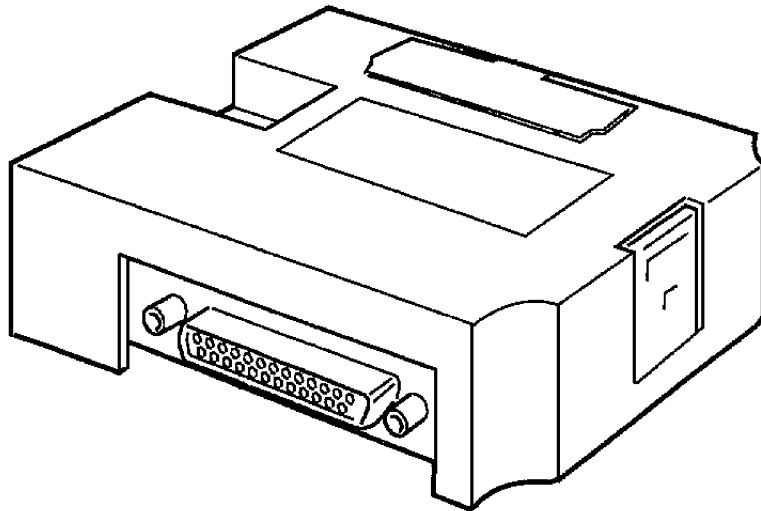# NT-series
Direct Connection

Operation Manual

Produced March 1995

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 head precautions can result in injury to people or damage to the product.

DANGER! Indicates information that, if not heeded, is likely to result in loss of life or serious injury.

WARNING Indicates information that, if not heeded, could possibly result in loss of life or serious injury.

Caution Indicates information that, if not heeded, could result in relative serious or minor injury, damage to the product, or faulty operation.

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.

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.

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

About this Manual:

This manual describes the installation and operation of the NT-series Direct Connection and includes the sections described below.

Please read this manual carefully and be sure you understand the information provided before attempting to install and operate the NT-series Direct Connection.

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.

Section 1 describes precautions for using the I/F unit, and the role and operation of the I/F unit related to the functions of the PT, the direct connection function, and the NT link.

Section 2 describes how to connect the host link I/F unit using a host link to the PT and the PT to the PC.

Section 3 describes how to connect the host link I/F unit to the PT through an NT link and the PT to PC.

Section 4 describes how to connect the C200H Host Interface to the PT and the PT to the PC.

Section 5 describes the basic operation of the new Direct Connection function. Please read this section carefully before using your PT. The Direct Connection function is extremely useful when a PT is used.

Section 6 describes specific operation of the PT using a "direct access" and an NT link. This section also describes the settings of support tools only in relation to allocated bits and allocated words. Refer to the manuals of support tools or PT for other settings or displays of support tools.

SECTION 1
Interface Unit

This section describes precautions for using the I/F unit, and the role and operation of the I/F unit related to the functions of the PT, the direct connection function, and the NT link.

1-1 Getting Starting

To ensure that the Interface Unit works correctly, carefully observe the following when positioning and handling it.

Location

Do not install the Interface Unit in a location subject to the following conditions:

Dust, chemicals, or steam

Severe temperature fluctuations

High humidity and condensation

Direct sunlight

Strong electrical or magnetic fields

Poor ventilation

Severe vibration

Handling

Do not:

Subject the Unit to strong shocks or vibrations

Position the Unit's Printed Circuit Boards downward

Touch the Unit's Printed Circuit Boards

Put heavy objects on the unit

Supply a voltage different from the specified voltage

1-2 Programmable Terminal

The OMRON Programmable Terminal (PT) displays the status and other information about the FA-applied factory. The PT is briefly described below.

1-2-1 Role and Operation

The Programmable Terminal (PT) is a FA factory terminal device which communicates with Programmable Controllers (PCs) and displays the operating status of machines and other equipment, work instructions, and operations of the PT.

Production Line Status Monitoring

The PT displays real-time information about the system and equipment operating status and manufactured quantity.

Production Control (3)		Date: 27 Jan 93 Time: 14:15:32	
Product	NT20M	NT600M	NT10S
Today's target	560 units	441 units	352 units
Current production	305 units	275 units	213 units
% achieved	54.4 %	60.0 %	60.5 %
Defects	2 units	8 units	1 unit
Repairs	7 units	15 units	5 units

Messages   The PT warns of system or equipment errors with a display and buzzer, and prompts the appropriate remedial action.

```
┌─────────────────────────────────────────────┐
│        ┌──────────────────────────┐          │
│        │         Alarm            │          │
│        └──────────────────────────┘          │
│                                               │
│   ┌─────────────────┐   ┌─────────────────┐   │
│   │ Assembly line B │ _ │ Positioning pin │   │
│   └─────────────────┘   └─────────────────┘   │
│                                               │
│      is defective. Line stopped.              │
│                                               │
│   Check these points:                         │
│                                               │
│          1. Pin L3 missing?                   │
│          2. Position of dog M2.               │
│          3. Attachment of photosensor P5.     │
└─────────────────────────────────────────────┘
```
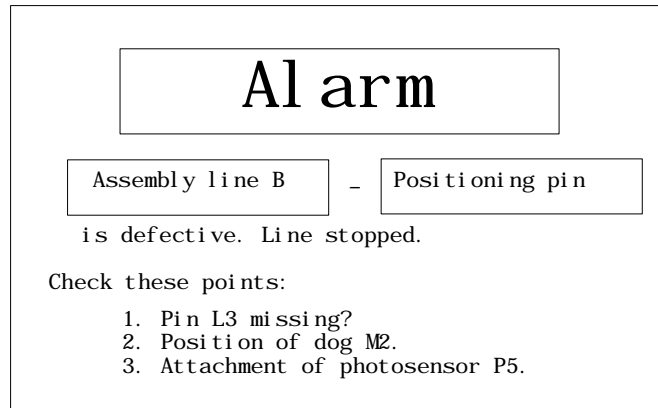
Panel Switch Functions (Operation from the PT)   Setting touch switches on the PT allows workers to use the PT as an operating panel. Production targets and other numeric data input to the PT can be transmitted to the PC.
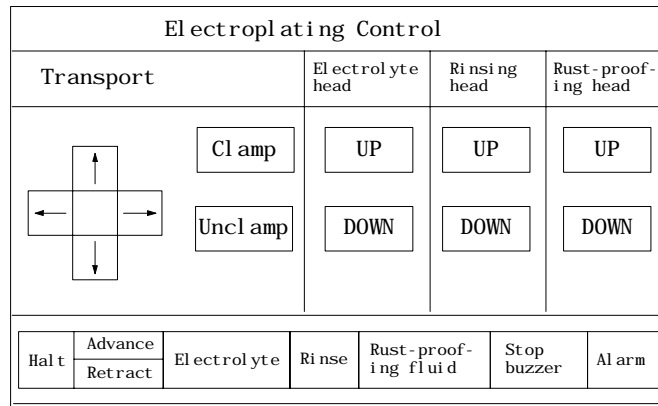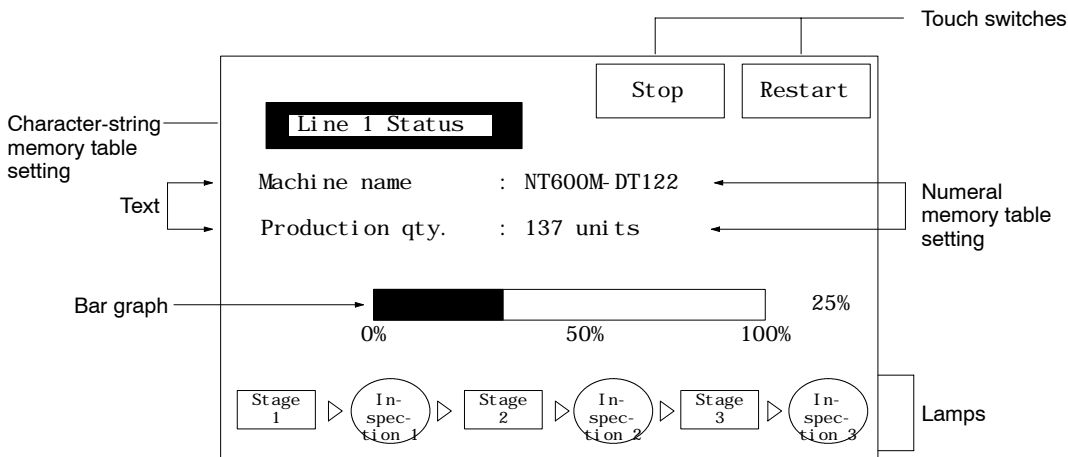
Electroplating Control				
Transport	Electrolyte head	Rinsing head	Rust-proofing head	

```
┌──────────────────────────────────────────────────────────────────┐
│                  Electroplating Control                            │
├──────────────────────┬──────────┬──────────┬──────────────────────┤
│ Transport            │Electrolyte│ Rinsing │ Rust-proof-           │
│                      │  head     │  head   │ ing head              │
│                      │           │         │                       │
│         ↑   ┌──────┐ │ ┌────┐    │ ┌────┐  │ ┌────┐                │
│       ┌─┤ ├─┐│ Clamp│ │ │ UP │    │ │ UP │  │ │ UP │                │
│     ← │     │→└──────┘ │ └────┘    │ └────┘  │ └────┘                │
│       └─┤ ├─┘┌──────┐ │ ┌────┐    │ ┌────┐  │ ┌────┐                │
│         ↓   │Unclamp│ │ │DOWN│    │ │DOWN│  │ │DOWN│                │
│             └──────┘ │ └────┘    │ └────┘  │ └────┘                │
├──────┬───────┬───────┴──┬──────┬──┴────────┬┴──────┬──────────────┤
│      │Advance│          │      │Rust-proof-│ Stop  │              │
│ Halt ├───────┤Electrolyte│ Rinse│ ing fluid │ buzzer│ Alarm        │
│      │Retract│          │      │           │       │              │
└──────┴───────┴──────────┴──────┴───────────┴───────┴──────────────┘
```

1-2-2 Displays

The PT can display the following items to provide the operations mentioned previously. Each of these items is called a "display element."

Refer to the manuals of each PT for the details of a display element such as functions, specifications, and quantity to be displayed.

```
                                              ┌──── Touch switches
Character-string ──────┐        ┌──────┐  ┌────────┐
memory table           │        │ Stop │  │Restart │
setting                │        └──────┘  └────────┘
                       │  ███████████████████
         Text ─────────┤  █ Line 1 Status   █
                       │  ███████████████████
                       │
                          Machine name   : NT600M-DT122  ◄──── Numeral
                                                               memory table
                          Production qty. : 137 units    ◄──── setting

   Bar graph ──────►    ████████████░░░░░░░░░░░░  25%
                        0%        50%      100%

  ┌─────┐  ┌─────┐ ┌─────┐  ┌─────┐ ┌─────┐  ┌─────┐
  │Stage│▷ │ In- │ │Stage│▷ │ In- │ │Stage│▷ │ In- │  ──── Lamps
  │  1  │  │spec-│ │  2  │  │spec-│ │  3  │  │spec-│
  └─────┘  │tion1│ └─────┘  │tion2│ └─────┘  │tion3│
           └─────┘          └─────┘          └─────┘
```

Text   Characters marks, and image data (NT610C/NT612G) which remain unchanged can be written directly as text.

Character-String Memory Tables

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

Numeral Memory Tables

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

Hexadecimal values can be displayed.

Lamps

Lamps are square or round frames fan-shaped* or polygonal* which indicate the operating status. They are controlled by the PC. They can be lit (highlighted) or flashed (intermittent normal and highlighted display).
*Only the NT610C/NT612G can use fan-shaped and polygonal lamps.

Touch Switches

Touch switches can be set anywhere on the screen. Touching the screen at a touch switch location can switch the display (stand-alone function or display-switch function), notify the PC (notification function), numerals/character-string input (character key function)*, numerals/character-string copy (copy setting function)*, move between numerals/character-string setting areas (cursor moving function)*, screen hard copy (printing function)*. The touch switches can be lit or flashed by the PC in the same way as the lamps.
*Only the NT610C/NT612G can use the copy setting function, the cursor movement function, the character keys for character-strings, and the screen printing function.

Graphs

The bar graph, trend graph* or broken line graph* displays a comparison with a value stored in the memory table. A percentage value can be displayed simultaneously.
*Only the NT610C/NT612G can use a trend graph and a broken line graph.

1-3   Interface Unit

The Interface Unit provides communication between the PT and PC. This sections describes the operation of the Interface Unit and the added Direct Connection function and NT link.

Refer to *Section 5 Direct Connection Operation* and *Section 6 PT Operation* for details on the Direct Connection function.

1-3-1 Operation

Many communication units are available to provide communication between the PT and PC for different system configurations. The Interface Unit is the communication units which can be mounted on the PT. The I/F unit is available in two types: host link I/F unit and C200H I/F unit.
There are three communication methods to the PC as follows.

Host link (direct connection) . . . using host link I/F unit

NT link (direct connection) . . . . using host link I/F unit

C200H (direct connection) . . . . using C200H I/F unit

I/F units can be connected to the host link unit or CPU unit of the PC (only the CPU unit when the NT link or C200H I/F unit is used).

The Interface Unit operates as an intermediary between the PT and PC. It reads information to be displayed on the PT from the PC memory area and writes it to the PT memory table, and writes information to the PC memory area with the PT touch switches.

The Interface Unit reads instructions to switch screens from the PC memory area and controls the PT. It reads the status of the PT and writes it to the PC memory area.
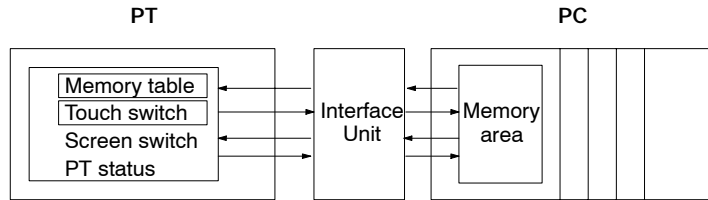
1-3-2 Direct Connection Function

The Direct Connection function is described below.

The PT is able to directly refer to PC bit and word data so that a PT can be connected to a PC without changing the PC program currently running the production line.

The bits and words referring to operating status and work instruction information and those storing input data can be freely allocated to almost any part of the PC memory. Bits and words in the PC can be referenced from any memory table.

The area to control and notify the PT status, including display screens, backlighting on a flash control, alarms and buzzers, can be freely allocated to any part of the PC memory.

1-3-3 Direct Connection Setting

The Direct Connection function is set using the NT-series Support Tool, which is the name of the software used to create and maintain the display data for the PT displays, memory table data, and mark data. Refer to the appropriate manual for information on the Support Tool and how it is used, as well as for the system configuration:

Direct Connection is Not Selected

The conventional Interface Unit communication protocol is used. De-select the Direct Connection function to use existing programs.

In this case, communication is with the PC's Data Memory. Data in all other areas is PC program data which must be sent to the Data Memory in order to be transmitted. In addition, the number of numeral and character-string memory tables which can be communicated with the PC is limited.
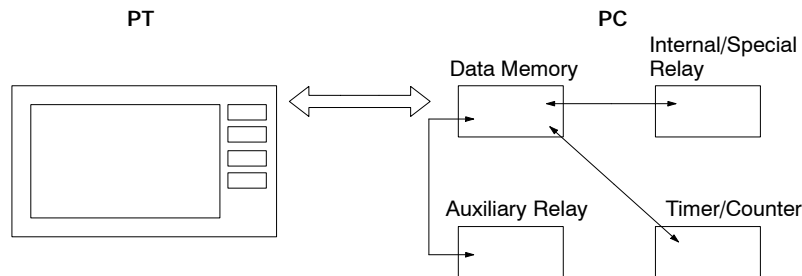

Note The system ROM described in this manual is only for the Direct Connection function. It cannot be used without the Direct Connection function. Refer to Appendix C Summary of Data Conversion to change programs for conventional types of I/F units.

Direct Connection is Set   The Interface Unit Direct Connection protocol is used. Direct Connection allows direct reading and writing of most bits and words of the PC memory and allows automatic changing of the display. This new communication format reduces the load on the PC and increases the efficiency of program development.

Refer to *Section 5 Direct Connection Operation* and *Section 6 PT Operation* for details on the Direct Connection function.
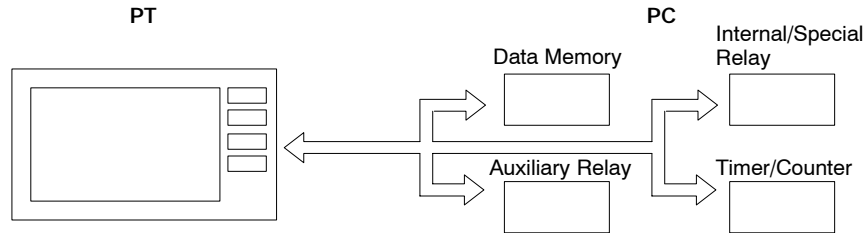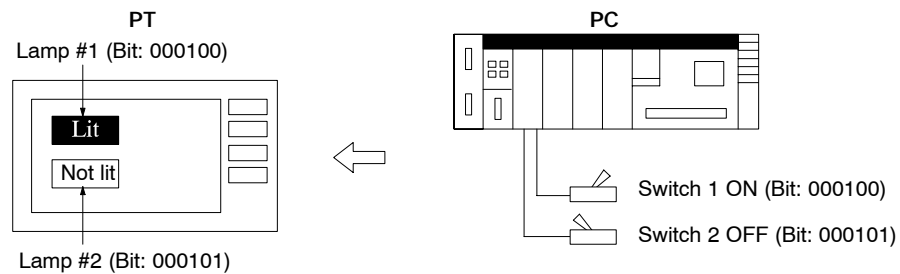

Direct Connection Examples

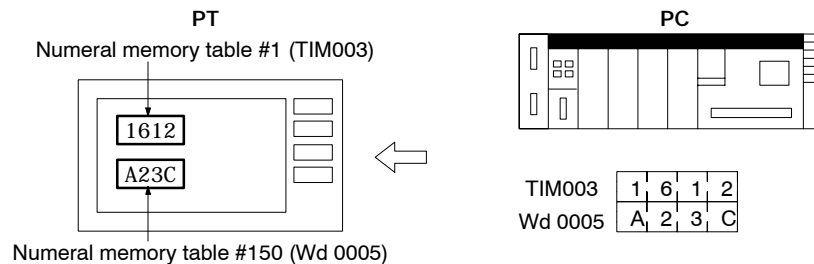Examples are presented below of PT and PC operation when the Direct Connection function is set.

Example 1
The status of a PC bit can be directly displayed as a PT lamp without using a PC program.

Example 2
The displayed word can be freely selected for each memory table. The display as a heraldically value makes it easy to monitor word contents.
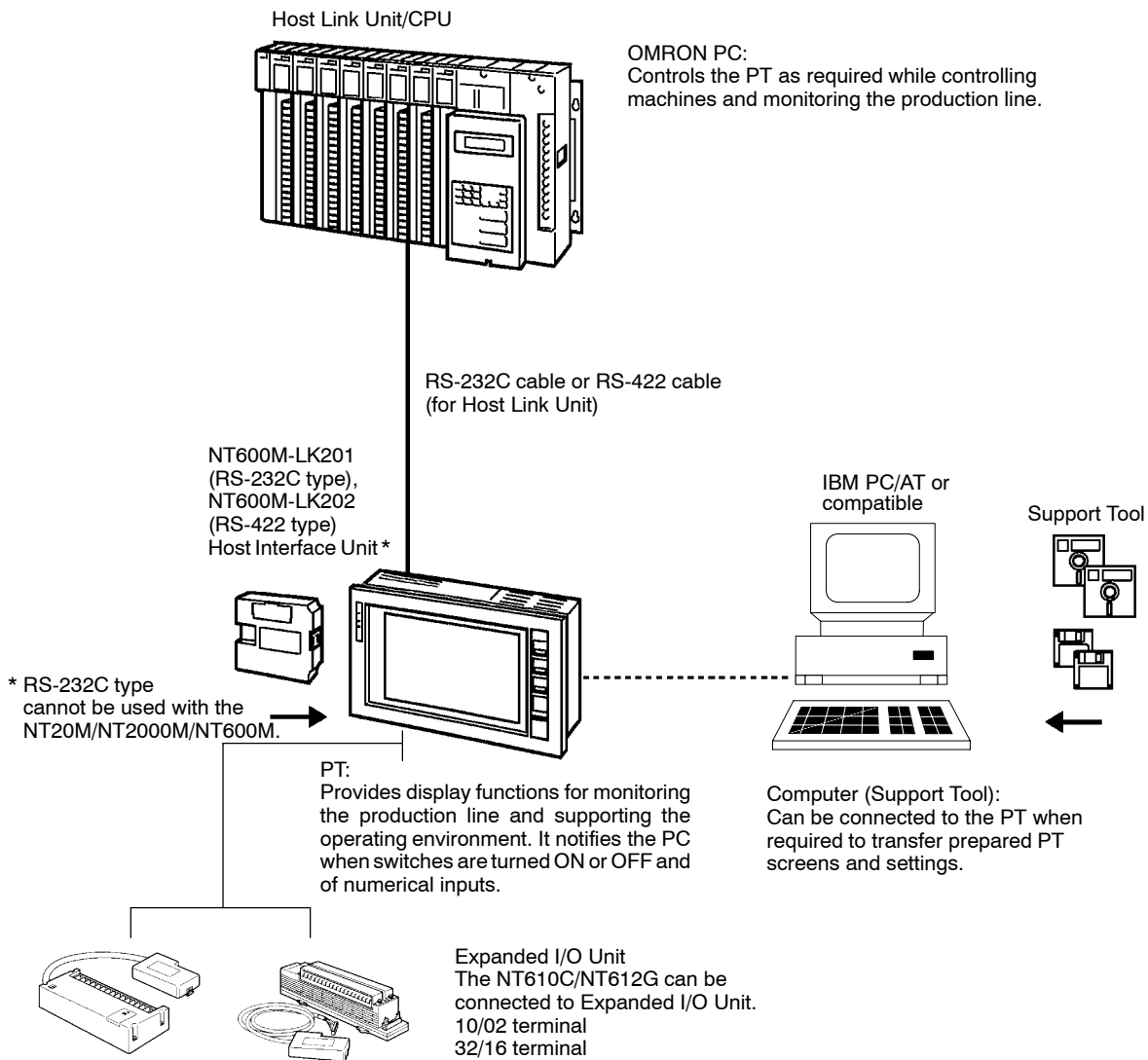

1-3-4 NT LINK

The NT link is a communication method of the host link I/F units.
The NT link uses the direct connection function and can execute high speed communications with a CPU (built-in host link) of the C and CVM1/CV series.

Note   Be sure to use the NT link with the Direct Connection function.

1-4   System Configuration Using a Host Link

This section shows the basic configuration of a system using a Host Link. Refer to the individual equipment manuals for information on the equipment used in the system.

Host Link Unit/CPU

OMRON PC:
Controls the PT as required while controlling machines and monitoring the production line.

RS-232C cable or RS-422 cable
(for Host Link Unit)

NT600M-LK201
(RS-232C type),
NT600M-LK202
(RS-422 type)
Host Interface Unit *

IBM PC/AT or
compatible

Support Tool

* RS-232C type
cannot be used with the
NT20M/NT2000M/NT600M.

PT:
Provides display functions for monitoring the production line and supporting the operating environment. It notifies the PC when switches are turned ON or OFF and of numerical inputs.

Computer (Support Tool):
Can be connected to the PT when required to transfer prepared PT screens and settings.

Expanded I/O Unit
The NT610C/NT612G can be connected to Expanded I/O Unit.
10/02 terminal
32/16 terminal

System Equipment and Software

OMRON PC
C series and CVM1/CV series PCs

The Cj j H, CQM1-CPU21/41/42/43/44-E, and CVM1/CV series PCs with version [-EV1] can be connected directly to the PT.

The C200HS-CPU21/23/31/33-E series can be connected directly to the PT.

Other C series requires the host link unit.

Programmable Terminals
NT20M, NT2000M, NT600M, NT612G, and NT610C.

Computer
IBM PC/AT or compatible.

Support Tool
NT20M/NT2000M/NT600M Support Tool Version 4.j (NT20M-ZASAT-EV4).
NT610C/NT612G Support Tool Version 3.j (NT610G-ZA3AT-EV3).

Connections

Use an RS-232C cable, RS-422 cable, or optical-Fiber to connect the PT to the PC.

Refer to Section 2 Installing the host link I/F Unit for the host link and Connecting to the PC for details about connecting the PT to the PC.

System Configuration
The equipment and parts required to configure the system to use the Direct Connection function are shown below.

	NT20M/NT2000M		
Programmable Terminal	**Monochrome LCD: NT20M-DT121-V2 Touch-panel Model** **NT20M-DN121-V2 Touch-panel Unequipped Model***	**Backlight replaceable: NT20M-DT131 Touch-panel Model** **NT20M-DN131 Touch-panel Unequipped Model***	**Large size Model: NT2000M-DT131 NT2000M-DT131B (black case) Touch-panel Model** **NT2000M-DN131 Touch-panel Unequipped Model***

Screen-data Memory Board/Screen Memory	**Screen Memory**
	  SRAM/32 KB: RAM22-15, SRAM/128 KB: RAM13-10, EPROM/64 KB:ROM-KD-B,
	  EPROM/128KB: ROM-13-12B, EEPROM/32 KB: EER22-20		

Host I/F Unit	RS-232C type: NT600M-LK201		
System ROM	NT20M-SMR31-E		
Support tool	NTM Support Tool NT20M-ZASAT-EV4: 3.5-inch (2DD) and 5.25-inch (2HD) disks		
Expanded I/O Unit	Unavailable		
System Key Unit	Unavailable		NT-FK200

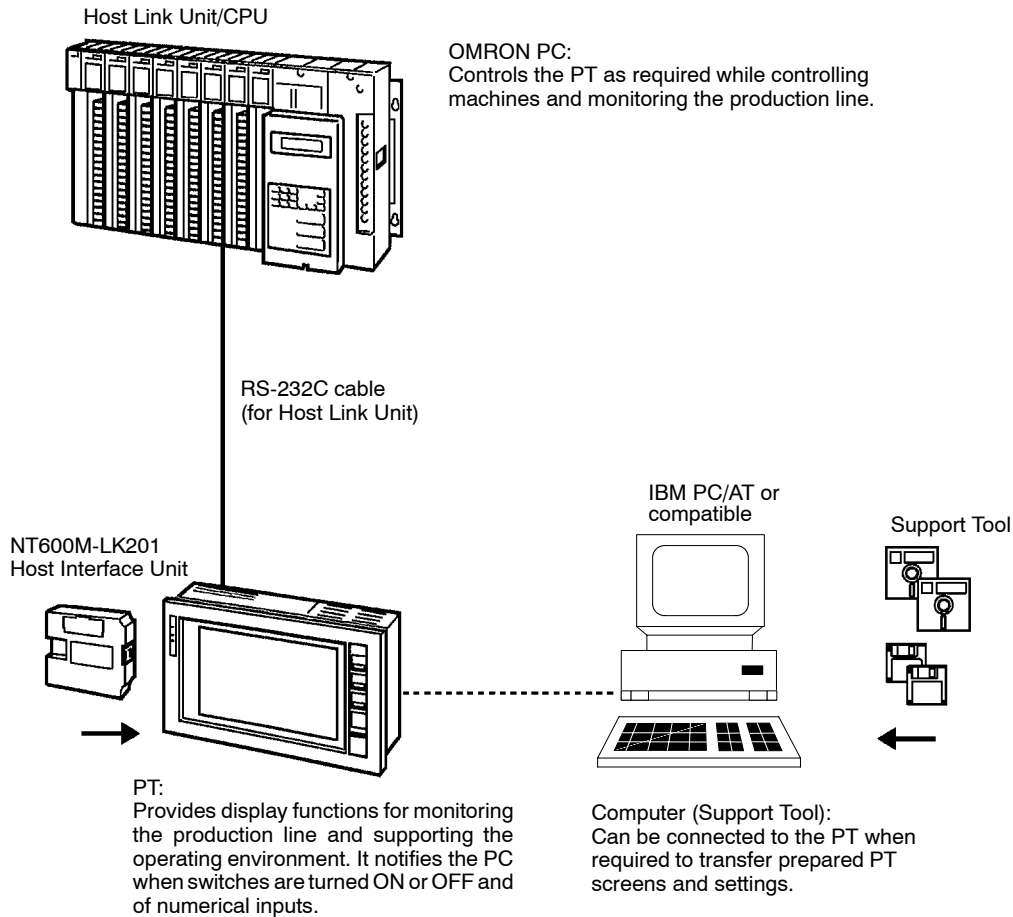|	NT600M	
Programmable Terminal	**Monochrome LCD: NT600M-DT122 Touch-panel Model, NT600M-DN122 Touch-panel Unequipped Model***	**EL display: NT600M-DT211 Touch-panel Model, NT600M-DN211 Touch-panel Unequipped Model***

Screen-data Memory Board/Screen Memory	**Screen-data Memory Board**
	  IC socket type: NT600M-MP251,
	  64-kbyte SRAM: NT600M-MR641, 128-kbyte SRAM: NT600M-MR151,
	  256-kbyteSRAM: NT600M-MR251
	
	Screen Memory
	  The screen memory chip must be inserted in the IC socket. Screen data is written with a PROM writer.
	  64-kbyte EPROM: ROM-KD-B, 128-kbyte EPROM: ROM 13-12B,
	  256-kbyte EPROM: ROM 23-15B, 32-kbye EEPROM: EER22-20	

Host I/F Unit	RS-232C type: NT600M-LK201	
System ROM	NT600M-SMR31-E	
Support tool	NTM Support Tool NT20M-ZASAT-EV4: 3.5-inch (2DD) and 5.25-inch (2HD) disks	
Expanded I/O Unit	Unavailable	

*The touch-panel unequipped models cannot perform input/output operations with the expanded I/O unit, so only
  the display function can be used with these models.

Programmable Terminal	NT612G
	NT612G-DT211, NT612G-DT211B (black case) Touch-panel Model
Screen-data Memory Board	1MB Flash memory: NT610G-MF161
Host I/F Unit	RS-232C type: NT600M-LK201, RS-422 type:NT600M-LK202
System ROM	NT610G-SMR31-EV2
Support tool	NT610G-ZA3AT-EV3 3.5-inch (2DD) disk
Expanded I/O Unit	10/02 terminal: NT600M-MD211, 32/16 terminal: NT20M-MD212, Connection cable for expanded I/O unit: NT600M-IF001 (only for 32/16 terminal)

Programmable Terminal	NT610C
	NT610C-DT151-V1, NT610C-DT151B-V1 (black case):Touch-panel Model
Screen-data Memory Board	1MB Flash memory: NT610G-MF161
Host I/F Unit	RS-232C type: NT600M-LK201, RS-422 type:NT600M-LK202
System ROM	NT610C-SMR31-EV2
Support tool	For NT612G/NT610C: NT610G-ZA3AT-EZ3 3.5-inch (2DD) disk
Expanded I/O Unit	10/02 terminal: NT600M-MD211, 32/16 terminal: NT20M-MD212, Connection cable for expanded I/O unit: NT600M-IF001 (only for 32/16 terminal)
System Key Unit	NT-FK200

1-5   System Configuration Using an NT Link

This section shows the basic configuration of a system using an NT Link. Refer to the individual equipment manuals for information on the equipment used in the system.

Host Link Unit/CPU

OMRON PC:
Controls the PT as required while controlling machines and monitoring the production line.

RS-232C cable
(for Host Link Unit)

IBM PC/AT or
compatible

Support Tool

NT600M-LK201
Host Interface Unit

PT:
Provides display functions for monitoring the production line and supporting the operating environment. It notifies the PC when switches are turned ON or OFF and of numerical inputs.

Computer (Support Tool):
Can be connected to the PT when required to transfer prepared PT screens and settings.

System Equipment and Software

OMRON PC	C series and CVM1/CV series PC
	The C series can be used with the C200HS-CPU21/22/31/33-E and the CQM1-CPU41/42/43/44-E.
	The CVM1/CV series can use a PC of version [-EV1] onward.
Programmable Terminals	NT20M, NT2000M, NT612G, and NT610C.
Computer	IBM PC/AT or compatible.
Support Tool	NT20M/NT2000M/NT600M Support Tool Version 4.j (NT20M-ZASAT-EV4). NT610C/NT612G Support Tool Version 3.j .

Connections

Use an RS-232C cable to connect the PT to the PC.

Refer to Section 3 Installing the NT link I/F Unit and Connecting to the PC

System Configuration   The equipment and parts required to configure the system to use the Direct Connection function are shown below.
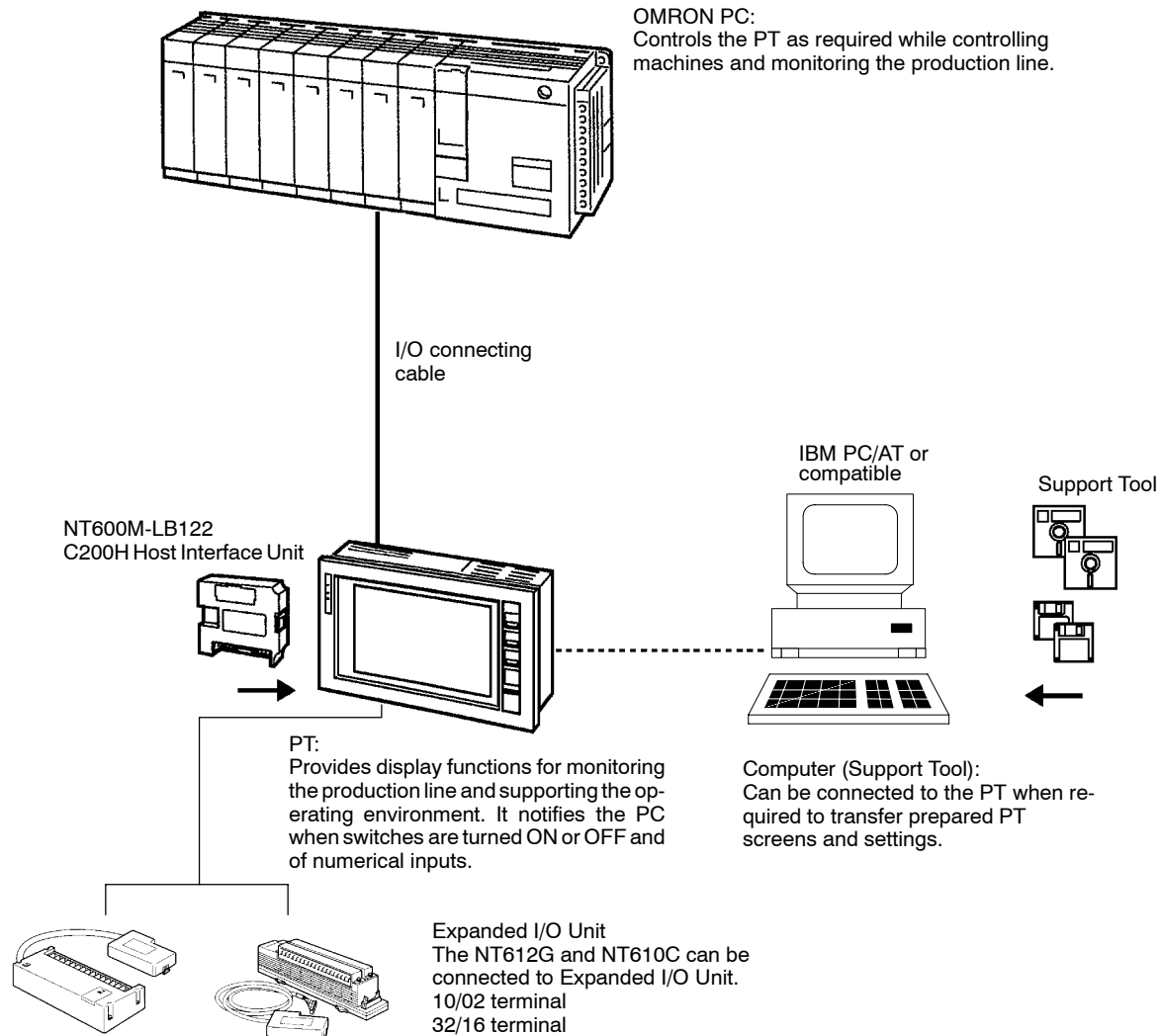
10

Programmable Terminal	NT20M/NT2000M		
	Monochrome LCD: NT20M-DT121-V2 Touch-panel Model	Backlight replaceable: NT20M-DT131 Touch-panel Model	Large size Model: NT2000M-DT131 NT2000M-DT131B (black case) Touch-panel Model
Screen-data Memory Board/Screen Memory	**Screen Memory** SRAM/32 KB: RAM22-15, SRAM/128 KB: RAM13-10, EPROM/64 KB:ROM-KD-B, EPROM/128KB: ROM-13-12B, EEPROM/32 KB: EER22-20		
Host I/F Unit	NT600M-LK201		
System ROM	NT20M-SMR34-E		
Support tool	NTM Support Tool NT20M-ZASAT-EV4: 3.5-inch (2DD) and 5.25-inch (2HD) disks		
Expanded I/O Unit	Unavailable		
System Key Unit	Unavailable		NT-FK200

Programmable Terminal	NT612G
	NT612G-DT211, NT612G-DT211B (black case):Touch-panel Model
Screen-data Memory Board	1MB Flash memory: NT610G-MF161
Host I/F Unit	NT600M-LK201
System ROM	NT610G-SMR34-EV2
Support tool	NT610G-ZA3AT-EV3 3.5-inch (2DD) disk
Expanded I/O Unit	10/02 terminal: NT600M-MD211, 32/16 terminal: NT20M-MD212, Connection cable for expanded I/O unit: NT600M-IF001 (only for 32/16 terminal)

Programmable Terminal	NT610C
	NT610C-DT151-V1, NT610C-DT151B-V1 (black case):Touch-panel Model
Screen-data Memory Board	1MB Flash memory: NT610G-MF161
Host I/F Unit	NT600M-LK201
System ROM	NT610C-SMR34-EV2
Support tool	For NT612G/NT610C: NT610G-ZA3AT-EV3 3.5-inch (2DD) disk
Expanded I/O Unit	10/02 terminal: NT600M-MD211, 32/16 terminal: NT20M-MD212, Connection cable for expanded I/O unit: NT600M-IF001 (only for 32/16 terminal)
System Key Unit	NT-FK200

1-6 System Configuration Using a C200H Host Interface Unit

This section shows the basic configuration of a system using a C200H Host Interface Unit. Refer to the individual equipment manuals for information on the equipment used in the system.

OMRON PC:
Controls the PT as required while controlling machines and monitoring the production line.

I/O connecting cable

IBM PC/AT or compatible

Support Tool

NT600M-LB122
C200H Host Interface Unit

PT:
Provides display functions for monitoring the production line and supporting the operating environment. It notifies the PC when switches are turned ON or OFF and of numerical inputs.

Computer (Support Tool):
Can be connected to the PT when required to transfer prepared PT screens and settings.

Expanded I/O Unit
The NT612G and NT610C can be connected to Expanded I/O Unit.
10/02 terminal
32/16 terminal

System Equipment and Software

OMRON PC	C200H, C200HS, C20H, C28H, C40H, and C60H PCs can be directly connected to the PT via an I/O connecting cable.
Programmable Terminals	NT20M, NT2000M, NT600M, NT612G, and NT610C.
Computer	IBM PC/AT or compatible.
Support Tool	NT20M/NT2000M/NT600M Support Tool Version 4.j (NT20M-ZASAT-EV4). NT610C/NT612G Support Tool Version 3.j (NT610G-ZA3AT-EV3).

Connections

Use an I/O connecting cable to connect the PT to the PC.

Refer to *Section 4 Installing the C200H I/F Unit and Connecting to the PC* for details on connecting the PT to the PC.

System Configuration   The equipment and parts required to configure the system to use the Direct Connection function are shown below.

Programmable Terminal	NT20M/NT2000M		
	Monochrome LCD: **NT20M-DT121-V2** **Touch-panel Model** **NT20M-DN121-V2** **Touch-panel Unequipped** **Model***	**Backlight replaceable:** **NT20M-DT131** **Touch-panel Model** **NT20M-DN131** **Touch-panel Unequipped** **Model***	**Large size Model:** **NT2000M-DT131** **NT2000M-DT131B** **(black case)** **Touch-panel Mode** **NT2000M-DN131** **For Touch-panel** **Unequipped Model***

Screen-data Memory Board/Screen Memory	**Screen Memory**
	  SRAM/32 KB: RAM22-15, SRAM/128 KB: RAM13-10, EPROM/64 KB:ROM-KD-B,
	  EPROM/128KB: ROM-13-12B, EEPROM/32 KB: EER22-20		

Host I/F Unit	NT600M-LB122		
System ROM	NT20M-SMR32-E		
Support tool	NTM Support Tool NT20M-ZASAT-EV4: 3.5-inch (2DD) and 5.25-inch (2HD) disks		
Expanded I/O Unit	Unavailable		
System Key Unit	Unavailable		NT-FK200

Programmable Terminal	NT600M	
	Monochrome LCD: **NT600M-DT122 Touch-panel Model,** **NT600M-DN122 Touch-panel** **Unequipped Model***	**EL display:** **NT600M-DT211 Touch-panel Model,** **NT600M-DN211 Touch-panel** **Unequipped Model***

Screen-data Memory Board/Screen Memory	**Screen-data Memory Board**
	  IC socket type: NT600M-MP251,
	  64-kbyte SRAM: NT600M-MR641, 128-kbyte SRAM: NT600M-MR151,
	  256-kbyte SRAM: NT600M-MR251
	
	Screen Memory
	  The screen memory chip must be inserted in the IC socket. Screen data is written with
	  a PROM writer.
	  64-kbyte EPROM: ROM-KD-B, 128-kbyte EPROM: ROM 13-12B,
	  256-kbyte EPROM: ROM 23-15B, 32-kbye EEPROM: EER22-20	

Host I/F Unit	NT600M-LB122	
System ROM	NT600M-SMR32-E	
Support tool	NTM Support Tool NT20M-ZASAT-EV4: 3.5-inch (2DD) and 5.25-inch (2HD) disks	
Expanded I/O Unit	Unavailable	

*The touch-panel unequipped models cannot perform input/output operations with the expanded I/O unit, so only
the display function can be used with these models.

Programmable Terminal	NT612G
	NT612G-DT211, NT612G-DT211B (black case):Touch-panel Model
Screen-data Memory Board	1MB Flash memory: NT610G-MF161
Host I/F Unit	NT600M-LB122
System ROM	NT610G-SMR32-EV2
Support tool	NT610G-ZA3AT-EV3 3.5-inch (2DD) disk
Expanded I/O Unit	10/02 terminal: NT600M-MD211, 32/16 terminal: NT20M-MD212, Connection cable for expanded I/O unit: NT600M-IF001 (for 32/16 terminal only)

Programmable Terminal	NT610C
	NT610C-DT151-V1, NT610C-DT151B-V1 (black case):Touch-panel model
Screen-data Memory Board	1MB Flash memory: NT610G-MF161
Host I/F Unit	NT600M-LB122
System ROM	NT610C-SMR32-EV2
Support tool	For NT612G/NT610C: NT610G-ZA3AT-EV3 3.5-inch (2DD) disk
Expanded I/O Unit	10/02 terminal: NT600M-MD211, 32/16 terminal: NT20M-MD212, Connection cable for expanded I/O unit: NT600M-IF001 (for 32/16 terminal only)
System Key Unit	NT-FK200

1-7   Before Operating

Follow the procedure indicated below before operating a PT with Interface Unit installed.

PC   **PT**   **Support Tool**

```
                          ┌──────────────────────────────┐
                          │ Check the PT power supply and │
                          │ ground cable connections.     │
                          └──────────────────────────────┘
                                Refer to the appropriate
                                PT Manual
                                        │
                          ┌──────────────────────────────┐
                          │ Install the Interface Unit.   │
                          └──────────────────────────────┘
                                Refer to page 18.
                                        │
┌──────────────────────┐  ┌──────────────────────────────┐
│ Check and change the │  │ Check and set the PT and Inter-│
│ PC settings.         │  │ face Unit.                    │
└──────────────────────┘  └──────────────────────────────┘
  Refer to Page 24 and the      Refer to page 20, 21.
  Host Link Unit, Peripheral            │
  Tool, and appropriate PC    ┌──────────────────────────────┐
  Manual                      │ Connection to the PC.         │
                              └──────────────────────────────┘
                                Refer to page 22.
                                        │
                          ┌──────────────────────────────┐
                          │ Check settings and communica- │
                          │ tions.                        │
                          └──────────────────────────────┘
                                Refer to page 72.      ┌──────────────────────────────┐
                                                       │ Create screens with the Support│
                                                       │ Tool                          │
                                                       └──────────────────────────────┘
                                                         Refer to Section 5, 6, and
┌──────────────────────┐  ┌──────────────────────────────┐  *NT20M/NT600M Support*
│ Create the PC program.│  │ Transfer screen data          │  *Tool Operation Manual,*
└──────────────────────┘  └──────────────────────────────┘  *NT610C/NT612G Support*
  Refer to Section 5, 6, and    Refer to the appropriate      *Tool Operation Manual.*
  the appropriate PC Manual      PT Manual
          │
┌──────────────────────┐
│ Trial operation      │
└──────────────────────┘
```

Reference Manuals   Each device is covered in the manuals described below.

For the host link

Equipment or Software	Name of Manual	Manual No.
PTs	NT20M/NT2000M Operation Manual	V001-E1-2
	NT600M Operation Manual	V002-E1-2
	NT612G Programmable Terminal Operation Manual	V024-E1-1
	NT610C Programmable Terminal Operation Manual	V025-E1-1
Support tools	NT20M/NT600M Support Tool Operation Manual	V004-E1-2
	NT610C/NT612G Support Tool Operation Manual	V023-E1-1
PCs	SYSMAC C20H/C28H/C40H/C60H User's Manual (Programming/RS-232C Interface)	W176-E1-04
	SYSMAC C120/C500 User's Manual (Programming)	W060-E1-02
	SYSMAC C200H User's Manual (Programming)	W130-E1-03B
	SYSMAC C200HS Programming Manual (Software)	W235-E1-02
	SYSMAC C1000H/C2000H User's Manual (Programming)	W140-E1-03
	SYSMAC CQM1 Reference Manual	W228-E1-02A
	SYSMAC CV500/CV1000 User's Manual (Ladder)	W202-E1-03A
	*For a PC of the CVM1 series, refer to the SYSMAC CV500 CV1000 User's Manual	
Peripheral tools	CVM1/CV Series Support Software Operation Manual (Details)	W196-E1-02
Host link unit	SYSMAC C Series Host Link Unit User's Manual	W143-E1-04
	SYSMAC CVM1/CV Series Host Link User's Manual	W205-E1-02

For the NT link

Equipment or Software	Name of Manual	Manual No.
PTs	NT20M/NT2000M Operation Manual	V001-E1-2
	NT612G Programmable Terminal Operation Manual	V024-E1-1
	NT610C Programmable Terminal Operation Manual	V025-E1-1
Support tools	NT20M/NT600M Support Tool Operation Manual	V004-E1-2
	NT610C/NT612G Support Tool Operation Manual	V023-E1-1
PCs	SYSMAC C200HS Programming Manual (Software)	W235-E1-02
	SYSMAC CQM1 Reference Manual	W228-E1-02A
	SYSMAC CVM1/CV500/1000/2000 User's Manual (Ladder Programming)	W202-E1-03A
Peripheral tools	CVM1/CV Series Support Software Operation Manual (Details)	W196-E1-02

For the C200H I/F unit

Equipment or Software	Name of Manual	Manual No.
PTs	NT20M/NT2000M Operation Manual	V001-E1-2
	NT600M Operation Manual	V002-E1-2
	NT612G Programmable Terminal Operation Manual	V024-E1-1
	NT610C Programmable Terminal Operation Manual	V025-E1-1
Support tools	NT20M/NT600M Support Tool Operation Manual	V004-E1-2
	NT610C/NT612G Support Tool Operation Manual	V023-E1-1
PCs	SYSMAC C20H/C28H/C40H/C60H User's Manual (Programming/RS-232C Interface)	W176-E1-04
	SYSMAC C200H User's Manual (Programming)	W130-E1-03B
	SYSMAC C200HS Programming Manual (Software)	W235-E1-02

SECTION 2
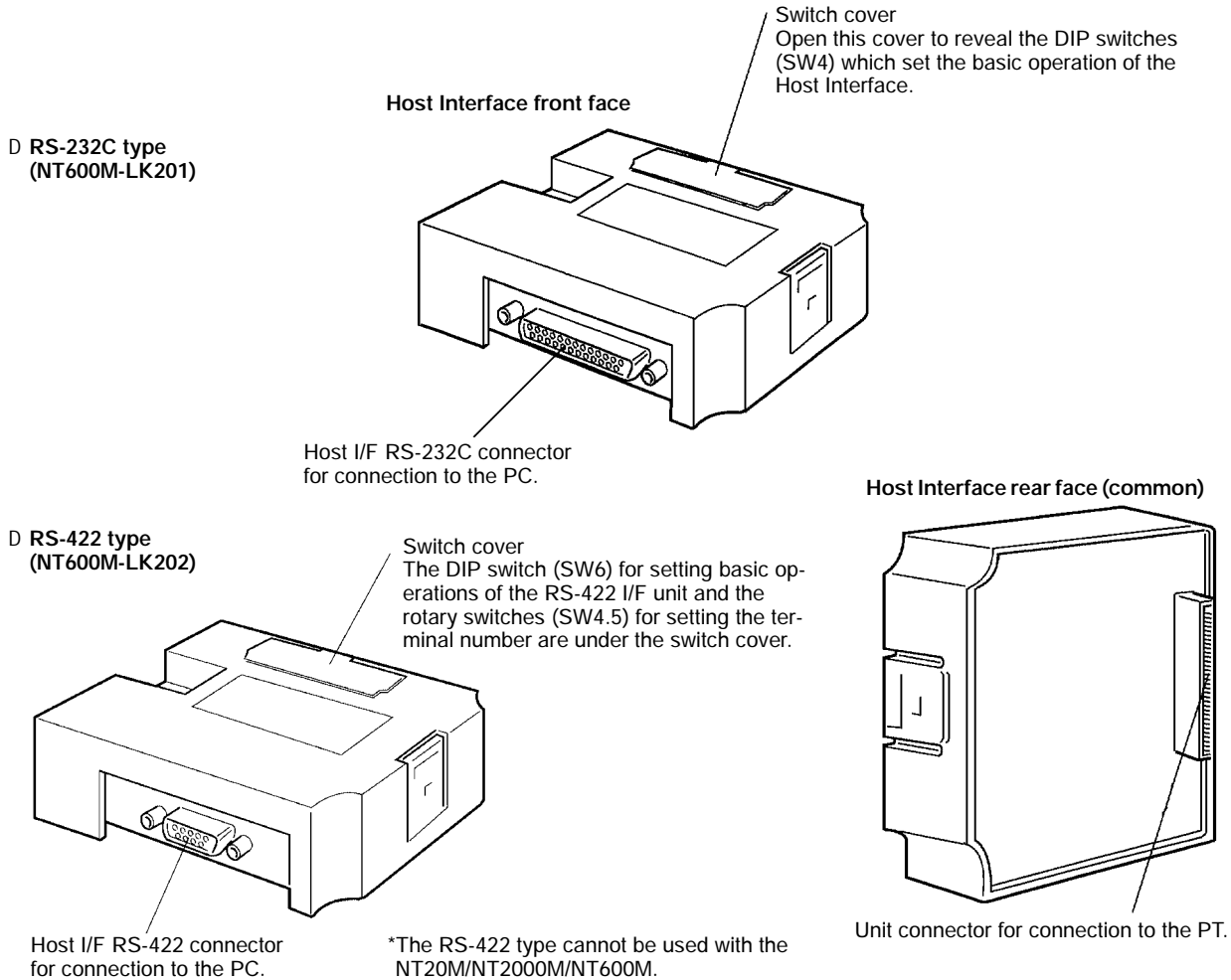# Installing the host link I/F Unit for the host link and Connecting to the PC

This section describes how to connect the host link I/F unit using the host link to the PT and the PT to the PC.

2-1   Components and Settings

The names and functions of the Host Interface parts are shown in the diagram below before installing the host link I/F unit using the host link to the PT.

NT600M-LK201/LK202 Host Interface

Switch cover
Open this cover to reveal the DIP switches (SW4) which set the basic operation of the Host Interface.

Host Interface front face

D **RS-232C type
(NT600M-LK201)**

Host I/F RS-232C connector for connection to the PC.

Host Interface rear face (common)

D **RS-422 type
(NT600M-LK202)**

Switch cover
The DIP switch (SW6) for setting basic operations of the RS-422 I/F unit and the rotary switches (SW4.5) for setting the terminal number are under the switch cover.

Host I/F RS-422 connector for connection to the PC.

*The RS-422 type cannot be used with the NT20M/NT2000M/NT600M.

Unit connector for connection to the PT.

2-2   Installing in the PT

This section describes how to install the host link I/F unit in the PT and to set the DIP switch.

2-2-1   Installation

Turn the cut-out in the Host Interface to the left and push the Unit in until a "click" is heard.

In difficult-to-connect situations move the Unit when connecting the Host Interface.

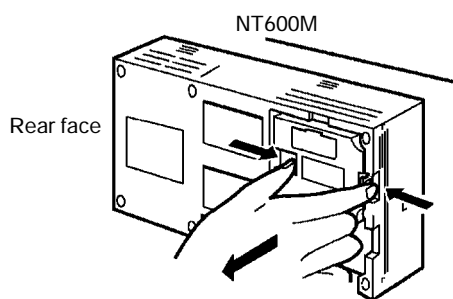**Note** Turn off the PT power supply when installing or removing the unit.

Example: Installation in the NT600M

NT600M

Rear face

Cut-out
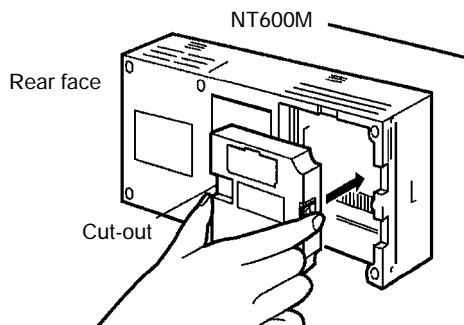
How to Remove the Unit
Hold the unit by the indentations at each side, press inwards and pull out the unit.

**Example: Removal from the NT600M**

NT600M

Rear face

2-2-2 DIP Switch Settings

Set the operating environment with the Host Interface DIP switches (SW4) before installing the PT (SW4 for LK201 or SW6 for LK202).
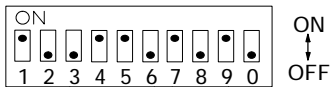
Set the Host Interface DIP switches in the positions shown below.

Note S Turn off the power supply before setting the DIP switches.

S Use the cables recommended by OMRON to connect the units. Incorrect communication may result if non-recommended cable types are used.
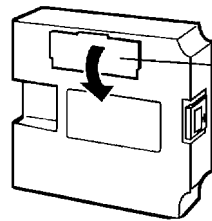
Switch cover

The DIP switches are under the switch cover on the front of the I/F Unit.

Not used

[SW4-1/SW6-1]
Initial value settings of a memory table to which words are allocated

Setting	Meaning	Description
(ON) 1	PT	Initial values set by the Support Tool. At the start of PT operation, write to the allocated word of the PC the initial values of the memory table whose "initialization" is set to "ON".
(OFF) 1	PC	The contents of the words allocated in the PC memory are used as the memory table initial values.

[SW4-2/SW6-2]
Settings of general memory for the PT status control area and the PT status control area (only when NT20M/NT2000M/NT600M is used) (Page 66, 69)

| Setting	Meaning	Description
(ON) 2	Add	Add PT Status Control Area and PT Status Notify Area to the general memory.
(OFF) 2	Don't add	Do not add PT Status Control Area and PT Status Notify Area to the general memory.

[SW4-7,8,9/SW6-7,8,9] Sets the PT Baud Rate

Setting	Baud Rate
7 8 9 ON↕OFF	4800bps
7 8 9 ON↕OFF	9600bps
7 8 9 ON↕OFF	19200bps

Set to the same value as the baud rate of the host link function of the PC.
Set to the largest value among values available for both PT and PC.

2-2-3 Rotary Switch Setting (Only RS-422 Type)

The RS-422 type host link I/F unit (NT600M-LK202) has two rotary switches (SW4,5) under the switch cover. Set both of them to "00" when using the host link I/F unit with the direct connection.
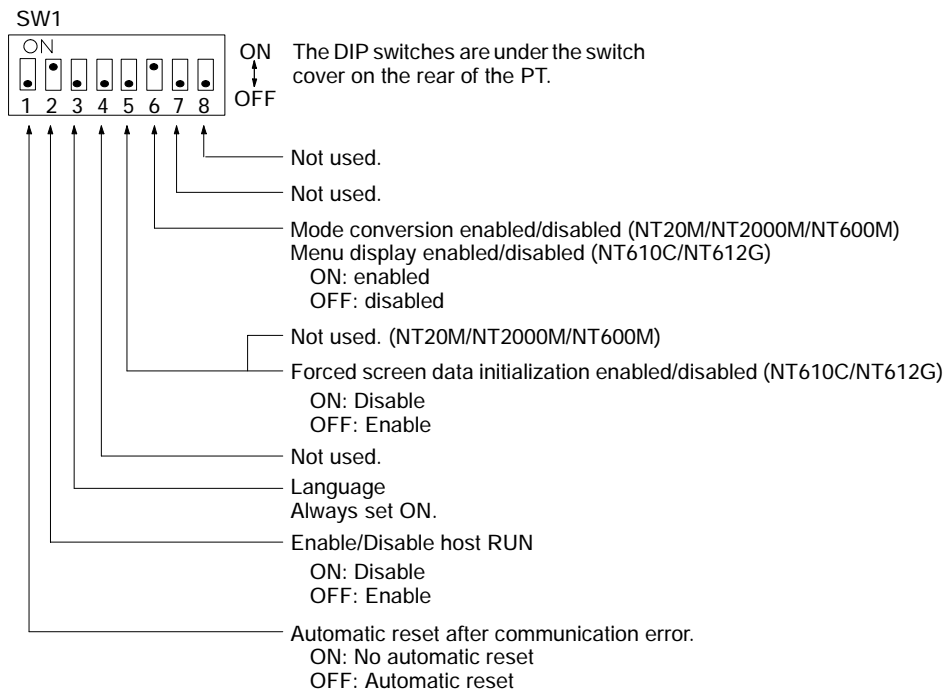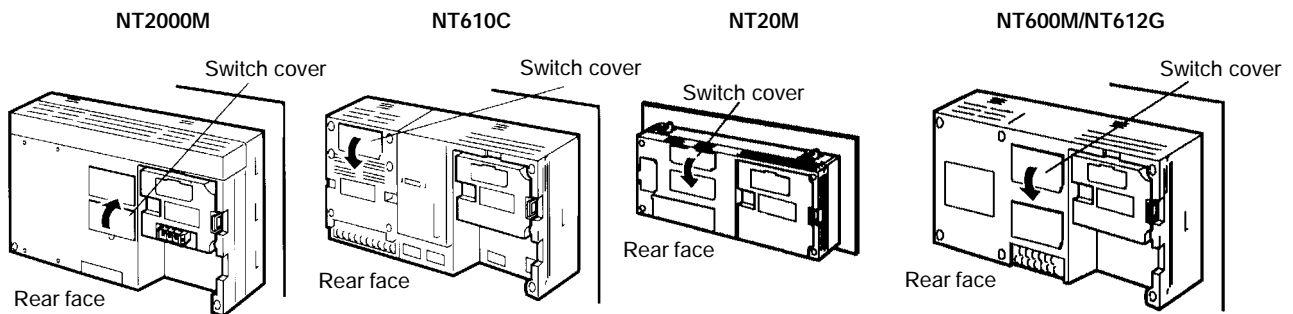
SW4   SW5

x 10^1 x 10^0
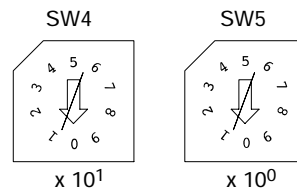
Note Turn the power off to set the rotary switches.

2-2-4 Setting the PT Switches

If Host Interface is installed the communication specifications must be set with DIP switches (SW1) on the PT. These settings are not required if the Direct Connection function is selected.

The PT unit DIP switch (SW1) settings are described below. Refer to the appropriate *PT Operation Manual* for more details.

Note Turn off the power supply before setting the DIP switches.

NT2000M   NT610C   NT20M   NT600M/NT612G

Switch cover   Switch cover   Switch cover   Switch cover

Rear face   Rear face   Rear face   Rear face

SW1

ON ↕ OFF

The DIP switches are under the switch cover on the rear of the PT.

Not used.

Not used.

Mode conversion enabled/disabled (NT20M/NT2000M/NT600M)
Menu display enabled/disabled (NT610C/NT612G)
   ON: enabled
   OFF: disabled

Not used. (NT20M/NT2000M/NT600M)
Forced screen data initialization enabled/disabled (NT610C/NT612G)
   ON: Disable
   OFF: Enable

Not used.

Language
Always set ON.

Enable/Disable host RUN
   ON: Disable
   OFF: Enable

Automatic reset after communication error.
   ON: No automatic reset
   OFF: Automatic reset

2-3　Connection to an OMRON PC (by the RS-232C Method)

Connect the PT fitted with the Host Interface to the OMRON PC with an RS-232C.

2-3-1　Compatible PCs

Some models and series of OMRON PCs have the Host Link function built-in. Check the model and series of the PC against the type of Host Link Unit before making the connections.

The compatible PCs are listed in the table below.

PC-series	Units with built-in Host Link Function		Connectable to
	Host Link Unit	**CPU Unit**	
C-series	---	C20H/C28H/C40H/C60H	Cｊｊ H
	C120-LK201-V1	---	C120, C200H, C500 (F), C1000H, C2000 (H)
	C200H-LK201-V1	---	C200H
		C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	C200HS
	C500-LK201-V1 C500-LK203	---	C500, C1000H
		CQM1-CPU21-E CQM1-CPU41-E CQM1-CPU42-E CQM1-CPU43-E CQM1-CPU44-E	CQM1
CV-series (∗)	CV500-LK201	CV500-CPU01-EV1	CV500
		CV1000-CPU01-EV1	CV1000
		CV2000-CPU01-EV1	
CVM1-series (∗)	CV500-LK201	CVM1-CPU01-EV1 CVM1-CPU11-EV1	CVM1

(∗)The NT612G/NT610C with the system ROM model NT610G-SMR31-EV2/NT610C-SMR31-EV2 cannot be connected to the CPU of the CVM1/CV-series PC whose name does not have ″-EV1″, to the PT. Be careful if the system ROM has been changed from the conventional one. Use the host link units to connect the CPU, whose name does not have ″-EV1″.
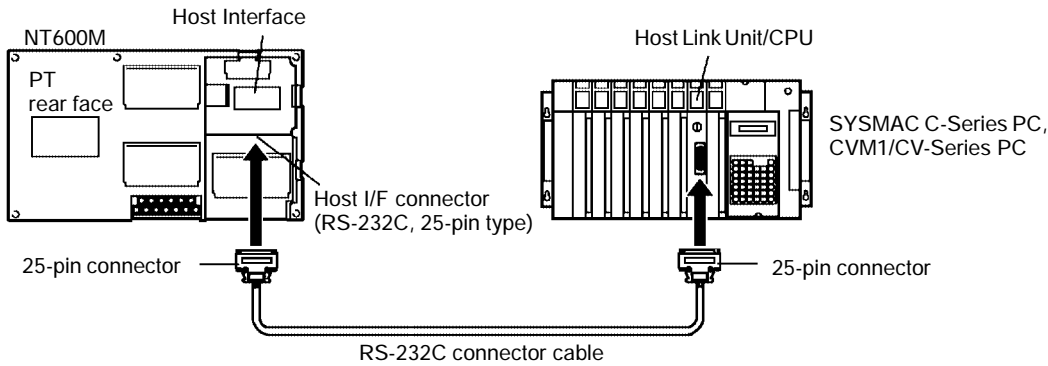
2-3-2　Connecting the PT

Refer to the diagrams below to select the appropriate cable for the unit connectors. Connect the PT to the PC.

Note　Turn off the PT and PC power supplies before inserting or removing connectors.
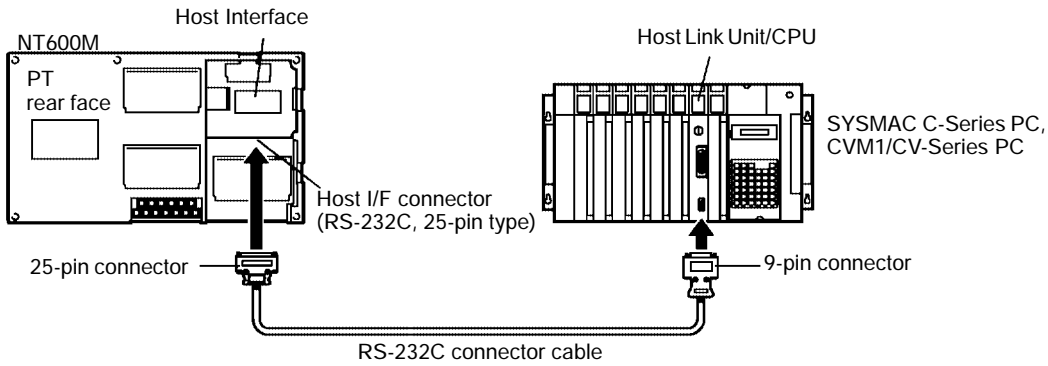
Connecting to a PC with 25-pin Connector

Use the following connector cable with a 25-pin connector at each end to connect the PT to a PC with a 25-pin connector:
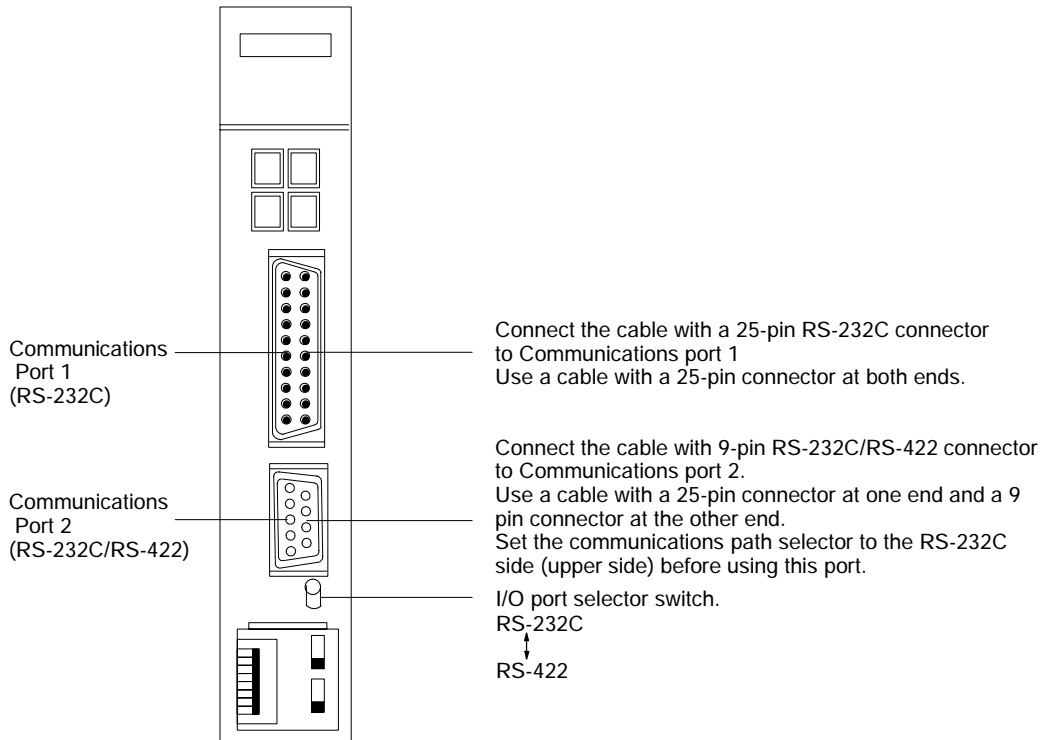

Connecting to a PC with 9-pin Connector

Use the following connector cable with a 25-pin connector at one end and a 9-pin connector the other end to connect the PT to a PC with a 9-pin connector:
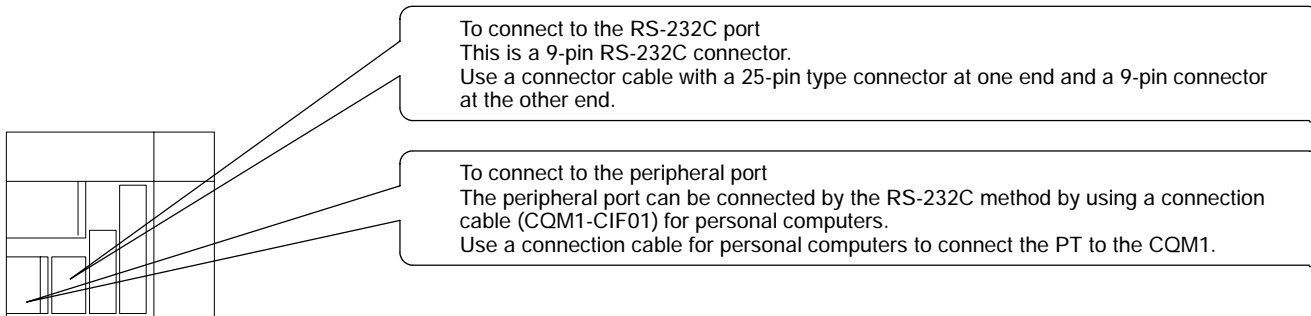

Connecting the PT to a CV or CVM1 Series Host Link Unit

Two types of connector are found on CV500-LK201 Host Link Units. Both of these connector types can be connected with an RS-232C connector cable. Select the connector cable which matches the connector type.

Connect the cable with a 25-pin RS-232C connector to Communications port 1
Use a cable with a 25-pin connector at both ends.

Connect the cable with 9-pin RS-232C/RS-422 connector to Communications port 2.
Use a cable with a 25-pin connector at one end and a 9 pin connector at the other end.
Set the communications path selector to the RS-232C side (upper side) before using this port.

I/O port selector switch.
RS-232C

RS-422

Connecting the PT to the C-series CQM1 unit

The CQM1 has two types of connectors.
Each type can be connected with the RS-232C port (use a connection cable for personal computers to connect to the peripheral port connector).

> To connect to the RS-232C port
> This is a 9-pin RS-232C connector.
> Use a connector cable with a 25-pin type connector at one end and a 9-pin connector at the other end.

> To connect to the peripheral port
> The peripheral port can be connected by the RS-232C method by using a connection cable (CQM1-CIF01) for personal computers.
> Use a connection cable for personal computers to connect the PT to the CQM1.

If a Cable Longer than 5 m is Required

If a cable longer than 5 m is required, a longer cable can be fabricated; however the overall length should not exceed 15 m. Refer to *Appendix F RS-232C Connections* for more details.

When the PT is more than 15 meters away from the PC

Use RS-422 connections if the PT is more than 15 m from the PC. Communication is possible up to 500 m through a multicore shielded cable. However, connection is limited 1-to-1 connection between units. Refer to *Section 2-4 Connection to an OMRON PC (by the RS-422 method)* for more details.

In situations where unstable communication occurs

Optical-fiber cable connections are used in situations where unstable communication occurs because of noise problems. Communication is possible up to 500 m. However, connection is limited 1-to-1 connection between units. Refer to *Appendix G Optical Fiber Cable Connections* for more details.

2-3-3 PC Switch Settings

When the PT and PC are connected together, set the conditions at the PC Host Link Unit and the CPU as shown in the table below.
The method of setting the conditions with the switches on each unit is described on the following pages. Refer to the manual on each unit for more detailed information on making these settings.

Item	Switch setting position
I/O port	RS-232C
Baud rate	Set to the same baud rate as the PT
Transfer code	ASCII, 7 data bits, 2 stop bits
Parity	Even
1-to-1/1-to-N	1-to-N
Instruction level	Level 1, 2, 3
Unit#	00

Note The 1-to-N setting enables BCC (Block Check Character). The 1-to-N connection cannot be used to connect a Host Link Unit to a PT.
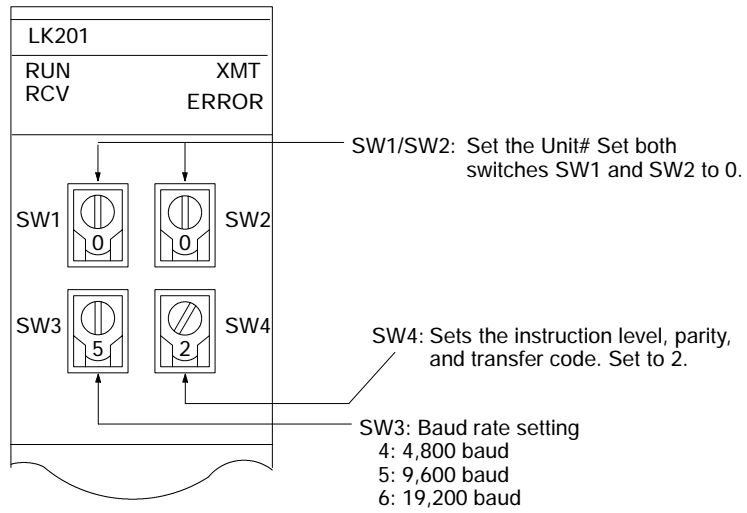
Connection to a Host Link Unit

Two types of Host Link Unit are available: a Rack-mounting type and a CPU-mounted type. The switch settings differ according to the type of Host Link Unit. Set the switches according to the unit type.
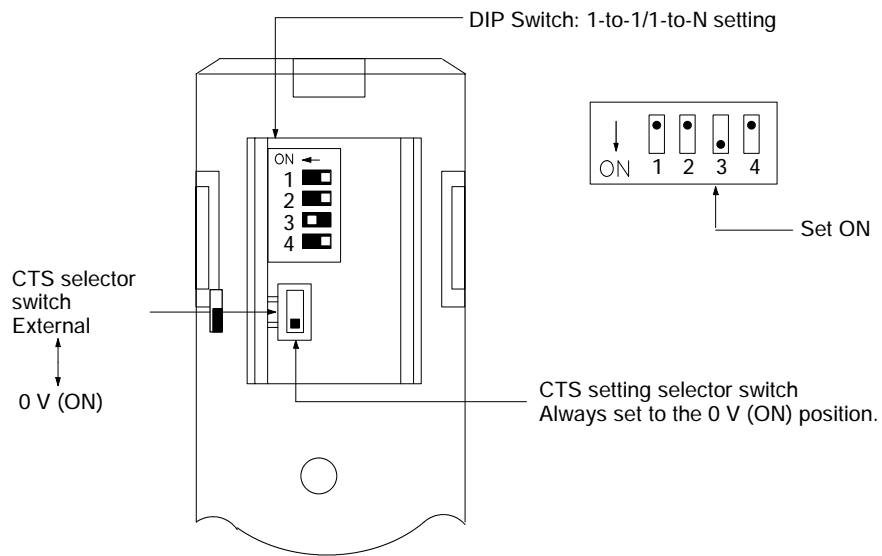
C200H: Rack-mounting Type

C200H-LK201-V1

Setting the Front Switches
Set each switch with a flathead screwdriver until the displayed settings agree with the settings described on the previous page.
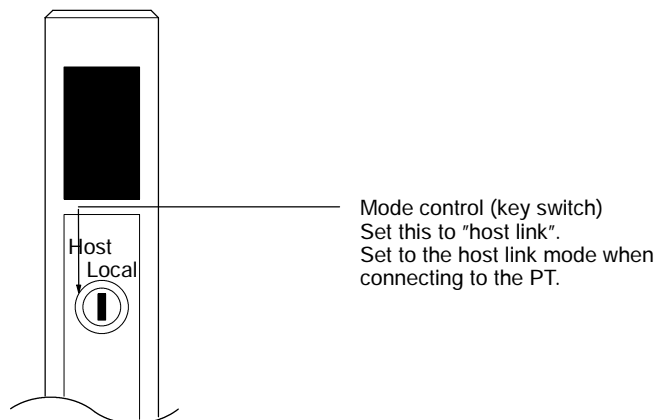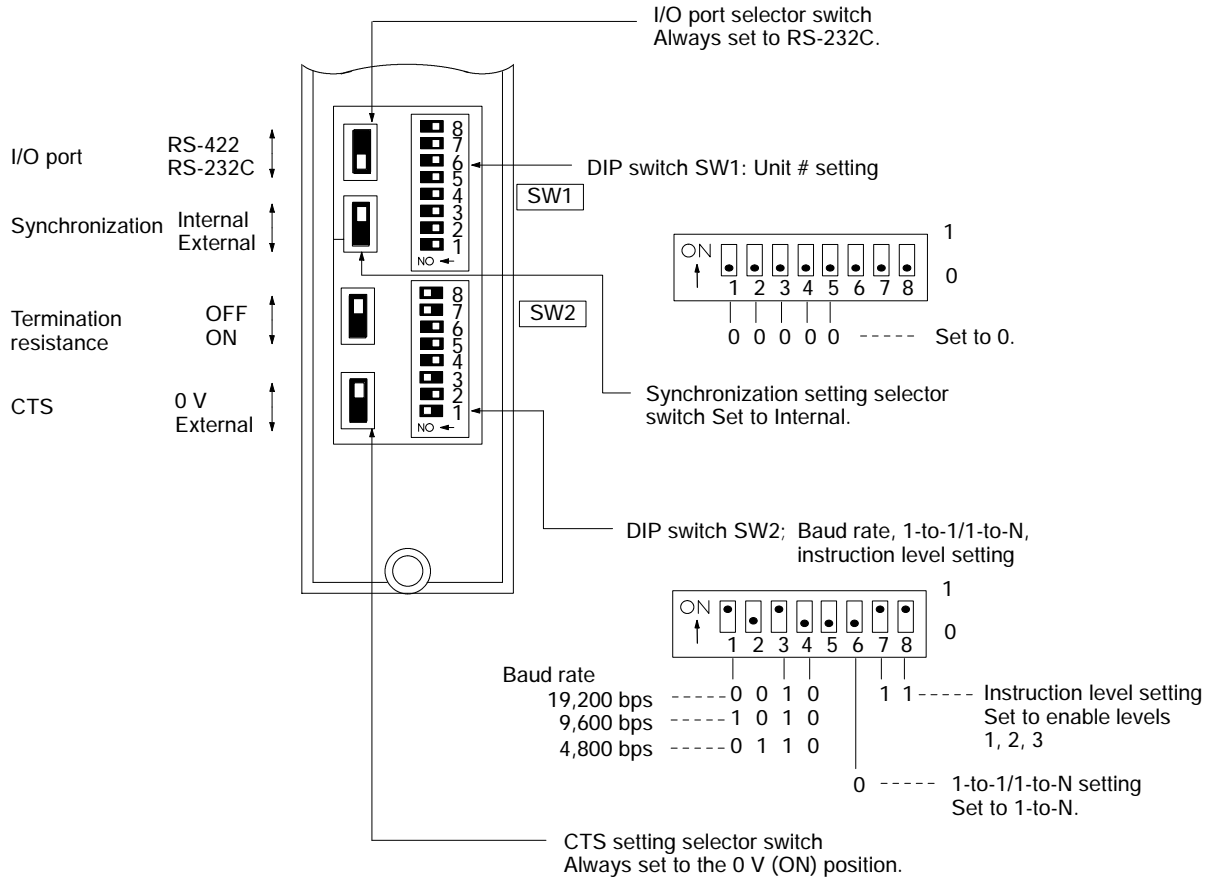
LK201

RUN   XMT
RCV   ERROR

SW1/SW2: Set the Unit# Set both
switches SW1 and SW2 to 0.

SW1   [0]   [0]   SW2

SW3   [5]   [2]   SW4

SW4: Sets the instruction level, parity,
and transfer code. Set to 2.

SW3: Baud rate setting
4: 4,800 baud
5: 9,600 baud
6: 19,200 baud

Setting the Rear Switches

DIP Switch: 1-to-1/1-to-N setting

ON ←
1
2
3
4

ON 1 2 3 4

Set ON

CTS selector
switch
External

0 V (ON)

CTS setting selector switch
Always set to the 0 V (ON) position.

**C500(F), C1000(F)
Rack-mounting Types**

C500-LK201-V1

Setting the front switch

Host
Local

Mode control (key switch)
Set this to "host link".
Set to the host link mode when
connecting to the PT.

Setting the Rear Switches

I/O port selector switch
Always set to RS-232C.

I/O port   RS-422
            RS-232C

Synchronization   Internal
                   External

Termination resistance   OFF
                          ON

CTS   0 V
       External

SW1

SW2

DIP switch SW1: Unit # setting

ON
1 2 3 4 5 6 7 8   1
                   0

0 0 0 0 0 ----- Set to 0.

Synchronization setting selector
switch Set to Internal.

DIP switch SW2; Baud rate, 1-to-1/1-to-N,
              instruction level setting

ON
1 2 3 4 5 6 7 8   1
                   0

Baud rate
  19,200 bps ----- 0 0 1 0   1 1 ----- Instruction level setting
   9,600 bps ----- 1 0 1 0   Set to enable levels
   4,800 bps ----- 0 1 1 0   1, 2, 3

                              0 ----- 1-to-1/1-to-N setting
                                      Set to 1-to-N.

CTS setting selector switch
Always set to the 0 V (ON) position.

C500(F), C1000(F)
Rack-mounting Types

C500-LK203

Setting the Rear Switches

I/O port selector switch
Always set to RS-232C.

5 V supply — ON / OFF

I/O port — RS-422 / RS-232C

DIP switch SW1: Unit #, parity, transfer code setting

SW1

Synchronization — Internal / External

```
ON        1
↑    ● ● ● ● ● ● ● ●
     1 2 3 4 5 6 7 8   0
```

Termination resistance — OFF / ON

```
          0 0 ----- Parity, transfer code setting.
0 0 0 0 0 ---------- Unit # setting.
          Set to 0.
```

SW2

Synchronization setting selector
switch Set to Internal.

CTS — 0 V / External

DIP switch SW2: Baud rate, 1-to-1/1-to-N,
instruction level setting

```
ON        1
↑    ● ● ● ● ● ● ● ●
     1 2 3 4 5 6 7 8   0
```

Baud rate
19,200 bps ----- 0 0 1 0   1 1 --- Instruction level setting
9,600 bps ----- 1 0 1 0   Set to enable levels
4,800 bps ----- 0 1 1 0   1, 2, 3

0 ----- 1-to-1/1-to-N setting
Set to 1-to-N.

CTS setting selector switch
Always set to the O V (ON) position.

CPU-mounted Type   C120-LK201-V1

Setting the Rear Switches
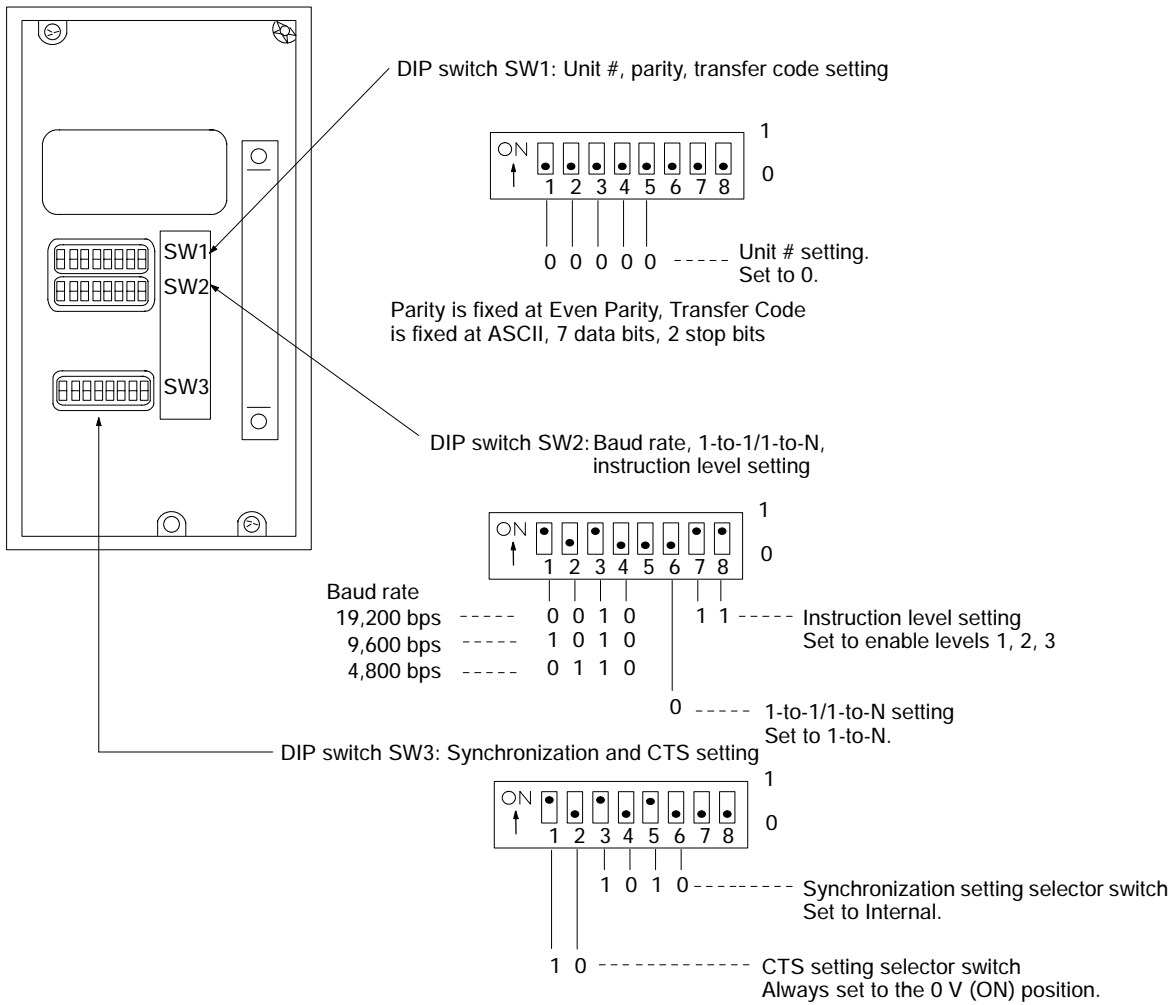
DIP switch SW1: Unit #, parity, transfer code setting

```
ON    ┌─────────────────┐   1
 ↑     │ ■ ■ ■ ■ ■ ■ ■ ■ │
       └─────────────────┘   0
         1 2 3 4 5 6 7 8
```

0 0 0 0 0 ----- Unit # setting.
                Set to 0.

Parity is fixed at Even Parity, Transfer Code
is fixed at ASCII, 7 data bits, 2 stop bits

DIP switch SW2: Baud rate, 1-to-1/1-to-N,
                instruction level setting

```
ON    ┌─────────────────┐   1
 ↑     │ ■ ■ ■ ■ ■ ■ ■ ■ │
       └─────────────────┘   0
         1 2 3 4 5 6 7 8
```

Baud rate
19,200 bps ----- 0 0 1 0   1 1 ----- Instruction level setting
 9,600 bps ----- 1 0 1 0   Set to enable levels 1, 2, 3
 4,800 bps ----- 0 1 1 0

                         0 ----- 1-to-1/1-to-N setting
                                 Set to 1-to-N.

DIP switch SW3: Synchronization and CTS setting

```
ON    ┌─────────────────┐   1
 ↑     │ ■ ■ ■ ■ ■ ■ ■ ■ │
       └─────────────────┘   0
         1 2 3 4 5 6 7 8
```

              1 0 1 0 -------- Synchronization setting selector switch
                               Set to Internal.

1 0 ------------- CTS setting selector switch
                  Always set to the 0 V (ON) position.

CV/CVM1 Series   CV500-LK201
Rack-mounting Types

Setting the Front Switches
Set the operating conditions with the PC System Setting functions when a CV/
CVM1 Series Host Link Unit is connected to a PC. The PC System Settings can
be made from the Peripheral Tool (FIT, etc.) or PC system setting information
created with a Peripheral Tool can be transferred to the CPU. Refer to CVM1/CV
Series Support Software Operation Manual (Details) (W196-E1-02) for more
details.

Set the DIP switches to enable the system settings to be made.
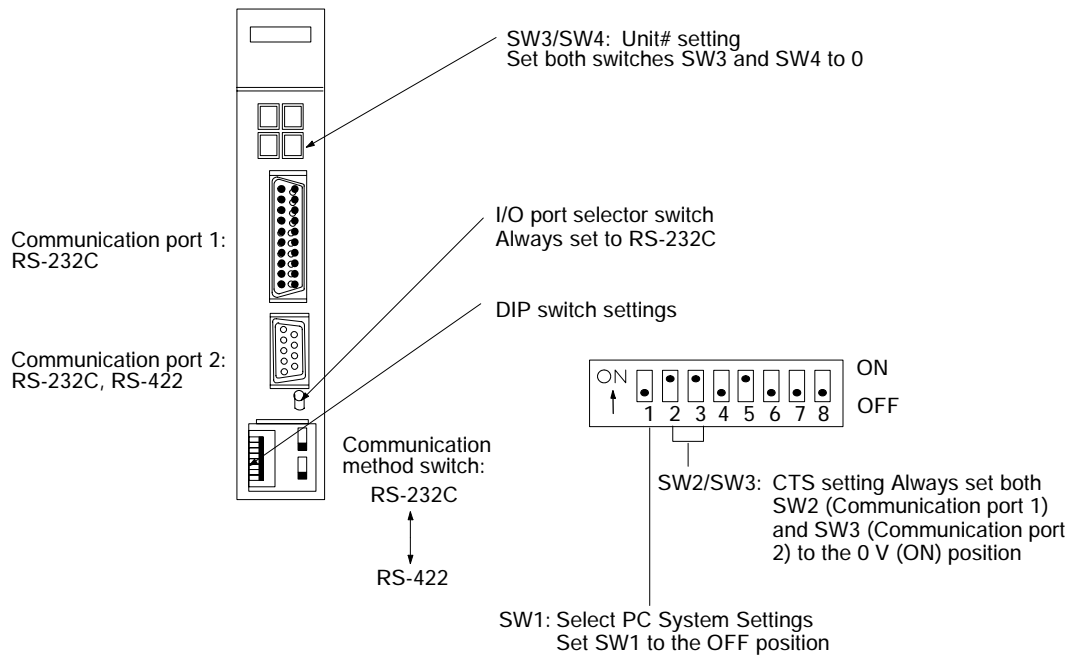
SW3/SW4: Unit# setting
Set both switches SW3 and SW4 to 0

I/O port selector switch
Always set to RS-232C

Communication port 1:
RS-232C

DIP switch settings

Communication port 2:
RS-232C, RS-422

ON
1 2 3 4 5 6 7 8
ON
OFF

Communication
method switch:

RS-232C

RS-422

SW2/SW3: CTS setting Always set both
SW2 (Communication port 1)
and SW3 (Communication port
2) to the 0 V (ON) position

SW1: Select PC System Settings
Set SW1 to the OFF position

Connection to a CPU

Set the operating conditions with the PC System Setting functions when connecting to a Mini H-type (C⎤⎤H) or CV/CVM1 Series CPU. The PC System Settings can be made from the Peripheral Tool (FIT, etc.) or PC system setting information created with a Peripheral Tool can be transferred to the CPU.

Refer to the SYSMAC C20H/C28H/C40H/C60H User's Manual (Programming/RS-232C Interface) (W176-E1-04), and CVM1/CV Series Support Software Operation Manual (Details) (W196-E1-02) for more details.

Mini H-type PCs (C⎤⎤H)   C20H/C28H/C40H/C60H

No switch settings required when connecting to a Mini H-type PC.

CV/CVM1-series   CV500-CPU01-EV1
CV1000-CPU01-EV1
CV2000-CPU01-EV1
CVM1-CPU01-EV1
CVM1-CPU11-EV1

Note The NT610C/NT612G cannot be connected to any CPU the name of which does not have [-EV1].
Use the host link unit.

Front Switch Settings
When connecting to a CV/CVM1 Series CPU, select the RS-232C input port.

Communication method switch:

RS-232C

↕

RS-422

I/O port selector switch
Set to RS-232C.

DIP switch setting

ON
OFF

SW4: System Setting
ON: The system is set to the default value.
OFF: The system is set to a desired system setting.
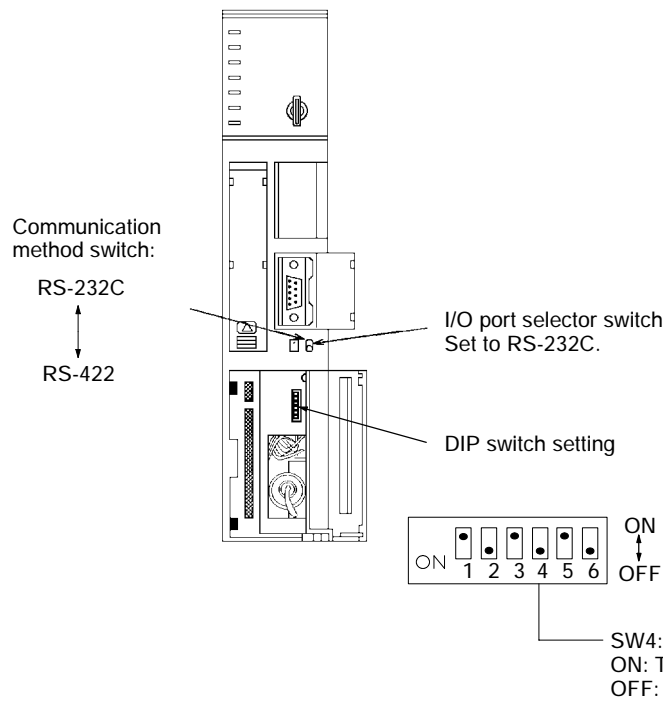
Item	Settings	Default Value
Baud Rate	1200/2400/4800/9600/ 19200 bps	9600 bps
Stop bit	1 or 2 stop bits	2 stop bits
Parity	Even/odd/non-parity.	Even parity
Data length	ASCII 7 bits	ASCII 7 bits
Unit #	00 to 31.	Unit #00

Connection to a CPU (C series C200HS, CQM1)

Set the communication conditions to the PC system setting area(DM area) when a C200HS or CQM1 CPU is connected.
Write the "PC system settings" for the C200HS or CQM1 directly from the peripheral tool (FIT etc.) to the data memory (DM).
Refer to SYSMAC CQM1 Reference Manual (W228-E1-02A) for more details.

How to set the DIP switch
When the RS-232C port is used, set the DIP switch so as to make the PC system settings for RS-232C port effective.

Example: CQM1

SW5: DIP switch setting

ON
OFF

Switch setting for communication using the RS-232C port
Set SW5 to "OFF" to make the PC system settings effective.
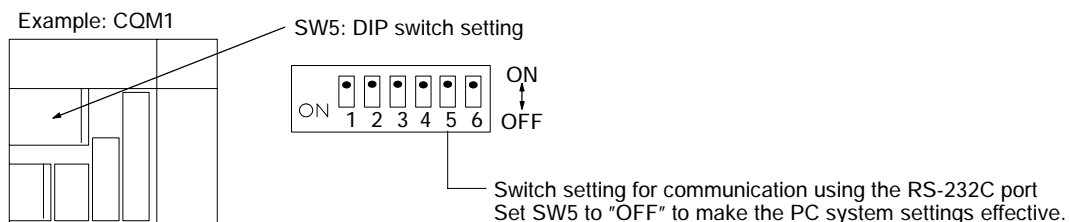
How to make the PC system settings
Write settings to the PC system setting area (data memory) according to the used port.

When Using the RS-232C Port	When Using the Peripheral Port	Written Value	Settings
DM6645	DM6650	0001	Host link mode and conditions are set.
DM6646	DM6651	03XX *	Data length: 7 bits, 2 stop bits, even parity, baud rate:see below
DM6648	DM6653	0000	Unit # 0

(*) Set XX to one of the following numbers according to the PT's baud rate.

02: 4800bps
03: 9600bps
04: 19200bps

2-4 Connection to an OMRON PC (by the RS-422 Method)

Connect the PT equipped with an RS-422 type Host I/F Unit to an OMRON PC by the RS-422 method.
If the PT is more than 15 meters away from the PC, use this unit.
The PT can be connected to the PC within 500 meters.

The RS-422 is the method to connect one upper computer to two or more PCs. But only one PT can be connected to one PC.

Note The RS-422 type I/F unit cannot be used with the NT20M/NT2000M/NT600M.

2-4-1 Compatible PCs

Some models and series of OMRON PCs have the Host Link function built-in. Check the model and series of the PC against the type of Host Link Unit before making the connections.
The compatible PCs are listed in the table below.

PC-series	Units with built-in Host Link Function		Connectable to
	Host Link Unit	CPU Unit	
C-series	---	C20H/C28H/C40H/C60H	Cｊｊ H
	C120-LK201-V1	---	C120, C200H, C500(F), C1000H, C2000(H)
	C200H-LK201-V1	---	C200H
		C200HS-CPU21-E C200HS-CPU23-E C200HS-CPU31-E C200HS-CPU33-E	C200HS
	C500-LK201-V1 C500-LK203	---	C500, C1000H
		CQM1-CPU21-E CQM1-CPU41-E CQM1-CPU42-E CQM1-CPU43-E CQM1-CPU44-E	CQM1
CV-series	CV500-LK201	CV500-CPU01-EV1	CV500
		CV1000-CPU01-EV1	CV1000
CVM1-series	CV500-LK201	CVM1-CPU01-EV1 CVM1-CPU11-EV1	CVM1

31

2-4-2 Parts Required

RS-232C/RS-422 cable OMRON does not provide the RS-232C/RS-422 cable.
Make a connection cable according to the operation condition (the communicating distance between the PC and the PT).
Two connectors, two connector covers, and one cable are required.
One connector and one connector cover are supplied with each of the PT and the PC.
Refer to Appendix F RS-232C Connection to make a connection cable.

About the link adaptor

The link adaptor is a converter to connect cables different in communication method. The model number of the link adaptor to be used is B500-AL004(-P). Set the following conditions after connection. Refer to the manuals of each PC (host link section) and of host link units.

Setting CTS
Always set this to ″0V″ (ON).

Setting terminal resistance
Set this to ″ON″ when an RS-422 cable is used with the PC.
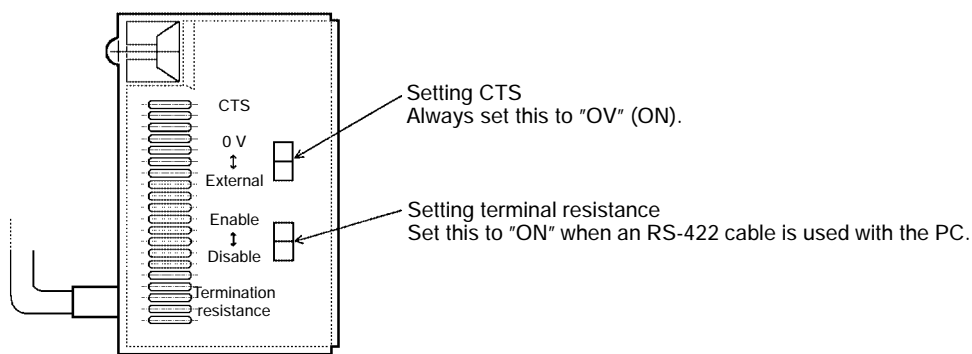
Connecting the Cables
RS-422 communication allows connection between a PT and PC via a Link Adaptor using RS-232C and RS-422 cables.

The method of connection differs depending on whether the unit has an RS-232C connector or RS-422 connector

Note 1. Ground the PC unit FG terminal to Class 3 ground. Refer to the appropriate *PC Installation Guide* for details.

2. Turn off both the PT and PC power supplies before connecting or disconnecting connectors.

Connecting Units with an RS-232C Connector

The diagram below shows the connection of a PC and PT using an RS-422 cable and a Link Adaptor. The connection from the PC to the Link Adaptor is by means of an RS-232C cable.
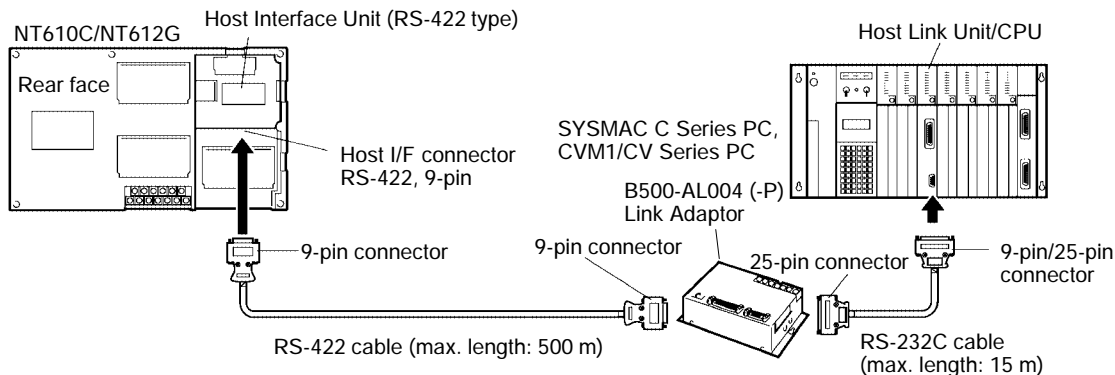
Connecting Units with an RS-422 Connector

Some types of PC unit have an RS-422 connector. An RS-422 cable can be connected directly to this connector.
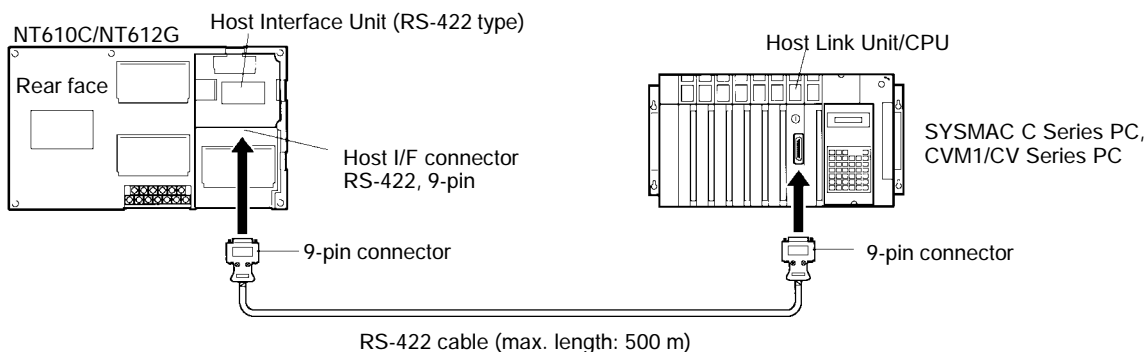
2-4-3 Connector Specifications and Wiring for Each Unit

The combination of pin numbers to which the connection cable is connected differs according to the connector specifications of each unit.
Select an appropriate combination from the following connection combinations in accordance with the connector specifications of each unit, and connect the cable to the connectors.
Refer to the Appendix F RS-232C Connection for wiring.

Connecting Units with an RS-232C Connector

The PT to PC connection method below uses two Link Adaptors.

Wiring an RS-232C Cable

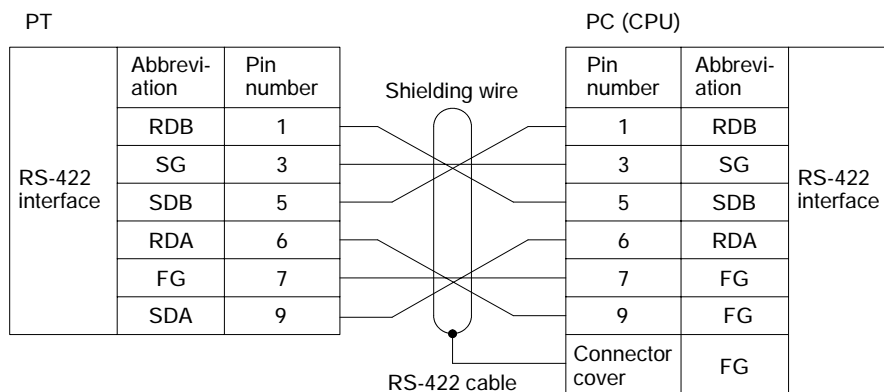**Connector Specifications for a B500-AL004 (-P) Link Adaptor**

Connector: RS-232C

Electrical characteristics: Complies with EIA RS-232C

Signal direction: Signal input and output is relative to the PT.
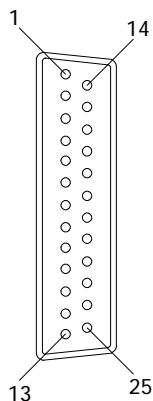
Connector pin #	Signal name	Abbrevi-ation	Signal direction	
			Input	Output
1	Frame ground	FG	---	---
2	Send data	SD (TXD)		Yes
3	Receive data	RD (RXD)	Yes	
4	Request send	RS (RTS)		Yes
5	Clear to send	CS (CTS)	Yes	
6		DR	---	---
7	Signal ground	SG (GND)	---	---
8		CD		
20	Data terminal ready	ER (DTR)		Yes

How to connect the wires to the connector

Each unit's connector for the PC has different specifications.
Refer to Connector Specifications and Wiring for OMRON Units in Appendix F RS-232C Connections for specifications of each unit's connector for the PC.

Wiring an RS-422 Cable

Connector Specifications for a B500-AL004 (-P) Link Adaptor

Connector: RS-422

Electrical characteristics: Complies with EIA RS-422

Signal direction: Signal input and output is relative to the PT or PC.

Connector pin #	Signal name	Abbrevi-ation	Signal direction	
			Input	Output
1	Receive data B	RDB	Yes	
3	Signal ground	SG	---	---
5	Send data B	SDB		Yes
6	Receive data A	RDA	Yes	
7	Frame ground	FG	---	---
9	Send data A	SDA		Yes

Wiring Connections

The connection of two Link Adaptors with an RS-422 cable is shown below.
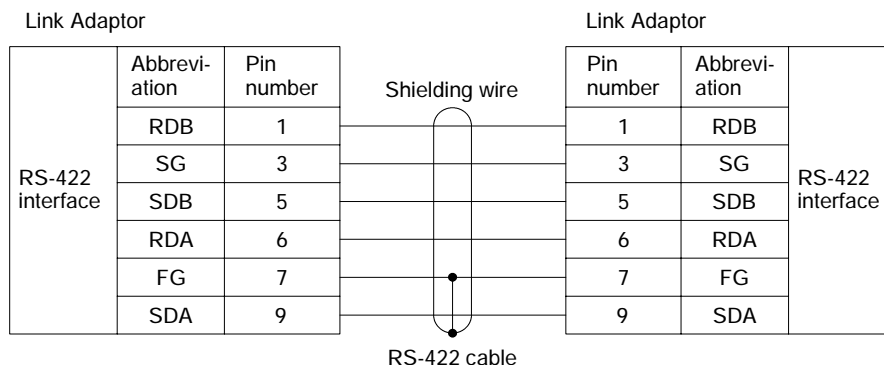
Connecting Units with an RS-422 Connector

The connector specifications and wiring connections for a unit with an RS-422 connector is described below. Refer to Connection to a Unit with an RS-232C/RS-422 Connector for the specifications of the link adaptor's RS-422 connector.
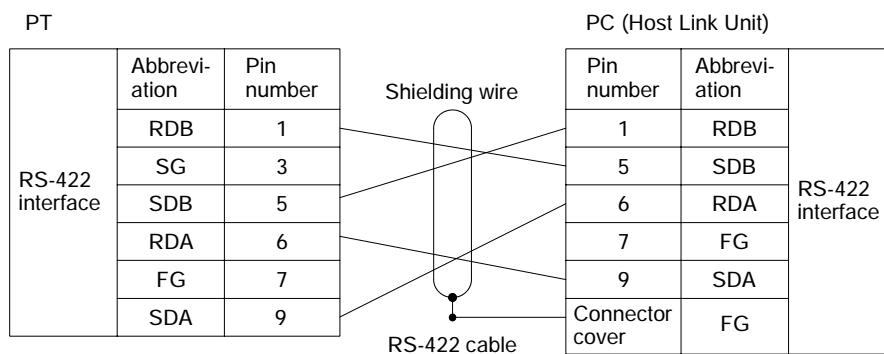
Connecting to a C Series Host Link Unit

C Series Host Link Unit Connector Specifications

Applicable Host Link Unit: C200H-LK202-V1
                              C500-LK201-V1
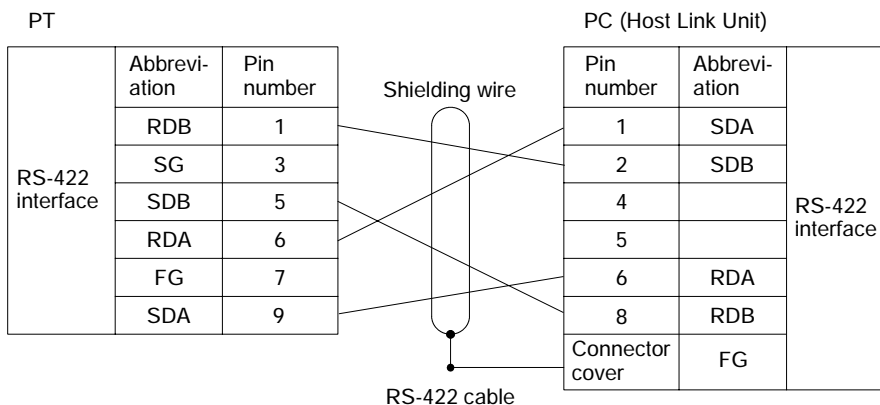   C120-LK202-V1

Electrical characteristics: Complies with EIA RS-422

Signal direction: Signal input and output is relative to the Host Link Unit.
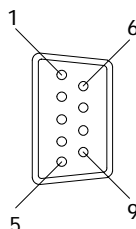
Connector pin #	Signal name	Abbrevi-ation	Signal direction	
			Input	Output
1	Receive data B	RDB	Yes	
3	Signal ground	SG	---	---
5	Send data B	SDB		Yes
6	Receive data A	RDA	Yes	
7	Frame ground	FG (GND)	---	---
9	Send data A	SDA		Yes

Wiring Connections

PT			Shielding wire	PC (CPU)		
	Abbrevi-ation	Pin number		Pin number	Abbrevi-ation	
RS-422 interface	RDB	1		1	RDB	RS-422 interface
	SG	3		3	SG	
	SDB	5		5	SDB	
	RDA	6		6	RDA	
	FG	7		7	FG	
	SDA	9		9	FG	
			RS-422 cable	Connector cover	FG	

Connecting to a C Series Host Link Unit (Insulated)

C Series Host Link Unit 25-pin Connector Specifications

Applicable Host Link Unit: C500-LK203 (Insulated)

Electrical characteristics: Complies with EIA RS-422

Signal direction: Signal input and output is relative to the Host Link Unit.
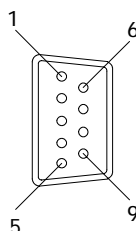
Connector pin #	Signal name	Abbrevi-ation	Signal direction	
			Input	Output
Connector cover	Frame ground	FG	---	---
1	Receive data B	RDB	Yes	
5	Send data B	SDB		Yes
6	Receive data A	RDA	Yes	
7	Frame ground	FG	---	---
9	Send data A	SDA		Yes

Wiring Connections

Connect the cable shielding wire to the connector cover and Pin 7 at the Host Link Unit end of the cable only.

PT			Shielding wire	PC (Host Link Unit)		
	Abbrevi-ation	Pin number		Pin number	Abbrevi-ation	
RS-422 interface	RDB	1		1	RDB	RS-422 interface
	SG	3		5	SDB	
	SDB	5		6	RDA	
	RDA	6		7	FG	
	FG	7		9	SDA	
	SDA	9	RS-422 cable	Connector cover	FG	

Connecting to a CV/CVM1 Series Host Link Unit

CV/CVM1 Series Host Link Unit Connector Specifications

Applicable Host Link Unit: CV500-LK201 (communication port #2)

Electrical characteristics: Complies with EIA RS-422

Signal direction: Signal input and output is relative to the Host Link Unit.
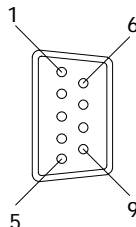
Connector pin #	Signal name	Abbrevi-ation	Signal direction	
			Input	Output
Connector cover	Frame ground	FG	---	---
1	Send data A	SDA (SD -)		Yes
2	Send data B	SDB (SD +)		Yes
6	Receive data A	RDA (RD -)	Yes	
8	Receive data B	RDB (RD +)	Yes	

Wiring Connections

PT				PC (Host Link Unit)		
	Abbrevi-ation	Pin number	Shielding wire	Pin number	Abbrevi-ation	
	RDB	1		1	SDA	
	SG	3		2	SDB	
RS-422 interface	SDB	5		4		RS-422 interface
	RDA	6		5		
	FG	7		6	RDA	
	SDA	9		8	RDB	
				Connector cover	FG	

RS-422 cable

Connecting to a CV Series CPU

CV Series CPU Connector Specifications

Applicable CPU: CV500-CPU-01-EV1
CV1000-CPU01-EV1
CVM1-CPU01-EV1
CVM1-CPU11-EV1

Electrical characteristics: Complies with EIA RS-422

Signal direction: Signal input and output is relative to the PC.
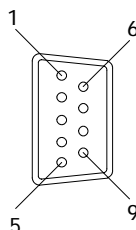
Connector pin #	Signal name	Abbrevi-ation	Signal direction	
			Input	Output
Connector cover	Frame ground	FG	---	---
1	Send data A	SDA (SD -)		Yes
2	Send data B	SDB (SD +)		Yes
4	Request send	RS		Yes
5	Clear to send	CS	Yes	
6	Receive data A	RDA (RD -)	Yes	
8	Receive data B	RDB (RD +)	Yes	

Wiring Connections

Short Pin 4 (RS) and Pin 5 (CS) together on the connector at the PC end of the cable.
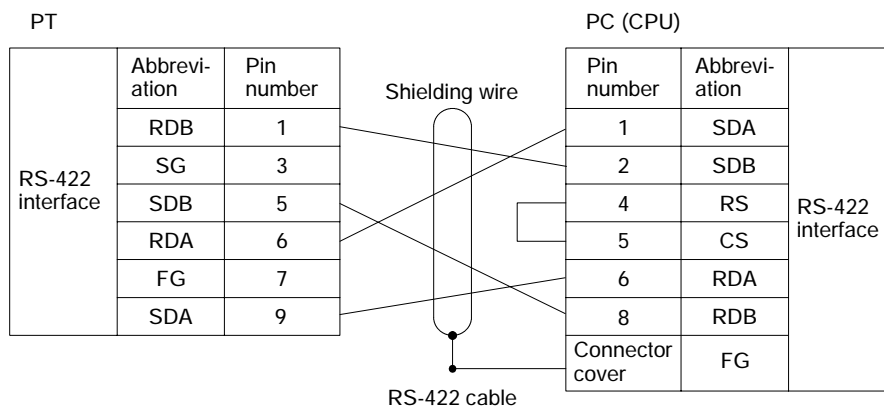
2-4-4 PC Switch Settings

When the PT and PC are connected together, set the conditions at the PC Host Link Unit and the CPU as shown in the table below.
The method of setting the conditions with the switches on each unit is described on the following pages. Refer to the manual on each unit for more detailed information on making these settings.

Item	Switch setting position
I/O port	RS-422
Baud rate	Set to the same baud rate as the PT
Transfer code	ASCII, 7 data bits, 2 stop bits
Parity	Even
1-to-1/1-to-N	1-to-N
Instruction level	Level 1, 2, 3
Unit#	00

Note The 1-to-N setting enables BCC (Block Check Character). The 1-to-N connection between Host Link Units and PTs is not possible.

Connection to a Host Link Unit

Two types of Host Link Unit are available: a Rack-mounting Unit and a CPU-mounted Unit. The switch settings differ according to the type of Host Link Unit. Set the switches according to the unit type.

C200H: Rack-mounting Unit

C200H-LK201-V1
C200H-LK202-V1

Setting the Front Switches

Set each switch with a flathead screwdriver until the displayed settings agree with the settings described on the previous page.

LK201

RUN   XMT
RCV   ERROR

SW1   SW2
  0   0

SW3   SW4
  5   2

SW1/SW2: Set the Unit#
          Set both switches SW1 and SW2 to 0.

SW4: Sets the instruction level, parity, and transfer code.
     Set to 2.

SW3: Baud rate setting
     4: 4,800 baud
     5: 9,600 baud
     6: 19,200 baud
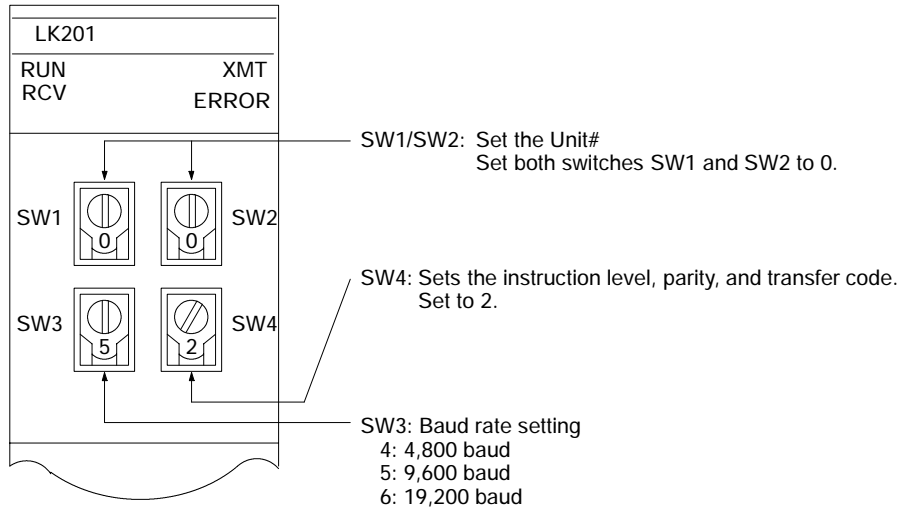
Setting the Rear Switches

C200H-LK201-V1

ON
1
2
3
4

DIP Switch: 1-to-1/1-to-N setting

ON 1 2 3 4

Set ON

CTS selector switch
External
↕
0 V (ON)

CTS setting selector switch
Always set to the 0 V (ON) position.
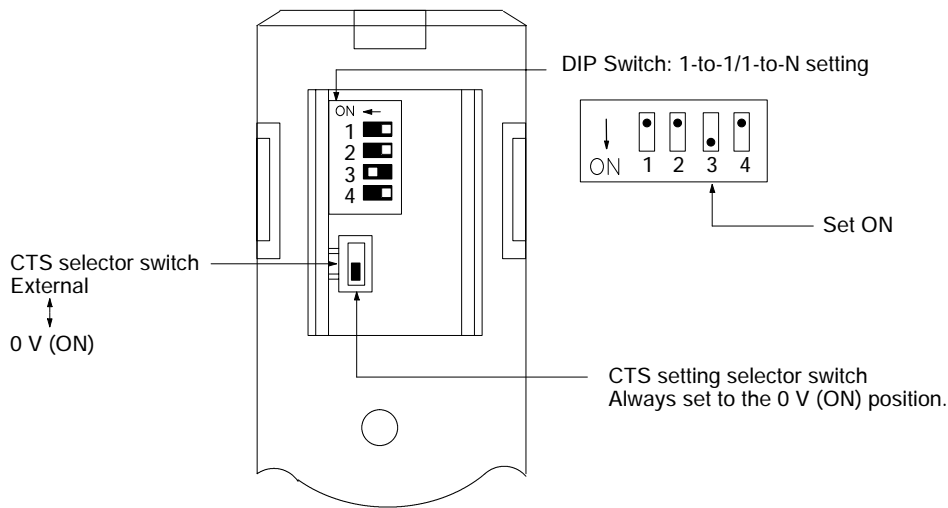
C200H-LK202-V1
For types with an RS-422 connector.

Termination resistance ON/OFF switch.
Set ON.
Note: The termination resistance must also be
turned ON at the Link Adaptor

1-to-1 (ON)

1-to-N (OFF)

Termination
resistance
ON

OFF

1-to-1/1-to-N selector switch.
Set to 1-to-N (OFF).
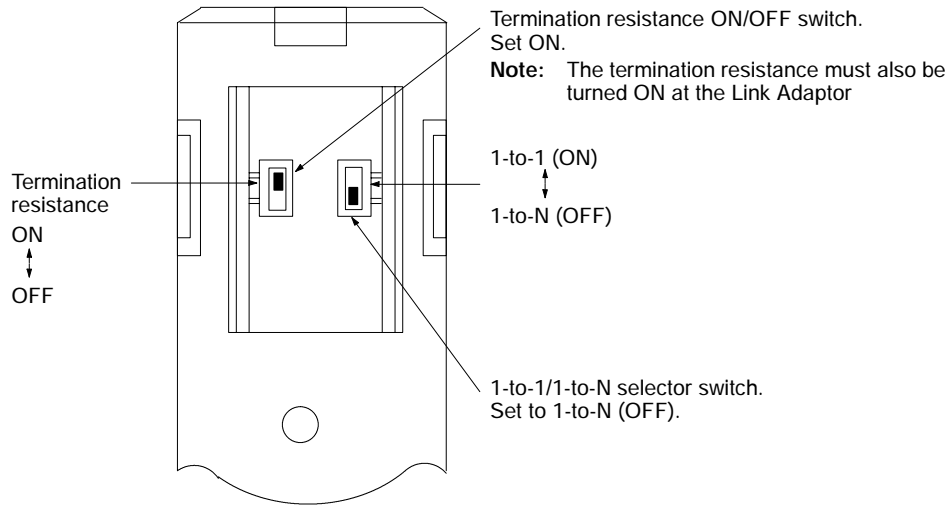
C500(F), C1000(F), C2000(H) Rack-mounting Units

C500-LK201-V1
C500-LK203

Setting the Front Switches

C500-LK201-V1
Set the mode control to the host link mode (Page 27).

Setting the Rear Switches

C500-LK201-V1

I/O port   RS-422 / RS-232C

Synchronization   Internal / External

Termination resistance   OFF / ON

CTS   0 V / External

I/O port selector switch
When connecting to the RS-232C connector, set to RS-232C.
When connecting to the RS-422 connector, set to RS-422.

SW1

DIP switch SW1: Unit # setting

```
ON
    1 2 3 4 5 6 7 8
```
1
0

0 0 0 0 0 - - - - - - - Set to 0.

SW2

Synchronization setting selector switch
Set to Internal.

DIP switch SW2: Baud rate, 1-to-1/1-to-N, instruction level setting

```
ON
    1 2 3 4 5 6 7 8
```
1
0

Baud rate
19,200 bps - - - - 0 0 1 0
9,600 bps - - - - 1 0 1 0
4,800 bps - - - - 0 1 1 0

1 1 - - - - Instruction level setting
Set to enable levels 1, 2, 3

0 - - - - - - 1-to-1/1-to-N setting
Set to 1-to-N.

CTS setting selector switch
Always set to the 0 V (ON) position.

Termination resistance ON/OFF switch.
Set ON when using an RS-422 cable.
Note: The termination resistance must also be turned ON at the Link Adaptor.

Setting the Rear Switches

C500-LK203

I/O port selector switch
When connecting to the RS-232C connector, set to RS-232C.
When connecting to the RS-422 connector, set to RS-422.

| 5 V supply | ON |
| | OFF |

| I/O port | RS-422 |
| | RS-232C |

DIP switch SW1: Unit #, parity, transfer code setting

SW1

| Synchronization | Internal |
| | External |

0 0 - - - - Parity, transfer code setting.

0 0 0 0 0 - - - - - - Unit # setting
Set to 0.

| Termination resistance | OFF |
| | ON |

SW2

| CTS | 0 V |
| | External |

Synchronization setting selector switch
Set to Internal.

DIP switch SW2: Baud rate, 1-to-1/1-to-N, instruction level setting

Baud rate
19,200 bps - - - - 0 0 1 0   1 1 - - - Instruction level setting
 9,600 bps - - - - 1 0 1 0   Set to enable levels 1, 2, 3
 4,800 bps - - - - 0 1 1 0

0 - - - - - 1-to-1/1-to-N setting
Set to 1-to-N.

CTS setting selector switch
Always set to the 0 V (ON) position.

Termination resistance ON/OFF switch.
Set ON when using an RS-422 cable.
Note: The termination resistance must also be turned ON at the Link Adaptor.

CPU-mounted Units

C120-LK201-V1
C120-LK202-V1

Setting the Rear Switches

DIP switch SW1: Unit #, parity, transfer code setting

ON
1 2 3 4 5 6 7 8

1
0

0 0 0 0 0 - - - - - - Unit # setting.
Set to 0.

Parity is fixed at Even Parity, Transfer Code is fixed at ASCII, 7 data bits, 2 stop bits

DIP switch SW2: Baud rate, 1-to-1/1-to-N, instruction level setting

SW1
SW2
SW3

ON
1 2 3 4 5 6 7 8

1
0
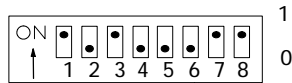
Baud rate
19,200 bps - - - - - 0 0 1 0   1 1 - - - Instruction level setting
9,600 bps - - - - - 1 0 1 0   Set to enable levels 1, 2, 3
4,800 bps - - - - - 0 1 1 0

0 - - - - - - 1-to-1/1-to-N setting
Set to 1-to-N.

DIP switch on C120-LK201-V1. SW3: Synchronization
and CTS setting
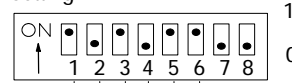
ON
1 2 3 4 5 6 7 8

1
0

1 0 1 0 - - - - - Synchronization setting selector switch
Set to Internal.

1 0 - - - - - - - - - - - CTS setting selector switch
Always set to the 0 V (ON) position.

DIP SW3 on C120-LK202-V1 Termination resistance

ON
1 2 3 4 5 6 7 8

1
0
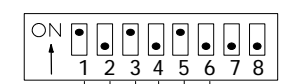
1 0 1 0 1 0 - - - Termination resistance setting
Set ON when using an RS-422 cable.
Note: The termination resistance must also be
turned ON at the Link Adaptor.

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CV/CVM1 Series Rack-Mounting Units

CV500-LK201

Setting the Front Switches

Set the operating conditions with the PC System Setting functions when a CV/CVM1 Series Host Link Unit is connected to a PC. The PC System Settings can be made from the Peripheral Tool (FIT, etc.) or PC system setting information created with a Peripheral Tool can be transferred to the CPU.
Set the DIP switches to enable the system settings to be made.
Refer to the *CV/CVM1 Series Support Software Operation Manual (Details) (W196-E1-02)* for more details of the system settings.
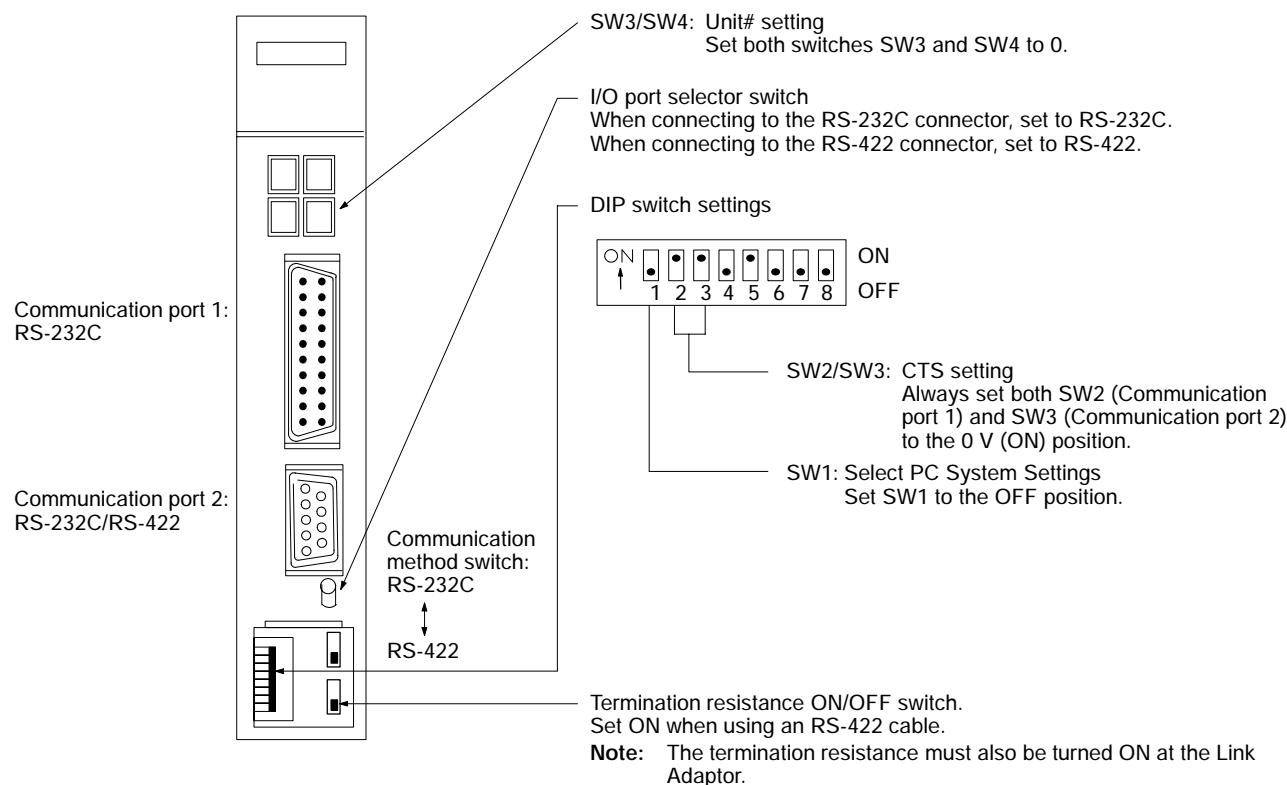
SW3/SW4: Unit# setting
Set both switches SW3 and SW4 to 0.

I/O port selector switch
When connecting to the RS-232C connector, set to RS-232C.
When connecting to the RS-422 connector, set to RS-422.

DIP switch settings

Communication port 1: RS-232C

SW2/SW3: CTS setting
Always set both SW2 (Communication port 1) and SW3 (Communication port 2) to the 0 V (ON) position.

SW1: Select PC System Settings
Set SW1 to the OFF position.

Communication port 2: RS-232C/RS-422

Communication method switch: RS-232C ↕ RS-422

Termination resistance ON/OFF switch.
Set ON when using an RS-422 cable.
Note: The termination resistance must also be turned ON at the Link Adaptor.

Connection to a CPU

Set the operating conditions with the PC System Setting functions when connecting to a CV/CVM1 Series CPU. The PC System Settings can be made from the Peripheral Tool (FIT, etc.) or PC system setting information created with a Peripheral Tool can be transferred to the CPU. Refer to the *CVM1/CV Series Support Software Operation Manual (Details)* for more details of the system settings.

Note   The NT610C/NT612G cannot be connected to any CPU the name of which does not have [-V1]. Use the host link unit.

CV-/CVM1-series: CV500-CPU01 (-EV1)
CV1000-CPU01 (-EV1)
CVM1-CPU01 (-EV1)
CVM1-CPU11 (-EV1)

Setting the Front Switches

I/O port selector switch
When connecting to the RS-232C connector, set to RS-232C.
When connecting to the RS-422 connector, set to RS-422.

Termination resistance ON/OFF switch.
Set ON when using an RS-422 cable.
Note: The termination resistance must also be turned ON at the Link Adaptor.

Communication method switch:
RS-232C
↕
RS-422

ON
OFF

ON   1   2   3   4   5   6

Terminal resistance switch
Set SW-6 to the OFF position.
SW4 : System Setting
ON   : Default value
OFF : System setting

SECTION 3
Installing the I/F Unit for the NT Link and Connecting to the PC

This section describes how to install the host link I/F unit in the PT by the use of the NT link and to connect the PT to the PC.

3-1　Description and Function of Components

Before explaining how to connect the the host link I/F unit by the use of the NT link to the PT, the names and functions of the Host Interface Unit components are described.

NT600M-LK201 Host Interface Unit

Switch cover
Open this cover to reveal the DIP switches (SW4) which set the basic operation of the Host Interface.

Host Interface front face

Host I/F RS-232C connector for connection to the PC.

Host Interface rear face

Unit connector for connection to the PT.
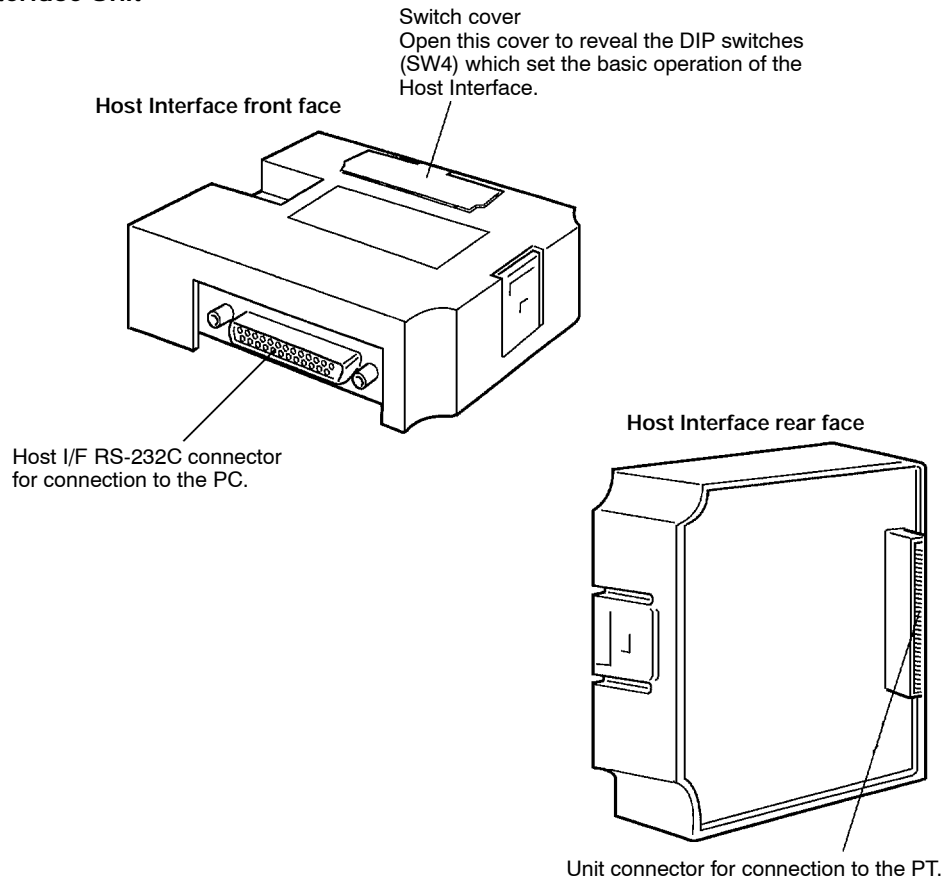
3-2　Installing in the PT

How to install the Host Interface in the PT.

3-2-1　Installation

Turn the cut-out in the Host Interface to the left and push the Unit in until a "click" is heard.

In difficult-to-connect situations move the Unit when connecting the Host Interface.

Note　Turn off the PT power supply when installing or removing the Unit.

Installation in the NT20M

NT20M

Rear face

Cut-out
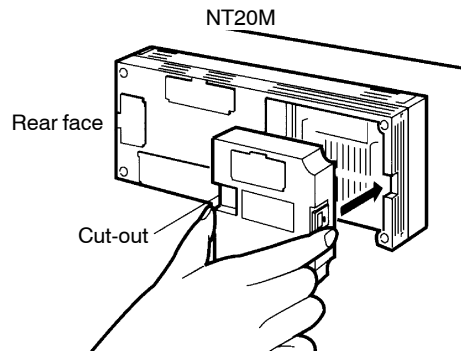
Installation in the NT610C
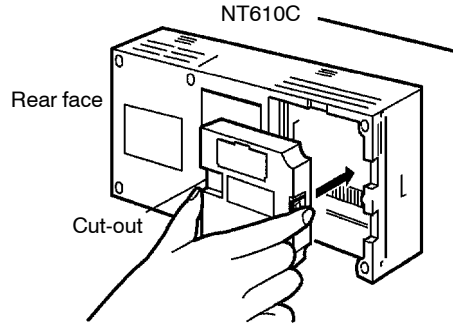
How to Remove the Unit

Example: Removal from the NT610C

Hold the Host Interface Unit by the indentations at each side, press inwards and pull out the Unit.
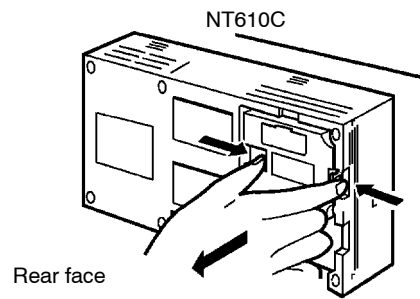
3-2-2 DIP Switch Settings

Set the operating environment with the Host Interface DIP switches (SW4). Set the Host Interface DIP switches in the positions shown below.

Note Turn off the power supply before setting the DIP switches.
Use the cables recommended by OMRON to connect the units. Incorrect communication may result if non-recommended cable types are used.

The DIP switches are under the switch cover on the front of the Interface Unit.
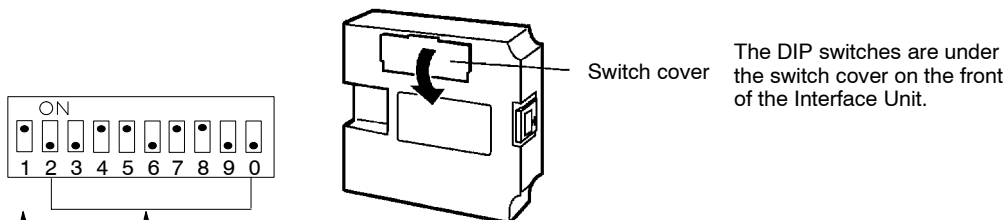
[SW4-1] Initial settings of a memory table allocated with words

Setting	Meaning	Description
(ON) 1	PT	Set to initial values preset by the Support Tool. Write the initial value of the memory table, whose "initialization" is set to "ON", to the PC's allocated word on PT's startup.
(OFF) 1	PC	The contents of the words allocated in the PC memory are used as the memory table initial values.

[SW4-2~0] Set as shown in the figure.

Set SW4–2~0 as shown in the figure on the following page when the host link I/F unit is used with the NT link.

*   The factory setting is shown in the figure below.
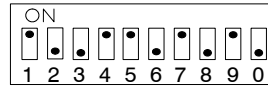
3-2-3 Setting the PT Switches

Set the DIP switch (SW1) of the PT after installing the host link I/F unit.
The PT unit DIP switch (SW1) settings are described below. Refer to the appropriate PT Operation Manual for more details.

Note Turn off the power supply befor setting the DIP switches.

NT2000M	NT610C	NT20M	NT612G

SW1

The DIP switches are under the switch cover on the rear of the PT.

Not used.

Not used.

Enabled/disabled mode conversion (NT20M/NT2000M)
Enabled/disabled menu display (NT610C/NT612G)
   ON: enabled
   OFF: disabled

Not used. (NT20M/NT2000M)

Enabled/disabled forced screen data initialization (NT610C/NT612G)
   ON: Disable
   OFF: Enable

Not used.

Reserved for system use. Always set OFF.

Enable/Disable host RUN
   ON: Disable
   OFF: Enable

Automatic reset after communication error.
   ON: No automatic reset
   OFF: Automatic reset
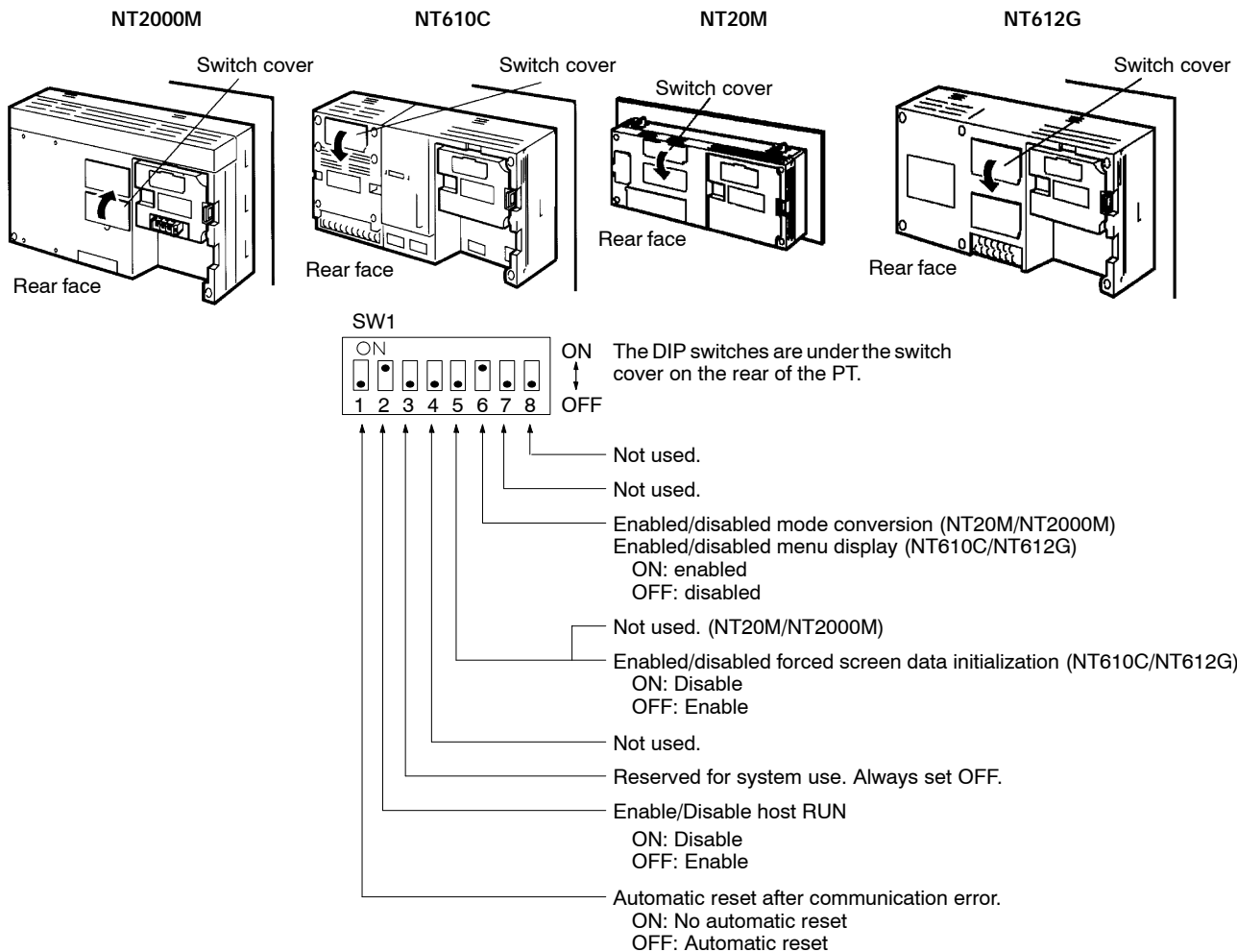
3-3 Connection to an OMRON PC

Connect the PT fitted with the Host Interface to the OMRON PC with an RS-232C.

3-3-1 Compatible PCs

The units of OMRON PCs with the host link function differ according to the models or series of the PC.
Check the model and series of the PC before making the connections. The compatible PCs are listed in the table below.

PC-series	CPU Unit	Connectable to
C-series	C200HS-CPU21-E	C200HS
	C200HS-CPU23-E	
	C200HS-CPU31-E	
	C200HS-CPU33-E	
	CQM1-CPU41-E	CQM1
	CQM1-CPU42-E	
	CQM1-CPU43-E	
	CQM1-CPU44-E	
CV-series	CV500-CPU01-EV1	CV500
	CV1000-CPU01-EV1	CV1000
	CV2000-CPU01-EV1	CV2000
CVM1-series	CVM1-CPU01-EV1	CVM1
	CVM1-CPU11-EV1	

3-3-2 Connecting the PT

Refer to the diagrams below to select the appropriate cable for the unit connecotrs. Connect the PT to the PC.

Note Turn off the PT and PC power supplies before inserting or removing connectors. Use the cables recommended by OMRON to connect the units. Incorrect communication may result if non-recommended cable types are used.

Use the following connector cable with a 25-pin connector at one end and a 9-pin connector the other end.
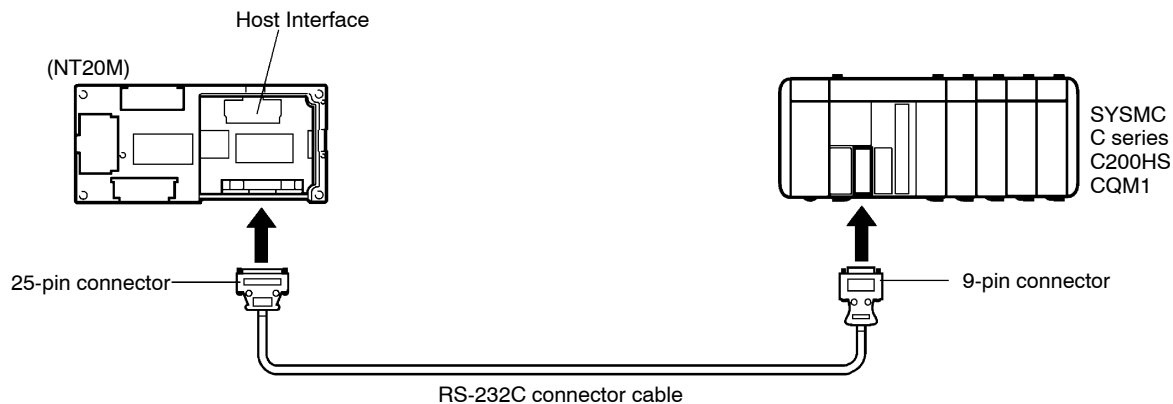
3-3-3 PC Switch Settings

Set the DIP switch, etc. of the CPU so as to use the NT link after connecting the PT to the PC.

Connection to a C series CPU

Set the DIP switch and PC system setting area (Data Memory) of the CPU to be connected (C200HS or CQM1) as the following.

How to set the DIP switch (for CQM1 only)
Set SW5 to "OFF" so as to allow the PC system setting to the RS–232C port to be effective.

SW5: DIP switch setting

Set SW5 to "OFF" (to the right).

ON   OFF
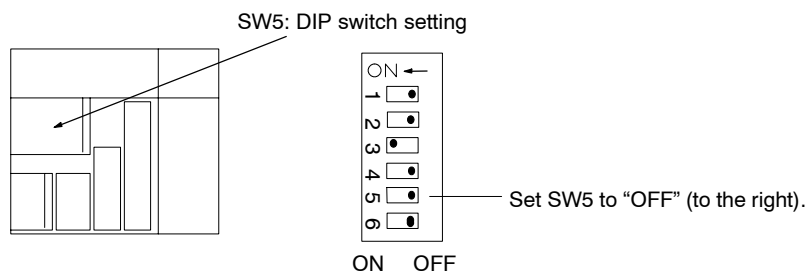
How to set the PC setting
Write a value to the PC system setting area (data memory) shown below.
The data memory (DM) can be directly accessed from the peripheral tool (FIT, etc.).

Word #	Written Value	Communication Condition
DM6645	4000	Use the NT link.

Connection to a CVM1/CV series CPU

Set the DIP switch and I/O port selector switch of the CPU to be connected (CVM1/CV series) as shown below.

How to set the DIP switch
Set SW3 to "ON" so as to enable the NT link.

How to set the I/O port selector switch
Set the I/O port selector switch to "RS–232C" (to the top) so as to use the host link connector with the RS–232C method.

I/O port selector switch setting
Set to "RS–232C" (upper position).

SW3: DIP switch setting

Set SW3 to "ON" (to the right).

OFF   ON
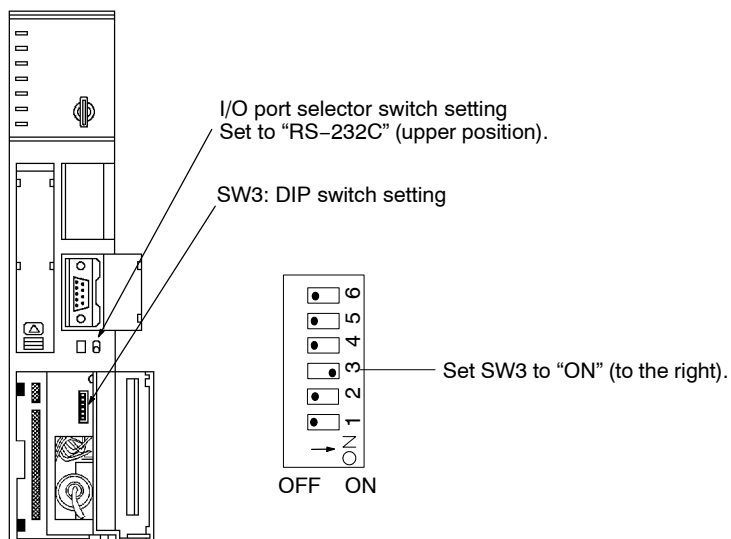
SECTION 4
Installing C200H I/F Unit and Connecting to the PC

This section describes how to connect the C200H Host Interface to the PT and the PT to the PC.

4-1   Description and Function of Components

The names and functions of the C200H Host Interface parts are shown in the diagram below.

NT600M-LB122 C200H Host Interface

C200H Host Interface front face

Switch cover
Open this cover to reveal the rotary switch and DIP switches which set the basic operation of the C200H Host Interface.

Host I/F connector for connection to the PC.

C200H Host Interface rear face

Unit connector for connection to the PT.
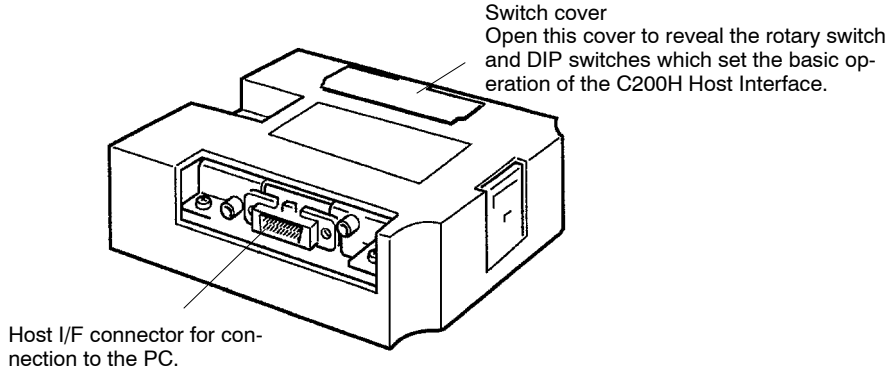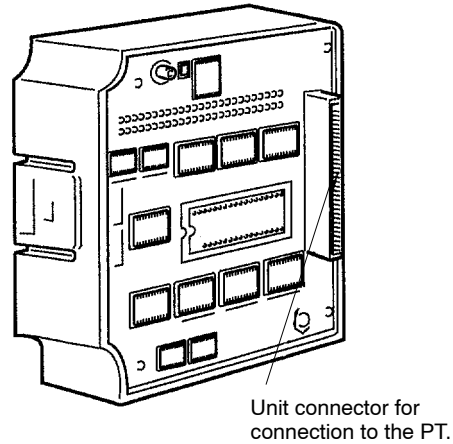
4-2   Installing to the PT

The method of installing the C200H Interface Unit in the PT and setting the DIP switches are described below.

4-2-1   Installation

Turn the cut-out in the C200H Host Interface to the left and push the Unit in until a "click" is heard.

In difficult-to-connect situations move the Unit when connecting the C200H Host Interface.

Note   Turn off the PT power supply when installing or removing the C200H Host Interface Unit.

Installation in the NT600M

NT600M

Rear face

Cut-out
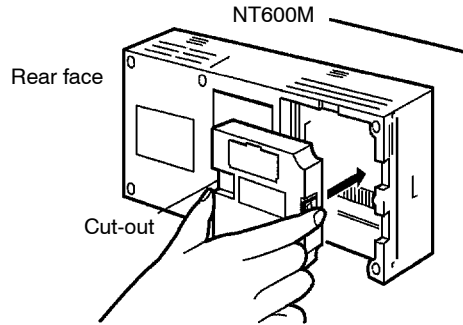
Removal from the PT Hold the Unit by the indentations at each side, press inwards and pull out the Unit.
Example: Removal from the NT600M.

NT600M

Rear face
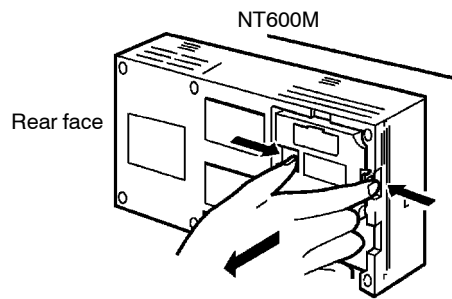
Note Turn off the PT power supply when installing or removing the Unit.

4-2-2 DIP Switch Settings

Before mounting the PT, the operating environments of the PT must be set with the DIP switch (SW1) on the C200H Host Interface Unit.
The DIP switch (SW1) settings are described below.

Note Turn off the power supply before setting the DIP switches.

ON

1 2 3 4 5 6 7 8   (Factory setting)
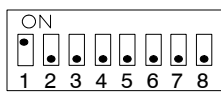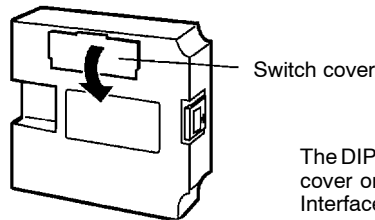
Switch cover

The DIP switches are under the switch cover on the rear of the C200H Host Interface Unit.

Reserved for system use. Always set OFF.

[SW1-1]
Initial value settings of a memory table to which words are allocated

Setting		Description
	(ON)	Set to initial values preset by the Support Tool. Write the initial value of the memory table, whose "initialization" is set to "ON", to the PC's allocated word on PT's startup. At the start of PT operation, write to the allocated word of the PC the initial values of the memory table whose "initialization" is set to "ON".
	(OFF)	The contents of the words allocated in the PC memory are used as the memory table initial values.

[SW1-2] Reserved for system use. Always set OFF.

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4-2-3 Rotary Switch Settings

The rotary switch (SW3) on the C200H Host Interface Unit is used to set a unit number for the C200H Host Interface Unit. The C200H Host Interface Unit is treated the same as a C200H Special I/O Unit. Therefore, the unit number allocated to the C200H Host Interface Unit must be unique and not identical with the unit number of any Special I/O Unit.

SW3

```
      0
   9     1
 8         2
 7         3
   6     4
      5
```
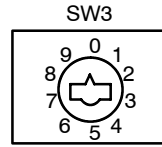
(Factory setting)

When the unit number has been set, the Special I/O Unit will be allocated the corresponding words in C200H memory, as shown in the following table. The words which are allocated to the C200H Host Interface Unit, however, are not used because C200H Host Interface Unit processing is handled in the area allocated by the Support Tool. The words allocated to the C200H Host Interface Unit as a Special I/O Unit can therefore be used as work bits/words.

Unit no.	Word no.
0	100 to 109
1	110 to 119
2	120 to 129
3	130 to 139
4	140 to 149
5	150 to 159
6	160 to 169
7	170 to 179
8 (∗)	180 to 189
9 (∗)	190 to 199
(∗)Cannot be set with the Cj j H.	

Note 1. Do not set the unit number of the Cj j H to 8 or 9, otherwise a Special Unit Error will result.

2. If the C200H Host Interface Unit is connected to the Cj j H, no Expanded I/O Unit can be connected to the Cj j H. Therefore, any of the above unit numbers can be designated without worrying about unit number duplication.

4-3   Connection to an OMRON PC

Connect the PT fitted with the C200H Host Interface Unit to the OMRON PC with an I/O connecting cable.

4-3-1 Compatible PCs

Check the PC model number and series before making the connections.

The compatible PCs are listed in the table below.

CPU	PC
C20H, C28H, C40H, and C60H	C j j H
C200H-CPU01-E	C200H
C200H-CPU03-E	
C200H-CPU11-E	
C200H-CPU21-E	
C200H-CPU23-E	
C200H-CPU31-E	
C200HS-CPU01-E	C200HS
C200HS-CPU03-E	
C200HS-CPU21-E	
C200HS-CPU23-E	
C200HS-CPU31-E	
C200HS-CPU33-E	

4-3-2 Connection

The following describes how to connect the C200H Host Interface Unit to the PC. The conditions required for connecting the C200H Host Interface Unit to the C200H vary from those required for connecting the C200H Host Interface Unit to the C j j H.

Note Turn off the PT and PC power supplies before inserting or removing connectors.

I/O Connecting Cable   Select the I/O connecting cable from the following.

PC	Model	Cable length
C200H	C200H-CN311	30 cm
	NT20M-CNP711 C200H-CN711	70 cm
	NT20M-CNP221 C200H-CN221	2 m
	NT20M-CNP521 C200H-CN521	5 m
	NT20M-CNP131 C200H-CN131	10 m
C j j H	C20H-CN312	30 cm
	NT20M-CNP712 C20H-CN712	70 cm
	NT20M-CNP222 C20H-CN222	2 m

Note   1. The connector on the C200H Host Interface Unit side of the NT20M-CNPj j j is miniaturized.

2. The total length of the I/O connecting cables between the C200H Host Inter-
    face Unit and the C200H must be 12 m maximum and the cables between
    the C200H Host Interface Unit and the Cj j H must be 6 m maximum.

3. Do not impose a pulling force exceeding 5 kg on any I/O connecting cable.

4. If an I/O connecting cable is extended through a hole, the diameter of the
    hole must be 53 mm minimum. By removing the connector cover, the I/O
    connecting cable can pass through a hole with a diameter of 33 mm, in which
    case, be sure to replace the cover onto the connector after the I/O connect-
    ing cable passes through the hole.

**Connection to C200H/
C200HS**

The C200H Host Interface Unit can be connected to a single CPU or Expanded
I/O Rack via an I/O connecting cable with the following restrictions.

The C200H Host Interface Unit cannot be connected to the Expanded I/O Rack
if the Expanded I/O Rack is connected to another Expanded I/O Rack.

The C200H Host Interface Unit cannot be connected to a Remote I/O Slave
Unit.

The C200H Host Interface Unit has a single connector. The C200H Host Inter-
face Unit cannot be connected between the CPU and Expanded I/O Rack. The
C200H Host Interface Unit must be always connected to the end of the system.
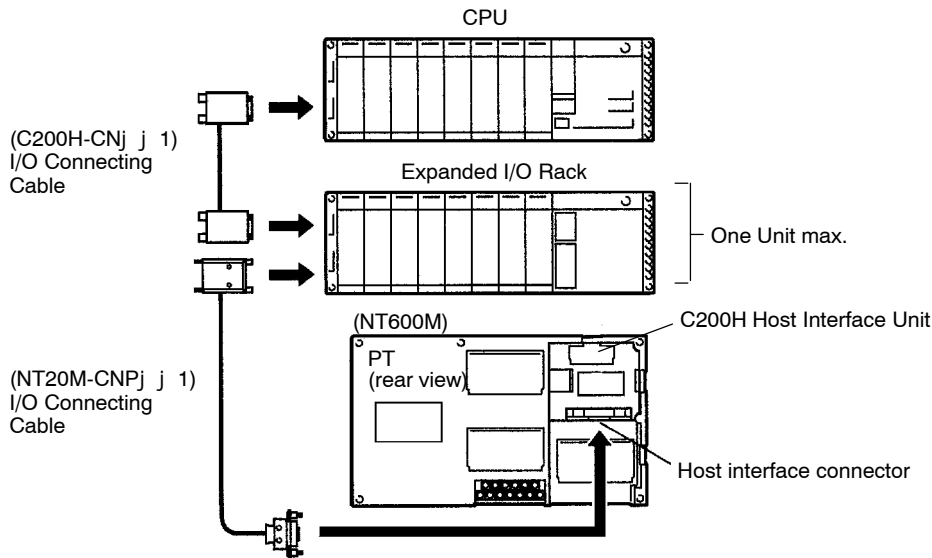
Connection to Cj j H

The C200H Host Interface Unit can be connected to a single CPU via an I/O con-
necting cable with the following restrictions.

Only one CPU is connectable.

A maximum of two I/O Units can be connected to the CPU. No Expanded I/O
Rack can be connected.

The Cj j H I/O Unit cannot be connected after the C200H Host Interface Unit.
The C200H Host Interface Unit must be always connected to the end of the
system.

CPU

C20H-CNj j 2
I/O Connecting Cable

I/O Unit

C20H-CNj j 2
I/O Connecting Cable

I/O Unit

Two Units max.

C200H Host Interface Unit

C20M-CNPj j 2
I/O Connecting Cable

(NT600M)

PT
(rear view)

Host Interface connector
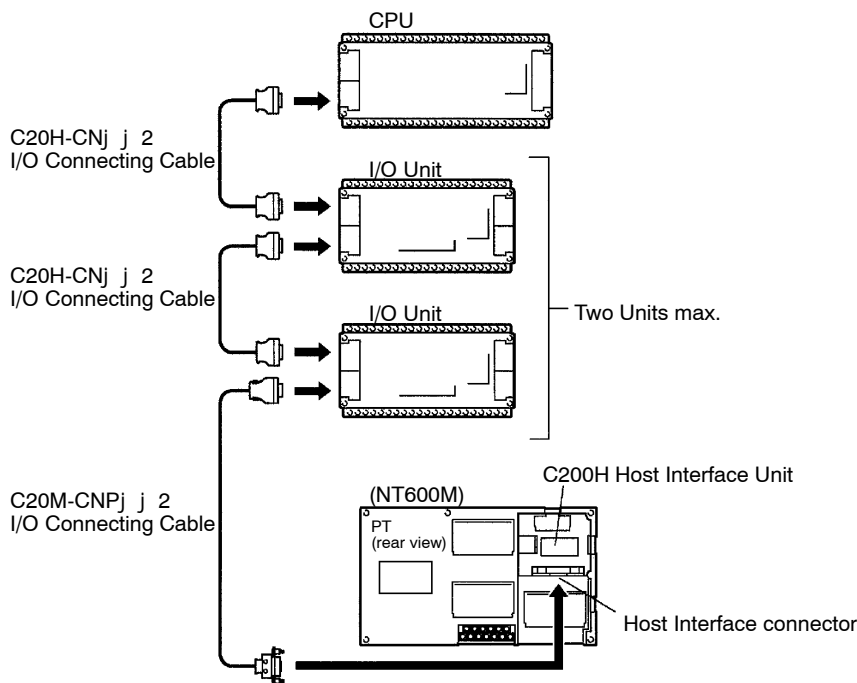
Note Be sure to install a noise filter when connecting Cj j H.

1. Install a noise filter to the power line of the Cj j H.
2. The distance between the noise filter and the Cj j H must be as short as possible, and the noise filter must be separated from high tension lines.
3. Ground the case of the noise filter to the FG terminal.
4. Install a noise filter with a rated voltage of 24 VDC or equivalent to the power lines of the Cj j H as shown in the following diagram.

Noise filter

1   4   (+)

+24 V

IN   OUT   24 V

2   3   (−)
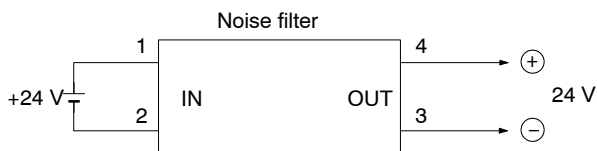
4-3-3 Power ON and OFF

The C200H Host Interface Unit operates as a C200H Expanded I/O Rack. This section describes how to turn the C200H Host Interface Unit ON and OFF. Be sure to follow the procedures described below, otherwise the whole system may shut down.

Power ON

To turn ON the C200H Host Interface Unit, turn ON the PT first, at which time the PT screen displays "Connecting to Host." Then turn ON the PC, at which time the system will go into normal operation after "Connecting to Host" is displayed on the PT screen for approximately 1 s.

Note 1. When the PC is turned ON first, the CPU of the PC resets the system. If a Programming Console is used in the system, the Programming Console will not operate. However, when the PT is turned ON, the PT screen displays "Connecting to Host" for approximately 1 s and then the system will go into normal operation.

2. If the I/O connecting cable is disconnected during system operation, PC will have an I/O Bus Error and the operation will be interrupted. If this occurs, connect the I/O connecting cable and reset the system.

Power OFF

To turn OFF the C200H Host Interface Unit, turn OFF the PC and PT simultaneously, in which case the PT will keep the screen as it is until the next time the PT is turned ON.

Note If the PT is turned OFF first, the CPU of the PC resets the system. If a Programming Console is used in the system, the Programming Console will not operate.

WARNING Interrupt the system to replace the PT or C200H Host Interface Unit. If only the PT is turned OFF before replacing the PT or C200H Host Interface Unit, however, the system will be interrupted instantly and the machines connected to the system may be damaged or an accident may result.

SECTION 5
Direct Connection Operation

This section describes the basic operation of the Direct Connection function. Please read this section carefully before using your PT. The Direct Connection function is extremely useful when a PT is used.

5-1 The Direct Connection Function

Direct Connection's features are described below.

5-1-1 Direct Connection

When a Host Interface Unit is mounted to a PT, the bits and words of the PC memory area can be freely allocated as reference elements required for the display and to store input data. The PT is then able to directly read and write these allocated bits and words to change the display and to control and notify the PT status. This function is called Direct Connection. The bits and words allocated for use by the Direct Connection function are referred to as "allocated" bits and words.
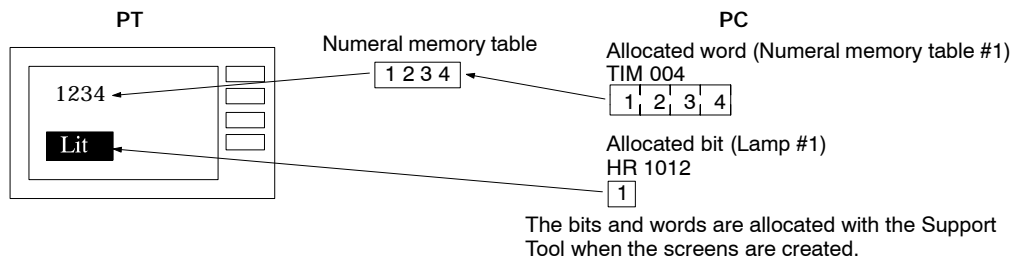
* The C200H I/F Unit treated as a Special I/O Unit for the PC processes and exchanges data at high speed with the PC.

5-1-2 Direct Connection and Indirect Connection (Applied Only When the C200H I/F Unit is Used)

There is a Direct Connection method and Indirect Connection method to allocate numeral tables for numeral display and character-string memory tables for character-string display. Only the Direct Connection method is used to allocate numeral tables used for bar graphs or numeral settings.

Direct Connection

The Direct Connection method enables the contents of the allocated word to correspond directly to those of the memory table to be displayed.
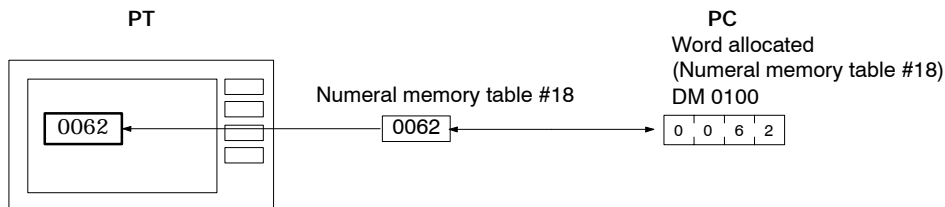
Indirect Connection

Regardless of whether the contents to be displayed are numeral or character-string data, the Indirect Connection method enables the display contents to correspond to the numeral table to be used so that the contents (value) of the numeral table will be regarded as the memory table number in order to display the contents of the memory table number. The memory table number is regarded as a numeral table number in the case of numeral display and a character-string memory table number in the case of character-string display.
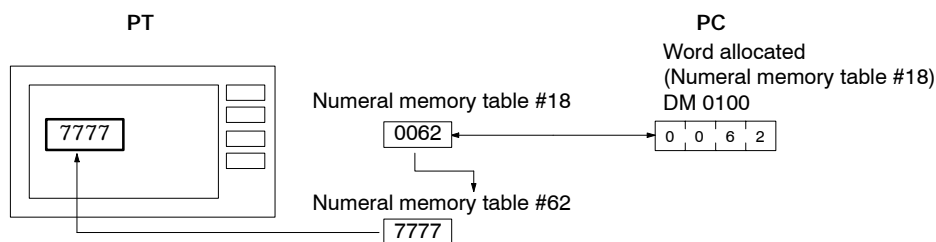
The contents of what is displayed can be changed with ease according to the situation although the connection procedure will be complicated. In the example on the previous page, when 1 is added to the contents of numeral table 18 to obtain 63, the contents of numeral table 63 will be displayed. The memory table used for display can be allocated to the PC's area so that what is displayed will change according to the change in the contents (i.e., the contents of numeral table 62 in the above case) to be displayed.

Refer to *6-6 Changing Allocated Word Contents in Indirect Connection* (changing allocated word contents in Indirect Specification / the C200H I/F unit only) for details on changing what is displayed in the Indirect Connection method.

Note The Indirect Connection method requires more time for processing than the Direct Connection method.

5-1-3 Types and Features of Allocated Data

Using Direct Connection the following items can be allocated to bits and words of the PC memory:

Display elements: numerals, character strings, lamps, touch switches, input/output terminals of the expanded I/O unit, bit memory table.

PT status: alarm and buzzer outputs, backlight lit or flashing, screen selection, currently displayed screen number, operating status, etc.

These allocated bits and words can be used by the PC to control the PT. The items the PC can control are categorized into two groups, as follows:

Control and notification of display elements

Control and notification of PT status

The relationship between the allocated memory and the control operation is shown in the table below.

Element, area		Allocated memory	Function	Control or Notification
Lamp		Bit	Control of display elements	Lights (flashes) when the allocated bit is turned ON (1) and goes out when the bit is turned OFF (0).
Touch switch		Bit	Control of display elements (Lamp bits)	Lights (flashes) when the allocated bit (Lamp bits) is turned ON (1) and goes out when the bit is turned OFF (0).
			Display element notification (Notify bit)	The allocated bit remains ON (1) while the touch switch is pressed.
Expanded I/O unit (∗)	Output terminal	Bit	(Control of display elements)	The output terminal is set to ON when the allocated control bit is set to ON (1); OFF when set to OFF (0).
	Input terminal	Bit	(Display element notification)	The allocated notify bit is ON (1) while the input terminal is ON.
Numeral table		Word	Display element control and notification	The contents of the allocated word and numeral table are continuously read and written to ensure that their contents are always identical.
Character-string memory table		Word	Display element control and notification	The contents of the allocated word and character-string memory table are continuously read and written to ensure that their contents are always identical.
Bit memory table		Bit	(Control of display elements)	The following functions are executed according to the status of the allocated bits: switch screen, alarm list function
PT Status Control Area		Word	PT status control	The allocated word is read to control the next PT status, including screen selection, copying a memory table, buzzer, backlighting.
PT status notification		Word	PT status notification	Notifies the allocated word of a change in PT status, including change of selected screen, numeral input to the memory table, operating status.

(∗) Available only with NT610C/612G

5-1-4 Data Allocated in the PC

The following bits and words of the PC memory area can be allocated.

Symbol	Area name		Allocate bit	Allocate word	
	C-series PC	CV/CVM1-series PC		Numeral	Character string
DM	Data Memory	Data Memery	OK	OK	OK
CH	Internal/Special Relay	Internal/Special Relay	OK	OK	OK
TIM	Timer	Timer	NG	1 word only	NG
CNT	Counter	Counter	NG	1 word only	NG
HR	Holding Relay	---	OK	OK	OK
AR	Auxiliary Relay	Auxiliary Relay	OK	OK	NG (∗)
LR	Link Relay	---	OK	OK	OK

(∗)"OK" when the C200H I/F unit is used.

Note The Auxiliary Relay area of the CVM1/CV-series PC is for limited use of the system and cannot be used for any other purpose.

The range of each memory area differs according to the PC type. Refer to *Appendix B PC Memory Map* for more details.

One word of the memory table can occupy a continuous area of up to 2CH for a numeral memory table, or 20CH for a character-string memory table (16CH in NT2000M).

When allocating the PT status control area and the PT status notification area, a 10CH continuous area is used for each allocated word, if general memory is used (the NT610C/NT612G cannot use general memory).
If general memory is not used, 4CH for the PT status control area and 3CH for the PT status notification area is used.

Do not exceed the memory area when allocating words.

When the NT20M/NT2000M/NT600M is used, or if allocating bits to the DM area with the NT610C/NT612G, all bits not allocated within the same word are set to 0 (OFF).

It is impossible for the PT to identify whether the area to which the word is allocated is protected or not.
Be sure to allocate words to the writable area.

Limitations on PC Area (Applied only when the C200H I/F unit is used)

Special Relay Area (Except for C200H: Wd 236 to 255, C200HS: Wd 236 to 299)

SR 25415 is used as a Special Unit Error Flag.

Auxiliary Relay Area (AR 00 to AR 27)

AR 07 is used as an error log bit when a C200H-CPU31-E, or C200HS is used. AR 18 to AR 21 are used as clock bits when a C200H-CPU11-E, C200H-CPU21-E, C200H-CPU23-E, C200H-CPU31-E, or C200HS is used. Other words are used as the HR area.

Data Memory Area (DM 0000 to DM 1999)

The area from DM 0969 to DM 0999 is for the error log when a C200H-CPU31-E is used. The area from DM1000 to DM 1999 is used exclusively for unit setting and this area can be set as read only. An area not allocated with the DM words can be used for other purposes.

Unit no.	DM words
0	1000 to 1099
1	1100 to 1199
2	1200 to 1299
3	1300 to 1399
4	1400 to 1499
5	1500 to 1599
6	1600 to 1699
7	1700 to 1799
8	1800 to 1899
9	1900 to 1999

5-2   Display Element Control and Notification

The control and notification of display elements using allocated bits and words is described below.
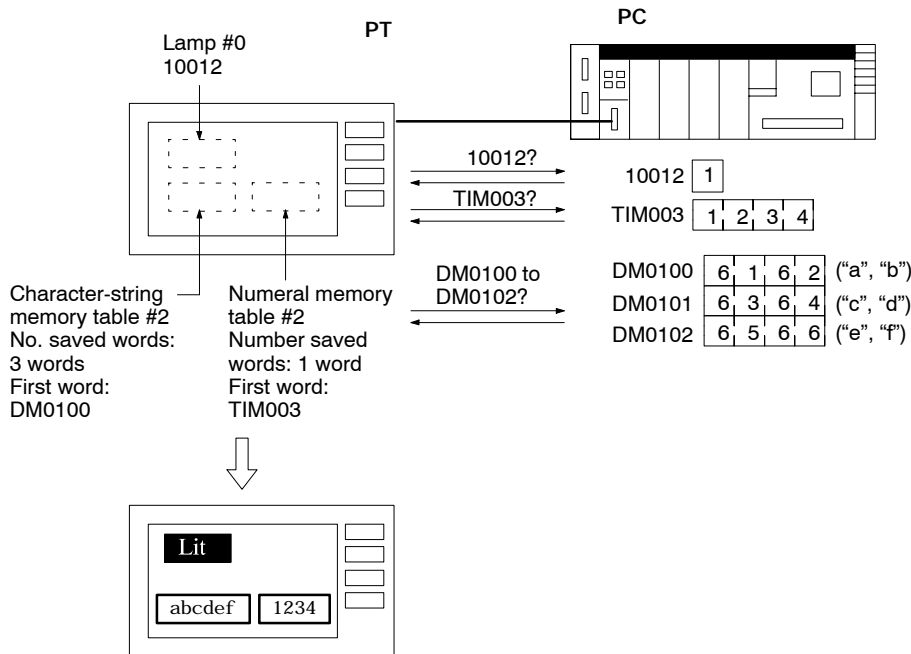
5-2-1 Controlling Display Elements

The PT and PC operate as described below to display element control.

1, 2, 3...   1. The PT asks the PC the status of the bits and words allocated to the elements displayed on the screen.

2. The PC responds with bit and word data.

3. The PT changes the display in response to the bit and channel data received.
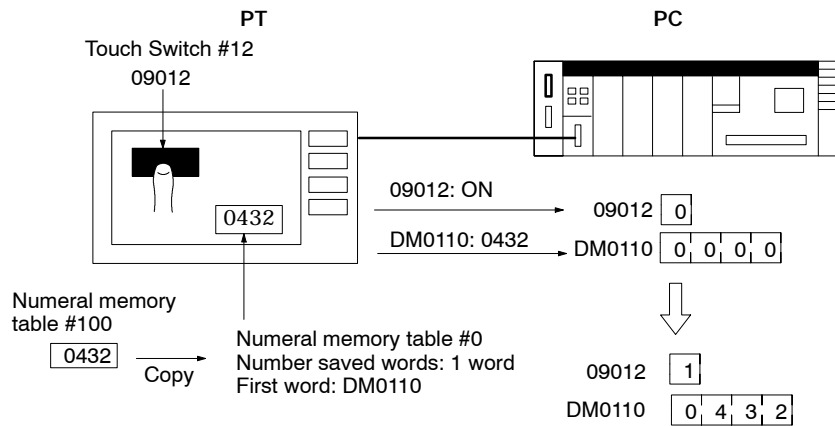
Example:

5-2-2 Notification of Display Elements

When the contents of a currently displayed numeral or character-string memory table is changed or a touch switch is pressed, the information is written to the bits and words in the PC memory.

Example:

5-3   PT Status Control and Notification

The PT Status Control Area and PT Status Notify Area are described below. Refer to *Section 6 PT Operation* for details.

5-3-1 PT Status Control Area

The PT Status Control Area is set by choosing Direct or Direct Specify Information under the Expanded Function from the Screen List on the Support Tool.

Any data written to this specified area is read by the PT.

The PT Status Control Area is configured as 10 consecutive words, as shown in the diagram below.

As to the NT20M/NT2000M/NT600M used with the host link, the control general memory is available, and it is an area of 10 consecutive words as shown in the figure below.

First word (Word n): Set with the Support Tool when the screen is created.
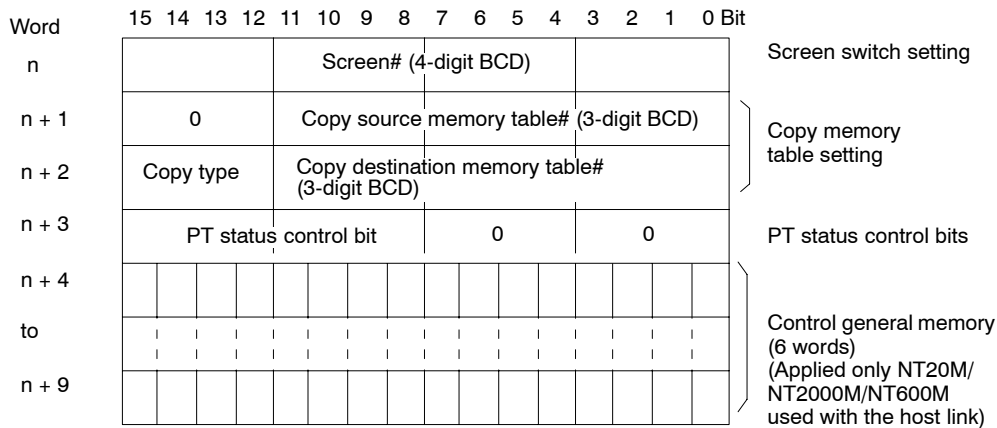
Screen Switch Settings

Specify the screen# to switch the screen displayed on the PT. (Refer to Page 82)

Copy Memory Table
Settings

Specify to copy the contents of a memory table internally in the PT. (Refer to Page 87)

Set the copy type to match the type of memory table to be copied, as follows:

    0: Character-string memory table

    1: Numeral memory table

Pt Status Control Bits

Set the bits ON or OFF according to the following table to control the backlighting and buzzer. (Refer to Page 97)
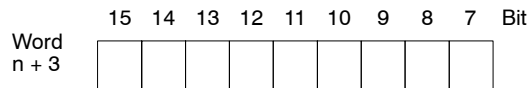
Bit no.	Controlled item	1 (ON)	0 (OFF)
15	Screen display (see note)	ON	OFF
14	Alarm output	ON	OFF
13	Continuous buzzer	ON	OFF
12	Intermittent buzzer (short)	ON	OFF
11	Initialize display history	ON	OFF
10	Backlight color	Red	White
9	Intermittent buzzer (long)	ON	OFF
8	Backlight mode	Continuous light	Flash
7	screen printing	ON	OFF

Note Backlighting turns on if the Screen Display bit is set ON and turns off if the Screen Display bit is set OFF (When the LCD display model is used).

    Bit 10 (backlight color) is effective when the NT20M/NT2000M is used.
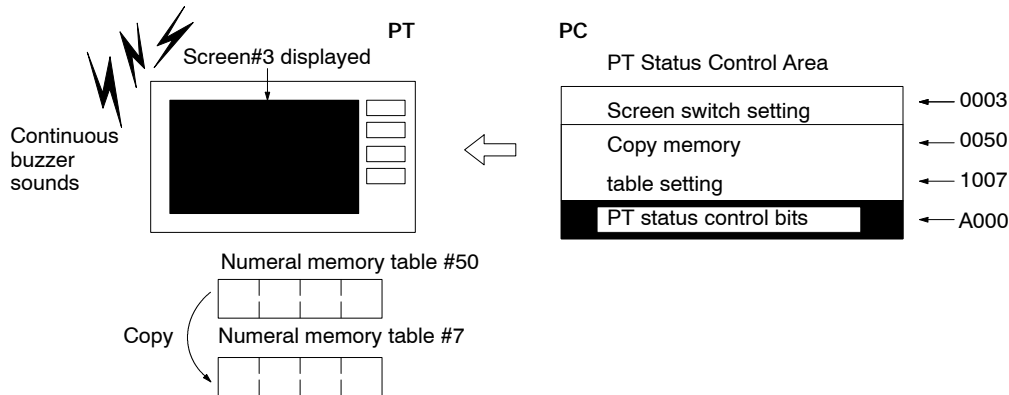
    Bit 8 (backlight mode) is effective when the NT20M/NT2000M is used.

    Bit 9 (intermittent long buzzer) is effective when the NT610C/NT612G is used.

    Bit 7 (print screen) is effective when the NT610C/NT612G is used.

Using the PT Status Control Area

When control data is written to the PT Status Control Area, the PT responds as shown in the diagram below.

Control General Memory (Applied only to NT20M/NT2000M/NT600M used with the host link)

The following bits and words can be allocated to the control general memory (Refer to Page 64, 101):

control bits for lamps, switches, output terminals of the expanded I/O unit, etc.

numeral memory table

Using this memory has the following effects.

The control general memory is read frequently at the same time as the PT Status Control Area. Allocating bits and words to the control general memory achieves faster screen refresh than allocating the bits and words to other areas of the memory. (Refer to Page 134)

The NT610C/NT612G can process fast without using the control general memory.

Up to 96 bits (6 words) can be allocated. The operation is identical to when the bits and words are allocated elsewhere in memory. Refer to *6-9 Turning Lamps and Touch Switches On and Off* and *6-4 Editing Displayed Numerals and Character Strings*.
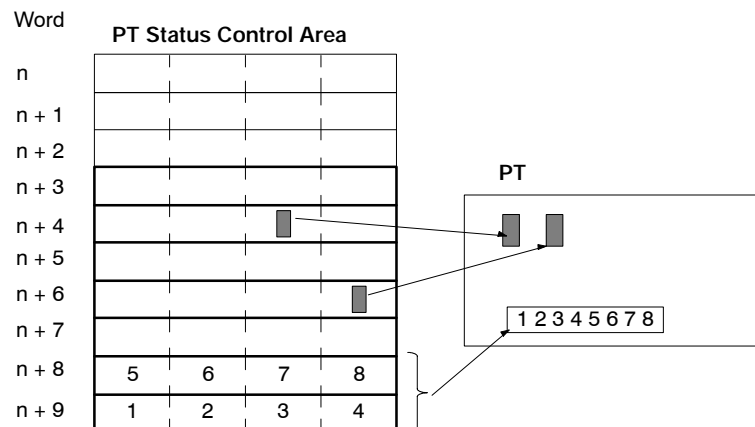
Without Control General Memory

Turn OFF the Interface Unit DIP Switch if the control general memory is not used. (SW4-2: RS-232C type, SW6-2: RS-422 type) The PT Status Control Area is configured as only four words, n to (n+3). The function of these words is the same as when the control general memory is used.
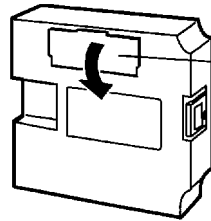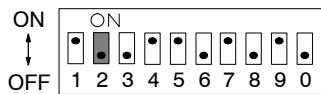
DIP Switch Setting

ON   ON
↑   ┌─────────────────────┐
       │ ● ● ● ● ● ● ● ● ● ● │   — Switch cover   The DIP switches are under the switch
OFF   └─────────────────────┘   cover on the front of the I/F Unit.
         1 2 3 4 5 6 7 8 9 0

SW4-2/SW6-2 sets the PT Status Control Area and PT Status Notify Area in the general memory.

Setting	Meaning	Function
▪ (ON) 2	yes	Add the general memory value to the PT Status Control Area and PT Status Notify Area.
▪ (OFF) 2	no	Do not add the general memory value the PT Status Control Area and PT Status Notify Area.

PT Status Control Area without General Memory

First word (Word n): Set with the Support Tool when the screen is created.

```
        15 14 13 12 11 10 9  8  7  6  5  4  3  2  1  0 Bit
Word   ┌──────────────────────────────────────────────┐
  n    │            Screen# (4-digit BCD)              │   Screen switch setting
       ├──────────────────────────────────────────────┤
n + 1  │    0    │  Copy source memory table# (3-digit BCD) │  ┐
       ├──────────────────────────────────────────────┤   │ Copy memory
n + 2  │  Copy type  │ Copy destination memory table#    │  │ table setting
       │             │ (3-digit BCD)                     │  ┘
       ├──────────────────────────────────────────────┤
n + 3  │  PT status control bit  │    0    │    0       │   PT status control bits
       └──────────────────────────────────────────────┘
```

5-3-2 PT Status Notify Area

The PT Status Control Area is set by choosing Direct or Direct Specify Information under the Expanded Function from the Screen List on the Support Tool.

Any changes in PT status are written to the PC PT Status Notify Area.

The PT Status Notify Area is configured as three consecutive words. As to the NT20M/NT2000M/NT600M used with the method of the host link, the notify general memory is available, and it is an area of 10 consecutive words as shown in the figure below.

First word (Word n): Set with the Support Tool when the screen is created.

```
        15 14 13 12 11 10 9  8  7  6  5  4  3  2  1  0 Bit
Word   ┌──────────────────────────────────────────────┐
  m    │            Screen# (4-digit BCD)              │   Currently displayed screen
       ├──────────────────────────────────────────────┤
m + 1  │    0    │  Numeral table entry number (3-digit BCD) │   Content upgrade memory table
       ├──────────────────────────────────────────────┤
m + 2  │    PT status    │    0    │    0              │   PT status
       ├──────────────────────────────────────────────┤
m + 3  │                                              │  ┐
       ├──────────────────────────────────────────────┤   │ Notify general memory
  to   │                                              │   │ (7 words)
       ├──────────────────────────────────────────────┤   │ (Applied only to NT20M/
m + 9  │                                              │   │ NT2000M/NT600M used
       └──────────────────────────────────────────────┘  ┘ with the host link)
```

Currently Displayed Screen

The screen number of the screen displayed on the PT is written to this word. Simultaneously, the PT Status Screen Switch Strobe Flag is set ON (1). After the PC is notified, this flag reverts to OFF (0). Checking the status of this flag provides a simple method of checking if the PT display has switched. (Refer to Page 107)

Content Upgrade Memory Table	The number of the numeral table is written to this word when the numeral table contents change due to PT switch operation. The input value appears in the word allocated for the appropriate numeral table. As the number of the numeral table is written, the PT Status Number Setting Strobe Flag is simultaneously set ON (1). After the PC is notified, this flag reverts to OFF (0). Checking the status of this flag provides a simple method of checking if a number has been input from the PT. (Refer to Page 108, 112)

This function for the character-string memory table is available only with the NT610C/NT612G.

PT Status

The bits shown in the following table are turned ON or OFF in response to the PT operating status and battery level. (Refer to Page 114)
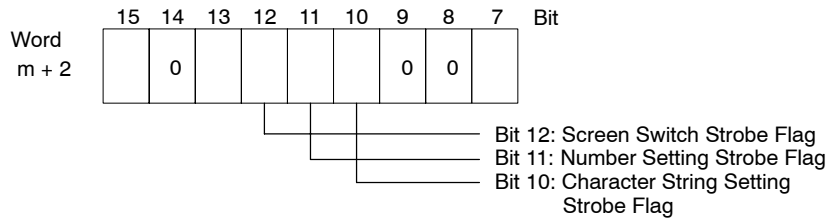

Bit	Notified item	1 (ON)	0 (OFF)
15	PT operating status	Run	Stop
13	Battery	Low	Normal
7	Printing status	Printing	Stop

Note   Bit 10 (Character String Setting Strobe Flag) is effective when the NT610C/NT612G is used.

Bit 7 (Printing status) is effective when the NT610C/NT612G is used.

Using the PT Status Notify Area

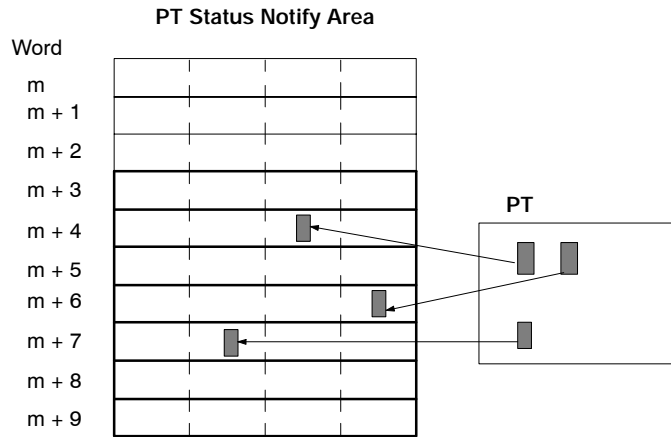The PT Status Notify area is notified as follows when the PT status changes.
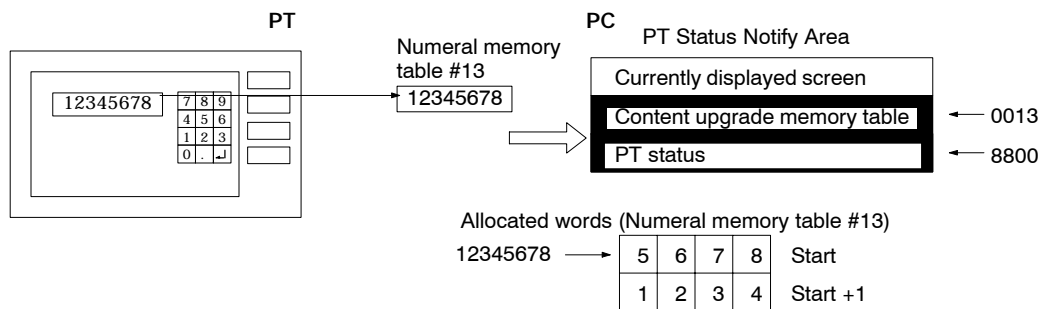
Notify General Memory (Applied only to NT20M/NT2000M/NT600M used with the host link)	Notify bits of the touch switch and the input terminal of the expanded I/O unit notify bits can be allocated to the control general memory. Using this memory has the following effects.

The notify general memory is written to the PC simultaneously with the PT Status Notify area, which has a high notification priority. Allocating bits to the notify general memory achieves faster touch switch notification than allocating the bits to other areas of the memory. (Refer to Page 64, 116)

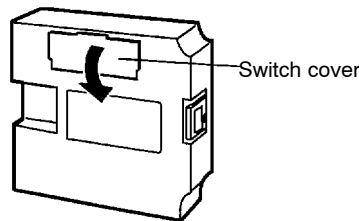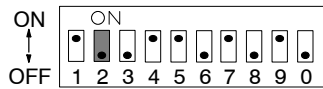NT610C/NT612G can process fast without using the control general memory.

Up to 112 bits (7 words) can be allocated. The operation is identical to when the bits are allocated elsewhere in memory. Refer to *6-15 Determining Touch Switch Status*.

PT Status Notify Area

Without Notify General Memory

Turn OFF the Host Interface Unit DIP Switch (SW4-2: RS-232C type, SW6-2: RS-422 type) if the notify general memory is not used. The PT Status Notify Area is configured as only three words, n to (n+2). The function of these words is the same as when the notify general memory is used.

DIP Switch Setting

Switch cover

The DIP switches are under the switch cover on the front of the I/F Unit.

SW4-2/SW6-2 sets the PT Status Control Area and PT Status Notify Area in the general memory.

Setting	Meaning	Function
2 (ON)	yes	Add the general memory to the PT Status Control Area and PT Status Notify Area.
2 (OFF)	no	Do not add the general memory to the PT Status Control Area and PT Status Notify Area.

PT Status Control Area when General Memory Not Used

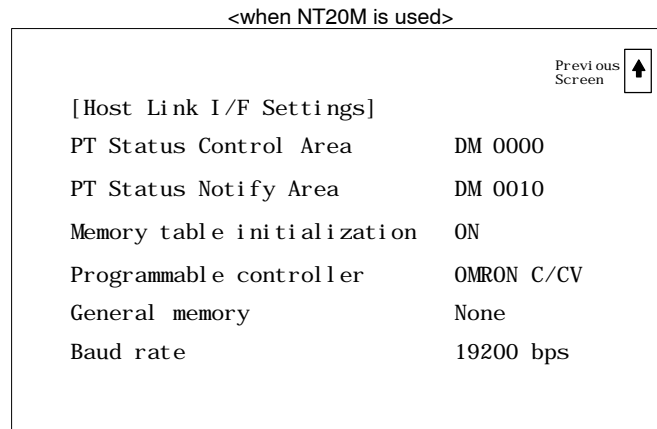First word (Word n): Set with the Support Tool when the screen is created.

Word	15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 Bit	
n	Screen# (4-digit BCD)	Currently displayed screen
n + 1	0 Numeral table entry number (3-digit BCD)	Content upgrade memory table
n + 2	PT status 0 0	PT status

5-4   Checking the Interface Settings

Use the PT Status Area check function to check the Interface Unit settings.
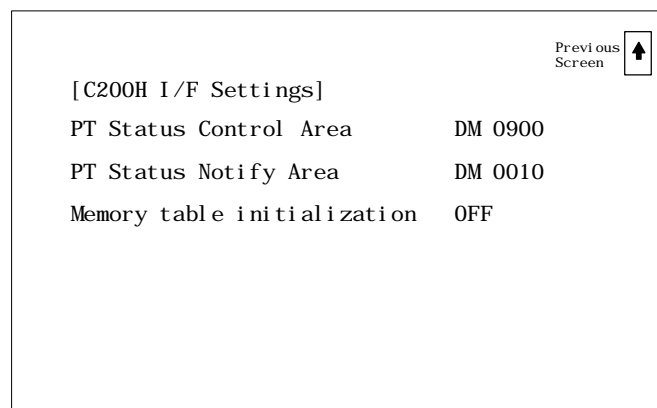
Follow the procedure below to check the settings.

1, 2, 3...   1. Display the PT System Menu.

2. Select the Maintain Mode item. The Maintain Mode menu is displayed.

3. Select the PT Setting item. The PT Settings are displayed.

4. Display the Host Link I/F Settings screen (when the host link/NT link is used).

```
                    <when NT20M is used>
                                              Previous  ⬆
                                              Screen
        [Host Link I/F Settings]
        PT Status Control Area           DM 0000
        PT Status Notify Area            DM 0010
        Memory table initialization      ON
        Programmable controller          OMRON C/CV
        General memory                   None
        Baud rate                        19200 bps
```

The PT Status Control Area, PT Status Notify Area, and Programmable controller settings are not displayed in the initialized status (i.e., before data transfer).

When C200H is used

[C200H I/F setting] is displayed when the C200H is used.

```
                                              Previous  ⬆
                                              Screen
        [C200H I/F Settings]
        PT Status Control Area           DM 0900
        PT Status Notify Area            DM 0010
        Memory table initialization      OFF
```

The "PT status control area" and the "PT status notification area" are not displayed in the initial state (before data is sent).

5. Check that the PT settings are the same as the Interface Unit DIP switch (SW4) settings.

* The menu selection differs according to the model and type of PT. Refer to the appropriate *PT Operation Manual* for details of menu operation.

5-5   Host Link/NT Link Screen Data

The host link I/F unit can use the three modes shown below by changing the system ROM (the NT610C cannot be used in the No Direct Connection mode).

No Direct Connection

Normal Direct Connection (host link)

NT link (Direct Connection)

This section describes the NT link and normal Direct Connection (host link) screen data and the relationship between host link/NT link screen data and the No Direct Connection screen data.

The system ROMs for each mode are shown in the table below:

Mode	NT20M/NT2000M	NT600M	NT612G	NT610C
No Direct connection	NT20M-SMR01-E	NT600M-SMR01-E	NT610G-SMR01-E	–
Normal Direct Connection (Host Link)	NT20M-SMR31-E	NT600M-SMR31-E	NT610G-SMR31-EV2	NT610C-SMR31-EV2
NT link	–	–	NT610G-SMR34-EV2	NT610C-SMR34-EV2

Relationship between the NT Link Screen Data and the Normal Direct Connection (Host Link) Screen Data

The NT link screen data is the same as the normal Direct Connection (host link) screen data.
There is no difference between them as to support tools.

Replacing the system ROM for the normal Direct Connection (host link) with the one for the NT link will enable the PT to operate faster.

Note There may be a slight difference in the operation timing between the normal Direct Connection (host link) and the NT link.
Confirm the operation of the system after changing the system ROM.

Relationship between the NT Link Screen Data and the No Direct Connection (host link) Screen Data

The screen data for No Direct Connection can be converted into the NT link (Direct Connection) screen data.

In this case, part of the program needs changing.
The procedure is the same as that of changing the No Direct Connection screen data into the NT link (Direct Connection) screen data.
Refer to the NT-series Host Interface Unit Direct Connection Operation Manual for more details.

SECTION 6
PT Operation

This section describes how to use the PT with the Direct Connection and the NT link. This section also describes the settings of support tools only in relation to allocated bits and allocated words. Refer to the manuals of support tools or the PT for other settings or displays of support tools.

6-1 Using the PT

How to create screen data, Direct Connection, NT link, and connecting the Support Tool are described below before the use of the PT is explained.

6-1-1 Before Using the PT

This section describes PC program creation and Support Tool screen data creation only as it relates to using the PT. For details of other procedures, refer to *1-6 System Configuration*.

Preparing to Operate the PT   The relationship between PT, PC and Support Tool operations is shown below.

```
    ┌──────────┐      ┌──────────┐      ┌──────────────┐
    │    PC    │      │    PT    │      │ Support Tool │
    └──────────┘      └──────────┘      └──────────────┘
         │                 │                   │
         ▼                 │                   ▼
   Create programs         │            Create screen data
         │                 │                   │
         │                 ▼                   │
         │          Transfer mode  ◀──── Transfer screen data
         │                 │
         ▼                 ▼
     Run mode ───────── Run mode
    (see note)
```
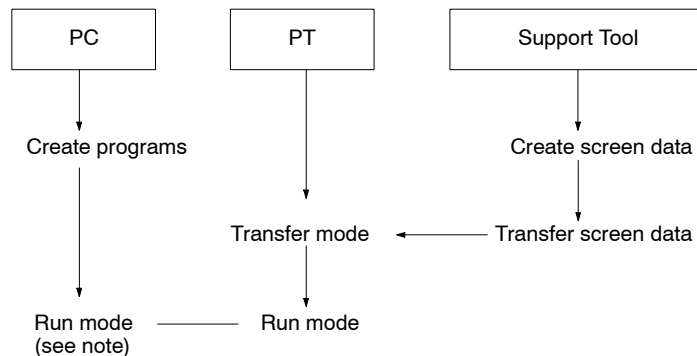
Note   The PT reads and writes data to allocated bits and words in the PC even if the PC is not set to Run mode.
Control of the PT and reading the status with the Peripheral Tool monitoring functions are also enabled.

Creating Screen Data   The PT switches the display between multiple screens. All screen data for a single PT corresponds to a single file.

```
    ┌──────────┐             ┌──────────────┐
    │    PC    │             │ Support Tool │
    └──────────┘             └──────────────┘
     Screen 1   ┐    File    ┌  Screen 1
     Screen 2   │  ◀─────▶   │  Screen 2
     Screen 3   ┘            └  Screen 3
```
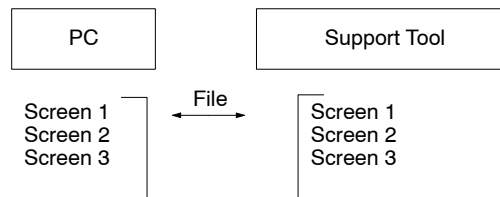
Screen data can be created by one of the following three methods:

creating a new file;

editing an existing file;

reading and editing selected screens from an existing file.

Equipment   The following equipment and settings are used in the examples in this section:

General memory:

PT: NT612G (EL display, touch panel version NT612G-DT211)

PC: OMRON C200H
The memory area used depends on the PC type. Refer to *Appendix E PC Memory Map* for details.

Support Tool: NT610C/NT612G Support Tool Version 3.j

General Memory (Applied only to NT20M/NT2000M/NT600M used with the host link): Do not use

Set the Host Interface Unit DIP switch SW4-2, or SW6-2 to the OFF position. The general memory is used if this switch is turned ON when the NT20M/NT2000M/NT600M is used. For details, refer to *2-1-2 DIP Switch Settings*.

6-1-2 Creating Screen Data

Screen data is created with the Support Tool. The basic procedure to create these screens is outlined below along with the relevant page number. The example describes the procedure for creating a new file using NT610C/NT612G Support Tool.

Main Menu

```
                NT610C / NT612G

             Support Tool Version. 3.2


             ▋Edit Screen▋        ⬛⬛ = Select

              Tool Settings        ⬛ = Confirm

              Exit



           (C) OMRON Corporation 1994
              All Rights Reserved
```
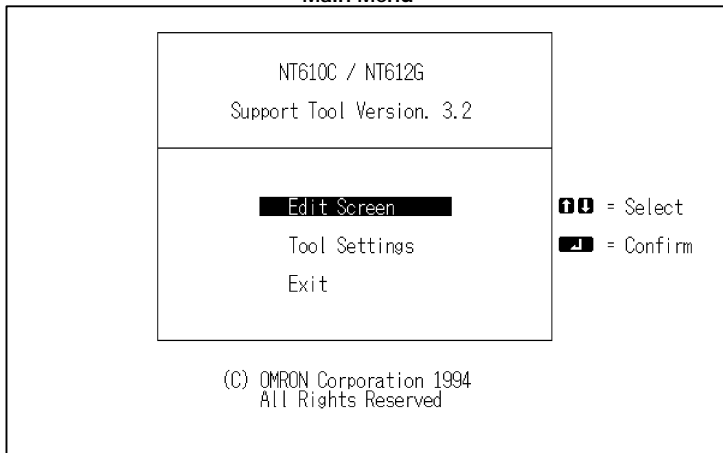
Tool Settings

NT610C/NT612G model setting (PT model)
Memory capacity setting (screen memory)

⬇ **Edit Screen**

File Selection Menu

```
  File List    NT610C-V3-0 1024KB    ------- File Selection -------

 FileName│     Title               -------- Help Message --------
 NEW_FILE│Creation of New File



                                  ⬛⬛  = Select
                                  ⬛   = Confirm
                                  PgDn = Next Page
                                  PgUp = Prev Page
                                  Esc  = Exit to Main Menu




 1 Copy 2Delete3Print 4Tools  5Hist. 6 Tmx. 7 Rcv. 8In.Scn 9Title 0 Next
```
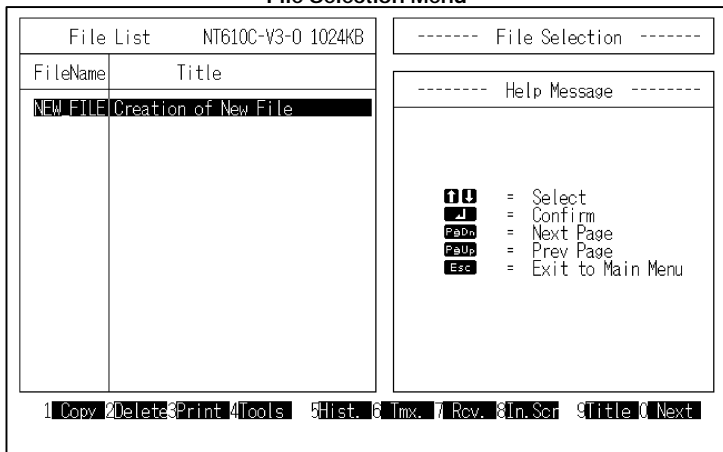
Create new file: select New File
Edit existing file: select file to edit

⬇

Create New File (Enter filename on completion.)

Screen Selection Display

```
[NEW_FILE] Scr list NT610C-V3-0  256KB    ------ Screen Selection ------
 No.│ Status │   Comment
  1 │        │                          -------- Help Message --------
  2 │        │
  3 │        │                          ▲▼     = Select
  4 │        │                          ↵      = Confirm
  5 │        │                          PgDn   = Next Page
  6 │        │                          PgUp   = Prev Page
  7 │        │                          Tab    = Specified Page
  8 │        │                          Space  = Mark/Unmark
  9 │        │                          Home   = Unmark All
 10 │        │              ▲           Shift+Home = Mark/Unmark All
 11 │        │                          Esc    = File Selection Menu
 12 │        │
 13 │        │                          Hist. [              ]
 14 │        │
 15 │        │
 16 │        │                                      0Byte
 1 Copy 2Delete 3Print 4Attrib  5 Read 6Commnt 7Image&Lib 8Co/Ovl 9 Mark 0 Next
```
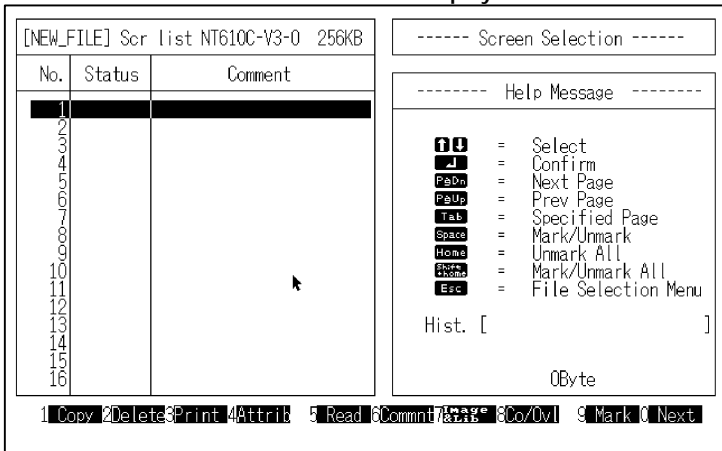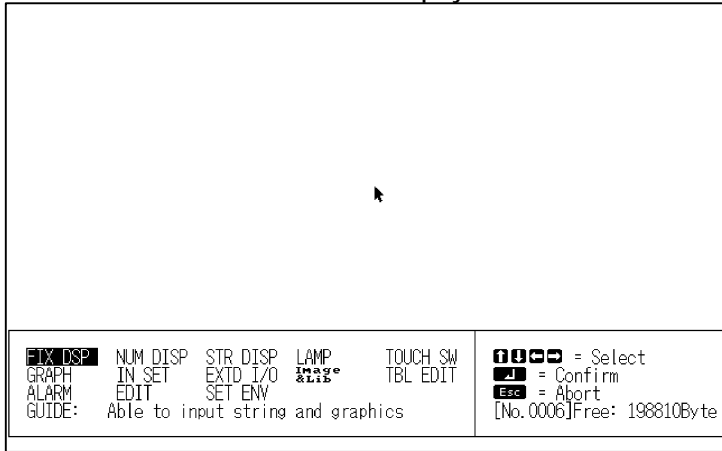
Setting Direct Connection Information

Press the function key ″Next″ followed by function key ″Direct″ to set the following data.

PT Status Control Area (word allocation) (Page 82, 97)

PT Status Notify Area (word allocation) (Page 114)

Numeral table (word allocation) (Page 87, 90)

Character-string memory table (word allocation) (Page 87, 90)

Expanded I/O input setting (bit allocation selection) (Page 116)

Expanded I/O output setting (bit allocation selection) (Page 101)

Bit memory table (Page 85, 104)

Reuse existing file: select ″Read″

Select Screen

Initial Edit Display

```
                          ▲




 FIX DSP  NUM DISP  STR DISP  LAMP     TOUCH SW    ▲▼◀▶ = Select
 GRAPH    IN SET    EXTD I/O  Image    TBL EDIT    ↵    = Confirm
 ALARM    EDIT      SET ENV   &Lib                 Esc  = Abort
 GUIDE:   Able to input string and graphics        [No.0006]Free: 198810Byte
```

Creating Screen

The following screen will be displayed. Set the following data from this screen.

Numeral display (numeral table selection) (Page 87, 90, 94)

Character-string display (character-string memory table selection) (Page 87, 90, 94)

Lamp (bit allocation) (Page 103)

Touch switch (bit allocation for control and notification) (Page 103, 117)

Graph (numeral memory table selection) (Page 97)

Input setting (numeral/character-string memory table selection) (Page 108, 112)

Expanded I/O (bit allocation selection) (Page 116)

Table editing (word allocation selection) (Page 87, 90, 94)

Alarm (bit memory table selection) (Page 104)

⬇ **Complete Create Screen** (Specify the filename for the newly created screen.)

Screen Selection Display

```
[NEW_FILE] Scr list NT610C-V3-0  256KB    ------ Screen Selection ------
 No.  Status      Comment
  1                                         -------- Help Message --------
  2
  3                                          ⬆⬇   =   Select
  4                                          ↵    =   Confirm
  5                                          PgDn =   Next Page
  6                                          PgUp =   Prev Page
  7                                          Tab  =   Specified Page
  8                             ▸            Space =  Mark/Unmark
  9                                          Home =   Unmark All
 10                                          Shift+=  Mark/Unmark All
 11                                          Home
 12                                          Esc  =   File Selection Menu
 13
 14                                         Hist. [                    ]
 15
 16                                                      0Byte
 1 Copy 2Delete 3Print 4Attrib  5 Read 6Commnt 7Image 8Co/Ovl  9 Mark 0 Next
```

⬇ **Complete Create File**

```
    File List   NT610C-V3-0   128KB    -------- Select File --------

FileName        Title                  -------- Help Message --------

NEW_FILE  Creation of New File

                                         ⬆⬇   =   Select
                                         ↵    =   Confirm
                                         PgDn =   Next Page
                                         PgUp =   Prev Page
                                         Esc  =   Exit to Main Menu

  Copy  Delete  Print  Tools  Hist.     Tmx.  Rcv.  In.Scr Title  Next
```

Set System memory

Press the function key F8: Start-up Screen. The following screen is displayed when the PT is booted up.

Transfer

Press the function key F6: Transfer. Transfer the created screen data to the PT.

Transferring Data to the PT   To transfer the screen data to the PT, connect the PT and Support Tool together and set the PT in Transfer Mode.

* When reusing existing file data with a different Direct Connection setting, change the settings as described in *Section 3 Converting Data*.
* Refer to the NT20M/NT600M Support Tool Operation Manual to create screen data with the NTM Support Tool Ver. 4.j .

6-1-3   Setting Direct Connection/NT Link

Set Direct Connection with the Support Tool before selecting a file. It is set from the Main Menu of the Tool Setting screen.

NTM Support Tool Version 4.j

To select Direct Connection, set the Direct setting item to OMROM.

```
                        Tool Settings

  NT Model              NT20M         NT600M
  Memory Size        32 KB    64 KB     128 KB      256 KB
  Direct setting       No        Yes


  Printer            Epson Dot Matrix      HP Laser
  Sheet Feeder          Yes          No
  Auto Refresh          Yes          No
  Display Grid          No     8-dot   16-dot    32-dot    TouchSw
  Communication Port    COM1         COM2
  Temporary Directory   \
  Data Directory        \

 Help Message    Set NT model                    ⬆⬇ = Select Item
                                                 ⬅➡ = Change Setting
                                                  ⏎ = Confirm
                 Confirm NT model                ESC = Abort
```

NT610C/NT612G support tool Ver.3.j

The NT610C/NT612G Support Tool is intended for use with the direct connection function only. Therefore, there is no setting for the direct connection function on the Tool Setting screen.

```
                        Tool Settings

  NT Model              NT612G       NT610C


  Printer            Epson Dot Matrix      HP Laser
  Sheet Feeder          Yes          No
  Mouse Use             Yes          No
  Communication Port    COM1              COM2
  Communication Mode    Stndrd      Hspeed
  Work Directory        \
  Data Directory        \                     ▶

 Help Message    Set NT model                    ⬆⬇ = Select Item
                                                 ⬅➡ = Change Setting
                                                  ⏎ = Confirm
                 Confirm NT model                Esc = Abort
 1      2      3 Time 4 Edit  5      6      7      8      9      0
```

Connecting to the Support Tool

The following equipment and software is required to create screens with the Support Tool:

Computer:PC/AT compatible computer.

Software:

NTM Support Tool Version 4.j
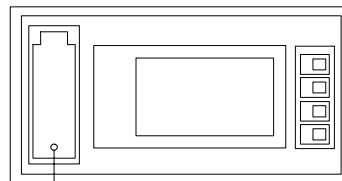NT20M-ZASAT-EV4
NT612G/NT610C Support Tool Version 3.j
NT610G-ZA3AT-EV3;

Refer to the *NT-series Support Tool Operation Manual* for details on the Support Tool software and connecting cables.
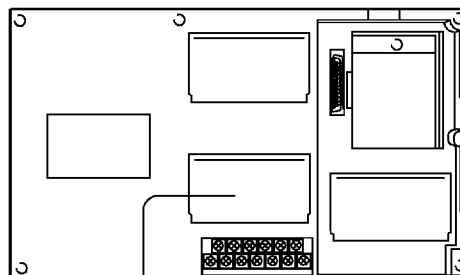
Connections

Connect the computer RS-232C connector to the PT connector with the connecting cable as shown in the diagrams below.
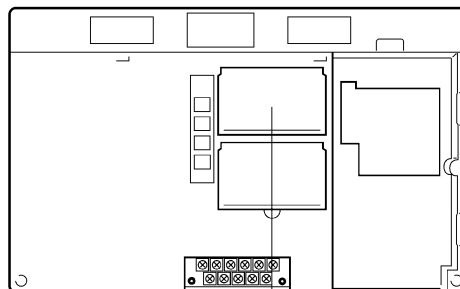
[NT20M]

Connector is under
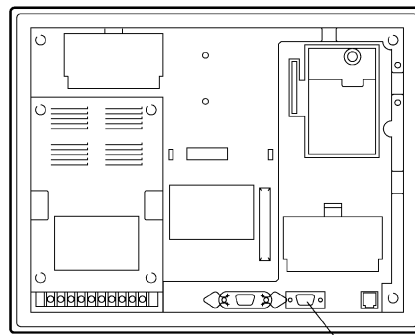the connector cover.

[NT600M/NT612G]

Connector is under
the connector cover.
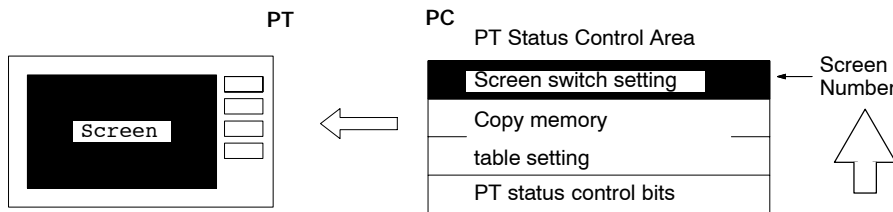
[NT2000M]

Connector is under
the connector cover.
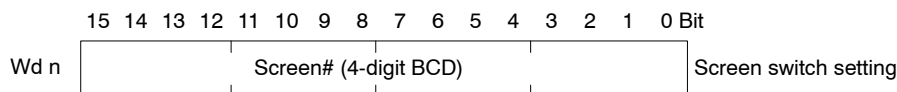
RS-232C connector

6-2 Switching Displayed Screens (Operating the PT Status Control Area)

Description

Write the screen number to the Screen Switch setting in the PT Status Control Area to switch the screen displayed on the PT.

PT

PC

PT Status Control Area

Screen switch setting ← Screen Number

Copy memory

table setting

PT status control bits

Screen

Allocated start address: Word n (set with the Support Tool)

| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 Bit |

Wd n — Screen# (4-digit BCD) — Screen switch setting

Screen#: 0000 (Screen clear — no display)
0001 to 0250 (NT20M/NT2000M)
0001 to 1000 (NT600M)
0001 to 2000 (NT610C/NT612G)

The special functions shown below are available with screen numbers 1197 to 2000 of the NT610C/NT612G.
The list of recently displayed screens, etc. can be confirmed during the operation.

1997: Screen showing recently displayed screens in displayed order

1998: Screen showing recently displayed screens in frequency order

1999: host connection status screen

2000: host error status screen

Restrictions

Allocated Words   The PT Status Control Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	(*)
LR	Link Relay	---	OK

(*) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1, 2, 3...   1. Use the Support Tool to allocate the PT Status Control Area to the PC memory.
2. Create a PC program to write the number of the displayed screen to the Screen Switch setting word in the PT Status Control Area as a 4-digit BCD (binary coded decimal) value.

Important Points

The displayed screen switches when the contents of the allocated word are 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. As shown in the example, it is also possible to use the function to notify which screen is currently displayed.

The screen specified at the Screen switch setting word will be displayed at the start-up of PT operation.
The start-up screen set with the support tool will be ignored.

Reference

When the displayed screen is switched due to PT Status Control Area operation, the screen number is written to the Currently Displayed Screen word in PT Status Notify Area. Refer to *6-11 Determining the Screen Displayed on the PT* for details.

Continuous or superimposed screens can be displayed by specifying the parent screen. If a child screen is specified, only the child screen is displayed.

Refer to the appropriate *PT Operation Manual* and *NT-series Support Tool Operation Manual* for information about displaying continuous and superimposed screens.

The displayed screen can also be switched by specifying the screen number as the touch switch or the input terminal of the expanded I/O unit with the support tool setting. As to the NT610C/NT612G, operating bit allocation of the bit memory table can switch the displayed screen. For details, refer to the users' manual of the PT or the sections of the support tool operation manuals describing the stand-alone function (screen selection function) or bit memory table.

Application Example

This example operates the PC switch (bit) to change the PT display screen.

Allocation   Allocate the memory as follows using the Support Tool:
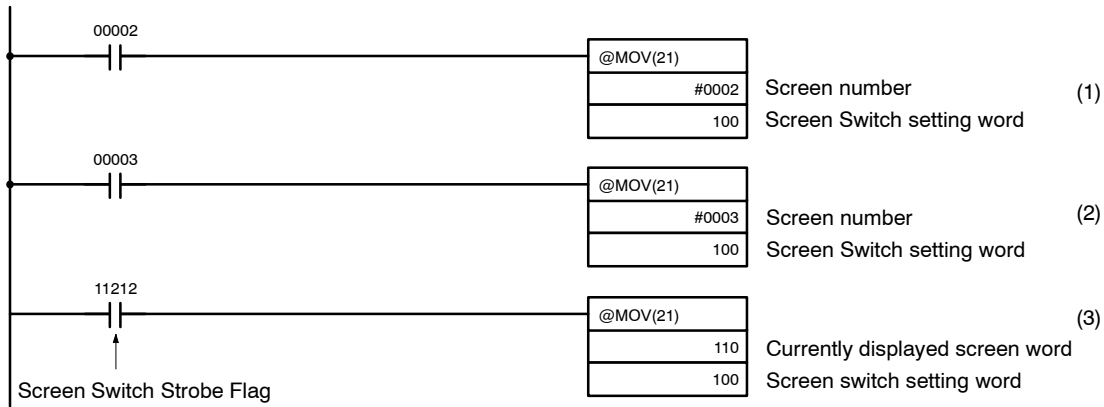PT Status Control Area: 100
PT Status Notify Area: 110

Screens   Create screens numbers 2 and 3 with the Support Tool and transfer them to the PT.

PC Program   Create a PC ladder program, as follows:

```
        00002
  ├──────┤ ├────────────────────────────┌─────────────┐
                                         │ @MOV(21)    │
                                         ├─────────────┤
                                         │       #0002 │  Screen number                    (1)
                                         ├─────────────┤
                                         │         100 │  Screen Switch setting word
                                         └─────────────┘
        00003
  ├──────┤ ├────────────────────────────┌─────────────┐
                                         │ @MOV(21)    │
                                         ├─────────────┤
                                         │       #0003 │  Screen number                    (2)
                                         ├─────────────┤
                                         │         100 │  Screen Switch setting word
                                         └─────────────┘
        11212
  ├──────┤ ├────────────────────────────┌─────────────┐
          ▲                              │ @MOV(21)    │            (3)
          │                              ├─────────────┤
  Screen Switch Strobe Flag              │         110 │  Currently displayed screen word
                                         ├─────────────┤
                                         │         100 │  Screen switch setting word
                                         └─────────────┘
```

Operation   PT operation when the program is run is described below.

1, 2, 3...   1. Screen number 2 is displayed on the PT when 00002 turns ON.

2. Screen number 3 is displayed on the PT when 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 Screen switch seting word in PT Status Control Area. In this case, the same screen need not be written twice.

When a program is created as in 3 above, the screen can also be switched from the PT using the Stand-alone functions (screen switch function) and it is not necessary to input the same screen number twice. The step in 3 is not necessary if the Stand-alone functions are not used.

Refer to *6-11 Determining the Screen Displayed on the PT* for more information on the Screen Switch Strobe Flag and notification of the currently displayed screen.

6-3 Changing Displayed Numerals or Character Strings (Operating Bit Allocation of Bit Memory Table)

Description

As to the NT 610C/NT612G, operating bit allocation of the bit memory table can switch the displayed screen.
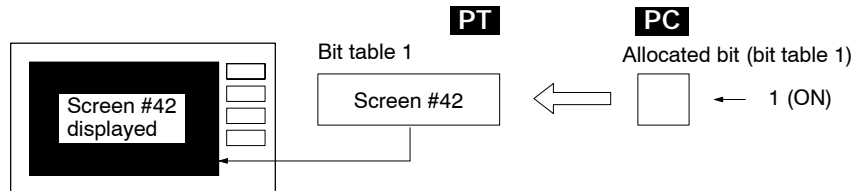
Set with the support tool the allocated bit of the bit memory table and the screen number displayed when its bit memory table is set to "ON".
When the allocated bit is changed from 0 (OFF) to 1 (ON), the screen selected is displayed. However, even if the allocated bit is changed from 1 (ON) to 0 (OFF), the displayed screen remains unchanged.

This function reads the allocated bit of the screen switching function, regardless of the currently displayed screen.
The operation of the PT (memory table updates, touch switch response, lamp response, etc.) may, therefore, become slower when many screens are switched by this function.

The special functions shown below are available with the screen numbers 1997 to 2000 of the NT610C/NT612G.
The record of recently displayed screens, etc. can be confirmed during the operation.

   1997: the list of recently displayed screens in displayed order

   1998: the list of recently displayed screens in frequency order

   1999: host connection status screen

   2000: host error status screen

Restrictions

Allocated words

Bit memory tables can be allocated to the following areas.

Symbol	C-series PC	CV/CVM1-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	–––	OK
AR	Auxiliary Relay	Auxiliary Relay	OK
LR	Link Relay	–––	OK

Note The Auxiliary Relay area of the CVM1/CV series PC is for limited use of the system and cannot be used for any other purpose.

The range of each memory area differs depending on the PC type. Refer to Appendix E PC Memory Map for details.

Procedure   *1, 2, 3...*   1. Use the support tool to allocate to the bit memory table the screen switching function, the screen number to display, and the area of the PC to allocate bits.

2. Create a PC program to switch the displayed screen by changing the allocated bit from "OFF" to "ON".
   To display an alarm screen when a certain bit is set to "ON", there is no need to create a program; bit allocation is enough for that purpose.

Application Example   This example gives a PC program to display an alarm screen in accordance with the bit which is set to "ON" when the water temperature of a tank exceeds the upper limit.

Allocation

Allocate the memory table as follows with the support tool:

Bit memory table No. 0: 00100 (the bit which is set to "ON" when the water temperature of a tank exceeds the upper limit)

Set the screen switching function to bit memory table No. 0 so as to display the screen # 1000.

Screens

Create an alarm screen as shown below on screen # 1000 and send it to the PT.

```
┌──────────────────────────────────────┐
│                            ┌────────┐ │
│                            │ Return │ │
│                            └────────┘ │
│   Process 4 Tank Water Temperature    │
│   ┌────────────────────────────────┐  │
│   │                                │  │
│   │     Over upper limit           │  │
│   │                                │  │
│   └────────────────────────────────┘  │
│      Check the thermostat immediately.│
│                                        │
└──────────────────────────────────────┘
```
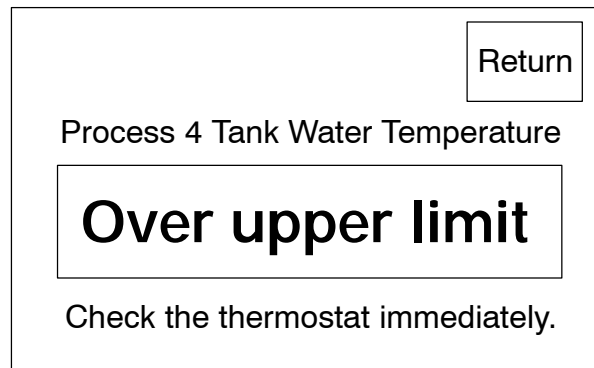
PC Program

No ladder program is required to control the PT.

Operation

The PT displays screen # 1000 when bit 00100 is set to "ON"

6-4 Editing Displayed Numerals or Character Strings (Copying Memory Table)

<u>Description</u>

The PT display can be changed by editing the contents of the numeral or character-string memory table used for the display.

The method described below for changing the display involves copying the contents of one memory table to another. Writing the source and destination memory table numbers to the Copy Memory Table Setting words of the PT Status Control Area allocated to the PC copies the contents of one memory table to another in the PT, which changes the display.

This is a convenient method to display predetermined numbers of character strings to suit the operating status. The changes are processed extremely rapidly as the PT Status Control Area is used.
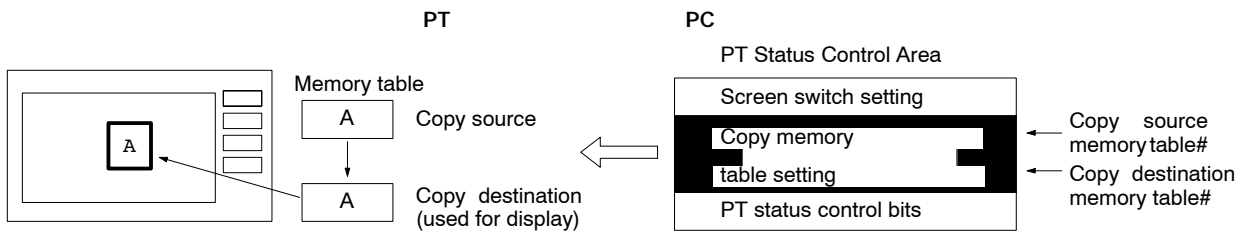
Allocated start address: Word n (set with the Support Tool)

| **Copy Type** | 0: Copy character-string memory table |
| | 1: Copy numeral table |

Character-string Memory Table Numbers	000 to 127 (NT20M/NT2000M)
	000 to 255 (NT600M)
	000 to 999* (NT610C/NT612G)
	* 256 to 999 are for read only. These cannot be used as copy destinations. 256 to 999 may not be available depending on the setting of support tools.

Numeral Table Numbers	000 to 127 (NT20M/NT2000M)
	000 to 511 (NT600M)
	000 to 999* (NT610C/NT612G)
	* 512 to 999 may not be available depending on the system memory setting of support tools.

<u>Restrictions</u>

Allocated Words   The PT Status Control Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	OK (*)
LR	Link Relay	---	OK

(*) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1, 2, 3...   1. Use the Support Tool to allocate the PT Status Control Area to the PC memory.
2. Specify the memory table to be displayed with the Screen Create functions of the Support Tool.

   Specify a numeral table for a numeral display.

   Specify a character-string memory table for a text display.
3. Use the Table Edit functions to write the contents of the copy source memory table.
4. Create a PC program to write the data described in 2 and 3 above to the Copy Memory Table setting words in the PT Status Control Area.

Important Points

In some cases the PT will read the specified area while the instructions are being written to the PT Status Control Area.

Therefore when using this method, be sure to write the copy destination memory table number word n+2 before writing the copy source memory table number Word n+1. The data may be written to an incorrect memory table if the copy source memory table number is specified first.

The PT reads only the words allocated to the memory tables displayed on the screen. When the contents of the copy source memory table need changing, be sure to display them.

The display may be incorrect when a numeral table is copied if the display method or number of stored addresses differ.

The copy is not executed if the Copy Type is set to a value other than 0 or 1.

The memory table is copied only when the contents change. To make repeated copies between the same source to destination memory table, set the Copy Type to a value other than 0 or 1 then reset it to the correct value.

Reference

Prepare a number of copy source memory tables in advance and use them to switch the display to suit the operating status.

As to the NT610C/NT612G, allocating memory tables of a copy source and a copy destination to the touch switch will enable the touch switch to function to change displayed numerals or character-strings by copying the memory tables.

Application Example

This example switches the displayed screen by copying the character-string memory table.

Allocation   Allocate the memory as follows using the Support Tool:

PT Status Control Area: 0100
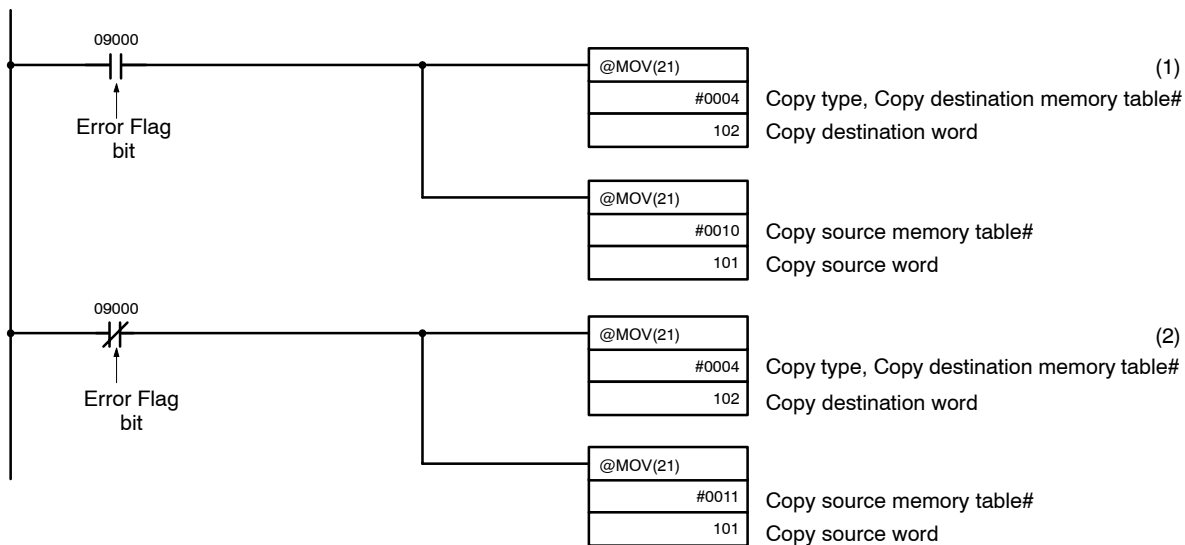
Screens   Use the Support Tool to create a screen which displays character-string memory table entry #4 and transfer it to the PT.

Set the initial values of the character-string memory table as shown below. It is not necessary to allocate addresses.

```
┌─────────────────────────────┐
│ Line 1                      │
│        ┌──────────────┐     │
│        │   Normal     │     │
│        └──────────────┘     │
│                ▲            │
│                │            │
└─────────────────────────────┘
```

Character-string memory table entry #4
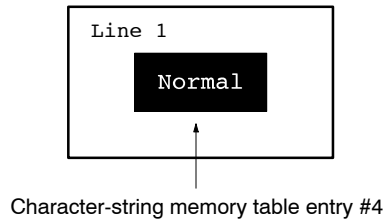
Character-string memory table

#	Contents	Qty characters
4	Normal	6 chars
10	Error	6 chars
11	Normal	6 chars

PC Program   Create a PC ladder program, as follows:

```
        09000
         ┤ ├────────────────┬──────┌─────────────┐                                    (1)
      Error Flag            │      │ @MOV(21)    │
         bit                │      ├─────────────┤
                            │      │      #0004   │  Copy type, Copy destination memory table#
                            │      ├─────────────┤
                            │      │       102    │  Copy destination word
                            │      └─────────────┘
                            │
                            └──────┌─────────────┐
                                   │ @MOV(21)    │
                                   ├─────────────┤
                                   │      #0010   │  Copy source memory table#
                                   ├─────────────┤
                                   │       101    │  Copy source word
                                   └─────────────┘

        09000
         ┤/├────────────────┬──────┌─────────────┐                                    (2)
      Error Flag            │      │ @MOV(21)    │
         bit                │      ├─────────────┤
                            │      │      #0004   │  Copy type, Copy destination memory table#
                            │      ├─────────────┤
                            │      │       102    │  Copy destination word
                            │      └─────────────┘
                            │
                            └──────┌─────────────┐
                                   │ @MOV(21)    │
                                   ├─────────────┤
                                   │      #0011   │  Copy source memory table#
                                   ├─────────────┤
                                   │       101    │  Copy source word
                                   └─────────────┘
```

Operation   PT operation when the created screen is displayed and the program is run is described below.

1, 2, 3...   1. The Error Flag (bit 09000) turns ON and the PT displays the message "Error" when an error occurs.

2. The Error Flag (bit 09000) turns OFF and the PT display reverts to "Normal" when the error is cleared.

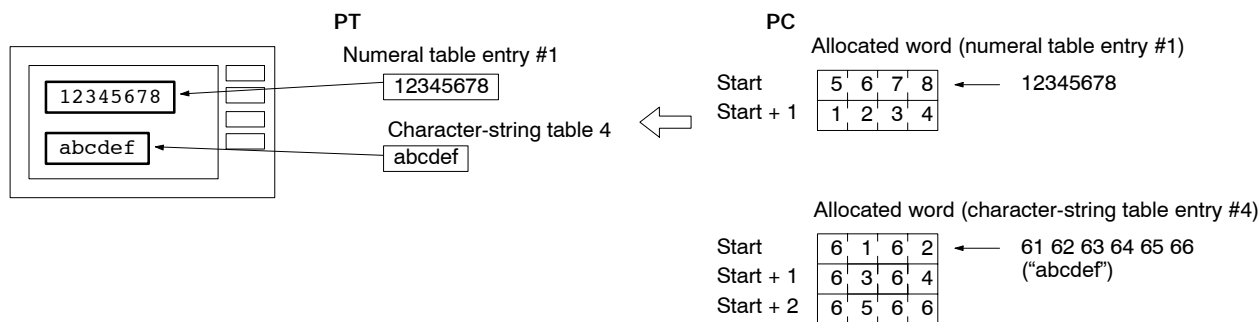**Note** Specify the copy destination memory table before the copy source memory table.

6-5 Changing Displayed Numerals or Character Strings (Changing Contents of Allocated Words)

Description

The PT display can be changed by editing the contents of the numeral or charac-ter-string memory table used for the display.

The method described below for changing the display involves editing the con-tents of the PC memory allocated to the memory table.

This is a convenient method to display changes in memory contents when moni-toring the PC memory.

PT   PC

Numeral table entry #1   Allocated word (numeral table entry #1)

12345678

12345678

Start | 5 | 6 | 7 | 8 | ◄── 12345678
Start + 1 | 1 | 2 | 3 | 4 |

Character-string table 4

abcdef

abcdef

Allocated word (character-string table entry #4)

Start | 6 | 1 | 6 | 2 | ◄── 61 62 63 64 65 66
Start + 1 | 6 | 3 | 6 | 4 | ("abcdef")
Start + 2 | 6 | 5 | 6 | 6 |

Allocate the words using the Support Tool.

Restrictions

Allocated Words

The number of words which can be allocated is shown in the table below.

Memory table	Words
Numeral	1 or 2 words
Character-string	NT20M/NT2000M: 1 to 16 words (2 to 32 characters) NT600M: 1 to 20 words (2 to 40 characters) NT612G/NT610C: 1 to 20 words (2 to 40 characters)

The memory table can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-se-ries PC	Numeral	Character-string
DM	Data Memory	Data Memory	OK (1 or 2 words for numeral tables)	OK (1 or 2 words for numeral tables)
CH	Internal/Spe-cial Relay	Internal/Spe-cial Relay	OK (1 or 2 words for numeral tables)	OK (1 or 2 words for numeral tables)
TIM	Timer	Timer	1 word only	NG
CNT	Counter	Counter	1 word only	NG
HR	Holding Relay	---	OK (1 or 2 words for numeral tables)	OK (1 or 2 words for numeral tables)
AR	Auxiliary Relay	Auxiliary Relay	OK (1 or 2 words for numeral tables)	OK (*)
LR	Link Relay	---	OK (1 or 2 words for numeral tables)	OK (1 or 2 words for numeral tables)

(*) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Ap-pendix E PC Memory Map* for more details.

Note The Auxiliary Relay area of the CVM1/CV series PC is for limited use of the sys-tem and cannot be used for any other purpose.

Contents and Display of Allocated Words

Numerals

Numbers are stored in the allocated words as shown below.

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 to 12	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 to 12	11 to 8	7 to 4	3 to 0	Bit
Start	5	6	7	8	
Start + 1	1	2	3	4	

Numbers can be handled in three different ways. The most-significant digit is processed differently according to the type of numeral display, as follows:

Hexadecimal display: display of all digits identical to the contents of the allocated words; (it cannot display negative digits)

Decimal, no sign: an "F" as the most-significant digit is displayed as "0," any other value as the most-significant digit and all other digits are displayed identical to the contents of the allocated words;

Decimal, with sign: an "F" as the most-significant digit is displayed as a minus sign (–), any other value as the most-significant digit and all other digits are displayed identical to the contents of the allocated words;

Display Example
Data contains numbers 0 to 9 only

Word				
Start	3	4	5	6
Start + 1	F	0	1	2

Decimal, no sign   123456
Decimal, with sign   –123456
Hexadecimal   F0123456

Data includes letters A to F

Word				
Start	3	B	5	6
Start + 1	F	0	1	2

Decimal, no sign   123B56
Decimal, with sign   –123B56
Hexadecimal   F0123B56

If hexadecimal data (A to F) is transmitted when a decimal display is selected, the letters are displayed unchanged.

Note   1. If the number of display digits is less than the number of digits to display (4 digits for a single word, 8 digits for two words) the contents of the allocated word are not displayed and all digits are displayed as asterisks (*).

2. If the display is selected as a decimal display with sign, an "F" as the most-significant digit represents the minus sign. Consequently, the number of digits in a negative number is reduced by one

*The actual display is also affected by the zero-suppression and decimal-point display settings. Refer to the *NT-series Support Tool Operation Manual* for details.

Character Strings

Character strings are stored in sequential words from the start address as Special English 8-bit code (normal characters) . Two normal characters or one wide character is allocated to each word of memory. A maximum of 20 words (40 characters) can be allocated in the NT600M/NT612G/NT610C, or 16 words (32 characters) in the NT20M/NT2000M.

Word	Start		Start + 1		- - - - - - - -	Start + 19	
	Code 1	Code 2	Code 3	Code 4		Code 39	Code 40
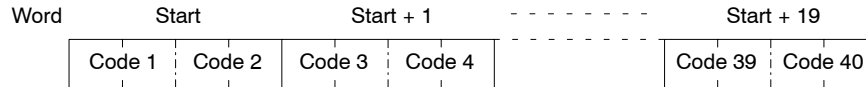
Display Example

Allocate as follows to arrange characters in order.

"A"=41H "B"=42H   Start   CH | 4 | 1 | 4 | 2 |
"C"=43H "D"=44H   Start+1CH | 4 | 3 | 4 | 4 |
→ "ABCD"
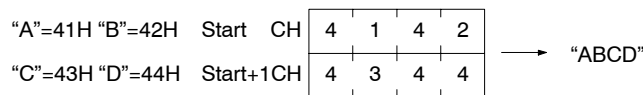
*Character codes 00 to 1FH are displayed in on half size characters. 00H is converted to 20H.

Procedure

1, 2, 3...   1. Use the Support Tool to allocate the numeral and character-string memory table to the PC memory.

2. Create a PC program to write the display numerals and character strings to the allocated words.

Important Points

To use a single numeral table to display multiple screens, standardize the display method. Incorrect display may result if the display method is changed.

If the number of characters written is less than the number of characters in the allocated words, fill the remaining character spaces with normal characters (character code: 20H). The display may be incorrect if other unwanted character codes remain.

Reference

As to the NT20M/NT2000M/NT600M used with the host link,
The display switches very rapidly if the numeral table is allocated to the general memory words of the PT Status Control Area. However, it is not possible to allocate a character-string memory table to the general memory.

Application Example

This example directly displays the contents of the words allocated as the numeral table in the PC memory.

Allocation

Allocate the memory as follows using the Support Tool:
numeral table entry #1: 0000 (number words: 2)
numeral table entry #2: 0002 (number words: 1)

Use the Support Tool to create a screen which displays numeral table numbers 1 and 2 and transfer it to the PT.
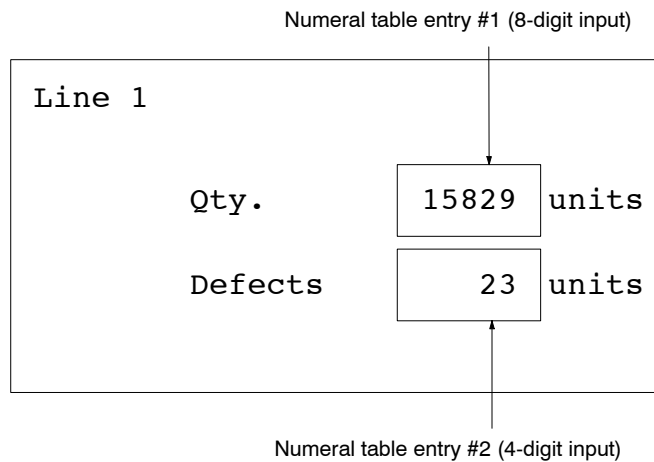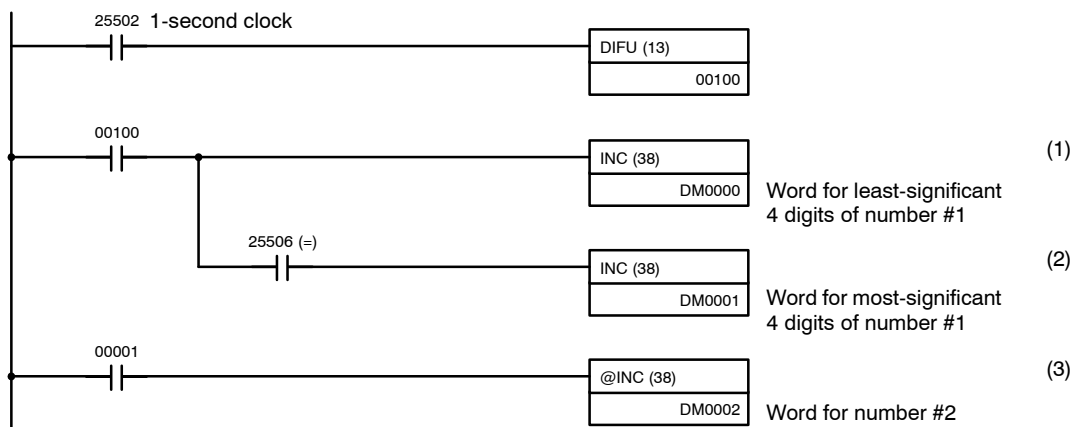
Numeral table entry #1 (8-digit input)

```
Line 1


          Qty.            15829  units


          Defects            23  units
```

Numeral table entry #2 (4-digit input)

PC Program   Create a PC ladder program, as follows:

```
   25502  1-second clock
  ──┤├──────────────────────────────────────────┌─────────────┐
                                                 │ DIFU (13)   │
                                                 ├─────────────┤
                                                 │       00100 │
                                                 └─────────────┘

   00100
  ──┤├────────┬────────────────────────────────┌─────────────┐         (1)
              │                                 │ INC (38)    │
              │                                 ├─────────────┤
              │                                 │      DM0000 │  Word for least-significant
              │                                 └─────────────┘  4 digits of number #1
              │   25506 (=)
              └───┤├───────────────────────────┌─────────────┐         (2)
                                                │ INC (38)    │
                                                ├─────────────┤
                                                │      DM0001 │  Word for most-significant
                                                └─────────────┘  4 digits of number #1

   00001
  ──┤├──────────────────────────────────────────┌─────────────┐         (3)
                                                 │ @INC (38)   │
                                                 ├─────────────┤
                                                 │      DM0002 │  Word for number #2
                                                 └─────────────┘
```

Operation   PT operation when the created screen is displayed and the program is run is described below.

1, 2, 3...   1. The contents of word 0000 are incremented by 1 each second. The displayed value in the numeral table entry entry number1 is increased by 1 each second.

2. When the counter in (1) causes an increase in the most-significant digits, the contents of word 0001 are incremented by 1. The displayed value in the PT numeral table entry number1 most significant digits is increased by 1.

3. When bit 00001 turns ON the contents of 0002 are incremented by 1. The displayed value in the PT numeral table entry number 2 is increased by 1.

6-6 Changing Displayed Numerals or Character Strings (Changing Allocated Word in Indirect Specification / the C200H I/F Unit only)

Description

In the Indirect Connection method, a numeral table is specified to display a numeral or character-string, and the value of the numeral table will become the memory table number to be used for display. In the following example, 39 is used as the value of the memory table.

There are two ways to change the display:

1. Change the memory table number to be displayed. In the following example, the contents of numeral memory table 41 is changed. This section provides further details on this method.

2. Change the memory table contents used for display. In the following example, the contents of character-string memory table 39 is changed.

   The following is the description of how to change displayed contents with method 1. Method 2 is how to change the contents of the allocated word of the displayed memory table. Refer to Copying the Memory Table (Page 87) or Changing Allocated Word Contents (Page 90).
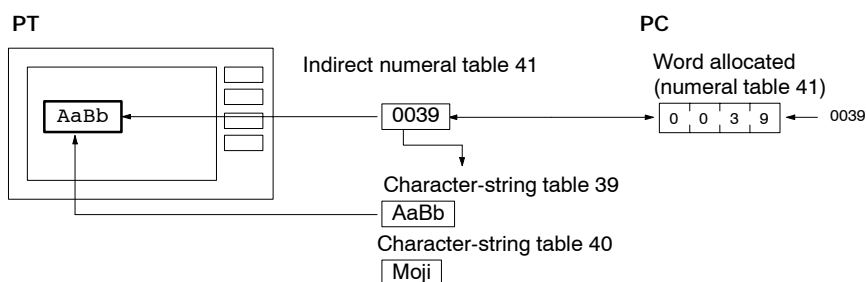
Use the Support Tool for word allocation of the numeral table to be used in the Indirect Connection method when displaying a value or character-string.

Restrictions

Allocated Words

The number of words which can be allocated in the Indirect Connection method is shown in the table below.

Memory table	Words
Numeral	1 or 2 words

The memory table number to be displayed can be selected from the following value ranges. The memory table number consists of four digits maximum so that the user is able to allocate only a single word.

When numerals are displayed:
000 to 127 (NT20M/NT2000M)
000 to 511 (NT600M)
000 to 999* (NT612G/NT610C)

* 512 to 999 may not be available depending on the "system memory" setting of the support tool.

When character-strings are displayed:
000 to 127 (NT20M/NT2000M)
000 to 255 (NT600M)
000 to 999 (NT612G/NT610C)

* 256 to 999 are for read only, and the contents to be changed cannot be written. 256 to 999 may not be available depending on the "system memory" setting of the support tool.

The numeral table can be allocated to the following area.

Symbol	Area	Allocation
DM	Data Memory	OK (1 or 2 words for numeral tables)
CH	Internal/Special Relay	OK (1 or 2 words for numeral tables)
TIM	Timer	1 word only
CNT	Counter	1 word only
HR	Holding Relay	OK (1 or 2 words for numeral tables)
AR	Auxiliary Relay	OK (1 or 2 words for numeral tables)
LR	Link Relay	OK (1 or 2 words for numeral tables)

The range of each memory area varies according to the PC type. Refer to *Appendix A PC Memory Map* for more details.

Refer to *6-5 Changing Displayed Numerals and Character Strings* for information on saving a value and character string to the allocated word of the numeral table or character-string memory table to be used for display, or to the allocated word of the numeral table to be used in the Indirect Connection method.

Procedure

1, 2, 3... 1. Use the Support Tool to specify the PC area for the numeral table to be used for numeral and character-string display in the Indirect Connection method.

2. Use the Table Edit function of the Support Tool to write the contents to be displayed to the memory table to be used for display.

   Specify a numeral table for a numeral display.

 or Specify a character-string memory table for a text display.

3. Create a program on the PC to change the contents of the allocated word of the numeral table to be used in the Indirect Connection method.

Application Example

This example changes the displayed character string by adding the contents of the PC word for the numeral table to be used in the Indirect Connection method.

Allocation Allocate the memory as follows using the Support Tool:
numeral table entry #51: DM0000 (number of words: 1)

Screens Use the Support Tool to create a screen which displays character-string memory table entry #51 in the Indirect Connection method as shown below and transfer it to the PT. Set numeral table number 51 to 100 as the initial value. Set initial values to character-string memory tables 100 and 103 as shown below. There is no need to allocate words.

```
Line 1

Product    NT20M
```
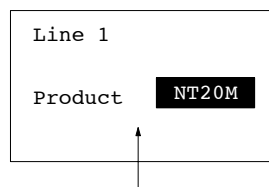
This character-string memory table is indirectly specified with numeral memory table #51.

#	Contents	No. of characters
100	NT20M	6 chars
101	NT600M	6 chars
102	NT612G	6 chars
103	NT610C	6 chars

PC Program Create a PC ladder program, as follows:

Make sure the contents of the numerals memory table used in indirect specification are within the range of the memory table number to be displayed.
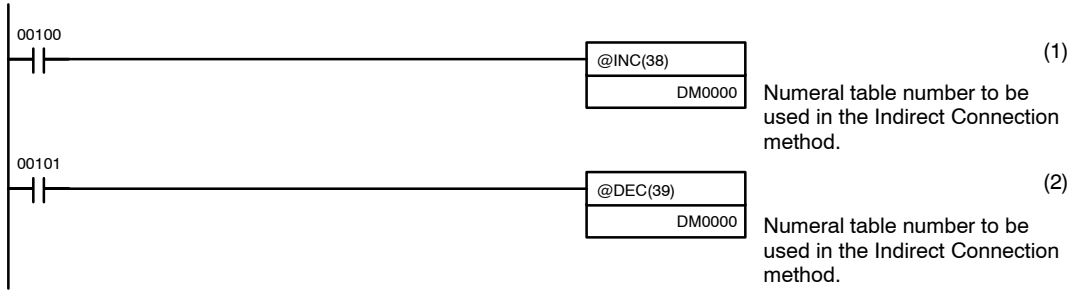
```
  00100
  ──┤├──                           ┌──────────────┐        (1)
                                    │  @INC(38)    │
                                    ├──────────────┤  Numeral table number to be
                                    │    DM0000    │  used in the Indirect Connection
                                    └──────────────┘  method.

  00101
  ──┤├──                           ┌──────────────┐        (2)
                                    │  @DEC(39)    │
                                    ├──────────────┤  Numeral table number to be
                                    │    DM0000    │  used in the Indirect Connection
                                    └──────────────┘  method.
```

Operation PT operation when the created screen is displayed and the program is run as described below.

1, 2, 3... 1. When bit 00100 is ON, the PT's display changes from NT20M to NT600M, and from NT612G to NT610C.

2. When bit 00101 is ON, the PT's display changes from NT610C to NT612G, and from NT600M to NT20M.

6-7 Upgrading Graphs (Changing Allocated Word Contents)

Description

The bar graph can be upgraded by editing the contents of the memory table used for the bar graph. The graph can be updated by updating the contents of the numeral memory table (direct specification) when the C200H I/F unit is used.

Allocate the words using the Support Tool.

Restrictions

Allocated Words The number of words which can be allocated is shown in the table below.

Memory table	Words
Numeral	1 or 2 words

The memory table can be allocated to the areas listed in the following table.

Symbol	C-series PC	CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK (1 or 2 words for numeral tables)
CH	Internal/Special Relay	Internal/Special Relay	OK (1 or 2 words for numeral tables)
TIM	Timer	Timer	1 word only
CNT	Counter	Counter	1 word only
HR	Holding Relay	---	OK (1 or 2 words for numeral tables)
AR	Auxiliary Relay	Auxiliary Relay	OK (∗)
LR	Link Relay	---	OK (1 or 2 words for numeral tables)

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Refer to *6-5 Changing Displayed Numerals and Character Strings* for information on saving numbers to allocated words.

Note   1. A bar graph cannot be used to display hexadecimal values. The display remains unchanged even if specified.

2. Setting a negative numeral whose most-significant digit is "F" to the allocated word of the graph "decimal, no sign" will make the graph display "0" and the percentage "***".

3. A graph cannot specify indirectly the memory table when the C200H I/F unit is used; even if specified in directly, it will be regarded as direct specification.

Reference

As to the NT610C/NT612G, specifying the reference memory table to the data values 0%, –100%, 100% will make it possible to change the values during the operation.Refer to the *NT612G Programmble Terminal Operation Manual,* and *the NT610C Programmble Terminal Operation Manual* for more details.

The sampling cycle of the trend graph can be set in 0.1 second, but the trend graph may not be updated every 0.1 second (100msec) depending on the number of lines or the amount of other display elements. The following table shows the number of lines and the time required for updating the graph when only the trend graph is displayed.
Refer to it to set the sampling cycle.

Number of Lines	Time Required to Update
5	100msec
20	100msec
30	300msec
40	700msec
50	800msec

6-8   Controlling the PT Status (Operating the PT Status Control Area)

Description

Write the control data to the PT Status Control bits in the PT Status Control Area allocated in PC memory to control the backlighting and buzzer.

Allocated start address: Word n (set with the Support Tool)

```
         15 14 13 12 11 10 9   8   7   6   5   4   3   2   1   0 Bit
Word   ┌──────────────────────────┬───┬───┬───┬───┬───┬───┬───┐
n+3    │     PT status control bit │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ 0 │ PT status control bits
       └──────────────────────────┴───┴───┴───┴───┴───┴───┴───┘
```

PT status control bits:

```
        15   14   13   12   11   10   9    8    7    Bit
      ┌────┬────┬────┬────┬────┬────┬────┬────┬────┐
n+3CH │    │    │    │    │    │    │    │    │    │
      └────┴────┴────┴────┴────┴────┴────┴────┴────┘
```

Turn bits 6 to 0 OFF

Controlled item	1 (ON)	0 (OFF)
Screen display	ON	OFF
Alarm output	ON	OFF
Continuous buzzer	ON	OFF
Intermittent buzzer (short)	ON	OFF
Initialize display history	ON	OFF
Backlight color	Red	White
Intermittent buzzer (long)	ON	OFF
Backlight mode	Continuous light	Flash
Print screen	ON	OFF
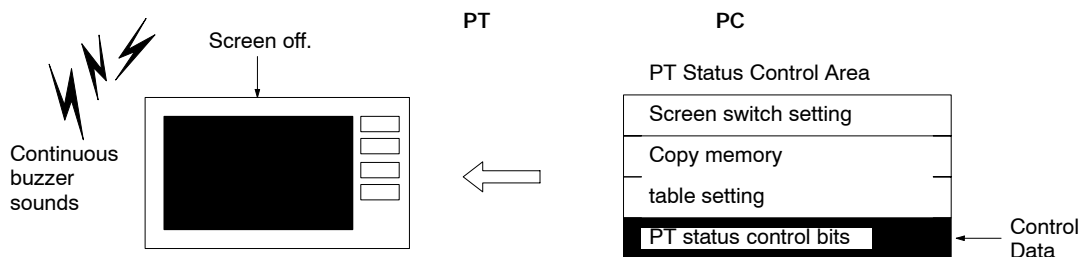
Note Bit 15 (Screen display) when used for a LCD (liquid-crystal display) backlighting turns on if the Screen Display bit is set to ON and turns off if the Screen Display bit is set to OFF.

Bit 10 (Backlight color) is valid for the NT20M/NT2000M.

Bit 8 (Backlight mode) is valid for the NT20M/NT2000M.

Bit 9 (intermittent long buzzer) is effective when the NT610C/NT612G is used.

Bit 7 (Print screen) is effective when the NT610C/NT612G is used.

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 is turned off with the LCD display version PT. To restore the last cleared screen display, set Bit 15 to 1 (ON) or press the system key or the touch switch of the PT, or the input terminal of the expanded I/O unit which has reset attribute. On the LCD display version PT, the bit acts to turn the backlight on and off.

Another method of restoring the screen is to display a screen using the Screen Switch setting bit.

Alarm Output (Bit 14)

The Alarm Output bit turns on and off the ALM OUTPUT terminals at the rear of the PT.

Alarm Output control with Bit 14 is enabled only when the alarm output is turned on with the PT memory switches.

Refer to the appropriate *PT Operation Manual* and the *NT-series Support Tool Operation Manual* for more details.

Continuous (Bit 13), Intermittent Short (Bit 12) and (Bit 9) Long intermittent (Bit 9) buzzer sounds

The continuous buzzer sounds continually without interruption.

The intermittent short buzzer sounds for 0.5 sec at 0.5 sec intervals.

The long intermittent buzzer sounds for 1.0 sec at 1.0-second intervals.

If than the three buzzers are set to 1 (ON), the priority among them is as follows.

    1. Continuous buzzer

    2. Short intermittent buzzer

    3. Long intermittent buzzer

Buzzer control with these bits is enabled only when the buzzer is turned on with the PT memory switches.

Refer to the appropriate *PT Operation Manual* and the *NT-series Support Tool Operation Manual* for more details.

Initialize Display History (Bit 11)

The Initialize Display History initializes the display history stored in the PT.

The display history is initialized when Bit 11 is set from 0 (OFF) to 1 (ON). Bit 11 reverts to 0 (OFF) after the display history is initialized.

Backlight Color (Bit 10) and Mode (Bit 8)

The NT20M/NT2000M allows backlighting to be controlled as follows using combinations of Bit 10 and Bit 8.

Bit		Backlight status when Bit 15 set 1 (ON)
10	8	
0	0	White flash (white on $ off)
0	1	White on
1	0	Red flash (Red on $ off)
1	1	Red on

When backlighting is turned OFF (Bit 15 is set to 0 (OFF)), the backlight color (red or white) and backlight mode (continuous or flashing) are invalid.

Print Screen (Bit 7)

The NT610C/NT612G can make a hard copy of the screen currently displayed with a printer connected to the PT.
Set Bit 7 from 0 (OFF) to 1 (ON) to print the screen currently displayed.
The printing cannot be canceled.
Make sure that Bit 7 (printing status) of the PT Status Notification area is set to 0 (OFF) before starting printing.

* Set "Print screen" to 0 (OFF) after the printing starts and Bit 7 of the PT Status Notification area is set to 1 (ON).

In addition to the PT Status Control Area, the PT status can be controlled by setting the screen attributes with the Support Tool, as follows:

Alarm: Alarm output ON

Buzzer attribute: Continuous, Intermittent, Off

Backcolor: White backlighting, Red backlighting

Backlighting: Backlighting On/Off

In addition, the display (or backlighting) is turned off if the PT is unused for a certain time if the PT memory switches are set to enable the burn-in prevention feature (EL display version) or the backlight control feature (LCD display version).

Refer to the appropriate *PT Operation Manual* and the *NT-series Support Tool Operation Manual* for more details.

* It is possible to set the touch switch as "print screen key" to execute screen printing. Refer to the user's manuals of each PT or operation manuals of support tools for more details.

Note The PT Status Control bits remain unchanged if the PT status is changed with the screen attributes or memory switches, so that the status of the PT Status Control bits do not match the actual PT status.

Example: The continuous buzzer may sound if the status of Continuous Buzzer bit 13 is 0 (OFF).

Restrictions

Allocated Words

The PT Status Control Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	OK (∗)
LR	Link Relay	---	OK

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1, 2, 3...   1. Use the Support Tool to allocate the PT Status Control Area to the PC memory.

2. Create a PC program to write the control status to the PT Status Control bits in the PT Status Control Area.

Note   1. The PT Status Control Area is not read immediately after the PT is booted up. The PT Status Control Area is read and control executed when the control status is changed.

2. A change of any bit from 0 to 15 is followed by all necessary control operations according to the contents of bits from 7 to 15. Be sure to set all bits correctly even if one status control is necessary.

Application Example

This example controls the PT status to use the PT as a warning lamp and of printing the screen.

Example of the PT used as an alarm lamp

Allocation   Allocate the memory as follows using the Support Tool:

PT Status Control Area: 0100

Screens   Not required.

PC Program   Create a PC ladder program, as follows:

```
   09002        09003
     ┤╱├          ┤├ ─────────────────────┬──────────────┐                          (1)
                                           │  @MOV (21)   │
                                           ├──────────────┤
                                           │        #A000 │  Screen display, Continuous buzzer
                                           ├──────────────┤
                                           │          103 │  PT Status Control word
   09003
     ┤╱├ ─────────────────────────────────┬──────────────┐                          (2)
                                           │  @MOV (21)   │
                                           ├──────────────┤
                                           │        #9000 │  Screen display, Intermittent buzzer
                                           ├──────────────┤
                                           │          103 │  PT Status Control word
   09002        09003
     ┤├          ┤├ ─────────────────────┬──────────────┐                          (3)
                                           │  @ANDW (34)  │
                                           ├──────────────┤
                                           │          103 │  PT Status Control word
                                           ├──────────────┤
                                           │        #CFFF │  Continuous buzzer, Intermittent buzzer is 0
                                           ├──────────────┤
                                           │          103 │  PT Status Control word
```
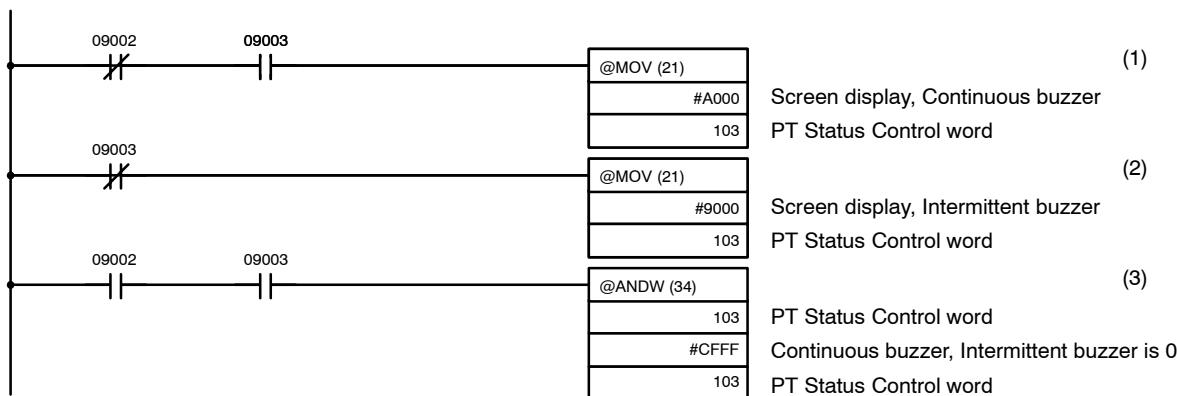
Operation   PT operation when the program is run is described below.

1, 2, 3...   1. PT Status Control bits are set as shown below when bit 09002 turns OFF. This command block not executed when bit 09003 is OFF.

Screen display (Bit 15): 1 (ON)

Continuous buzzer (Bit 13): 1 (ON)

The PT continuous buzzer sounds.

2. PT Status Control bits are set as shown below when bit 09003 turns OFF.

Screen display (Bit 15): 1 (ON)

Intermittent buzzer (Bit 12): 1 (ON)

The PT intermittent buzzer sounds.

3. PT Status Control bits are set as shown below when both bits 09002 and 09003 turn ON.

Continuous buzzer (Bit 13): 0 (OFF)

Intermittent buzzer (Bit 12): 0 (OFF)

The PT buzzer stops.

Example of printing the screen

Allocation   Allocate the memory as follows using the Support Tool:

PT Status Control Area: CH0100

PT Status Notification Area: CH0110

Screens   Not required.

PC Program   Create a PC ladder program, as follows:
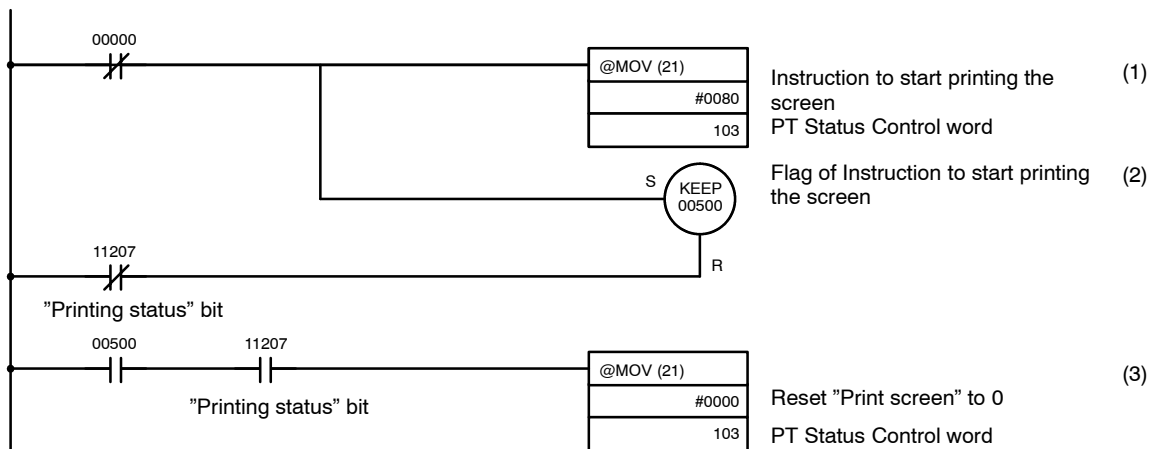
Operation   The PT will operate as follows by executing the program after the screen of which a hard copy is required is displayed.

1, 2, 3...   1. It controls "Print screen" of the PT status control bit and instructs to start printing as soon as bit 00000 is set to "ON".

2. It makes internal auxiliary relay 00500 to confirm that a start printing instruction is issued.
   00500 returns to "OFF" after the "printing status" bit of the PT Status Notification area is set to "ON".

3. It resets the "Print screen" bit to "OFF" when the "Printing status" bit is set to "ON" after the instruction to start printing.

6-9   Turning Lamps and Touch Switches On and Off (Operating Allocated Bits)

Description

By setting the lamp, touch-switch, and expanded I/O unit output terminal control bits (lamp bits) allocated to the PC memory to ON(1) or OFF(0), the lamps or

touch switches can come on (flash) or go off, or the expanded I/O unit output terminal can be turned ON and OFF.
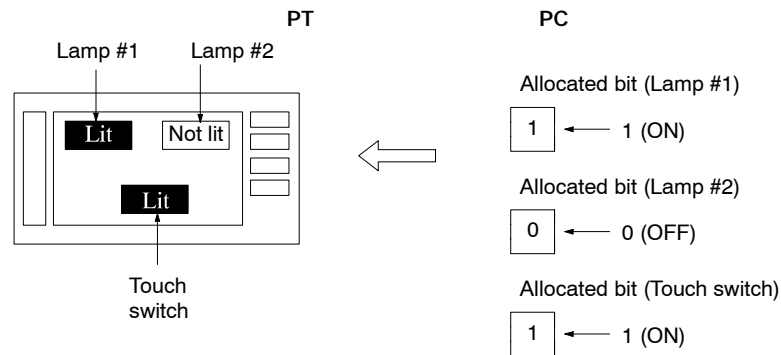
Allocate the control bits with the Support Tool. The control bits control the status of lamps and touch switches as follows:

0 (OFF): Not lit

1 (ON): Lit or flashing

The lamp and touch switch display attributes are set with the Support Tool to determine if the lamp or touch switch lights continuously or flashes. Refer to the *NT-series Support Tool Operation Manual* for details.

Restrictions

Allocated Bits

The lamp, touch-switch and the expanded I/O unit output terminal control bits (lamp bits) can be allocated to the areas listed in the following table.

Symbol	C-serles	CVM1/CV-series PC	Allocation OK?
DM	Data Area	Data Area	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	OK
LR	Link Relay	---	OK

Note The Auxiliary Relay area of the CVM1/CV series PC is for limited use of the system and cannot be used for any other purpose.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1, 2, 3...   1. Use the Support Tool to allocate the lamp, touch switch and output terminal Control Bits (lamp bits) to the PC memory. Use the display attributes to set if each lamp and touch switch flashes or lights continuously.

2. Create a PC program to set the allocated control bits (lamp bits) to ON (1) and OFF (0) so as to allow the lamps or touch switches to come on (flash) or go off,or the output terminal to be switched ON and OFF.

Reference

To the touch switches, the notify bits can be allocated in addition to the control bits (lamp bits).
The notify bits are the bits to notify the PC whether a touch switch is pressed or

not.

Refer to Section 6-15 Determining Touch Switch Status or expanded I/O unit input terminal status (P.) for details.

Turning the lamp "on" is the same as reverse display.

As to the NT610C/NT612G, a lamp displaying any image or library data can be set to each lamp status (on, off, or on and off).

Refer to the NT612G Programmable Termind Operation Manual and the NT610C Programmable Terminal Operation Manual for more details.

Application Example

This example controls the bits to move a robot arm and turning the lamps on and off.

Allocation

Allocate the memory as follows using the Support Tool:

Lamp #0: 00200 (output bit to raise robot arm)

Lamp #1: 00201 (output bit to lower robot arm)

Lamp #2: 00202 (output bit to rotate robot arm counterclockwise)

Lamp #3: 00203 (output bit to rotate robot arm clockwise)

Lamp #4: 00204 (output bit to clamp rotate robot arm)

Lamp #5: 00205 (output bit to unclamp rotate robot arm)

Screens

Create a screen as shown below to display Lamps #0 to #5 with the Support Tool and transfer it to the PT. Set the display attribute to "Light".
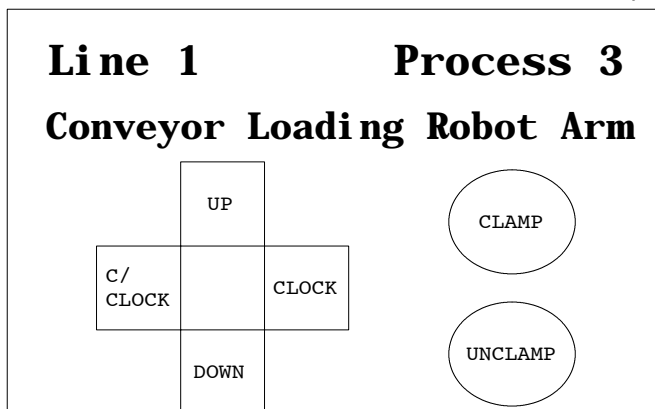
Raise: Lamp#0
Lower: Lamp#1
Counterclockwise:Lamp#2
Clockwise: Lamp#3
Clamp: Lamp#4
Unclamp: Lamp#5

PC Program

No PC ladder program is required to control the PT. Only a program to control the robot arm movement is required.

Operation

When the ladder program is executed to control the robot arm, the PT lamps turn on and off in synchronization with the arm movement.

For example, Lamp#0 lights when the robot arm ascends and goes out when it stops ascending.

Example:
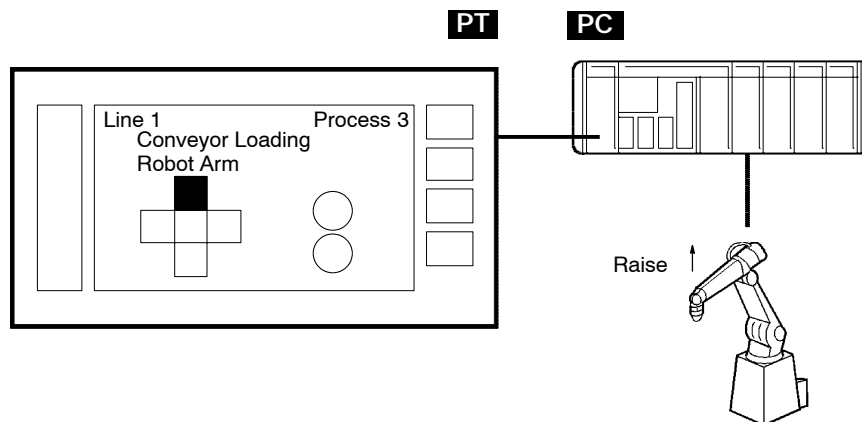
6-10 Displaying the Alarm List (Operating the Allocated Bits of the Bit Memory)

Description

As to the NT610C/NT612G, according to the status of an allocated bit of the bit memory table, the contents of the character-string memory table (alarm message) correspondent to the bit is automatically displayed and cleared. This function is called "Alarm List Function".

The image library can correspond to the bit separately from the alarm message, as can be used as guidance.

The alarm message and image library correspondent to bit memory table 10
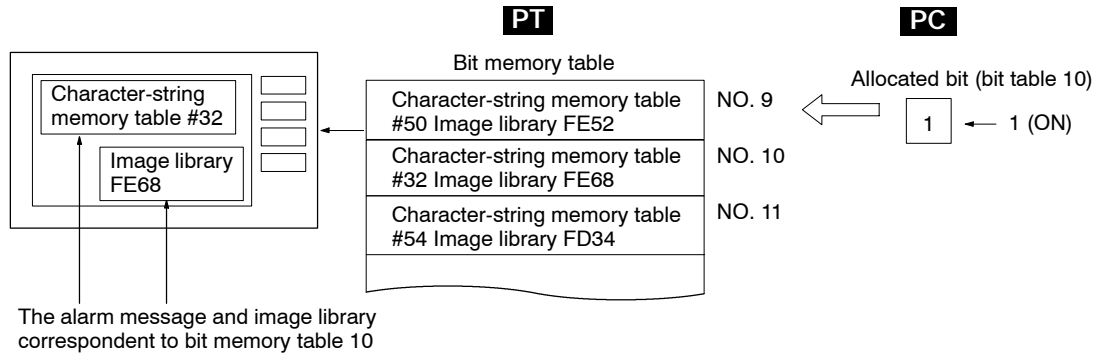
Set an allocated bit of the bit memory table and the alarm message and image library displayed when the bit memory table is turned on with support tools.

The content (alarm message) of the corresponding character-string memory table is displayed when the allocated bit is set to 1 (ON), or cleared when set to 0 (OFF).

The bit memory table has the "alarm list function", which always reads the status of the allocated bit and records when and how many times it is set to 1 (ON). Creating an alarm list display section enables confirmation of the alarm list during operation. It can be displayed in order of occurrence or frequency.

Refer to *the NT612G Programmable Terminal Operation Manual* and *the NT610C Programmable Terminal Operation Manual* for more details.

Restrictions

Allocated Bits

The bit memory table can be allocated to the following areas.

Symbol	C-series PC	CV/CVM1-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	OK
LR	Link Relay	---	OK

Note The Auxiliary Relay area of the CVM1/CV series PC is for limited use of the system and cannot be used for any other purpose.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1. Make the following settings of the bit memory table with a support tool.

   Alarm list function

   Character-string memory table number containing alarm messages

   Image library to be displayed

   PC area to which a bit will be allocated

   (Screen number to be displayed)

2. Create a screen to display alarm messages with a support tool.

Since alarm messages are automatically displayed when a certain bit is set to ON, there is no need to create a PC program.

Application Example

This example shows a PC program to display an alarm screen in response to the bit which is set to "ON" when the water temperature of a tank exceeds the upper limit.

Allocation

Allocate the memory as follows using the Support Tool:

Bit memory table #20: CH 01512

Bit memory table #21: CH 00407

Bit memory table #22: AR 0000

Bit memory table #23: LR 1003

Bit memory table #24: LR 1004

At the same time, set the character-string memory table number containing alarm messages, the image library to be displayed, etc..

Screens

Create an alarm screen as shown below and send it to the PT.

Alarm list   Image library display area
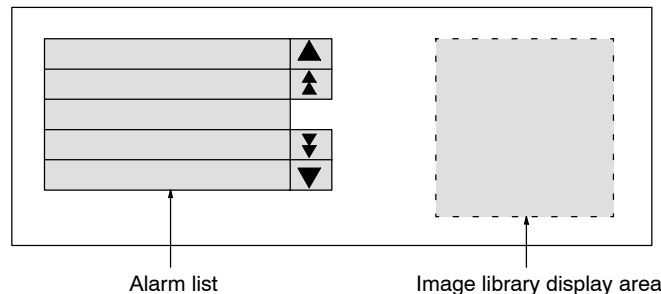
PC Program

No PC ladder program is required to control the PT.

Operation   The operation with the created screen will be as follows according to the status
of the allocated bits.

When all allocated bits are OFF

	▲
	⬆
	⬇
	▼
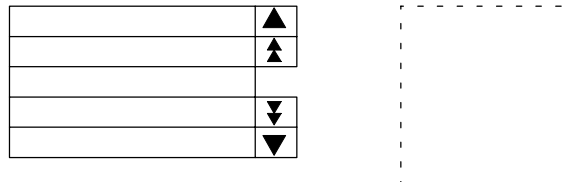
When bit AR0000 is ON

Content of the character-string memory table correspondent
to bit memory table #22

Water tank overheated.	▲
	⬆
	⬇
	▼
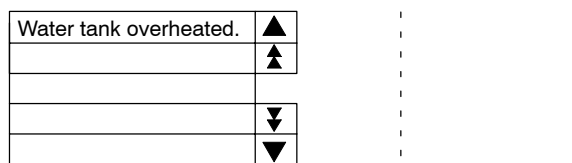
When bit 00407 is ON

Content of the character-string memory table correspondent
to bit memory table #21

Process 3 stops.	▲
Water tank overheated.	⬆
	⬇
	▼
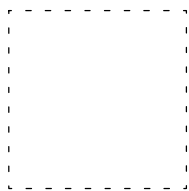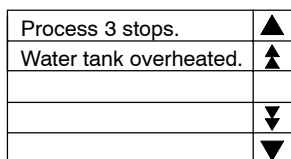
If an alarm message display area (alarm list)
with more than one columns has been
created, alarm messages will be displayed in
ascending order of bit memory table number.
If the bit memory numbers of the alarm mes-
sages are set in order of priority, alarm mes-
sages will be displayed according to their
priority.

When the second alarm message is pressed

The image library correspondent to
the second alarm message

Process 3 stops.	▲
Water tank overheated.	⬆
	⬇
	▼

Urgent

Check the
thermostat.
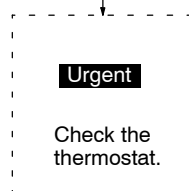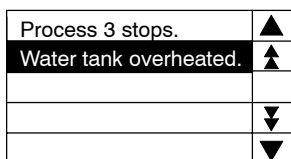
The alarm list is a touch switch.
Press the touch switch of the dis-
played alarm message to display
the corresponding image library.
The selected alarm message will be
inverted.
It is possible to correspond the
screen number to the bit memory
table.
Press the second alarm message
again to display the corresponding
screen.

When bit 00407 returns to OFF

Water tank overheated.	▲
	⬆
	⬇
	▼
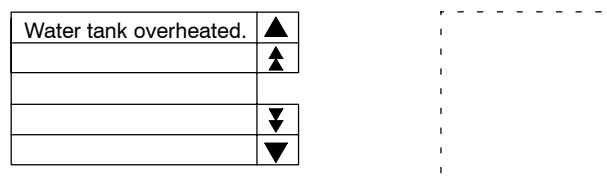
6-11 Determining the Screen Displayed on the PT (Reading from the PT Status Notification Area)

Description

The screen displayed on the PT can be determined by reading the Currently Displayed Screen from the the PT Status Notify Area allocated in the PC memory. When the screen is switched, the PT Status Notify Area is notified as follows:

Switch notification: PT Status Display Switch Flag

New Screen number: Currently Displayed Screen
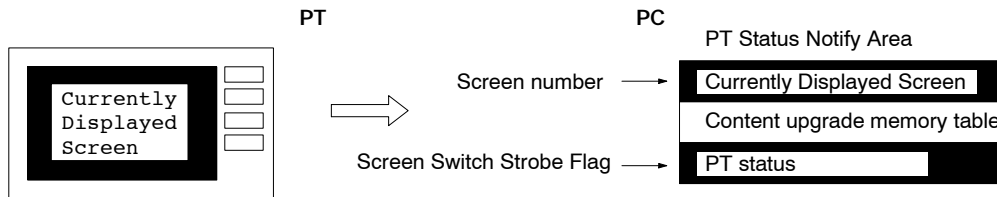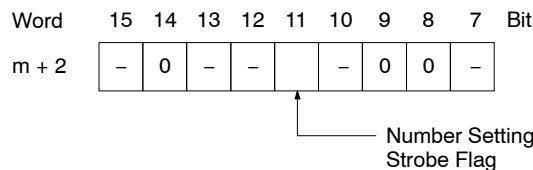

Allocated start address: Word n (set with the Support Tool)
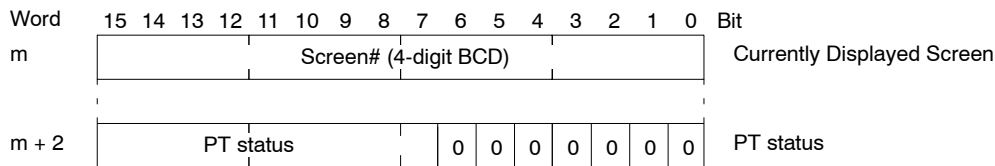
Screen#: 0000 to 0250 (NT20M/NT2000M)
        0000 to 1000 (NT600M)
        0000 to 2000 (NT610C/NT612G)

Screen Switch Strobe Flag

Restrictions

Allocated Words

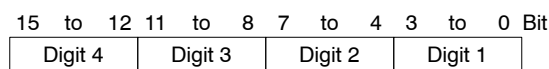The PT Status Notify Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	C-series PC OK CVM1/CV-series PC NG (∗)
LR	Link Relay	---	OK

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1, 2, 3...   1. Use the Support Tool to allocate the PT Status Notify Area to the PC memory.

2. Create a PC program to read the Currently Displayed Screen from PT Status Notify Area.
The screen# is handled as a 4-digit BCD (binary coded decimal) value.

Reference

The Currently Displayed Screen is upgraded when the screen is switched with the PT's stand-alone function, and bit memory table. Refer to the Stand-alone functions for the bit memory table (screen switch function) in the PT User's Manuals for details.

The PT Status Display Switch bit turns ON (1) in the PT Status Control Area when the screen display switches. It reverts to OFF (0) when the PC is notified of the screen switch. The current screen# can be read by reading the Currently Displayed Screen when the PT Status Display Switch bit turns ON (1).

The number of the parent screen is notified if continuous screens or superimposed screens are displayed.

Application Example

This example reads the screen# each time the PT screen display switches.

Allocation

Allocate the memory as follows using the Support Tool:

PT Status Notify Area: 0110

Screens

Create several screens which can be switched with the Support Tool and transfer them to the PT.

PC Program

Create a PC ladder program, as follows:

```
        11212
         ┤├──────────────┬──────┌──────────────┐                        (1)
                         │      │  @MOV (21)   │
     Screen Switch       │      ├──────────────┤
     Strobe Flag         │      │   DM0100     │
                         │      ├──────────────┤
                         │      │   DM0101     │ Word storing the previously displayed screen number.
                         │      └──────────────┘
                         │      ┌──────────────┐                        (2)
                         └──────│  @MOV (21)   │
                                ├──────────────┤
                                │     110      │ Word to notify the currently display screen number.
                                ├──────────────┤
                                │   DM0100     │ Word storing the currently displayed screen number.
                                └──────────────┘
```
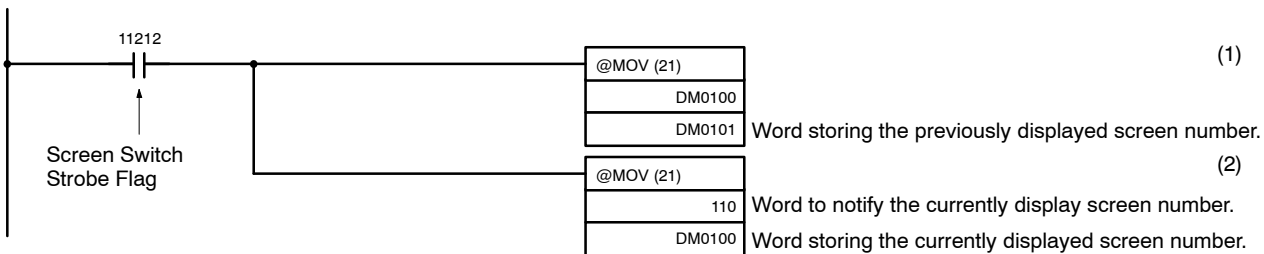
Operation

PT operation when the program is run is described below.

1, 2, 3...   1. When the PT screen display switches and the Screen Switch Strobe Flag (Bit: 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 PT is read and transferred to DM0100. The number of the currently displayed screen is stored in word 0101.

6-12   Determining a Number Input to the PT

Description

The PT can be used as a numeric keypad or a thumb wheel switch to write numbers to a numeral table. Only the NT610C/NT612G have the sum rotary key function. When a number is written to a numeral table with this so-called "number setting function" an area allocated in PC memory is notified as follows:

Upgrade notify: PT Status Number Setting Strobe Flag

Upgraded table entry number: Upgraded memory table

Upgrade details: numeral table allocated word
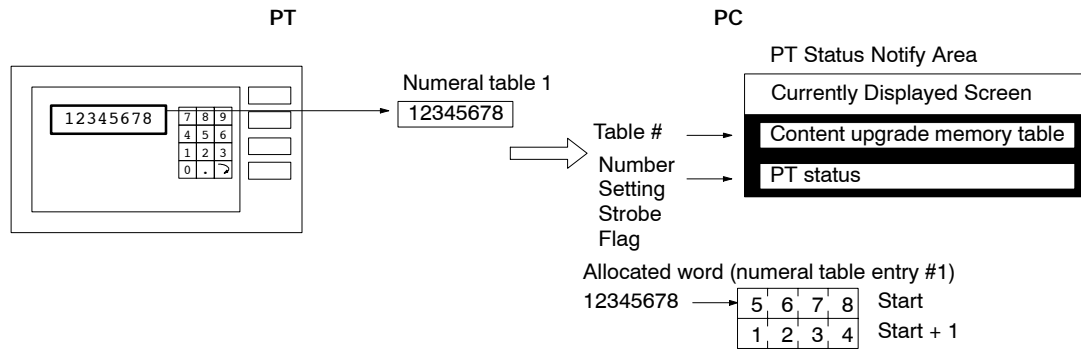
Allocated start address: Word n (set with the Support Tool)
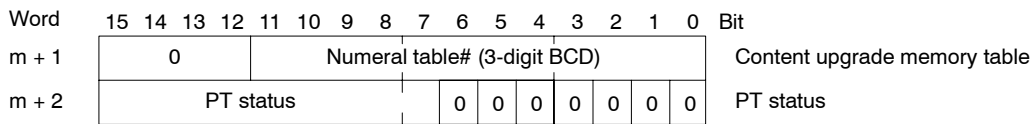
Numeral table#:   000 to 127 (NT20M/NT2000M)
                  000 to 511 (NT600M)
                  000 to 999* (NT610C/NT612G)

*512 to 999 may not be available depending on the setting of the system memory.

Number Setting Strobe Flag

Restrictions

Allocated Words

The PT Status Notify Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	C-series PC OK CVM1/CV-series PC NG (∗)
LR	Link Relay	---	OK

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Contents and Display of Allocated Words

Numbers are stored in the allocated words as shown below.

Stored as a single word

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 to 12	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 to 12	11 to 8	7 to 4	3 to 0 Bit
Start	5	6	7	8
Start + 1	1	2	3	4

Note The order in which the numbers are stored in the allocated words depends on the original specification of the Host Interface Unit NT20M-SMR01-E, NT20M-SMR02-E, NT600M-SMR02-E, NT600M-SMR02-E, or NT610G-SMR01-E. Refer to *5-4 Modifying Programs for Conversion*.

Numbers can be handled in the following three different ways:

Hexadecimal: All digits are handled as contents of the allocated words negative numbers (cannot be displayed). As to the NT20M/NT2000M/NT600M, however, cannot be input with the number setting function.

Decimal, no sign: Stored as entered.

Decimal, with sign: For a negative number, an "F" is stored as the most-significant digit, all other digits stored as entered. A positive number is stored as entered.

Examples:

	Word				
	Start	3	4	5	6
123456 →	Start + 1	0	0	1	2

	Start	3	4	5	6
−123456 →	Start + 1	F	0	1	2

Note 1. If a negative values is written when the value is handled as a decimal display with sign, an "F" as the most-significant digit represents the minus sign. Consequently, the number of digits in a negative number is one less than for a positive number. As to the thumb wheel switch positive numbers will also be represented as numbers of up to seven digits.

2. All numbers are stored as integers. If a decimal point is input, the position of the decimal point is determined by the display method setting. The input number cannot therefore be determined from the contents of the memory word.

3. As to the thumb wheel switch, whenever the touch switch "+" or "−" is pressed, the information is notified to the PC.

Procedure

1, 2, 3... 1. Use the Support Tool to allocate the PT Status Notify Area to the PC memory.

2. Use the Support Tool to create a number setting screen and allocate a numeral table to the PC memory area.

3. Create a PC program to read the PT content upgrade memory table when the PT Status Number Setting Strobe Flag in the PT Status Notify Area turns ON 1. The contents of the PT content upgrade memory table are handled as 3-digit BCD (binary coded decimal) values.

4. Read the words allocated to the numeral table allocated at step 3.

Important Points

The Number Setting Strobe Flag turns OFF (0) when the PC has been notified. Therefore, always read the PT content upgrade memory table when this flag turns ON (1).

Numbers input to the PT are stored in the words allocated to the numeral table as BCD (binary coded decimal) values. The most-significant digit is treated differently for positive and negative values. Consider these restrictions when creating the PC program to read the contents of the allocated words.

Application Example

This example reads the contents of the numeral table input from the PT

Allocation

Allocate the memory as follows using the Support Tool:

PT Status Notify Area: 0110

Numeral table entry number 3: 0003 (words: 1)

Numeral table entry number 4: 0004 (words: 1)

Screens

Create a number setting screen with the Support Tool to input values into memory tables numbers 3 and 4 and transfer it to the PT. Numbers should be input as 4 digits.

Numeral table entry number 3 (4-digit input)

```
Line 1
      Qty.        800  units

Defect limit      30  units

1  2  3  4  5  6  7  8  9  0  CLR  +/-
```

Numeral table entry number 4 (4-digit input)

PC Program

Create a PC ladder program, as follows:

```
        11211                                              (1)
  ──────┤↑├──────────────────────────┌──────────────┐
                                      │ @MOV (21)    │
                                      ├──────────────┤
                                      │          111 │  Content upgrade memory table notification word
                                      ├──────────────┤
                                      │       DM0105 │  Word to store the numeral table entry number.
                                      └──────────────┘
  Number Setting
  Strobe Flag
```
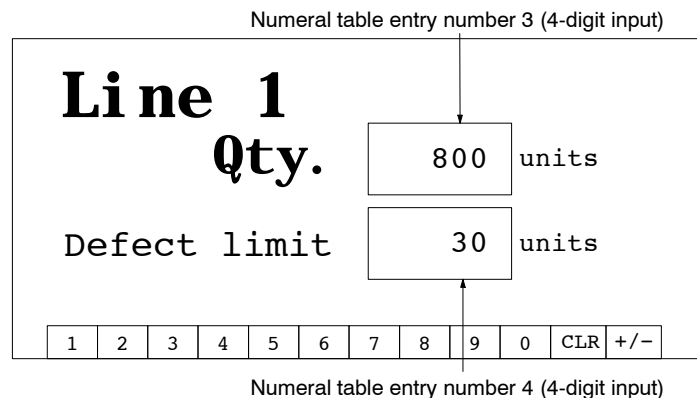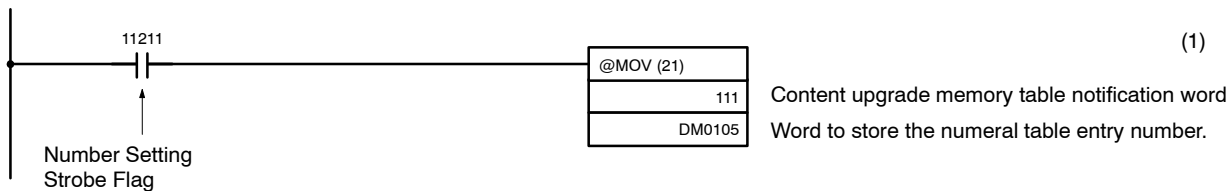
Operation

PT operation when the number setting screen is displayed and the program is run as described below.

When the Number Setting Strobe Flag (Bit: 11211) turns ON (1) the contents of word 111 are transferred to 0105. The number of the numeral table with upgraded contents is stored in word 0105.

The value input to the numeral table is stored in the word allocated to the numeral table. Numeral table entry number 3 is allocated to word 0003 and numeral table entry number 4 is allocated to word 0004.

6-13 How to Identify the Character-String Input Stored in the PT

Description

The NT610C/NT612G has the "character–string setting function", which makes it possible to write a character-string registered with a touch switch to the character-string memory table by pressing the touch switch.

A character-string written to the character-string memory table by the character-string setting function will be notified to the allocated area of the PC, as shown below.

Upgrade notification　　　: "String setting strobe" of the "PT status"

Upgraded table number: "Upgraded content memory table"

Upgraded contents　　　: Allocated word of the character-string memory table
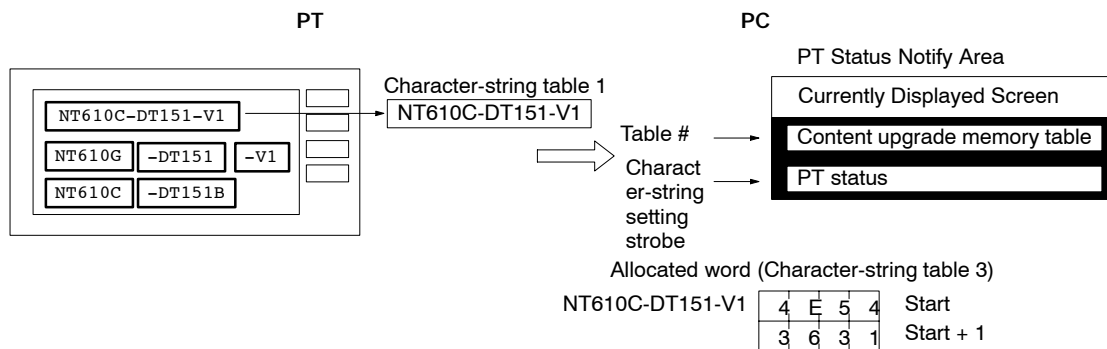
Allocated start adress: mCH (set with the Support Tool)

Word	15 14 13 12	11 10 9 8 7 6 5 4 3 2 1 0	Bit	
m + 1CH	0	Character-string table# (3-digit BCD)		Content upgrade memory table number
m + 2CH	PT status	0 0 0 0 0 0 0		PT status

Character-string memory table #: 000 to 999* (NT610C/NT612G)

> * 256 to 999 may not be available depending on the system memory setting of support tools.

Character-string setting strobe:

Restrictions

Allocated Words　　　　The PT Status Notify Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	C-series PC OK CVM1/CV-series PC NG (∗)
LR	Link Relay	---	OK

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Contents and Display of Allocated Words

Character strings are stored in sequential words from the start address as Special English 8-bit code (normal characters). Two normal characters allocated to each word of memory. A maximum of 20 words (40 caracters) can be allocated in the NT600M/NT612G/NT610C, or 16 words (32 characters) in the NT20M/NT2000M.

Start CH		Start + 1 CH		- - - - - - - -	Start + 19CH	
Code 1	Code 2	Code 3	Code 4		Code 39	Code 40

Example

"ABCD" ⟶ "A"=41H "B"=42H Start CH | 4 | 1 | 4 | 2 |
          "C"=43H "D"=44H Start+1CH | 4 | 3 | 4 | 4 |
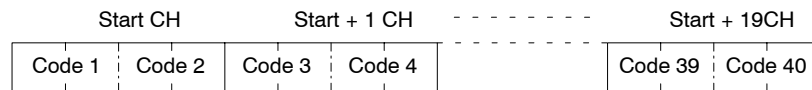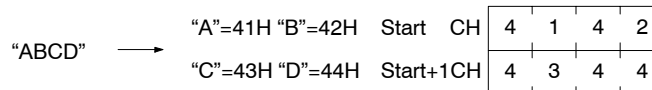
Procedure

1, 2, 3...   1. Use the Support Tool to allocate the PT Status Notify Area to the PC memory.

2. Create a "character-string setting" screen to display alarm messages with a support tool, and allocate the character-string memory table to the area of the PC.

3. Create a PC program so as to read the upgraded content memory table of the PT status notification area when the character-string setting strobe of the PT status notification area is set to 1 (ON).
   The contents of the upgraded content memory table is written in the three digits BCD (Binary Coded Decimal).

4. Read the allocated word of the character-string memory table which has been read in step 3.

Important Points

The character-string setting strobe is set to 0 (OFF) when notified to the PC. Read the memory table with upgraded contents at the leading edge (0 !   1) of the character-string strobe signal.

Application Example

This example shows a PC program to read the character-string memory table number which contains the character-string entered by the PT.

Allocation

Allocate the memory as follows using the Support Tool:

PT Status Notify Area: 0110

Character-string memory table #2: 0120 (words: 10)

Character-string memory table #3: 0130 (words: 10)

Screens

Create a character-string setting screen to write character-strings to character-string memory tables #2 and #3 as shown below, and send it to the PT.

| From | Yokohama | ← Character-string memory table #2 |
| To | Tokyo | ← Character-string memory table #3 |

| Yokohama | Tokyo | Osaka |
| Kyoto | Hiroshima | Nagoya |

Touch switch

PC Program

Create a PC ladder program, as follows:

```
   11210
────┤├────────────────────────────────────────┌──────────────┐                    (1)
                                               │  @MOV (21)   │
                                               ├──────────────┤
     ↑                                         │     111      │  Contents upgrade memory table notification word
Character-string                               ├──────────────┤
setting strobe                                 │   DM0106     │  Word for storing character-string memory table #
                                               └──────────────┘
```
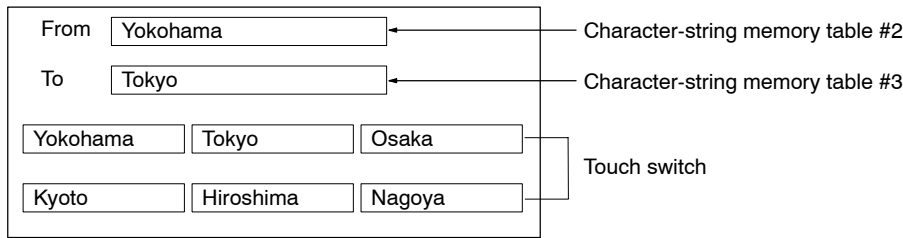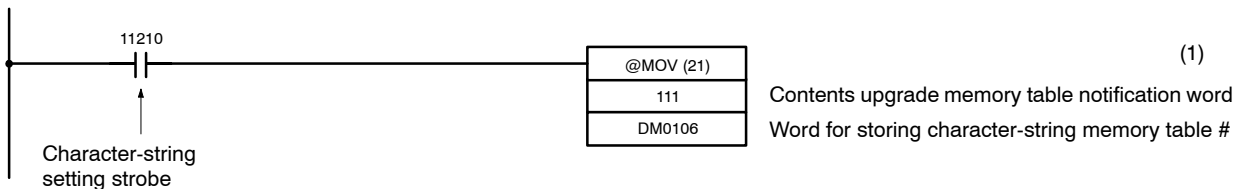
Operation

The operation will be as follows when the created character-string setting screen is displayed on the PT and the program is executed:

1, 2, 3...   1. The contents of word 111 is sent to DM0106 after the character-string setting strobe (bit 11210) is set to ON.
The upgraded character-string memory table number will be written to DM0106.

The character-strings entered to the character-string memory table are stored in the word to which the character-string memory table is allocated.
Character-string memory table #2 is stored in DM0120 to 0129, #3 in DM0130 to 0139.

6-14   Determining PT Operating Status

Description

The PT operating status and the battery level can be determined by reading the PT Status word in the PT Status Notify Area allocated to the PC memory.
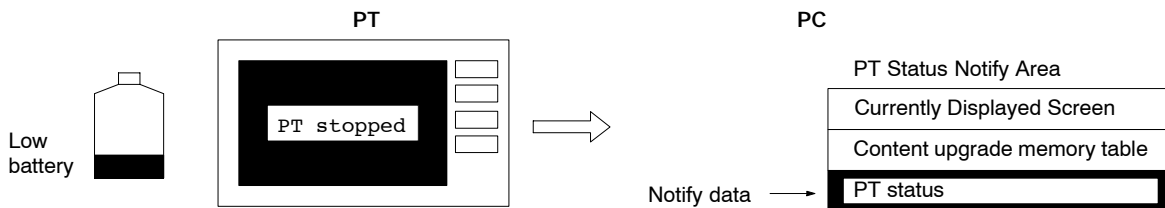
PT

PT stopped

Low battery

PC

PT Status Notify Area

| Currently Displayed Screen |
| Content upgrade memory table |
| PT status |

Notify data →

Allocated start address: Word n (set with the Support Tool)

Word	15 14 13 12 11 10 9 8	7	6	5	4	3	2	1	0	Bit
m + 2	PT status notify bit		0	0	0	0	0	0	0	PT status

PT Status Notify Bits:

Word	15	14	13	12	11	10	9	8	7	Bit
m + 2		0					0	0		

Bit	Notified item	1 (ON)	0 (OFF)
15	PT operating status	Run	Stop
13	Battery	Low	Normal
7	Printing Status	Printing	Stop

Bit 12: Screen Switch Strobe Flag
Bit 11: Number Setting Strobe Flag
Bit 10: Character-string Setting Strobe

Note Bit 10 (Character-String Setting Strobe Flag) is effective when the NT610C/NT612G is used.
Bit 7 (Printing Status) is effective when the NT610C/NT612G is used.

PT Operating Status (Bit 15) This bit is ON (1) when the PT is in Run mode. It is OFF when the PT is not in Run mode and while the System Menu is displayed. Reading and writing the allocated bits and words is disabled when this bit is OFF (0).

Battery (Bit 13) This bit turns ON (1) when the PT internal memory back-up battery is low.

Screen Switch Strobe Flag (Bit 12) This bit turns ON (1) when the PT screen display switches due to an instruction from the PC, due to the stand-alone functions or due to the operation of the allocated bits of the bit memory table. It reverts to OFF (0) when the PC is notified of the screen switch. Refer to *6-11 Determining the Screen Displayed on the PT* for more details.

Number Setting Strobe Flag (Bit 11) This bit turns ON (1) when a value is written to a numeral table by the PT number setting function. It reverts to OFF (0) when the PC is notified of the number input. Refer to *6-12 Determining a Number Input to the PT* for more details.

Character-String Setting Strobe Flag (Bit 10) This bit turns ON (1) when a character-string is written to the character-string memory table by the character-string setting function of the NT610C/612G.
It returns to OFF (0) when the PC is notified of the input.
Refer to *Section 6-13 How to Identify the Character-String Input Stored in the PT* for details.

Printing Status (Bit 7) This bit turns ON (1) during the printing operation with the printer connected to the PT after the PC issues an instruction or the touch switch (print screen key) is pressed. It returns to OFF (0) when the printing is completed. However, when the PT displays the system menu or an abnormal screen, it returns to OFF (0). Refer to *Section 6-8 Controlling the PT Status* for details.

Restrictions

Allocated Words The PT Status Notify Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	C-series PC OK CVM1/CV-series PC NG (∗)
LR	Link Relay	---	OK

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

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## Procedure

1, 2, 3...　　1. Use the Support Tool to allocate the PT Status Notify Area to the PC memory.

2. Write a PC program to read the PT Status word from the PT Status Notify Area and check the status of the bits described above.

Important Points

All screen data and other data in the PT is lost when the PT battery becomes flat. Replace the battery with a new one as soon as possible after a low battery voltage is detected.

Refer to the appropriate *PT Operation Manual* for details of the battery replacement procedure.

Application Example

This example reads the PT operation status then sounds the buzzer and outputs an alarm if the battery voltage is low.

Allocation　　Allocate the memory as follows using the Support Tool:

PT Status Control Area: 100

PT Status Notify Area: 110

Screens　　Not required.

PC Program　　Create a PC ladder program, as follows:

@ORW(35)		(1)
103	PT status control word	
#6000	Sets the alarm output and continuous buzzer to 1	
103	PT status control word	

11213 — Low battery alarm bit
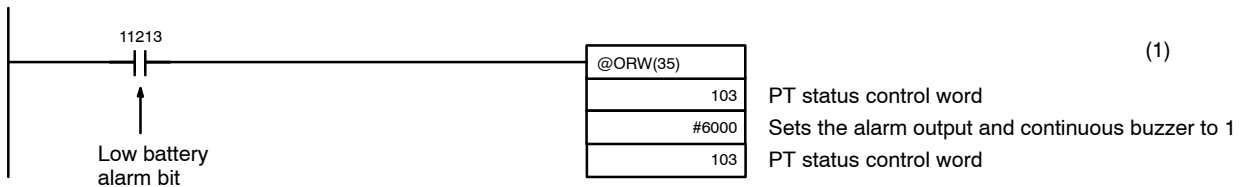
Operation　　PT operation when the program is run is described below.

If the low-battery notify bit (11213) is ON the following bits in the PT Status Control Area are controlled:

Alarm output (bit 14): 1 (ON)

Continuous buzzer (bit 13): ON

The PT continuous buzzer sounds and the alarm output turns ON.

Refer to *6-8 Controlling the PT Status*.

6-15 Determining Touch Switch or Expanded I/O Unit Input Terminal Status

Description

A touch switch status (pressed or not) can be determined by checking the ON/OFF status of the notify bit allocated in the PC to the touch switch or expanded I/O unit input terminal status.

PT　　　　　　　　　　　　PC

Touch switch 1

Allocated notify bit
(touch switch 1)
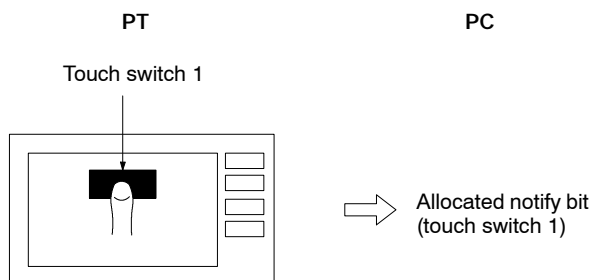
Allocate the notify bits with the Support Tool.

The status of the bit reflects the touch switch status, as follows:

Momentary: 0 (OFF): not pressed
            1 (ON): pressed
Alternate: The allocated notify bit is set from 0 to 1 (ON) or from 1 to 0 (OFF).
Set: The allocated notify bit is compulsorily set to 1 (ON).
Reset: The allocated notify bit is compulsorily set to 0 (OFF).

Restrictions

Allocated Bits

The PT Status Notify Area can be allocated to the areas listed in the following table.

Symbol	C-series PC	CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	OK
LR	Link Relay	---	OK

Note The Auxiliary Relay area of the CVM1/CV series PC is for limited use of the system and cannot be used for any other purpose.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

1, 2, 3... 1. Set the area of the PC to allocate notify bits of a touch switch and an input terminal with a support tool.
2. Create a PC program to read and check the allocated notify bits.

Important Points

All bits of the DM area, including the allocated notify bits of a touch switch and an input terminal, as well as those not allocated, are set to 0 (OFF).
The words of this DM area cannot be used except for allocating touch switches or input terminals.
As to words other than those of the DM area, only the notify bits will be changed.
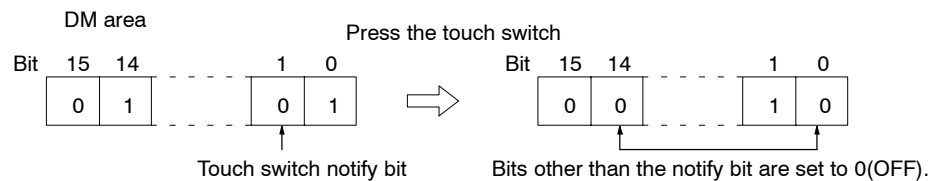
Be sure to allocate notify bits within the same screen to different bits.

As to the NT20M/NT2000M/NT600M used with the host link, the statuses of touch switches and expanded I/O units are notified in word units to the allocated notify bits.
Thus, the previously notified status ON may be set to OFF.

When changing the screen

The allocated notify bits are processed as follows when the screen is changed. All bits are set to OFF if the notify bits are set in general memory of the PC.

All bits remain unchanged if the notify bits are not set in general memory. However, if there is a touch switch set to momentary within the same word, all allocated notify bits are set to OFF.

When more than one notify bits are set within the same word

When more than one notify bits are set within the same word, and only when a touch switch set to the set is notified earlier, the previous bit status is set to OFF if other touch switches are notified later.

As to the NT20M/NT2000M/NT600M used with the host link, take the things above points into consideration, and check the statuses of the touch switches and the input terminals.

Reference

As to the NT20M/NT2000M/NT600M used with the host link, allocating notify bits of touch switches or input terminals to the word in general memory of the PT status notification area ensures faster processing.
Refer to *Section 5-3 PT Status Control and Notification by Allocated Bits and Words* for more details.

When the C200H is used, touch switches and input terminals are notified bit by bit. In the words to which notify bits are allocated, the bits not allocated are not influenced.

In direct connection, the display attribute "bit input" is invalid.
"Touch switch" is always set.

The following five functions in addition to the notifying touch switch status functions can be set to touch switches using the support tool.

  a) Switching screens (stand-alone function or screen switching function)

  b) Functioning as an input key when setting numeral/character-strings (numeral/character-strings setting function)

  c) Copying numerals/character-strings (copy setting function)

  d) Moving numerals/character-string setting areas (cursor moving function)

  e) Printing screens and interrupting printing (screen printing function)

Refer to the users' manual of each PT for details of these functions.

Application Example

This example uses the touch switches as normal switches for use as a PT operating panel.

Allocation

Allocate the touch switches as follows using the Support Tool:

Touch switch number 10: control bit (lamp bit)
                                        05000 (Run lamp)
                         notify bit   06000

Touch switch number 11: control bit (lamp bit)
                                        05001 (Stop lamp)
                         notify bit   06001

Set the touch switch function to Notify Bit.

Screens

Create a screen which displays touch switches numbers 10 and 11 as shown below and transfer it to the PT. Set the display attribute to "Light".

Touch switch #10

```
┌─────────────────────┐
│ Line 1              │
│           ┌──────┐  │
│           │ RUN  │  │
│           └──────┘  │
│           ┌──────┐  │
│           │ STOP │  │
│           └──────┘  │
└─────────────────────┘
```
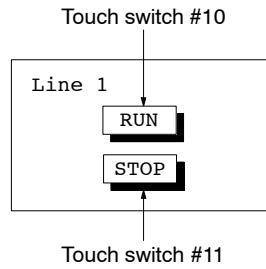
Touch switch #11

PC Program

Create the following ladder program.
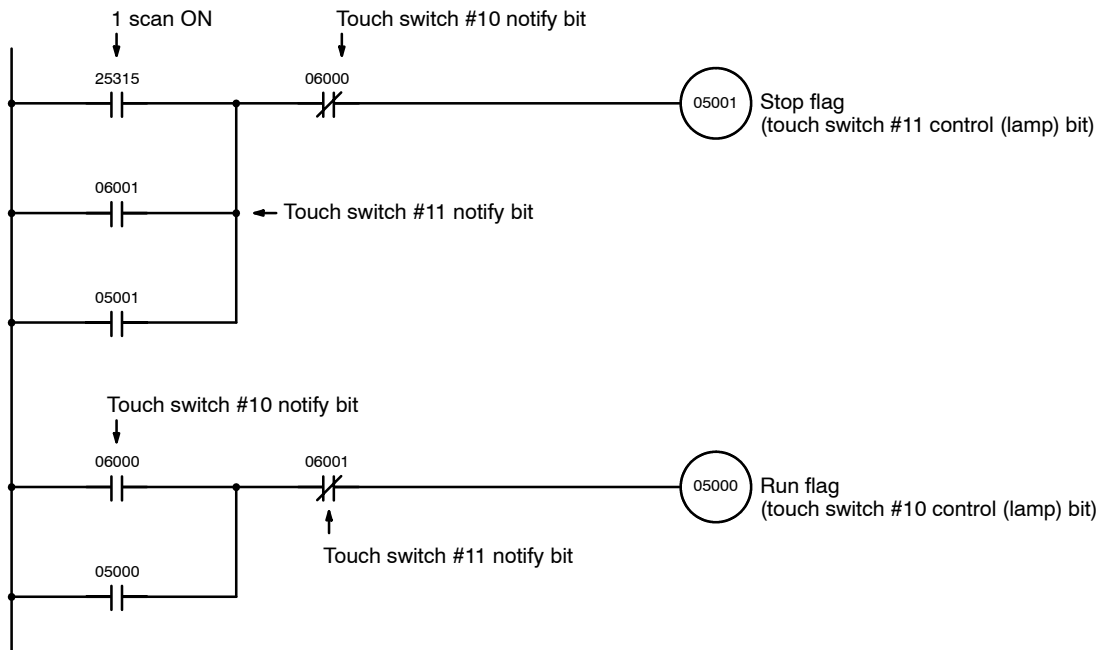
Operation

PT operation when the created screen is displayed and the program is run is described below.

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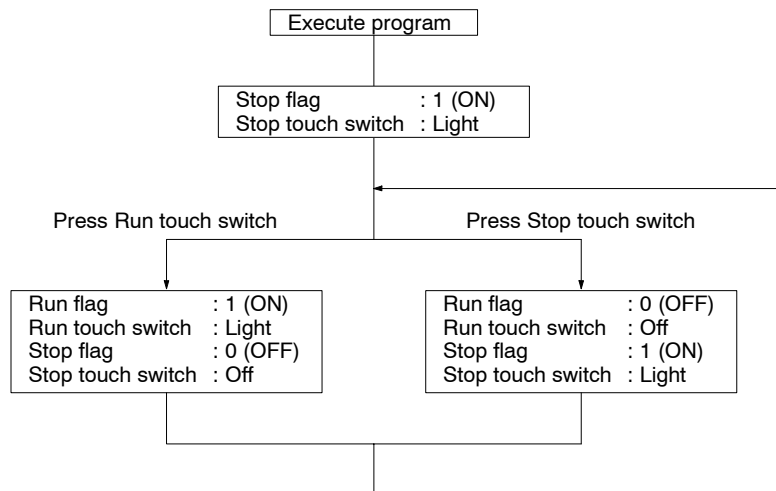
Refer to *6-9 Turning Lamps and Touch Switches On and Off* for the method of lighting and turning off touch switches.

6-16 How to Use the Clock Function

The NT610C/NT612G has the "clock function" to set and display date and time. This section describes how to set and display date and time and to notify date and time to the PC.

Clock Function

The clock function uses numeral memory tables #247 to 255 as the clock data tables.
#247 to 253 are for displaying and reading, and #254 and 255 are for time setting.
#247 to 253 store upgraded clock data in synchronization with the built-in clock of the PT.
It cannot be changed with the PC.

Function	Numeral memory table	Bit	Item	Value	Notes
For displaying and reading	247		Second	00 to 59	
	248		Minute	00 to 59	
	249		Hour	00 to 23	24-hour system
	250		Day	01 to 31	
	251		Month	01 to 12	
	252		Year	00 to 99	Last two numbers of year
	253		Day of the week	00 to 06	See below.
For setting	254	0 to 7 8 to 15 16 to 23 24 to 31	Second Minute Hour Day	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 the week Not used	01 to 12 00 to 99 00 to 06 always 00	Last two numbers of year See below

*Values correspond to days of the week, as shown in the table below.

Day of the week	Sunday	Monday	Tuesday	Wednes-day	Thurs-day	Friday	Satur-day
Value	00	01	02	03	04	05	06

Setting example: 14:53:30, Tuesday, April 27, 1993

254	27	14	53	30

255	00	02	93	04

6-16-1 Displaying Date and Time

To display the date or time, set an area to display contents of numeral memory tables #247 to 253 when creating a screen with a support tool.
Numeral memory tables #247 to 253 store upgraded clock data in synchronization with the built-in clock of the PT.
It cannot be changed with the PC.

6-16-2 Setting Date and Time

Description

Change values in numeral memory tables #254 and #255 to set the date and time with the PC. Set the time by copying the data between the memory tables, as shown below.

Numeral memory tables #254 and #255 are for time setting. #254 and #255 cannot be allocated to the area of the PC. First write a setting to a table other than #254 or #255, and then copy it to #254 and #255.
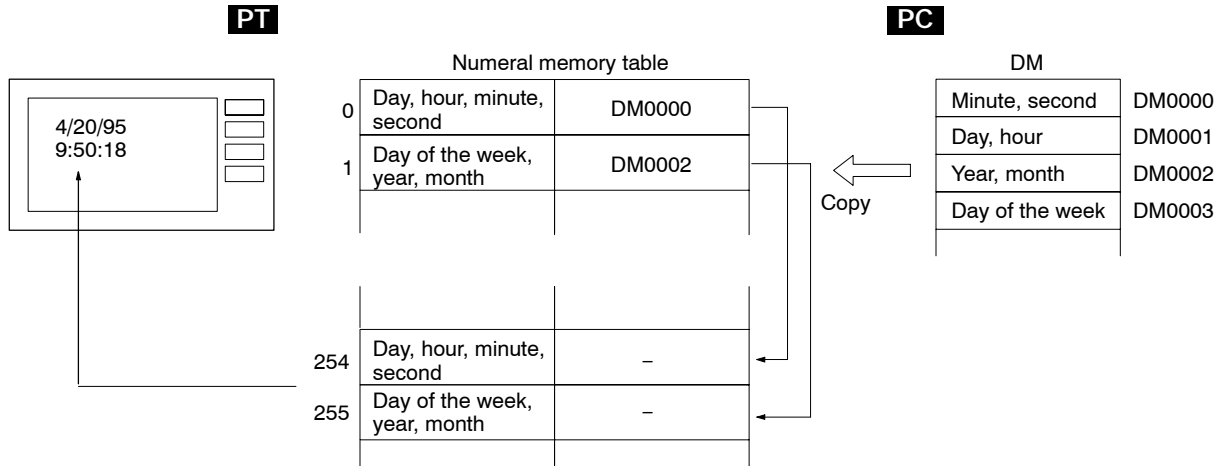
Restrictions

Allocated Words

The PT Status Notify Area can be allocated to the areas listed in the following table. 2CH allocation to each table is required for time setting.

Symbol	C-series PC	CVM1/CV-series PC	Allocation OK?
DM	Data Memory	Data Memory	OK
CH	Internal/Special Relay	Internal/Special Relay	OK
TIM	Timer	Timer	NG
CNT	Counter	Counter	NG
HR	Holding Relay	---	OK
AR	Auxiliary Relay	Auxiliary Relay	C-series PC OK CVM1/CV-series PC NG (∗)
LR	Link Relay	---	OK

(∗) "OK" when the C200H I/F unit is used.

The range of each memory area differs according to the PC type. Refer to *Appendix E PC Memory Map* for more details.

Procedure

Numeral memory table #254 and #255 are for time setting. #254 and #255 cannot be allocated to the area of the PC. To set the time from the PC, write the setting to a table, and copy it to table #254 and #255.

1, 2, 3...   1. Allocate a memory table not used for the clock function to the area of the PC. Allocate in direct specification when the C200H I/F is used.
2CH allocation to each table is required for time setting.

2. Write the date and time to be set to #254 and #255 to the allocated word with the PC.

3. Copy the allocated numeral memory table to #254 and #255.

Refer to *Section 6-4 Editing Displayed Numerals or Character-Strings* for the method of copying the memory table.

Important Points

Do not allocate numeral memory tables #247 to 255 with the clock function to words of the PC.

Numeral memory tables #247 to 253 are for displaying (reading) only.
Do not write data to these tables when setting numerals or copying a memory table.

Numeral memory tables #254 and #255 are for time setting only.
Do not use them for numeral display or graph display.

As to numeral memory tables #247 to 255, the initial value set with the support tool is invalid.

Allocate the area of the memory table, which is the copy source of numeral memory tables #254 and #255 in direct specification.
Do not allocate in indirect specification.

Reference

On the "Tool Setting" screen of the support tool, the date and the time can be set using the function key [f.3] (time). Refer to the NT610C/NT612G Support Tool Operation Manual for more details.

The numeral setting function can rewrite numeral memory tables #254 and #255 to set the date and the time. This function uses the touch switches allocated on the PT screen as ten keys and writes numerals to the numeral memory table. For details of the numeral setting function, refer to the NT610C Programmable Terminal Operation Manual and the NT612G Programmable Terminal Operation Manual.

Application Example

This is an example to set the date and time with the PC.
This example uses a C200H (C200H-CPU11/21/23/31) with a clock function.
The clock function is allocated to AR18 to 21CH of the C200H area.

Allocation

Allocate as follows with the support tool.

PT Status Notify Area   : 100
Numeral Table entry #264 DM0000 (words:2)
Numeral Table entry #265 DM0002 (words:2)

Screens

As shown in the figure below, use numeral memory tables #247 to 252 to create the screen to display the date and time with the support tool, and send it to the PT.

Numeral memory table #251 (two-digit number)

Numeral memory table #250 (two-digit number)

Numeral memory table #252 (two-digit number)

9:50:18, 4 /20 /95

Numeral memory table #249 (two-digit number)

Numeral memory table #247 (two-digit number)

Numeral memory table #248 (two-digit number)
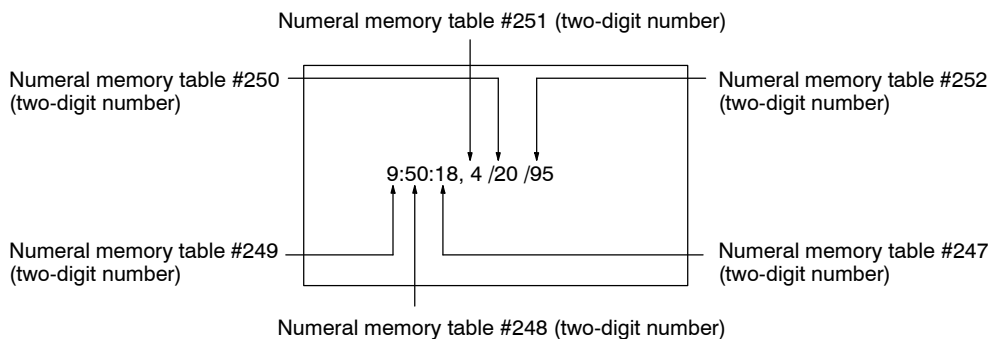
PC Program   Crente a PC labber program, as follows:
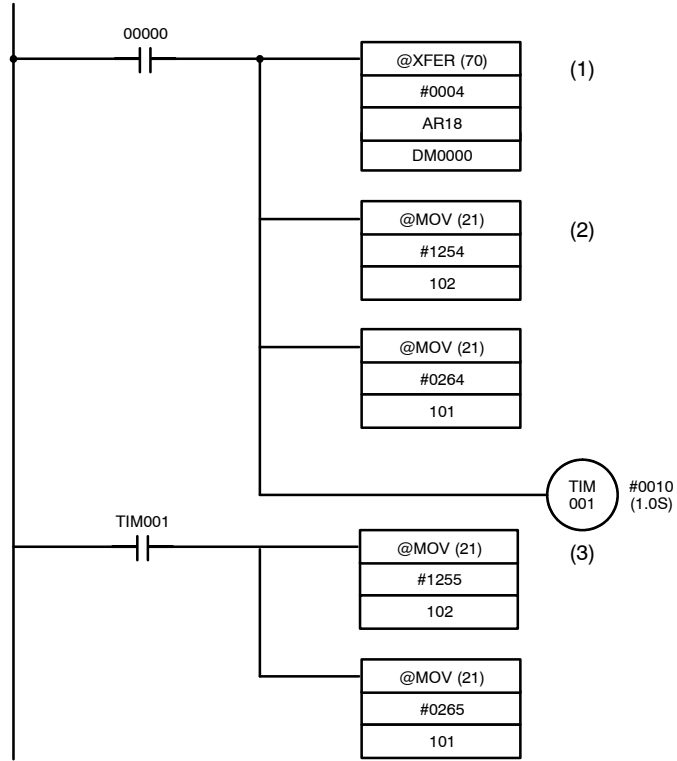
```
                    00000
  ─────────────────┤ ├──────────┬──────────┌──────────────┐
                                            │  @XFER (70)  │  (1)
                                            ├──────────────┤
                                            │    #0004     │
                                            ├──────────────┤
                                            │    AR18      │
                                            ├──────────────┤
                                            │   DM0000     │
                                            └──────────────┘

                                            ┌──────────────┐
                                            │  @MOV (21)   │  (2)
                                            ├──────────────┤
                                            │    #1254     │
                                            ├──────────────┤
                                            │    102       │
                                            └──────────────┘

                                            ┌──────────────┐
                                            │  @MOV (21)   │
                                            ├──────────────┤
                                            │    #0264     │
                                            ├──────────────┤
                                            │    101       │
                                            └──────────────┘

                                              ╭─────╮  #0010
                                              │ TIM │  (1.0S)
                                              │ 001 │
                                              ╰─────╯
                    TIM001
  ─────────────────┤ ├──────────┬──────────┌──────────────┐
                                            │  @MOV (21)   │  (3)
                                            ├──────────────┤
                                            │    #1255     │
                                            ├──────────────┤
                                            │    102       │
                                            └──────────────┘

                                            ┌──────────────┐
                                            │  @MOV (21)   │
                                            ├──────────────┤
                                            │    #0265     │
                                            ├──────────────┤
                                            │    101       │
                                            └──────────────┘
```

Operation   The operation will proceed as follows when executing the program after the screen is displayed.

1, 2, 3...   1. The date and time set in the PC (AR18 to 21) are read and written to the bits (DM0000 to 0003), to which numeral memory tables #264 and #265 are allocated, when bit 00000 is set to ON.

2. The data of numeral memory table #264 (day, hour, minute, second) is copied to numeral memory table #254, which is for clock function setting.

3. One second after the memory table is copied, the data of numeral memory table #265 (day of the week, year, month) is copied to numeral memory table #255 which is for of clock function setting.

The date and time set in the PC are set to and displayed by the PT.

6-16-3 Notifying Date and Time to the PC

<u>Description</u>

The date and time set in the PT can be notified to the PC. Numeral memory tables #247 to 253 are for displaying. They cannot be allocated to the PC area.

Use the method of copying data between memory tables to notify the date and time.
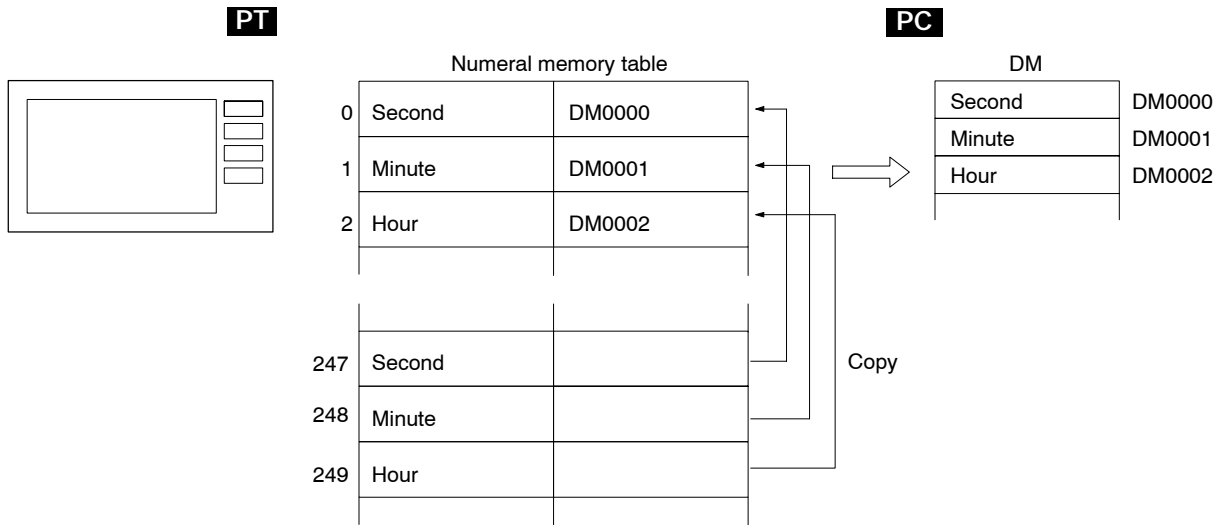
Procedure

1, 2, 3...   1. Allocate the area of the PC to a memory table not used for the clock function.

2. Copy the contents of #247 to 253 to the allocated memory table.
    The copied date and time are notified to the PC area.

Important Points

Numeral memory tables #247 to 253 store the upgraded clock data with the built-in clock of the PT.
It cannot be changed with the PC.

Numeral memory tables #247 to 253 are for displaying (reading) only.
Do not write data to them when setting numeral or copying a memory table.

Do not allocate numeral memory tables #247 to 255 with the clock function to words of the PC.

Allocate in direct specification the area of the memory table, which is the copy source of numeral memory tables #247 and #253, when the C200H is used.
Do not allocate in indirect specification.

Application Example

This is an example to read the date and time set in the PT.

Allocation

Allocate as follows with the support tool.

PT Status Notify Area: 0100
Numeral table entry #258: 0000 (words:1)
Numeral table entry #259: 0001 (words:1)

Screens

Not required

PC Program   Create a PC ladder program, as follows:

```
                    00000
   ────────────────┤├─────────┬─────────┌──────────────┐
                              │         │  @MOV (21)   │    (1)
                              │         ├──────────────┤
                              │         │       #1258   │
                              │         ├──────────────┤
                              │         │        102    │
                              │         └──────────────┘
                              │
                              │         ┌──────────────┐
                              ├─────────┤  @MOV (21)   │
                              │         ├──────────────┤
                              │         │       #0248   │
                              │         ├──────────────┤
                              │         │        101    │
                              │         └──────────────┘
                              │                                ╭─────╮  #0010
                              └────────────────────────────────┤ TIM │  (1.0S)
                                                                │ 000 │
                                                                ╰─────╯
                    TIM000
   ────────────────┤├─────────┬─────────┌──────────────┐
                              │         │  @MOV (21)   │    (2)
                              │         ├──────────────┤
                              │         │       #1259   │
                              │         ├──────────────┤
                              │         │        102    │
                              │         └──────────────┘
                              │
                              │         ┌──────────────┐
                              └─────────┤  @MOV (21)   │
                                        ├──────────────┤
                                        │       #0249   │
                                        ├──────────────┤
                                        │        101    │
                                        └──────────────┘
```
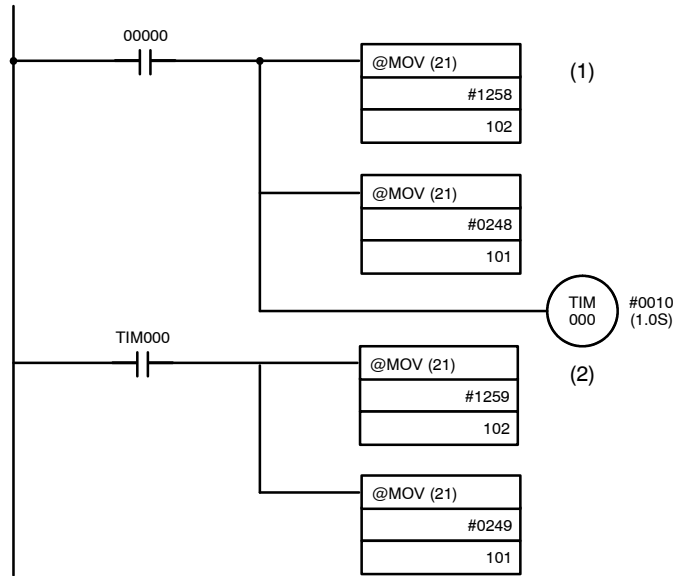
Operation   The operation will proceed as follows when executing the program.

1, 2, 3...   1. The data of numeral memory table #248 (minute), which is for clock function setting, is copied to numeral memory table #258 when bit 00000 is set to ON.

2. One second after the memory table is copied, the data of numeral memory table #249 (hour), which is for clock function setting, is copied to numeral memory table #259.

The date and time set in the PT are stored in DM0000 and 0001, to which numeral memory tables #258 and #259 are allocated.

SECTION 7
Troubleshooting

This section describes the action to take when the PT does not work correctly after connected to the PC.

7-1 Errors Occurring when the Power is Turned ON

Refer to the table below for the causes and remedies for errors occurring when the PT power is turned on.

Error Message	Cause	Remedy
No Host I/F	Host Interface Unit not installed. The System ROM is not compatible with the Host Interface Unit.	Install the Host Interface Unit. Determine the System ROM compatible with the Host Interface Unit and mount the correct type of ROM.
Memory Unformatted	Screen data memory board not installed. EEPROM or EPROM not mounted correctly on the the screen data memory board. The screen memory board DIP switch settings do not match the specifications of the memory chip. The system ROM is not correctly mounted.	Correctly install the screen data memory board. Correctly mount the memory chip on the screen memory board. Correctly set the screen memory board DIP switch. Transfer the screen data once more with the Support Tool.
Screen Data Corrupted	The system ROM is not correctly mounted. The screen data is not compatible with the System ROM. The power supply was turned off during transmission of the screen data.	Correctly mount the system ROM. Create the correct screen data with the Support Tool. Transfer the screen data once more with the Support Tool.
Mark Data Corrupted	The power supply was turned off during transmission of the screen data. Transmission of the screen data was interrupted.	Transfer the screen data once more with the Support Tool.

Host error*	If the PT DIP switches are set to enable Host RUN input:
	   The PC power supply is not turned on.
	   The Host RUN input signal voltage is low.
		Turn on the PC power supply.
		Apply the voltage to the Host RUN input.

No direct information set ! Use the Support Tool to set the PT Control Area and PT Notify Area.	The PT Status Control Area and PT Status Notify Area are not allocated to memory.	Allocate the PT Status Control Area and PT Status Notify Area to memory with the Support Tool.
No error message The PT cannot start up.	Incorrect data is written to the screen memory when the NT612G/NT610C is used.	Initialize the screen data memory. Refer to "Initializing memory" in the manuals of the NT612G/NT610C.
An error occurred in the unit. (Only when C200H I/F unit is used.)	The C200H I/F unit is malfunctioning.	Contact the maintenance service office.
Battery Lowered.	The battery voltage in the PT is low.	Replace the battery. Refer to the users' manuals of each PT.
No Exp. I/O Unit Exists. (A continuous buzzer sounds at the same time.)	A connector of the expanded I/O unit connected to the PT at the start of operation was disconnected when the NT612G/ NT610C was used.	Press the 🔊 key to stop the buzzer, turn off the power, and connect the expanded I/O unit. Turn on the power after connecting the expanded I/O unit to restart operation.

* The NT610C/NT612G displays the screen data registered to screen #2000, if any.

* If the expanded I/O unit is not connected when the power is turned on (or when reset), this error message is not displayed.

7-2 Errors Occurring During Operation

Refer to the table below for the causes and remedies for errors occurring during PT operation.

Error Message	Cause	Remedy
Host error*	If the PT DIP switches are set to enable Host RUN input: The PC power supply is not turned on. The Host RUN input signal voltage is low.	Check the PC power supply and operating status.
Setting error 　Simultaneous display of memory type and address.	Bits or words allocated with the Support Tool in the PC memory not found.	Check the memory in the PC used and correct the bit and word allocation.

*　The NT610C/NT612G displays the screen data registered to screen #2000, if any.

(When C200H I/F unit is used)

Status	Cause	Remedy
The memory table setting screen is displayed and the initial screen does not appear. No error message is displayed on the PT or the buzzer does not go off.	The PC has an error.	Check the error by monitoring and restore the condition.
The initial screen is displayed and the screen is locked.		

No error message is displayed on the PT or the buzzeer does not go off.
Refer to *Responding to Error Messages* in Section 7 of the SYSMAC C200H User's Manual (Programming), and to *Dealing with Errors* in Section 9 of the SYSMAC C200H User's Manual (Software) for details of errors and remedy to the errors.

7-3　Communication Errors

The remedies for communication errors occurring during operation are described below.

Communication Error Message

A message is displayed on the PT and a buzzer sounds when a communication error occurs. Error messages are displayed if automatic reset after communication error is disabled with the DIP switches.

Procedure

When the buzzer sounds, press the BUZZER or RETURN key to revert the screen display to the operation display.

Error Display   Communication errors are displayed as follows:

[Error Messages and Their Meanings when the Host Link is Used]
Error on Receive

```
        ┌──────────────────────┐          Error Description
        │                      │            ACIA parity error
        │   Receive Error      │            ACIA overrun error
        │   ┌──────────────┐   │            ACIA framing error
        │   │              │◄──┼──────────   Buffer overflow
        │   └──────────────┘   │            Timeout
        │                      │            NAK receive error
        │                      │            Unit # error
        └──────────────────────┘            FCS error
```

Error on Transmit

```
        ┌──────────────────────┐
        │                      │          Error Description
        │   Transmit Error     │            Timeout
        │   ┌──────────────┐   │
        │   │              │◄──┼──────────
        │   └──────────────┘   │
        │                      │
        └──────────────────────┘
```

Error Message	Cause	Remedy
Parity error Overrun error Framing error Buffer overflow	Communication parameters set incorrectly. Noise caused data corruption during communication.	Make sure the PT parity bit, frame length, baud rate, stop bits, and flow control settings match the PC settings. Use a noise-resistant cable if communication occurs in an environment with high levels of noise.
Timeout	Cable connector is disconnected. PC is halted.	Reconnect the cable. Make sure the PC is able to communicate with the PT.
NAK error (End code simultaneously displayed)	An error existed in the communication data from the PT. Noise caused data corruption during communication.	Possible PT defect. Check PT operation. Use a noise-resistant cable if communication occurs in an environment with high levels of noise. Refer to the *SYSMAC C-series Host Link Unit User's Manual*. Check the End code.
Unit # error	The PC unit # was changed. The PC is transmitting incorrect data. Noise caused data corruption during communication.	Set the PC unit # to 0. Check PC operation. Use a noise-resistant cable if communication occurs in an environment with high levels of noise.
FCS error	The PC is transmitting incorrect data. Noise caused data corruption during communication.	Check PC operation. Use a noise-resistant cable if communication occurs in an environment with high levels of noise.

[Error Messages and Their Meanings when the NT Link is Used]

Error on Receive

```
        ┌──────────────────────┐            Error Description
        │    Receive Error     │              Parity error
        │   ┌──────────────┐   │              Overrun error
        │   │              │◄──┼────────      Framing error
        │   └──────────────┘   │              Buffer overflow
        │                      │              Timeout
        └──────────────────────┘              NAK receive error
                                              PCS error
```

Error on Transmit

```
        ┌──────────────────────┐
        │    Transmit Error    │
        │   ┌──────────────┐   │            Error Description
        │   │              │◄──┼────────      Timeout
        │   └──────────────┘   │
        │                      │
        └──────────────────────┘
```

Error Message	Cause	Remedy
Parity error Overrun error Framing error Buffer overflow	Communication parameters set incorrectly.

Noise caused data corruption during communication. | Make sure the PT parity bit, frame length, baud rate, stop bits, and flow control settings match the PC settings. Use a noise-resistant cable if communication occurs in an environment with high levels of noise. |
| Timeout | Cable connector is disconnected. PC is halted. | Reconnect the cable. Make sure the PC is able to communicate with the PT. |
| NAK error (End code simultaneously displayed) | An error existed in the communication data from the PT. Noise caused data corruption during communication. | Possible PT defect. Check PT operation.

Use a noise-resistant cable if communication occurs in an environment with high levels of noise. |
| FCS error | The PC is transmitting incorrect data. Noise caused data corruption during communication. | Check PC operation. Use a noise-resistant cable if communication occurs in an environment with high levels of noise. |

[Error Messages and Their Meanings When the C200H is Used]

Error on Receive

```
        ┌──────────────────────┐            Error Description
        │    Receive Error     │              Timeout
        │   ┌──────────────┐   │              End code error
        │   │              │◄──┼────────
        │   └──────────────┘   │
        │                      │
        └──────────────────────┘
```
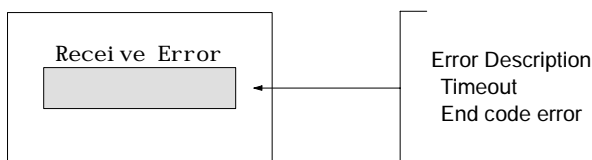
Error Message	Cause	Remedy
Timeout	PC is halted.	Make sure the PC is able to communicate with the PT.
End code error	The PT or the C200H Host Interface Unit has an error	Consult your OMRON representative.

INDEX

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.

Cat. No. V026-E1-1
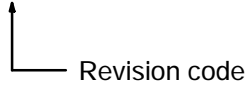
———— Revision code

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	March 1995	Original production **ntlp:**