normal lamp and OFF color or ON/Flashing color. This is caused by the properties of the color LCD and does not indicate failure of equipment. When part of the external frame is lost, change a combination of colors.

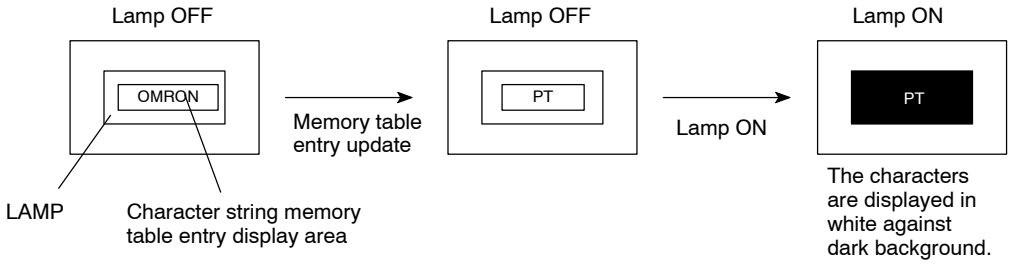
- **Guide Display**

  Guide display character can be attached to the lamp. Attributes of the guide display character are the same as that of character display. Refer to *Characters and Figures that can be Displayed* (page 137).

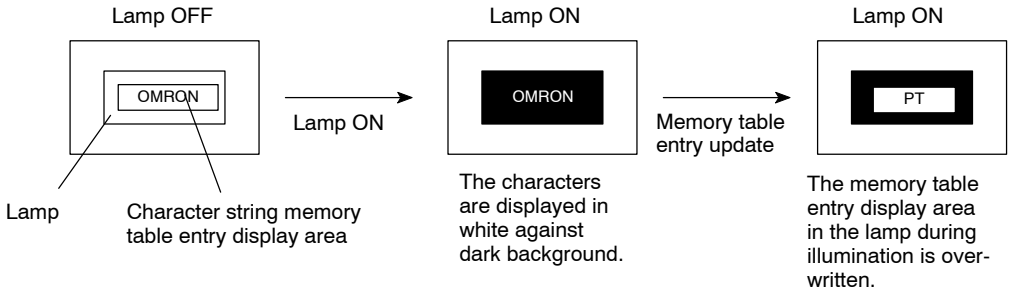
- **When a Memory Table Display Is Overlapped with a Normal Lamp**

  The guide display character of the normal lamp is a fixed character string. In order to change the guide display of the normal lamp according to the circumstances, display the display area of the numeral memory table entry or character string memory table entry in conjunction with illumination of lamp. However, depending on a timing of ON of normal lamp and memory table entry update, the result of indication differs as shown in the examples below. Be careful when creating a control program.

  Example 1: When the normal lamp is turned ON after updating the memory table entry



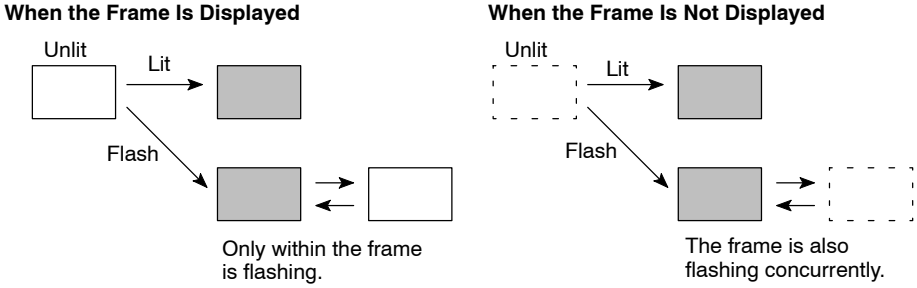
Example 2: When the memory table entry is updated while normal lamp is ON



- **Frame Display and ON/Flashing**

  ON/Flashing operations differ depending on the presence of the frame display of the normal lamp.

  When the frame is displayed, only an area within the frame is ON or flashing. When the frame is not displayed, an area is ON or flashing together with the frame.

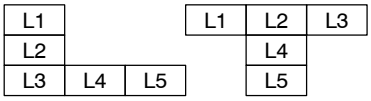


- Combined display of normal lamp

  With multiple lamps of the same number (or the same bit) registered, the lamps combined as shown below can be ON simultaneously.

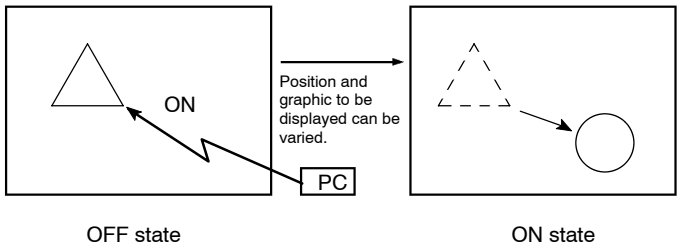
  Display Example

  The same number (or bit) is specified for the lamps L1 through L5.



4-6-2 Image/Library Lamp Function

The image/library lamp displays a different image or library data and displays it at a different position according to a command (bit ON/OFF) from the PC.



For an image/library lamp, the presence of an external frame, ON/flashing, color display, guide display, and so forth, cannot be specified.

However, since the attributes of every display factors when registering the library data are displayed as they are, a range of application will be widened further.

Image/Library Lamp Attributes

The following attributes can be set to an image/library lamp.

- **Lamp Codes**

  Graphics to be displayed during ON and OFF are specified by the library or image data codes.

- **Display Position**

  Positions to be displayed during ON and OFF are specified.

4-7 Touch Switches

The NT30/30C has a function whereby input operations can be performed by using touch panels displayed on the screen. NT30/30C screens can be switched or bit information can be sent to the PC by pressing (lightly touching) the touch switches on the panel.

The touch switches can also be made to light up (or flash) and go OFF like lamps.

Touch switches are set when creating the screen data on the NT-series Support Tool.

The following explanation covers the types of touch switch that can be displayed, and functions other than that for notification to the PC.

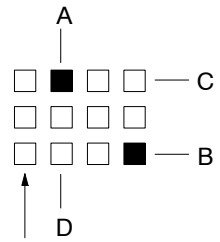
For the actual method used to notify touch switch statuses to a PC, see *Touch Switch Status* (page 220).

For the actual method used to access touch switch statuses at the PC, see *Notifying the PC that a Switch Has Been Pressed* (page 220).

⚠**Caution**
- Do not use input functions such as PT touch switches for applications where danger to human life or serious property damage is possible or for emergency switch applications.
- Press touch switches with a force of no greater than 30 N.
  Applying higher force may cause glass to break, possibly resulting in injuries and prevent operation.
- Do not press touch switches carelessly while the backlight is OFF or while nothing is displayed on the screen. Otherwise the system may operate unpredictably.
  Only press touch switches after confirming system safety.

Correct use

- If touch switches are pressed in rapid succession, their inputs may not be successfully received. Confirm that the input of a touch switch has been successfully received before moving on to the next operation.
- Note on pressing 3 touch switches
  When multiple touch are set in positions that form a row and three of these touch switches are pressed at the same time, a malfunction occurs due to characteristics of the touch switch configuration.
  Be careful how you position touch switches when setting them.
  Example 1: Touch switches are created at positions A and B and at their vertical/horizontal intersection points C or D

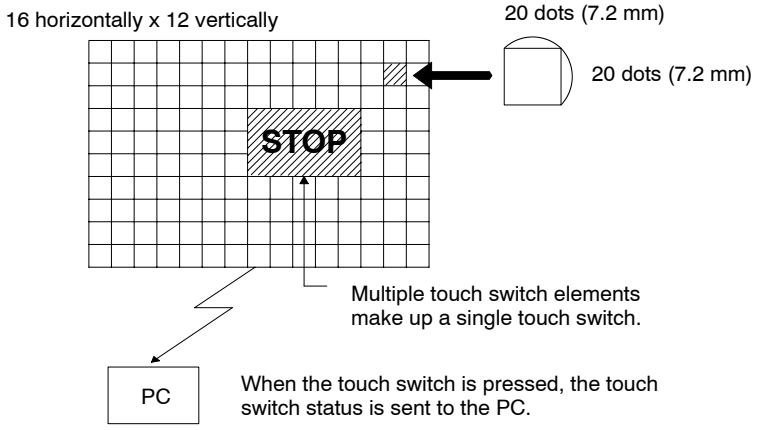


Small touch switch frame

- When switches A, B, and C are turned ON simultaneously, switch D is also regarded as having come ON due to the touch switch configuration.
- When switches A, B, and D are turned ON simultaneously, switch C is also regarded as having come ON at the same time.

4-7-1 Functions of Touch Switches

Touch switches are created using rectangular elements shown below. A touch switch can comprise more than one touch switch element. Up to 192 touch switches can be registered on one screen.



- **Functions of Touch Switches**

  Touch switches can have the following functions:

  - PC notification function (page 220)
  - Screen switch (stand-alone) function (page 157)
  - Input key function* (page 159)
  - Copy key function (page 160)
  - Cursor moving key function (page 160)
  - Screen print function (page 160)

  * The “input key function” is a general term for the 3 functions character string (character key) input function,” “pop-up window/keyboard (window key) function,” and “control code input (control key) function” that are displayed on the NT-series Support Tool.

Touch Switch Attributes

The following attributes can be set for the touch switches.

- **Display Frame**

  A display frame of the touch switch can be specified by the following two methods.

  - **Fixed-shape Display Frame**

    This is a frame displaying an area of display frame type that acts as Touch Switch. There are four kinds of display frames as shown in the table below: Standard, Solid 1, Solid 2, No Display Frame.

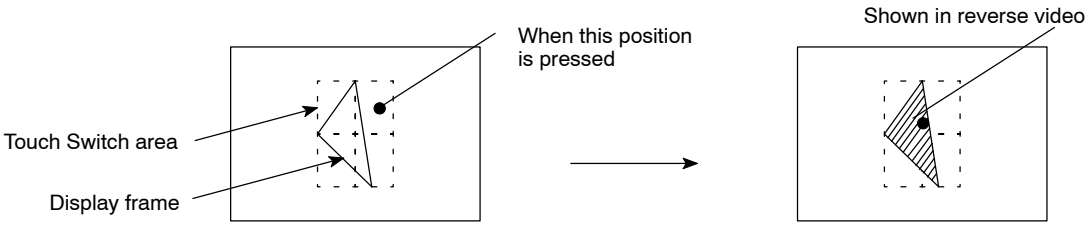
    When No Display Frame is selected, only the label is displayed (or nothing if no label is specified) unless an ON (or flash) instruction is sent from the PC, or the touch switch is pressed.

Display Frame Type	Switch OFF	Switch ON
Standard		
Solid 1		
Solid 2		
No display frame		

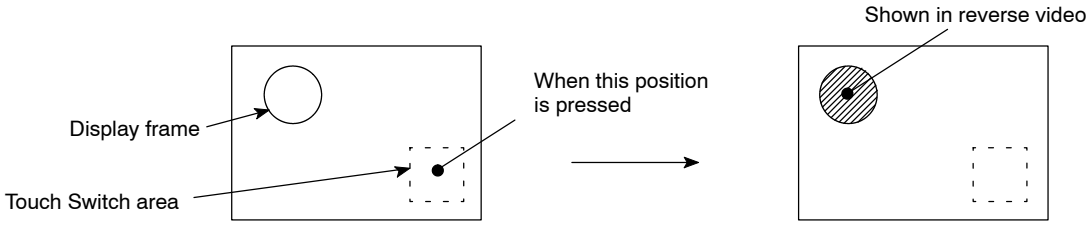
  - **Free-shape Display Frame**

    This is a display frame capable of freely setting the display position and shape irrespective of Touch Switch area. A shape to be specified can be selected out of Square, Circle, Polygon, and Fan.

    For example, free-shape display frame can be used in the following manner.



Example: Setting a display frame inside the touch switch area



Example: Setting a display frame outside the touch switch area

- **Reverse Video Entry**

  This attribute can specify the Touch Switch so as to be shown in reverse video when it is touched and operated.

- **Guide Display**

  Labels can be assigned to touch switches. When the touch switch is ON, the label is displayed in reverse video in the case of an NT30 and in the exclusive

OR color (see page 124) in the case of the NT30C. Attributes of guide display characters are in the same way as character display. Refer to *Characters and Figures that can be Displayed* (page 137).

- **ON/Flashing**

  This attribute can specify whether or not the Touch Switch is allowed to be ON or flashing when the Touch Switch is ON or flashing according to an instruction from the PC.

- **Color Display (NT30C Only)**

  External frame color (when displayed): 8 colors

  OFF color: 8 colors or transparency

  ON/Flashing, entry color: 8 colors

4-7-2 Stand Alone Function

The NT30/30C can switch over the screen only by operating the switches without instructions from the PC.

When screen data is created with the NT-series Support Tool, the screen number of a screen to be switched over is assigned to the input terminal of the touch switch. When the touch switch is pressed during operation, the screen of the number specified is displayed. At this time, the screen number just switched over is also notified to the PC.

Depending on the screen number allocated to it, a touch switch can be made to perform one of two functions:

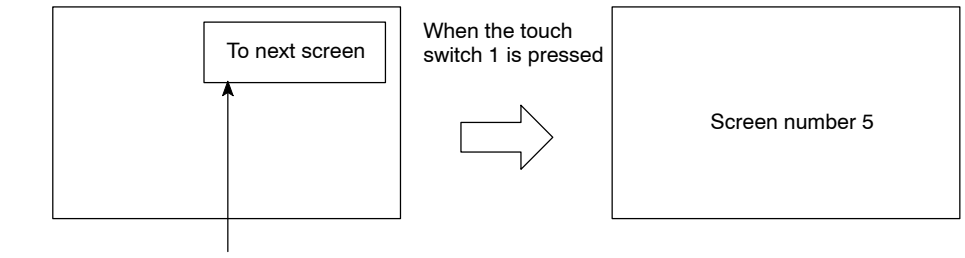
- **When a Screen Number in the Range 1 to 2000 Is Specified:**

  Pressing the touch switches causes the display to switch to the screen with the specified number.

- **When Screen Number 0 Is Specified:**

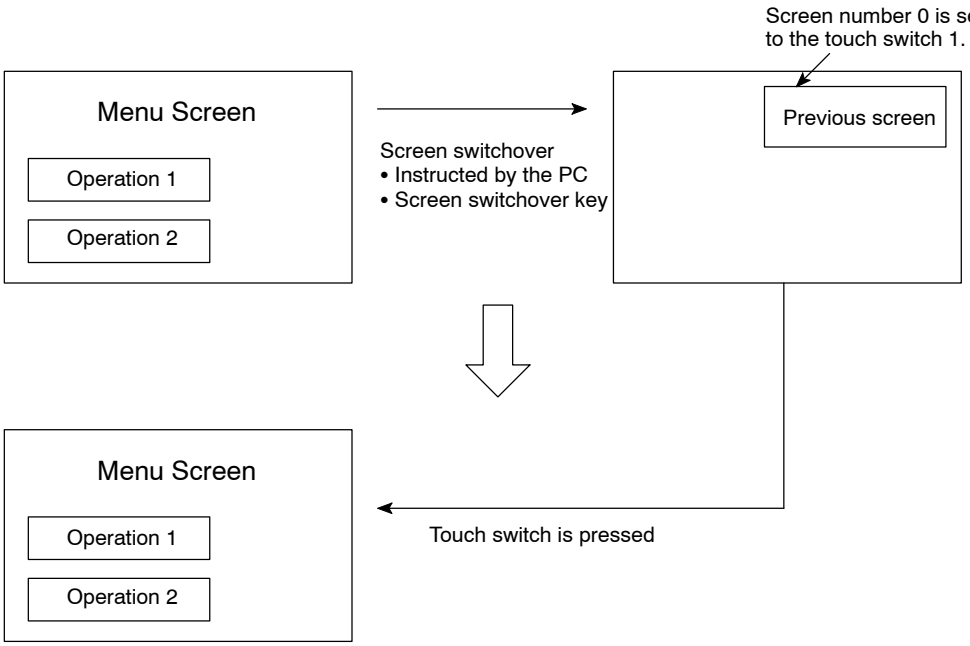
  The touch switch functions as the screen switchover return key. Setting this key allows you to return to the screen that was displayed immediately before the current screen.

  Screen Number in the Range 1 to 2000 Set



Screen number 5 is set to the touch switch 1

Screen Number in the Range 0 Set



Only a touch switch can have the screen switchover return key function. If display of screen number 0 is specified from the PC, the screen will go blank.

The number of screens that can be returned using the screen switchover return key is a maximum of 32 screens. However, it is assumed that the screen switchover return key has been set to all screens to be returned.

4-7-3 Input Key Function

This is a function that allows touch switches to be used for input and is mainly used when using numeral/character string setting functions. Input keys are classified into the following three types:

Character keys (character string input function):

Used to input character strings when using a character-string setting function. For details, see *4-9 Character String Setting* (page 171).

Window keys (pop-up window/keyboard function):

Used to open and close windows when using the pop-up window function. Also used to switch between keyboards when using character-string setting functions. For details, see *4-9 Character String Setting* (page 171) or *4-10 Pop-Up Window Function* (page 173).

Control keys (control code input function):

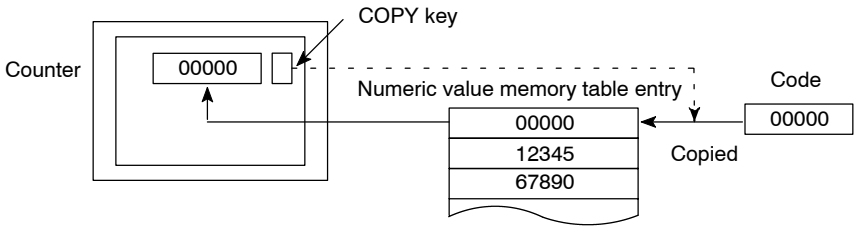
Used for functions provided by the system, such as the numeric key function used with numeral setting functions, the system key functions provided with previous PT models, and special control functions. For details, see the next section *Functions of Control Keys*.

Functions of Control Keys The touch switch control keys have the following functions:

Key	Function
0 to 9, A to F	Used to input numerical values
CLR	Clears input numerical values and character strings
±	Assigns the opposite sign to input numerical values
.	Used to input a decimal point
HOME	Used to move to the input field at the top left of the screen
↑, ↓, ←, →	Used to move to the next input field
⏎	⏎ system key (confirms character input without shifting to another input field)
🔊	🔊 system key (stops the buzzer)
↑ , ↓	↑ and ↓ system keys (screen switching of continuous screens, shifting to input fields)
MENU	System keys 🔊 + ↑ + ↓ (system menu display)
CA	Used to cancel input (Cancel)
BS	Deletes the numeral or character immediately preceding the input cursor
DEL	Deletes the numeral or character at the input cursor location
◀, ▶	Used to shift the input cursor
ENT	Confirms input of a character (after confirmation, the cursor shifts to the next input field)
⏫ ⏬	Alarm list/history display page scrolling
▲, ▼	Alarm list/history line scrolling

4-7-4 COPY Key Function

When the Touch Switch is pressed, values or codes (constant) in the memory table entry input column are copied into other memory table entry or the numeral/character string setting input column (Refer to *4-8 Numeral Setting* and *4-9 Character String Setting*). The COPY key is useful to set the numeral/character string display to its initial state and to enter the same value (initial value, etc.) into the multiple numeral/character string setting input column.



Example: COPY key used as a RESET key for the counter

Copy source (memory table entry or code) and copy destination (memory table entry or numeral/character string setting input column) are specified.

4-7-5 Cursor Moving Key Function

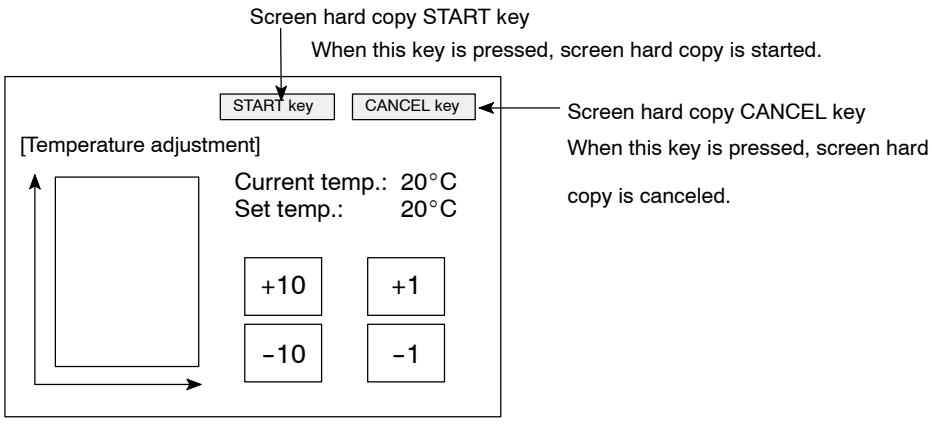
This is a Touch Switch to select the numeric value setting input column (ten-key type) and the character string setting input column when entering data. When the Touch Switch is pressed, a cursor (display frame) is moved to the numeral/character string setting input column specified to be ready for input operation (Refer to *4-8 Numeral Setting* and *4-9 Character String Setting*). The numeric value/character string setting input column is automatically produced with the NT-series Support Tool. A pop-up window open function can also be set for the same touch switch.

4-7-6 SCREEN PRINT Key Function

When the Touch Switch is pressed, a screen hard copy (screen image) is printed by a printer connected to the NT30/30C.

Two kinds of keys can be set: START key that starts the printing operation and CANCEL key that cancels the printing operation.

Even when the screen hard copy is being carried out, the NT30/30C continues operation.



4-8 Numeral Setting

The numeral setting is a function to enter the numeral values on the screen. The numeral setting allows the numeral value to be entered directly from the touch switch or B7A Unit into a numeral memory table entry to be displayed on the screen and further to be sent to the PC.

The following is a guide to the numeral setting function, a guide to the method for creating the numeric keys required for numeral settings on the screen, and an explanation of how to use numeric keys during operations.

Numeral setting screens cannot be registered as child screens of continuous screens.

With overlapping screens, only one screen can be set as a numeral setting screen.

For the actual method used to notify the PC of input numerical values, see *Notification of Numbers to the PC* (page 224).

The numeral setting is carried out when a screen is created with the NT-series Support Tool.

⚠**Caution** Ensure that there will be no adverse effects on the system before changing monitor data.

4-8-1 Numeral Setting Functions

The numeral setting has the following functions.

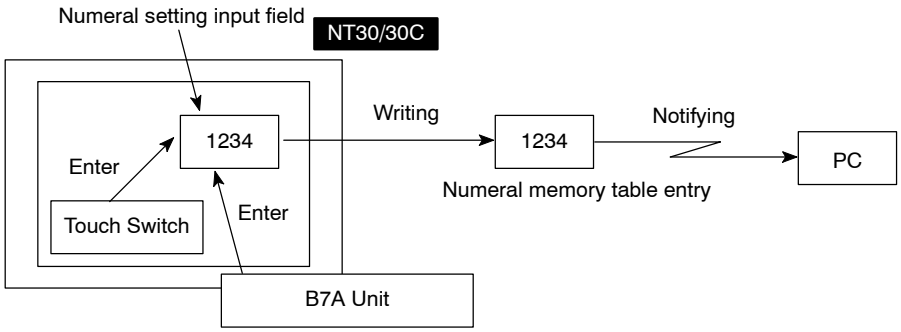
Basic Operation

The numeral setting operation is as follows:

(1) A numeral value is entered from the touch panel or B7A Unit.

(2) The numeral value entered is displayed in the numeral setting area on a screen.

(3) When the numeral value entered is confirmed, it is written into the numeral memory table entry and simultaneously sent to the host.



Reference It is possible to disable input to a numeral setting input field by using a system control (PT Status Control Area) operation (see page 239).

Numerical Values that Can Be Input and Attributes that Can Be Set

Numeral values up to 8-digit (up to 7-digit for negative numbers) can be entered in decimal and hexadecimal notation.

- **Entry of Decimal Number**

  When the display attribute is set to decimal number display, a numeral value can be entered in decimal.

- Range of Numeral Values

Range of numeral values that can be entered differs depending on a sign.

With a sign not displayed: 0 to 99999999 (8-digit)

With a sign displayed: –9999999 to +99999999 (7-digit negative number, 8-digit positive number)

For a thumb wheel type, numeric values are up to 7-digit for both positive and negative numbers with signs displayed.

- Decimal Point

A maximum of 7 digits can be entered to the right of the decimal point.

- **Entry of Hexadecimal Number**

When the display attribute is set to hexadecimal number display, a numeral value can be entered in hexadecimal.

- Range of Numeral Values

Range of numeral values that can be entered is from 0 to FFFFFFFF (8-digit).

- **Attributes That Can Be Set**

The attributes that can be set for numerical values displayed in input fields are the same as those for numeral displays. See *Numerals that can be Displayed* (page 139).

Checking the Upper/Lower Limit

When the upper limit and lower limit of the input numeral values have been set, erroneous numeral values outside of the range can be prevented from being stored in the numeral memory table entry or notified to the PC.

When the numeral values entered are confirmed, upper/lower limits are checked.

Correct use

When the numeral values entered are confirmed, upper/lower limits are checked.
Otherwise the system may operate unpredictably.

4-8-2 Types of Numeral Setting

There are two kinds of numeral setting: numeric keys and thumbwheels. Though the basic functions are the same, screen display and inputting methods differ between two types.

A maximum of 50 input fields (combined total for both numeric keys and thumbwheels) can be registered on one screen.

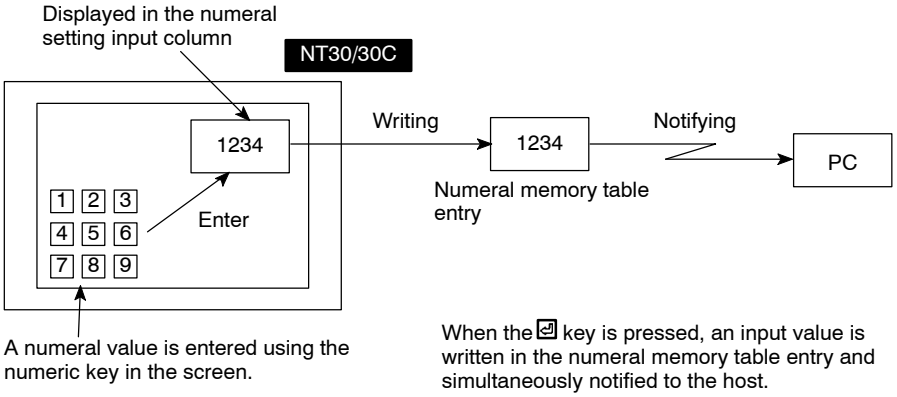
Numeric Keys

When any numeral value is entered by the numeric key (character key) assigned to the touch switch or B7A Unit, a numeral value just entered is displayed on a screen. When the RETURN key is pressed after an input operation is completed, the numeral value entered is written into the numeral memory table entry and then notified to the host.

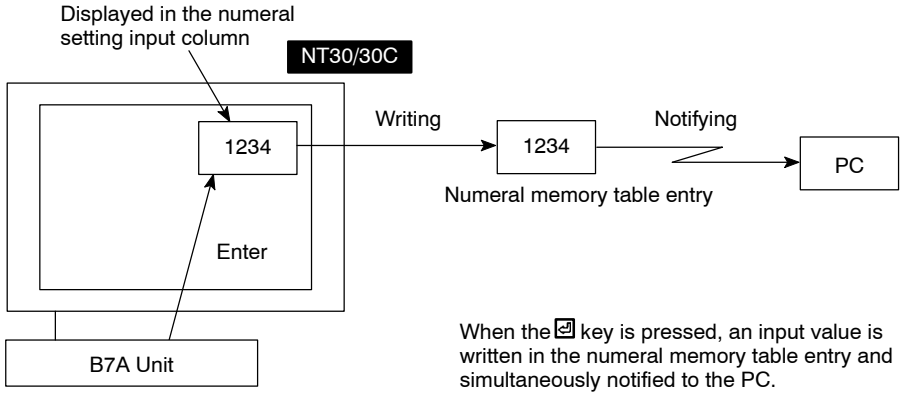
When there are multiple numeral setting input columns, a numeral setting input column for input operation is also selected by the numeric key.

To use the numeric key type, it is necessary to create not only the numeral setting input column on a screen but also the numeric key for input operation (Refer to page 164).

Using a Touch Panel



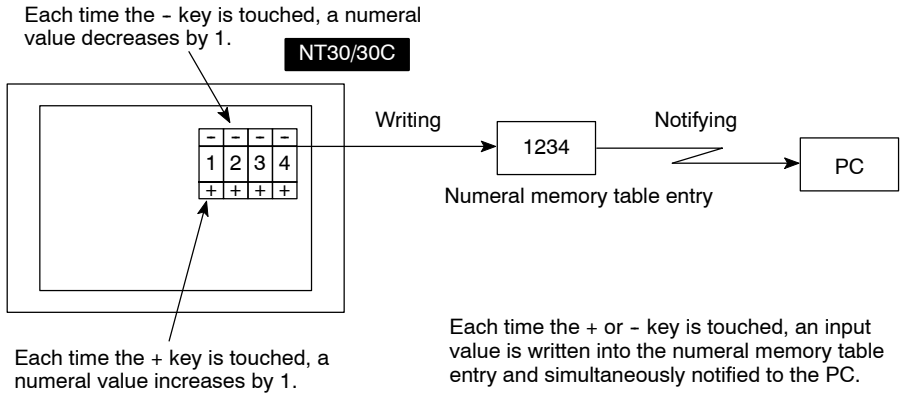
Using a B7A Unit



Thumbwheels

By means of touch switches that can be increased/decreased every digit of numeral value, a numeral value can be entered from the numeral setting input column. Every time a numeral value displayed is changed, the numeral value displayed is written into the numeral memory table entry and simultaneously notified to the PC.

Therefore, the thumbwheel type can perform an entry of numeral value only by creating the numeral setting input column on a screen.



4-8-3 Numeric Key Creation

In order to use the numeric key type numeral setting, it is necessary to create not only the numeral setting input column on a screen but also a numeric key for performing an input operation.

Screen Attribute Setting

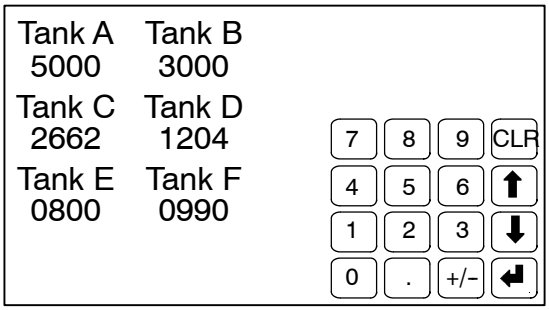
A numeric key type can be selected by setting a screen attribute.

The System Keypad (Numeral Setting) of the screen attributes is specified to System (System Keypad set to ON) or User (System Keypad set to OFF).

- **Screen when System Is Specified**

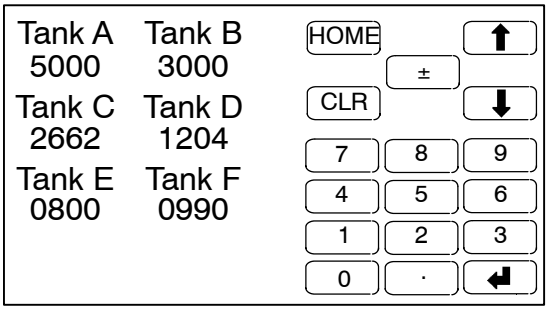
  When a numeral setting input field is created, numeric keys are automatically displayed.

  Numeric key display position and arrangement are fixed. In this screen, only the type of numeric key (system key) in the following page can be used.



- **Screen when User Is Specified**

  Display position and arrangement of the numeric key can be set freely by assigning to the touch switch (Refer to page 165).



  Numeric keys are created using the control keys (touch switches with the control code input function). Also, normal size characters of 0 to 9 and A to F can be used as numeric keys with the character keys (touch switches with the character string input function).

Reference

With the DOS version of the NT-series Support Tool, even when the Numeral Setting of the screen attribute is User, there is still a function for automatically creating system numeric keys. The Windows version, however, does not have this function.

Allocation of Numeric Keys

Numeric keys can be allocated to the touch switches or B7A Unit.

- **Allocation to Touch Switches**

  When the touch switches are used as numeric keys, the numeric keys allocated are specified when creating the touch switches.

  For numeral settings, the following numeric keys (system keys) can be used.

  For creation of the touch switches, refer to *4-7 Touch Switches* (page 154).

Numeric key	Numeric key	Numeric key (system key)
0	A	↑
1	B	↓
2	C	←
3	D	→
4	E	⏎
5	F	
6	CLR	⬆
7	+/−	⬇
8	.	MENU
9	HOME	

* “MENU” means the system menu display.

When a numeral setting screen is displayed, no notification will be made to the PC if touch switches for which numeric key and system key allocations have been made are pressed.

- **Allocation to the B7A Unit**

  A numeric key is allocated to each input from the B7A Unit. For details, refer to the *4-12 Operation of B7A Unit* (page 185).

  In the numeral setting screen, entry from the B7A Unit allocated to the numeric keys and system keys will not be notified to the PC.

4-8-4 How to Use Numeric Key Settings

In order to enter the numeral values using numeric keys, the numeral setting input column subject to entry must be specified to be ready for input operation before entering the numeral values using the numeric key.

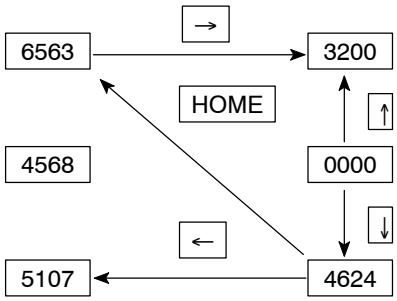
Specifying the Numeral Setting Input Column to Be Entered

The numeral setting input column to be entered is specified by either numeric key, system key, or touch switch (numeral/character string setting cursor moving key).

The frame (cursor) around the specified numeral setting input column and the cursor attributes can be specified.

- **Specifying the Column Using Numeric Keys**

The numeral setting input column is specified with the HOME, ➡ , ⬅ , ⬆ , ⬇ keys out of the numeric keys. A cursor can be moved between the numeral setting input columns using these keys as shown below.



When the HOME key is pressed, the cursor can be moved at a stretch to an area at the upper left corner where a sum of XY coordinates is at a minimum (the numeral setting input column at the upper left in the example above).

- **Specifying the Column Using the System Keys**

When the system keys ⬆ and ⬇ of the touch panel, a cursor can be moved in the order that the numeral setting input column is created by the NT-series Support Tool.

For example, when three numeral setting input columns are created, a cursor can be moved in due order as follows:

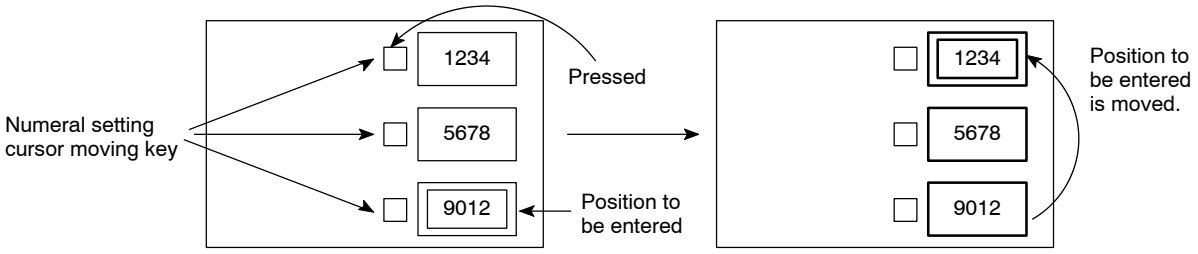
⬆ key: First → Second → Third → First

⬇ key: First → Third → Second → First

The order of movement using the system keys ⬆ and ⬇ can also be changed. For details, refer to N*T-series Support Tool for Windows Operation Manual* (V061).

- **Specifying the Column Using the Cursor Moving Keys**

With the numeral/character string setting cursor moving key of the touch switch being set, the numeral setting input column can be specified only by touching the key.



Reference

- When using NT-series Support Tool, cursor moving keys can be automatically created as touch switches associated with the input fields when numeral setting input fields are created.
- The pop-up window function (open) can also be assigned to the cursor moving keys (if the keys are created automatically, this function can be set by modification).

Entering the Numeric Values

The numeric values are entered using the numeric key numeric (0 to 9, A to F), decimal point (.), sign (+/–), clear (CLR), RETURN (⏎) keys.

The numeral values can be entered in the same manner as a general electric calculator as follows:

- **Entering the Integer Part and Decimal Fraction**

  An integer part is entered from the least significant digit. When an input numeral value is in excess of display digits, the numeral value shifts to the left from the least significant digit.

  When a decimal point is entered, a decimal fraction can be entered thereafter. The decimal fraction is entered from the most significant digit. When an input numeral value is in excess of display digits, the numeral value shifts to the right from the most significant digit.

Key Entry	Numeral Value Display
(Initial state)	1234.5678
1	2341.5678
2	3412.5678
.	3412.5678
4	3412.4567

- **Changing the Sign**

  In case of sign display setting, the sign alternates from + to – and vice versa, each time the sign (+/–) key is pressed.

- **Confirming the Input Numeral Value**

  Be sure to press the RETURN key after an input operation is completed. When the RETURN key is pressed, the numeral value displayed is written into the numeral memory table entry and simultaneously notified to the PC.

- **Initial Operation of the Input Keys**

  When the RETURN (⏎), sign (+/–), and decimal point(.) keys are pressed initially (when pressing these keys immediately after displaying a screen or inputting the keys), the NT30/30C will operate as follows:

  - **RETURN (⏎) Key**

    The display is cleared by 0. The NT30/30C starts entering the integer part.

  - **Sign (+/–) Key**

    The display is cleared by 0, but the sign is not reversed (when entering a decimal number or displaying a sign).

  - **Decimal point (.) Key**

    The display is cleared by 0. The NT30/30C starts entering the decimal fraction (when entering a decimal number or displaying a decimal fraction).

- **Checking the Upper/Lower Limits**

  The upper/lower limits are checked when pressing the RETURN key after an input operation is completed. If it is found that an input numeral value is in excess of limit as a result of checking, the contents of the numeral memory table

entry (previous values prior to entry) is displayed again, but this is not notified to the PC.

- **Example of Input**

Numeral display varies as shown below when actually entering numeral values.

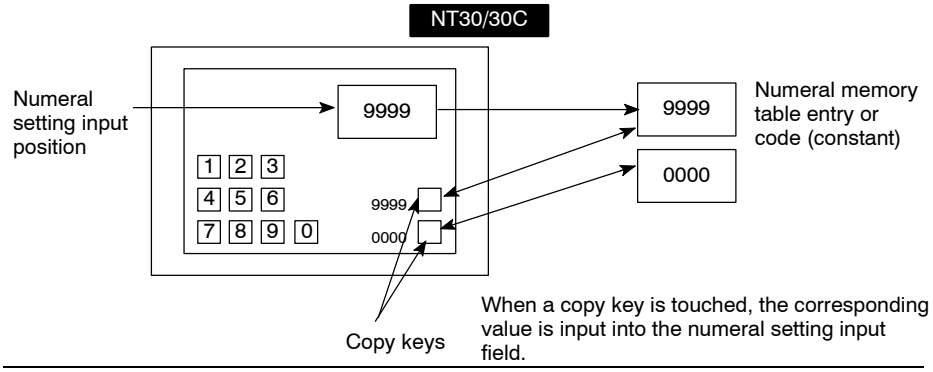
Input example 1) In case of decimal notation, sign displayed, integer part 4-digit, decimal fraction 3-digit

Order	Key	Numeral Display	Order	Key	Numeral Display	Order	Key	Numeral Display
Initial value		0000.000	7	A	-1524.000	14	.	0000.000
1	1	0001.000	8	.	-1524.000	15	7	0000.700
2	5	0015.000	9	1	-1524.100	16	2	0000.720
3	2	0152.000	10	5	-1524.150	17	↵	0000.720
4	B	0152.000	11	2	-1524.152	18	±	0000.000
5	±	-0152.000	12	7	-1524.527	19	1	0001.000
6	4	-1524.000	13	↵	-1524.527	20	±	-0001.000

Input example 2) In case of decimal notation, sign not displayed, integer part 4-digit, decimal fraction 3-digit

Order	Key	Numeral Display	Order	Key	Numeral Display	Order	Key	Numeral Display
Initial value		0000.000	5	±	0152.000	10	↵	1524.130
1	1	0001.000	6	4	1524.000	11	.	0000.000
2	5	0015.000	7	.	1524.000	12	9	0000.900
3	2	0152.000	8	1	1524.100	13	5	0000.950
4	B	0152.000	9	3	1524.130	14	↵	0000.950

Reference Using touch switches set as copy keys (see page 160) allows you to input the value or code (constant) in a numeral memory table entry into a numeral setting input field in a one-touch operation.



4-8-5 How to Use Thumbwheel Settings

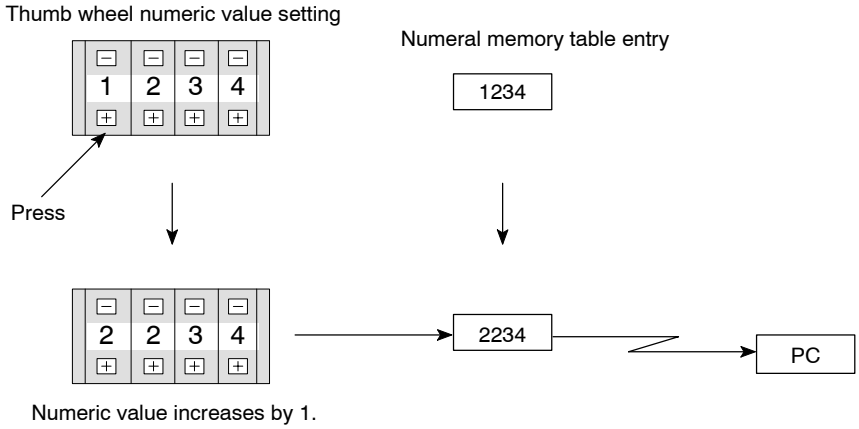
For numeral setting with a thumbwheel, a numeric value is entered by directly touching the increment/decrement (+, –) keys. Keys such as numeric key are not required.

Entering the Numeric Values

The numeric values are entered using the increment/decrement (+, –) keys provided at each digit.

- **Specifying the Numeric Values**

  When the increment/decrement (+, –) key is touched, the numeric value at that digit will increase/decrease by 1. Each time + or – key is touched, the numeric value just changed is notified to the PC. It is not necessary to press the RETURN (⏎) key unlike the numeric key type.



  A numeric value cannot be entered into the thumb wheel type from the ten-key.

- **Changing Signs**

  In case of sign display setting, the sign + is specified by touching the + key of the digit for which the sign is displayed and the sign – by touching the – key.

- **Checking the Upper/Lower Limits**

  Upper/lower limits are checked when pressing the increment/decrement (+, –) keys. If it is found that an input numeral value is in excess of the limit as a result of checking, the contents of the numeral memory table entry (previous value before pressing the increment/decrement (+, –) keys) is displayed again, but this is not notified to the PC.

  With the thumb wheel type, if the upper limit is 1n...n and the lower limit is 0m...m (n and m represent digits), and n...n < m...m, it is not possible to change between numbers with a different number of digits.

  For example, if the upper limit is 1,200 and the lower limit is 201, if the initial value has 3 digits then it will be possible to change within the range 201 to 999, and if the initial value has 4 digits, it will be possible to change within the range 1,000 to 1,200. It will not, however, be possible to change between these two ranges.

  This is because, when an attempt is made to change the leading digit from 0 to 1, or from 1 to 0, the upper/lower limit check stops the change. In order to avoid this, set an upper and lower limit so that n...n $\geq$ m...m, or set up a separate touch switch and use this touch switch to write the new value when changing between values with a different number of digits.

4-8-6 Setting Items for Numeral Setting

For the numeral setting, the following items are set when being created with the NT-series Support Tool. However, for numeral setting of thumb wheel type, there are some restrictions on the setting of several items.

Items to be Set

- **Numeral Memory Table Entry To Access**

  The number of the numeral memory table entry is specified to register the numeric values entered for the numeral setting.

- **Number of Digits of Numeric Value Entered**

  The number of digits of numeric value entered is specified. Up to 8-digit can be specified by figuring out a sum of the number of digits of both integer part and decimal fraction. However, when displaying a sign, the number of negative numbers is limited to a maximum of 7-digit.

- **Upper/Lower Limit**

  Upper limit and lower limit are set separately. A maximum of 8-digit numeric value (up to 7-digit for negative numbers) can be set.

  When the upper limit value or lower limit value is negative, set F as the eighth digit.
  Example: When the upper limit value or lower limit value is –123, set F0000123.

- **Display Attribute**

  The same attributes as the numeral display are set. For details, refer to the *Numerals that Can Be Displayed* (page 139).

Restrictions and Additions when Creating the Thumb Wheel Type

For numeral setting for thumb wheel type, there are the following restrictions and additions when setting the items.

- **Number of Digits of Positive Numbers To Be Entered with a Sign Displayed**

  For the thumb wheel type, with a sign displayed, the maximum number for the total number of digits in the integral portion and the decimal portion of positive numbers to be entered is 7.

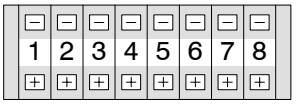
- **Display Size**

  There are only three kinds of size that can be specified. Size is specified by the touch switch size of the increment/decrement (+, –) keys. Display size is selected out of three size: minimum unit of touch switch (20 dots by 20 dots), 1 x 1 (small), 2 x 2 (medium), 3 x 3 (large). Entire size of the numeral setting input column is specified by the touch switch size just specified.

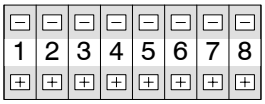
- **Shape (End Plate)**

  Either of the two kinds of shape as shown below can be set. Decoration (end plate) at both ends of the numeral setting input column differs.

With End Plate



Without End Late



- **Restricted Display Attributes**

There are the following restrictions on display attributes.

Character type:	Wide size only
Character magnification:	Either of double, x4, or x9 in correspondence with display size specified
Character display attribute:	Normal display only (reverse and so forth are not available)
Zero suppress:	Without zero suppress only

For details, refer to the *Numerals that Can Be Displayed* (page 139).

4-9 Character String Setting

Character string setting (character string input) is a function for entering character strings on the screen.

The character string setting allows a character string to directly be entered from the touch switch into the character string memory table entry, displayed in the screen, and also sent to the PC.

This section outlines the character string setting function and explains how to input character strings during operation.

For the actual method used to access input character strings at the PC, see *Notifying the PC of a Character String* (page 227).

The character string setting is carried out when creating a screen with the NT-series Support Tool.

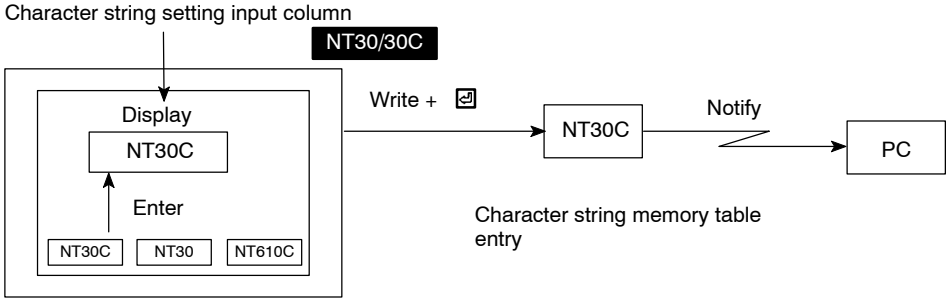
4-9-1 Functions of Character String Setting

The character string setting has the following functions.

(1) The touch switches (character key) are previously set by the NT-series Support Tool.

(2) When the character key ("NT30C" in an example in the figure) is pressed, a guide character of the character key ("NT30C" in the example in the figure) is entered in the character string setting input column.

(3) When the Enter (⏎) key is pressed, the character string of the character string input column is written into the character string memory table entry and simultaneously notified to the PC.



Reference

- By using the pop-up window function (see page 173), it is possible to select and open a number of windows (keypads), each of which comprises a number of character keys, thus allowing various types of input.
- Input to character string setting input fields can be disabled by a system control (PT Status Control Area) operation.

4-9-2 How to Enter Character Strings

An appropriate character string setting input column must be specified to be ready for an input operation before a character string is entered by the character key.

- **Specifying the Character String Setting Input Column To Be Entered**

  The character string setting input column to be entered is specified by either ten-key, system key, or touch switch (numeral/character string setting cursor moving key).

  The frame (cursor) around the specified character string setting input column and the cursor attributes can be specified.

  Concrete specifying method is the same as numeral setting. Refer to the *Specifying the Numeral Setting Input Column to be Entered* (page 165).

Reference The window opening function can be set for cursor moving keys. For details, see *4-10 Pop-Up Window Function* (page 173).

- **Entering the Character String**

  The character strings are displayed in the input column of the character string setting in due order of the touch switches being pressed (A character is inserted at an input cursor position). At this time, the keyboard screen can also be switched over halfway.

  When entering the character strings, the following control keys of the touch switches can be used.

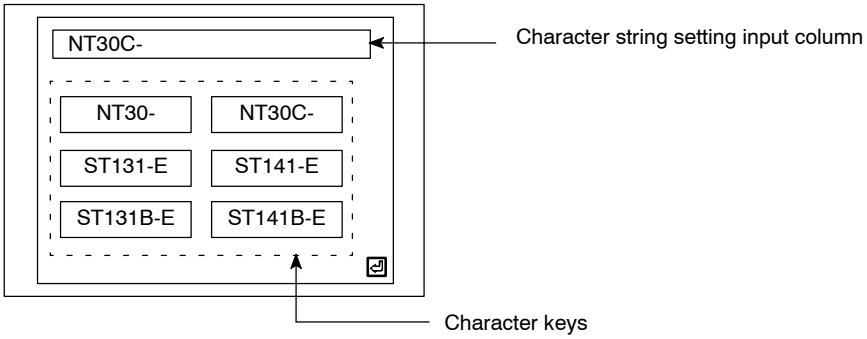
Control Key	Function
CA	Used to cancel character string entry
BS	Used to delete a character just before an input cursor
DEL	Used to delete a character at an input cursor
◀	Used to move an input cursor to the left by one character
▶	Used to move an input cursor to the right by one character
ENT	Used to confirm an input character (After confirming this, a cursor moves to the following input column)

  Be sure to press the Enter (⏎) key after an input operation is completed. At this time, the character strings being displayed are written into the character string memory table entry and simultaneously notified to the host.

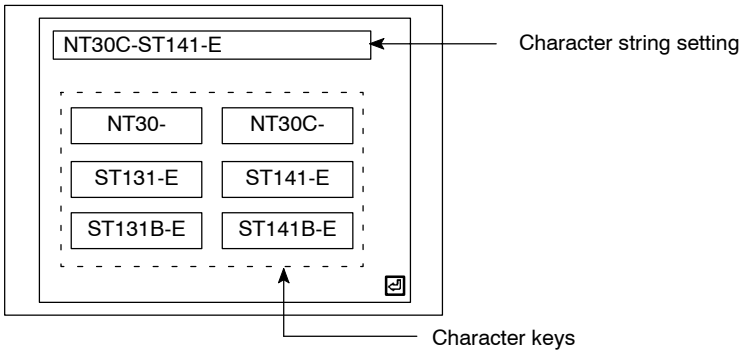
Reference
- In order to make character string settings, a key to confirm character string input is required. Allocate the Enter (⏎) or ENT control key to a touch switch to create this key.
- It is also possible to use the control keys of the input key function (however, the four keys used for alarm display cannot be used).
- By switching between windows, a large number of character keys can be used. It is also possible to create a temporary input field in a window to allow the existing data to be checked while inputting new data. For details, see *4-10 Pop-Up Window Function* (page 173).
- Using copy keys (page 160) allows you to input the value or code (constant) stored in a character string memory table entry into a character string setting input field in a one-touch operation.

Examples:

- When the "Model NT30C-"



- Then, when the "ST141-E"



- Finally, when the Enter (⏎) key is pressed, the "Model NT30C-ST141-E" displayed in the input column of the character string setting is confirmed and written into the character string memory table entry and simultaneously notified to the PC.

4-10 Pop-Up Window Function

The NT30/30C features a pop-up window function, which is used to display windows overlaying the currently displayed screen (base screen). These windows can be opened whenever required by pressing touch switches.

The pop-up window function can only be used with Ver.3 and later versions of the direct connection function (with Ver.3, the windows can only be used as keyboards).

Reference The opening of windows can be disabled by a system control (PT Status Control Area) operation.

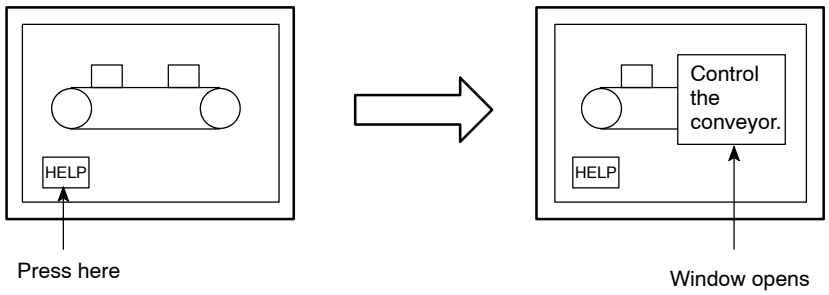
4-10-1 Functions of Pop-Up Windows

The functions of pop-up windows are described below.

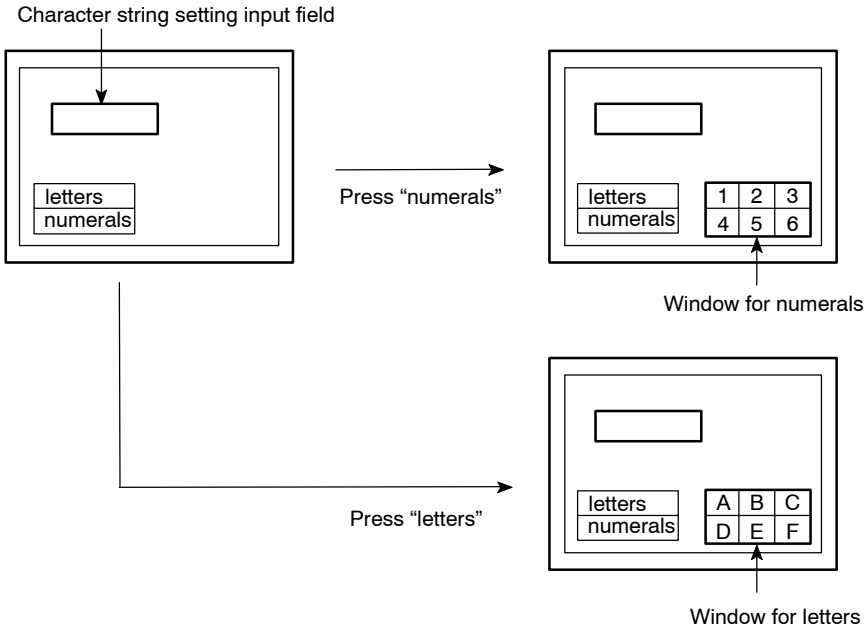
What is a Window?

A window is a screen that can be displayed overlaying a currently displayed screen (the base screen). Its size and display position can be changed. Windows are mainly used for the following applications.

- An explanatory message can be registered in a window, enabling it to be used as a HELP screen during an operation.



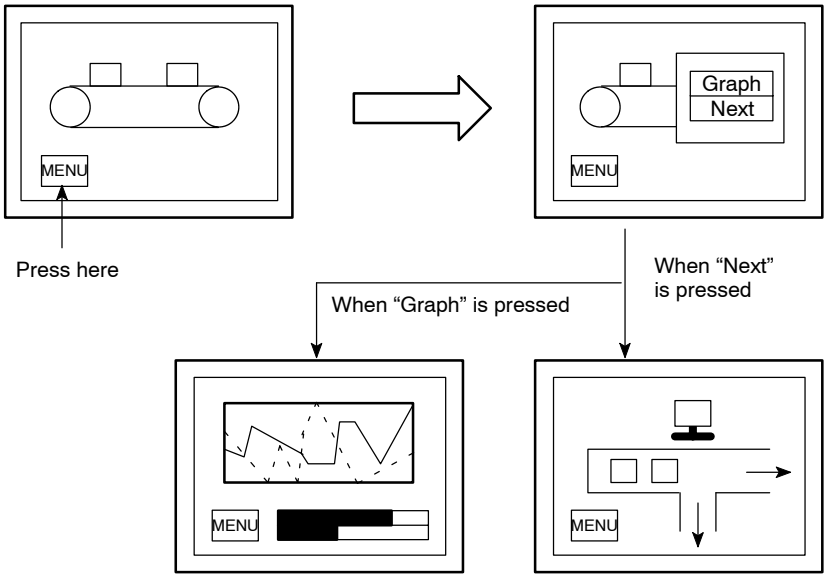
- By registering multiple character keys (touch switches) for use in character string setting, windows required for specific purposes can be displayed whenever necessary, allowing various types of input.



Reference

In order to make character string settings, a key to confirm character string input is required. Allocate the Enter (↵) or ENT control key to a touch switch to create this key.

- By registering multiple screen switching keys (touch switches), menus for screen switching can be created.



Window Screens and Display Elements

Using the pop-up window function, windows can be created in the screens numbered 1900 to 1979 (note that a screen for which a window is registered is called a window screen). Screens other than these cannot be opened as windows. Screen after creating a window in the screen number range 1900 to 1979, specify the window area (display area). The window will then open in a display area of the specified size and at the specified position.

The following elements can be displayed in NT30/30C windows. If elements other than these are registered on a window screen, they will not be displayed when the window opens.

- Background color screen attribute (NT30C only)
- Fixed displays
- Touch switches (but the input notification and screen print functions cannot be used)
- Numeral/character string input setting fields (only one can be used)

Elements that project beyond the display area will not be displayed when the window opens. Similarly, display elements on the base screen that overlap even partly with the window will be deleted when the window opens.

Reference

- Since the pop-up window function and screen print function share the same memory area, it is not possible to open a window during screen printing. Conversely, a screen cannot be printed while a window is open.
- The display elements in a window cannot be notified to the PC. This means that the lamp bits of touch switches in windows cannot be controlled.
- While a window is open, display processing may be slightly delayed.

4-10-2 Opening and Closing Windows

Windows are opened and closed by using touch switches with the pop-up window/keyboard function: either the window keys or cursor moving keys.

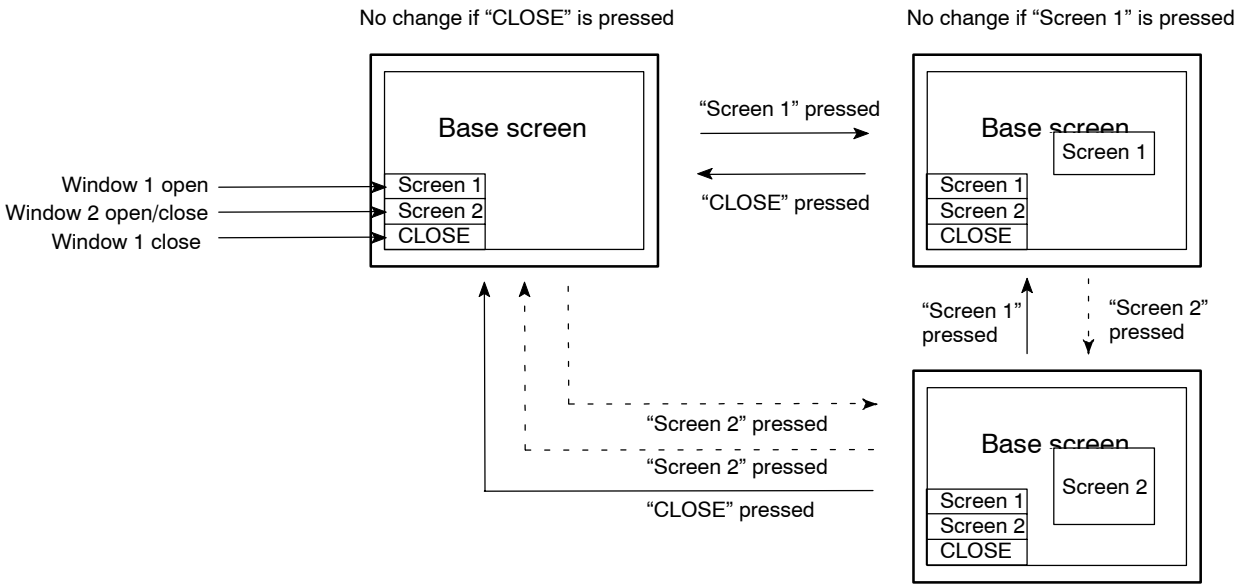
Opening and Closing Windows with the Window Keys

Window keys can be used in the following way to open and close windows (note that window keys can be created either on the base screen or in a window).

Open: When the touch switch is pressed, the specified window opens. If another window is open when the touch switch is pressed, it is closed first before the specified window is opened. If the specified window is already open, nothing happens.

Close: When the touch switch is pressed, the open window is closed.

Open/Close: The specified window opened if it is not open, and closed if it is open. If another window is open, it is closed first and then the specified window is opened.



If an attempt is made to open a window that has not been registered, no window is opened (if a window is currently open, it will be closed).

It is not possible to open more than one window at the same time. If multiple overlapping child screens are registered for an parent screen, only the first child screen will be applicable.

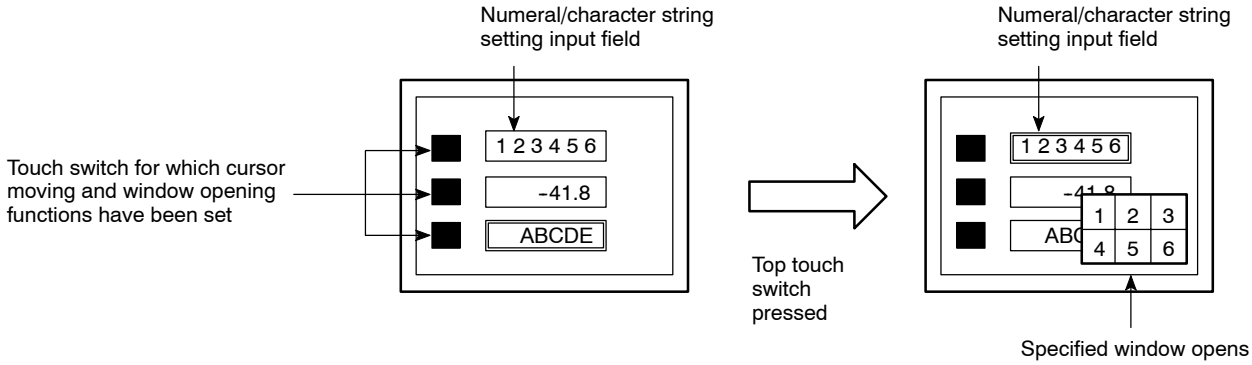
On switching to another screen, an open window will be automatically closed.

Reference When creating a screen with the NT-series Support Tool, it is possible to specify a window to be displayed when the screen is displayed (an initial window). With the Windows version, this is performed using the screen attribute Load Local 1 (Keyboard) and with the DOS version it is performed using Keyboard/Window Display under Input Settings.

Opening Windows with the Cursor Moving Keys

It is possible to set a window key open function for the cursor moving keys used for numeral/character string setting, in addition to their cursor moving function. Doing this makes it possible to specify an input field and also display the window to be used in a one touch operation.

If another window is open when the cursor moving key is pressed, that window is closed first before the specified window is opened (the cursor also moves to the specified input field). If the specified window is already open, the cursor moves to the relevant input field but nothing else happens.



If the cursor moving keys are created automatically during creation of a numeral/character string input field with the NT-series Support Tool, the window opening function is not set. In this case, the window to be opened can be specified by modifying the touch switch.

4-10-3 Temporary Input Fields

Only one numeral or character string setting input field can be registered for a window. This input field can be used - in combination with a number of numeral and character string input fields on base screens - for provisional input before any data is input into the actual input field on the base screen. This kind of numeral or character string input field in a window is called a temporary input field. Its advantage is that entries can be input into the temporary input field while checking the current setting on the base screen.

However, if the temporary input field in the window and the input field on the base screen are not of the same type, the temporary input field will not be displayed. Note also that temporary input fields cannot be used for thumb wheel type input fields.

The temporary input field will also be unusable and not displayed if it has fewer digits than the actual input field on the base screen (number of integer digits + number of decimal fraction digits + digit for decimal point + digit for sign).

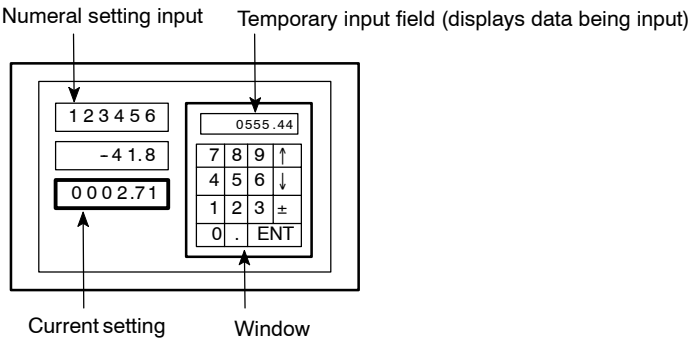
If it is not possible to use a temporary input field, the data has to be input directly onto the base screen.

How to Input Data Into Temporary Input Fields

Temporary input fields are used in the following way.

(1) Specify the numeral/character string input field used for actual input with a numeric key, system key, or touch switch (cursor moving key).

The actual method used for specification is the same as that for numeral setting. See *Specifying the Numeral Setting Input Column to be Entered* (page 165).



It is possible to display a window simultaneously with a cursor movement. For details, see *Opening Windows with the Cursor Moving Keys* (page 177).

(2) If the window in which the temporary input field is registered is not displayed, open it (this could also be done prior to step (1)). For the method for opening the window, see *Opening and Closing Windows* (page 176).

The temporary input field displays the contents of the actual input field at that point in time. The display of the temporary input field is governed by the following attributes:

- Attributes determined by the settings for the temporary input field:
  Character font, scale, display attribute, smoothing, character color, background color
- Attributes determined by the settings for the actual input field on the base screen:
  Numbers of integer and decimal fraction digits, upper limit value, lower limit value, decimal/hexadecimal, zero suppress, sign display.

The cursor frame of the temporary input field is always displayed.

(3) Input the numerical value or character string. The method is the same as that normally used to input numerical values and character strings. See *Entering the Numeral Values* (page 167), or *How to Enter the Character Strings* (page 172).

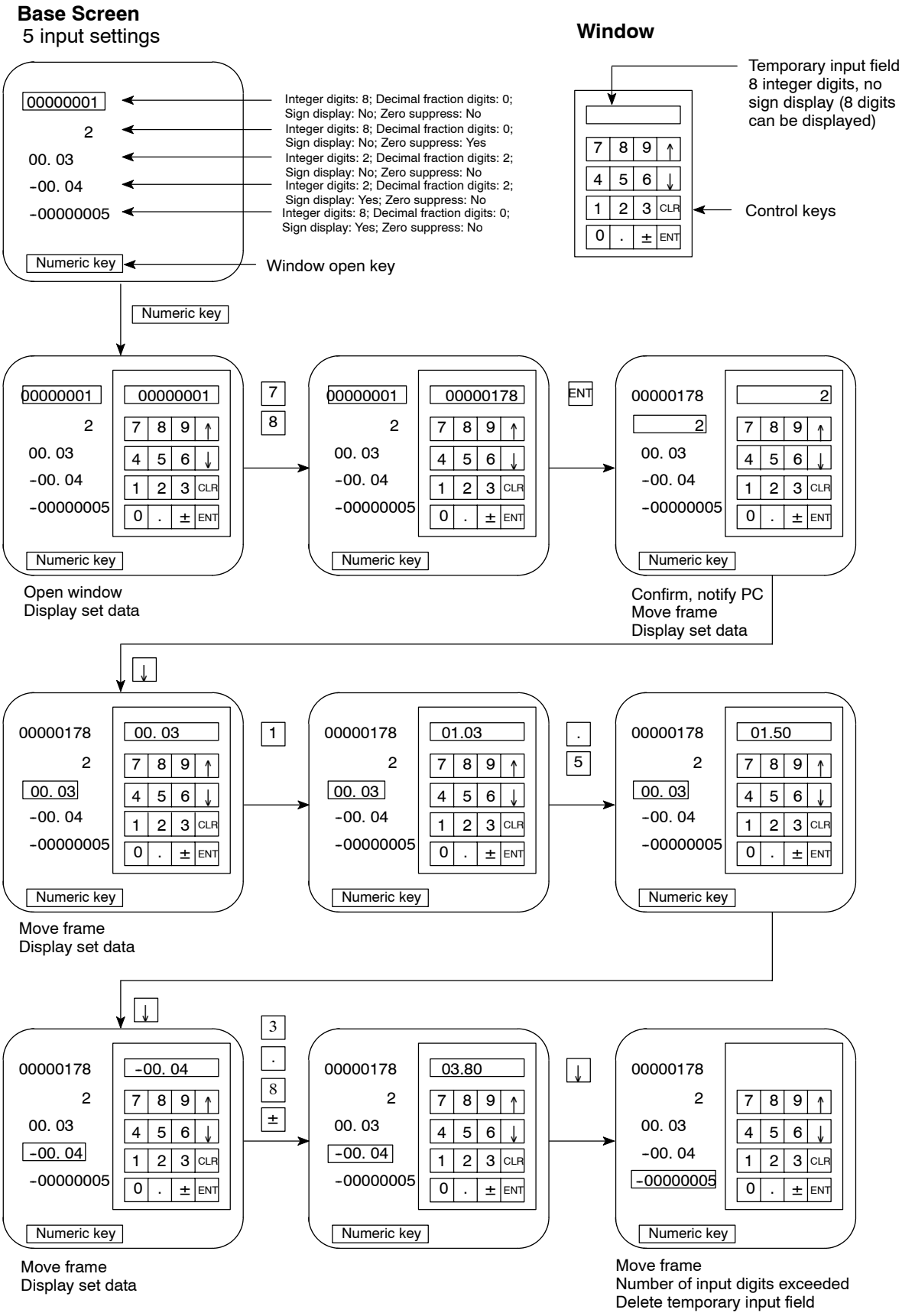
The numerical value or character string is input into the temporary input field.

(4) The input numerical value of character string is written to the input field on the base screen on confirming it by pressing the ENT key or the return key (↵), and the contents of the corresponding numeral/character string memory table entry are changed accordingly (notification to the PC also takes place at this time). On confirming by pressing the ENT key, the cursor moves to the next input field on the base screen.

If the input value is outside the range delimited by the upper and lower limit values, the original value is redisplayed.

Note also that if the actual input field on the base screen is changed before input is confirmed, the input data will be destroyed. The input data will also be destroyed if the window is closed or the screen is switched before confirmation.

Operation Example Temporary input operation example



4-11 Alarm List & History Display Functions

The NT30/30C can monitor the state of PC bits of the host and display the corresponding message (using the character string memory table entry) or image/library data (alarm list display) when a specific bit becomes 1 (ON).

The NT30/30C can record that those bits become 1 (ON) and also display them in the order of frequency or occurrence (alarm history display).

Since the alarm list/history data are backed up by the built-in battery, they are not lost when the power is turned OFF.

⚠ **Caution** If not backed up by the built-in battery, the memory switch settings will all be initialized to the values set with the NT-series Support Tool when the power is turned OFF.
If the message "Battery Lowered" is displayed while the NT30/30C is being used, replace the built-in battery immediately. For details on how to replace the battery, see *Replacing the Battery* (page 253).

4-11-1 Alarm List Display

Alarm list display has the following functions.

Displaying a Message (Character String Memory Table Entry) or Image/Library Data

The NT30/30C monitors multiple bits according to the setting of the bit memory table entry and displays the character string memory table entry (message) set to the corresponding bit memory table entry when there is any bit that becomes 1 (ON). Since the display column of a message is also a touch switch, corresponding image/library data can be displayed by pressing the message being displayed.

If the description of alarms is provided in the character string memory table entry and the corrective actions against those alarms are described for the image/library data, it is possible to take appropriate measures rapidly.

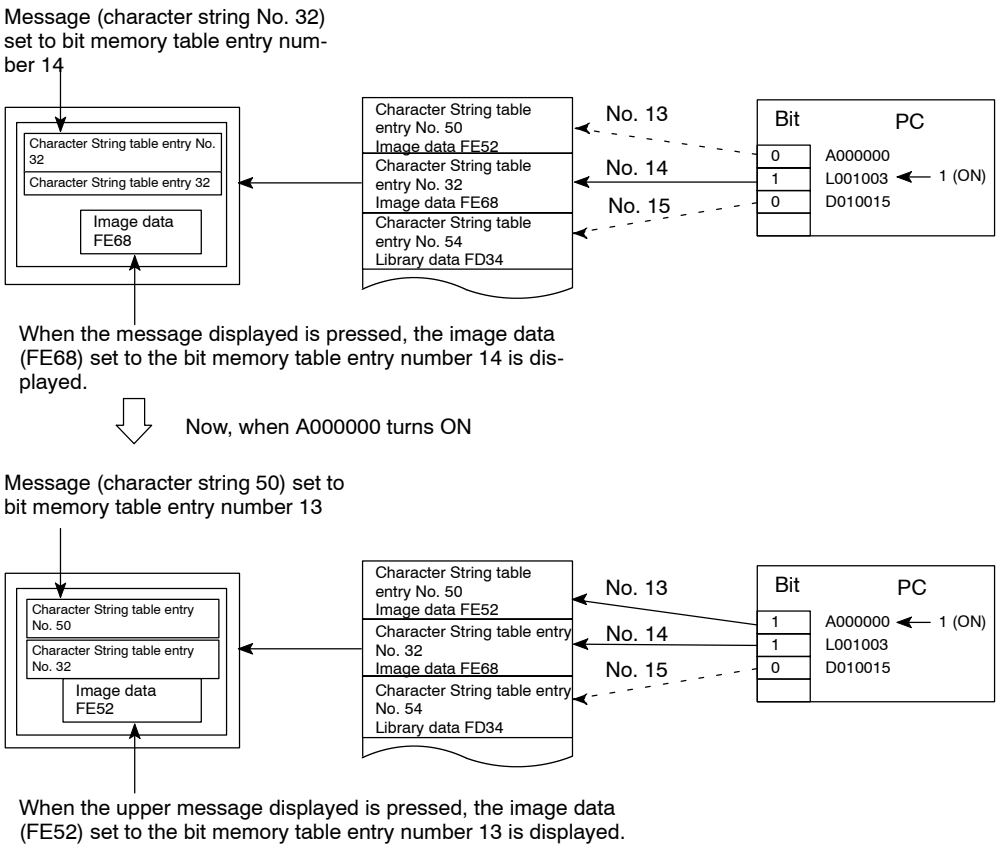
- **To Display Multiple Messages**

  When multiple bits become 1 (ON), the bit memory table entry with smaller table entry number is displayed preferentially.

  When multiple messages can be displayed, the messages of higher priority (smaller bit memory table entry number) will be displayed earlier.

  The display column of message and the image/library data displayed correspondingly are referred to as Alarm Group collectively. The NT30/30C can display up to four individual alarm group on one screen and simultaneously show up to 12 messages in one alarm group.

Example:

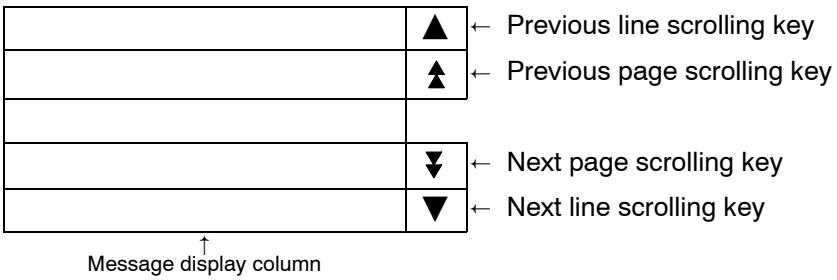


When the bit corresponding to the message being displayed returns to 0 (OFF), the message is cleared and the next message is displayed according to the order of priority.

- **Scrolling the Message**

  When the message issued extends more than the number of lines set to message display, the message being displayed can be scrolled in unit of line or page.

  When the number of lines for message display is set to four or more, the control keys for scrolling are automatically created as shown below.



When the number of lines for message display is set to one to three, only line scrolling keys are automatically created.

The scrolling key can also be set and corrected with control code input function control keys. (When the scrolling key has been created independently, it is necessary to perform Associate With for the alarm history.)

- **Scrolling Keys Shown in Reverse Video**

  Since these scrolling keys are automatically shown in reverse video when there are any messages in front or behind those keys, it is found whether or not there are any messages that are not displayed.

Switching the Image/Library Data to be Displayed

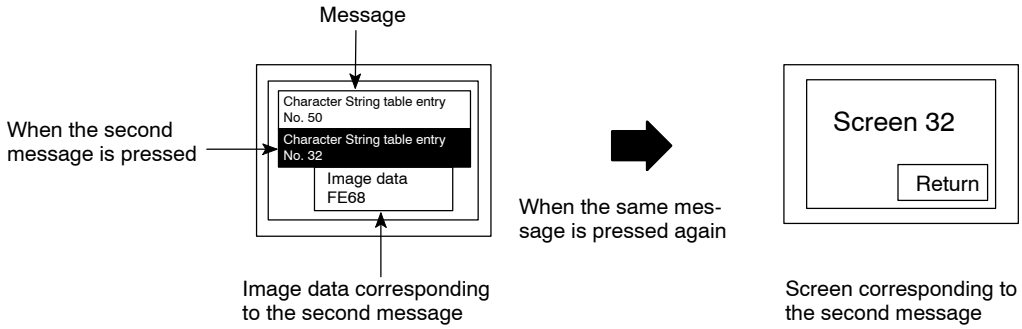
The message display column also serves as a touch switch. By selecting the message (touch switch) displayed, corresponding image/library data can be displayed.

Switching Over to the Corresponding Screen

To the bit memory table entry used for the alarm list display function, corresponding screen number can be set, as well as corresponding character string memory table entry (message) and image/library data.

When the screen number has been set, by pressing the message once again that is being selected in the section above Switching the image/library data to be displayed, it is possible to switch over to and display that screen.

Example:



Setting the Alarm List Display Function (Setting the Bit Memory Table Entry)

When the alarm list display function is used, it is necessary to set the bit memory table entry and screen display function. This paragraph describes the setting of the bit memory table entry. For the display setting, refer to *NT-series Support Tool for Windows Operation Manual* (V061).

In order to set the message to consecutive or overlapping screens, only the first sub-screen is effective.

In one alarm group, the bit memory table entries less than continuous 128 can be used and the state of up to 128 bits can be monitored. The smaller the bit memory table entry number, the higher the order of priority a massage has.

The following settings are done to each bit memory table entry.

- **Recording the Alarm History**

  Setting of whether or not a change of PC bit to which the bit memory table entry is assigned is recorded.

- **Screen Switchover Function**

  Setting of whether or not the screen switchover function is used.

- **Character String Memory Table Entry Number**

  Character string memory table entry number displayed as a message is set.

- **Display Color (NT30C Only)**

  Character color of a message is set.

- **Image/Library Data**

  Code of image/library data displayed together with a message is set.

- **Screen Switchover**

  Screen number displayed by the alarm list and history display function is set.

- **Bit (PC Address)**

  Bit in the PC, to which the bit memory table entry is assigned, is set.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

When specifying the DM Area, specify the bit number (00 to 15) along with the word address.

Example of setting:

No.	Host	#	Table entry	Dsp Cl	Image & Lib	SwScreen	Bit	Comment
000	No	No					------	
001	No	No					------	
002	Ys	No	999	Red	FD20	2000	CH 000000	
003	Ys	No	123	Blue	FD21	1234	AR 000000	
004	No	No	124	Whit	FD22	1235	LR 001003	
005	No	No	125	Whit	FD23	1236	LR 001004	
006	No	No					------	
007	No	No					------	

In this example, four bits IR/CIO 000000, AR 000000, LR 001003, LR 001004 are monitored using four bit memory table entries of bit memory table entry numbers 002 to 005.

4-11-2 Displaying the Alarm History

The alarm history constantly monitors the status of the bit for which Alarm is turned ON under Function in the bit memory table and records the date and time at which it changes to 1 (i.e., turns ON).

The bits recorded in the alarm history are always monitored irrespective of the display screen of the NT30/30C. If the number of bits are increased excessively, the processing speed of the NT30/30C may become slower.

The alarm history is common to all bit memory table entries. Unlike the message display, it cannot deal with only a part of bit memory table entry.

Recording Format of Alarm History

For the alarm history, the following data is recorded in the memory concerning the bit that turns 1 (ON).

- Bit address
- Date and time of occurrence
- Message set in the bit memory table entry (the contents of the character string memory table entry)

Maximum Number of Alarms to be Recorded

The maximum number of alarms that can be recorded is 256 when they are recorded in the order of occurrence, and 255 for each alarm message when they are recorded in the order of frequency.

Data recorded is backed up by a battery, so it is not lost even when the power supply is turned OFF.

Reference If the battery in the PT loses voltage, recorded data cannot be retained correctly.

When recording in the order of occurrence, the way alarms are recorded when the number of alarms capable of being recorded is exceeded is determined by the Alarm (Use Ring Buffer) under System (Alarm First-in First-out setting of the System Memory with DOS version) on the NT-series Support Tool as follows:

ON: Old history is cleared and new history is recorded.
OFF: Alarms in excess of 256 are not recorded (new alarms are discarded).

In order to clear (initialize) the alarm history, the memory is initialized (see page 82). It is also possible to clear (initialize) the alarm history using bit 11 (display history initialization) of the PT status control bits.

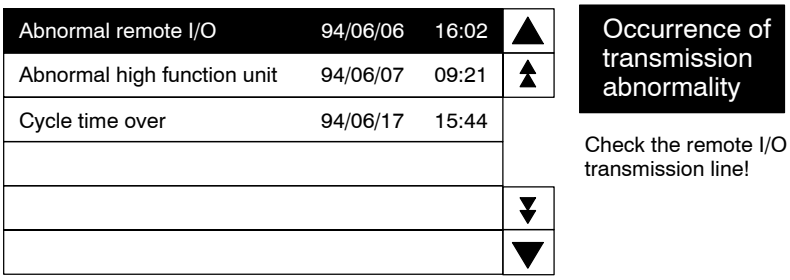
How to Make Sure of Alarm History

The alarm history can be displayed by the NT30/30C during operation by setting an area and displaying method when creating a screen data with the NT-series Support Tool.

There are two displaying methods: in the order of occurrence and frequency.

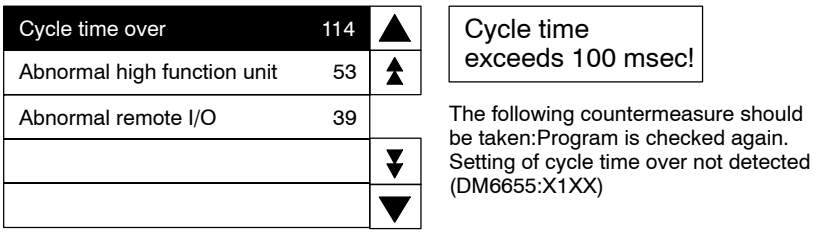
- In Order of Occurrence

The alarm history is displayed in the order that a bit becomes 1 (ON). As more detailed information, date and time of occurrence can be displayed simultaneously.



- In Order of Frequency

The alarm history is displayed in the order of frequency that a bit becomes 1 (ON). Number of occurrence is displayed simultaneously.



In either case, the number of alarms displayed can be set up to 12. When the alarm history is set, the scrolling keys are created automatically. Creating and using the scrolling keys are the same as the alarm list display. Refer to the *Scrolling the message* (page 181). Displaying the image/library data and switching over the screen are the same as the alarm list display. Refer to the *Switching the Image/Library Data to be Displayed and Switching over to the Corresponding Screen* (page 182).

The alarm history can be displayed simultaneously in the order of occurrence and frequency on one screen, respectively.

The alarm history display function does not automatically update the contents of display even when the state of bit is changed during displaying operation. The contents of display is updated when pressing the scrolling keys.

4-12 Operation of B7A Units

A B7A Unit can be used to connect external devices, such as switches and indicators, to the NT30/30C. This section describes the operation of the B7A Unit.

The B7A Unit has the following five functions:

- Input notification function
- Numeric key (system key) function
- Screen switching function
- External output function
- Backlight OFF function releasing attribute

⚠ **Caution** Do not use the input functions of the B7A Unit for applications that could involve danger to human life or serious property damage, or for emergency switch functions.

Reference In order to use expansion I/O, the B7A Interface Unit intended specifically for expanded I/O must be installed on the NT30/NT30C and connected to the B7A Unit by cable. For the installation and connection methods, see *2-9 Connection of Expanded I/O* (page 64).

Assignment of Functions To perform external I/O, an externally installed B7A Unit must be used. There are three types of B7A Unit, with the following I/O characteristics.

16 input points:
Corresponding to expanded I/O outputs with expanded I/O Nos. 0 to 15.

16 output points:
Corresponding to expanded I/O outputs with expanded I/O Nos. 0 to 15.

8 input points/8 output points:
Inputs and outputs correspond to expanded I/O input Nos. 0 to 7 and expanded I/O output Nos. 0 to 7 respectively.

When creating screens with the NT-series Support Tool, functions such as input notification, numeric key (system key), screen switching, and external output can be allocated without restriction to each I/O terminal of the B7A Unit.

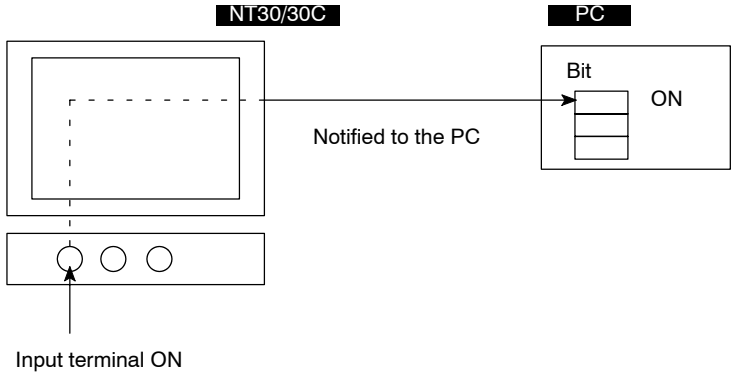
4-12-1 Contents of Functions

Details of each function are as follows:

- **Input Notifying Function**

  With the PC bits assigned to the input terminals, the state of input terminals can be notified to the PC by turning ON/OFF the bits specified in accordance with the state of the input terminals.

  At this time, even when the bits are turned ON simultaneously with the touch switches or multiple terminals, all input states are notified to the PC.



- **Numeric Key (System Key) Function**

With the numeric keys (system keys) assigned to the input terminals, the input terminals can function similar to those keys specified. However, with the system keys assigned to the input terminals, those terminals cannot be used as the system keys other than the operation mode (system menu, etc.).

The following numeric keys (system keys) can be assigned to the input terminals.

Numeric key	Numeric key	Numeric key (system key)
0	A	↑
1	B	↓
2	C	←
3	D	→
4	E	⏎
5	F	
6	CLR	⬆
7	+/−	⬇
8	.	MENU
9	HOME	

Reference When a screen switchover key for each screen is also assigned to the same input terminal, it acts as the screen switchover key.

- **Stand Alone Function**

With the screen number assigned to the input terminal, it can function as the screen switchover key similar to the touch switch. However, with 0 specified to the screen number, it functions as the screen switchover return key (see page 157).

Other than setting the input terminal as the screen switchover key that acts at each screen similar to the touch switch, it can also be set as the screen switchover key common to all screens. However, when the screen number common to all screens and the screen number for each screen are assigned concurrently to one input terminal, the screen number for each screen have priority.

Reference With the Windows version of the NT-series Support Tool, setting for each screen is not possible. The terminal will always be used as the switchover key for all screens.

- **External Output Function**

With the PC bits assigned to the output terminals, those output terminals can be turned ON/OFF in accordance with the state of the bits to which the output terminals are specified. External equipment connected to the output terminals can be controlled by the PC.

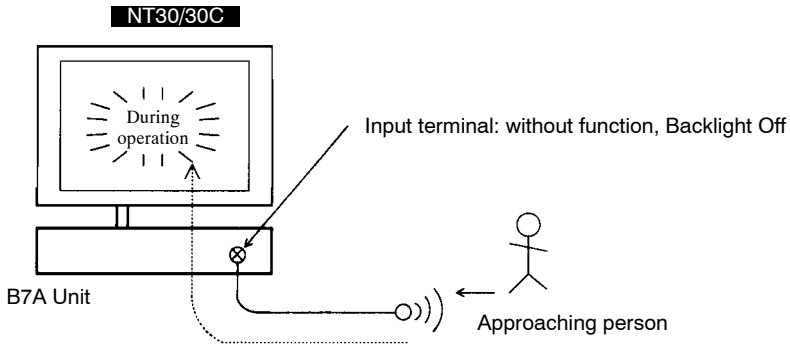
ON/OFF state of the output terminal is held unless the state of the bit is changed.

- **Screen Saver Function Releasing Attribute**

  With this attribute set to an input terminal, an OFF state is released when the input terminal turns ON, even if the backlight is turned OFF with the screen saver function activated (see page 95).

  However, for the terminals to which both numeric key and screen switchover functions are assigned, the screen saver function is always released. For the terminals to which the input notifying function is assigned and the terminals to which any function is not assigned, screen saver attribute and not-release attribute can be selected.

  For example, with the screen saver attribute set to the terminals without this function, the PT screen can be displayed when a person approaches to the NT30/30C, by combining with a sensor as shown below.



Reference When turning ON the terminal to which both screen switchover key and numeric key functions are assigned, with the screen saver, only the screen saver state is released and the function of those keys will not be implemented. However, in case of input notifying key, it is notified to the PC irrespective of the screen saver release attribute.

- **Key Press Sound**

  Though a key press sound does not sound under any circumstances for the input notifying key, sound or no sound can be selected for other function and non-function keys according to the memory switch setting (see page 92).

SECTION 5
Using Host Link and NT Link

This section describes how the NT30/30C can be used when using the Host Link and NT link.

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5-1 Outline of Host Link and NT Link Operations

This section explains the fundamentals when using the Host Link/NT link - allocated bits and words, and the method for control of the NT30/NT30C and notification to the PC - and also describes the actual procedure used for screen switching.

5-1-1 Equipment and Settings Used in This Chapter

The following equipment and settings are used in the examples in this Chapter:

Devices PT: NT30-ST131-E

PC: CQM1

Software: NT-series Support Tool Ver. □

NT-series Support Tool settings

PT model: 30

Memory capacity: 512 KB

PC model: OMRON

5-1-2 Allocatable Bits and Words

The names of the bits and words that are allocated to the PC at the NT-series Support Tool, and the areas for each PC model, correspond in the following way. The types of area that can be allocated to display elements depends on the type of display elements. For details, refer to the explanations of the allocations for each type of display element in this section. The range of respective area varies with the type of PC. Refer to *Appendix J PC Memory Maps* (page 293).

The allocations must be made without exceeding respective area range.

OMRON PCs

Symbol	Name used on the NT-series Support Tool	C-series PCs	CVM1 and CV-series PCs	CS1-series PCs
D	DM Area	DM Area	DM Area	DM Area
None	CIO Area	IR Area	CIO Area	CIO Area
T	Timer	Timer Area	Timer Area	Timer Area
C	Counter	Counter Area	Counter Area	Counter Area
H	HR Area	HR Area	–	HR Area
A	Auxiliary Area	AR Area	Auxiliary Area	Auxiliary Area
L	Link Relay	LR Area	–	–

When allocating memory table entries to words, the allocation must not exceed the word area.

The Auxiliary Area of a CV-series PC is allocated to the system and cannot be used for purposes other than the system use. However, reading from this area is possible.

One allocation for a memory table entry can use up to 2 consecutive words in the case of numeral memory table entries or 16 words in the case of character string memory table entries.

5-1-3 NT30/30C Status Control and Notification to PC

This section describes the fundamentals of the display elements, NT30/30C status control, and notification, which are the basics of the NT30/30C functions.

For details on using the PT Status Control Area and the PT Status Notify Area, refer to *5-7 NT30/30C Status Control (*page 239) and *5-8 Notification of the Operating Status to the PC* (page 244).

Controlling the Display Elements Using Allocated Bits and Words

The NT30/30C will operate as described below in the display element control operation.

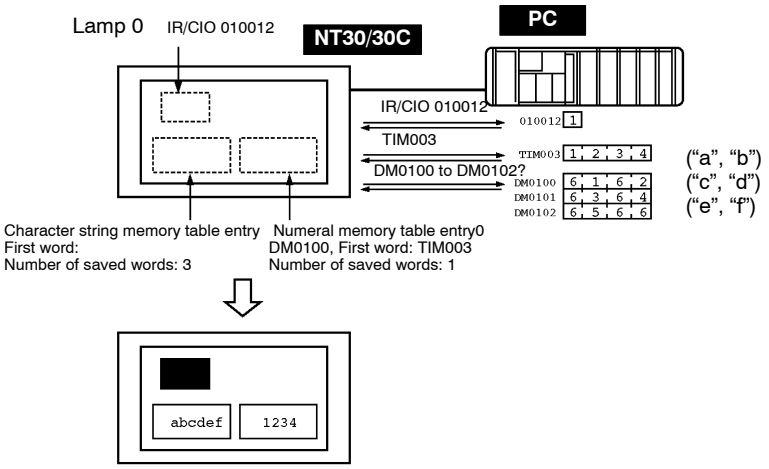
NT30/30C Operation

(1) The NT30/30C checks the allocation bits and words of the display elements and makes an inquiry to the PC.

(2) The PC answers the NT30/30C about the bit and word data.

(3) The NT30/30C changes the display status according to the bits and words obtained from the PC.

NT30/30C Operation Example



Controlling the NT30/30C Status Using Allocated Bits and Words ..... PT Status Control Area (PC to PT)

The PT Status Control Area (PC to PT) is provided to control the NT30/30C status from the PC. When data is written to this area in the PC, the NT30/30C will read the data and operates according to the data. The PT Status Control Area is configured as four consecutive words as shown below.

Word	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Bit	
n						Screen No. (4-digit BCD)												Screen switch setting
n+1	0					Copy source memory table entry # (3-digit BCD)												Copy memory table entry setting
n+2	Copy type					Copy destination memory table entry # (3-digit BCD)												
n+3	PT status control bits												0	0	0	0	0	PT status control

The first word (word n) of the PT Status Control Area must be set with the NT-series Support Tool.

The PT Status Control Area (PC to PT) can be allocated words in the following PC areas.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of each memory area differs according to the PC type. Refer to *Appendix J PC Memory Maps* (page 293).

Correct use Make the allocations so that there is no duplication between the PT Status Control Area and the PT Status Notify Area.

- **Screen Switch Settings (refer to page 195)**

  Specify the screen # to switch the screen displayed on the NT30/30C.

- **Copy Memory Table Entry Settings (refer to page 212)**

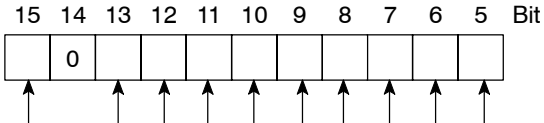
  Specify the memory table entry number to copy the contents of a memory table entry internally in the NT30/30C.

  Set the copy type to match the type of memory table entry to be copied:

  0: Character string memory table entry
  1: Numeral table entry

- **PT Status Control Bits (refer to page 240)**

  Set the bits ON or OFF according to the following table to control the screen display and buzzer.



Controlled Item	1 (ON)	0 (OFF)
Screen display	Performed	Not performed
Continuous buzzer	Sounded	Not sounded
Intermittent buzzer (short)	Sounded	Not sounded
Display history initialization	Performed	Not performed
Backlight color	Red	White
Intermittent buzzer (long)	Sounded	Not sounded
Backlight mode	Lit	Flashing
Screen printing	Performed	Not performed
Window opening	Disabled	Enabled
Numeral/character string input	Disabled	Enabled

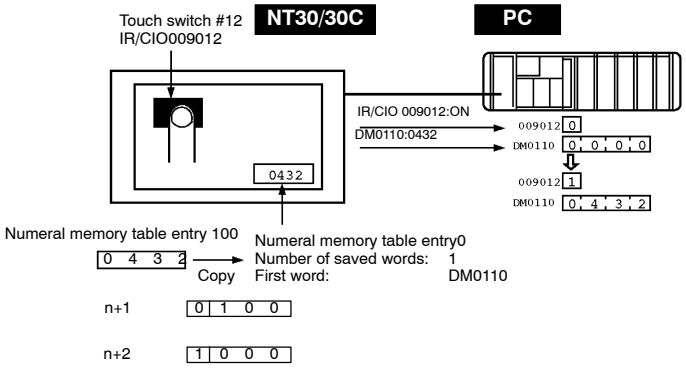
Notifying the Display Elements by Using Allocated Bits and Words

The NT30/30C will operate as described below in the display element notification operation.

NT30/30C Operation

The NT30/30C will write any changes in the contents of the numeral or character string memory table entry being displayed or pressing of a touch switch to the bits and words area in the PC.

NT30/30C Operation Example



Notifying the NT30/30C Status by Using Allocated Bits and Words ..... PT Status Notify Area (PT to PC)

The PT Status Notify Area (PT to PC) is provided to notify the NT30/30C status changes to the PC. When any NT30/30C status has changed, such change is written to this area in the PC, and the PC will read the data from this area to check the NT30/30C status.

The PT Status Notify Area is configured as three consecutive words as shown below.

Word	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	Bit	
m					Screen # (4-digit BCD)													Screen being displayed
m+1	0				Numeral memory table entry # (3-digit BCD)													Content upgrade memory table entry
m+2	PT status									0	0	0	0	0	0	0		PT status

The first word (word m) of the PT Status Notify Area must be set with the NT-series Support Tool.

The PT Status Control Area (PC to PT) can be allocated words in the following PC areas.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to *Appendix J PC Memory Maps* (page 293).

Correct use Make the allocations so that there is no duplication between the PT Status Control Area and the PT Status Notify Area.

- **Currently Displayed Screen (refer to page 199)**

  The screen number displayed on the NT30/30C is written to this word.

  Simultaneously, the PT status screen switch strobe flag is set to ON (1). After this is notified to the PC, this flag reverts to OFF (0). Checking the status of this flag will provide a simple method of checking if the NT30/30C display has switched.

  However, when connected to a CVM1/CV series CPU Unit, if the PLC is set to asynchronous operation, it may not be possible to determine the flag status.

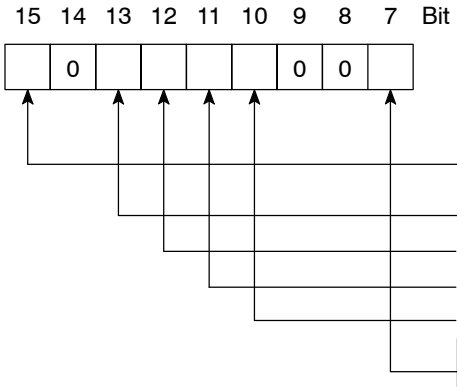
- **Content Upgrade Memory Table Entry (refer to page 225, 227)**

  The number of the numeral or character string table entry is written to the word when the numeral or character string memory table entry contents change due to the touch switch operation on the NT30/30C. (The contents of the word to which the numeral or character string table entry has been allocated also change.)

  As the number of the numeral table entry is written, the PT status numeral or character string setting strobe flag is simultaneously set ON (1). After this is notified to the PC, this flag reverts to OFF (0). Checking the status of this flag will provide a simple method of checking if a number or character string has been input from the NT30/30C.

- **PT Status Notification Bits (refer to page 244)**

  The NT30/30C operation status and other information are written with the ON or OFF of the bits as shown below.



Controlled item	1 (ON)	0 (OFF)
PT operation status	Run	Stop
Battery	Low	Normal
Screen switching strobe		
Numeral setting strobe flag		
Character string setting strobe flag		
Printer operating status	Printing	Stopped

The screen switching strobe, the numerical setting strobe, and the character string setting strobe come ON (i.e., change to 1) in the following cases:

Screen switching strobe: The screen is switched by operations at the NT30/NT30C.

Numerical setting strobe: The contents of the numeral memory table are changed by operations at the NT30/NT30C.

Character string setting strobe: The contents of the character string memory table are changed by operations at the NT30/NT30C.

These strobes turn OFF (0) automatically after notification is made to the PC. The status of operations at the NT30/NT30C can be easily monitored using the rising edges of these strobes.

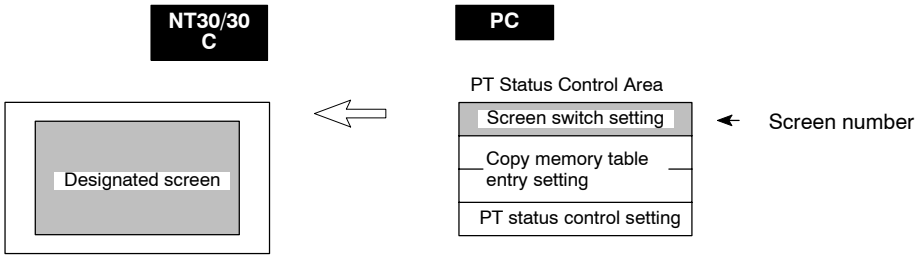
When connected to a CVM1/CV series CPU Unit, however, if the PLC is set to asynchronous operation, it may not be possible to determine the strobe status.

5-1-4 Switching the Screen Display Using the PT Status Control Area

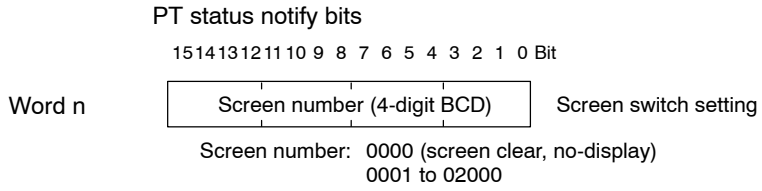
The following describes the procedure used to switch the NT30/30C screen display by controlling from the PC by using the PT Status Control Area.

The displayed screen can also be switched by other methods: by registering a screen number for a touch switch or bit memory table entry and then pressing the touch switch, or by changing the status of the allocated bit of a bit memory table entry, during operation. For details on these methods, see *Stand Alone Function* (pages 157, 187) or the next section, *Switching the Screen Display (by Using a Bit Memory Table Entry*.

To switch the NT30/30C screen display by controlling from the PC, write a screen number at the screen switch setting in the PT Status Control Area.



Screen Switch Settings in the PT Status Control Area



Reference The screens numbered 1997 to 1999 are earmarked for special functions, as shown below. The display history can be checked by calling them during operation.

1997: Display history (order of occurrence) screen
1998: Display history (order of frequency) screen
1999: Screen when connected to the host

- **Allocated Words**

The PT Status Control Area (PC to PT) can be allocated words in the following PC areas.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to the appendix *PC Memory Map* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Control Area (PC to PT) to the PC memory.
2. Program the PC to write the number of the displayed screen to the screen switch setting word in the PT Status Control Area.

   Use a 4-digit BCD (binary-coded decimal) value to set a screen number.

   If a screen has been switched by operating the PT Status Control Area (PC to PT), the contents of the currently displayed screen word in the PT Status Notify Area (PT to PC) also change.

- **Startup Screen**

When the NT30/30C starts up, it displays the screen whose screen number is written in the screen switch setting. The startup screen set with the NT-series Support Tool is invalid.

- **Screen Switching Timing**

The NT30/30C screen switches when the contents of the screen switch setting have changed. To re-specify the number of the currently specified screen, first write the value 0000 to clear the screen before writing the appropriate screen number.

- **Use of the Screen Switching Strobe**

Program the PC to read the number of the currently displayed screen and to write the number to the screen switch setting word at the leading edge of the screen switching strobe of the PT Status Notify Area. This programming enables screen switching by using the touch switches on the NT30/30C and eliminates repeated setting of the same screen number. If the screen switching is not executed on the NT30/30C, the screen switching strobe does not need to be checked.

For the screen switching strobe, refer to the *Notifying the Display Screen to the PC* (page 199).

- **Consecutive Screens and Overlapping Screens**

  Consecutive or overlapping screens can be displayed by designating the parent screen. If a child screen is designated, only the child screen is displayed.

  For information on consecutive and overlapping screens, refer to the *Classification of Screens* (page 131).

Example of Display Screen Switching

This example operates the PC switch (bit) to switch the NT30/30C display screen.

- **NT-series Support Tool Settings**

  Make the following settings with the NT-series Support Tool:

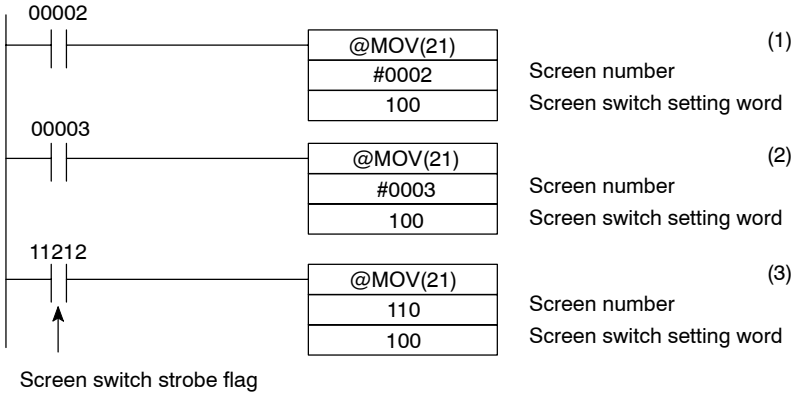
  PT Status Control Area: IR 0100

  PT Status Notify Area: IR 0110

  Screen number to be created: Screen No. 2 and No. 3

- **PC Ladder Program**

  Include the following in the PC ladder program:



- **Program Operation**

(1) Screen #2 is displayed on the NT30/30C when IR/CIO 00002 turns ON.

(2) Screen #3 is displayed on the NT30/30C when IR/CIO 00003 turns ON.

(3) When the screen switch strobe flag turns ON, the number of the currently displayed screen is read and written to the currently displayed screen word in the PT Status Notify Area. In this case, the NT30/30C will not write the same screen twice.

5-1-5 Switching the Screen Display Using a Bit Memory Table Entry

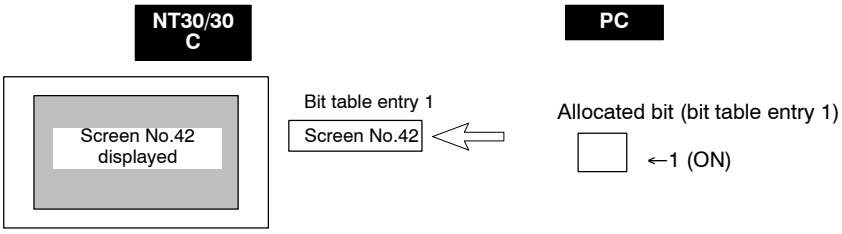
This section describes the actual procedure used to perform screen switching under the control of the PC by using bit memory table entries.

This function continually reads the allocated bits of the screen switching function regardless of which screen is currently displayed. Consequently, if the number of screens that could be switched to with this function is large, PT operations (such as updating of memory table entries, touch switch response, lamp response) may be delayed.

One of two methods can be used to switch the screen display: registering a screen number for a touch switch and pressing the touch switch during opera-

tion, or writing the screen number into the PT Status Control Area. For details on these methods, see *Stand-alone Functions* (page 157, 187) or *Switching the Screen Display Using the PT Status Control Area* (page 195).

To switch the screen displayed on the screen of the NT30/30C under the control of the PC, the allocated bit of the bit memory table entry in which the screen number of the screen to be displayed is registered is set to 1 (ON).



Reference The screens numbered 1997 to 1999 are earmarked for special functions, as shown below. The display history can be checked by calling them during operation.

1997: Display history (order of occurrence) screen
1998: Display history (order of frequency) screen
1999: Screen when connected to the host

- **Allocated Words**

The PT Status Notify Area (PT to PC) can be allocated words in the following PC areas.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to *Appendix J PC Memory Map* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Notify Area (PT to PC) to the PC memory.
2. Program the PC to switch the allocated bit from OFF to ON and switch the screen display. In cases such as that where a warning screen is to be displayed when a particular bit is turned ON, programming is not required; it is sufficient just to set the allocated bit.

- **Screen Display Timing**

The NT30/30C screen switches when the allocated bit of the bit memory table entry changes from the 0 (OFF) to 1 (ON) status. However, the display does not change when the allocated bit returns from the 1 (ON) to the 0 (OFF) status.

Example Application of Screen Switching

In this example, if the temperature in a water tank rises above the upper limit, a bit is turned ON, and the warning screen that corresponds to the bit is displayed.

- **NT-series Support Tool Settings**

  The following settings are made using the NT-series Support Tool.

  Bit memory table entry No. 0

  Allocated bit . . . . . 000100 (input bit that comes ON when the temperature of the water tank rises above the upper limit)

  Function . . . . . Screen switching (screen No. 1000)

  Created screen No. . . . . Screen No. 1000



- **PC Program**

  Ladder programming to control the NT30/30C is not required.

- **Program Operation**

  When IR/CIO 001000 comes ON, the NT30/30C displays screen No. 1000.

5-1-6 Notification of Number of Currently Displayed Screen

The following describes the processing to ascertain the number of the currently displayed screen of the NT30/30C.

This processing reads the data from the PC status notify area.

To indicate that the screen has switched, use the screen switch strobe flag.

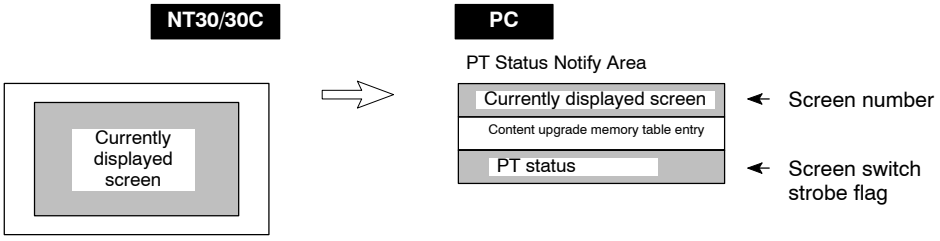
To display the number of the currently displayed screen, use the currently displayed screen word.

When the screen has switched, the NT30/30C notifies the following to PT Status Notify Area (PT to PC) allocated to the PC.

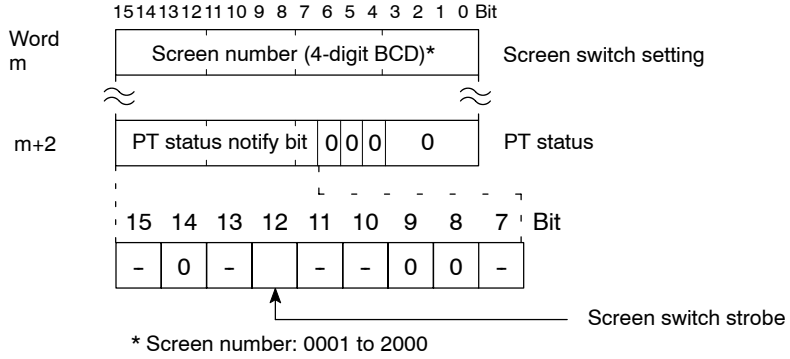
Screen switch notification: Screen switch strobe flag of the PT status word

New screen number: Currently displayed screen word

By reading the currently displayed screen word when the screen switch strobe flag has turned ON, the number of the currently displayed screen on the NT30/30C is displayed.



Currently Displayed Screen and PT Status in the PT Status Notify Area



Use a 4-digit BCD (binary-coded decimal) value to set a screen number.

The screen switch strobe bit reverts to OFF (0) after this is notified to the PC.

- **Allocated Words**

  The PT Status Notify Area (PT to PC) can be allocated words in the following PC areas.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer *Appendix J PC Memory Map* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Notify Area (PT to PC) to the PC memory.
2. Program the PC to read the currently displayed screen word in the in the PT Status Notify Area when the screen switch strobe flag in the PT Status Notify Area has turned ON.

The contents of the currently displayed screen word are updated also by switching the screen by pressing a touch switch on the NT30/30C.

For this function, refer to the *Stand-alone Function* (pages 157, 187) or *Switching the Screen DisplayUsing a Bit Memory Table Entry* (page 197).

- **Consecutive Screens and Overlapping Screens**

  When a consecutive or overlapping screen is displayed, the number of the parent screen is written to the currently displayed screen word.

  For information on consecutive and overlapping screens, refer to the *Classification of Screens* (page 131).

Example of Reading the Number of Currently Display Screen

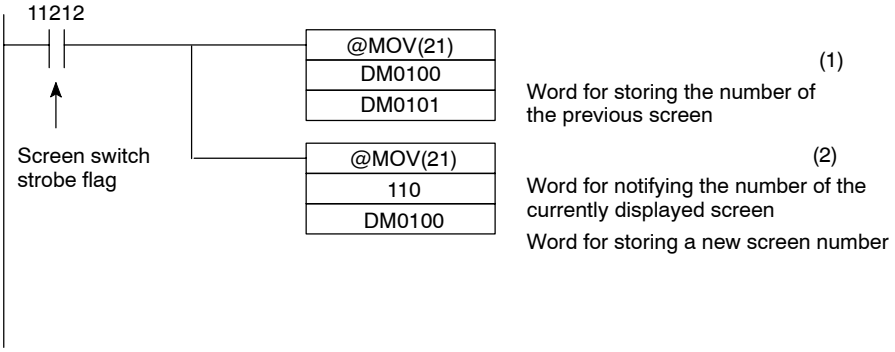
This example gives the PC program section that reads the screen number each time the screen is switched. In this example, the number of the previous screen is also stored.

- **NT-series Support Tool Settings**

  Make the following settings with the NT-series Support Tool:

  PT Status Notify Area: IR 0110

- **PC Ladder Program**



- **Program Operation**

(1) When the NT30/30C screen display switches and the screen switch strobe flag (IR/CIO 11212) turns ON, the contents of DM0100 are transferred to DM0101. The number of the previously displayed screen is stored in word 0101.

(2) The new screen number notified by the NT30/30C is read and transferred to DM0100. The number of the currently displayed screen is stored in DM0100.

5-2 Memory Tables and Graphs

Displaying Character String Memory Table Contents

Since the character string memory table can be allocated to words in the PC, the PC can write data to the character string memory table entries, and initial values can be set when creating the screen data.

During operation, automatic updating is performed to ensure that the currently displayed NT30/30C character string memory table entry contents and PC word contents always match each other.

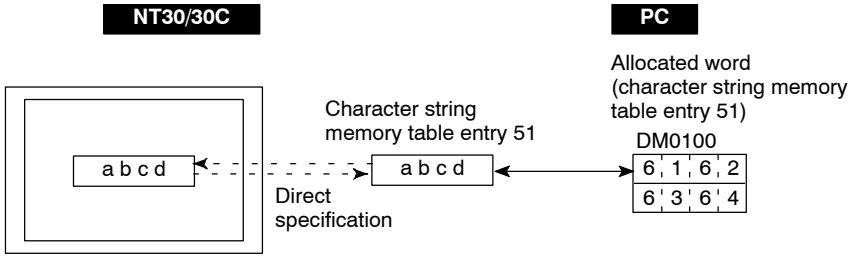
There are two methods for accessing character string memory table entries used for character string display, as follows:

- Direct specification (character string display property Indirect Specification set to OFF.)
- Indirect specification (character string display property Indirect Specification is set to ON.)

Reference Only direct specification can be used as the access method for character string memory table entries used for character string settings.

- **Direct Specification**

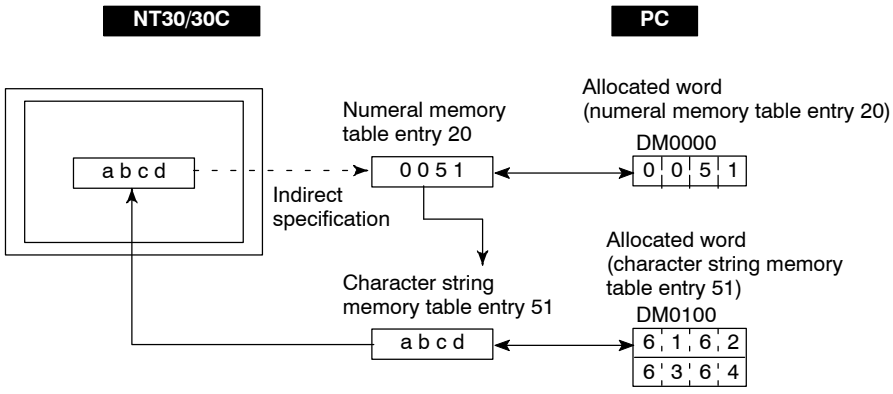
Direct specification is a method of specification in which the contents of displayed memory table entries are directly correlated with the contents of the allocated words.



- **Indirect Specification**

In indirect specification, even if the displayed data is a character string, the display is correlated with a numeral memory table entry. The contents (numerical value) of this numeral memory table entry are regarded as a character string memory table entry number and the contents of the table entry with this number are displayed.

A combined total 50 of numeral displays and character string displays can be specified on one screen by using indirect specification.



This specification method is a little complex, but it allows the display to be changed more easily according to the circumstances. In the example above, if 1 were added to the contents of memory table entry 20 to give 52, the contents of memory table entry 52 would be displayed instead.

The memory table entries used for display can also be allocated to areas in the PC, so that the display can also be changed in response to changes in the data to be displayed (i.e., the contents of character string memory table entry 51 in the example above).

However, in comparison with direct specification, indirect specification requires more time for processing.

Setting the Words of the Character String Memory Table

When creating the screen data by using the NT-series Support Tool, make the following settings for each numbered character string:

- **Initialization Setting**

  Set whether or not the PC words are initialized with the character string memory table initial value registered to the screen data memory when the main power supply is turned ON or reset.

- **Number of Registration Words**

  Set the number of words within 20 words required for registering the character string data. One word can store two characters.

- **Setting the Words for the Character String Memory Table Entries**

  The character string memory table entries can be allocated to the following PC words. Set the word type and the first word.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to the appendix *PC Memory Maps* (page 291).

If the number of registration words x 2 (word setting window) set in memory table (TBL EDIT) on the NT-series Support Tool is larger than the number of character digits (character string display setting window), the character string may be broken halfway.

Displaying Numeral Memory Table Contents

Since the numeral memory table can be allocated to words in the PC, the PC can write data to the numeral memory table entries, and initial values can be set when creating the screen data.

In addition, if a numeral memory table entry is correlated with a graph, the graph can be displayed in accordance with the numeric value in the numeral memory table entry.

During operation, automatic updating is performed to ensure that the currently displayed NT30/30C numeral memory table entry contents and PC word contents always match each other.

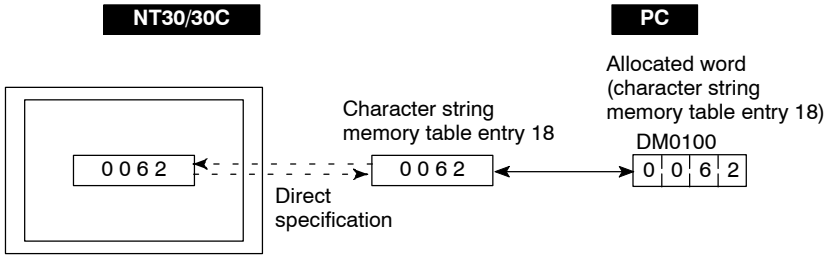
There are two methods for accessing numeral memory table entries used for numeral display, as follows:

- Direct specification (numeral display property Indirect Specification is set to OFF)
- Indirect specification (numeral display property Indirect Specification is set to ON)

Reference Only direct specification can be used as the access method for graphs and numeral settings.

- **Direct Specification**

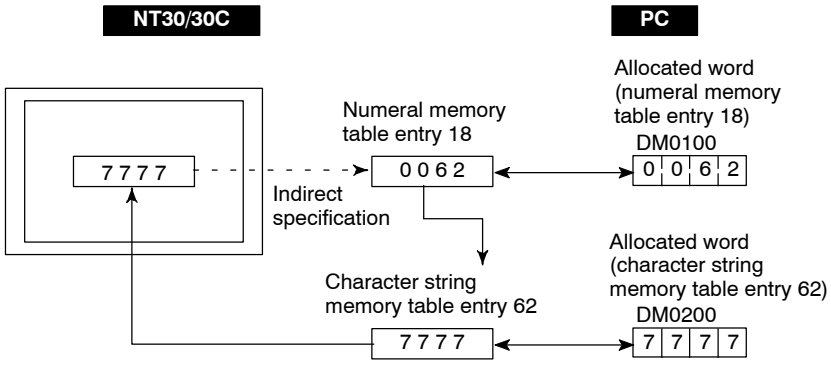
Direct specification is a method of specification in which the contents of displayed memory table entries are directly correlated with the contents of the allocated words.



- **Indirect specification**

Indirect specification is a method whereby the contents (numeric value) of the specified numeral memory table entry are taken as the number of a numeral memory table entry, and the contents of the numeral memory table entry with that number are displayed.

A combined total 50 of numeral displays and character string displays can be specified on one screen by using indirect specification.



This specification method is a little complex, but it allows the display to be changed more easily according to the circumstances. In the example above, if 1 were added to the contents of memory table entry 18 to give 52, the contents of memory table entry 63 would be displayed instead.

The memory table entries used for display can also be allocated to areas in the PC, so that the display can also be changed in response to changes in the data to be displayed (i.e., the contents of character string memory table entry 62 in the example above).

However, in comparison with direct specification, indirect specification requires more time for processing.

Setting the Words of the Numeral Memory Table

When creating the screen data by using the NT-series Support Tool, make the following settings for each numbered numeral:

- **Initialization setting**

  Set whether or not the PC words are initialized with the numeral memory table initial value registered to the screen data memory when the main power supply is turned ON or reset.

- **Number of registration words**

  Set the number of words within 2 words required for registering the numeral data. One word can store up to 4 digits. Two words can store up to 8 digits.

- **Setting the Words for the Numeral Memory Table Entries**

  The numeral memory table entries can be allocated to the following PC words. Set the word type and the first word.

○: Possible
×: Impossible

Sym-bol	C Series PC	Alloca-tion	CVM1/CV Series PC	Alloca-tion	CS1 Series PC	Alloca-tion
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	1 word	Timer	1 word	Timer	1 word
CNT	Counter Area	1 word	Counter Area	1 word	Counter Area	1 word
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to the appendix *PC Memory Maps* (page 291).

5-2-1 Allocated Words and Display of the Memory Tables

This section explains the relationship between the contents of the allocated words of numeral/character string memory table entries and their display.

- **Contents of Numeral Memory Table Entries**

  Stored as a Single Word

15 to 12	11 to 8	7 to 4	3 to 0	Bit
Digit 4	Digit 3	Digit 2	Digit 1	

Example: 1234

15 to 12	11 to 8	7 to 4	3 to 0	Bit
1	2	3	4	

  Stored as a Double Words

Word	15 to12	11 to 8	7 to 4	3 to 0	Bit
Start	Digit 4	Digit 3	Digit 2	Digit 1	
Start+ 1	Digit 8	Digit 7	Digit 6	Digit 5	

Example: 12345678

Word	15 to12	11 to 8	7 to 4	3 to 0 Bit
Start	5	6	7	8
Start+ 1	1	2	3	4

- **Displaying Numeral Memory Table Entry**

Numerals can be displayed in three different ways according to the contents of the numeral memory table entry, as mentioned below.

The most significant digit (digit 4 of a single word or digit 8 of a double word) is processed in different ways.

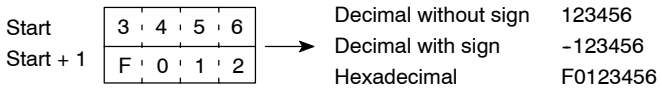
Hexadecimal display: All digits are handled as stored in the allocated words.

Decimal display without signs: If the most significant digit is F, it is handled as 0, and the most significant digit other than F and other digits are handled as stored in the allocated words.

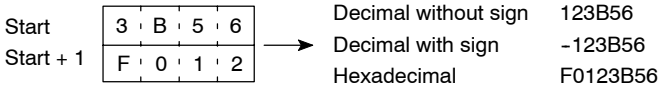
Decimal display with signs: If the most significant digit is F, it is handled as – (minus sign), and the most significant digit other than F and other digits are handled as stored in the allocated words.

Numeral Memory Table Entry Display Examples

- When the data are numeral data (0 to 9)



- When the data contain characters (A to F)



If the hexadecimal data (A to F) are stored when the decimal display has been set, the alphabets are displayed.

If the number of display digits has been set to be smaller than the maximum number of digits of the registration words (4 digits for 1 word; 8 digits for 2 words), the contents of the allocated words are not displayed and ∗ symbols will be displayed at all digits.

If the most significant digit is F when decimal with signs has been set, the numeral is handled as a negative number. The maximum number of digits of the negative number becomes smaller than that of the positive number by 1 digit.

The actual display will vary according to the zero suppress setting and decimal fraction setting as well as the contents mentioned above. Refer to the *NT-series Support Tool for Windows Operation Manual* (V061).

- **Contents of the Character String Memory Table Entry**

A character string is stored in the allocated words beginning with the first word in normal-size characters or marks.

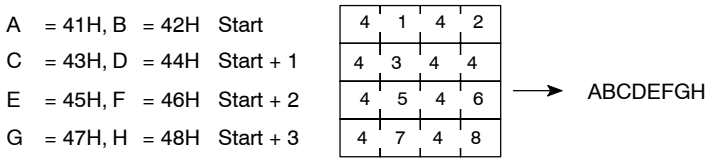
Two normal-size characters or one mark is stored in one word. One memory table entry can store up to 20 words (40 characters).



ASCII control characters (00 to 1FH) are displayed on the screen as a space character (20H).

Character String Memory Table Entry Display Example

To display the characters in order, allocate the characters as follows.



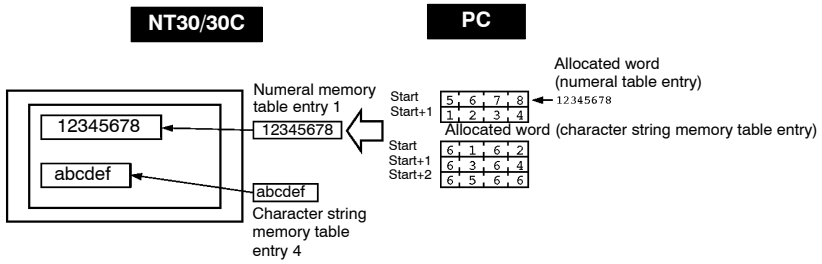
5-2-2 Changing Displayed Numerals or Character Strings, Direct Specification

The following describes the procedure to change displayed numerals or character strings by changing the contents of the allocated words.

If using indirect specification, refer to *Changing Displayed Numerals or Character Strings*, *Indirect Specification* (page 209).

Numerals and character strings can also be changed by copying between memory table entries: see *Copying Memory Table Entries* (page 212).

To change the numerals or character strings displayed on the NT30/30C, make changes with the numeral or character string memory table entry. To make changes with the numeral or character string memory table entry of the NT30/30C, change the contents of words by the PC.



When it is necessary to display changing data such as monitored data of words in the PC, use the numeral and character string memory tables. This must be used to change the display contents (contents of memory table entries and words).

Procedure

1. Use the NT-series Support Tool to allocate the numeral and character string memory tables to the PC memory.
2. Register the memory table entries for the numerals and character strings to be displayed when creating the screen data by using the NT-series Support Tool.

   To display a character string, use a character display and specify the character string memory table entry by using the NT-series Support Tool.

   To display numerals, use a numeral display and specify the numeral memory table entry by using the NT-series Support Tool.

3. Program the PC to write the contents of numerals and character strings to be displayed on the NT30/30C to the PC words.

- **Important Points when Writing a Character String**

  If a character string to be written is smaller than allocated word x 2, fill up the vacant stop with spaces (20H). If unnecessary characters are left in the area, the character string will not be displayed correctly.

  If the character font for character strings displayed on the NT30/30C screen is set as half size and a normal-size character string is written after displaying a 2-byte code (mark), part of the mark will remain displayed, as shown below.



  In this case, first write a 2-byte code (EB9F to EBDE) for which nothing is registered, then write a normal-size character string.

Application Example of the Numeral Memory Table Entries Allocated to the PC Words

This example gives the procedure to directly display the contents of the words allocated as the numeral memory table entries in the PC memory. The NT30/30C screen display will change as the contents of the PC word change.

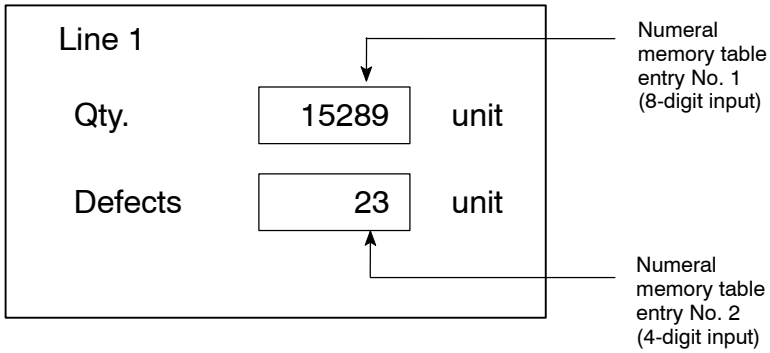
- **NT-series Support Tool Settings**

  Allocate the memory as shown below by using the NT-series Support Tool.

  Numeral memory table entry No. 1: DM0000 (registration word: 2)

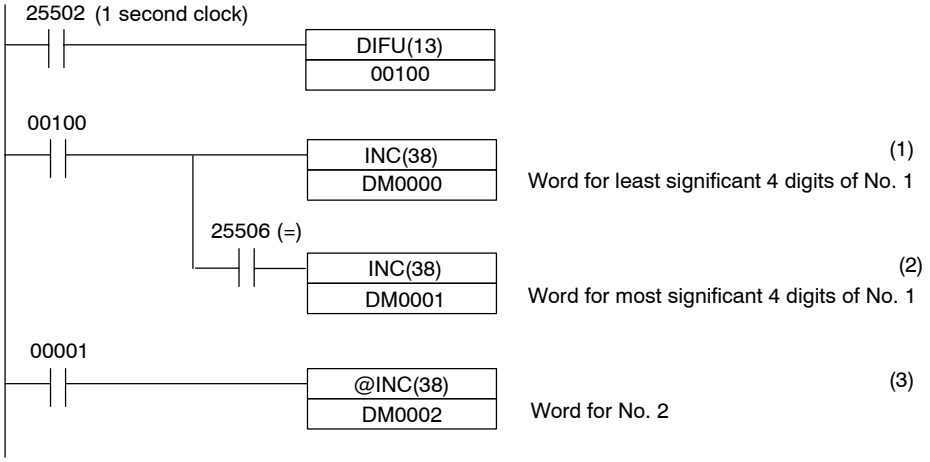
  Numeral memory table entry No. 2: DM0002 (registration word: 1)

  Screen numbers to be created: No. 1 and No. 2



- **PC Ladder Program**

Include the following in the PC ladder program.



- **Program Operation**

(1) The contents of word DM0000 are incremented by 1 each second. The value displayed on the NT30/30C in numeral table entry No. 1 increases by 1 each second.

(2) When the counter in (1) above causes an increase in the most significant digits, the contents of word DM0001 are incremented by 1 each second. The value displayed on the NT30/30C in numeral memory table entry No. 1 most significant digits increases by 1.

(3) When IR/CIO 00001 turns ON, the contents of DM0002 are incremented by 1. The value displayed on the NT30/30C in numeral memory table entry No. 2 increases by 1.

5-2-3 Changing Displayed Numerals or Character Strings, Indirect Specification

The following describes the procedure to change displayed numerals or character strings by changing the contents of the allocated words.

If using direct specification, refer to *Changing Displayed Numerals or Character Strings, Direct Specification* (page 207).

Numerals and character strings can also be changed by copying between memory table entries. See *Copying Memory Table Entries* (page 212).

The following describes the procedure to change displayed numerals or character strings indirectly by specifying a numeral/memory table entry. The contents of the specified numeral memory table entry (39 in the following example case) is regarded as the memory table entry number used for display.

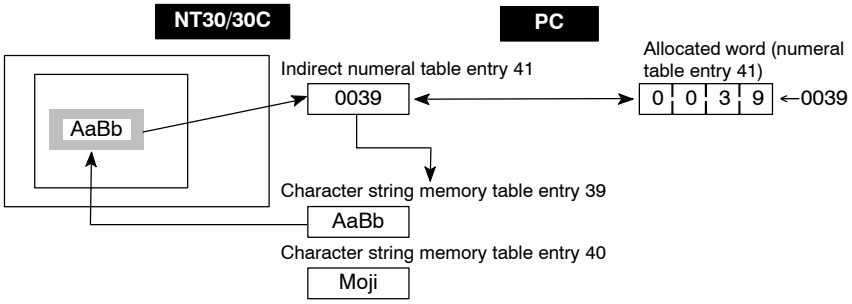
Either of the following two methods can be used to change the contents of the display.

(1) Changing the memory table entry number to be displayed
(To change the contents of numeral memory table entry 41, in the following example case)

(2) Changing the contents of the memory table entry used for display
(To change the contents of character string memory table entry 39, in the following example case)

In this section, the procedure for changing the display contents by using method (1) is explained.

Method (2) involves changing the contents of the allocated table entry. For details, refer to the sections on memory table entry copy (page 212) and changing displayed numerals or character strings (direct specification) (page 207).



This method is convenient when switching the display at the same location, for example when monitoring a series of words, or when using unique codes to specify individual character strings, etc.

Procedure

1. Set the PC area for the numeral memory table entries to be used for indirect specification of numeral/character display using the NT-series Support Tool.
2. When creating the screen data with the NT-series Support Tool, register for the screen the numeral memory table entry accessed using an indirect specification. Set “Indrct” for “Ref way”.

   For a character string, specify the numeral memory table entry by using the character display function of the NT-series Support Tool.

   For numerical values, specify the numeral memory table entry by using the numeral display function of the NT-series Support Tool.
3. Using the table edit function of the NT-series Support Tool, write the data to be displayed to the memory table entry that is used for display. Use a numeral memory table entry to display numerals and use a character string memory table entry to display character strings.
4. Program the PC to change the contents of the word allocated to the numeral memory table entry that is used in indirect specification.

- **Important Points when Writing Memory Table Entry Numbers**

  When writing the number of the memory table entry whose contents are to be displayed to the numeral memory table entry to be accessed using an indirect specification, always specify this number in BCD format. Also make sure that you do not specify a number outside the range of memory table entry numbers that actually exist (for example by specifying 0500 when the number of character string memory table entries is set to 256).

  If the contents of the memory table entry used for indirect specification are written in hexadecimal format, or if the specified memory table entry number is outside the available range, the display will not be updated.

- **Important Points when Writing Character Strings**

  The important points when displaying character strings are the same as those that apply for indirect specification. See the *Important Points when Writing Character Strings Using Direct Specification* (page 207).

Example of Changing a Character String in Indirect Specification

An example in which the character strings being displayed are changed by adding the contents of the word allocated to the numeral memory table entry that is used in indirect specification is given below.

- **NT-series Support Tool Settings**

  Perform the following setting with the NT-series Support Tool.

  Numeral memory table entry No. 51:DM0000 (registration word: 1 word)

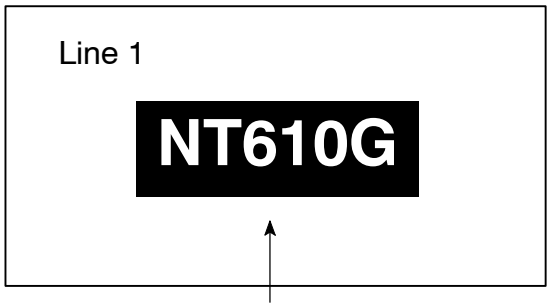
  Character string memory table entry No. 100:NT610G . (6 digits)

  Character string memory table entry No. 101:NT610C . (6 digits)

  Character string memory table entry No. 102:NT30 (6 digits)

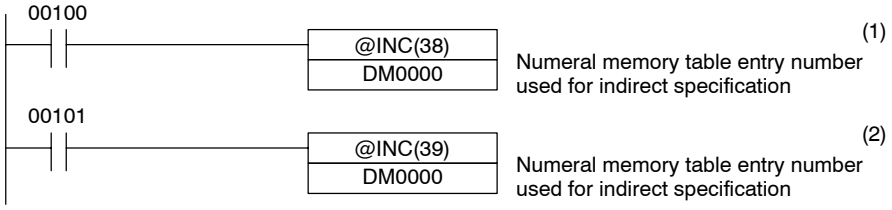
  Character string memory table entry No. 103:NT30C (6 digits)

  Contents to be registered for the screen: Numeral memory table entry No. 51



- **PC Program**

  Include the following in the PC ladder program.



- **Program Operation**

  (1) Each time IR/CIO 00100 comes ON, the display on the NT30/30C changes to the next item in the following sequence.

  NT610G → NT610C → NT30 → NT30C

  (2) Each time IR/CIO 00101 comes ON, the display on the PT changes to the next item in the following sequence.

  NT30C → NT30 → NT610C → NT610G

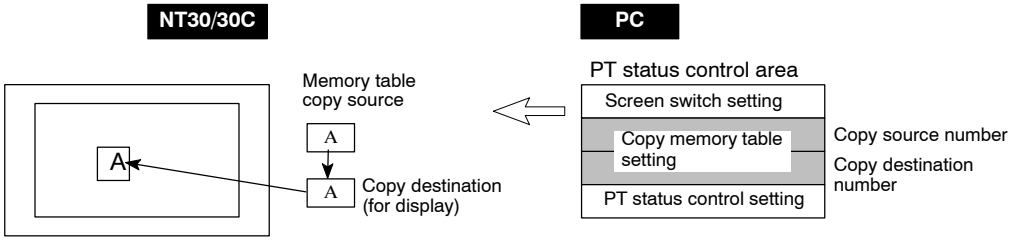
  In this example, the contents of numeral memory table entry 51, which is accessed using indirect specification, are not checked. When actually using the program, make sure that the contents of numeral table No. 51 are not outside the range 0100 to 0103.

5-2-4 Copying Memory Table Entries

The following describes the procedure to change displayed numerals or character strings by copying the contents of a memory table entry.

Numerals and character strings can be changed also by changing the contents of the allocated words. Refer to *Changing Displayed Numerals or Character strings* (pages 207, 209) explained before.

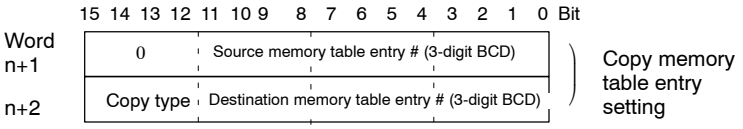
To change the numerals or character strings displayed on the NT30/30C, copy the data between the numeral or character string memory table entries by using the copy memory table entry setting of the PT Status Control Area.



Write a memory table entry number etc. to the copy memory table entry setting area in the PT Status Control Area in the PC memory. Data will be copied between the memory table entries in the NT30/30C and the displayed value will change accordingly.

This procedure is convenient to switch predetermined values or character strings according to the situation. By preparing several units of contents, various contents can be displayed by switching them to suit the situation.

Copy Memory Table Entry Setting in the PT Status Control Area



Copy type:

0: Copy between the character string memory table entries
1: Copy between the numeral memory table entries
2 to F (nothing happens)

Copy source and destination memory table entry numbers:

Character string memory table entries: 000 to 999 (Numbers 256 to 999 are read-only memory table entries. They cannot be used as copy destinations. In addition, depending on the setting made in the system memory settings of the NT-series Support Tool, it may not be possible to use numbers 256 through 999.

Numeral memory entries: 000 to 999 (Depending on the setting made in System under PT Configuration (System Memory with the DOS version) of the NT-series Support Tool, it may not be possible to use numbers 512 through 999).

- **Allocated Words**

The PT Status Control Area can be allocated to the following PC areas:

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to Appendix PC Memory Map (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Control Area (PC to PT) to the PC memory.
2. Register the memory table entries for the numerals and character strings to be displayed when creating the screen data by using the NT-series Support Tool.

   To display a character string, use a character display and specify the character string memory table entry by using the NT-series Support Tool.

   To display numerals, use a numeral display and specify the numeral memory table entry by using the NT-series Support Tool.
3. Set the copy source data to the memory table entry when creating the screen data by using the NT-series Support Tool.

   Use the table edit function.
4. Program the PC to write the copy type, copy destination memory table entry number, and copy source memory table entry number to the copy memory table entry setting word in the PT Status Control Area.

- **Order for writing to the PT Status Control Area (PC to PT)**

First write the copy destination memory table entry number, and then, write the copy source memory table entry number to the PT Status Control Area (PC to PT).

The NT30/30C reads the area sometimes when the PC is writing the settings. If the copy source memory table entry number has been written first and is changed, unexpected memory table entry may possibly be changed.

- **Allocated Words that the NT30/30C Reads**

The NT30/30C reads the allocated words in the PC for the memory table entries that need to be displayed. If the copy source memory table entry is allocated to a PC word, it may sometimes be used at the initialization only.

- **Use of the Copy Type**

Copy will not be executed when the copy type is other than 0 or 1. The memory table entry copy is executed only when the contents of the area are changed.

To repeat copying of the same copy source and same copy destination, write a value other than 0 or 1 for the copy type, and then, write a correct value again.

- **Copying a Numeral Memory Table Entry**

  If the display method or the number of registered words include discrepancies, a numeral memory table entry may not be copied and displayed correctly.

Application Example of Copying of a Character String Memory Table Entry

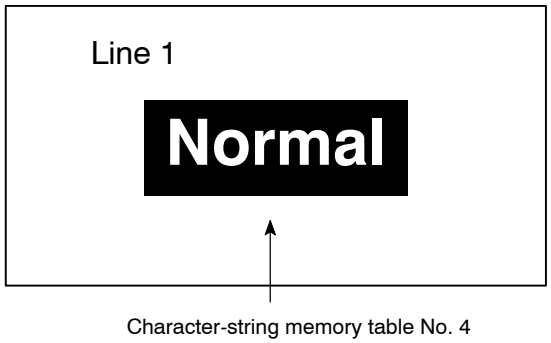
This example gives a PC program section to switch the character string display on the screen by using the memory table entry copy operation as the allocated bit is turned ON and OFF.

- **NT-series Support Tool Settings**

  Allocate the memory as shown below by using the NT-series Support Tool.

  PT Status Control Area allocation: IR/CIO 0100

  Contents registered to the screen: Character string display (character string memory table entry No. 4)

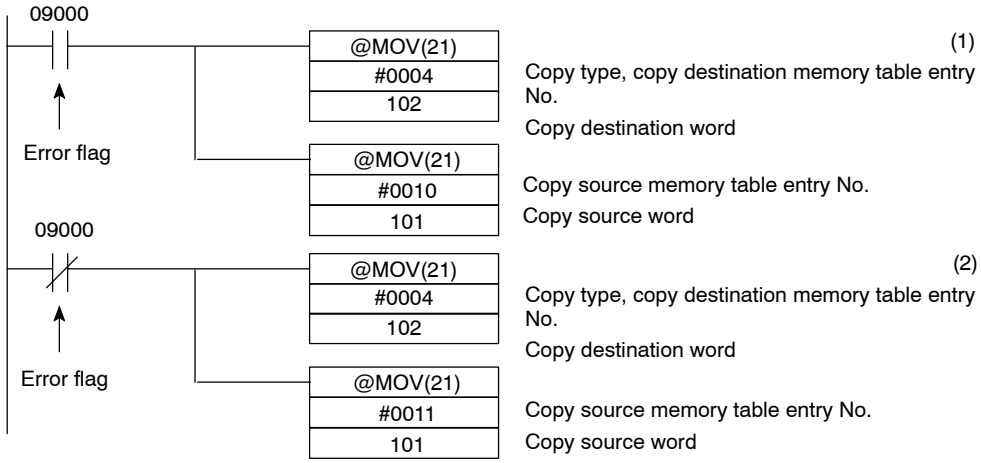


Character string memory table entry settings

No.	Contents	Number of Character Digits
4	Normal	6 digits
10	Error	6 digits
11	Normal	6 digits

- **PC Program**

  Include the following in the PC ladder program.



- **Program Operation**

(1) When an error occurs (IR/CIO 09000 turns ON), the NT30/30C displays the message “Error”.

(2) When the error is cleared (IR/CIO 09000 turns OFF), the NT30/30C display message reverts to “Normal”.

5-2-5 Upgrading Graphs

The following describes the procedure to upgrade the graph display on the NT30/30C by changing the contents of the allocated words.

To change the graph display on the NT30/30C, change the contents of the PC words to which the numeral memory table entries have been allocated.

The graph display cannot use hexadecimal numbers. If hexadecimal numbers are set, the bar graph will not be displayed.

By writing a negative number (whose most significant digit is F) to the allocated word of a graph set as “Sign display No”, the graph display will become 0 % and the % display will show “∗∗∗%”.

For the procedure to write numeral values to the allocated words of the numeral memory table entries, refer to *Allocation Words and Display of the Memory Tables* (page 205).

For the procedure to change the contents of a numeral memory table entry (PC words), refer to *Changing Displayed Numerals or Character Strings* (pages 207, 209).

- **Allocated Words**

The numeral memory table can be allocated to the following PC areas:

○: Possible
×: Impossible

Sym-bol	C Series PC	Alloca-tion	CVM1/CV Series PC	Alloca-tion	CS1 Series PC	Alloca-tion
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	1 word	Timer	1 word	Timer	1 word
CNT	Counter Area	1 word	Counter Area	1 word	Counter Area	1 word
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to Appendix PC Memory Map (page 291).

5-3 Lamps and Touch Switches

5-3-1 Allocated Bits and Display of Lamps

Lamps are controlled by allocating them to the PC bits. Set the area and bit number.

- **Available Allocation Bits**

  The lamps can be allocated to the following PC areas:

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

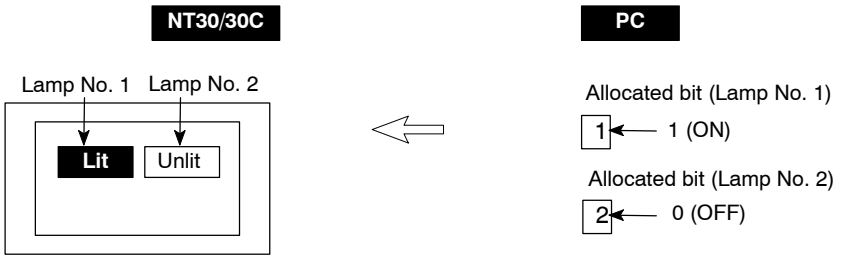
The range of respective area varies with the type of PC. Refer to the appendix *PC Memory Maps* (page 291).

To set the data memory (DM), specify the word number and then the bit number (00 to 15).

5-3-2 Turning ON and OFF Lamps

The following describes the procedure to change the lamp display status on the NT30/30C by changing the contents of the allocated bits.

To change the lamp display status on the NT30/30C, turn ON and OFF the lamp control bit allocated in the PC.



The lamp control bit indicates the lamp status as follows:

0 (OFF): Unlit
1 (ON): Lit (reverse display) or flashing

Procedure

1. Use the NT-series Support Tool to set the PC memory area where the lamp control bit is to be allocated to.
2. Register the lamps to the screen when creating the screen data by using the NT-series Support Tool.

3. Program the PC to turn ON/OFF the lamp control bit.

Use the NT-series Support Tool to set the lamp display attributes whether the lamp is lit or flashing when the lamp control bit is turned ON.

- **Image/Library Lamp Data**

With the NT30/30C, it is possible to set lamps that display any required image or library data in their lit status and in their unlit status. For details, see *Image Library Lamp Function* (page 153).

Application Example to Make the Lamp Light or Flash

This example gives a procedure to control the bits to move a robot arm and turning the lamps ON and OFF.

- **NT-series Support Tool Settings**

Allocate the memory as shown below by using the NT-series Support Tool.

Lamp No. 0: IR/CIO 000200 (output bit to raise robot arm), guide display message “UP”

Lamp No. 1: IR/CIO 000201 (output bit to lower robot arm), guide display message “DOWN”

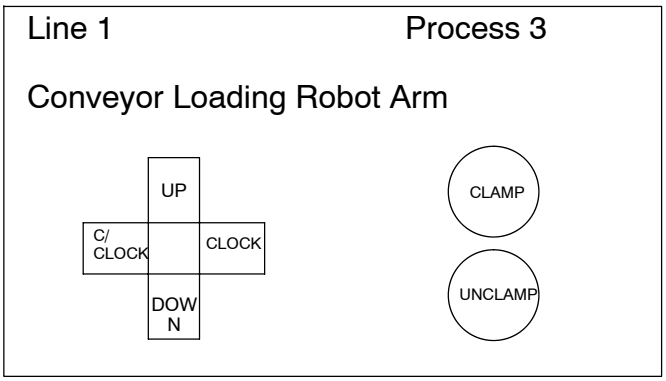
Lamp No. 2: IR/CIO 000202 (output bit to rotate robot arm counterclockwise), guide display message “C/CLOCK”

Lamp No. 3: IR/CIO 000203 (output bit to rotate robot arm clockwise), guide display message “CLOCK”

Lamp No. 4: IR/CIO 000204 (output bit to clamp rotate robot arm), guide display message “CLAMP”

Lamp No. 5: IR/CIO 000205 (output bit to unclamp rotate robot arm), guide display message “UNCLAMP”

Contents registered to the screen: Lamp No. 0 to No. 5



UP: Lamp No. 0
DOWN: Lamp No. 1
C/CLOCK: Lamp No. 2
CLOCK: Lamp No. 3
CLAMP: Lamp No. 4
UNCLAMP: Lamp No. 5

- **PC Ladder Program**

No PC ladder programming is required to control the NT30/30C. Only a program to control the robot arm movements is required.

- **Program Operation**

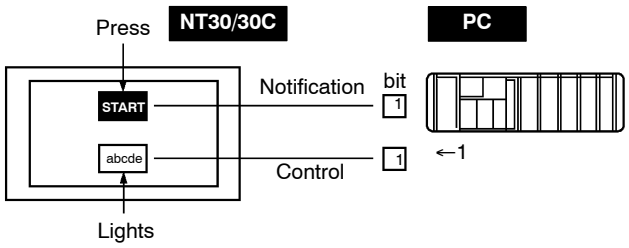
When the ladder program section to control the robot arm is executed, the lamps on the NT30/30C screen turn ON and OFF in synchronization with the robot arm movement.

For example, lamp No. 0 lights when the robot arm moves up and goes out when it stops moving up.

5-3-3 Allocated Bits, and Display, of Touch Switches

Method for PC Notification and NT30/30C Control

Two types of bit can be allocated to touch switches: notify bits - which serve to notify statuses to the PC - and control bits (lamp bits), which control the lighting (flashing) of the touch switches. (For other types of function, only lamp bits can be allocated.) When a touch switch is pressed the notify bit status changes and, when the control bit is ON, the touch switch lights (or flashes).



In order to notify the status of a touch switch to the PC, the touch switch must be allocated to a specified PC bit so that it can be managed. Designate the area and bit address.

To use a touch switch for notification to the PC, set the function setting in the touch switch properties to Notify Bit.

- **Types of Notification Operation**

  It is possible to select one of four types of notification operation that occur when the touch switch is pressed.

  - Momentary

    When the touch switch is pressed the bit comes ON and when it is released the bit goes OFF.

  - Alternate

    When the touch switch is pressed the bit comes ON if it is OFF and goes OFF if it is ON.

  - Set

    When the touch switch is pressed the bit comes ON, and it remains ON when the touch switch is released.

  - Reset

    When the touch switch is pressed the bit goes OFF, and it remains OFF when the touch switch is released.

Reference

On one screen, if there is more than one momentary key allocated to the same bit and these keys are simultaneously pressed and then released, the timing with which OFF is notified to the PC differs between Host Link and NT Link in the following way:

Host Link: OFF is notified when all the keys that were simultaneously pressed have been released.

NT Link: OFF is notified when just one of the keys that were simultaneously pressed is released.

- **Important Points Relating to Notification Operations**

Details on touch switch notification operations are listed below.

Type of notification operation	When using Host Link When using NT link (DM area)	When using NT link (other than DM area)
Momentary	(1) Notification in word units (all other bits in the word are OFF)	(3) Notification in bit units
Alternate Set Reset	(2) Notification in word units (note that the word contents are read on display and notification is based on these contents)	(4) Notification in bit units

When using touch switch input notification, note the following points.

- In the case of (1) in the table, the other bits in the same word are turned OFF by notification.
- In the case of (2) in the table, since notification is executed on the basis of the contents of the word before display, the other bits in the word are not overwritten. However, if the contents of the word are changed at the PC during display, they will be rewritten based on the contents before display.
- If the screen is switched while a momentary key is pressed, the touch switch itself will disappear and the OFF status will be notified to the PC. This means that, in the case of (1) in the table, all the bits in the word will be set to the OFF status.
- When using the Host Link, or when using the NT link with the DM area, the notification operation is different for the momentary type and the other types, and they should not both be specified in the same word.

In the case of (3) and (4), notification has no effect on the other bits in the word.

- **Possible Bit Allocations**

Notify bits and control bits for touch switches can be allocated to the areas of the PC memory listed in the following table.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

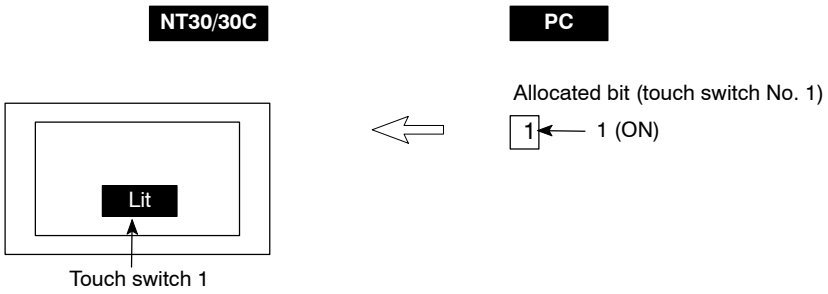
The range of each memory area differs according to the PC type. See the appendix *PC Memory Maps* (page 291).

When making a data memory (DM) specification, specify the bit number (00 to 15) following the word number.

5-3-4 Touch Switch Status

This section describes how to change the statuses of allocated bits and thereby the statuses of the touch switches displayed by the NT30/30C.

The statuses of touch switches displayed by the NT30/30C are changed by switching the control bits allocated in the PC memory ON and OFF.



The status of the lamp bit reflects the touch switch status, as follows:

0 (OFF): Unlit

1 (ON): Lit (inverse display) or flashing

Procedure

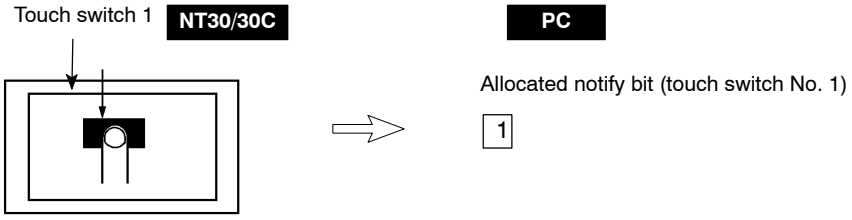
1. Use the NT-series Support Tool to allocate the touch switch lamp bits to the PC memory.
2. When creating the screen data using the NT-series Support Tool, register the touch switch for a screen.
3. Program the PC to switch the lamp bit of the touch switch ON and OFF.

   Set whether a touch switch will be continuously lit or blink when its bit has been turned ON by setting the NT-series Support Tool touch switch display attributes.

5-3-5 Notifying the PC that a Switch Has Been Pressed

This section describes how the status of a touch switch (whether it has been pressed or not) is accessed.

With the NT30/30C, when a touch switch is pressed, the notify bit allocated to that touch switch in the PC memory is automatically notified.



Depending on the set operation type, the status of the allocated bit for touch switch status notification will be controlled in tone of the following ways:

Momentary: 0 (OFF) . . Not pressed
1 (ON) . . . Pressed

Alternate: The allocated bit is switches to 1 (ON) if currently 0, and to 0 (OFF) if currently 1.

Set: The allocated notify bit is switched to 1 (ON).

Reset: The allocated notify bit is switched to 0 (OFF).

In order to determine the status of a touch switch, the status of the touch switch notification bit allocated to it is determined.

The touch switch notify bits can be allocated to the following areas of the PC memory.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of each memory area differs according to the PC type. See the appendix *PC Memory Maps* (page 291).

When making a data memory (DM) specification, specify the bit number (00 to 15) following the word number.

Procedure

1. Use the NT-series Support Tool to allocate the touch switch notify bits to the PC memory.
2. When creating the screen data using the NT-series Support Tool, register the touch switch for a screen.
3. Program the PC to switch the notify bit of the touch switch ON and OFF.

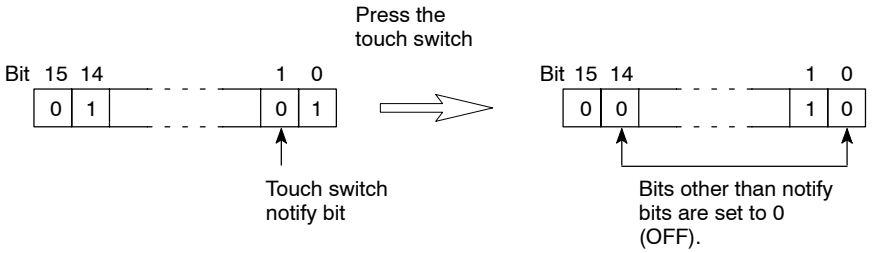
- **Important Points when Accessing Touch Switch Statuses**

Details on touch switch notification operations are listed below.

Type of notification operation	When using Host Link When using NT link (DM area)	When using NT link (other than DM area)
Momentary	(1) Notification in word units (all other bits in the word are OFF)	(3) Notification in bit units
Alternate Set Reset	(2) Notification in word units (note that the word contents are read on display and notification is based on these contents)	(4) Notification in bit units

When using touch switch input notification, note the following points.

- In the case of (1) in the table, the other bits in the same word are turned OFF by notification.



In the case of (2) in the table, since notification is executed on the basis of the contents of the word before display, the other bits in the word are not overwritten. However, if the contents of the word are changed at the PC during display, they will be rewritten based on the contents before display.

- If the screen is switched while a momentary key is pressed, the touch switch itself will disappear and the OFF status will be notified to the PC. This means that, in the case of (1) in the table, all the bits in the word will be set to the OFF status.
- When using the Host Link, or when using the NT link with the DM area, the notification operation is different for the momentary type and the other types, and they should not both be specified in the same word.

In the case of (3) and (4), notification has no effect on the other bits in the word.

Reference

In the case of (1), even bits whose status is held by self-holding operation or by the KEEP instruction will be turned OFF. In order to avoid this, allocate a bit from an area other than the DM Area, even when communicating via NT Link.

Application Example

This example uses the touch switches as normal switches (bits) in order to use the NT30/30C as an operating panel.

- **NT-series Support Tool Settings**

Make the following settings using the NT-series Support Tool.

Touch switch No. 10:

Function: Notify Bit

Shape: 3-D

Lamp attributes: Light

Control bit: IR/CIO 05000 (Run flag) ... Guide message: RUN

Notify bit: IR/CIO 06000

Touch switch No. 11:

Function: Notify Bit

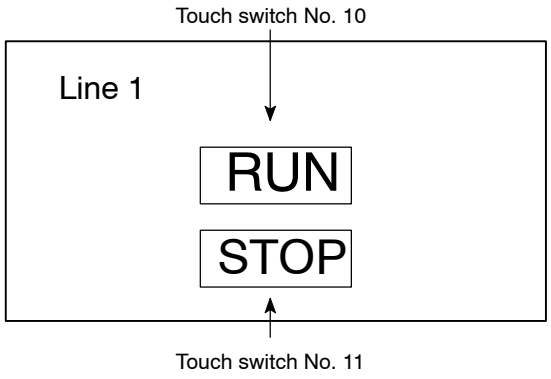
Shape: 3-D

Lamp attributes: Light

Control bit: IR/CIO 05001 (Stop flag) ... Guide message: STOP

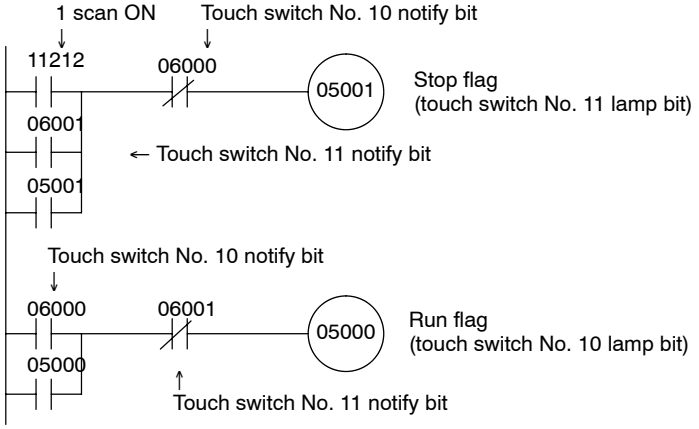
Notify bit: IR/CIO 06001

Data registered for the screen: touch switch No. 10, touch switch No. 11



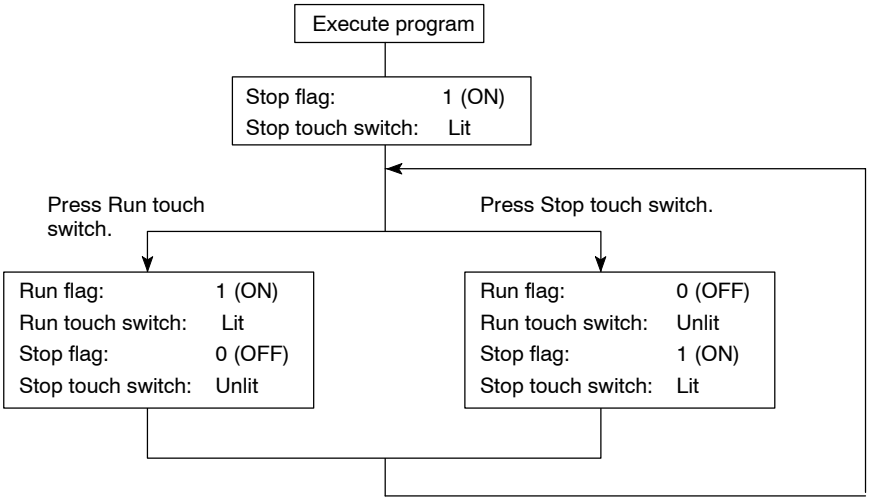
- **PC Program**

Include the following in the ladder program.



- **Program Operation**

The operation when the program is executed is presented below.



5-4 Numeral and Character String Setting

5-4-1 Notification of Numbers to the PC

This section describes how the numerical data input at an NT30/30C is accessed by the PC using the numeral setting function (numeral input function).

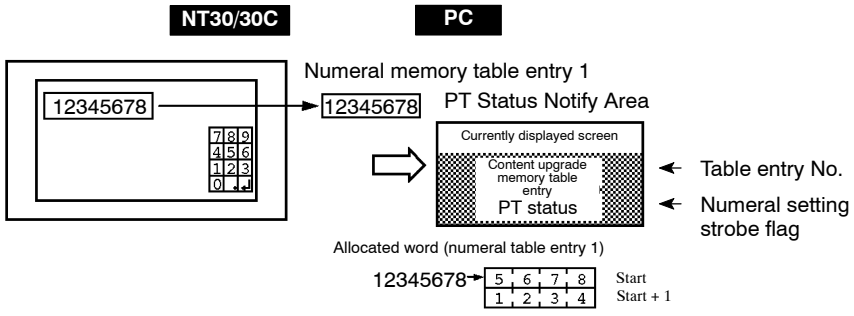
In order to determine when numerical data has been input at the NT30/30C, the numeral setting strobe flag in the PT Status Notify Area is used. In order to determine the upgraded numeral memory table entry number, the content upgrade memory table entry in the PT Status Notify Area is used.

When numerical data is input at the NT30/30C, this is automatically notified to the PT Status Notify Area (PT → PC) allocated in the PC memory as follows.

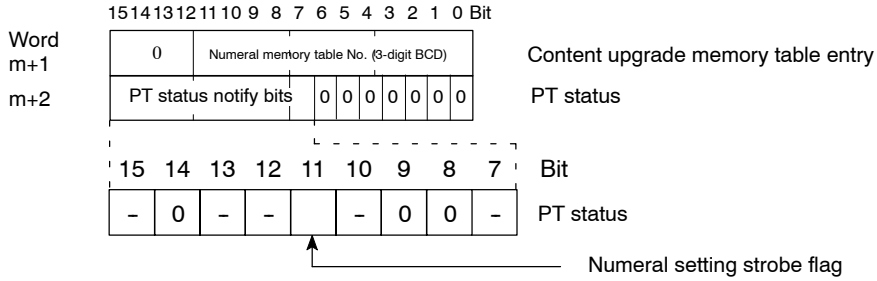
Notification of upgrade: PT status numeral setting strobe flag turned ON (1)

Upgraded numeral table entry number: Stored in the content upgrade memory table entry

When the PC reads the content upgrade memory table entry at the leading edge of the numeral setting strobe flag, it determines the numeral memory table entry number in which the numerical data that was changed at the NT30/30C is stored.



Content Upgrade Memory Table Entry Set in the PT Status Notify Area and PT Status



Numeral memory table entry No.: 000 to 999

Data is written to the content upgrade memory table entry as three digits of BCD (binary coded decimal) data.

When the numeral setting strobe flag bit has been notified to the PC it returns to the OFF (0) status.

For details on the method for storing a number in the word allocated for the numeral table entry, see *Allocation Words and Display of the Memory Tables* (page 205).

- **Restrictions on Allocating Words**

  The PT Status Notify Area can be allocated to the PC memory areas listed in the following table.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of each memory area differs according to the PC type. See the appendix *PC Memory Maps* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Notify Area (PT → PC) to the PC memory.
2. Using the NT-series Support Tool, create a numeral setting screen and allocate the numeral memory table entry to the PC memory.
3. Program the PC for reading the content upgrade memory table entry in the PT Status Notify Area when the numeral setting strobe flag in the PT Status Notify Area comes ON (1).
4. Read the allocated word for the numeral memory table entry number read in step 3.

- **Disabling Numeral Input**

  Numeral input can be disabled by a PT Status Control Area operation. For details, see *5-7 NT30/30C Status Control* (page 239).

Application Example

This example shows the reading of the numeral memory table entry number after a value has been changed by inputting numerical data at the NT30/30C.

- **NT-series Support Tool Settings**

  Make the following settings using the NT-series Support Tool.

  Allocated word for the PT Status Notify Area: IR/CIO0110

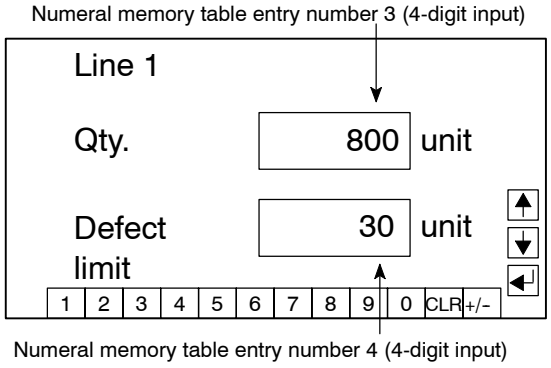
  Numeral memory table entry No. 3: DM 0005 (saved word: One)

  Numeral memory table entry No. 4: DM 0006 (saved word: One)

  Data registered for the screens:

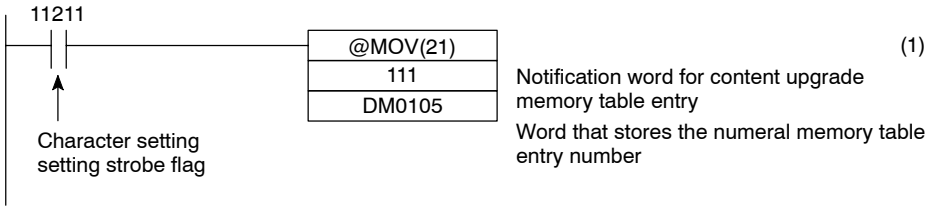
  Numeral setting 1 ... Table entry: Numeral memory table entry No. 3

  Numeral setting 2 ... Table entry: Numeral memory table entry No. 4



- **PC Program**

  Include the following in the PC ladder program.



- **Program operation**

(1) When the numeral setting strobe flag (IR/CIO 11211) comes ON (1), the contents of IR/CIO 0111 (the word where the content upgrade memory table entry is located) are transferred to DM 0105. The number of the numeral memory table entry that contains the upgraded data is stored in DM 0105 (in this case it is 0003 or 0004).

If the numeral memory table entry is allocated to a PC word, the value input to it can be read easily by accessing the allocated word.

In this case, the contents of numeral memory table entry No. 3 are stored in DM 0005 and the contents of numeral memory table entry No. 4 are stored in DM 0006.

5-4-2 Notification of Character String to the PC

This section describes how the character string data input at an NT30/30C is accessed by the PC.

In order to determine when character string data has been input at the NT30/30C, the character string setting strobe flag in the PT Status Notify Area is used. In order to determine the upgraded character string memory table entry number, the content upgrade memory table entry in the PT Status Notify Area is used.

When character string data is input at the NT30/30C, this is automatically notified to the PT Status Notify Area (PT → PC) allocated in the PC memory as follows.

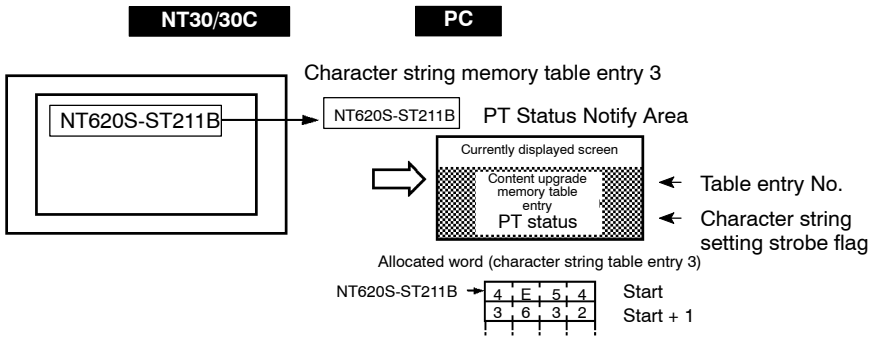
Notification of upgrade:

PT status character string setting strobe flag turned ON (1)

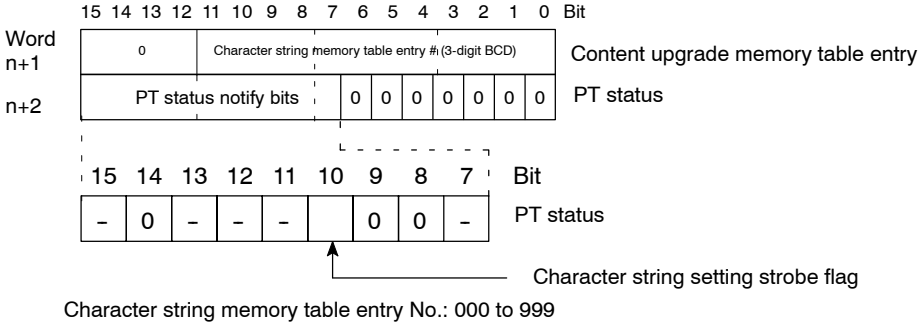
Upgraded character string table entry number:

Stored in the content upgrade memory table entry

When the PC reads the content upgrade memory table entry at the leading edge of the character string setting strobe flag, it determines the character string memory table entry number in which the character string data that was changed at the NT30/30C is stored.



Content Upgrade Memory Table Entry Set in the PT Status Notify Area and PT Status



Character string memory table entry No.: 000 to 999

Data is written to the content upgrade memory table entry as three digits of BCD (binary coded decimal) data.

When the character string setting strobe flag bit has been notified to the PC it returns to the OFF (0) status.

For details on the method for storing a number in a word allocated for the character string table entry, see *Allocation Words and Display of the Memory Tables* (page 205).

- **Restrictions on Allocating Words**

The PT Status Notify Area can be allocated to the PC memory areas listed in the following table.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	–	–	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	–	–	–	–

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of each memory area differs according to the PC type. See the appendix *PC Memory Maps* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Notify Area (PT → PC) to the PC memory.
2. Using the NT-series Support Tool, create a character string input field on the screen and allocate the character string memory table entry to the PC memory.
3. Program the PC for reading the content upgrade memory table entry in the PT Status Notify Area when the character string setting strobe flag in the PT Status Notify Area comes ON (1).
4. Read the allocated word for the character string memory table entry number read in step 3.

- **Disabling Character String Input**

Character string input can be disabled by a PT Status Control Area operation. For details, see *5-7 NT30/30C Status Control* (page 239).

Application Example

This example shows the reading of the character string memory table entry number after a value has been changed by inputting character string data at the NT30/30C.

- **NT-series Support Tool Settings**

Make the following settings using the NT-series Support Tool.

Allocated word for the PT Status Notify Area: IR/CIO0110

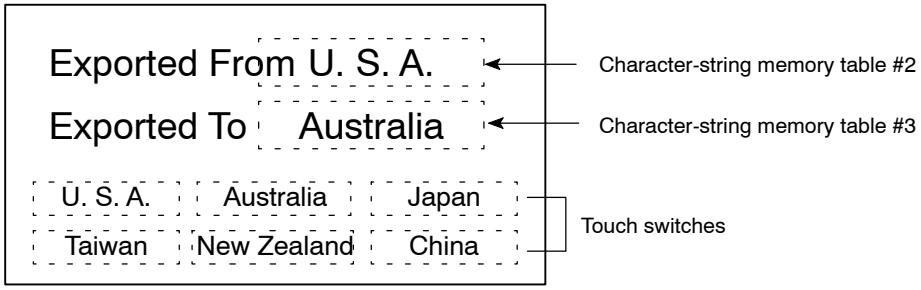
Character string memory table entry No. 2: DM 0120 (registration word: 10)

Character string memory table entry No. 3: DM 0130 (registration word: 10)

Data registered for the screens:

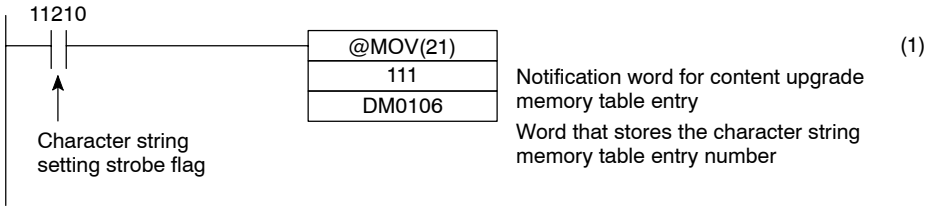
Character string setting 1 .... Table entry: character string memory table entry entry No. 2

Character string setting 2 .... Table entry: character string memory table entry No. 3



- **PC Program**

  Include the following in the PC ladder program.



- **Program Operation**

(1) When the character string setting strobe flag (IR/CIO 11210) comes ON (1), the contents of IR/CIO0111 (the word where the content upgrade memory table entry is located) are transferred to DM 0106. The number of the character string memory table entry that contains the upgraded data is stored in DM 0106 (in this case it is 0002 or 0003).

If the character string memory table entry is allocated to a PC word, the value input to it can be read easily by accessing the allocated word.

In this case, the contents of character string memory table entry #2 are stored in DM 0120 to 0129 and the contents of character string memory table entry #3 are stored in DM 0130 to 0139.

5-5 Alarm Lists

5-5-1 Allocated Bits of Bit Memory Table

The alarm list function automatically displays and clears alarm messages (contents of character string memory table entries) that correspond to the allocated bits of memory table entries, in accordance with the status of these bits.

Bit memory table entries are managed by allocation to designated PC bits. Specify the area and bit number.

- **Available Allocation Bits**

The bit memory table entries can be allocated words in the following PC areas.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

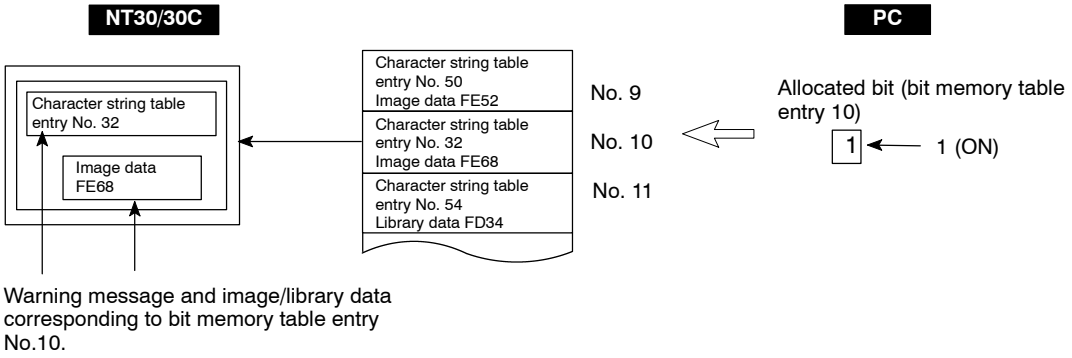
The range of respective area varies with the type of PC. Refer to the appendix *PC Memory Maps* (page 291).

When data memory (DM) is specified, specify the bit number (00 to 15) after the word number.

5-5-2 Displaying Alarm Lists Using Bit Memory Table Entries

This section explains the actual procedure used to display the alarm messages of the alarm list function on the screen of the NT30/30C.

In order to display an alarm message, the allocated bit of the bit memory table entry allocated to the PC has to be switched ON.



The relationship between the status of the allocated bit of the bit memory table entry and the corresponding alarm message is as follows:

0 (OFF): Deleted
1 (ON): Displayed

Procedure

1. Select Memory Table (TBL EDIT with the DOS version) from the NT-series Support Tool editing menu, set the allocated bit of the bit memory table entry in the PC area, then set the corresponding alarm message.
2. When creating screen data with the NT-series Support Tool, register the alarm list specified by the bit memory table entry in (1) above for the screen.
3. Program the PC to switch the allocated bit of the bit memory table entry ON and OFF.

- **Image/library Data Corresponding to Alarm Messages**

  Apart from alarm messages, image/library data can also be set for bit memory table entries. The alarm list is composed of touch switches and touching (pressing) an alarm message will display the corresponding image/library data for your guidance.

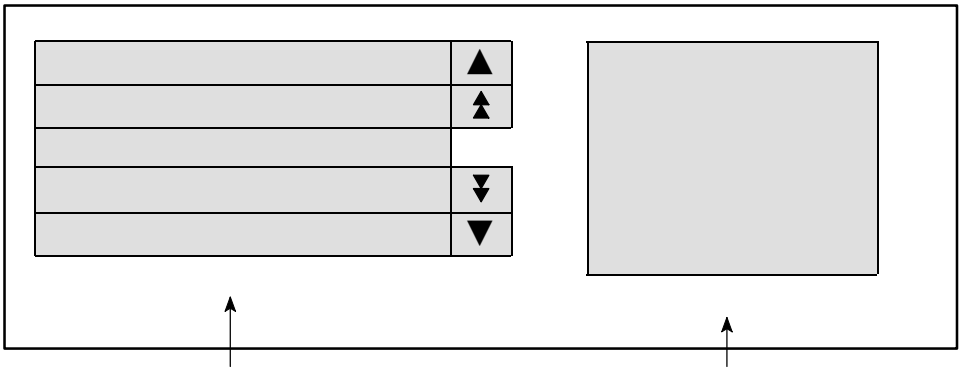
Example of Alarm List Display

In this example, if the temperature in a water tank rises above the upper limit, a bit is turned ON, and the alarm message corresponding to it is displayed.

- **NT-series Support Tool Settings**

  The following settings are made using the NT-series Support Tool.

  Bit memory table entry No. 20: IR/CIO 001512
  Bit memory table entry No. 21: IR/CIO 000407
  Bit memory table entry No. 22: AR 000000
  Bit memory table entry No. 23: LR 001003
  Bit memory table entry No. 24: LR 001004
  Data registered for the screen: Alarm list



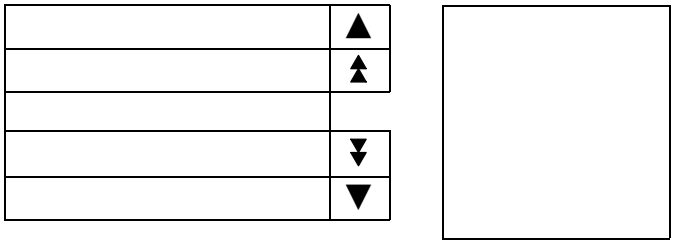
- **PC Program**

  Ladder programming to control the NT30/30C is not required.

- **NT30/30C Operation**

When the created alarm message screen is displayed, the following operations will take place in accordance with the status of the allocated bits.

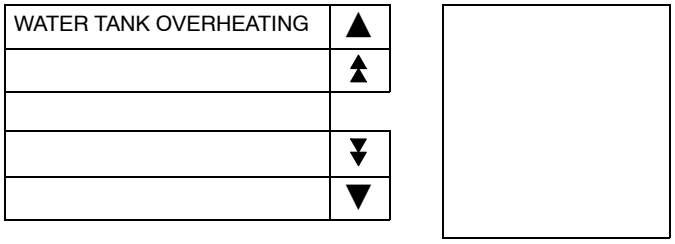
- When all allocated bits are OFF



↓

- When AR0000 comes ON

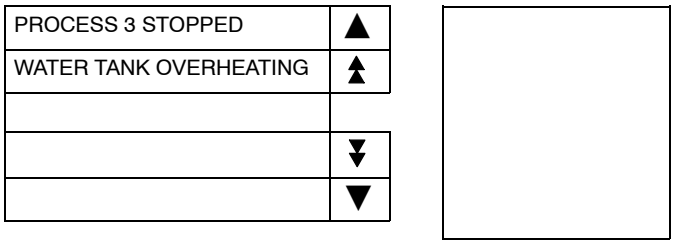
Contents of character string memory table entry corresponding to bit memory table entry No. 22



↓

- If IR/CIO 00407 then comes ON

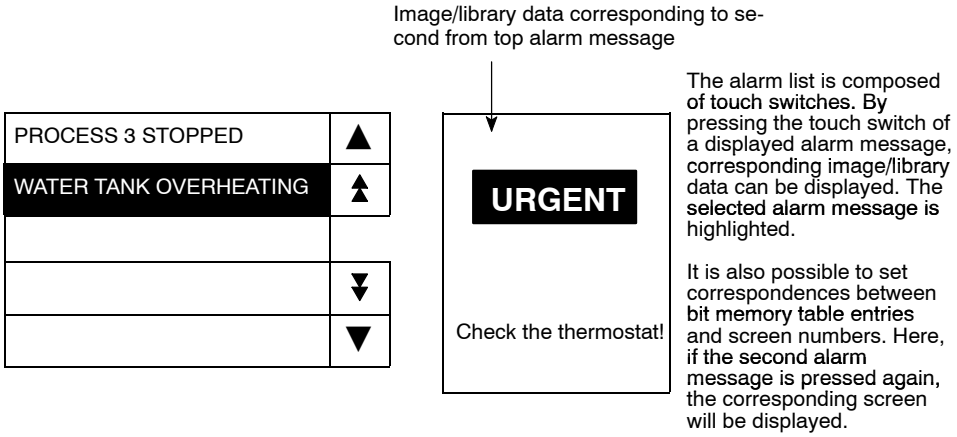
Contents of character string memory table entry corresponding to bit memory table entry No. 21



If an alarm list with multiple lines is created, alarms are displayed in descending order of bit memory table entry numbers.
If the bit memory table entries are set in ascending order of priority, the display will also be arranged in accordance with the order of priority.

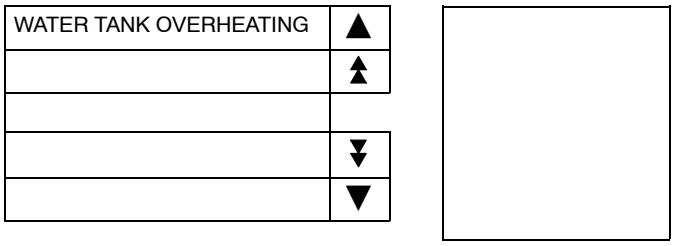
↓

- When the second from top alarm message is pressed



↓

- When IR/CIO 00407 returns to the OFF status



5-6 Clock Function

The NT30/30C has a clock function for setting the date and time.
This section explains how to set the date and time, and how to notify the date and time to the PC.

5-6-1 About the Clock Function

The clock function uses the numeral memory table entries numbered 247 through 255: these memory table entries are used exclusively for clock data.

As shown in the table below, numbers 247 through 253 are for display and reading only, and numbers 254 and 255 are for time setting. Numbers 247 through 253 store clock data that is updated by the internal clock of the NT30/30C. This data cannot be rewritten by the PC.

Reference When the NT battery voltage drops, the clock function cannot operate correctly when the power is switched OFF.

Function	Numeral memory table entry number	Bit	Information	Value	Remarks
Display/reading only	247		Second	00 to 59	
	248		Minute	00 to 59	
	249		Hour	00 to 23	24-hour system
	250		Date	01 to 31	
	251		Month	01 to 12	
	252		Year	00 to 99	Last 2 digits of year
	253		Day of week	00 to 06	See below
Setting only	254	0 to 7 8 to 15 16 to 23 24 to 31	Second Minute Hour Date	00 to 59 00 to 59 00 to 23 01 to 31	24-hour system
	255	0 to 7 8 to 15 16 to 23 24 to 31	Month Year Day of week Vacant	01 to 12 00 to 99 00 to 06 Always 00	Last 2 digits of year See below

* The numerical values that correspond to the days of the week are as follows:

Day of week	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Value	00	01	02	03	04	05	06

Setting example: April 27 (Thu), 1995, 14:53:30

254	27	14	53	30
255	00	04	95	04

5-6-2 Date and Time Display

In order to display the date or time, an area in which the contents of numeral memory table entries 247 through 253 can be displayed must be set during screen creation with the NT-series Support Tool.

Numeral memory table entries 247 through 253 store clock data that is updated by the internal clock of the NT30/30C. This data cannot be rewritten by the PC.

5-6-3 Date and Time Setting

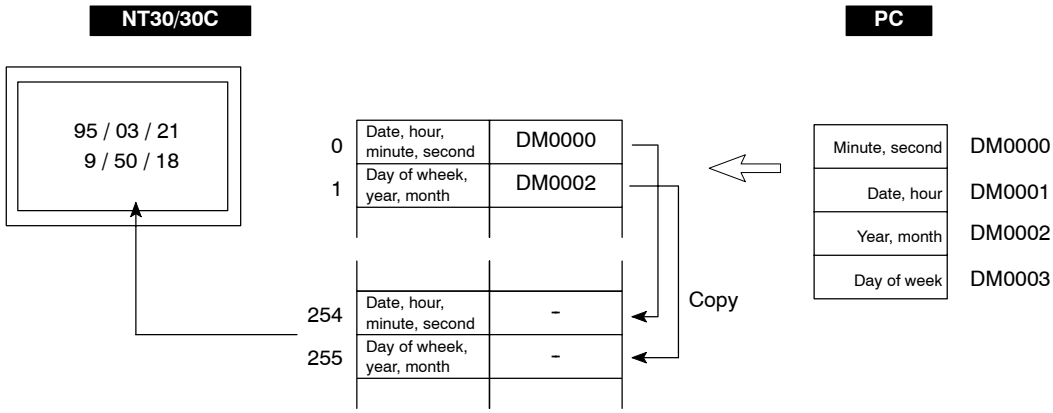
When the date and time are set from the PC, the contents of the numeral memory table entries numbered 254 and 255 are rewritten. It is possible to use the method of copying between memory table entries to set the time, as shown below.

Reference

- t is also possible to set the date and time by using function key [F3] (Time) on the Tool Settings screen of the NT-series Support Tool.

  For details, see the *NT-series Support Tool for Windows Operation Manual* (V061).
- It is also possible to set the date and time by rewriting the contents of numeral memory table entries 254 and 255 using the numeral setting function.

Numeral memory table entries 254 and 255 are exclusively for time setting. They can be allocated to an area of the PC for other uses. It is possible to rewrite the contents of these memory table entries by first writing the new setting into table entries other than 254 and 255 and then copying it into table entries 254 and 255 by using the memory table entry copy function.



- **Available allocation words**

  The memory table can be allocated words in the following PC areas. For time setting, two words have to be allocated for each table entry.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of respective area varies with the type of PC. Refer to the appendix *PC Memory Maps* (page 291).

Procedure

1. Allocate the two memory table entries that are to be the copy source for the setting to areas in the PC. Two words must be allocated for each table entry.

2. Next, at the PC, specify the date and time that are to be set in numeral memory table entries 254 and 255 in these allocated words.

3. Copy the settings from the copy source numeral memory table entries to numeral memory table entries 254 and 255.

For the method for copying memory table entries, see *Copying Memory Table Entries* (page 212).

- **Important Points Concerning the Numeral Memory Table Entries Used for the Clock Function**

Do not allocate the numeral memory table entries to which the clock function is assigned (numbers 247 to 255) to PC words.

Numeral memory table entries 247 through 253 are exclusively for display (read only). Do not attempt to write data to them by using numeral settings or by copying between memory table entries.

Numeral memory table entries 254 and 255 are exclusively for time setting (write only). Do not use them for numeral settings or graph displays.

Initial values set with the NT-series Support Tool are invalid in the case of numeral memory table entries 247 through 255.

Date and Time Setting Example

The following is an example of setting the date and time from the PC.
In this example, a C200H (type C200H-CPU11,21,22,23,31) - which has a time function - is used. The time function is assigned to words AR 18 to 21 of the C200H.

- **NT-series Support Tool Settings**

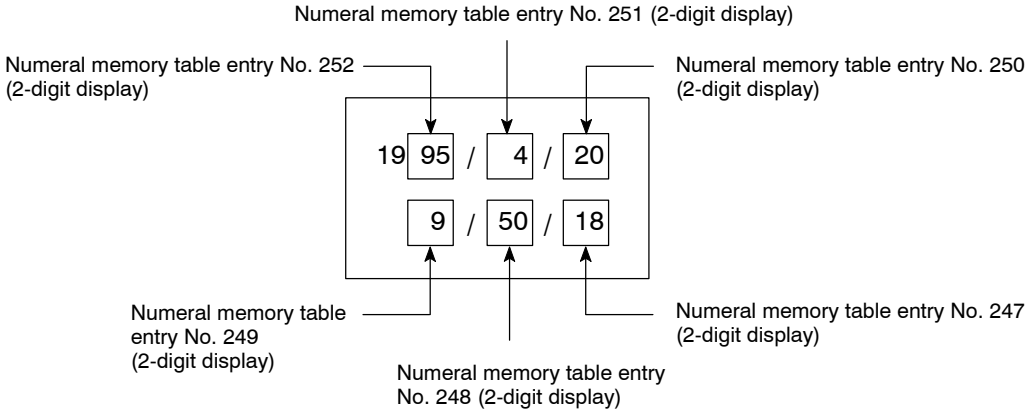
The following settings are made using the NT-series Support Tool.

PT Status Control Area: IR/CIO 0100

Numeral memory table entry No. 264: DM0000 (words: 2)

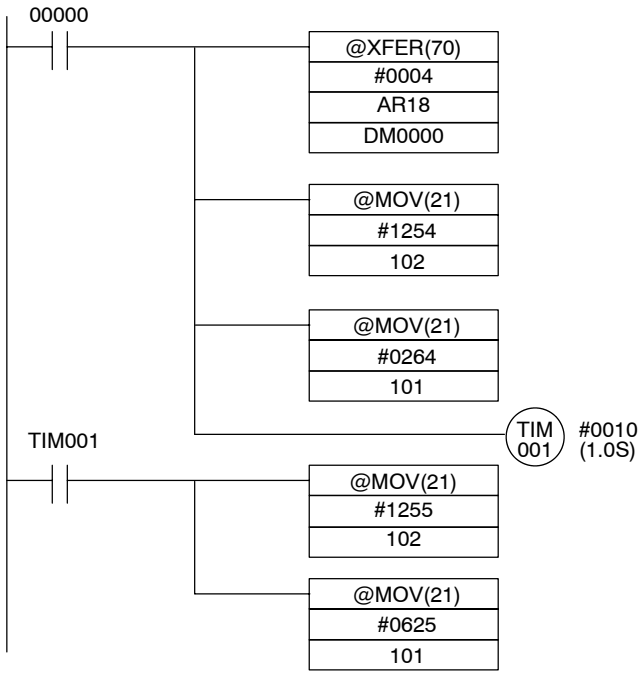
Numeral memory table entry No. 265: DM0002 (words: 2)

Data registered on the screen: Numeral memory table entry Nos. 247 to 252



- **PC Program**

Include the following in the ladder program.



- **Program Operation**

When the created screen is displayed on the NT30/30C and the program is executed, the operation is as follows.

(1) When IR/CIO 00000 comes ON, the date and time (AR 18 to 21) set in the PC are read, and written to the words (DM0000 to 0003) allocated to numeral memory table entries 264 and 265.

(2) Copy the contents of numeral memory table entry 264 (day, hour, minute, second) into numeral memory table entry 254, which is used for setting the clock function.

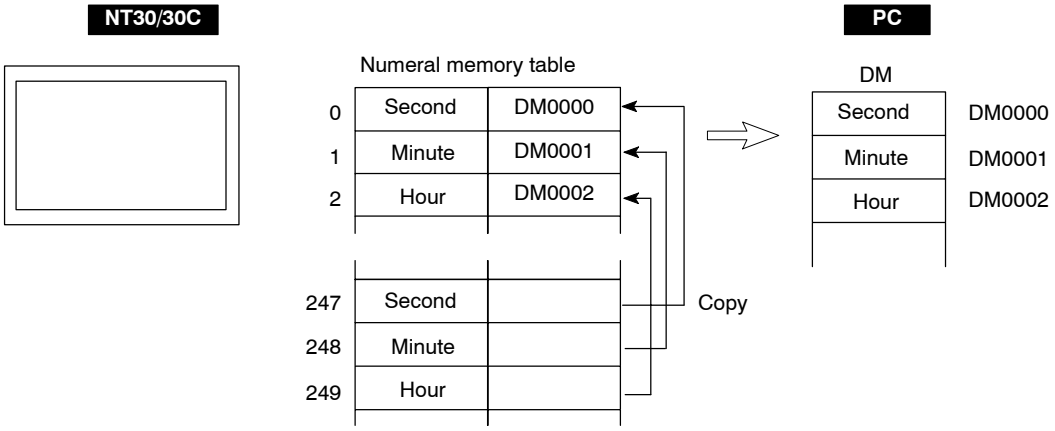
(3) After waiting about a second for the memory table entry copy operation in step (2) to be completed, copy the contents of numeral memory table entry 265 (day of the week, year, month) into numeral memory table entry 255, which used for setting the clock function.

The date and time set at the PC will also be set at the NT30/30C and displayed.

5-6-4 Notification of the Date and Time to the PC

The date and time set at the NT30/30C can be notified to the PC. The numeral memory table entries numbered 247 through 253 are used for display. They cannot be allocated to PC areas.

The method used to notify the date and time is copying between memory table entries.



Procedure

1. Allocate an area in the PC to the numeral memory table entries (number corresponding to the data to be read) that are to be made the copy destination.
2. Copy the contents of numeral memory table entries 247 to 253 to the numeral memory table entries allocated as the copy destination in step (1). The copied date and time is notified to the area in the PC.

- **Important Points Concerning Numeral Memory Table Entries Used for the Clock Function**

  Numeral memory table entries 247 through 253 store clock data, which is updated by the internal clock of the NT30/30C. This data cannot be rewritten by the PC.

  Numeral memory table entries 247 through 253 are exclusively for display (read only). Do not attempt to write data to them by using numeral settings or by copying between memory table entries.

  Do not allocate the numeral memory table entries to which the clock function is assigned (numbers 247 to 255) to PC words.

Example of Reading the Time Set for the NT30/30C

This is the procedure for reading the time (hour, minute) set for the NT30/30C.

- **NT-series Support Tool Settings**

  The following settings are made using the NT-series Support Tool.

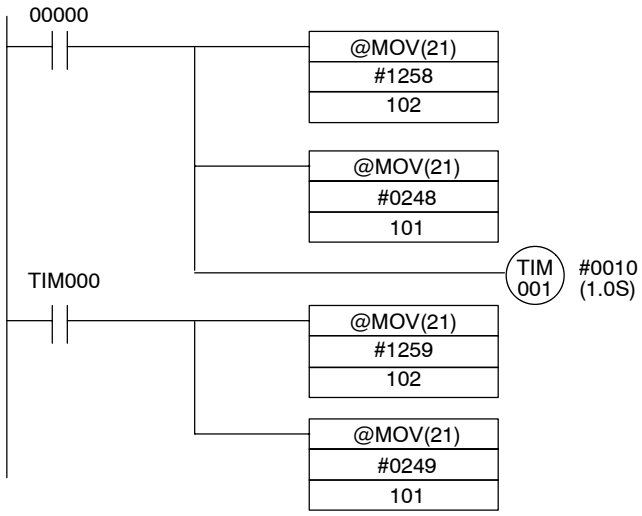
  PT Status Control Area: IR/CIO 0100

  Numeral memory table entry No. 258: DM0000 (one word)

  Numeral memory table entry No. 259: DM0001 (one word)

- **PC Program**

Include the following in the ladder program.



- **Program Operation**

When the program is executed, the operation is as follows.

(1) When IR/CIO 00000 comes ON, the contents (minutes) of numeral memory table entry 248, which is used for reading the clock function, are copied to numeral memory table entry 258.

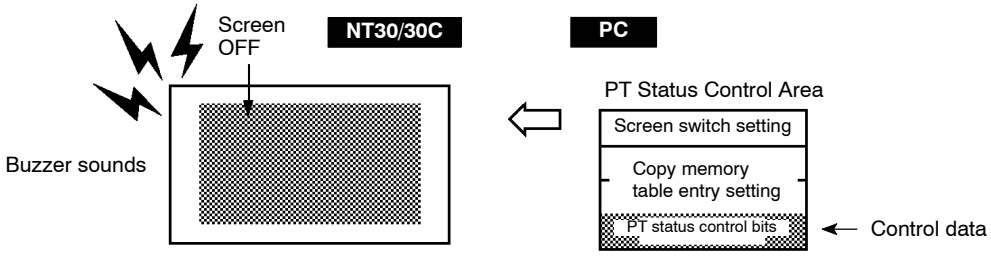
(2) After waiting one second for the memory table entry copy operation in step (1) to be completed, copy the contents of numeral memory table entry 249 (hours), which used for reading the clock function, into numeral memory table entry 259.

The hour and minute set in the NT30/30C are stored in DM0000 and DM0001, which are the words allocated to numeral memory table entries 258 and 259.

5-7 NT30/30C Status Control

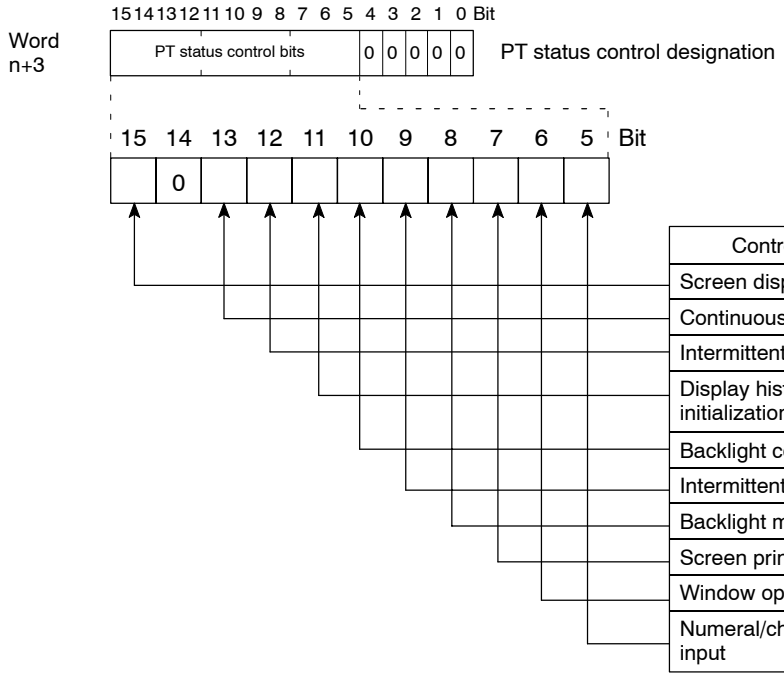
In order to control the status of the NT30/30C from the PC, the PT status control bits in the PT Status Control Area are used.

The statuses of the NT30/30C can be controlled from the PC by writing control data to the PT status control bits of the PT Status Control Area allocated in the PC memory.



5-7-1 Controllable NT30/30C Functions

PT Status Control Bits in the PT Status Control Area



Set bits 4 to 0 to 0 (OFF).

Controlled Item	1 (ON)	0 (OFF)
Screen display	Performed	Not performed
Continuous buzzer	Sounded	Not sounded
Intermittent buzzer (short)	Sounded	Not sounded
Display history initialization	Performed	Not performed
Backlight color	Red	White
Intermittent buzzer (long)	Sounded	Not sounded
Backlight mode	Lit	Flashing
Screen printing	Performed	Not performed
Window opening	Disabled	Enabled
Numeral/character string input	Disabled	Enabled

Reference Bit 10 (backlight color) is effective when using an NT30.

The PC status control bits remain unchanged if the NT30/30C status is changed with the screen attributes or memory switches, which means that the statuses of the PT status control bits do not match the actual status of the NT30/30C. For example, the buzzer may sound even though the setting for continuous buzzer bit 13 is OFF.

In this kind of case, control the NT30/30C by using the PT status control bits.

- **Screen Display (Bit 15)**

  The screen display bit is used to display and clear the screen to prevent burn-in on the CRT. Set bit 15 to 0 (OFF) to clear the screen. The backlight will also go OFF at the same time.

  When the screen has been cleared, the last displayed screen can be redisplayed either by turning bit 15 ON, or by pressing a touch switch. The backlight will also light at the same time.

Reference
- Instead of turning bit 15 ON, a screen can be displayed by specifying its screen number. For details on screen switching, see *Switching the Screen Display* (page 197).
- If the screen is cleared and bit 15 is ON, turn bit 15 OFF and then back ON again.

- **Continuous Buzzer (Bit 13), Short Intermittent Buzzer (Bit 12) and Long Intermittent Buzzer (Bit 9)**

  The continuous buzzer sounds continuously without interruption.
  The short intermittent buzzer sounds for 0.5 seconds at 0.5 second intervals.
  The long intermittent buzzer sounds for 1.0 seconds at 1.0 second intervals.

  If 1 (ON) is specified for more than one of the three buzzers at the same time, the buzzers will sound in accordance with the following order of priority:

1. Continuous buzzer
2. Short intermittent buzzer
3. Long intermittent buzzer

Another way to stop a buzzer sounding is to use a touch switch to which the buzzer stop attribute function is allocated.

Whether or not the buzzer actually sounds also depends on the setting of the buzzer memory switch of the NT30/30C. For details on this setting, see *Using the buzzer* (page 93).

In addition to PT status bit operations, the buzzer status can also be controlled by using screen attributes. The screen attributes are set with the NT-series Support Tool.

Buzzer attribute: Set whether the screen will sound or not when a screen is displayed, and, if it sounds, the type of buzzer.

- **Display History Initialization (Bit 11)**

Display history initialization initializes the display history in the NT30/30C.

When bit 11 is switched from 0 (OFF) to 1 (ON), the display history in the NT30/30C is initialized.

After initialization, it returns to the 0 (OFF) status.

- **Backlight Color (Bit 10), Backlight Mode (Bit 8)**

In the case of the NT30, the backlight is controlled by the combination of bit 10 and bit 8 statuses, as shown below.

Bit		Backlight status when the bit 15 status is 1 (ON)
10	8	
0	0	Flashing in white (lit in white ⇔ OFF)
0	1	Lit in white
1	0	Flashing in red (lit in red ⇔ OFF)
1	1	Lit in red

In the case of the NT30C, the display flashes in white when the bit 8 status is 0 (OFF) and is lit in white when the bit 8 status is 1 (ON) (bit 10 is ineffective).

When the backlight is set to be OFF (i.e., when the status of bit 15 is 0 (OFF)), the backlight color (white or red) and backlight mode (flashing or continuously lit) settings are ineffective.

- **Screen Printing (Bit 7)**

Hard copies of the screen can be made by connecting a printer to the NT30/30C.

When bit 7 is set from 0 (OFF) to 1 (ON), printing of the screen displayed at that time starts. Note that it is not possible to stop printing part way through.
Start printing after confirming that bit 7 (printer operating status) of the PT status notification area is in the 0 (OFF) status.

When printing starts and bit 7 of the PT status notification area has been set to the 1 (ON) status, the screen printing bit is returned to 0 (OFF).

- **Window Opening (Bit 6)**

It is possible to display a partial screen overlying the currently displayed screen. This partial screen is called a window, and control of windows can be

allocated to touch switches. Window opening is specified to disable the opening of windows using touch switches.

When bit 6 is set to 1 (ON), windows will not open even if a window opening touch switch is pressed, and currently open windows are closed.

- **Numeral/Character String Input (Bit 5)**

Input of numerical values and character strings into numeral/character string input fields and thumb wheel type input can be disabled using this bit.

When bit 5 is set to 1 (ON), it will not be possible to input anything into input fields by pressing touch switches (or input to the input terminals of the B7A Unit) to which numeric keys and character string keys are allocated.

It will also not be possible to change numerals using thumb wheel type input.

5-7-2 How to Control NT30/30C Functions

This section describes how to control the functions of the NT30/30C.

- **Restrictions on Allocating Words**

The PT Status Control Area (PC → PT) can be allocated to the PC memory areas listed in the following table.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of each memory area differs according to the PC type. See the appendix *PC Memory Maps* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Control Area (PC → PT) to the PC memory.
2. Program the PC to write control data to the PT status control bits of the PT Status Control Area.

- **Control Timing of PT Status Control Bits**

The PT status control bit is not read when the NT30/30C starts up. It is only read, and control is only executed, when the contents of the PT Status Control Area are changed after the NT30/30C has been started up.

Since control of the NT30/30C statuses is executed after the bits corresponding to the PT status control bits have changed, to execute control again the corresponding bits must be specified again.

Application Example

This example is of the NT30/30C being used as a warning lamp by using PT status control bits.

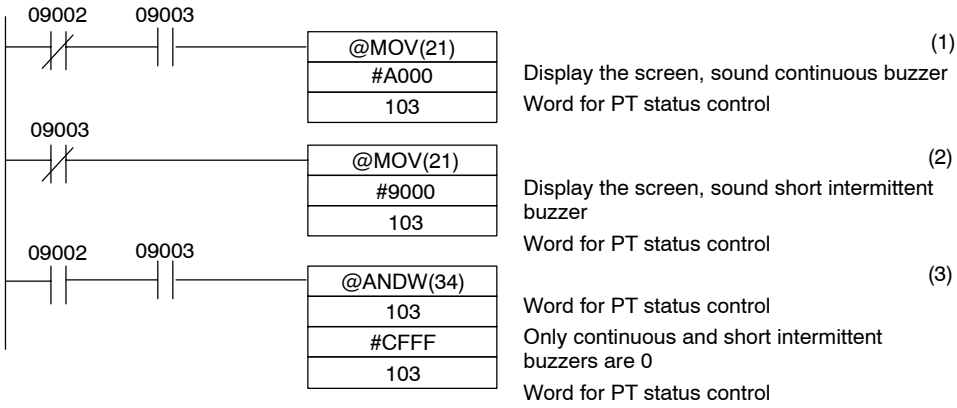
- **NT-series Support Tool Settings**

  Make the following setting using the NT-series Support Tool.

  Allocated Word for the PT Status Control Area: IR/CIO 0100

- **PC Program**

  Include the following in the PC ladder program.



- **Program Operation**

(1) The PT status control bits are set as shown below when IR/CIO 09002 turns OFF. This command block is not executed when IR/CIO 09003 is ON.

Screen display (bit 15)	1 (Performed)
Continuous buzzer (bit 13)	1 (Sounded)

The NT30/30C continuous buzzer sounds.

(2) The PT status control bits are set as shown below when IR/CIO 09003 turns OFF.

Screen display (bit 15)	1 (Performed)
Short intermittent buzzer (bit 12)	1 (Sounded)

The NT30/30C short intermittent buzzer sounds.

(3) The PT status control bits are set as shown below when both IR/CIO 09002 and IR/CIO 09003 turn ON.

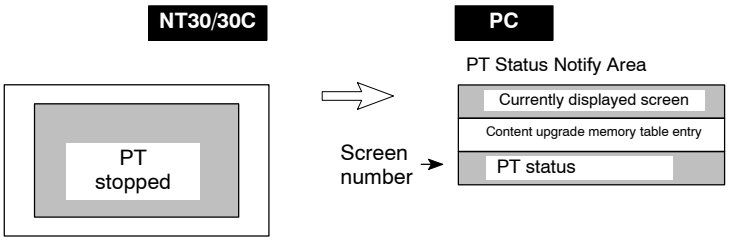
Continuous buzzer (bit 13)	0 (Not sounded)
Short intermittent buzzer (bit 12)	0 (Not sounded)

The NT30/30C buzzer stops.

5-8 Notifying the PC of PT Operating Status

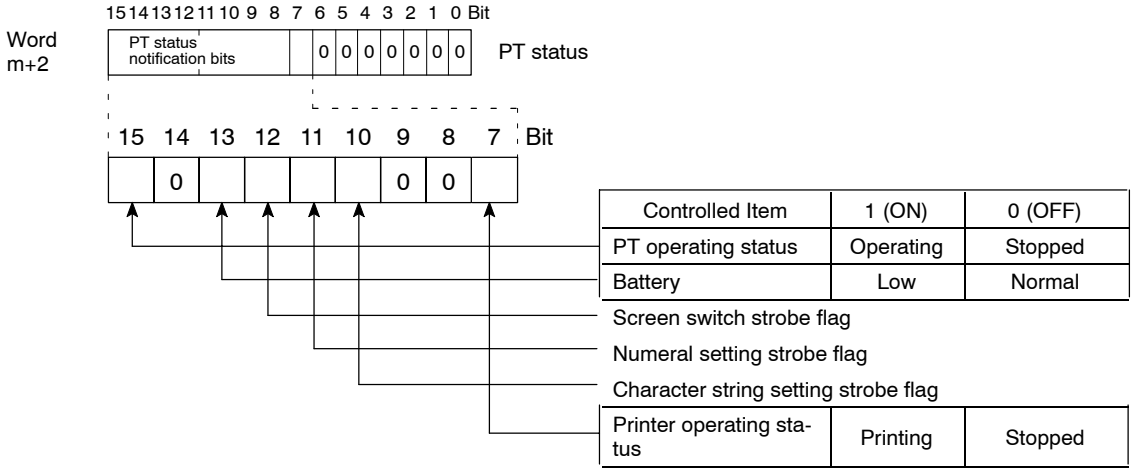
In order to access the NT30/30C status from the PC, PT status in the PT status notification area is used.

The status (operating statuses, etc.) of the NT30/30C can be determined from the PC by reading the PT status word in the PT Status Notify Area allocated in the PC memory.



5-8-1 Accessing NT30/30C Status

PT Status Notification Bits in the PT Status Notify Area



- **PT Operating Status (Bit 15)**

  When the NT30/30C is in the RUN mode this bit is set to ON (1). In other modes and while the system menu is displayed it is OFF (0). When this bit is OFF allocated bits and words cannot be read or written to.

- **Battery (Bit 13)**

  If the voltage of the backup battery for the NT30/30C memory becomes low, this bit is set to ON (1).

- **Screen Switch Strobe Flag (Bit 12)**

  When the screen displayed on the NT30/30C is switched by a designation from the PC, by the stand-alone function or by the operation of the allocated bit of a bit memory table entry, the screen switch strobe flag comes ON (1). On notification to the PC, it returns to the OFF (0) status.

  For details on how the screen switch strobe flag is used, see *Notifying the PC of the Display Screen* (page 199).

- **Numeral Setting Strobe Flag (Bit 11)**

  When numerical data is input to a numeral table entry using the NT30/30C numeral setting function, the numeral setting strobe flag comes ON (1). On notification to the PC, it returns to the OFF (0) status.

  For details on how the numeral setting strobe flag is used, see *Notifying the PC of Numbers* (page 224).

- **Character String Setting Strobe Flag (Bit 10)**

  This bit is set to 1 when a character string is input to a character string memory table entry by using the character string setting function. On notification to the PC, the bit is set to 0 (OFF).

  For details, see *Notify the PC of Character Strings* (page 227).

- **Printer Operating Status (Bit 7)**

  This bit is set to 1 (ON) when screen printing is executed at a printer connected to the NT30/30C in accordance with an instruction from a touch switch (screen print key) or from the PC. On completion of printing the bit is set back to 0 (OFF). Note that if the NT30/30C system menu or an error screen is displayed, the bit will be set to 0 (OFF) even if the printer is printing.

  For details, see *NT30/30C Status Control* (page 239).

5-8-2 Reading NT30/30C Operating Status

This section explains how to determine the status of the NT30/30C, and access its operating status.

- **Restrictions on Allocating Words**

  The PT Status Notify Area (PT → PC) can be allocated to the PC memory areas listed in the following table.

○: Possible
×: Impossible

Symbol	C Series PC	Allocation	CVM1/CV Series PC	Allocation	CS1 Series PC	Allocation
DM	DM Area	○	DM Area	○	DM Area	○
CH	IR Area	○	CIO Area	○	CIO Area	○
TIM	Timer Area	×	Timer	×	Timer	×
CNT	Counter Area	×	Counter Area	×	Counter Area	×
HR	HR Area	○	-	-	HR Area	×
AR	AR Area	○	Auxiliary Area	×	Auxiliary Area	×
LR	LR Area	○	-	-	-	-

The Auxiliary Area of CV series PC is used exclusively for special applications in the system, and cannot be used for other application.

The range of each memory area differs according to the PC type. See the appendix *PC Memory Maps* (page 291).

Procedure

1. Use the NT-series Support Tool to allocate the PT Status Notify Area (PT → PC) to the PC memory.
2. Program the PC to read the PT status word of the PT Status Notify Area and check each bit status.

- **Report Timing of PT Status Notify Bit**

  The information in the PC status notify area (PT → PC) is written to the PC when the NT30/30C status is changed during operation.

Example of Using the PT Status Notify Bit

An operation example in which the NT30/30C status is checked by operating the PT status notify bit is explained below.

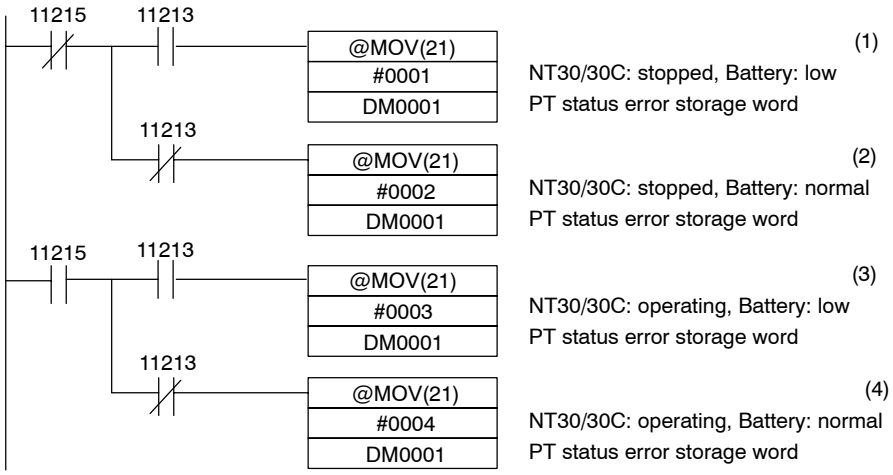
- **NT-series Support Tool Settings**

  Perform the following setting with the NT-series Support Tool.

  PT Status Notify Area allocated word: IR/CIO 0110

- **PC Program**

  Include the following in the PC ladder program.



- **Program Operation**

  (1) If PT operating status (IR/CIO 11215) is turned OFF (0) and battery (IR/CIO 11213) is turned ON (1), 1 (NT30/30C stop, low battery voltage) is transmitted to DM0001.

  (2) If PT operating status (IR/CIO11215) is turned OFF (0) and battery (IR/CIO 11213) is turned OFF (0), 2 (NT30/30C stop, normal battery voltage) is transmitted to DM0001.

  (3) If PT operating status (IR/CIO 11215) is turned ON (1) and battery (IR/CIO 11213) is turned ON (1), 3 (NT30/30C running, low battery voltage) is transmitted to DM0001.

  (4) If PT operating status (IR/CIO 11215) is turned ON (1) and battery (IR/CIO 11213) is turned OFF (0), 4 (NT30/30C running, normal battery voltage) is transmitted to DM0001.

SECTION 6
Troubleshooting and Maintenance

This section describes the action to take when NT30/30C errors occur, and how to carry out maintenance and inspections to prevent the occurrence of errors.

6-1 Hardware Faults 248
6-2 Responding to Displayed Error Messages 249
6-2-1 Errors Occurring when the Power is Turned ON 249
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6-2-3 Errors Occurring on Screen Data Initialization and Transfer 250
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6-1 Hardware Faults

When a fault relating to the operation of the NT30/30C occurs, find the symptoms in the table below and respond by following the corresponding remedy indicated in the table.

NT30/30C Symptoms	Cause	Remedy
POWER indicator fails to come ON	Power is not being supplied.	Check the connections and make sure that power is supplied correctly. (Refer to *2-2-2 Power Supply Connection*, page 20.)
	Power supply fuse has blown	Contact your OMRON service center.
Nothing is displayed on the screen.	Screen No. 0 has been read at the PC side.	This is not an error. Change the screen number. (Refer to *4-3 Screen Display*, page 131.)
Communication with the NT-series Support Tool not possible.	The Transmit Mode has not been established.	Display the system menu and select the Transmit Mode. (Refer to *3-6 Registering the Screen Data*, page 89.)
	Not connected to the NT-series Support Tool.	Check the installation of the connector cable. (Refer to *2-3 Connecting to the Support Tool*, page 21.)
	PT model setting and direct connection setting at the NT-series Support Tool do not match the NT30/30C.	Using the Tool Settings of the NT-series Support Tool, set the PT model and direct connection settings that match the NT30/30C.
Cannot communicate with the PC.	Memory switch settings do not match.	Check the communication setting in the Memory Switch menu of the Maintenance Mode, and match the PC and NT30/30C settings. (Refer to *3-5 Setting the Conditions of Communications with the PC Using the Memory Switches*, page 83.)
	NT30/30C and PC are not correctly connected.	Check that the type, length and installation of the connector cable match the specifications. (Refer to *2-5 Connection to a PC by the Host Link via RS-232C*, page 23, *2-6 Connection to a PC by the Host Link via RS-422A*, page 40, and *2-7 Connection to a PC by the NT Link*, page 56.)
	In Host Link connection connection, the PC termination resistance setting is incorrect.	Set the PC termination resistance correctly. (Refer to *2-6 Connection to a PC by the Host Link via RS-422A*, page 40.
The buzzer sounds and the RUN indicator turns OFF.	The NT30/30C is malfunctioning because of external noise.	Separate communications cables from the source of the noise, and insert noise filters in power lines.
There is no response from the touch panel.	The NT30/30C is malfunctioning because of external noise.	Separate communications cables from the source of the noise, and insert noise filters in power lines.
	The touch panel is broken.	Test the touch panel using the I/O check menu in Maintenance Mode.
The PC mode changes to MONITOR mode.	During Host Link communications, the NT30/NT30C changes the mode of the PC.	This is an NT30/NT30C specification. Connect via NT Link when using a PC that supports NT Link communications. (The mode is not changed if communications are performed via NT Link.)
Graph display is not updated.	A values set for the –100%, 0%, and 100% settings for percentage display is incorrect.	Correct the –100%, 0%, and 100% settings so that the following condition is satisfied: –100% setting < 0% setting < 100% setting

NT30/30C Symptoms	Cause	Remedy
Numeral display and character string display is not displayed properly. Nothing is displayed for character string display. There are no messages displayed in the alarm list or alarm history.	Because the memory table is allocated to PC memory, display is updated according to the contents of PC memory.	When using the contents of a memory table as fixed values, do not allocate the memory table to PC memory.
	The battery voltage dropped and memory table data was lost.	Replace the battery and execute memory table initialization. (Refer to *Replacing the Battery* on page 253 and *Initializing Memory* on page 78.) When not using a battery, turn the resume function OFF. (Refer to *Resume Function* on page 96.)
	Because the resume function is set to ON, initial values for image data memory are not reflected in memory tables.	Execute memory table initialization. (Refer to *Initializing Memory* on page 78.) If the resume function is not required, turn it OFF. (Refer to *Resume Function* on page 96.)
	With indirect specification for numeral display and character string display, the number of words in the numeral memory table is 2.	Set the number of words of the numeral memory table to 1.
Only * signs are displayed in a numeral display or a numeral input field.	The numeral in the numeral memory table is over the number of display digits.	Check the value for the word in the PC that is allocated to the numeral memory table. When the numeral display or input field has 4 digits or less, allocate 1 word in the PC to the numeral memory table.

6-2 Responding to Displayed Error Messages

When the NT30/30C displays an error message, find the corresponding symptoms in the appropriate table below and respond by following the remedy indicated in the table.

6-2-1 Errors Occurring when the Power is Turned ON

The table below shows the errors that can occur when the power supply to the NT30/30C is turned ON, and their remedies.

Message	Cause	Remedy
Memory Unformatted	The power was switched OFF during initialization of the screen data memory or while checking the screen data memory.	Initialize the screen data memory and transmit the screen data again.
Screen Data Corrupted	The power was switched OFF during screen data transmission.	Initialize the screen data memory and transmit the screen data again.
Mark Data Corrupted	• The power was switched OFF during screen data transmission. • Transmission of screen data was interrupted.	Initialize the screen data memory and transmit the screen data again.
No direct information is set!! Use the NT-series Support Tool to set PT Control Area and PT Notify Area.	No words have been allocated for the PT Status Control Area and PT Status Notify Area.	Allocate words for the PT Status Control Area and PT Status Notify Area by using the NT-series Support Tool.
None (does not start up)	Illegal data has been written to the screen data memory.	Initialize the screen data memory. See *3-4 Initializing Memory* (page 78).
None (The buzzer sounds and the RUN indicator flashes alternately orange and red.)	The system program cannot be started up because there is an error in it.	Contact your OMRON service center.

Message	Cause	Remedy
Battery Lowered (At the same time, the RUN indicator will light in orange (during operation) or red (when stopped).)	Voltage of battery in the NT30/30C is low.	Change the battery. See *Replacing the Battery* (page 253).
An illegible message (with meaningless characters) is displayed	DIP switch SW2 pin 6 on the NT30/30C is OFF. (The Japanese system program is installed.)	Switch OFF the power to the NT30/30C, set DIP switch SW2 pin 6 to ON, and re-install the system program.
Initialize System Program?	DIP switch SW2 pin 7 on the NT30/30C is ON.	After selecting No, switch OFF the power to the NT30/30C, set DIP switch SW2 pin 7 to OFF, and switch the power back on. DO NOT select Yes.
System Program Corrupted	The system program cannot be started up because there is an error in it.	Install the system program with the NT30/NT30C System Installer.
System Program is Not Downloaded	The system program cannot be started up because it has been deleted.	The system program has to be re-installed. Contact your OMRON service center.

6-2-2 Errors Occurring During Operation

The table below shows the errors that can occur during operation of the NT30/30C, and their remedies.

Message	Cause	Remedy
Setting Error Area Type and Word Address	Allocated bits/words set with the NT-series Support Tool not found at PC.	After checking the PC area being used, set correct bits/words.
Word Address Setting Error Word Area of Screen data or PT Control Area is wrong. Please confirm Screen Data.		

6-2-3 Errors Occurring on Screen Data Initialization and Transfer

The table below shows the errors that can occur when data is written to the NT30/30C screen data memory, and their remedies.

Message	Cause	Remedy
Initialization Error	Hardware fault or screen data memory life reached	If the same message is displayed even after executing screen data memory initialization or screen data transmission several times, contact your OMRON service center.

6-2-4 Communication Errors

This section describes the errors relating to communication with the PC that can occur during operation, and their remedies.

- **Operation when a Communication Error Occurs**

  When a communication error occurs, the error message is displayed at the NT30/30C, and the buzzer sounds. Error messages are displayed when the Automatic Reset memory switch is set (OFF).

  Some error messages are displayed even if the Automatic Reset memory switch is set (ON).

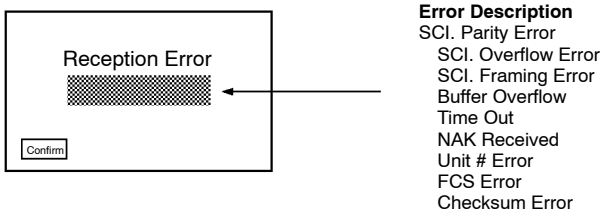
- **Procedure when a Communication Error Occurs**

  When an error message is displayed, press the [confirm] touch switch displayed on the screen. The screen display will return to the RUN mode.

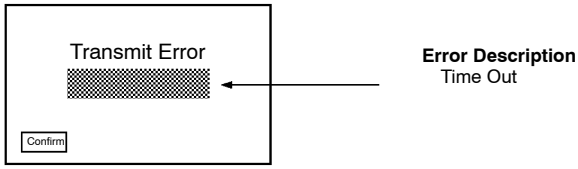
- **Display of Communication Errors**

As shown below, communication errors are displayed in the center of the screen, together with a classification indicating whether they are receive or send errors.

Screen when an Error Has Occurred during Reception



Screen when an Error Has Occurred during Sending



Message	Cause	Remedy
(SCI) Parity Error Framing Error Overrun Error Buffer Overflow	Communication parameters/ conditions set incorrectly.	Check whether the parity bit, data bit length, baud rate, stop bit length, and flow control settings of the PC match the settings of the NT30/30C.
	Noise caused data corruption during communication.	Use a noise-resistant cable if communication occurs in an environment with high levels of noise.
	The connectors of the connecting cable are not connected correctly.	Reconnect the cable.
Time Out	The connectors of the connecting cable have become disconnected.	Reconnect the cable.
	The PC is stopped.	Make sure the PC is able to communicate with the NT30/30C.
	During transmission of one command, a time lapse exceeding 5 seconds is detected.	Check the cable connection.
NAK Received (end code simultaneously displayed)	Noise caused data corruption during communication.	Check the allocated bit and word settings. If there is a possibility of noise, separate cables from the source of the noise, and insert noise filters in power lines. If the NT30/NT30C is used in an environment with high levels of noise, use a noise-resistant cable and make the cable length as short as possible.
Unit # Error	The unit # does not match that set in the PC.	Set the PC unit No. to 0.
	The PC is transmitting incorrect data.	Check PC operation.
	Noise caused data corruption during communication.	Use a noise-resistant cable if communication occurs in an environment with high levels of noise.
FCS Error Checksum Error	The PC is transmitting incorrect data.	Check PC operation.
	Noise caused data corruption during communication.	Use a noise-resistant cable if communication occurs in an environment with high levels of noise.

6-3 Maintenance of the NT30/30C

Carry out maintenance work in order to ensure that the NT30/30C is always used in its optimum condition.

⚠**WARNING** Never attempt repairs, modification or disassembly. You could sustain an electric shock.

- **Spare PT**

  It is advisable to have a spare NT30/30C available to minimize system downtime in the event of an NT30/30C failure or if the screen display becomes difficult to read due to deterioration of the display unit.

- **Backlight**

  When the backlight in the display is getting dim and the screen cannot be read easily, replace the backlight. The backlight can be replaced at the rear of the NT30/30C while it is mounted in an operation panel.

  - **Replaceable Backlight Model**

    NT30-CFL01 (for NT30)
    NT30C-CFL01 (for NT30C)

  - **Guide to Backlight Replacement**

    Under normal conditions it can be assumed that the backlight will need to replaced after about 10,000 hours. However, the life of the backlight does vary in accordance with the environment in which it is used and it should be replaced when it is getting dim and the screen is getting hard to read.

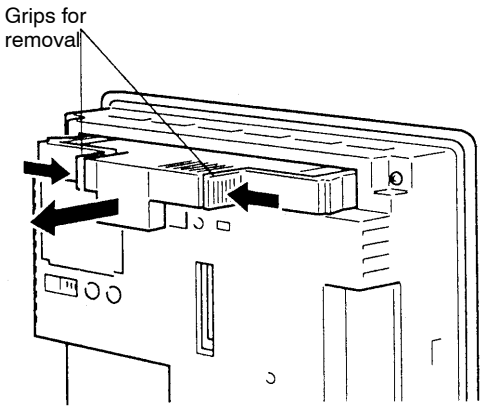
Replacing the Backlight

Use the following procedure to replace the backlight.

⚠**WARNING** Danger of electric shock. Switch OFF the NT30/30C power before changing the backlight.

Procedure

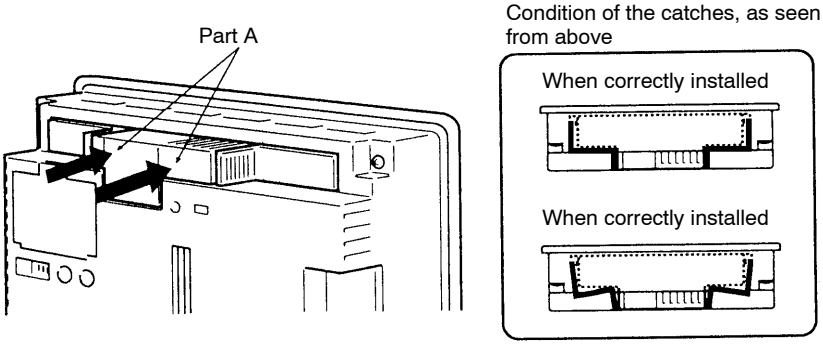
1. Turn OFF the power to the NT30/30C, grasp the backlight unit by its grips (this will cause the catches at either side of the backlight unit to disengage from the NT30/30C body) and pull the backlight unit toward you to remove it.



2. Fit a new backlight.

   After inserting the backlight unit until it is fully home, press firmly on both sides of part A until you hear a click. Check that the backlight unit catches

have engaged with the NT30/30C, and that the rear face of the backlight unit is parallel with the rear face of the NT30/30C, as shown in the figure below.



6-3-1 Replacing the Battery

The NT30/30C uses a lithium battery to back up the memory contents.

The battery life is 5 years if the NT30/30C is used in a location where the ambient temperature is 25°C. If the temperature at the location of use is higher than this, the battery life will be shorter. Change the battery at suitable intervals in accordance with the operating environment of the NT30/30C.

It is advisable to keep a spare battery so that the battery can be replaced immediately if replacement becomes necessary.

- **Battery model**

  C500-BAT08

- **Battery Replacement**

  Replace the battery in the following cases. The battery must be replaced within 5 days.

  - When 5 years have passed since the installation of a new battery.
  - When the RUN indicator is lit in orange (during operation) or in red (when stopped).
  - When the message “Battery Lowered” is displayed on switching ON the power or resetting the NT30/30C.
  - When “Lowered” is displayed when the battery check in the I/O check menu is performed.

- **Battery Replacing Method**

  Replace the battery by following the procedure given below.

  To protect the contents of the memory, the battery must be replaced in less than 5 minutes.

Procedure

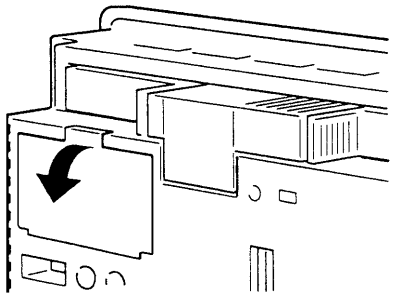
1. Keep the power ON for at least 1 minute and then turn it OFF.

Reference

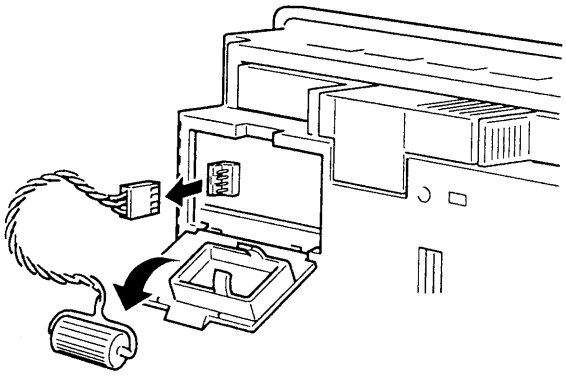
Unless the power is kept ON for at least 1 minute, the memory contents cannot be retained for more than 5 minutes without a battery.

2. Open the battery cover on the left side of the rear face of the NT30/30C by getting a purchase on its upper edge with your fingernails and pulling it toward you. Do not try to open the battery cover with a tool such as a screwdriv-

er instead of your fingers since this will cause scratching or damage the components inside the cover.



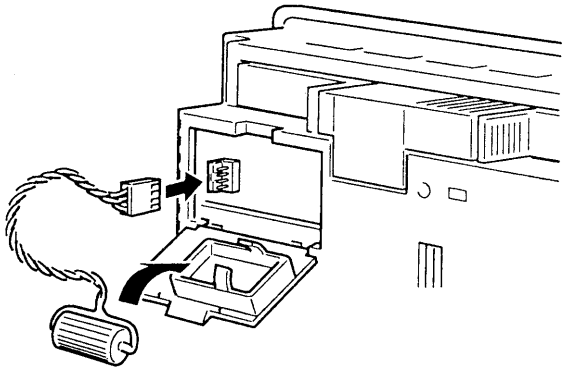
3. Remove the battery that is secured under the battery cover, grip the cable, and pull the connector straight out.



4. Insert the connector of the new battery into the connector on the NT30/30C and fit the battery under the battery cover.

   When inserting the battery connector, make sure that the projection on it faces to the left, and press it fully home while keeping it straight.

   The connector of the new battery must be connected within 5 minutes after disconnecting the old battery's connector. However, the battery can be replaced while the NT30/30C power is ON, and in this case there is no time restriction.



5. Close the battery cover, making sure that the cable is not trapped.

⚠ **Caution** When replacing a battery, ensure that the battery terminal does not touch the board in the NT30/30C.

6-4 Inspection and Cleaning

Clean and inspect the NT30/30C regularly to ensure that it is always used in its optimum condition.

Cleaning Method

If the display is dirty the screen is difficult to see. Clean the screen from time to time as follows.

- In daily cleaning, wipe the display with a soft dry cloth.
- If the soiling cannot be removed with a dry cloth, wet the cloth with diluted neutral detergent (2%), wring it out well and wipe the display with it.
- If rubber or vinyl products, tape, etc. are left stuck to the display for long periods they will cause staining. If such items are stuck to the display, remove them during cleaning.

Correct use

Never use volatile solvents such as benzene or thinners, or chemical dusters. These could cause degeneration of the coatings of the NT30/30C display and body.

Inspection Method

In normal environments, inspect the NT30/30C at intervals of between 6 months and a year. In environments that are extremely hot and humid, or very dusty environments, shorten the inspection interval.

- **Items Required for Inspection**

  Prepare the following items before starting the inspection.

  - The tools supplied with the NT30/30C
  - Screwdrivers (Philips, flat-head)
  - Tester (or digital voltmeter)
  - Industrial alcohol
  - 100% cotton cloth
  - Hygrometer (required in some cases)
  - Thermometer (required in some cases)
  - Synchroscope (required in some cases)
  - Pen-writing oscilloscope (required in some cases)

- **Points Inspected**

  Inspect the following points to determine if there is any divergence from the stated criteria. If there is, either improve the surrounding environment so that the values fall within the stated range, or adjust the NT30/30C.

Point Inspected	Inspection Details	Criterion	Inspection Instrument
Power supply voltage	Fluctuation in power supply terminal voltage	Permissible voltage fluctuation range (24 VDC –15% +10%)	Tester
Ambient environmental conditions	Ambient temperature (temperature in the operation panel)	0 to 50°C	Thermometer
	Ambient humidity (humidity in the operation panel)	35% to 85%	Hygrometer
	Presence/absence of dust	Dust must not be settled	Visual inspection

Point Inspected	Inspection Details	Criterion	Inspection Instrument
Mounting conditions	Looseness of mounting brackets etc.	To be no looseness	Accessory tools
	Connector connections of connecting cable	To be fully inserted and locked, with no looseness	
	Looseness of screws in external wiring	To be no looseness	Philips screwdriver
	Conditions of external connecting cables	Faults such as incipient disconnections.	Visual inspection
Components with limited lives	Brightness of the backlight	Must be sufficiently bright. Backlight life: Brightness is halved after about 10,000 hours in use.	Visual inspection

⚠ **Caution**
- If a faulty unit is returned for repairs, write as detailed a description of the fault as possible and send this description together with the unit to the OMRON address indicated on the back cover of this book.
- When disposing of an PT that is no longer required, be sure to comply with any local restrictions that apply to its disposal.

Reference Cautions on replacing the NT30/30C

When replacing the NT30/30C after discovering a fault during inspections, note the following points:

- Be sure to switch the power OFF before replacement.
- After replacement, check that the new NT30/30C is not subject to the same error.

Appendix A
Specifications

General Specifications

Item	Specification
Power supply voltage	24 VDC
Allowable power supply voltage range	20.4 VDC to 26.4 VDC (24 VDC –15% +10%)
Power consumption	15 W max.
Ambient operating temperature	0 to +50°C (with no freezing)
Storage temperature	–20 to +70°C (with no freezing)
Ambient operating humidity	35% to 85% (with no condensation)
Operating environment	No corrosive gases.
Resistance to electrostatic discharge	Level 3 (IEC801-2) In air ±8 kV, contact ±6 kV, indirect ±7 kV
Electromagnetic field strength	10 V/m (IEC801-3)
Fast transient/burst noise	Power supply line: 2 kV (IEC801-4) I/O line: 0.25 kV
Damped oscillatory wave	Power supply line: 1 kV (IEC255-4)
Vibration resistance	10 to 57 Hz with 0.075 mm single amplitude for a total of 30 min. in X, Y, and Z directions
	57 to 150 Hz with 9.8 m/s^2 acceleration in X, Y, and Z directions
Shock resistance	Malfunction: 15 G, 3 times each in X, Y, and Z directions
Dimensions (mm)	195 x 142 x 56 mm (WxHxD) (when B7A Interface Unit installed: 195 x 142 x 75 mm (WxHxD))
Weight	1.0 kg max.
Enclosure ratings	Front panel: Equivalent to IP65 (front face waterproof construction).
	Rear case: IP20
	Terminals: IP00
Applicable standards	EN61131-2 (1995) EN50081-2 (1992)

Performance Specifications

Display Specifications

Item	Specification	
Display panel	Display device	NT30: Monochrome LCD (2 backlight colors) NT30C: Color STN LCD (with backlight)
	Number of dots (resolution)	320 dots horizontally x 240 dots vertically
	Effective display area	115.2 mm horizontally x 86.4 mm vertically
	View angle	Left/right direction: 35° Up: 25° Down: 35°
	Display color	NT30: Backlight white, red NT30C: 8 colors (and intermediate colors can be displayed with tiling patterns)
	Service life	50,000 hours minimum (guidance figure assuming normal use)
Backlight (white cold cathode tube)	Service life	10,000 hours minimum (until brightness reduced to 50%)
	Automatic turn-off	Can be set to turn off in 10 minutes or 1 hour, or to remain on.
Indicators	POWER (Green indicator)	Lit while power is being supplied.
	RUN	Lit in green during operation. Lit in orange (during operation) or in red (when NT30/NT30C stopped) if battery voltage becomes low.

Panel Specifications

Item	Specification
Touch panel	Number of switches: 192 (16 horizontally x 12 vertically) Maximum number that can be registered per screen: 192
	Input: Pressure-sensitive type
	Threshold force for operation: 1 N min.
	Life expectancy: 1 million operations minimum
Expanded I/O (B7A Interface Unit)	Input: 8 points/16 points Output: 8 points/16 points (total I/O: 32 points)

Display Capacity

Item		Specification
Display elements (*1)	Character displays	Fixed character data (character strings registered for each screen)
	Character string displays	50 positions per screen (40 bytes per string)
	Numeral displays	50 positions per screen, 8-digit display
	Graph displays	50 positions per screen, capable of displaying signs, % display
	Trend graph	One frame per screen, 50 items per frame
	Broken line graph	One frame per screen, 256 items. per frame, 512 points per item, 512 points per screen
	Graphic displays	Can be displayed wherever required
	Lamps	Max. 1024 lamps per file, 256 positions per screen
	Touch switches	Max. 1024 per switches file, 192 positions
	Numeral settings	Display of set numerical values, 50 per screen
	Character string settings	Display of setting character-strings, 50 per screen
	Alarm list	4 groups per screen (The alarm history is displayed in the order of occurrence and frequency, group by group.)
	Alarm history	
	Clock display	Time display of built-in clock by numeral display function
Screen types	Normal screen	Displays screens registered as normal.
	Overlapping screens	A maximum of 8 registered screens can be displayed overlapping each other.
	Consecutive screens	A maximum of 8 screens can be displayed sequentially by scrolling. (The screen can be scrolled by ↑ ↓ keys)
	Window screens	For input setting numeric keys/character keys (maximum of 50 settings). Window screens use screen numbers 1900 to 1979.
	Display history screens	Order of occurrence (max. 1023 screens), order of frequency (max. 255 times)
Screen attributes		Buzzer, display history, numeral setting display, background colors (NT30C only), backlight color (NT30 only), backlight
Number of screens	Max. number of registered screens	2000 screens
	Screen number	0: No display 1 to 2000: User registered screens (However, 1997 screen is a display history occurrence order screen, 1998 screen is a display history frequency order screen, 1999 screen is a host connecting screen, and 1999 screen is the screen displayed during connection to the host.)
Screen registration method		By transferring screen data created using the support tool to the NT30/30C.
Screen saving method (screen data memory)		Flash memory (storing format unique to NT30/30C)

(*1) The total number of display elements for numeral display, graphs, and numeral settings must be 1024 or less.

Display Element Specifications

Item	Specifications
Display characters	Half-size characters (8 x 8 dots): Alphanumerics and symbols Normal-size characters (8 x 16 dots): Alphanumerics and symbols Mark (16 x 16 dots): User-defined pictographs (32 x 32 dots) (64 x 64 dots) Image data: 8 x 8 to 320 x 240 dots, User-defined image character size is set freely in the unit of 8 x 8 dots. Library data: 1 x 1 to 320 x 240 dots
Enlargement function	Double width, double height, and magnification of 4x, 9x, 16x, 64x
Smoothing processing	Available for enlarged characters with magnification of 4x or more
Character display attribute	Normal, inverse, flashing, inverse flashing, transparent display
Image data	Variable-size pictograph Size: Min. 8 x 8 dots, max. 320 x 240 dots Capable of setting a size in the unit of 8 dots Incapable of setting the enlarged display, smoothing processing, display attributes such as inverse/flashing.
Library data	Combination of any graphics Size: Min. 1 x 1 dot, max. 320 x 240 dots Capable of setting any size Enlarged display, smoothing processing, and display attributes such as inverse/flashing are displayed according to the setting registered.
Graphics	Continuous straight line, circle, arc, sector, rectangle, polygon
Line type	4 types only for continuous straight line (solid line, broken line, alternate long and short dash, long and two short dashes)
Painting out	10 types
Graphic display attributes	Normal/inverse flashing, transparent display
Display color (NT30C only)	8 colors (red, green, blue, yellow, magenta, cyan, white, black)
Color specification (NT30C only)	Display color, background color, boundary color (line color)

Data Quantities

Item	Specifications
Character-string data	40 characters (normal-size) x 1000; 744 data are only for reading operation)
Numeral data	8-digit x 1000
Bit data	One contact x 256
Mark data	224 (in terms of 16 x 16 dots)
Image data	224
Library data	896
Touch switches	Each 1024
Lamps	

Special Features

Item	Specifications
Buzzer	Three kinds of sound (continuous sound, intermittent short-sound, intermittent long-sound) ON: Reception of a command from the PC, buzzer setting screen display, error screen display such as abnormal reception OFF: Reception of a command from the PC, [sound] key input, screen display without buzzer setting Sound pressure: Min. 80 dB/Average 87 dB (measured at 10 cm in front) Setting: Set the “Buzzer Sound” to “ON” in the “MEMORY SWITCH MENU”. “ERR ON” for only when an error occurs.
Maintenance functions	• Self-test function, such as memory, switch • Setting condition confirmation function, such as communication condition • Communication check function
Battery retention	• Retention of display history data • Retention of NT610C memory data Battery life: Five years (25°C) When the voltage drops: A message “Battery Lowered” is displayed. The RUN indicator is lit in orange or red. Communication flag (BAT LOW) to the PC is ON (1).
Key input sound setting	Touch switch Input sound: Sounds for 0.2 second. Setting: Set the “Key Press Sound” to “ON” in the “MEMORY SWITCH MENU”.
Resume function	To retain the contents without initializing the memory table (character string, numeral value) when turning ON the power, resetting, changing over the operation mode. Setting: Set the “Resume Function” to “ON” in the “MEMORY SWITCH MENU”.
Screen printing function	To print the screen just displayed by means of printer interface connector. Setting: Set an output specification in the “MEMORY SWITCH MENU”. ESC/P color: Conforms to ESC/P 24-J83C, color printing ESC/P grayscale: Conforms to ESC/P 24-J83C, monochrome 8 grayscale levels PR201H color: Conforms to PC-PR201H, color printing PR201H grayscale: Conforms to PC-PR201H, monochrome 8 grayscale levels

Communications Specifications

For a Host Link via RS-232C

Item	Specification
Communications standard	EIA RS-232C
Communications settings	Start-stop synchronization Baud rate: 9600, 19,200 bps Data length: 7 bits Stop bits: 2 bits Parity: Even
Connector	9-pin, D-sub connector (female)
Number of Units connected	1 to 1
Transmission distance	Max. 15 m
Communications protocol	C-series SYSWAY (1:N)

For a Host Link via RS-422A

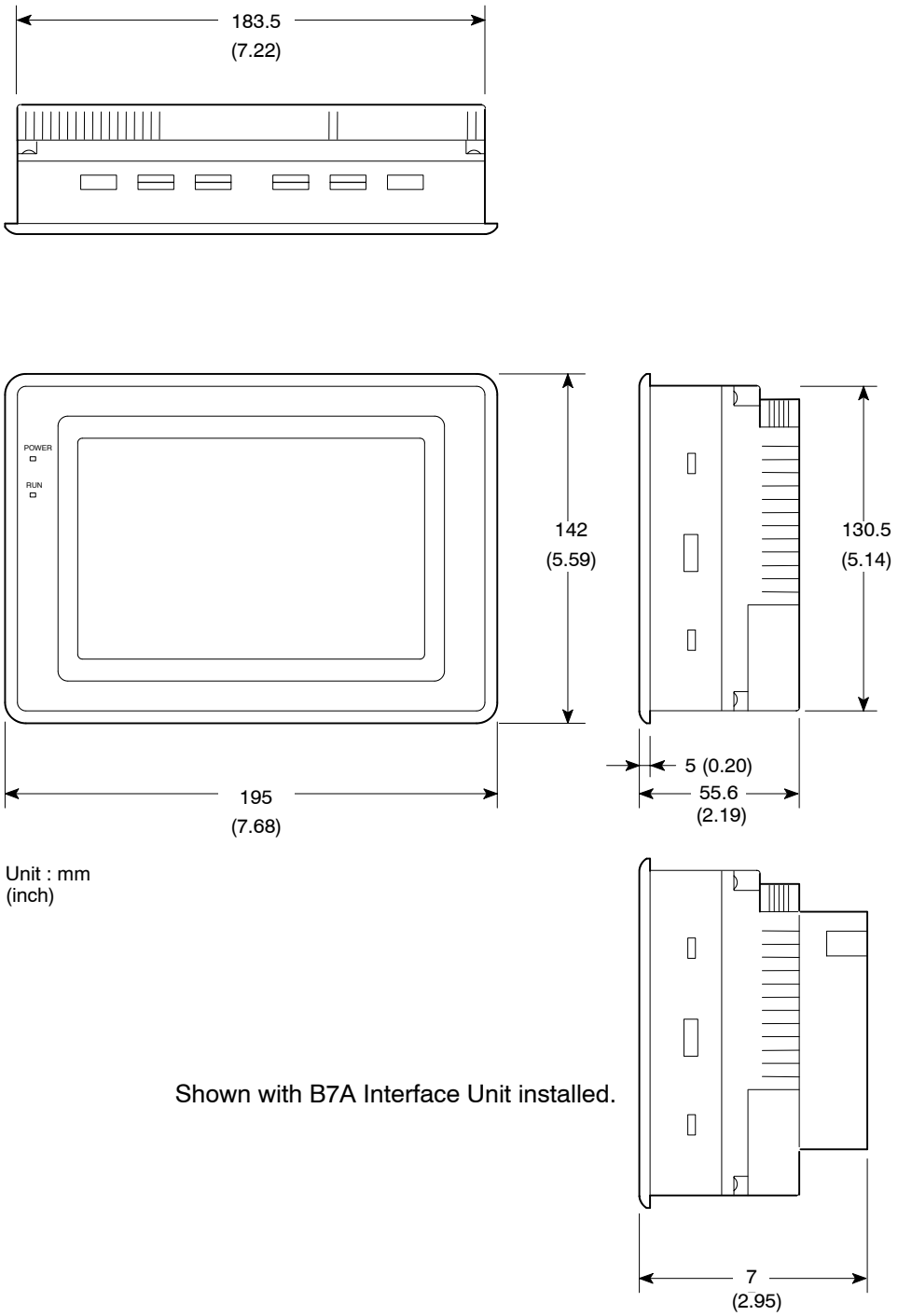
Item	Specification
Communications standard	EIA RS-422A
Communications settings	Start-stop synchronization Baud rate: 9600, 19,200 bps Data length: 7 bits Stop bit: 2 bits Parity: Even
Communications terminal block	M3.5
Number of Units connected	1 to 1
Transmission distance	Max. 500 m
Communications protocol	C-series SYSWAY (1:N)

For NT Link

Item	Specification
Communications standard	EIA RS-232C
Connector	9-pin D-sub connector (female)
Number of Units connected	1 to 1
Transmission distance	Max. 15 m

Appendix B
Dimensions

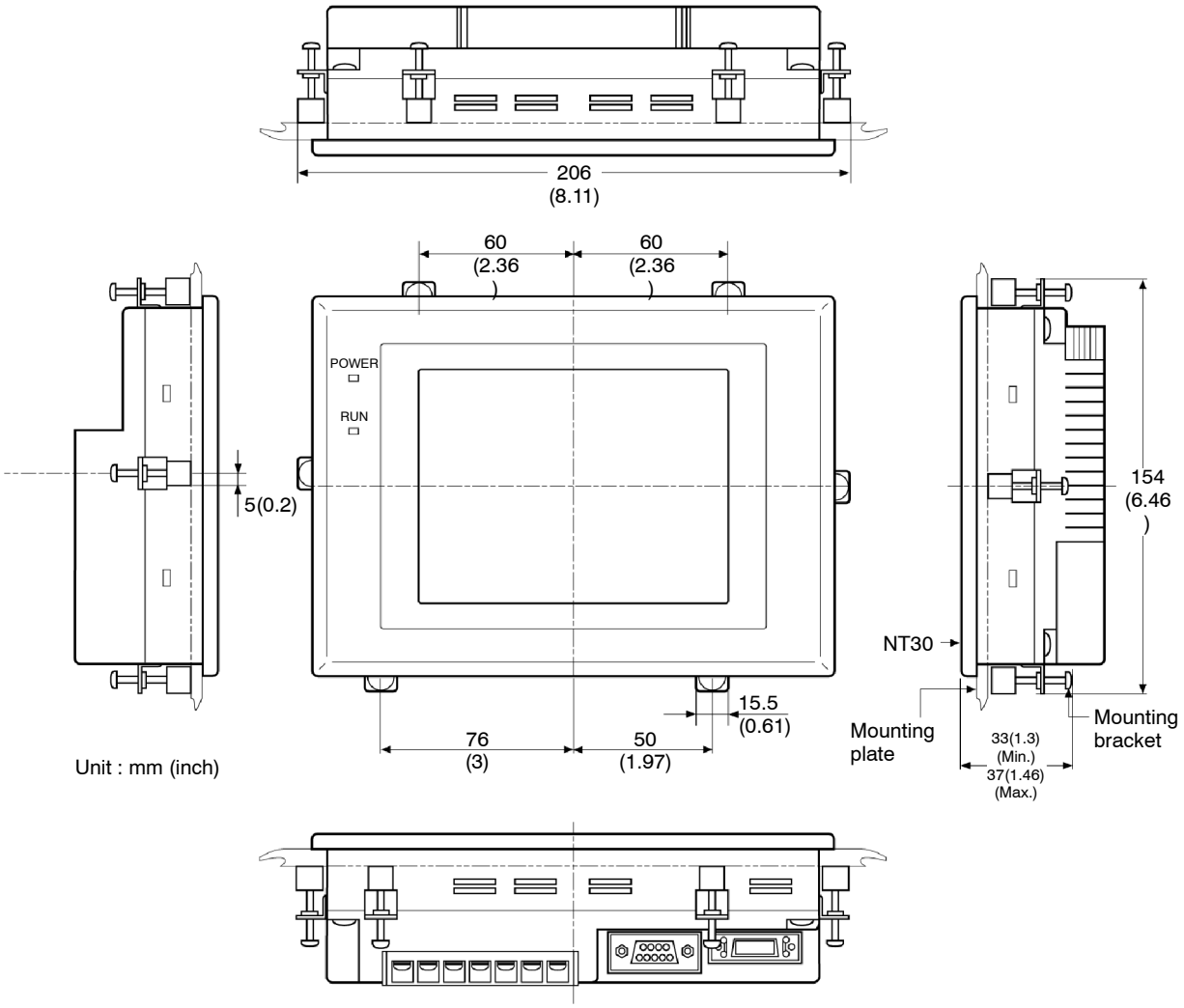
Programming Terminals (NT30-ST131(B)-E, NT30C-ST141(B)-E)



Unit : mm
(inch)

Shown with B7A Interface Unit installed.

Mounting bracket dimensions

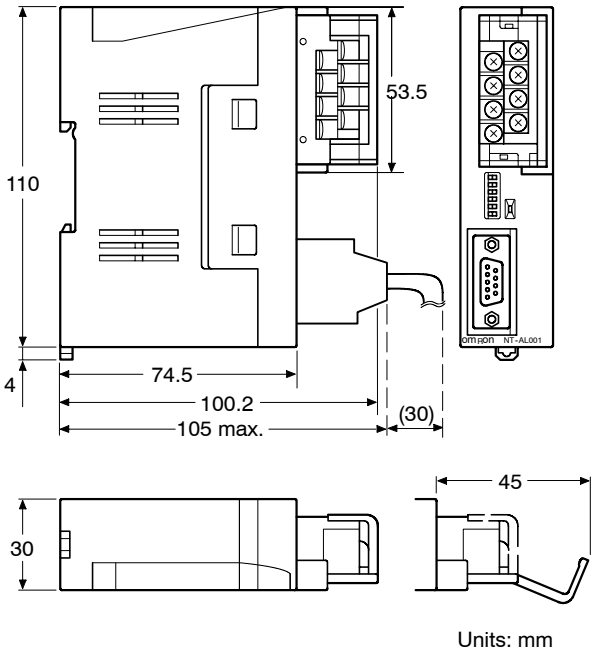


Unit : mm (inch)

Appendix C
Using RS-232C/RS-422A Link Adapters

This section outlines the external dimensions, procedure for mounting and removal, and specifications of an RS-232C/RS-422A Link Adapter (NT-AL001). Refer to this information when designing the control panel.

Dimensions



Units: mm

30 × 114 × 100.2 mm (WxHxD): with the RS-422A terminal block cover closed

30 × 114 × 119.5 mm (WxHxD): with the RS-422A terminal block cover open

Methods for Mounting and Removal

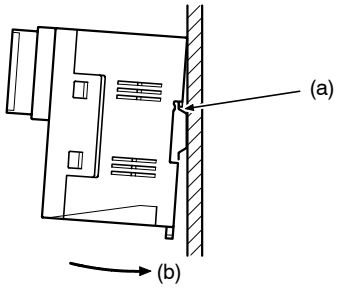
The RS-232/RS-422 Link Adapter (NT-AL001) can be mounted on a DIN track or in an operation panel.

The RS-422A terminal block of the Link Adapter can be easily removed.

Mounting to a DIN Track

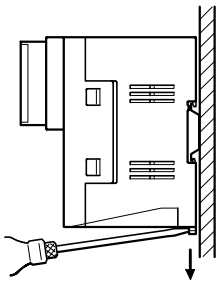
Latch the top part of the rear face of the Link Adapter (“a” in the figure) onto the top edge of the DIN track, and push the Unit in the direction indicated by “b” in the figure.

Then fit end plates at the right and left of the Link Adapter to secure it and ensure that it cannot shift laterally.



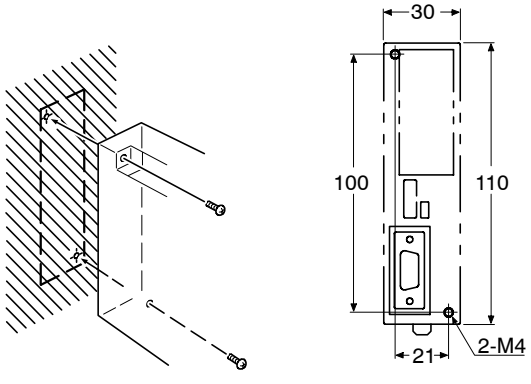
Removal from a DIN Track

Remove the end plates at right and left of the Link Adapter and, as shown in the figure below, insert a flat blade screwdriver into the track stopper at the bottom face of the Link Adapter and prize it free.



Mounting to an Operation Panel

Drill two mounting screw holes in an operation panel with a thickness of at least 2 mm and secure the Link Adapter with screws.



Units: mm

Note In order to ensure a secure and strong mount, mount the Link Adapter in an operation panel with a thickness of at least 2 mm (0.08 inch).

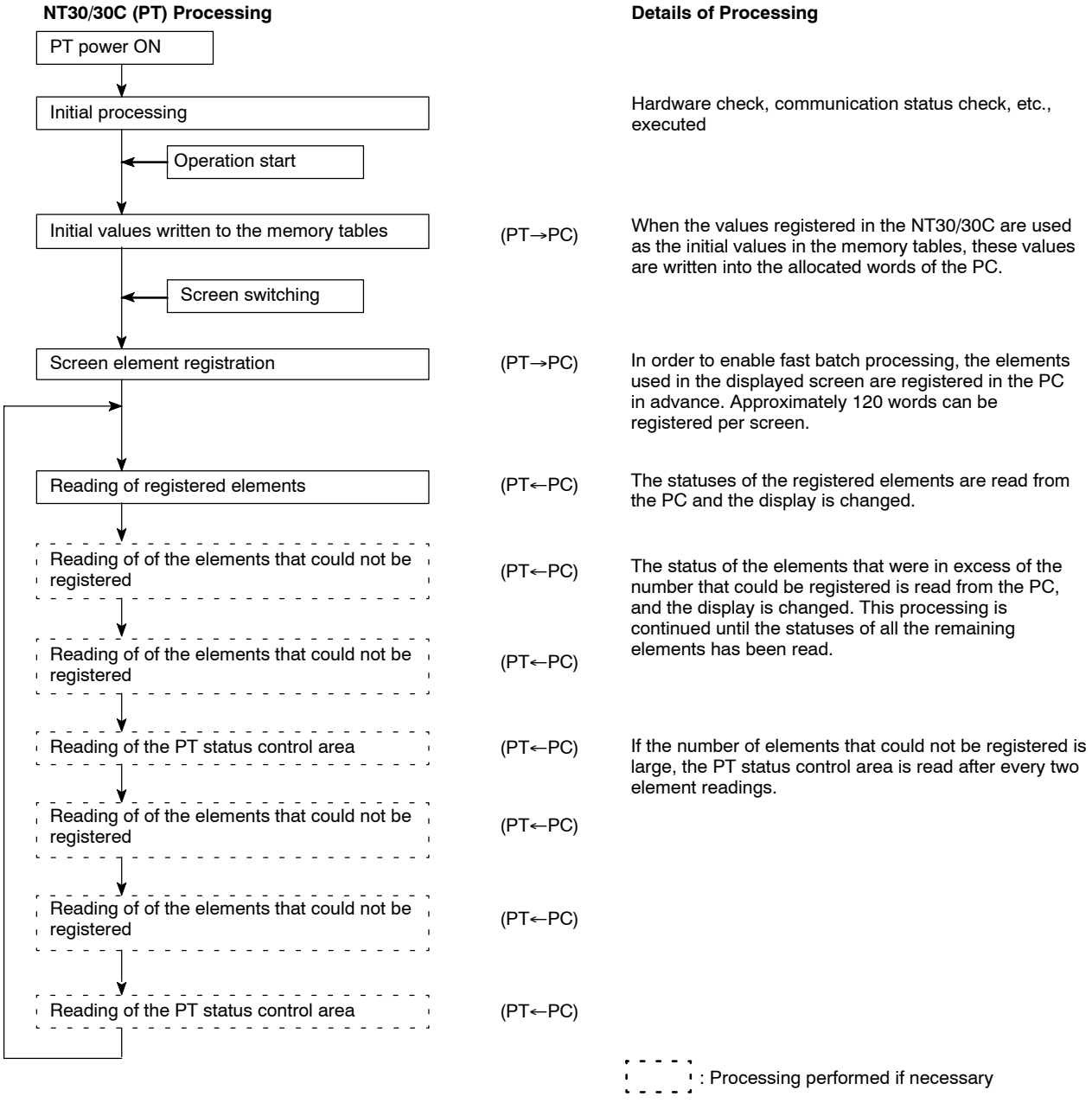
Appendix D
NT30/30C Internal Processing

The following processing is executed inside the NT30/30C. Processing is divided into two types: periodic processing and event processing.

Periodic Processing

The following processing is executed inside the NT30/30C to enable high-speed control from the PC.

Usually, the only data read from the PC are the elements used for the currently displayed screen. Even if the contents of the PC words allocated to memory tables are changed, these contents are not updated at the PT unless the memory table is used for the displayed screen. However, the bit memory table that can be used with Ver.3 and later versions of the direct connection function can be set to be read continually.



- **Number of Words for Screen Element Registration**

The number of words used for screen element registration is as follows.

Allocated words: Number of words

Allocated bits: Number of words calculated by summing the number of bits in each area and taking 1 word to be 16 bits.

Example:

Character string memory table: 3 of 12 allocated words each
Numeral memory table: 4 of 2 allocated words each
Allocated bits for control: 19 I/O relays, 7 link relays (contiguous bits)

The number of words assigned to character string memory table and numeral memory table is as follows:

12 words × 3 + 2 words × 4 = 44 words

The assignment for bits is as follows:

19 I/O relays ÷ 16 = 1 word with a remainder of 3 bits → 2 words
7 link relays ÷ 16 = 0 words with a remainder of 7 bits → 1 word

The total is therefore 44 words + 2 words + 1 word = 47 words

Elements occupying up to approximately 120 words, calculated in this way, can be registered. If the number of elements is larger than this, internal processing is increased in proportion to the excess number and this generates a delay in processing.

If the point where the quantity that can be registered is exceeded is in the middle of an element that spans several words (for example a character string memory table), registration is quit without registering that element.

If there are bit memory table entries that have been set to be read continuously, the requirement for this processing is also registered. If the number of such bit memory table entries is large, processing will be delayed.

- **Order of Priority for Registration**

Elements are registered in the following order of priority according to their type.

(1) Allocated words of the PT status control area
(2) Allocated bits for control (lamps, lamp bits of touch switches, bit memory table entires)
(3) Allocated words of numeral memory table
(4) Allocated words of character string memory table

If there is more than one element for each of (2) through (4), the elements are registered in accordance with the following priority of word and bit areas:

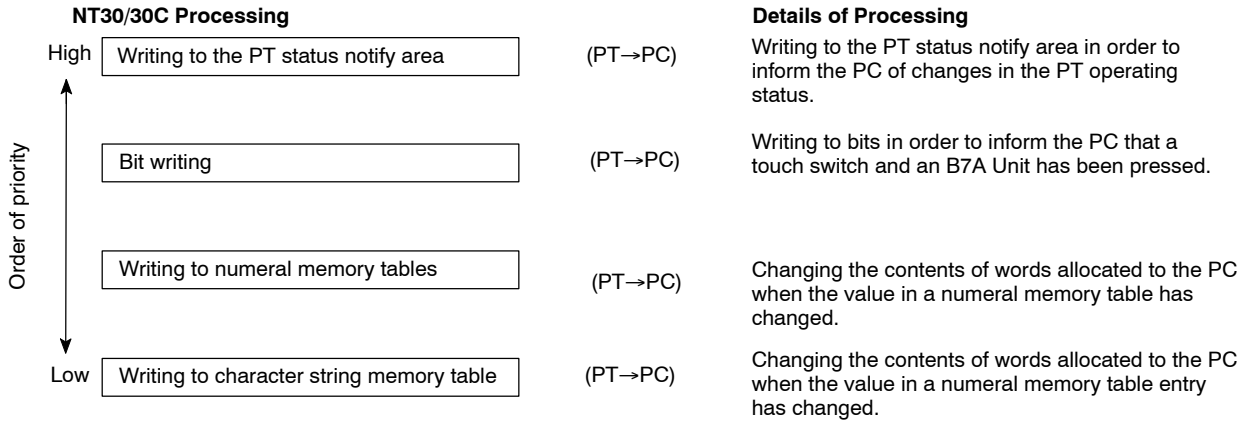
(1) Data memory (DM)
(2) I/O relays (CH)
(3) Timers (TIM)
(4) Counters (CNT)
(5) Holding relays (HR)
(6) Auxiliary relays (AR)

Within each area, words and bits are allocated from the smallest number up.

Event Processing

When the status of the NT30/30C changes during operation, the processing for writing the changed data to the relevant area of the PC memory is executed.

This kind of processing is only executed when statuses change. When changes occur simultaneously, processing is executed in accordance with the order of priority.



Data is only written to PC bits and numeral/character string memory table entries for elements in screens currently being displayed. If the contents of numeral/character string memory table entries that are not being displayed change, the changed contents are not written to the PC.

Appendix E
Making the Cable to Connect to the PC

Explained below is the method for making the cable that connects the NT30/30C and the PC.

Connect the wires to the connectors in accordance with the connector specification for each unit.

Parts Required

Two connectors, two connector covers and one cable are required to make up a connecting cable. One connector and one connector cover is supplied with most PCs.

Name	Model	Delivered with	Remarks
Connector	XM2A-0901	C series CQM1, C200HS, C200HX/HG/HE, CPM1, SRM1 CVM1/CV series CPU Unit CV500-LK201	9-pin, manufactured by OMRON
	XM2A-2501	C500-LK203 C500-LK201 C200H-LK201	25-pin, manufactured by OMRON
	DB-25P	C500-LK201-V1 C120-LK201-V1	25-pin, manufactured by JAE
Connector Cover	XM2S-0911	C series CQM1, C200HS, C200HX/HG/HE, CPM1, SRM1 CVM1/CV series CPU Unit CV500-LK201	9-pin, manufactured by OMRON
	XM2S-2511	C500-LK203 C500-LK201 C200H-LK201	25-pin, manufactured by OMRON
	DB-C2-J9	C500-LK201-V1 C120-LK201-V1	25-pin, manufactured by JAE

Note When connecting the NT30/30C to an OMRON PLC C□□H , the connector and the connector hood must be prepared separately since they are not supplied with the C□□H.
The connector provided in the CPU Unit of the C□□H is a 9-pin connector. For the connection, the following connector and connector hood should be prepared.

- Connector: XM2A-0901 (9-pin, OMRON)
- Connector hood: XM2S-0911 (9-pin type, OMRON)

Prepare the cable recommended by OMRON.
The recommended cables are indicated in the following table.

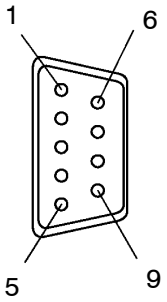
Name	Type	Remark
Cable	AWG28×5P IFVV-SB	Multiconductor shielded cable (FUJIKURA, Ltd.)
	CO-MA-VV-SB 5P×28AWG	Multiconductor shielded cable (HITACHI Cable, Ltd.)

Connector Specifications and Wiring for OMRON Units

The combination of pin numbers to which the connecting wires are connected differs according to the connector specifications for each unit. Check the connector specifications of the unit to be connected and make the wiring connections for the items in the connection combination indicated below which are applicable.

NT30/30C Connector Specifications (9-pin)

- Electrical characteristics: Complies with EIA RS-232C
- Signal direction: Signal input and output is relative to NT30/30C.



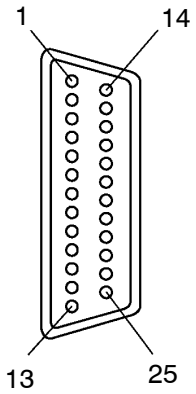
Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
6	+5V (150 mA Max.)	+5V		○
9	Signal ground	SG (GND)	–	–

* Before using the +5V supply of pin No. 6, check that the current capacity of the equipment to be supplied is no greater than 150 mA.
The +5V output of NT30/30C is +5V ± 5% 150 mA max.

Connecting an NT30/30C to a C-Series Host Link

- **C-series Host Link Unit 25-pin connector specifications**

- Applicable Host Link Unit: C200H-LK201-V1
  C500-LK201-V1
  C500-LK203
  C120-LK201-V1
- Electrical characteristics: Complies with EIA RS-232C
- Signal direction: Signal input and output is relative to the PC.



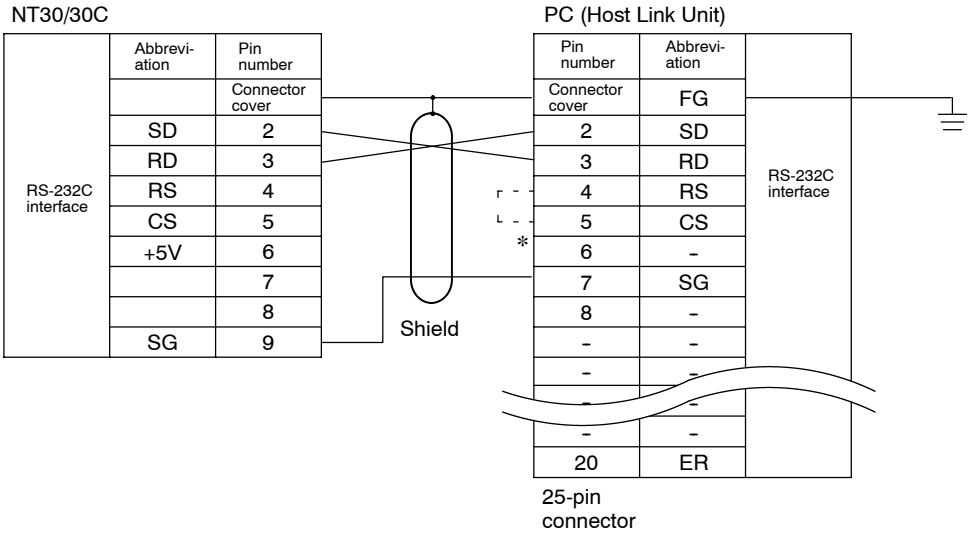
Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
1	Frame ground	FG	–	–
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
7	Signal ground	SG (GND)	–	–
14	Optical connector +5V (see note 2)	+5V	–	–
15	Send signal element timing 2 (see note 1)	ST2	○	
17	Receive signal element timing (see note 1)	RT	○	
20	Data terminal ready	ER (DTR)		○
24	Data signal element timing (see note 1)	ST1		○

Note 1. No element timing signals on C200H-LK201-V1
2. C500-LK201 and C200H-LK201-V1 only

- **Wiring Connections**

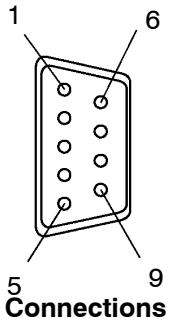
The NT30/30C does not use pin 4 (RS) or pin 5 (CS). Either short the RS and CS pins of the PC connector together or set the CTS setting selector switch at the rear face of the Host Link Unit to "0V" (see ∗ in the figure).

Connect the cable shield to the connector cover and pin 1 at the Host Link Unit end of the cable only.



Connecting an NT30/30C to a C-Series CPU Unit (C□□H)

- **C-series CPU Unit (C□□H) 9-pin Connector Specifications**
  - Applicable CPU Unit: C20H/C28H/C40H/C60H
  - Electrical characteristics: Complies with EIA RS-232C
  - Signal direction: Signal input and output is relative to the PC.

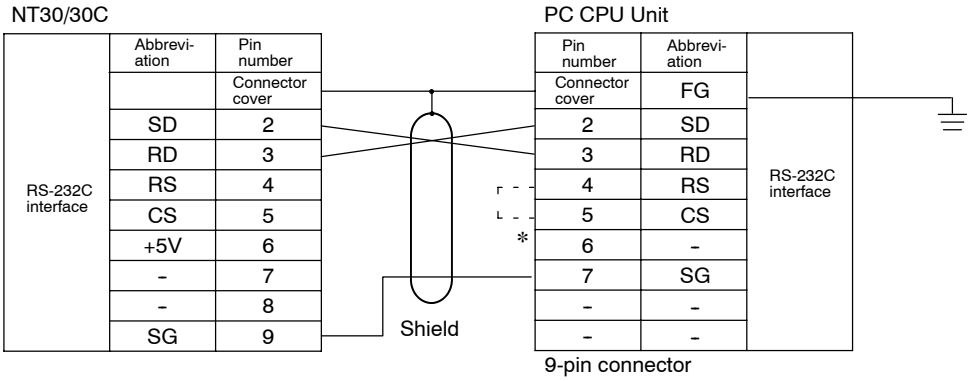


Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
7	Signal ground	SG (GND)	–	–

- **Wiring Connections**

The NT30/30C does not use pin 4 (RS) or pin 5 (CS). Short the RS and CS pins of the PC connector together (see ∗ in the figure).

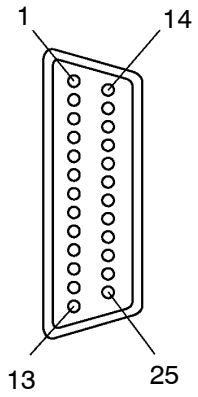
Connect the cable shield to the connector cover and pin 1 at both the NT30/30C and CPU Unit ends of the cable.



Connecting an NT30/30C to a CVM1/CV-Series Host Link Unit

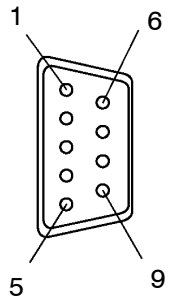
- **CVM1/CV-series Host Link Unit connector specifications**
  - Applicable Host Link Unit: CV500-LK201
  - Electrical characteristics: Complies with EIA RS-232C
  - Signal direction: Signal input and output is relative to the PC.

Communications Port 1 (25-pin Connector)



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
1	Frame ground	FG	–	–
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
7	Signal ground	SG (GND)	–	–
8	Carrier detected	CD (DCD)	○	
14	Optical connector +5V	+5V		○
20	Data terminal ready	ER (DTR)		○

Communications Port 2 (9-pin Connector)



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
9	Signal ground	SG (GND)	–	–

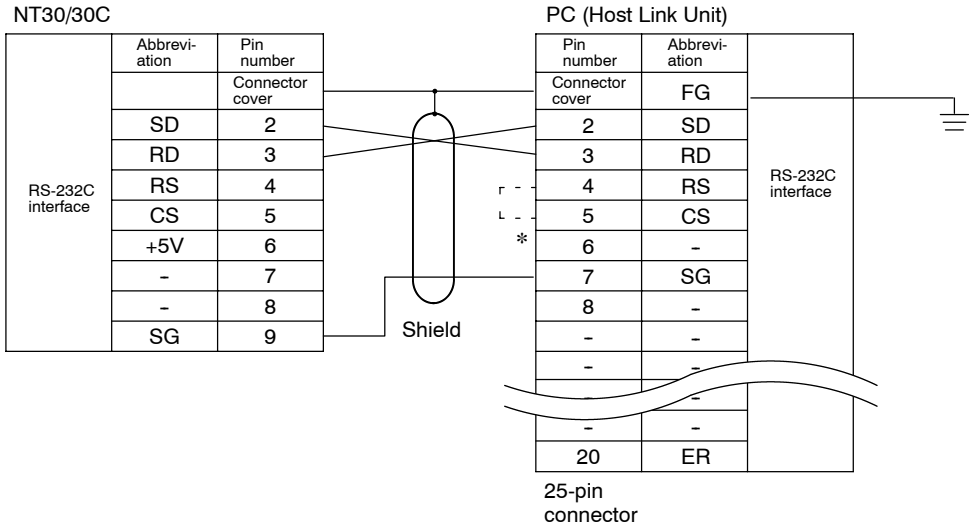
- **Wiring Connections**

CVM1/CV-series Host Link Units have two types of connector, which must be wired differently.

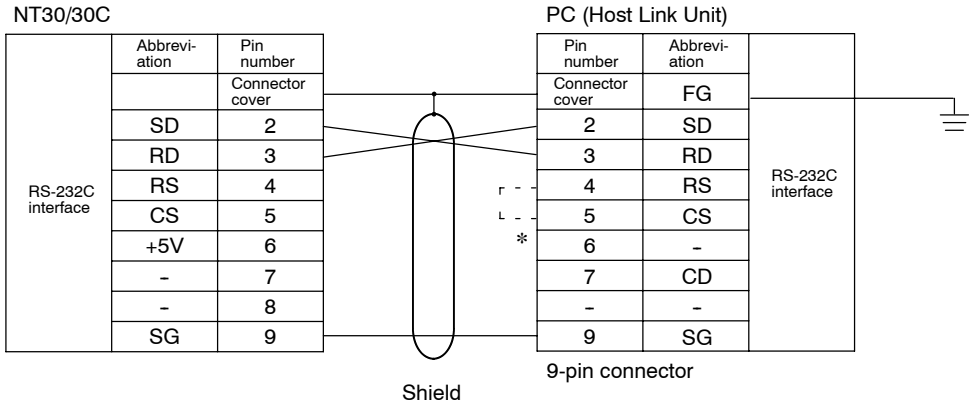
The NT30/30C does not use pin 4 (RS) or pin 5 (CS). Either short the RS and CS pins of the PC connector together or set the CTS setting selector switch at the rear face of the Host Link Unit to “0V” (see ∗ in the figure).

Connect the cable shield to the connector cover and pin 1 at the Host Link Unit end of the cable only.

Communications Port 1 (25-pin Connector)



Communications Port 2 (9-pin Connector)



Connecting an NT30/30C to an SRM1, a CS1-series Serial Communications Unit, or a CPU Unit Other Than a C-Series C□□H CPU Unit

- **CS1-series CS1G/H, C-series C200HS, C200HX/HG/HE(-Z), CPM1, CPM2A, CPM2C, CQM1, CQM1H, CVM1/CV-series (-EV□) CPU Unit, SRM1, CS1-series Serial Communications Unit 9-pin connector specifications**

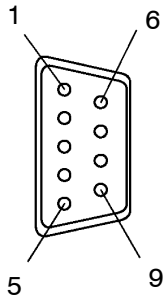
Applicable CPU Units, SRM1:

CPM1-10CDR-□	CQM1-CPU21-E	C200HS-CPU21-E	C200HX-CPU34-(Z)E	CS1G-CPU42(-V1)
CPM1-20CDR-□	CQM1-CPU41-EV1	C200HS-CPU23-E	C200HX-CPU44-(Z)E	CS1G-CPU43(-V1)
CPM1-30CDR-□	CQM1-CPU42-EV1	C200HS-CPU31-E	C200HX-CPU54-(Z)E	CS1G-CPU44(-V1)
CPM1-30CDR-□-V1	CQM1-CPU43-EV1	C200HS-CPU33-E	C200HX-CPU64-(Z)E	CS1G-CPU45(-V1)
CPM1A-10CD□-□	CQM1-CPU44-EV1		C200HX-CPU65-(Z)E	
CPM1A-20CD□-□		C200HE-CPU32-(Z)E	C200HX-CPU85-(Z)E	CS1H-CPU63(-V1)
CPM1A-30CD□-□		C200HE-CPU42-(Z)E		CS1H-CPU64(-V1)
CPM1A-40CD□-□			CV500-CPU01-EV1	CS1H-CPU65(-V1)
			CV1000-CPU01-EV1	CS1H-CPU66(-V1)
CPM2A-30CD□□-□	CQM1H-CPU11	C200HG-CPU33-(Z)E	CV2000-CPU01-EV1	CS1H-CPU67(-V1)
CPM2A-40CD□□-□	CQM1H-CPU21	C200HG-CPU43-(Z)E	CVM1-CPU01-EV□	
CPM2A-60CD□□-□	CQM1H-CPU51	C200HG-CPU53-(Z)E	CVM1-CPU11-EV□	SRM1-C02-V2
	CQM1H-CPU61	C200HG-CPU63-(Z)E	CVM1-CPU21-EV□	
				CS1W-SCU21

The host link function incorporated in CV/CVM1 CPUs (with the exception of -EV□) cannot be used.

Refer to *Section 2 Hardware Settings and Connections* before connecting to the peripheral port of a CPM1, CPM2A, CPM2C, CQM1H, SRM1, or CS1G/H CPU Unit, and use the special Connecting Cables or Adapters.

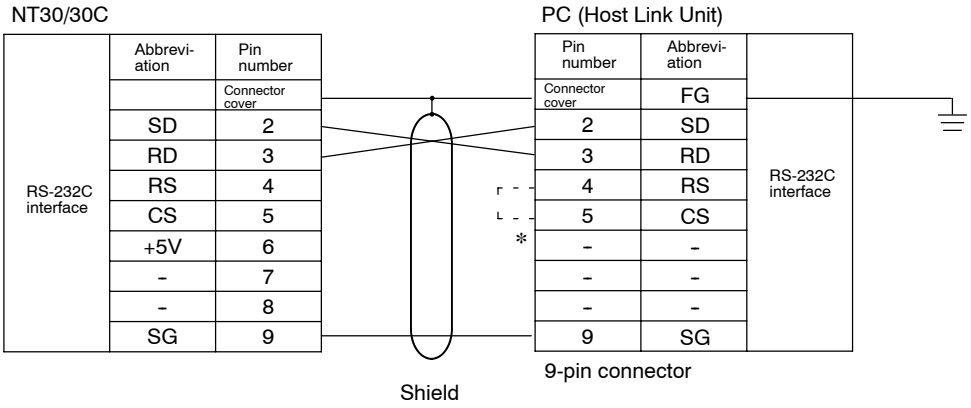
- Electrical characteristics: Complies with EIA RS-232C
- Signal direction: Signal input and output is relative to the PC.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground	FG	–	–
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
9	Signal ground	SG (GND)	–	–

- **Wiring Connections**

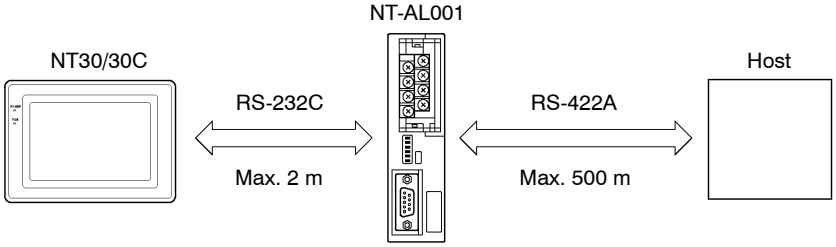
The NT30/30C does not use pin 4 (RS) or pin 5 (CS). Either short the RS and CS pins of the PC connector together or set the CTS setting selector switch at the rear face of the Host Link Unit to "0V" (see ∗ in the figure).



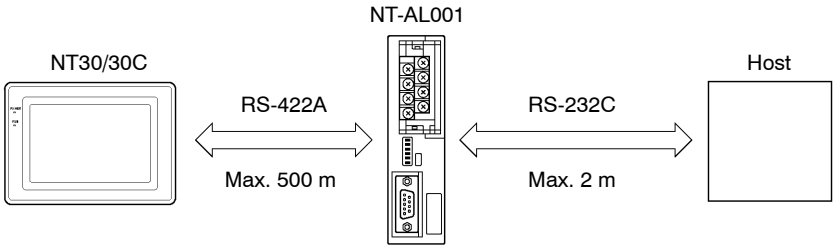
Connecting an NT30/30C to an RS-232C/RS-422 Converter Unit (NT-AL001)

By connecting an RS-232C/RS-422 converter unit, transmission distance of 15 m or longer (max. 500 m) is realized. It is also possible to connect an RS-422A type NT30/NT30C to an RS-232C connector of a host.

- **RS-232C type NT30/30C**



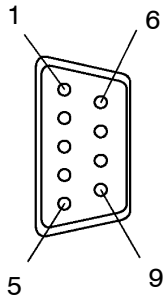
- **RS-422A type NT30/30C**



Reference When connecting the C200HX/HG/HE to an RS-232C/RS-422 converter unit, use the converter unit of lot No. 15YS or above.
A converter unit prior to lot No. 15YS cannot be used.

- **NT-AL001 RS-232C Connector Specifications (9-pin Type)**

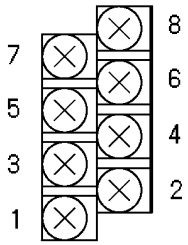
  - Electrical characteristics: Complies with EIA RS-232C
  - Signal direction: Signal input and output is relative to the NT-AL001.



Connector Pin No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
Connector cover	Frame ground or earth	FG	–	–
2	Send data	SD (TXD)		○
3	Receive data	RD (RXD)	○	
4	Request to send	RS (RTS)		○
5	Clear to send	CS (CTS)	○	
6	+5V input	+5V	○	
9	Signal ground	SG (GND)	–	–

- **NT-AL001 RS-422A Terminal Block Specifications**

  - Terminal block: RS-422A terminal block (M3 screws)
  - Electrical characteristics: Complies with EIA RS-422A
  - Signal direction: Signal input and output is relative to the NT-AL001.

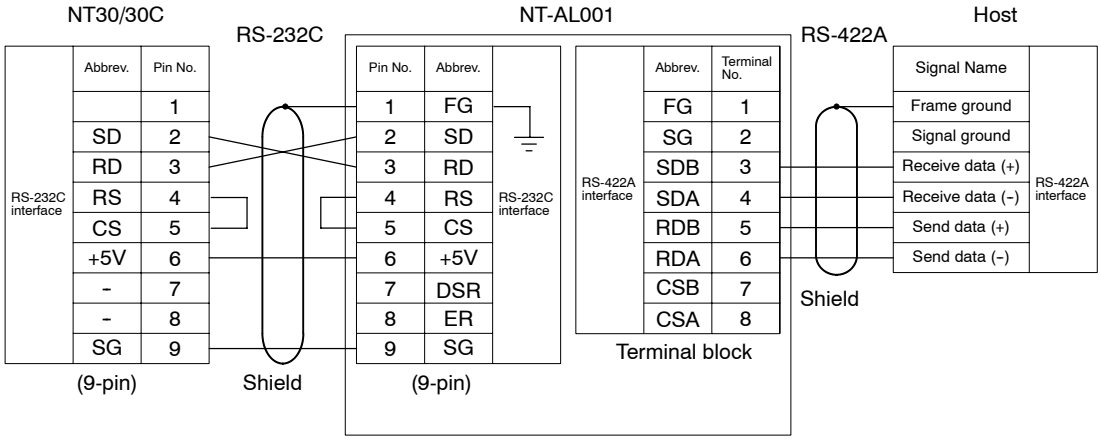


Terminal No.	Signal Name	Abbreviation	Signal Direction	
			Input	Output
8	Request to send (–)	CSA		○
7	Request to send (+)	CSB		○
6	Receive data (–)	RDA	○	
5	Receive data (+)	RDB	○	
4	Send data (–)	SDA		○
3	Send data (+)	SDB		○
2	Signal ground	SG	–	–
1	Function ground	FG	–	–

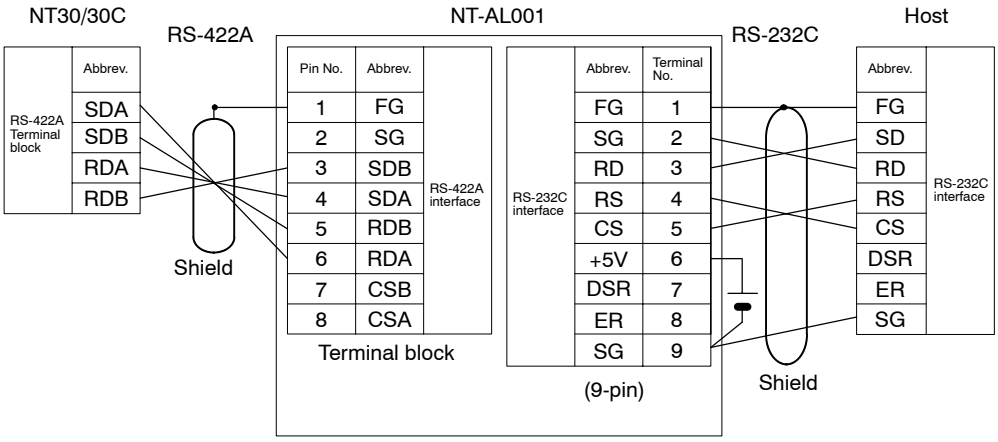
Note: Signals CSA and CSB are those for special applications.

- **Wiring Connections**

  - RS-232C type NT30/30C



- RS-422A type NT30/30C



Making the Cable

The procedure to make up the cable is described below.

Cable Preparation

The preparation of the cable differs according to whether or not the shield is to be connected to the FG.

- **Cable with Shield Connected to FG**

(1) Cut the cable to the required length.

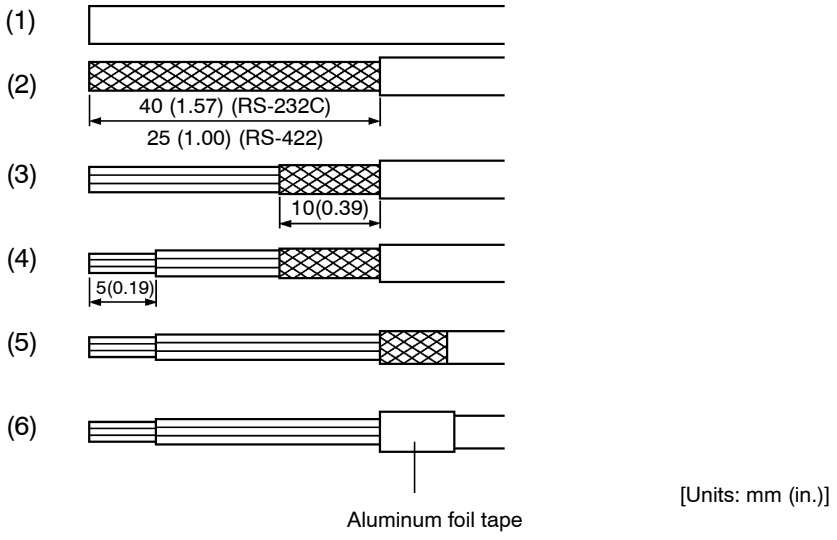
(2) Remove the external vinyl insulation from the cable with a razor blade. Take care not to damage the shielding underneath.

(3) Cut back the shield with scissors.

(4) Use wire strippers to strip the insulation from each wire.

(5) Fold back the shield.

(6) Wrap aluminum foil tape around the folded-back shield.



[Units: mm (in.)]

- **Cable with Shield Not Connected to FG**

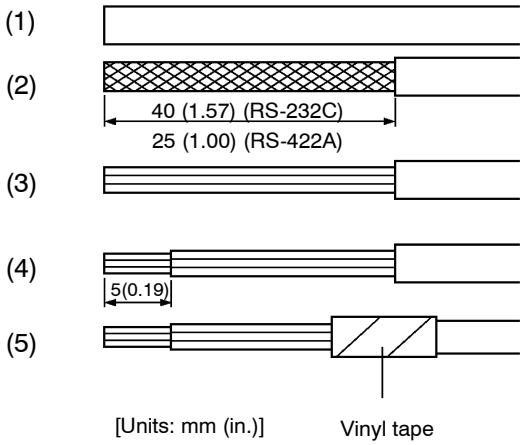
(1) Cut the cable to the required length.

(2) Remove the external vinyl insulation from the cable with a razor blade. Take care not to damage the shield underneath.

(3) Cut back the shield with scissors.

(4) Use wire strippers to strip the insulation from each wire.

(5) Wrap vinyl tape over the cut off end of the shield.

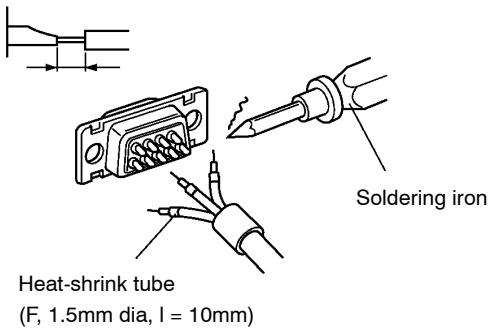


Soldering

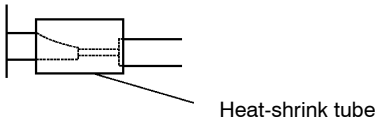
(1) Slide heat-shrink tube over each wire.

(2) Pre-solder each wire and connector cable.

(3) Solder each wire to the connector terminal.

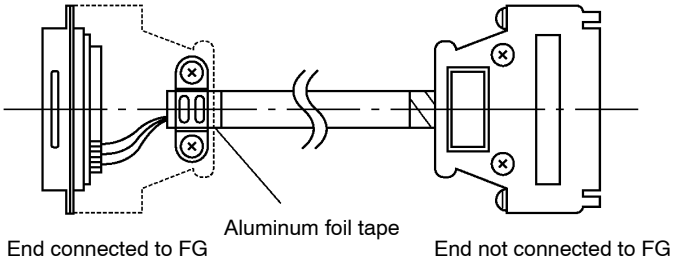


(4) Push the heat-shrink tube over the soldered joint and heat the tube to shrink it in place.



Connector Cover Assembly

Assemble the connector covers as shown in the diagram below.

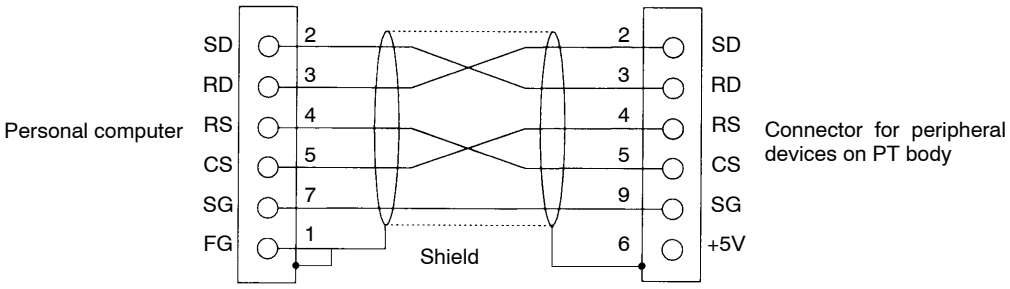


Appendix F
Connecting Cable Specifications

Assembly of Connecting Cables

Wiring should be carried out in one of the following ways, depending on the type of RS-232C connector.

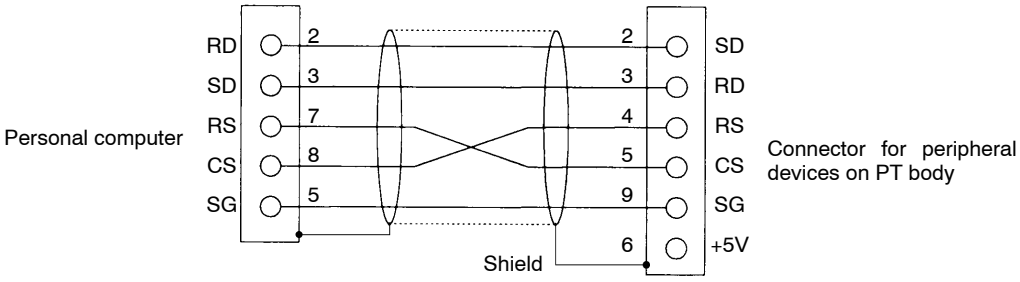
25-pin Connector



Use the following recommended products when making the connecting cable.

Name	Model	Remarks
Connector	XM2A-2501	25-pin, Made by OMRON, for personal computer
	XM2A-0901	9-pin, Made by OMRON, for NT30/30C body
Connector cover	XM2S-2511	25-pin, Made by OMRON, for personal computer
	XM2S-0911	9-pin, Made by OMRON, for NT30/30C body
Cable	AWG28 × 5P IFVV-SB	Multi-core shielded cable Made by Fujikura, Ltd.
	CO-MA-VV-SB 5P × 28AWG	Multi-core shielded cable Made by Hitachi, Ltd.

9-pin Connector



Use the following recommended products when making the connecting cable.

Name	Model	Remarks
Connector	XM2D-0901	9-pin, Made by OMRON, for personal computer
	XM2A-0901	9-pin, Made by OMRON, for NT30/30C body
Connector cover	XM2S-0911	9-pin, Made by OMRON (Two)
Cable	AWG28 × 5P IFVV-SB	Multi-core shielded cable, Made by Fujikura, Ltd.
	CO-MA-VV-SB 5P × 28AWG	Multi-core shielded cable, Made by Hitachi, Ltd.

* At the computer end of the cable, use a connector cover that is appropriate for the specifications of the screws on the computer connector.

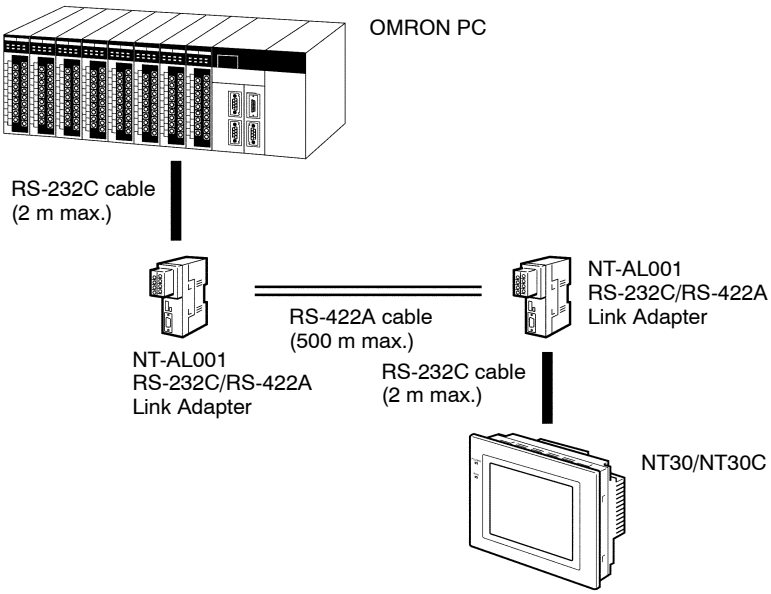
Appendix G
Connection Using RS-232C/RS-422A Link Adapters

By using the RS-232C/RS422A Link Adapter (NT-AL001), RS-232C can be converted to RS-422A, and communications over a distance of up to 500 m is possible.

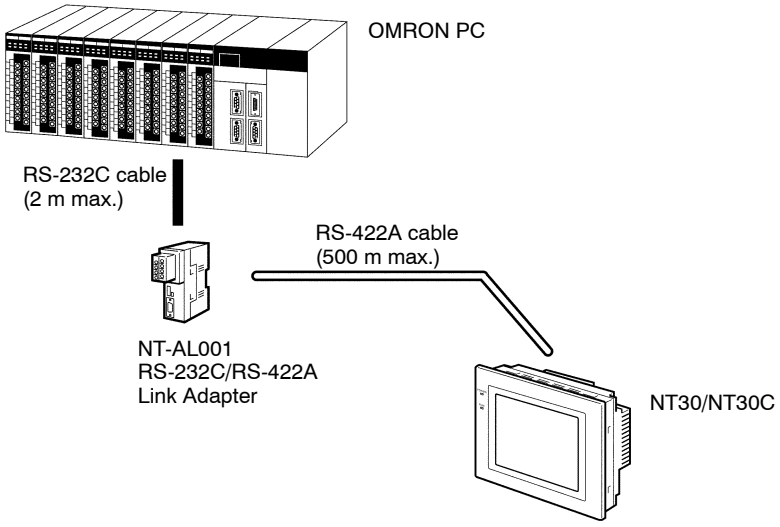
Connection is possible using the NT30/NT30C's RS-232C connector or using the NT30/NT30's RS-422A terminal block. The methods differ in the way shown below.

Connection Method

- **NT30/NT30's RS-232C Connector**

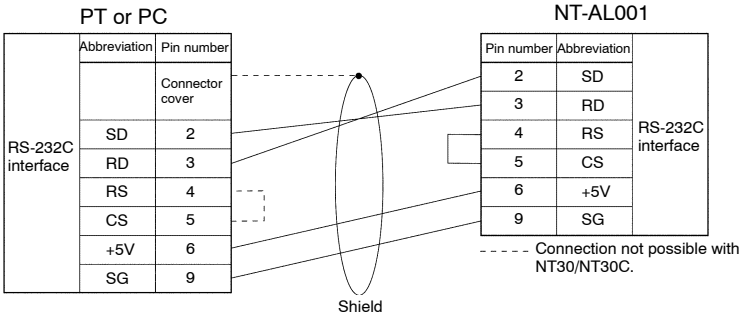


- **NT30/NT30's RS-422A Terminal Block**

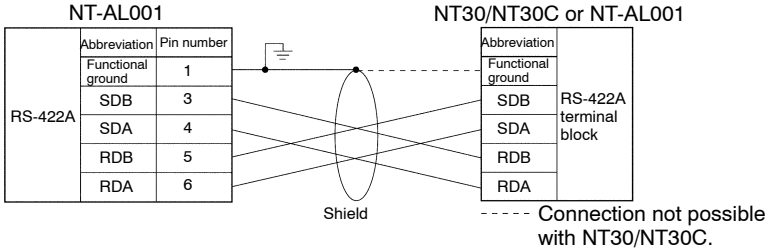


Wiring

- **RS-232C Cable Wiring**

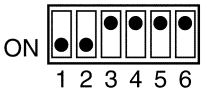


- **RS-422A Cable Wiring**

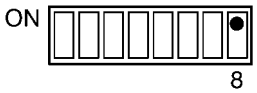


Switch Settings

- **DIP Switch Setting for the RS-232C/RS-422A Link Adapter**



- **DIP Switch Setting for the NT30/NT30C**



(Settings for other DIP switch pins will depend on other factors.)

Set the NT30/NT30C's memory switches for RS-422A communications.

Appendix H
Standard Models

Programmable Terminals (PTs)

Model	Specification
NT30-ST131-E	Monochrome display, ivory
NT30-ST131B-E	Monochrome display, black
NT30C-ST141-E	STN color display, ivory
NT30C-ST141B-E	STN color display, black

Host Link Units

Model	Specification	Applicable PC
C120-LK201-V1	CPU-mounting Unit with RS-232C connector	C-series C1000H C2000
C120-LK202-V1	CPU-mounting Unit with RS-422A connector	
C200H-LK201-V1	Rack-mounting Unit with RS-232C connector for C200H	C-series C200HS C20HX/HG/HE(-Z)
C200H-LK202-V1	Rack-mounting Unit with RS-422A connector for C200H	
C500H-LK201-V1	Features a selectable RS-232C/RS-422A connector	C-series C1000H C2000H
C500-LK203	Rack-mounting Unit for C500	
C200-LK202-V1	Rack-mounting Unit with RS-422A connector for C200H	
CV500-LK201	• Features an RS-232C connector and a selectable RS-232C/RS-422A connector • Rack-mounting Unit for CVM1/CV	CVM1/CV-series CV500 CV1000 CV2000 CVM1

Serial Communications Unit

Model	Specification	Applicable PC
CS1W-SCU21	Rack-mounting Unit with 2 RS-232C ports	CS1-series CS1G/H

CompoBus/S Master Control Unit

Model	Specification	Applicable PC
SRM1-C02-V2	• RS-232C port (When communicating via RS-422A, connect the CPM1-CIF11 RS-422A Adapter to the peripheral port.) • Supports Host Link, 1:1 NT Link, and 1:N NT Link communications	SRM1

CPU Units for Connection via Host Link

Model	Specification	Applicable PC
C20H/C28H/C40H/C60H	Features a 9-pin connector for RS-232C connections	C-series C20H C28H C40H C60H

Model	Specification	Applicable PC
CPM1-10CDR-□ CPM1-20CDR-□ CPM1-30CDR-□ CPM1-30CDR-□-V1 CPM1A-10CD□-□ CPM1A-20CD□-□ CPM1A-30CD□-□ CPM1A-40CD□-□	RS-232C adapter RS-422A adapter connected to the peripheral port.	C-series CPM1
CPM2A-30CD□-□ CPM2A-40CD□-□ CPM2A-60CD□-□	Features a 9-pin connector for RS-232C connections	C-series CPM2A
CPM2C-10□□□□□□-□ CPM2C-20□□□□□□-□	The communications connector contains the functionality of both a peripheral port and an RS-232C port. (Both of these ports can be made available with the CPM2C-CN111 Connecting Cable. It can also be used just as a single peripheral port or RS-232C port with the CS1W-CN114 or CN-118 Connecting Cables respectively.)	C-series CPM2C
CQM1-CPU21-E CQM1-CPU41-EV1 CQM1-CPU42-EV1 CQM1-CPU43-EV1 CQM1-CPU44-EV1	Features a 9-pin connector for RS-232C connections	C-series CQM1
CQM1H-CPU11 CQM1H-CPU21 CQM1H-CPU51 CQM1H-CPU61	Features a 9-pin connector for RS-232C connections (The CQM1H-CPU11 has only a peripheral port.)	C-series CQM1H
C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	Features a connector for RS-232C connections (selectable/9-pin)	C200HS
C200HE-CPU32-(Z)E (*) C200HE-CPU32-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HE(-Z)
C200HG-CPU33-(Z)E (*) C200HG-CPU43-(Z)E C200HG-CPU53-(Z)E (*) C200HG-CPU63-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HG(-Z)
C200HX-CPU34-(Z)E (*) C200HX-CPU44-(Z)E C200HX-CPU54-(Z)E (*) C200HX-CPU65-(Z)E C200HX-CPU85-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HX(-Z)
CS1G-CPU42(-V1) CS1G-CPU43(-V1) CS1G-CPU44(-V1) CS1G-CPU45(-V1)	Features a 9-pin connector for RS-232C connections	CS1-series CS1G
CS1H-CPU63(-V1) CS1H-CPU64(-V1) CS1H-CPU65(-V1) CS1H-CPU66(-V1) CS1H-CPU67(-V1)	Features a 9-pin connector for RS-232C connections	CS1-series CS1H
CV500-CPU01-EV1 CV1000-CPU01-EV1 CV2000-CPU01-EV1 CVM1-CPU01-EV□ CVM1-CPU11-EV□ CVM1-CPU21-EV□	Features a connector for RS-232C connections (selectable/9-pin)	CVM1/CV-series CV500 CV1000 CV2000 CVM1

Note For CPU Units marked (*), a communications port is required.

CPU Units for Connection via NT Link

Name	Model	PC series
CPM1-10CDR-□ CPM1-20CDR-□ CPM1-30CDR-□ CPM1-30CDR-□-V1 CPM1A-10CD□-□ CPM1A-20CD□-□ CPM1A-30CD□-□ CPM1A-40CD□-□	RS-232C adapter RS-422A adapter connected to the peripheral port.	C-series CPM1
CPM2A-30CD□□-□ CPM2A-40CD□□-□ CPM2A-60CD□□-□	Features a 9-pin connector for RS-232C connections	C-series CPM2A
CPM2C-10□□□□□□-□ CPM2C-20□□□□□□-□	Connect to the RS-232C connector on the CPM2C-CN111 Connecting Cable that is connected to the communications port on the CPU Unit.	C-series CPM2C
CQM1-CPU41-E CQM1-CPU42-EV1 CQM1-CPU43-EV1 CQM1-CPU44-EV1	Features a 9-pin connector for RS-232C connections	C-series CQM1
CQM1H-CPU21 CQM1H-CPU51 CQM1H-CPU61	Features a 9-pin connector for RS-232C connections	C-series CQM1H
C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	Features a 9-pin connector for RS-232C connections	C200HS
C200HE-CPU32-(Z)E (*) C200HE-CPU32-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HE(-Z)
C200HG-CPU33-(Z)E (*) C200HG-CPU43-(Z)E C200HG-CPU53-(Z)E (*) C200HG-CPU63-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HG(-Z)
C200HX-CPU34-(Z)E (*) C200HX-CPU44-(Z)E C200HX-CPU54-(Z)E (*) C200HX-CPU64-(Z)E C200HX-CPU65-(Z)E C200HX-CPU85-(Z)E	Features a connector for RS-232C connections (selectable/9-pin)	C-series C200HX(-Z)
CV500-CPU01-EV1 CV1000-CPU01-EV1 CV2000-CPU01-EV1	Features a 9-pin connector for RS-232C connections	CV500 CV1000 CV2000
CVM1-CPU01-EV2 CVM1-CPU11-EV2 CVM1-CPU21-EV2	Features a 9-pin connector for RS-232C connections	CVM1-series

Note For CPU Units marked (*), a communications port is required.

RS-232C/RS-422C Link Adapter

Model	Remarks
NT-AL001	Features a 9-pin connector for RS-232C connections and an 8-pin terminal block for RS-422A connections.

RS-232C Adapter and RS-422A Adapter

Model	Remarks
CPM1-CIF01	Connects the RS-232C port on the NT30/NT30C to the peripheral port on the CPM1.
CPM1-CIF11	Connects the RS-422A port on the NT30/NT30C to the peripheral port on the CPM1.

Related Products for PTs

Name	Model	Remarks
NT Support Tool System Installer	NT-ZJ3MX1-EV3	Version 3.□ For Windows 95/98 on PC/AT or compatible computers. 3.5-inch FD
	NT-ZJCMX1-EV3	Version 3.□ For Windows 95/98 on PC/AT or compatible computers. CD-ROM
	NT-ZJCMX1-EV4	Version 4.□ For Windows 95/98/NT4.0 on PC/AT or compatible computers. CD-ROM
Options	NT30-CFL01	Replaceable Backlight (NT30)
	NT30C-CFL01	Replaceable Backlight (NT30C)
	NT30-KBA01	Silicone rubber chemical-proof cover
	NT30-KBA04	Reflection-suppressing protective sheets
	C500-BAT08	Battery

* The DOS versions of the NT Support Tool (NT-ZA3PC/ZA3DV-V□) and the System Installer (NT30-ZS3PC/ZS3DV-V1) can also be used.

Parts Used for Connection

Cables with Connectors

Model	Cable Length	Applicable Unit	Communication Method
XW2Z-200S	2 m	Host Link Units with 25-pin connectors	Host Link
XW2Z-500S	5 m		
XW2Z-200T	2 m	Host Link Units and CPU Units with 9-pin connectors	Host Link, NT Link
XW2Z-500T	5 m		

Connection Cables

Model	Remarks
AWG28×5P IFVV-SB	Multicore cable, manufactured by Fujikura, Ltd.
CO-MA-VV-SB 5P×28AWG	Multicore cable, manufactured by Hitachi Cable, Ltd.

Applicable Connectors

Name	Model	Remark
Connector	XM2A-2501	25-pin, manufactured by OMRON
	XM2A-0901	9-pin (plug), manufactured by OMRON
	DE-9P	9-pin, manufactured by JAE
Connector Cover	XM2S-2511	25-pin, manufactured by OMRON
	XM2S-0901	9-pin, manufactured by OMRON
	DE-C1-J6	9-pin, manufactured by JAE

Printer Cable

Model	Specification
NT-CNT121	Printer cable for half pitch (1.5 m), manufactured by OMRON

Connecting Cable for Peripheral Port of CS1-series PCs

Model	Specification
CS1W-CN118	Manufactured by OMRON. (CS1-series peripheral port ↔ D-SUB, 9-pin, female connector)

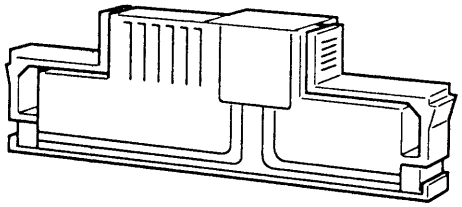
Connecting Cable for CPM2C Communications Port

Model	Specification
CPM2C-CN111	Manufactured by OMRON. (CPM2C communications port ↔ D-SUB, 9-pin, female connector; C-series peripheral port)

Appendix I
Options

Replaceable Backlight ... NT30-CFL01 for NT30, NT30C-CFL01 for NT30C

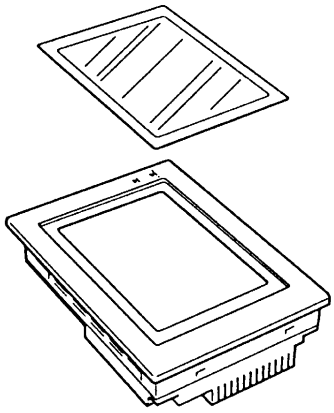
This is a backlight for replacement purposes.



Note When disposing of a backlight that is no longer required, be sure to comply with any local restrictions that apply to its disposal.

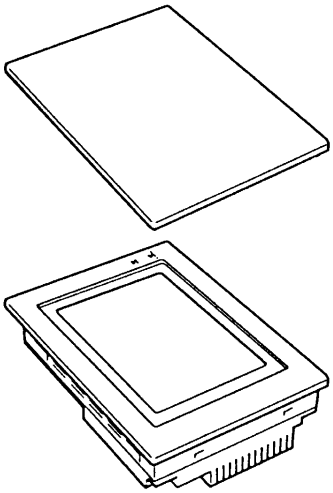
Protective Sheets ... NT30-KBA04

Stuck to the display to prevent it from being soiled. The entire sheet is colorless and transparent.



Chemical-proof Cover ... NT30-KBA01

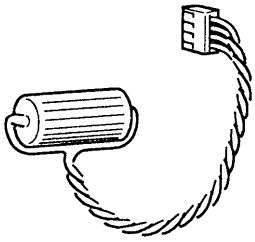
Covers the front of the terminal and protects against all kinds of chemical agents. The entire sheet is milky white and is made of silicone rubber.



Request
- The cover will not afford protection against some chemicals.
- Since the cover is milky white, it makes the display slightly less clear.
- This cover does not protect the connector between the NT30/30C and panel.

Battery ... C500-BAT08

This is a lithium battery used for memory backup.



Appendix J
PC Memory Maps

OMRON C-Series Memory Map

Area		IR Area	HR Area	AR Area	LR Area	Timer/ Counter Area	DM Area
Ladder type	C20H C28H C40H C60H	0000 to 0255	0000 to 0099	0000 to 0027	0000 to 0063	0000 to 0511	0000 to 1999
	C200HS C200HE(-Z) C200HG(-Z) C200HZ(-Z)	0000 to 0511	0000 to 0099	0000 to 0027	0000 to 0063	0000 to 0511	0000 to 6655 7000 to 9999
	C1000H	0000 to 0255	0000 to 0099	0000 to 0027	0000 to 0063	0000 to 0511	0000 to 4095
	C2000(H) CQM1						0000 to 6655
	CQM1H						0000 to 6655 (*)
	CPM1 CPM1A	0000 to 0019 0200 to 0255	0000 to 0019	0000 to 0015	0000 to 0015	0000 to 0127	0000 to 1023 6144 to 6655
	CPM2A CPM2C			0000 to 0023		0000 to 0255	0000 to 6655
Flow type	C1000HF	0000 to 0255	0000 to 0099	0000 to 0027	0000 to 0063	0000 to 0511	0000 to 4095
SRM1		0000 to 0019 0200 to 0255	0000 to 0019	0000 to 0015	0000 to 0015	0000 to 0127	0000 to 2021 6144 to 6655

* The area that can be used depends on the model of CPU Unit.

OMRON CV-Series Memory Map

Area	CIO Area	HR Area (*1)	AR Area	LR Area	Timer/Counter Area	DM Area
CV500 CVM1-CPU01 (-V□)	0000 to 2555		0000 to 0511		0000 to 0511	0000 to 8191
CV1000 CVM1-CPU11 (-V□) CV2000 CVM1-CPU21 (-V□)	0000 to 2555		0000 to 0511		0000 to 1023	0000 to 9999 (*2)

(*1) Included in the CIO area in the case of CVM1/CV-series PCs.

(*2) This is the area that can be used with an NT30/30C. The DM area itself occupies the range 00000 to 24575.

OMRON CS1-Series CS1G/H Memory Map

Area	CIO Area	HR Area (*2)	AR Area	LR Area	Timer/Counter Area	DM Area
CS1G CS1H	0000 to 2555 (*1)		0000 to 0511 (*3)		0000 to 1023 (*4)	0000 to 9999 (*5)

(*1) This is the area that can be used with an NT30/30C. The CIO area itself occupies the range 00000 to 06655.

(*2) The HR area cannot be used from the NT30/NT30C.

(*3) This is the area that can be used with an NT30/30C. The AR area itself occupies the range 00000 to 00959.

(*4) This is the area that can be used with an NT30/30C. The Timer/Counter area itself occupies the range 00000 to 04095.

(*5) This is the area that can be used with an NT30/30C. The DM area itself occupies the range 00000 to 32767.

Appendix K
Special Characters

English Character Codes

When using the terminal for the first time, the system program must be installed with pin 6 of SW2 ON to enable English language messages to use the following codes.

Example: Hex code is represented by 30, decimal code by 48, and character by 0.

30	0
48	

Code 20 and 32 in the table represents a space, as indicated by “SP”.

Hex Digits 1st → 2nd ↓	**2-**		**3-**		**4-**		**5-**		**6-**		**7-**		**8-**		**9-**	
-0	20	SP	30	0	40	@	50	P	60	‘	70	p	80	Ç	90	É
	32		48		64		80		96		112		128		144	
-1	21	!	31	1	41	A	51	Q	61	a	71	q	81	ü	91	æ
	33		49		65		81		97		113		129		145	
-2	22	”	32	2	42	B	52	R	62	b	72	r	82	é	92	Æ
	34		50		66		82		98		114		130		146	
-3	23	#	33	3	43	C	53	S	63	c	73	s	83	â	93	ô
	35		51		67		83		99		115		131		147	
-4	24	$	34	4	44	D	54	T	64	d	74	t	84	ä	94	ö
	36		52		68		84		100		116		132		148	
-5	25	%	35	5	45	E	55	U	65	e	75	u	85	à	95	ò
	37		53		69		85		101		117		133		149	
-6	26	&	36	6	46	F	56	V	66	f	76	v	86	å	96	û
	38		54		70		86		102		118		134		150	
-7	27	’	37	7	47	G	57	W	67	g	77	w	87	ç	97	ù
	39		55		71		87		103		119		135		151	
-8	28	(	38	8	48	H	58	X	68	h	78	x	88	ê	98	ÿ
	40		56		72		88		104		120		136		152	
-9	29	)	39	9	49	I	59	Y	69	i	79	y	89	ë	99	Ö
	41		57		73		89		105		121		137		153	
-A	2A	*	3A	:	4A	J	5A	Z	6A	j	7A	z	8A	è	9A	Ü
	42		58		74		90		106		122		138		154	
-B	2B	+	3B	;	4B	K	5B	[	6B	k	7B	{	8B	ï	9B	¢
	43		59		75		91		107		123		139		155	
-C	2C	,	3C	<	4C	L	5C	\	6C	l	7C	|	8C	î	9C	£
	44		60		76		92		108		124		140		156	
-D	2D	-	3D	=	4D	M	5D	]	6D	m	7D	}	8D	ì	9D	¥
	45		61		77		93		109		125		141		157	
-E	2E	.	3E	>	4E	N	5E	^	6E	n	7E	~	8E	Ä	9E	Pt
	46		62		78		94		110		126		142		158	
-F	2F	/	3F	?	4F	O	5F	_	6F	o	7F	⌂	8F	Å	9F	*ƒ*
	47		63		79		95		111		127		143		159	

Hex Digits 1st → 2nd ↓	A-		B-		C-		D-		E-		F-	
-0	A0	á	B0	⋮⋮	C0	└	D0	╨	E0	α	F0	≡
	160		176		192		208		224		240	
-1	A1	í	B1	▒	C1	┴	D1	╤	E1	β	F1	±
	161		177		193		209		225		241	
-2	A2	ó	B2	▒	C2	┬	D2	╥	E2	Γ	F2	≥
	162		178		194		210		226		242	
-3	A3	ú	B3	│	C3	├	D3	╙	E3	π	F3	≤
	163		179		195		211		227		243	
-4	A4	ñ	B4	┤	C4	─	D4	╘	E4	Σ	F4	⌠
	164		180		196		212		228		244	
-5	A5	Ñ	B5	╡	C5	┼	D5	╒	E5	σ	F5	⌡
	165		181		197		213		229		245	
-6	A6	a	B6	╢	C6	╞	D6	╓	E6	µ	F6	÷
	166		182		198		214		230		246	
-7	A7	o	B7	╖	C7	╟	D7	╫	E7	τ	F7	≈
	167		183		199		215		231		247	
-8	A8	¿	B8	╕	C8	╚	D8	╪	E8	Φ	F8	°
	168		184		200		216		232		248	
-9	A9	⌐	B9	╣	C9	╔	D9	┘	E9	Θ	F9	·
	169		185		201		217		233		249	
-A	AA	¬	BA	║	CA	╩	DA	┌	EA	Ω	FA	* 1
	170		186		202		218		234		250	
-B	AB	1/2	BB	╗	CB	╦	DB	■	EB	δ	FB	* 1
	171		187		203		219		235		251	
-C	AC	1/4	BC	╝	CC	╠	DC	▬	EC	∞	FC	* 1
	172		188		204		220		236		252	
-D	AD	¡	BD	╜	CD	═	DD	▌	ED	ø	FD	* 1
	173		189		205		221		237		253	
-E	AE	«	BE	╛	CE	╬	DE	▐	EE	ε	FE	* 2
	174		190		206		222		238		254	
-F	AF	»	BF	┐	CF	╧	DF	▄	EF	∩	FF	* 3
	175		191		207		223		239		255	

* 1: Used as the prefix for library data codes (2 bytes).

* 2: Used as the prefix for image data codes (2 bytes).

* 3: Used as the prefix for mark data codes (2 bytes).

Note In order to input these characters using the support tool, enter the relevant character code with the numeral keys while holding down the ALT key.

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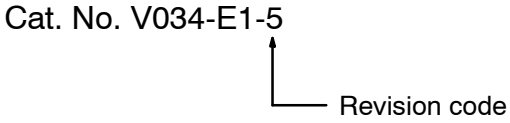
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Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	September 1995	Original production
2	May 1996	Addition of notes on safety
3	August 1996	Revisions associated with model change P.21 Correction of DIP switch description P.20 Changes associated with modifications to screens P.69, P.73, P.74, P.75, P.76, P.77, P.78, P.79, P.80, P.81, P.82, P.83, P.84, P.91, P.93, P.95, P.96, P.98, P.103, P.105, P.106, P.107, P.108, P.109, P.110, P.111, P.112, P.113, P.114, P.115 Review of reference manuals, reference pages, and index viii, P.12, P.15, P.16, P.26, P.36, P.85, P.89, P.90, P.92, P.111, P.118, P.135, P.161, P.174, P.193, P.199, P.206, P.207, P.209, P.221, P.222, P.231, P.242, P.245, P.253, P.263, P.264, P.269, P.288, P.313, P.314, P.315, P.316, P.317, P.318, P.319, P.320
4	January 1998	Addition of C200HX/HG/HE, CPM1 and SRM1 Correction of safety precautions Changes of RS-232C wiring
5	January 2001	Addition of CS1 Series. Overall correction and unification of terminology. Partial rewrite for clarification.

OMRON

OMRON ELECTRONICS LLC

1 Commerce Drive
Schaumburg, IL 60173
847.843.7900
For US technical support or
other inquiries: 800.556.6766

OMRON CANADA, INC.

885 Milner Avenue
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416.286.6465

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